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UNION CARBIDE CORPORATION P. O. BOX 324, TUXEDO, NEW YORK 10987  
MEDICAL PRODUCTS DIVISION TELEPHONE NUMBER: (914) 351-2131

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Return  
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June 8, 1984



U. S. Nuclear Regulatory Commission  
Division of Fuel Cycle and Material Safety  
Advanced Fuel and Spent Fuel Licensing Branch  
Willste Building  
7915 Eastern Avenue  
Silver Spring, MD 20910

Attn: Leland C. Rouse

Dear Sir:

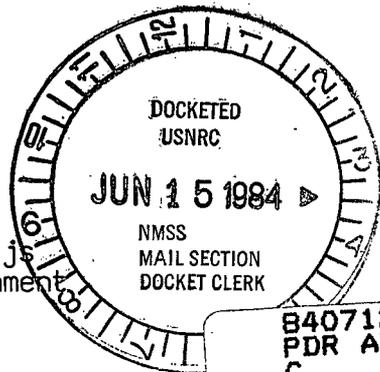
Per your request I have enclosed Mr. K. D. George's Resume of Nuclear Experience for your reference. It reflects over 30 years of experience in nuclear development and operations work at several facilities. A substantive part of his experience involved operations with SNM criticality control.

Mr. George is under contract with us as a technical consultant. He is a member of the Nuclear Safeguards Committee and he will serve as our competent authority for criticality control. Since his work experience was not primarily concerned with criticality control, we and he intend to consult with recognized experts in criticality at ORNL. We intend to do this whenever interpretation of published safety guides is required where application to our particular process conditions is not clear.

This affirmation is being made in answer to your concerns about our degree of familiarity with criticality control criteria. We have included a license requirement in our most recent application (06/06/84) which requires that we retain a person who is knowledgeable in criticality safety to serve on the Nuclear Safeguards Committee.

Very truly yours,

*James J. McGovern*  
James J. McGovern  
Business Manager  
Radiochemicals



JJMcG:j  
Attachment

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*mjo*

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May 27, 1984

## RESUME OF NUCLEAR EXPERIENCE

**NAME:** Kenneth D. George

**ADDRESS:** R.D. 3, Box 278  
Kingsland Road  
Boonton, New Jersey 07005

**CITIZENSHIP:** U.S.

**FORMAL EDUCATION:** M.S. (Physics)  
Graduate, Oak Ridge School of Reactor Technology  
(ORSORT)

**SUMMARY OF QUALIFICATIONS:** Over 30 years' experience in such fields as nuclear reactor technology, research reactor operations, nuclear radiation protection, health physics, radioactivity, radioisotope processing, nuclear hazards analysis, atmospheric dispersion of effluents, and effects of nuclear weapons.

### DETAILS OF PERTINENT NUCLEAR EXPERIENCE: (starting with most recent)

- a. Presently consultant to Union Carbide Corporation, Sterling Forest Laboratory, owner of the 5-MW MTR-type research reactor and associated radiochemical processing facility. This facility runs around the clock producing kilocurie quantities of radioisotopes for worldwide nuclear-medicine applications. Duties include developing technical specifications for reactor license renewal and amendment; originating or reviewing safety analyses for Special Nuclear Material and byproduct material licenses; conducting audits of reactor and radioisotope processing operations, of nuclear materials accountability, of nuclear criticality control, and of radiation safety in nuclear operations and laboratory work; making fission-product inventory, radiation shielding, and meteorological dispersion calculations; member of Nuclear Safeguards Committee.
- b. Over 17 years was spent at the Sterling Forest Research Center of Union Carbide Corporation, initially as Reactor Supervisor, then as Superintendent of Nuclear Operations, and later as Senior Scientist. For this entire period, I was a member of the Nuclear Safeguards Committee.

As Reactor Supervisor I was responsible for the safe and efficient operation of a 5-MW MTR-type pool reactor that provided irradiation services to industry and to in-house research and isotope production activities. This reactor operated 24-hours per day and was equipped with heat exchangers, pneumatic tubes, a demineralizer cleanup system, waste collection systems, thermal column, and beam tubes. These, together with in-core irradiation positions, created a great variety of situations requiring personnel radiation protection and equipment decontamination. I was responsible for the safety of such situations, assisted by health physics technicians

who provided routine monitoring services. I designed and gave training courses to reactor operator trainees for AEC licensing examinations. These courses included topics in health physics, radiation shielding, criticality, radioactivity, water chemistry, and Federal Part 20 regulations, in addition to reactor technology.

As Superintendent of Nuclear Operations I was responsible not only for reactor operation, through a Reactor Supervisor, but also for the operation of the Hot Laboratory. The latter consisted of five large shielded cells in which remote handling and processing of irradiated materials was conducted, and several radiochemical laboratories. Radioactive material was also packaged and shipped from the Hot Lab. These activities expanded greatly the radiation and contamination situations that could and did arise from time to time. The operation of the liquid waste processing facility was also under my jurisdiction as was also the extensive cell ventilation system leading to the gaseous-effluent stack.

As Senior Research (later Development) Scientist I was in a staff position to the Nuclear Operations (reactor and hot cells) Manager. My duties were to render expert technical advice on radiation problems as they arose or could be anticipated from knowledge of the facility. I was also expected to keep site personnel abreast of changes in isotope nuclear data and in Federal Part 10 regulations. Training was still given to reactor operator trainees for NRC licensing exams. Some of the more extensive tasks undertaken were the relicensing of the reactor where I wrote the entire Technical Specifications (none previously existed) which included safety analyses, evaluation of radiological consequences of accidents, gaseous effluent concentrations, and so forth. These were accepted, with some changes, by NRC and have apparently been since used by them as a model for other research reactors. Another major task was the preparation and submission to NRC of a safety analysis for the irradiation of targets containing highly-enriched U-235 for the production of kilocurie amounts of fission-product isotopes. In addition to thermal-hydraulic matters, an extensive evaluation of on-site and off-site radiation doses had to be made. A particular study was made of atmospheric dispersion and meteorological conditions in the surrounding region, with both hand calculations and computer programs used. Dose rates and commitments (man-rems) were made to a 50-mile radius from the site, both for NRC and for N.Y. State regulatory bodies. In connection with the use of our products in nuclear medicine, I specialized in internal dosimetry of radioactive materials and human organ doses from scanning agents. To assist in this, I set up computer programs so our development and research groups could easily obtain organ doses from their experimental data. I also originated computer programs for use by our sales personnel in calculating Tc-99m yields from our various Mo-99/Tc-99m generators. I was also called upon for shielding calculations in a variety of situations ranging from radiopharmaceuticals (Xe-133, Tc-99m generators, Ga-67, I-131, etc.) to a waste storage facility for drums of fission-product waste. A computer program was written to assist the structural engineers designing this facility. This facility has since been in operation with results apparently confirming the shielding calculations.

- c. For about 13 years I was a civilian scientist at the Army's Picatinny Arsenal with six of those years being involved closely in nuclear programs. For roughly half of this time I provided expert advice on nuclear physics and radiation, including technical liaison between the Army (Ordnance Corps) and AEC weapon laboratories on the effects and the design of nuclear warheads. The latter half involved the design of a 20-30 MW research reactor of MTR type. I attended Oak Ridge School of Reactor Technology for one year and after graduation spent a year on the ORNL Operations Div. staff for training and experience on research reactors, specifically the pool-type Bulk Shielding Reactor (BSR), the tank-type Low Intensity Test Reactor (LITR), and the Oak Ridge Research Reactor (ORR), all of these reactors having MTR-type cores.
- d. For one year I was in charge of the Health Radiation Branch at the Chalk River Nuclear Laboratories in Canada. This group provided all site health physics services, e.g. personnel monitoring, dosimetry, waste disposal, etc. The nuclear facilities at this site included a large 30-MW test reactor, radiochemical research laboratories, and pilot plants for production of U-233 and Pu-239 from irradiated slugs. The latter plants provided more than enough instances for coping with radioactive contamination and with criticality control of fissile material.
- e. For four years I was a physicist in a group at the Montreal and (later) the Chalk River Nuclear Laboratories of the joint U.K.-Canadian atomic energy project. This group was involved in the development of instrumentation and detectors for the measurement of nuclear radiation, principally for monitoring and health physics applications.

PROFESSIONAL SOCIETIES:            Emeritus Member, American Nuclear Society

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WM \_\_\_\_\_ I&E REF.   
WMUR \_\_\_\_\_ SAFEGUARDS   
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DESCRIPTION:

per your request, I  
have enclosed KID.  
George's Resume of  
Nuclear Experience  
for your reference  
06/15/84 INITIAL CEC