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NEUTRON PRODUCTS inc

Dickerson, Maryland 20753 U. S. A.

301/349-5001 Cable: NUSWASH

Local call

September 15, 1970

Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Attn: Mr. Gene W. Hendrix

Gentlemen:

In response to your letter of September 1, 1970, we are pleased to submit the following information in support of our application dated August 5th to amend By-product Material License No. 19-12667-01.

1. Procedures for handling liquid radioactive wastes.

We anticipate that radioactive liquid wastes may result only from decontamination of the hot cell or equipment in the hot cell. As stated in paragraph 3 below, we shall keep surface or particulate contamination as low as possible during all processing of cobalt-60 sources. If such contamination arises, however, the procedure for decontamination would be to wash down the cell or equipment with water drawn from the canal recirculating system. The canal contains about 7,500 gallons of demineralized water which is circulated through filters and demineralizer beds at the rate of about 10 gallons per minute. This is considered adequate capacity for any contamination levels we anticipate since decontamination of the cell by flushing will be carried out at a controlled rate. In the unlikely event that additional dilution or cleanup capacity would be desirable, the canal could be interconnected with the main pool (37,000 gallons) and/or the main pool filter and demineralizer system (30 gallons per minute).

The filters and ion exchange columns in the hot cell canal are normally monitored once a day. The filters are normally changed when they reach 300 mr/hr at contact and the columns are normally changed when

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they reach 1000 mr/hr at contact. During decontamination procedures described above, the entire operation would be carefully supervised, and the filters and columns would be monitored as frequently as necessary to determine when they require changing and would be changed as they reach 1000 mr/hr at contact.

The intake screens on the recirculating pumps will not pass particles larger than about 3/32 inch in diameter, so there is no possibility of sudden contamination of the filter from a large piece of radioactive material. In addition, if the radiation from these units exceeds about 7 R/hr at one foot, the area radiation monitors will alarm. The circulating pumps would then be stopped to prevent further contamination of the filters or resin beds. (As stated earlier, auxiliary cleanup capacity would be available by cross-connecting with the main pool systems, if necessary.) Thus, it is unlikely that the filters or ion exchange columns could become contaminated to the extent that they could not be changed using normal precautions, and *in extremis*, temporary shielding and extension tools could be used.

2. Emergency exhaust fan.

The emergency exhaust fan for the hot cell has been installed so as to pull air from the cell through the absolute filter.

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6. <u>Control of spreadable contamination.</u>

General procedures for control of spreadable contamination are described in Section IV of Neutron Products "Byproduct Materials Safety Evaluation", dated December 1967. Special procedures for control of spreadable contamination from hot cell operations are documented in the attached procedures for hot cell entry.

7. Procedures for emergency situations.

General procedures for handling emergencies are described in Sections IV and V of the "Byproduct Materials Safety Evaluation" referenced above. An emergency resulting from release of radioactive material from the hot cell will be handled by establishing temporary "restricted", "contamination", or "airborne radioactivity" areas as appropriate to the nature of the emergency.

Work within such areas will be under the direct supervision of the Radiation Protection Officer who will designate work schedules, work procedures, equipment, clothing, and other measures to assure adequate protection of personnel and to accomplish expeditious decontamination of the area.

We believe that the above information adequately supplements our amendment request of August 5, 1970. At this time we submit an additional request that Condition 11 of our Byproduct Material License be amended to read as follows:

> "Byproduct material shall be used by, or under the supervision of J. J. Hairston, J. A. Ransohoff, M. M. Turkanis, D. L. Repp, R. T. Jacobs, J. R. Demory, H. B. O'Neil, Jr., D. G. Woodard, or T. O. Ziebold."

Mr. Woodard is Manager of Radiation Process and Product Development and has been employed by Neutron Products since September 1968. Dr. Ziebold is Vice President and Manager of Radiation Sources and Systems and has been employed by Neutron Products on a part time basis since 1960 and on a full time basis since June 1970. The addition of these employees to our license will allow us greater flexibility in scheduling senior supervision of our operations. Resumes of their experience are enclosed.

With these answers, we trust that our application for license amendment is now in a condition for allowance, and request early approval.

Sincerely,

NEUTRON PRODUCTS, INC.

for Thomas O. Ziebold

Thomas O. Ziebold
Vice President

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PROCEDURE FOR HOT CELL ENTRY AFTER OPERATIONS INVOLVING EXPOSED COBALT

These procedures supplement normal hot cell entry procedures in cases where exposed cobalt has been processed.

1. Take a 10 minute air sample and count for gross activity.

   a. If less than 9×10^{-9} μci/ml, no significant airborne hazard is considered to be present.

   b. If greater than 9×10^{-9} μci/ml, wait for approximately one hour for the internal filter system to reduce the air activity, and then take another 10 minute air sample. If second sample is less than 9×10^{-9} μci/ml, no significant airborne hazard is considered to be present.

   c. If the sample taken after one hour still registers more than 9×10^{-9} μci/ml, entry may be made only by authorization of the Radiation Protection Officer, who shall specify protective clothing and protective breathing apparatus, as necessary.

2. Using the manipulators take smears on the work table or large tray beneath the work area and count for gross activity. If less than 10,000 dpm, but greater than 5,000 dpm, entry is permissable wearing gloves, coveralls, and shoe covers to reduce the spread of contamination. If the gross activity smears are less than 5,000 dpm, normal entry is permissable.

   a. If the contamination is greater than 10,000 dpm, the tray, the work area, and the equipment will be decontaminated using demineralized water from the canal water recirculating system. After decontamination, additional smears shall be taken and the same standards for entry shall apply.

   b. If for some reason the contamination cannot readily be removed by remote means, entry will be authorized only by the Radiation Protection Officer, and protective clothing, to include coveralls, gloves, caps and booties will be worn prior to entry into the hot cell.

3. Before entering the cell, a control point will be set up at the hot cell door to facilitate the donning, removing, and disposing of protective clothing. This area will include all equipment necessary for work in the cell and control area and for containing any spreadable contamination and may include such items as protective clothing, laundry hampers, waste containers, step off pads, and survey instruments.

DUDLEY G. WOODARD
Manager, Polymer Research

EDUCATION

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Tufts University, B.S. in Chemistry
Northeastern University, M.S. in Organic Chemistry
Chemistry or polymer coursework at American University, Brooklyn Polytechnical Institute, Pennsylvania State University, Farleigh Dickerson College and College of Forestry, Syracuse University.

EXPERIENCE

1968-Present - Neutron Products, Inc.

Responsible for the research and development of unique products or processes based on polymer synthesis and modifications employing gamma radiation.

1966-1968 - W. R. Grace & Co., Inc., Research Division, Washington Research Center, Clarksville, Md. Senior Research Chemist. Worked independently or had responsibility for group effort in the areas of condensation polymerizations of labile monomers and vinyl-ethylene copolymerizations.

1962-1966 - W. R. Grace & Co., Inc., Research Division, Washington Research Center, Clarksville, Md. Research Chemist. Had project responsibility for research and development of high barrier resins for bottles, and unusual heat shrinkable packaging films. Investigated the role of impurities in the competition between propagation and transfer in vinyl-olefin copolymerizations.

1957-1962 - Dewey and Almy Chemical Co. - later a division of W. R. Grace & Co., Inc. - Cambridge, Mass. Contributed at all stages to the development of a coating latex having an annual production of several millions of pounds. This included the original research leading to the product, control of latex and polymer properties during piloting and scale up to production facilities, coating trials, measurement and modification of the morphological characteristics of the polymer and general problem solving.

This background has provided significant experience in free radical copolymerization, in bulk, solution, suspension and emulsion, and includes some anionic and cationic polymerization work as well. Areas of competence also include most techniques for polymer and latex characterization.

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PATENTS

Issued patents include two U. S. and seven foreign. Several additional applications are being processed as of September, 1968.

MEMBERSHIPS: American Chemical Society, Polymer, Colloid, and Organic Coatings and Plastics divisions
Society of Plastics Engineers
American Nuclear Society

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T. O. ZIEBOLD
Vice President

EDUCATION (6/6)

Yale University, B.E., Chemical Engineering

Reactor Engineering School, Westinghouse Atomic Power Laboratory

Massachusetts Institute of Technology, S.M., Metallurgy

Massachusetts Institute of Technology, Ph.D., Metallurgy

EXPERIENCE

1970 to Present -- Neutron Products, Inc. Design, development, engineering, and manufacturing of radioactive isotope sources and radiation systems. Management of isotope production, source manufacture, and operation of gamma irradiators.

1964-1970 -- Member of the Faculty of the Massachusetts Institute of Technology with joint appointment in the Department of Nuclear Engineering and the Department of Metallurgy and Materials Science. Final position as Associate Professor of Nuclear Materials. Active in teaching and research on the effects of radiation on materials, the design of components for nuclear reactors and nuclear power reactor safety. Consulting activities included analysis of nuclear fuel performance, design and manufacture of nuclear reactor system components, and isotope applications.

1956-1960 -- Naval Reactors Branch, U. S. Atomic Energy Commission (Lieutenant, U. S. Navy). Nuclear power engineer responsible for design and manufacturing of nuclear reactor core components and development of advanced nuclear fuels.

MEMBERSHIPS

American Nuclear Society
American Society for Testing and Materials
Electron Probe Analysis Society of America (President, 1971)
Society of Sigma Xi
Tau Beta Pi
American Society of Mechanical Engineers; Ad hoc Committee for Nuclear Pumps and Valves

NEUTRON PRODUCTS inc

American National Standards Institute; Committee N45 on Reactor Plant Construction and Maintenance

NEUTRON PRODUCTS inc

NAME: DUDLEY G. WOODARD   COMPANY: NEUTRON PRODUCTS, INC., DICKERSON, MARYLAND

Type of Training	Where Trained	Duration of Training	On Job		Formal Course	
			Yes	No	Yes	No
1. Principles & Practices of radiological safety; biological effects of radiation.	Neutron Products, Inc.	Two years	X		~~X~~ no	
2. Radiation measurements including the use of various chemical dosimeters.	Neutron Products, Inc.	Two years	X		~~X~~ no	
3. Use of photons from Cobalt-60 to generate active species for liquid phase ionic or free radical reactions. This has included the loading and operation of the source drive and the use of all radiation safety and monitoring equipment. Under the supervision of AEC licensed operators.	Neutron Products, Inc.	Two years	X		~~X~~ no	

ISOTOPE HANDLING EXPERIENCE

Isotope	Maximum Amount	Where Experience was Gained	Duration of Experience	Type of Use
Cobalt-60	Megacuries	Neutron Products, Inc.	Two years	Chemical Synthesis and dosimetry.