UNITED TECHNOLOGIES RESEARCH CENTER

East Hartford
Connecticut 06108

March 20, 1985

MS 12
P9

U. S. Nuclear Regulatory Commission, Region I
Nuclear Materials Section B
631 Park Avenue
King of Prussia, PA 19406

Att: John E. Glenn, Chief

Subject: United Technologies Research Center License Number 06-07522-01

Reference: (A) Phone conversation between E. Wertz (NRC) and L. L. Packer (UTRC) on March 13, 1985.
(B) Docket Number 030-03795
(C) Control Number 02841

Dear Sir:

Pursuant to Reference (A), UTRC is pleased to resubmit the Enclosure A attachment to the subject material license application to include the following changes made to pages 22 and 25:

1. Item 10D6 - Licensed radioactive material usage at job locations - The word temporary has been removed from the basic policy statement.

2. Item 11D2b - Iodine 125 and other gases
The words such as charcoal traps and air sampling have been added.

I trust you will review the enclosed information and that it is sufficient for you to continue the processing of our license renewal application. Please do not hesitate to contact me at (203) 727-7009 if you have any additional questions.

Very truly yours,

UNITED TECHNOLOGIES CORPORATION
Research Center

L. L. Packer
Chief, Chemical Analysis and Processing

RECEIVED-REGION 1
1985 MAR 27 PM 3 23

8506180060 850524
REG1 LIC30
06-07522-01 PDR

Encls. 2 copies Enclosure A
cc: B. Ford, UTRC
UTRC Radiation Safety Committee

02841
"OFFICIAL RECORD COPY"

ML10 MAR 25 1985

Enclosure A

U.S. Nuclear Regulatory Commission

Application for Byproduct Material License Renewal

February 22, 1985

Item 3 - Use at Other Locations

In addition to use on its own premises, United Technologies Research Center will also make use of byproduct material for research and development at other UTC facilities and at temporary job sites anywhere in the United States. United Technologies Research Center will, as required, transport byproduct material throughout the United States, subject to NRC and DOT regulations. Byproduct materials will be transported outside United Technologies Research Center in company-owned, leased or other vehicles authorized by the Corporation or appropriate commercial carriers.

Item 5 - Radioactive Material

Elements	Chemical/ or Physical Form	Radioactivity Quantity
A. (1) Any byproduct materials with atomic number 3 to 83	any	200 millicuries per radionuclide with a total quantity not to exceed 5 curies.
A. (2) Byproduct material in addition to the above		
a. Krypton 85	any	400 curies
b. Hydrogen 3	any	1 curie
c. Xenon 133	any	1 curie
d. Cesium 137	any	5 curies
e. Gadolinium 153	any	8 curies
f. Iron 55	any	3 curies
g. Cobalt 60	any	1 curie
h. Americium 241	unsealed	2 microcuries
i. Americium 241	sealed sources	10 curies
j. Curium 244	sealed sources	1 curie
B. Any byproduct material	Neutron irradiated	400 millicuries
C. Special Nuclear Materials		
1. Plutonium 238	sealed sources	100 millicuries (10 mg)
2. Uranium 235	Uranium hexafluoride	15 grams
3. Uranium 235	any	2 grams
4. Uranium 233	any	1 gram

Item 6 - Purpose for Which Licensed Material will be Used

All licensed material will be used in connection with UTRC's research and development program. The work is directed at investigating practical radioactivity applications for experimental and demonstration purposes including testing of models, equipment and processes involved in industrial technology developments and practical demonstrations. The work includes, but is not limited to, X-ray fluorescence spectroscopy, neutron, X and gamma-ray transmission, material tagging and tracer experimentation. The uranium 235, and uranium 233 and plutonium 238 currently on hand will be held in storage until arrangements are made for authorized disposal.

Item 7 - Individuals Responsible for Radiation Safety Program and Their Training and Experience

Louis L. Packer - Radiation Safety Officer

Master of Science in Nuclear Engineering, North Carolina State University 1957

Master of Science in Management, Rensselaer Polytechnic Institute 1975

Combustion Engineering Corp. - 2 years - Nuclear radiation analysis studies concerned with nuclear submarine program.

United Technologies Research Center - 25 years - Chief, Radioisotope Laboratory, application of radioisotope technology.

Formal courses and on-the-job training for the past 28 years in:

a. Principles and practices of radiation protection.
b. Radioactivity measurements and monitoring protection.
c. Mathematics and calculations basic to the use and measurement of radioactivity.
d. Biological effects of radiation.
e. Administrative experience with applicable NRC and DOT regulations.

Experience with radiation:

Isotope	Amount	Where Experience Gained	Duration	Type of Use
Cobalt 60	8,000 Ci	United Technologies Research Center	2 years	research
Krypton 85	650 Ci	"	15 years	"
Iridium 192	100 Ci	"	5 years	"
Cobalt 60	100 Ci	"	1 year	"
Promethium 147	8 Ci	"	1 year	"
Xenon 133	5 Ci	"	5 years	"
Cesium 137	4 Ci	"	8 years	"
Americium 241	8 Ci	"	8 years	"
Plutonium 238	60 mCi	"	4 years	"
Gadolinium 153	5 Ci	"	10 years	"
Curium 244	190 mCi	"	4 years	"
Uranium 235	10 g	"	1 year	"

Item 7 (Cont'd)

Gerald S. Golden - Chairman, Radiation Safety Committee

Massachusetts Institute of Technology - B.S. in Chemistry, 1954

Rensselaer Polytechnic Institute - Ph.D. in Chemistry, 1957

Combustion Engineering - 5 years - Radiochemical analyses of primary coolant from submarine nuclear reactors

United Technologies Research Center - 22 years - Manager, Materials Characterization; supervision of applied radioisotope technology group

Formal courses and on-the-job training for the past 30 years in:

a. Principles and practices of radiation protection
b. Radioactivity measurements and monitoring protection
c. Mathematics and calculations basic to the use and measurement of radioactivity
d. Biological effects of radiation
e. Administrative experience with applicable NRC and DOT regulations

Item 7 (Cont'd)

Gary A. Gruver

Lehigh University - B.A. in Chemistry - 1966

Case Western Reserve University - Ph.D in Chemistry - 1971

Power Systems Division UTC - 12 years
Research Engineer in Catalysis and Chemical Experimentation

United Technologies Research Center - 2 years
Supervisor of Analytical Chemistry Group, application of radioisotope technology.

Formal courses and on-the-job training for the past 8 years in:

a. Principles and practices of radiation protection
b. Radioactivity measurement standardization and monitoring techniques
c. Mathematics and calculations basic to the use and measurement of radioactivity
d. Biological effects of radiation
e. NRC Rules and Regulations - Part 19 and Part 20

Performed radioactivity application work with the following radioactive materials:

Isotope	Amount	Where Experience Gained	Duration	Type of Use
Gadolinium 153	5 Ci	United Technologies Research Center	2 years	research
Americium 241	200 mCi	"	2 years	"
Iron 55	200 mCi	"	2 years	"
Phosphorous 32	190 mCi	Power Systems Division of UTC	2 years	"
Cadmium 109	10 mCi	United Technologies Research Center	2 years	"

Item 7 (Cont'd)

Michael D. Smith

Electronics Technician/Reactor Operator - U.S. Navy - 1964-1968

Nuclear Power Training Unit, Windsor, Connecticut - 3 months - Pressurized Water Reactor - Reactor Operator

Nuclear Submarine U.S.S. Gato SS(N)615 - 3 1/2 years - Pressurized Water Reactor - Reactor Operator

United Technologies Research Center - 15 years - Group Leader, Instrumentation Technician, application of radioisotope technology

Formal courses and on-the-job training for the past 20 years in:

a. Principles and practices of radiation protection
b. Radioactivity measurement standardization and monitoring techniques
c. Mathematics and calculations basic to the use and measurement of radioactivity.
d. Biological effects of radiation.
e. Administrative experience with applicable NRC and DOT regulations.

Experience with radiation:

Isotope	Amount	Where Experience Gained	Duration	Type of Use
Polonium 210	3 Ci	U.S.S. Gato - SS(N) 615	3 years	calibration
Cesium 137	4 Ci	United Technologies Research Center	7 years	research
Iridium 192	100 Ci	"	3 years	"
Krypton 85	650 Ci	"	11 years	"
Cobalt 60	100 Ci	"	1 year	"
Gadolinium 153	5 Ci	"	10 years	"
Plutonium 238	60 mCi	"	4 years	"
Americium 241	8 Ci	"	8 years	"
Curium 244	190 mCi	"	4 years	"
Phosphorous 32	50 mCi	"	1 year	"

Item 8 - Training Program

A. Users Training Program

Designation as a licensed material user by the radiation safety officer requires training and experience that will insure the safe and proper handling of radioactive material, as well as compliance with Nuclear Regulatory Commission Rules and Regulations. The qualifications required are set forth in the following Users Training Program:

1. Working knowledge, commensurate with the isotope, chemical and/or physical form and the amount of radioactive material in the following:

   a. Principles and practices of radiation protection
   b. Radioactivity measurement and monitoring techniques
   c. Mathematics and calculations basic to the use and measurement of radioactivity
   d. Biological effects of radiation
   e. Compliance with Nuclear Regulatory Rules and Regulations (Parts 19 and 20)

2. The required working knowledge can be acquired by formal course work, on-the-job training, technical reading, or NRC recognized training programs.

3. The required working knowledge must be demonstrated by oral or written examination to the Radiation Safety Officer. The examination will contain key questions on the following:

   a. Methods for performing and practically demonstrating:

      1. Surveys of external exposure levels in restricted and unrestricted areas
      2. Measurements of radioactive material concentration in air
      3. Surface contamination surveys of restricted and unrestricted areas
      4. Surveys of equipment prior to release to unrestricted areas
      5. Survey of packages received and packages prepared for shipment
      6. Leak test of source
      7. Calibration of radiation safety instruments

   b. Understanding of the following sections of NRC Rules and Regulations

      1. 19.12 Instructions to worker
      2. 20.3 Definitions
      3. 20.101 Exposure of individuals to radiation in restricted areas

Item 8 (Cont'd)

Users Training Program (Cont'd)

4. 20.103 Exposure of individual to concentrations of radioactive material in air in restricted areas
5. 20.105 Permissible levels of radiation in unrestricted areas
6. 20.203 Caution signs and labels
7. 20.403 Notification of incident
8. Appendix B and Appendix D

c. Contents of Regulatory Guide 10.7 "Guide for the Preparation of Application for Licenses for Laboratory Use of Small Quantities of Byproduct Material" - Items 10, 11, 12 and 14.

B. Individual Working In or Frequenting Restricted Area

Individuals working on specific programs under the supervision of a licensed material user will be instructed in the safe and proper handling of radioactive materials using the appropriate section of the Item 8A Users Training Program which apply to the specific program.

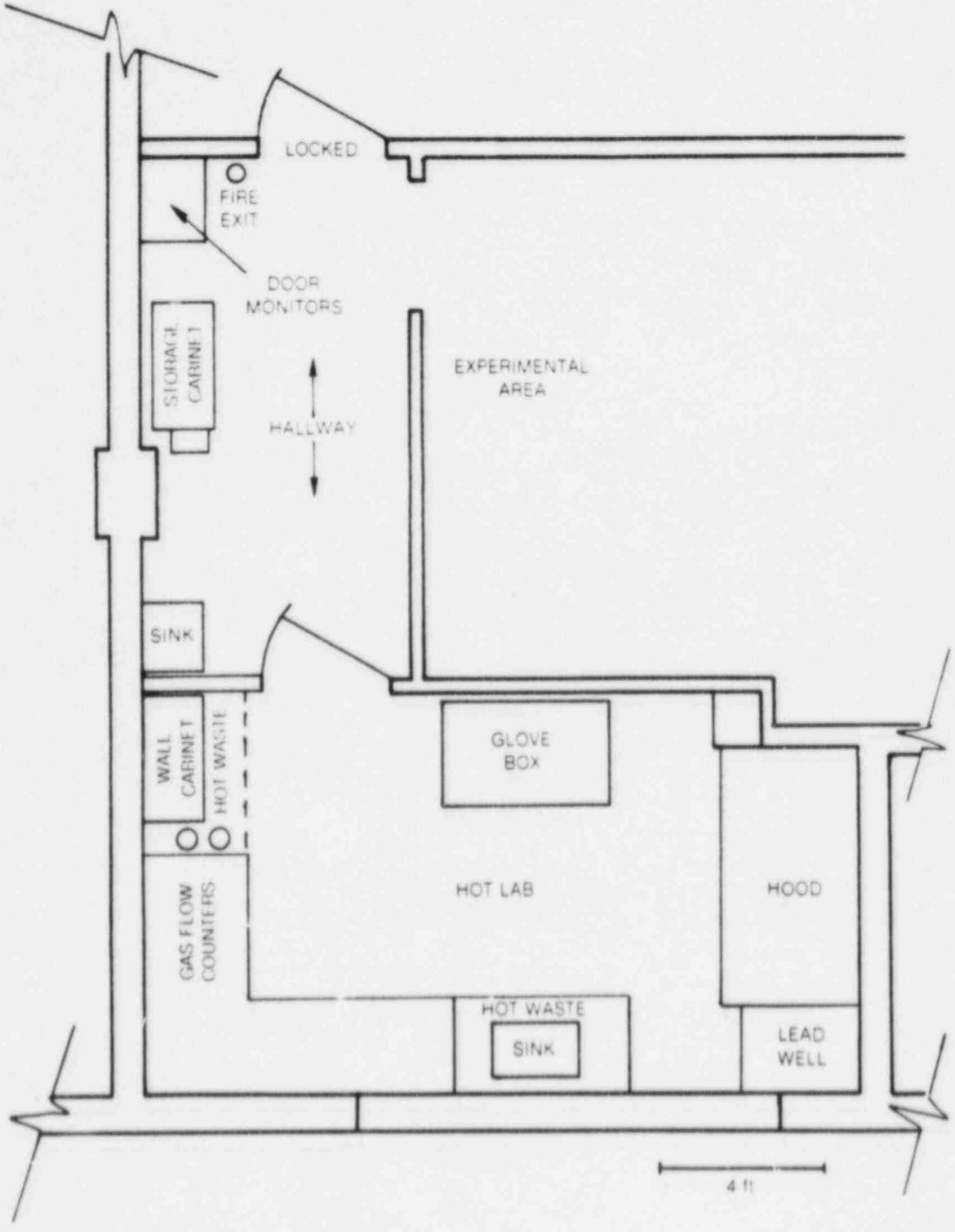
Item 9 - Facilities and Equipment

The United Technologies Research Center radioisotope laboratory dimensions and layouts are shown on pages 10 and 11 . A six-foot stainless steel Keewaunee fume hood and a four-foot stainless steel Keewaunee glove box are located in the "hot" lab. The ventilation provides a continuous flow of filtered air to the "hot" lab. "Hot" lab exhausts at either 300 or 1200 CFM via the fume hood through a Keewaunee-build filter housing containing a 2-inch x 24-inch x 30-inch dry panel filter and provisions for the installation of an 11 1/2-inch x 24-inch x 30-inch absolute filter. The absolute filter is installed when needed. The hood flow velocity of 100 linear feet per minute (1200 CFM) will be verified at least every six months using a Dioyer Vanometer Air Velocity Meter. The exhaust exits via a stack 12 feet above roof level. The laboratory contains a inground lead/concrete storage well 36 inches deep, 8 inches by 8 inches, and covered with a 6 inch thick sliding lead door and a 250 gallon stainless steel water retention tank.

With reference to Item 5, Krypton-85 400 curies, a closed gas system inside a locked safety enclosure is provided in the radioactive gas handling room. The enclosure has available exhaust rates of approximately 200 and 1,000 CFM through a stack 24 feet above roof level. A negative pressure inside the enclosure with respect to surrounding area will be maintained at all times. The 1,000 CFM flow rate is used during any gas transfer operation. A negative enclosure pressure gauge and several Geiger-Mueller detectors are included in the facility.

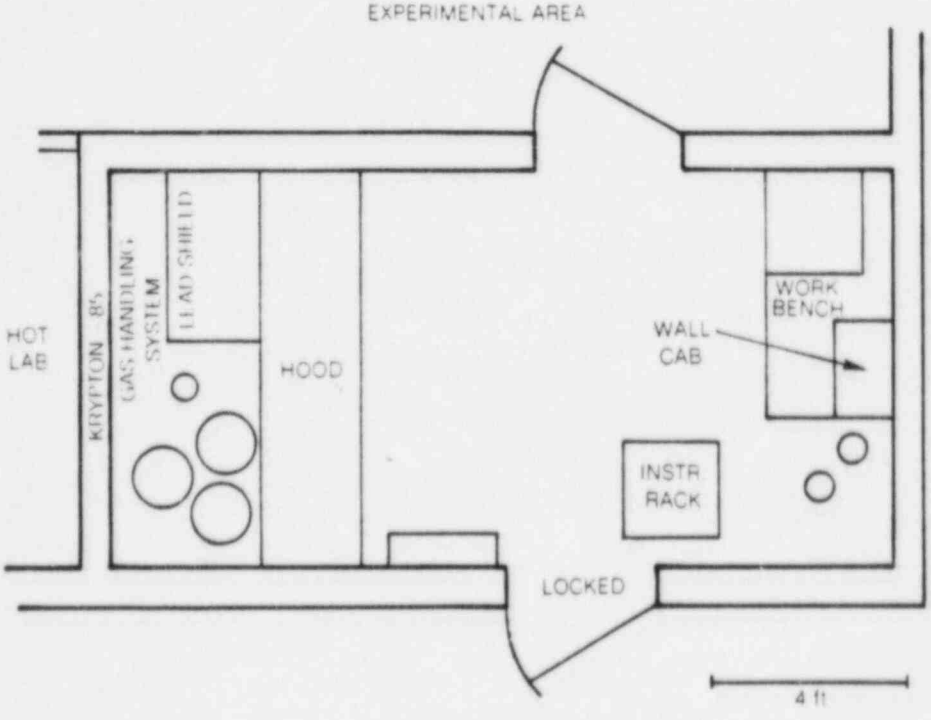
The areas identified as laboratory and gas handling room are assigned to the Radioisotope Laboratory. These areas are fitted with locks or bolts to restrict access.

UTRC LAB FACILITY



84-B-74-1

UTRC KRYPTON – 85 HANDLING ROOM



A. Radiation Detection Instrumentation

Line No.	Type of Instrument	Manufacturer's Name	Model Number	Number Available	Radiation Detected	Sensitivity Range
(1)	Air Ionization	Victoreen	440	1	alpha beta gamma	3 to 300 mr/hr (multiscale)
(2)	GM	Reactor Experiments	DIGI/CON	1	beta gamma	counts/min
(3)	Air Ionization	Victoreen	444	1	alpha beta gamma	3 to 300 mr /hr (multiscale)
(4)	Gas Flow Proportional	Nuclear Measurement	PCC11TC	1	alpha beta	counts/min
(5)	GM	Eberline	RM14	1	alpha beta gamma	counts/min
(6)	GM	Eberline	RM3A	1	alpha beta gamma	counts/min
(7)	GM	Nuclear-Chicago	2652	1	beta gamma	counts/min
(8)	GM	Victoreen	Thyac II	1	beta gamma	counts/min
(9)	Scintillation	Eberline	PAC-15A	1	beta	counts/min
(10)	Ionization	Eberline	Radector	1	gamma	millirem/hr rem/hr
(11)	Proportional Windowless Gas Flow	Nuclear Measurements	PCC 10A	1	alpha beta	counts/min
(12)	Ionization	Vantur Electronic Tritium Monitor	T-750A	1	beta	microcuries per cubic meter
(13)	Ionization	Landsverk	L64	set	gamma	millirem/hr
(14)	Seal Gas Flow Proportional	Canberra	2000	1	beta-gamma	counts/min
(15)	Germanium Detector Counter	Canberra	PIN	1	gamma	counts/min
(16)	Silicon Detector	Kevex	3000	1	x-ray	counts/min

Item 10 (Cont'd)

B. Calibration of Instruments

1. Quantitative Dose Rate Survey Instrumentation

The Victoreen 440 air ionization survey meter is the primary quantitative dose rate survey meter used. The Victoreen 444 air ionization survey meter functions as back-up to the Victoreen 440. The Victoreen 440 will be calibrated every four months to within ±10 percent at a minimum of two points near the lower 25 percent and upper 25 percent reading of each scale in order to examine readability, operability and accuracy. The Victoreen 444 will be calibrated every 12 months using the same procedures as the Victoreen 440. A record of the ionization chamber survey instrument calibration will be maintained in the Instrument Calibration log and each instrument is marked with the calibration date.

2. Quantitative Surface Contamination Instrumentation

The Nuclear Measurement Corporation PCC-11TC and PCC-10A gas flow proportional windowless counters will be calibrated each time surface area wipes or source leakage wipes are performed. Calibrated certified standards will be used. Available in the laboratory are the following certified standards for use in the gas flow proportional counter:

Radiochemical Center	SIRC	Strontium 90/Yttrium 90
Radiochemical Center	TERC	Thallium 204
New England Nuclear	NES 302	Americium 241
Isotope Product Laboratory	220	Chlorine 36

3. General Survey Instrumentation

The Geiger-Muller counter survey instruments will be operationally checked on response to background and to a check source. The Eberline RM14, Eberline RM3A and Reactor Experiments Digi/Con [Pancake G-MS] are the primary general survey instruments.

Item 10 (Cont'd)

C. Film, Badge, Dosimeters and Bioassay Procedures Used

1. Film Badge

Film badges will be required if a person is likely to receive in a calendar quarter 300 millirems to the body, 4 rems to the extremities or 1.8 rems to the skin of whole body. For personnel under 18 years of age, film badges will be required at 10 percent of the forementioned values. Film badges will also be required if a person enters a high radiation area (greater than 100 millirems per hour). A monthly film badge service such as offered by ICN Dosimetry Service Inc. of Cleveland, Ohio, will be used.

2. Dosimeter

The following dosimeter equipment is available for personnel monitoring:

a. 6 Landsverk Dosimeters, Model L-50 with a range of 0-200 mr.
b. 2 Landsverk Dosimeters, Model L-51 with a range of 0-5 R.
c. 1 Landsverk Dosimeter Charger, Model L-24K.
d. 1 Bendix Dosimeter Charger, Model 906-1

3. Bioassay

a. Tritium - Bioassay of urine for tritium will be performed if quantities in an unsealed form, gas/liquid, is used at any one time in amounts exceeding 50 millicuries. Weekly urine samples will be measured to determine tritium detectibility. After four weekly tritium urine determinations show less than 0.1 microcuries per liter, bioassay will be performed on a monthly basis. In the event that a monthly bioassay show levels in excess of 0.1 microcuries per liter, weekly bioassays will be performed. If urinary excretion rate exceeds 2.5 microcuries per liter, all work with Tritium will stop. Repeat bioassay will be taken within one week of the previous sample. Internal dose commitments will be estimated. Proper corrective action will be taken prior to resumption of work. Anticipated usage of unsealed quantities of tritium will be on a very infrequent basis.

b. Iodine 125 and Iodine 131 - Bioassay of urine for iodine 125 and iodine 131 will be performed if quantities in an unsealed form are used at any one time in amounts exceeding 0.5 millicuries in volatile or despersible form and 5 millicuries for iodine bound to nonvolatile agents. Weekly urine samples will be measured to determine the presence of radioactive iodine. Whenever the thyroid burden at the time of measurement exceeds 0.06 microcuries of iodine 125 or 0.02 microcuries for iodine 131, all work will stop. Repeat bioassay will be taken within 2 weeks of the previous measurements and an estimate of dose commitment

Item 10 (Cont'd)

will be made. Proper corrective action will be taken prior to resumption of work. Anticipated usage of unsealed quantities of radioactive iodine will be on a very infrequent basis.

c. Bioassay service - Bioassay for tritium and radioactive iodine in urine will be performed by a radiological service such as New England Nuclear Corporation.

D. Radiation Protection Procedures

1. Radiation Safety Committee

The radiation safety committee will administrate the Research Center's radioactivity program. The committee members are:

G. S. Golden - chairman
L. L. Packer - Radiation safety officer
G. A. Gruver

The committee will:

a. meet at least on a quarterly basis.
b. have the authority to approve or disapprove all proposals for radionuclide use prior to the purchase of all such materials.
c. set the standards of adequacy for establishing the qualification of the individual radioactive material user.
d. determine the adequacy of the facilities and equipment to be used with the radioactive material.
e. review the safety program, including review of records required to be maintained to insure compliance with NRC rules and regulations.
f. maintain a log note book of the committee's proceedings and safety evaluations of proposed uses of radioactive material.

2. Radiation Safety Officer

The radiation safety officer (RSO) will be responsible for the day-to-day operation of the radiation protection program within the Research Center. The RSO will:

a. insure that Engineering Orders involving radioactive materials are in compliance.
b. approve all engineering orders for acquiring radioactive material and insure compliance with NRC regulations
c. Terminate immediately the use of licensed radioactive material that is found to be a threat to health or property.

Item 10 (Cont'd)

d. Assure that radioactive materials possessed under the license conform to the materials listed on the license.

e. Assure that licensed radioactive material, particularly at temporary job sites, is handled only by individuals authorized by the license.

f. Assure that all users wear personnel monitoring equipment when required.

g. Assure that licensed materials stored in an unrestricted area be secured from unauthorized removal from the place of storage.

h. Assure that the transport of licensed radioactive material outside the confines of Corporation property will be in accordance with the Department of Transportation Regulations.

i. Assure that the terms and conditions of the license such as periodical leak tests of sealed sources are met.

j. Assure that the required personnel exposure, leak test, meter calibration, survey and material receipt, transfer and disposal records are maintained.

k. Maintain an inventory of all licensed radioactive material.

l. Assure that general surveillance over all activities involving licensed material is performed.

m. Responsible for authorizing the receiving, delivering and opening of all shipments of radioactive material arriving at United Technologies Research Center.

n. Responsible for authorizing the transportation and shipping of all licensed radioactive material leaving United Technologies Research Center.

o. Supervising and coordinating the radioactive waste disposal program.

p. Storing all radioactive materials not in current use, including wastes.

q. Review and establish the adequacy of the administrative controls and procedures to insure compliance with U.S. Nuclear Regulatory Commissions Rules and Regulations.

r. Review annually the pertinent radiation safety procedures for individuals working in or frequenting restricted areas.

Item 10 (Cont'd)

s. Insure that remote source handling (non-skin contact) is used for radioactive material handling operations that can result in dose exposure exceeding ten percent of the permissible dose (20.010a)* [e.g. contact hand radiation exposure potential of 1.8 rem requires distance dose reduction provided by remote handling].

3. Procedures for Picking Up, Receiving and Opening Packages Containing Radioactive Material to Insure Compliance with 20.205*

PURPOSE: In view of the possibility where an improperly prepared or damaged package may have produced hazardous levels of radiation during transportation, this procedure requires monitoring of package for external radiation levels.

IMPLEMENTATION:

a. Purchasing of Radioactive Material

(1) All Engineering Orders for radioactive material must be approved by the Radiation Safety Officer to insure compliance with the regulations.

(2) Order of quantities of radioactive material in excess of the Type A (71.4)

(a) Make arrangements to receive the package when it is offered for delivery by the carrier.
(b) If the package is to be picked up at the Carrier's terminal, make arrangements to receive notification from the carrier of the arrival of the package, at the time of arrival.

b. Monitoring Time Constraints

Monitoring shall be performed as soon as practicable after receipt, but no later than three hours after the package is received if received during regular working hours or eighteen hours if received after normal working hours.

---

* Rules and Regulations, Title 10, Chapter I, Code of Federal Regulations

Item 10 (Cont'd)

c. Radiation Monitoring

(1) Radioactive Contamination monitoring. The external surfaces of the package shall be monitored to determine the presence of removable radioactive contamination. These measurements will be recorded on the Incoming Radioactive Materials form.

(a) If any removable radioactive contamination is found, the package is to be placed into plastic containment and the Radiation Safety Officer must be immediately notified. In-house containment and decontamination procedure will be initiated.

(b) If the removable radioactive contamination in excess of 0.01 microcuries (22,000 disintegration per minute) per 100 square centimeter of package surface is found on the internal surface of the package, the Research Center shall immediately notify the final delivering carrier and by telephone and telegraph, mailgram, or facsimile, the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office (Part 20 Appendix D -Connecticut-Region I, USNRC Office of Inspection and Enforcement - 631 Park Avenue - King of Prussia, PA 19406 (215) 337-5000 (24 hours - 7 days).

(2) Radiation level monitoring. The external surface radiation levels of the package shall be measured at approximately one centimeter from the surface (do not contact the surface of the package) and at three feet from the external surface of the package. These measurements will be recorded on the Incoming Radioactive Material form.

If radiation levels are found on the external surface of the package in excess of 200 millirem per hour, or at three feet from the external surface of the package in excess of 10 millirem per hour, the Research Center shall immediately notify the final delivering carrier and by telephone and telegraph, mailgram or facsimile the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office (Part 20 Appendix D - Connecticut-Region I, USNRC Office of Inspection and Enforcement - 631 Park Avenue - King of Prussia, PA 19406 (215) 337-5000 (24 hours - 7 days).

Item 10 (Cont'd)

d. Opening Package - The opening of any package of radioactive material requires the approval of the Radiation Safety Officer. In addition, the following must be adhered to:

(1) Packages containing material requiring reporting under 20.205* will not be opened until approved by the Radiation Safety Officer.

(2) All packing material and sources are considered to be contaminated until monitored and found to be non-contaminated.

(3) Sealed sources in excess of one millicurie will be initially evaluated for contamination by wiping the inner shipping container or shield or source retainer structure. Actual sealed source wiping will be delayed until all packing material has been monitored and determined to be non-contaminated.

(4) All monitoring measurements shall be recorded on the Incoming Radioactive Material form.

(5) A radioactive material tag will be filled out and attached to the radioactive material container in accordance with 20.203*. This tag will include radiation levels, kinds of material, estimate of activity, data at which activity is estimated, mass enrichment, and principal emission. Sufficient information will be provided to permit individuals handling or using the container or working in the vicinity thereof to take precaution to avoid or minimize exposure.

4. Procedures for Sealed Source Leak Testing

a. Leak testing of sealed sources containing more than 100 microcuries of a beta or gamma emitter or more than 10 microcuries of an alpha emitter will be performed at intervals not to exceed six months by or under the supervision of a qualified user.

b. Leak testing of alpha-particle-emitting source containing more than 10 microcuries of an alpha emitter is required at 3-month intervals by or under the supervision of a qualified user.

---

* Rules and Regulations, Title 10, Chapter I, Code of Federal Regulations.

Item 10 (Cont'd)

c. Test wipes shall be taken from the source or from appropriate accessibility surface of the device in which the source is permanently or semipermanently mounted or stored.

d. A gas flow proportional counter such as a Nuclear Measurement Corporation Model PCC-10A gas flow proportional counter will be used to measure the wipes. A one sigma detection level of approximately 2×10^{-5} microcuries will be attained. Reference standards such as the following:

Radiochemical Center	SIRC	Strontium 90/Yttrium 90
Radiochemical Center	TERC	Thallium 204
New England Nuclear	NES302	Americium 241

will be used to calibrate the flow proportional counter.

e. Record of leak test results will be kept in units of microcurie.

f. If the leak test reveals the presence of 5×10^{-3} microcuries or more of removable contamination, the sealed source shall immediately be withdrawn from use, and appropriate decontamination, repair of disposal action will be taken. A report will be filed within 5 days of the test with the Nuclear Regulatory Commission describing the equipment involved, the test results and the corrective action taken.

5. Emergency Procedures

a. Contaminant - In the event of a fire or explosion, vehicle accident, ruptured source, or similar situation, action is to be taken to prevent further contamination of personnel, equipment and facilities. The accident area will be restricted until survey establishes that the area is free of radioactive material.

b. Fire - Standard fire fighting practices will be followed to extinguish the fire. Provision to prevent the spread of contamination will be instituted after the fire is contained.

Item 10 (Cont'd)

c. Notification - UTRC Emergency Notification List contained in the UTRC phone directory identifies by name and home and office phone number the radiation safety officer and a designated user. The radiation safety officer or a designated user will notify both the State Health officials (in Connecticut The Department of Environmental Protection - Radiation Control, Hartford telephone number 566-5668) and the NRC Regional Inspection and Enforcement Office in accordance with the requirements of Section 20.403 of 10 CFR20.

d. Lost Source - Immediately after the occurrence of a loss or theft of licensed material the radiation safety officer will notify UTRC's industrial security and legal department and action will be taken to recover the material. Report of the theft or loss of licensed material will be reported to NRC in accordance with the specific requirements of Section 20.402 of 10 CFR20.

e. Spills - Absorbent materials such as an absorbent mineral (Speedi Dri - Engehard Mineral and Chemical Corporation) and blotter paper will be used to contain and remove spilled radioactive material. The absorbent material containing the radioactive material will be sealed in labeled plastic bags for waste disposal. Rubber or plastic gloves and appropriate lab coats or coveralls will be used during spill clean-up. A survey will be performed to insure that the limits for removal of surface contamination are less than the following:

Surface	Beta or X-ray Emitters $\mu Ci/cm^2$	Alpha Emitters $\mu Ci/cm^2$
Unrestrictive	any removables	any removables
Restrictive	10^{-3}	10^{-5}
Personal clothing worn outside of unrestricted area	10^{-4}	10^{-5}
Skin	10^{-4}	10^{-5}

6. Licensed Radioactive Material Usage at Job Locations

a. Basic Policy - The job location will be returned to the same radiation levels as were present prior to the initiation of radioactive material usage under this license. Radiation background measurement levels will be established prior to usage of licensed radioactive material. At completion of

Item 10 (Cont'd)

work at the site, surveys for removable and non-removable contamination will be performed and recorded. An authorized radioactive material user will be present at the temporary job sites during the installation, handling and return of the radioactive material. At temporary job sites other than UTC facilities, a written document acknowledging the use of licensed material at that facility is required.

Site supervision will be instructed in safety procedures, types of radiation, radioactive material and applicable regulations. Provision as set forth in 19.12 will be followed.

b. Surveys

(1) External radiation fields will be surveyed to insure that radiation fields in unrestricted areas meet the requirements of 20.105 (1) and (2). These surveys will be performed on an initial daily basis and then performed consistent with the potential for any changes in the radiation fields. If the user is not present at the temporary job site the radiation levels to unrestricted areas will be less than 2 millirem per hour 12 inches from the source.

(2) Surface contamination smear surveys will be performed in restricted and unrestricted areas when working with other than sealed sources to insure that the limits for removable surface contaminants are less than the following:

Surface	Alpha Emitters	Beta or X-ray Emitters $\mu Ci/cm^2$
Unrestricted	any removables	any removables
Restricted	10^{-5}	10^{-3}
Personal clothing worn outside of restricted area	10^{-5}	10^{-4}
Skin	10^{-5}	10^{-4}

Surface contamination survey will be performed initially on a daily basis. Once survey establishes that adequate contamination control has been existed, surveys will be performed as follows:

Item 10 (Cont'd)

Greater than Part 30.71 Schedule B	Frequency of Surface Contaminants Surveys
5 times	monthly
20 times	biweekly
100 times	weekly

Alpha surveys will be performed weekly.

c. Airborne Contamination - Processes with the possible airborne escape of radioactive liquids or powders will be carried out within a fume hood or glovebox. Compliance with Part 20 Appendix B will be performed by air sampling with an air sampler such as a Staplex Type TF1A.

d. Spill Containment - Available at any location where radioactive liquid spill can occur will be an adequate supply of absorbent material such as blotter paper and "Kitty Litter".

e. Leak from Experimental Apparatus - if a minor leak occurs from the experimental apparatus, the leak will be isolated or the equipment will be secured. Absorbent material will be used to control and remove the contaminated liquid.

f. Signs - Radioactive material signs and radiation area signs will be used to delineate the presence of radioactive material and radiation fields.

g. Security of Radioactive Material From Unauthorized Removal - In the absence of an authorized user the radioactive material will be physically secured by:

(1) locking in a shipping case, cabinet, closet or room
(2) locking in a company vehicle or company authorized vehicle
(3) physically secured to a structural member of the building or equipment

h. Emergency Notification - In the absence of an authorized user, the names and phone numbers of authorized users will be posted at the temporary job site.

Item 11 - Waste Management

A. Waste Management Storage

All radioactive waste material is stored in a DOT approval 30/55 gallon drum. Drums are located in a restricted-access fenced area with a locked door. Each barrel is labelled and inventoried. A waste inventory log book is maintained.

B. Unsealed Sources - Disposal

Liquid radioactive waste will be disposed of in one of the following manners:

(1) Packaged for disposal and disposed of by an authorized waste disposal vendor such as Radiac Research Corporation

(2) Released to sewage system in accordance with Title 10, Part 20.303, CFR. Release to sewage occurs on a very infrequent basis. The last release to sewage occurred in July 1974.

C. Sealed Sources - Disposal

Sealed sources will be disposed of by an authorized waste disposal vendor such as Radiac Research Corporation or by return to the vendor from whom purchased.

D. Method for Monitoring or Estimating Radioactive Effluent to the Environment

1. Monitoring Release to the Sanitary Sewage System

Prior to release a water sample is obtained from the waste water retension tank. One cubic centimeter is evaporated in a planchet and counted in a gas flow proportional windowless counter.

2. Monitoring release to atmosphere

a. Krypton 85 - The amount of krypton-85 release is calculated by measuring the pressure of the gas trapped in a known volume. A tritium monitor with 60% efficiency for krypton-85 is available.

b. Iodine 125 and other gases - Anticipated usage is very infrequent. The last use of gases other than krypton-85 occurred over 10 years ago. Volatile radioactive release (such as iodine-125) will be calculated using good engineering practices, such as charcoal traps and air sampling. To date, no iodine compounds have ever been used.

NRC FORM 218 (4-79) NRCM 0240

U.S. NUCLEAR REGULATORY COMMISSION

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE: 3/13/85

TIME: 3:15 ☐ A.M. ☐ P.M.

☒ INCOMING CALL ☐ OUTGOING CALL ☐ VISIT

PERSON CALLING	OFFICE/ADDRESS	PHONE NUMBER / EXTENSION
L.L. Packer	United Technologies Corporation	(203) 727-7009
PERSON CALLED	**OFFICE/ADDRESS**	**PHONE NUMBER / EXTENSION**
E. Wurtz	RI	337-5168

CONVERSATION

SUBJECT: Telephone Deficiency

SUMMARY

(1) Will send letter confirming that survey procedures described in section 6. of Item 10 of "Radiation Surveys at Temporary Job Sites" refer to all job sites.

(2) Will confirm that release of I-175 to atmosphere will be determined by air sampling.

REFERRED TO:

☐ ADVISE ME OF ACTION TAKEN.

ACTION REQUESTED

INITIALS

DATE

ACTION TAKEN

INITIALS

DATE