FORM NRC-313 I (3-80) 10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

1. APPLICATION FOR: *(Check and/or complete as appropriate)*

	a. NEW LICENSE
	b. AMENDMENT TO: LICENSE NUMBER
X	c. RENEWAL OF: LICENSE NUMBER 20-14082-02

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*

Interex Corporation

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
617/237-6650

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION

William Karp

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
617/237-6650

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)

3 Strathmore Road
Natick, MA 01760

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*

Same

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL
(See Items 16 and 17 for required training and experience of each individual named below)

	FULL NAME	TITLE
a.	William Karp	Manager Health Physics
b.	Richard Fix, Ph[illegible]	Manager Environmental Sciences
c.	John Kempt	Radiation Specialist

License Fee Information on ~~Reverse side~~ Next Page

7. RADIATION PROTECTION OFFICER

William Karp

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.

8. LICENSED MATERIAL

LINE NO.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	C NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	Atomic No's 3-83 Inc.	Any	NA	3MCi Total
(2)	Cesium-137	Sealed Source	Sealed Serum Bottle (NEN)	6MCi
(3)	Americium-241	Any	NA	0.01 MCi
(4)	Nickel-63	Plated Source	Hewlett Packard 19303	15MCi each

	E DESCRIBE USE OF LICENSED MATERIAL
(1)	Preparation of reference solutions for inst. calibration, interlab testing, and chemical and radiochemical analysis of materials containing by nroduct nuclides
(2)	Calibration of nuclear detection instruments
(3)	Same as (1)
(4)	Electron Capture detector in gas chromatograph

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FORM NRC-313 I (3-80)

"OFFICIAL RECORD COPY"

9. STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	Multi-dose vial	New England Nuclear	NA
(2)			
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)	Cutie Pie	Victoreen	740D	1	B-G	25-250-2500 25000 mr/hr
(2)	Survey Meter	Victoreen	493	1	A-B-G	.5-5-50mr/hr 300-3000-3000C/M
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

XXb. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

See Attached

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
XX (1) FILM BADGE	Landauer	XX MONTHLY
☐ (2) THERMOLUMINESCENCE DOSIMETER (TLD)		☐ QUARTERLY
☐ (3) OTHER (Specify): _____		☐ OTHER (Specify):

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC. See Attached

☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC. NA

☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. NA

☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC. NA

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

Interex Corporation

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.

    a. Principles and practices of radiation protection.

    b. Radioactivity measurement standardization and monitoring techniques and instruments.

    c. Mathematics and calculations basic to the use and measurement of radioactivity.

    d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

Applicant 03-5[illegible]
Check No. 8719
Amount/Fee Category 150-3K
Type of Fee Renewal
Date Check Rec'd 4/23/81
Received By [illegible]

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.–18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)* $150.00	b. CERTIFYING OFFICIAL *(Signature)* Joseph Rosenberg
	c. NAME *(Type or print)* Joseph Rosenberg, Ph.D.
(1) LICENSE FEE CATEGORY: 3K	d. TITLE President
(2) LICENSE FEE ENCLOSED: $150.00	e. DATE 4-21-81 07652

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ITEM 16-17

RICHARD C. FIX, PH.D. - MANAGER ENVIRONMENTAL SCIENCES

Education:

B.S. Chemistry, University of Wisconsin, 1952.

Ph.D. Chemistry, Massachusetts Institute of Technology, 1956.

Experience:

Interex Corporation, Manager Environmental Sciences - 1972-present Directs the laboratory concerned with the analysis of environmental and other samples for radioactivity and of waste water for physical, chemical and biological characteristics. Is responsible for the performance of the numerous radiation surveillance programs for the nuclear power industry. Prepares reports for submission to the AEC, formulates environmental monitoring programs and develops information for use in environmental impact statements.

International Chemical and Nuclear Corporation/Tracerlab - Manager Technical Services Department and Staff Scientist - 1965-1972 - Directe and performed analysis of environmental, bioassay and reactor coolant samples. Designed and implemented several radiation surveillance programs and participated in numerous others. Was the principal investigator on contracts related to the development of radioactive sources for space flight and the development of a dosimetry system for use in food irradiation. Investigated the use of thermoluminescent dosimeter systems for environmental and personnel monitoring.

Controls for Radiation, Inc. - Vice President, Director of Researc and Development - 1957-1965 - Responsible for research and developement on the areas of radiation measurement and the use of isotopes. Develop a commercial thermoluminescent dosimetry system and several radiation monitoring systems under government contract. At various times, direct all laboratory operations, set-up a complete laboratory, performed submarine startup analyses, etc.

ITEM 16-17

WILLIAM KARP

EDUCATION:

A. B. Chemistry - 1944, Boston University

PREVIOUS EXPERIENCE:

Carbide and Carbon Chemicals Corporation, Oak Ridge, Tenn.

From 1944 to 1948 Mr. Karp performed chemical analyses and studies on a variety of materials used in nuclear processes. As a laboratory supervisor he was in charge of twenty personnel.

Tracerlab/International Chemical and Nuclear Corp.

Mr. Karp joined Tracerlab in 1948 as a member of the team that was sent to the Pacific to analyze fission product debris following nuclear detonations. He was in charge of all operations carried out in the shielded laboratories where a large variety of radioactive sources were produced. Source types varied from low level reference standards and spectrometer standards to multicurie sources of hard beta and gamma emitters involving specialized equipment. He also involved in the industrial application of radioactive tracers and has consulted in the design of various industrial control systems. He was also in charge of the commercial radioactive waste program, health physics, training courses and health physics survey services, and decontamination operations.

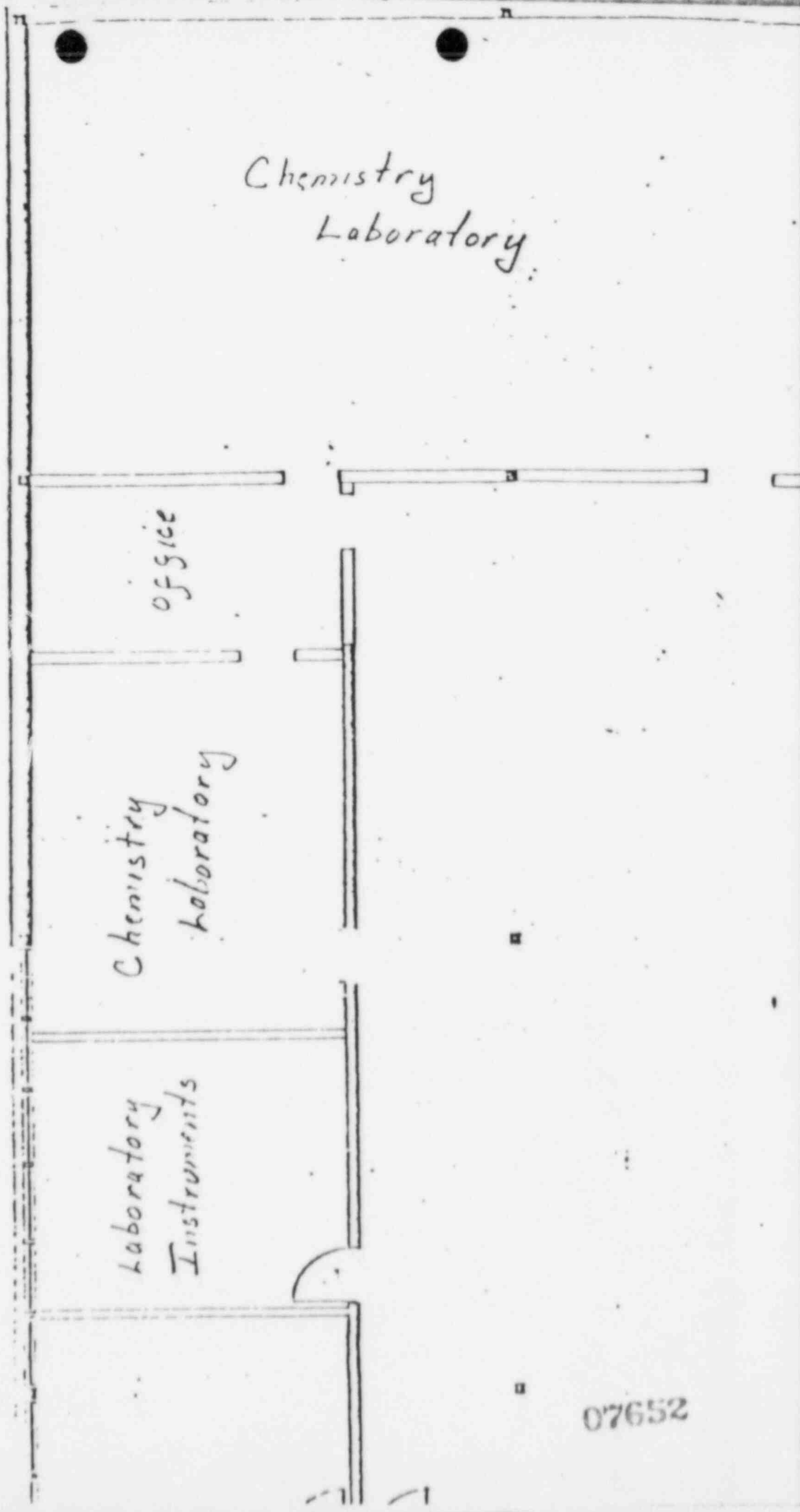
Mr. Karp was in charge of the Tracerlab radiation control program and served as plant health physicist. He has authored several Health Physics Manuals for in-plant use and has designed radiation control programs for various outside laboratories. He is often called upon to serve as consultant in radiation safety matters and served as a member of the Nuclear Incident Advisory Team for the State of Massachusetts. He was a member of the work group that helped to develop the Radiation Safety Code for the State of Rhode Island.

He has also served on working committees for ASTM, ASA and USASI concerned with the development of various codes in the radiation field.

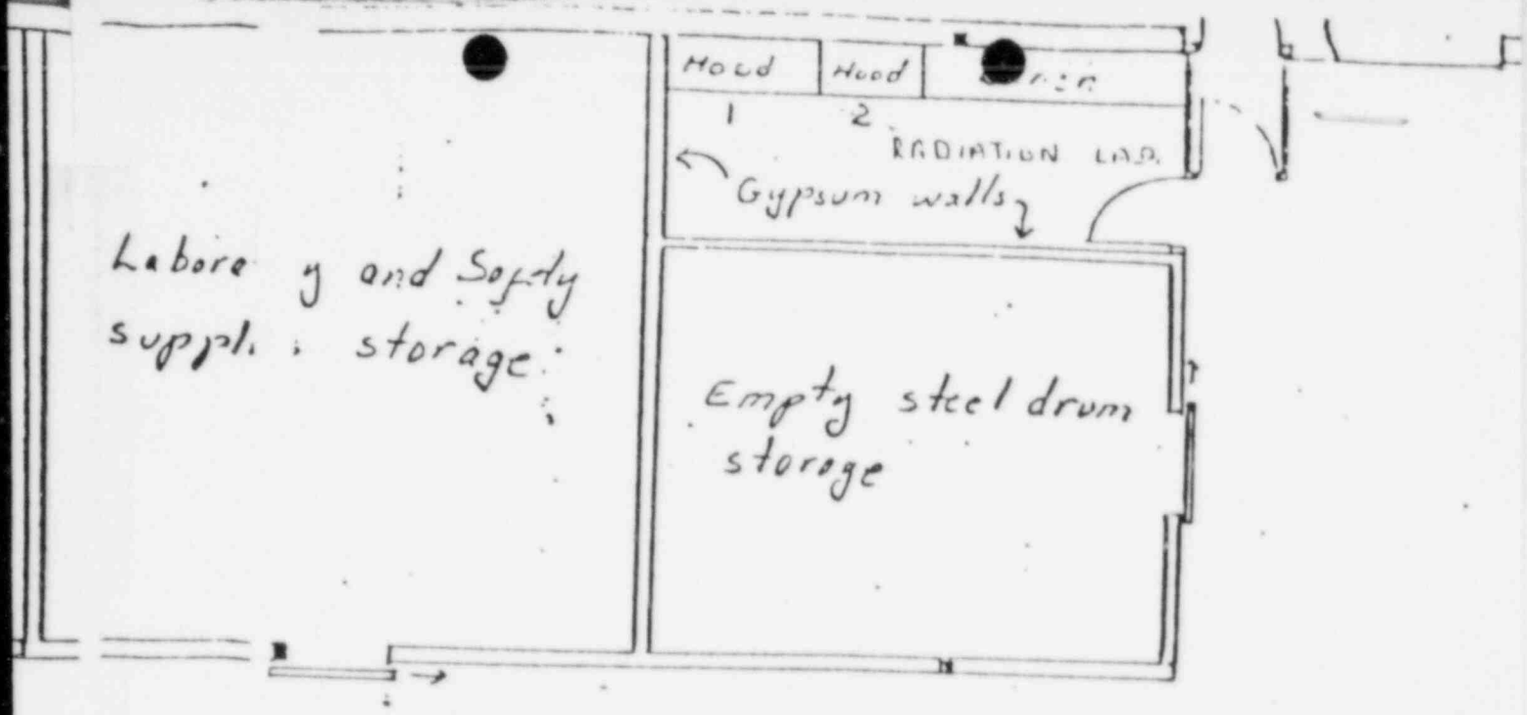
ITEM 16-17

JOHN KEMPT

Mr. Kempt joined Tracerlab (later International Chemical and Nuclear Company) in 1950. He was supervisor of radioactive source operations for over 10 years. In that capacity he was responsible for the design and production of all types of radioactive sources including Cobalt-60 and Cesium-137 sources in strengths up to 10 curies, Krypton 85 sources in strengths up to 20 curies and Strontium-90 sources in strengths of up to 2 curies. He has handled radioactive materials in solid, liquid and gaseous forms. For over 15 years, he was supervisor of radioactive waste operations. In that capacity he has had considerable radiation protection experience. He has served as supervisor of several large scale decontamination operations at customer sites and has also been part of a team that performed radiation surveys at facilities and institutions handling radioactive materials. During those 15 years, he has had considerable experience and training in the principles and practices of radiation protection.

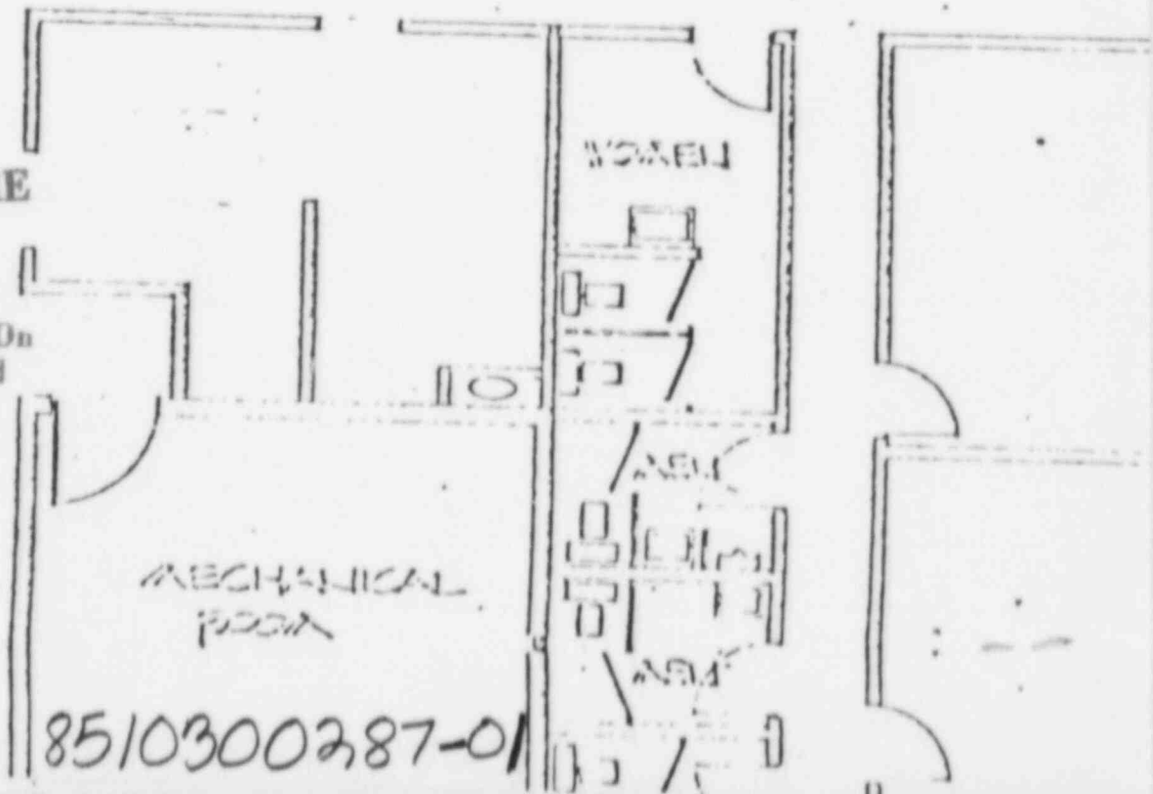

Chemistry Laboratory
Office
Chemistry Laboratory
Laboratory Instruments

07652



Construction : Concrete block and brick
Scale : 1/8" = 1'0"

INTEREX CORP
3 STRATHMORE RD
NATICK MA.



HEALTH PHYSICS PROGRAM

A. Maximum Permissible Exposure Levels

1. External Radiation - Irradiation of the body or parts of the body by an outside source of radiation

   Limits:

   Rems per calendar quarter

Whole body; head and trunk; active blood forming organs; lens of eyes or gonads	1 1/4
Hands and forearms; feet and ankles	18 3/4
Skin of whole body	7 1/2

2. Internal Radiation - irradiation of internal organs of the body by ingestion, inhalation, or absorption of particulate radioactive matter

   Limits:

   The limits have been established by the NCRP and are shown in 10CFR20, Appendix B

B. Radiation Safety Office (RSO)

1. The duties of the RSO will be as follows:

   a. Review all records generated pursuant to the requirements of 10CFR20 and the Interex Health Physics Program

   b. Monitor all aspects of the Health Physics Program to assure full compliance with Federal and State regulations.

   c. Review and approve of any potential modifications in the program including revisions on possession limits.

   d. Provide guidance and assistance in design of equipment and procedures used to handle radioactive materials.

C. Indoctrination

1. Any person assigned to work with radioactive material in the Radiation Lab will be appropriately indoctrinated by the lab supervisor. A copy of the outline used, entitled, "Radiation Safety Considerations" is attached.

D. Personnel Monitoring

1. Film badges will be worn by all persons who are assigned to work with radioactivity in the Radiation Lab. Film badges are changed monthly. The RSO will advise personnel of any measurable radiation reported.

E. Bioassays

1. Bioassays will not be required routinely. However, in the event of an accidental release of significant quantities of radioactive materials into the laboratory, bioassays might be required. The RSO will make the judgement based on contamination levels, nature of the release, the radioisotopes involved, the chemical and physical form of the nuclide.

   Bioassay would be handled by Interex's Environmental Assay Group or alternatively by M. Bolton of M.I.T. Health Physics Department.

F. Survey

1. Surveys must be performed in accordance with the NRC regulations, section 20.201, 10CFR20. The requirements are described below:

   External Dosage -

   All procedures must be planned with due consideration to the potential radiation dosage. A survey meter must be used to aid in making dosage evaluations during any periods when radioactive materials are being used. Film badges are worn at all times. Surveys are performed in the radiation laboratory after each use of radioactive material (see section L).

   Contamination -

   Considerable care must be exercised to prevent the possibility of contamination release. Personnel contamination is controlled by the use of protective clothing, including gloves, and lab coats. Laboratory contamination is minimized by adherring to the requirement that all work with radioactive materials in excess of 0.5 microcurie (if unsealed liquid or powders) must be performed in fume hoods. Personnel monitoring is required after each use of radioactive material (see section L).

G. Effluents

1. Radioactive materials may be generally released from the laboratory either up the stacks or down the drain.

   a. Drain Release

      The release of radioactive materials down the drain is specifically prohibited.

   b. Stack Release

      Work with radioactive materials in excess of 0.5 microcuries must be performed in fume hoods. There is virtually no possibility of stock release since only non-volatile solutions are used in our procedures.

H. Laboratory Air Sampling

1. Work with radioactive materials in excess of 0.5 microcuries (if unsealed liquid or powders) must be performed in fume hoods. This requirement coupled with low levels of materials authorized precludes the requirement for performing routine air analyses. However, the RSO may in the event of an accident involving the potential release of radioactive materials, require that a sampling be performed.

   Air samples would be taken on the Hi-Vol Air Sampler using a 4" diameter filter disc. Nuclide analyses would be performed by Interex's Environmental Assay Group or M. Bolton of M.I.T. Health Physics Department.

I. Records Management Program

1. The records of all surveys required by this program and the materials inventories, including receipts and disposals will be maintained by John Kempt. The records will be reviewed by William Karp, RSO.

J. Radioactive Waste

1. Radioactive waste will be packaged in accordance with the procedures described by the State of Washington, Department of Social and Health Services and the Nuclear Engineering Company. Solid materials may be placed directly in the radioactive waste drums. Liquids must be absorbed in Speedi-Dri with at least two volumes of Speedi-Dri to one volume of liquid before being placed in the radioactive waste drums.

K. Instrument Calibration

1. Instrument calibration is performed every three (3) months using a"5"mCi Cesium-137 source which has been calibrated by TLD. Accuracy is expected to be ±15%. It's dose rate has been established as follows:

35.4 mr/hr at 20 cm

Following are calibration distances to be used and doses expected (with meter long axis perpendicular to source).

Distance Source to Meter	Theoretical mR/hR Reading
On barrel	640
9 cm	180
18 cm	44
30 cm	16
55 cm	4.7

Calibrations are made in free air with minimum back scatter.

Calibrations to be performed under direction of W. Karp or J. Kempt.

See form entitled "Instrument Calibration".

L. Radiation Lab Rules

1. The radiation lab is kept locked when not in use.
2. The radiation lab is open to authorized personnel only.
3. The laboratory, must be appropriately posted with radiation signs in accordance with regulation 10CFR20.
4. Smoking and eating is prohibited.
5. Mouth pipetting is prohibited.
6. Lab coats will be worn at all times when working with radioactivity.
7. All personnel assigned to work with radioactivity in the area will wear film badges. Film badges must be returned to their assigned racks each night.
8. All work with radioactive materials in excess of 0.5 microcurie (of unsealed liquids or powders) must be performed in hoods.
9. Radioactive liquids cannot be put down the drain. They must be disposed of in accordance with prescribed procedures.
10. All personnel will monitor themselves frequently while working with radioactive materials in solution or powder form.
11. Survey meters should be in continuous use during radiation operations to assure minimum dosage.
12. During use of radioactivity, all personnel will thoroughly monitor themselves prior to leaving the area for smoking, eating, or quitting time. At the end of the day, personnel will monitor themselves and record the results on the form entitled "Personnel Monitoring Report".
13. Floors and other surfaces will be smear tested after use of radioactivity in the laboratory and the results recorded on the form entitled, "Radiation Lab Surveys". The smears, a total of 10, will be taken on the floor and on benches with a dry filter paper disc 1-2" diameter, each over an area of 100 cm^2. The results are determined by using, a flow proportional counter for alpha or beta, and a well scintillation detector for gamma.

M. Source Leak Testing

1. Source leak testing is accomplished by use of a standard wipe test. A dampened cotton swab is rubbed across the source. The wipe is then measured using a beta or gamma detector, as required with due consideration to the type of particle involved.

2. Special care must be taken to avoid dosage during the leak test procedure. Use 12" tweezers where possible. Confirm radiation levels by using survey instrument.

3. The following analytical equipment is available at Interex:

   Packard Auto Gamma Spectrometer Well Counter
   Nuclear Chicago Proportional Automatic Planchet Counter
   Low Background Beta Counting System
   ND4420 Multichannel Analyzer with 3 NaI and 2 GeLi Detectors
   Baird Atomic Proportional Automatic Planchet Counter

   Close calibrations are available for a broad spectrum of isotopes since the abouve equipment is used in the operation of the Analytical Lab.

4. The results of the leak tests are maintained by J. Kempt and reviewed by W. Karp, RSO.

N. What To Do In The Event Of An Accident:

In the event of an accident involving the escape of radioactive material the following steps will be taken:

1. Try to hold your breath if at all possible.

2. Shut off all ventilation including fans, ducts, windows, etc.

3. Evacuate area.

4. Seal off doors and windows with masking tape and declare area "off limits".

5. Check for extent of contamination - properly dispose of contaminated articles and summon the RSO.

6. No one is allowed to re-enter the area without specific authorization from the RSO.

7. The RSO will supervise the decontamination operation. It will involve the use of protective equipment, survey instruments and the proper decontaminants (based on the isotope and chemical form).

8. The RSO will secure medical attention for any persons who are suspected of being contaminated.

HEALTH PHYSICS PROGRAM
(Continued)

RADIATION SAFETY CONSIDERATIONS (TIME REQUIRED: 2 HOURS)*

1. Explanation of radiation phenomena
   alpha, beta, gamma, x-ray, neutron

2. Effects of radiation on man

3. Methods of measuring radiation levels
   internal-air sampling
   external-meters, film badges, dosimeters

4. Shielding considerations
   time - distance - absorption

5. MPC and MPD levels in relation to the type of work done.

6. Sign posting requirements as specified in 10CFR20

7. "Restricted" and "unrestricted" areas as defined in 10CFR20

8. What to do in the event of an accident

9. Review of Health Physics Manual

10. Review of general requirements of 10CFR19 and 10CFR20

Indoctrination rec'd. by: _____

Given by: _____

Date: _____

* Where the use involves microcurie quantities of a few non-volatile radioactive materials under precisely specified and carefully controlled conditions subject to the surveillance of the RSO, a period of training and experience in the use of one or more similar radioactive materials under the tutorship and supervision of a licensed user may be substituted.

INSTRUMENT CALIBRATION

Date:

Instrument:

By:

Calibration Information - "5" mCi Cs-137 Source

Distance	Theoretical mR/hR	Actual mR/hR
On barrel	640	
9 cm	180	
18 cm	44	
30 cm	16	
55 cm	4.7	

All measurements to be made with meter perpendicular to source

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INTEREX

PERSONNEL MONITORING REPORT

Date: _____

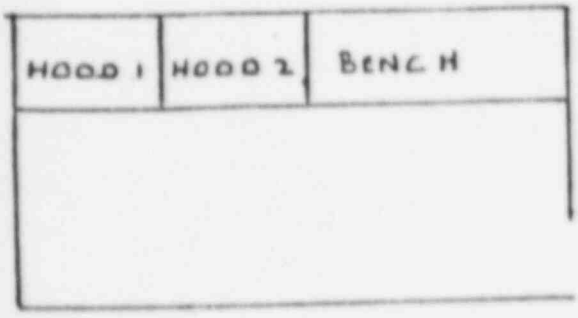
By: _____

..rument: _____

MONITORING

NAME	BACKGROUND (dpm)	SHOES (dpm)	FACE, HAIR (dpm	HANDS (dpm)	CLOTHING (dpm)

Radiation Lab Surveys



Smear Tests

Date
By
Instrument

Survey

Date
By
Instrument

Smear Tests - (Taken over 100 Cm^2 area)

No.	Description	Isotope	Bkgd. cpm	Net cpm	Net dpm

Survey

No.	Description	Mr/hr	No.	Description	Mr/hr