NRC Form 313 I
(12-81)
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 21-15446-01

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
KMS Fusion, Inc.
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(313) 769-8500

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION
J. C. Widman, RSO
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(313) 769-8500

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)* *(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)*
P.O. Box 1567
Ann Arbor, Michigan 48106-1567

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

(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.	See supplemental Sheet	
b.		
c.		

7. RADIATION PROTECTION OFFICER
J. C. Widman, Ph. D.

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

8. LICENSED MATERIAL

LINE NO.	ELEMENT AND MASS NUMBER (A)	CHEMICAL AND/OR PHYSICAL FORM (B)	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source) (C)	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME (D)
(1)	See supplemental sheet			
(2)				
(3)				
(4)				

RECEIVED BY LFMB
Date 12/1/83
Log R.C.3
By Cap
Orig. To R/III
Action Comp. Cap

Applicant
Check No. 34990
Amount Fee Category $150 3K
Type of Fee Ren
Date Check Rec'd 12/1/83
Received By Cap

DESCRIBE USE OF LICENSED MATERIAL (E)

(1)	See supplemental sheet
(2)	
(3)	8509120239 850828 REG3 LIC30 21-15446-01 PDR
(4)	

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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)	See supplemental sheet		
(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)	See supplemental sheet					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

See supplemental sheet

☐ b. CALIBRATED BY APPLICANT

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

12. PERSONNEL MONITORING DEVICES

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

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

☒ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.

☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC. See supplemental sheet

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

U. S. Ecology-See supplemental sheet

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.

Training and experience of members of the Radiation Safety Committee are given in items 6 and 7.

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	b. CERTIFYING OFFICIAL *(Signature)* D. E. Solomon
	c. NAME *(Type or print)* D. E. Solomon
(1) LICENSE FEE CATEGORY: 3K	d. TITLE Vice President, Operations
(2) LICENSE FEE ENCLOSED: $ 150	e. DATE November 16, 1983

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Supplemental information for KMS Fusion, Inc. application for renewal of by product materials license 21-15446-01.

Item 5. - Street Address.

By product material will be used at:

3621 South State Road
Ann Arbor, Michigan 48106

3941 Research Park Drive
Ann Arbor, Michigan 48106

The activity of tritium used or stored at 3941 Research Park Drive will be limited to 100 millicuries.

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Item 6. Individual(s) who will use or directly supervise the use of licensed material.

Licensed material will be used by persons designated by the Radiation Safety Committee.

Members of the committee are:

J. C. Widman, Ph. D., Chairman
D. L. Musinski, Ph. D.
G. Charatis, Ph. D.
D. E. Solomon

Dr. Musinski represents the Department of Materials Science, and Dr. Charatis represents The Fusion Experiments Department. These two departments are the principal users of licensed material at KMS Fusion, Inc. Mr. Solomon is Vice-President, Operations and represents management.

Statements of training and experience of committee members are attached.

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DONALD L. MUSINSKI

Training with radiation and radioactive materials:

Has completed two undergraduate physics courses involving nuclear structure and atomic physics.

Experience with radiation and radioactive materials:

Use of low-activity beta-gamma sealed sources as part of undergraduate and graduate physics curriculum at Trinity College and the University of Rochester.

Laboratory use of tritium at KMS for eight years--cryogenic targets, target chamber design and modification. Up to 1 curie tritium.

Technical Manager of tritium facility 8/80 - present. Up to 5KCi tritium

Radiation Safety Committee member 8/80 - present

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GEORGE CHARATIS

Formal training: Course in Nuclear Physics, University of Michigan; course in Handling of Radioactive Materials, KMSF.

Work experience in handling of radioactive materials:

Isotope	Maximum amount curies	Where experience gained	Duration of experience	Type of experience
H-3	70 µCi	KMSF	6 years	Supervisory*
Fe-55	10 mCi	KMSF	6 months	Instrument Calibration**

*Supervision of (a) insertion of H-3 containing targets into target chamber.

(b) clean up of target debris from optical surfaces.

**Used in calibation of TLDs on a daily basis.

Committee service:

Radiation and Industrial Safety Committee 1973-1976

Radiation Safety Committee July 1981 - present.

DAVID E. SOLOMON

Training with radiation and radioactive materials:

Has completed two undergraduate and two graduate courses in atomic and nuclear physics.

Experience with radiation and radioactive materials:

Experienced in personally using and later supervising utilization of kilocurie quantities of tritium since 1972. Founded and served as Director of Division of Materials Sciences (DMS) prior to becoming Vice President, Operations at KMS Fusion. DMS is the department utilizing tritium in fabricating inertial confinement fusion targets, and consequently Mr. Solomon dealt with the problems of tritium confinement, use, and safety on a daily basis in the mid 1970's. As can be seen from his resume, Mr. Solomon has authored six papers dealing with tritium technology. At KMS, Mr. Solomon has served for a number of years as Chairman of the General Safety Committee, is responsible for the Radiation Safety Committee and is the Corporate officer responsible for all safety related matters.

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Item 7. Radiation Protection Officer.

The Radiation Protection Officer is John C. Widman, Ph.D.

The duties and responsibilities of the Radiation Protection Officer are described in paragraph 3.2 of Policy RSC-026, "Radiation Safety Committee Bylaws", which is part of the enclosed Radiation Safety and Procedures Manual.

Dr. Widman has the Ph.D. degree in Environmental Health Science (Radiological Health) and has received Comprehensive Certification by the American Board of Health Physics. Statements of the training and experience of Dr. Widman are attached.

J. C. Widman, Ph.D. Training

Type of Training	Where Trained	Duration of Training	On-the-Job	Formal Course
a. Principles and practices of radiation protection	The University of Michigan Ann Arbor, MI. Ph.D. in Environmental Health Sciences (Radiological Health)	4 yrs.	no	yes, many
	Veterans Administration Hospital, Allen Park, MI.	13 yrs.	yes	no
	Wayne State University Detroit, MI.	6 mos.	no	yes
b. Radioactivity measurement standardization and monitoring techniques and instruments	The University of Michigan Ann Arbor, MI	4 yrs.	no	yes
	Veterans Administration Hospital, Allen Park, MI.	13 yrs.	yes	no
	Wayne State University Detroit, MI.	1 yr.	no	yes
c. Mathematics and calculations	The University of Michigan Ann Arbor, MI	7 yrs.	no	yes
	Veterans Administration Hospital, Allen Park, MI.	13 yrs.	yes	no
	Wayne State University Detroit, MI.	3 yrs.	no	yes
d. Biological effects of radiation	The University of Michigan Ann Arbor, MI.	4 yrs.	no	yes
	Veterans Administration Hospital, Allen Park, MI.	13 yrs.	yes	no

J. C. Widman, Experience with radiation

Isotope	Maximum amount	Where experience was gained	Duration of experience	Type of use (see legend)
H-3	up to 5000 Ci	KMS Fusion, Inc. Ann Arbor, MI.	3 yrs.	r
C-14	up to 10 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	4 yrs.	r, v
P-32	up to 40 mCi	Veterans Administration Medical Ctr. Allen Park, Mi.	8 yrs.	r, t
Cr-51	up to 50 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	8 yrs.	r, v, i
Co-57	up to 10 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	8 yrs.	r, v, i
Fe-55	10 mCi	KMS Fusion, Inc Ann Arbor, MI.	1 yr.	r
Fe-59	up to 1 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	8 yrs.	r, v
Co-60	5500 Ci	Veterans Administration Medical Ctr. Allen Park, MI.	1 yr.	sealed-source teletherapy
Ga-67	up to 5 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	8 yrs.	r, i
Se-75	up to 1 mCi	Veterans Administration Medical Ctr. Allen Park MI.	4 yrs.	v, i
MO-99/Tc99m	up to 2 Ci	Veterans Administration Medical Ctr. Allen Park MI.	10 yrs.	r, v, i

J. C. Widman, Experience with radiation (Cont'd.)

Isotope	Maximum amount	Where experience was gained	Duration of experience	Type of use (see legend)
In-111	up to 1 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	4 yrs.	i
I-123	up to 1 mCi	Veterans Administration Medical Ctr. Allen Park, MI.	2 yrs.	i
I-125	up to 2 mCi	Veterans Administration Hospital Allen Park, MI. & KMS Fusion, Inc.	9 yrs.	r, i
I-131	up to 200 mCi	Veterans Administration Hospital Allen Park, MI.	10 yrs.	i, t
Xe-133	up to 30 mCi	Veterans Administration Hospital Allen Park, MI.	3 yrs.	i
Cs-137	1 mCi	KMS Fusion, Inc. Ann Arbor, MI.	1 yr.	r
Hg-197	up to 1 mCi	Veterans Adminstration Hospital Allen Park MI.	3 yrs	r, i
Tl-201	up to 5 mCi	Veterans Administration Hospital Allen Park, MI.	5 yrs.	i
Ra-226	1 mCi	Wayne State University Detroit, MI.	2 mos.	Ra-Be neutron generator, teaching
Pu-238	1.1 mCi	KMS Fusion, Inc. Ann Arbor, MI.	3 yrs.	r
Pu-238	1 Ci	KMS Fusion, Inc. Ann Arbor, MI.	3 yrs.	Pu-Be neutron generator, research
Am-241	1 Ci	KMS Fusion, Inc. Ann Arbor, MI.	3 yrs.	Am-Be neutron generator, research

J. C. Widman, Experience with radiation (Cont'd.)

Isotope	Maximum amount	Where experience was gained	Duration of experience	Type of use (see legend)
Cm-244	0.1 mCi	KMS Fusion, Inc Ann Arbor, MI.	3 yrs.	r

In addition, there is extensive experience with medical x-ray machines at the Veterans Administration Medical Center, Allen Park, Michigan for 3 years.

Legend:

Type of use r research
v in-vitro medical testing
t radioisotope therapy
i medical imaging

Item 8. Licensed Material

Item	Element and mass number	Chemical/ physical form	Manufacturer model no.	Maximum activity and/or sealed sources and maximum activity per source which will be possessed at any one time
A.	Any byproduct material with atomic numbers between 3 & 83, inclusive	Any	*	Not to exceed 100 millicuries per radionuclide and 25 curies total
B.	Hydrogen-3	Any		Not to exceed 5000 curies total
C.	Americium-241	Sealed sources -alpha emitter	*	Not to exceed 10 millicuries per source and 25 millicuries total
D.	Americium-241	Sealed source -neutron emitters	*	Not to exceed 1 curie total
E.	Americium-241	Any		Not to exceed 1 millicurie total
F.	Curium-244	Any		Not to exceed 10 millicuries total
G.	Polonium-210	Any		Not to exceed 3 millicuries total

*A list of the manufacturer, model, radionuclide, and activity of sealed sources presently possessed is attached.

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Item 8. Sealed Sources presently possessed by KMS Fusion, Inc.

Nuclide	Activity 12-31-83	Manufacturer	Model	Reference or Serial No.
Co-60	22 μCi	Isotope Products	Cat. 236	1537-2
Sr-90	0.7 μCi	Isotope Products	Cat. 222	10128-1
Cs-137	70 μCi	Isotope Products	Cat. 229	1525-1
Am-241	0.9 Ci	Monsanto Research	MRC-AmBe-1497	-
Ba-133	80 μCi	Gamma Industries	-	1280-2
Cd-109	19 μCi	Gamma Industries	-	1280-3
Am-241	100 μCi	Gamma Industries	-	1280-4
Fe-55	6 mCi	Isotope Products	Cat. PH-55-10	-
Cm-244	0.97 mCi	Isotope Products	Cat. AFR-244	C-720

NOTE: This list does not include sources separately licensed by Special Nuclear Materials License SNM-1341, nor sources of activity less than the exempt quantity (Schedule B, ¶30.71, 10CFR30).

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Item 8. Use of licensed material.

Items A through G. For use in research and development as defined in Section 30.4 (q), 10 CFR part 30, and for use in the calibration of instruments.

Hydrogen-3 is used in the manufacture of experimental targets containing ^{3}H as well as deuterium and other inert, diagnostic gases. These targets are used for research directed towards the investigation of the physical phenomena underlying the fusion process.

Americium, curium and polonium are used in sources used in the calibration of instruments. One americium source is used to generate neutrons used in the calibration of instruments.

Iodine-125 (in activities up to about 5 millicuries) and tritium, carbon-14 and possibly other radionuclides (in quantities of about 100 microcuries or less) are used for laboratory tests incidental to the development of non-radioactive products and non-radioactive medical diagnostic test kits.

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Item 9. Container and/or device in which each sealed source will be stored or used.

The 0.9 curie Am-241 neutron source (MRC-AmBe-1497) is stored in a twenty gallon metal trash can into which paraffin has been cast. The trash can can be locked shut. This shielded storage continer was fabricated by KMS Fusion, Inc.

All other sealed sources are of low activity, and are stored in a lockable file cabinet, with a four digit manipulation-proof lock.

Both the file cabinet and paraffin-filled neutron source container are kept in an access-controlled area.

Item 10. Radiation Detection Instruments

Instrument no.	Type of instrument Manufacturer & Model	Number available	Radiation detected	Sensitivity range	Use
1.	Liquid scintillation counter Packard 300 CD	1	α,β, soft x-rays	3×10^{-6} to 10 μCi for beta emitters	urine bioassay, waste assay, wipe tests, environmental tritium monitoring
2.	Liquid scintillation counter Beckman LS3150T	1	α,β, soft x-rays	3×10^{-6} to 10μCi for beta emitters	research
3.	Automatic gamma counter 2" diam. NaI well detector Nuclear Chicago 1185	1	γ, x-rays	10^{-5} μCi/g to 1μCi/g	research
4.	Survey meter, portable Victoreen 471	1	α above 3.5 MeV β above 70 keV γ/x-rays above 6 keV	0.05mR/hr to 300 R/hr	radiation protection surveys
5.	Surface contamination monitor, GM pancake type Nuclear Associates Mini-monitor 125	1	γ/x-rays above 20 keV		uncalibrated surveys of surface contamination
6.	General purpose area monitor Victoreen "Frisker" Model 425 with Model 425-110 NaI probe	1	x/γ rays between 10 & 40 keV	0-500 to 0-500,000 cpm in 4 ranges	uncalibrated radiation protection area and personal monitor for I-125
7.	Neutron rem meter Eberline model PNR-4	1	neutrons, Thermal to 10 MeV	0.5-5000 $\frac{\text{mrem}}{\text{hr}}$	area surveys, neutrons
8.	GM survey meter Baird Atomic Model 420	1	β,γ, x-rays	0.01-12.5 $\frac{\text{mR}}{\text{hr}}$	area surveys, uncalibrated radiation detection

Instrument no.	Type of instrument Manufacturer & Model	Number available	Radiation detected	Sensitivity range	Use
9.	Geiger counter Eberline E-510	1	β,γ,x-rays	0.01-200 $\frac{mR}{hr}$	area surveys, uncalibrated radiation detection
10.	Multi-purpose survey meter Victoreen Thyac III	1			
	with 489-4 GM probe	1	β,γ, x-rays	0.01-200 $\frac{mR}{hr}$	area surveys, uncalibrated radiation detection
	with 489-60 ZnS probe	1	alpha	-	uncalibrated detection
	with 425-110 NaI probe	1	γ 10 to 40 keV	-	uncalibrated detection
	with 489-55 NaI probe	1	γ above 90 keV	-	uncalibrated detection
11.	Flow-through ion chamber Johnston 9558	7	airborne tritium	1-10,000 $\mu Ci/m^3$	stack monitors, room air monitors (one unit (has been modified to read 10-10^6 $\mu Ci/m^3$)
12.	Flow through ion chmaber Johnston 10558	2	airborne tritium	1-50,000 $\mu Ci/m^3$	area surveys
13.	Flow through ion chamber Johnston 111	1	airborne tritium	1-10^6 $\mu Ci/m^3$	area surveys

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Item 11. Calibration of instruments listed in item 10.

Instrument no. 1 is calibrated by KMS Fusion, Inc. with National Bureau of Standards (NBC) certified reference material or radioactivity standards traceable to NBS. This is done for all assays performed (e.g., bioassay, wipe tests, environmental, waste liquid, etc.) for the full range of quench which will be encountered in practice. Quench calibration standards are prepared for each assay which accurately simulate the sample type, size and volume. Quench standards are prepared with the scintillation cocktail which will actually be used for measurements.

Instruments 1 and 3 are used for research and not for health protection purposes, and are calibrated on a schedule determined by the research investigators.

Instruments 4, 8, 9, and 10 are calibrated every six months by Health Physics Associates (1) or Radiological Health Services (2). Instrument 10 is calibrated only with the 489-4 detector; other detectors are not used to quanitify radiation fields.

Instruments 5 and 6 have scales which read only in counts per minute. These instruments are used only for the detection, and not for the quantification of, radiation. Both these instruments are checked every six months with a Cs-137 check source to assure constancy of response.

Instrument 7 is calibrated on a six-month schedule by Eberline Instrument Company, Inc. (3).

Instruments 11 through 13 are used exclusively for tritium measurements. These instruments are calibrated on a six-month schedule either by Johnston Laboratories, Inc. (4) or by KMS Fusion, Inc., using a Johnston Laboratories model CL-1 tritium monitor calibrator. Commercially available tritium-containing calibration gas is used; the specific activity of the calibration gas is specified by the manufacturer and is traceable to the National Bureau of Standards. Calibration is done at two points on each scale. Instrument inaccuracies in excess of ten percent are noted on the instrument by attachment of a legible label.

(1) Health Physics Associates Ltd.
3304 Commercial Avenue
Northbrook IL 60062
(312) 564-3330

(2) Radiological Health Services
Medical & Health Phys. Consultants
8743 Holly Drive
Canton, MI 48187
(313) 459 4939

(3) Eberline Instrument Corporation
312 Miami Street
West Columbia, SC 29169
(803) 796-3604

(4) Johnston Laboratories, Inc.
3 Industry Lane
Cockeysville, MD 21030
(301) 666-9500

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Item 12. Personnel Monitoring Devices

Monitoring for external beta and gamma radiation is done using lithium fluoride thermoluminescent dosimeters (TLDs). Monitoring for exposure to neutrons is done using CR-39 track-etch dosimeters. Both dosimeter types are provided, and analyzed, by R.S. Landauer Jr. and Co., Glenwood Science Park, Glenwood IL 60425. We have two accounts with Landauer. Dosimeters on one account, comprising TLD dosimeters only, are exchanged on a quarterly schedule. Dosimeters on the second account which contain both TLD and track-etch dosimeters, are exchanged monthly. Ring dosimeters are used in a few instances where deemed appropriate.

Monitoring of visitors is performed using pen-type electroscope dosimeters (Dosimeter Corp. models 883 and 884 or equivalent). Calibration of these dosimeters is done at six-month intervals using Dosimeter Corp. calibrators. The calibration factor of all dosimeters is recorded. Dosimeters in error by more than 20 percent are withdrawn from service.

Item 13 Facilities and Equipment. A floor plan of KMS Fusion building no. 2, located at 3621 S. State Road, is attached. Research using large quantities of tritium is done exclusively in building 2. A description of the safety-related facilities and equipment for rooms in which radioactive materials are used follows.

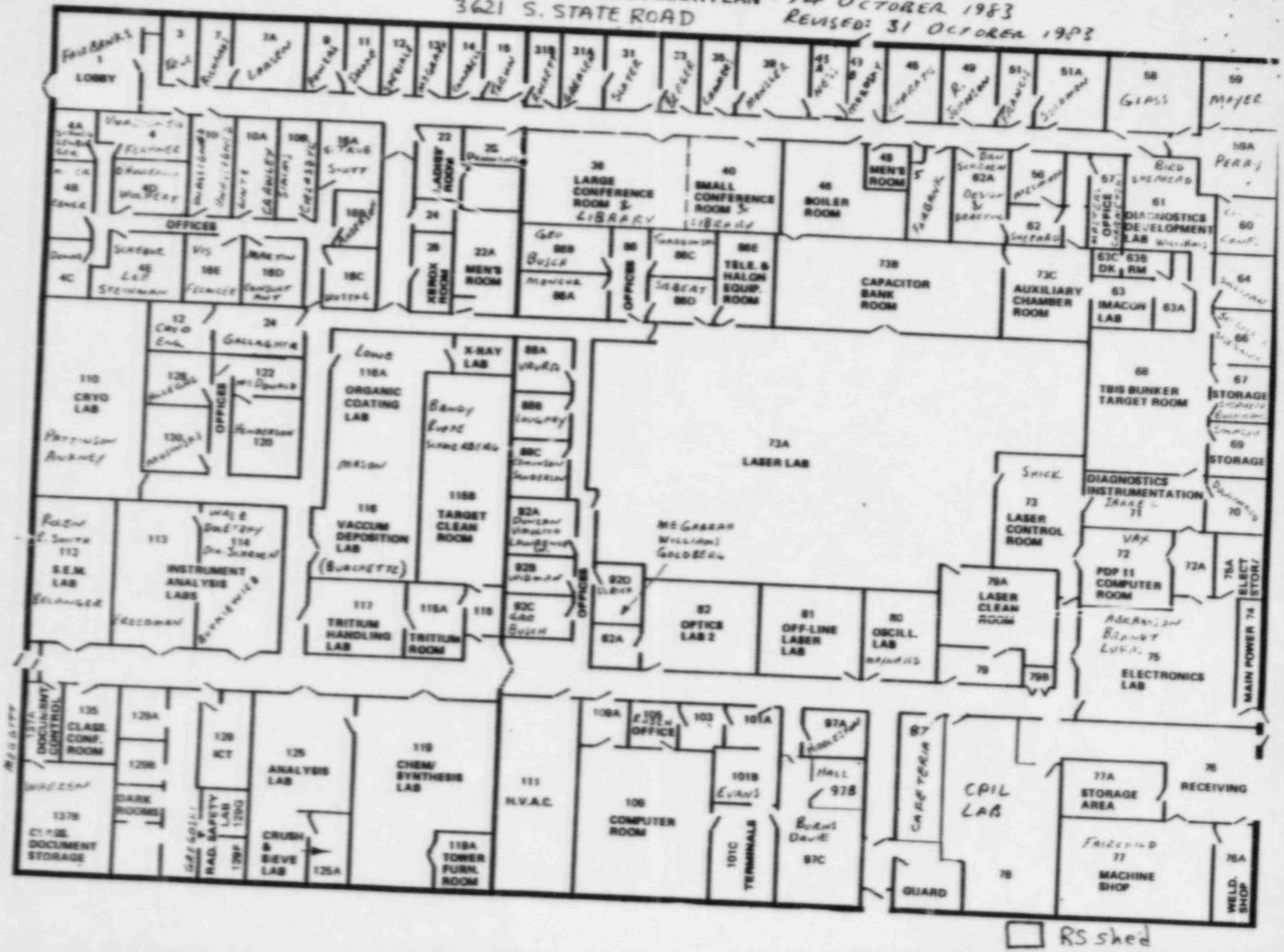
Room Number	Use	Safety facilities and equipment
117	Tritium storage, permeation fill, and other major operations	Stand-up fume hood (60" x 60"), permeation fill apparatus, uranium beds used for tritium storage, secondary containment glove box, auxiliary glove box, three gas purifiers for trapping any tritium released into secondary containment glove box, isolated ventilation system, tritium monitoring instruments for stack and secondary containment glove box, limited access
115A	Low-level tritium operations	Stand-up fume hood (36" x 60"), isolated ventilation system, limited access
115	Vestibule/coatroom	Monitoring instruments for 115A, 115B, 117, low-level stack
115B	Target sorting and mounting (low-level)	Bench-type fume hood (48" x 36"), isolated ventilation system, limited access, glove box
73B	Capacitor and sealed source storage	Limited access, halon fire extinguishing system, tongs for neutron sources, portable paraffin shield for transporting neutron sources
near 78	Guard station	Room air concentration (115A, 115B, 117) and stack (117, 115A) alarms are remote-wired to guard station as well as local
RS shed	Radioactive waste storage	Access controlled. Fenced in, locked, barbed wire, infra-red sensors
129F & G	RSO lab	48" x 36" fume hood, portable monitor storage, liquid scintillation counter

Radioactive materials are used in other areas of the building on an occasional basis. These are low levels (e.g., 1 mCi tritium elemental gas) for which no special facilities or equipment are necessary.

BUILDING No. 2 FLOOR PLAN - 14 OCTOBER 1983

3621 S. STATE ROAD

REVISED: 31 OCTOBER 1983



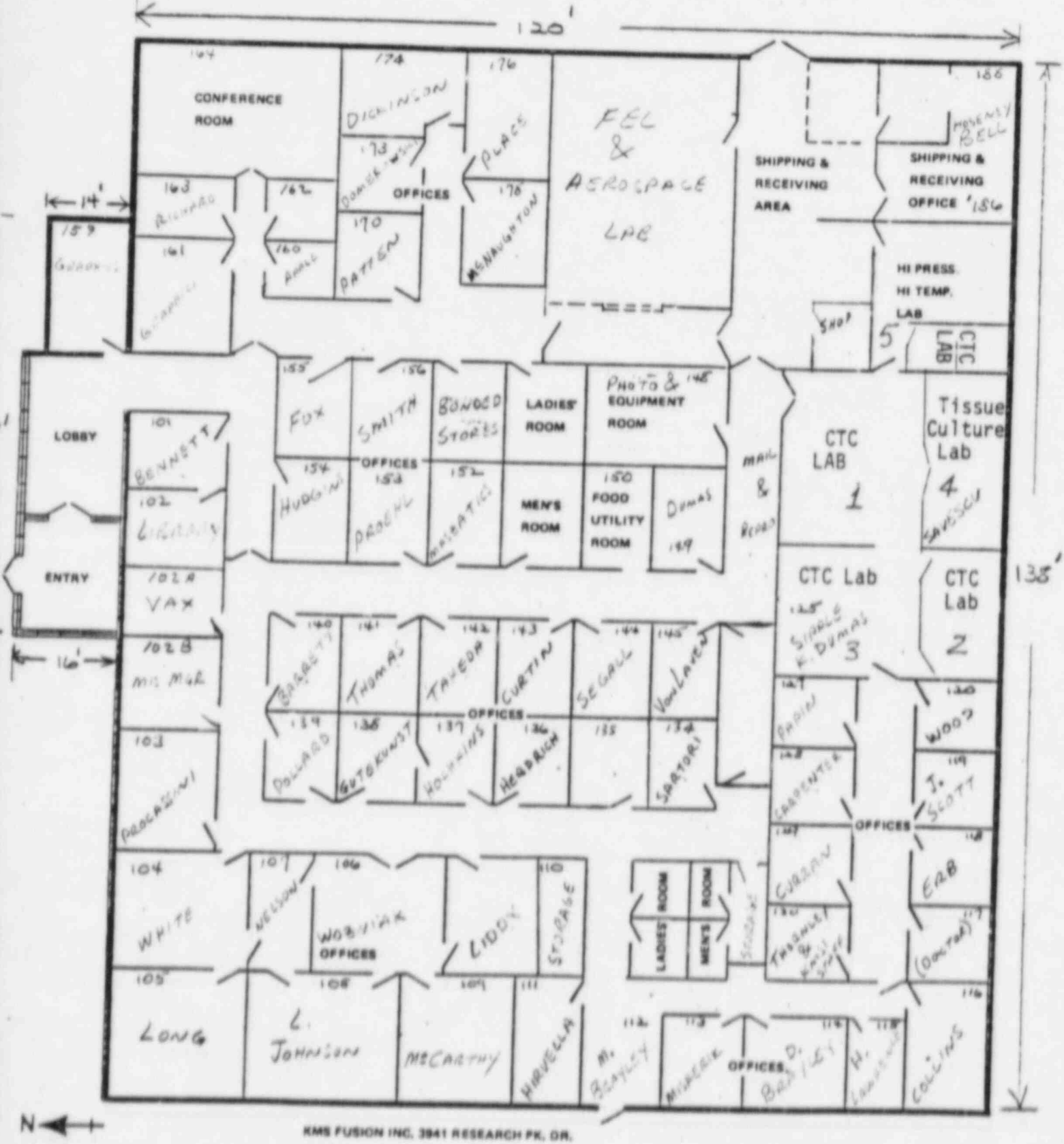
A floor plan of KMS Fusion, Inc. building 1, located at 3941 Research Park Drive, is also attached. Radioactive material is used only in the rooms at the south side of the building labeled "CTC Lab".

Room Number	Use	Safety facilities and equipment
CTC 1	Counting instruments low-level radioimmunoassay lab.	Access control
CTC 2	Radioiodinations waste storage	48" x 36" stainless steel fume hood equipped with charcoal filter. Access control.
CTC 3	Isotope storage	Access control. Lead shields for storage of millicurie quantities of I-125.
CTC 5	Low-level isotope storage	Access control.

PLANT 1 - 14 OCTOBER 1983

REVISED: 31 OCTOBER 1983

(Approx. dimensions)



KMS FUSION INC. 3941 RESEARCH PK. DR.

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Item 14. Waste Disposal

Solid radioactive waste will be compacted, packaged properly for shipment (generally DOT 17H drum) in a manner which meets all applicable Department of Transportation and disposal site regulations, and transferred to U.S. Ecology for ultimate disposal at the Richland, Washington, site. Our State of Washington Site Use Permit number is 4030.

Low-level liquid radioactive waste, including small quantities of liquid scintillation waste will be discharged to the sanitary sewer in accordance with 10CFR20.303 and 10CFR20.306. Higher levels of aqueous liquid waste will be absorbed or solidified according to a process approved by the State of Washington before being packaged and transferred to U.S. Ecology as described above. No non-aqueous liquid waste is anticipated.

NCR-FORM 313 1 (12-81)

Item 15. Radiation Protection Program

All aspects of the required radiation protection program are existent. The Radiation Safety Committee meets bimonthly to review problems and formulate policy as required. Policy and procedures exist for

a. procurement control of radioactive material

b. inventory of radioactive material

c. storage of and control of access to radioactive material

d. personal dosimetry including bioassay

e. receipt and survey of incoming packages of radioactive material as required by 10CFR20.205 and Regulatory Guide 7.3

f. control of laboratory contamination (surface wipe tests are done on a weekly basis, and will be done immediately after any radioiodinations)

Two copies of KMS Fusion Radiation Safety and Procedures Manual are enclosed. This manual describes the Radiation Protection program in detail.

FEDERAL EXPRESS

PLEASE COMPLETE ALL INFORMATION IN THE 5 BLOCKS OUTLINED IN ORANGE
SEE BACK OF FORM SET FOR COMPLETE PREPARATION INSTRUCTIONS

AIRBILL NUMBER 560489683

YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0482-9132-0

DATE: 11/18/83

FROM (Your Name): J Widman
COMPANY: K M S FUSION INC
STREET ADDRESS: 3621 SOUTH STATE
CITY: ANN ARBOR STATE: MI

TO (Recipient's Name): MATERIALS LICENSING BRANCH
COMPANY: U.S. Nuclear Regulatory Commission
STREET ADDRESS (P.O. BOX N° USERS ARE NOT DELIVERABLE): 799 Roosevelt Rd - Region III
CITY: Glen Ellyn STATE: ILL
ZIP (ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY): 60137

AIRBILL NO. 560489683

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE): 8073

PAYMENT: ☒ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card ☐ Cash in Advance
Account Number/Credit Card Number

IN TENDERING THIS SHIPMENT, SHIPPER AGREES THAT F.E.C. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM CARRIAGE HEREOF. F.E.C. DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS SHIPMENT. THIS IS A NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY. UNLESS YOU DECLARE A HIGHER VALUE, THE LIABILITY OF FEDERAL EXPRESS CORPORATION IS LIMITED TO $100.00. FEDERAL EXPRESS DOES NOT CARRY CARGO LIABILITY INSURANCE.

SERVICES (CHECK ONLY ONE BOX): ☒ 1 PRIORITY 1 – Overnight Package
DELIVERY AND SPECIAL HANDLING (CHECK SERVICES REQUIRED): ☒ 2 DELIVER

PACKAGES	WEIGHT	DECLARED VALUE
1	12	NDV
TOTAL 1	TOTAL 12	TOTAL NDV

RECEIVED AT: ☒ REGULAR STOP

RECEIVED BY (Signature): X

OVERNIGHT IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE "SPECIAL HANDLING".

FEDERAL EXPRESS USE: FREIGHT CHARGES / DECLARED VALUE CHARGE / ADVANCE ORIGIN / ADVANCE DESTINATION / OTHER / TOTAL CHARGES

PART# 2041730751 FEC-S-0751 D/O/8 REVISION DATE 7-82 GBF PRINTED USA

RECIPIENT COPY (AFFIXED TO PACKAGE, GIVEN TO RECIPIENT AT DELIVERY)

KMS fusion, inc.
A SUBSIDIARY OF KMS INDUSTRIES, INC.
3621 South State Rd.
Ann Arbor, MI 48104
313/769-8500
TELEX 235237

SHIPPER
NUMBER: 8073

SOLD TO.

SHIP TO:
U.S. Nuclear Regulatory Comm
799 Roosevelt Rd
Glen Ellyn, ILL 60137

Attention; Materials Licensing Branch
Region III

REF. P.O. NO.:	N/A
SHIPPED VIA:	Federal Express
WAYBILL NO.:	560489683
F.O.B. POINT:	Ann Arbor
PREPAID X COLLECT	
CONTAINERS:	1
GROSS WEIGHT:	12#
DECLARED VALUE:	NDV
DATE SHIPPED:	11-18-83

ITEM NO.		QTY. SHIPPED
1	License Renewal Application	1 lot

REASON FOR SHIPMENT:

Above

Control No. 75962

KMS industries inc.	CHECKED BY	REQUESTED BY	MAT'L SIGNED FOR BY
	C. BELL	J. Widman	

PURCHASING ACCOUNTING SHIPPING PROPERTY PACKING SLIP REQUESTOR ITEM