

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

| <p>1. (Check one)</p> <input type="checkbox"/> (a) New license<br><input type="checkbox"/> (b) Amendment to License No. _____<br><input checked="" type="checkbox"/> (c) Renewal of License No. <u>STB-258</u><br><input type="checkbox"/> (d) Previous License No. _____  |                        | <p>2. NAME OF APPLICANT</p> <p><b>S &amp; F Appliances, Ltd.</b></p> <hr/> <p>3. PRINCIPAL BUSINESS ADDRESS</p> <p><b>Morris, Illinois 60450</b></p> |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
|--|------------------------|--|--|----------|-------------------|--|--|-----------------|--|--|--|---------------------------------------|--|--|--|-------------------|------------------------|-----------------|-------------------|
| <p>4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED</p> <p><b>613 West Washington Street Morris, Illinois 60450</b></p>   |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>5. BUSINESS OR OCCUPATION</p> <p><b>Manufacturer</b></p>  |                        | <p>6. (a) IF APPLICANT IS AN INDIVIDUAL, STATE CITIZENSHIP</p>   | <p>(b) AGE</p>                                 |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED</p> <p><b>Manufacture of Incandescent Gas Mantles</b></p>  |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">(a) TYPE</th> <th style="width:25%;">(b) CHEMICAL FORM</th> <th style="width:25%;">(c) PHYSICAL FORM (Including % U or Th.)</th> <th style="width:30%;">(d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds)</th> </tr> </thead> <tbody> <tr> <td>NATURAL URANIUM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>URANIUM DEPLETED IN THE U-235 ISOTOPE</td> <td></td> <td></td> <td></td> </tr> <tr> <td>THORIUM (ISOTOPE)</td> <td><b>Thorium Nitrate</b></td> <td><b>Granular</b></td> <td><b>2,000 lbs.</b></td> </tr> </tbody> </table> <p>(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (in pounds)</p> <p><b>2,000 lbs. - 909.09 Kgms.</b></p> |                        |  |  | (a) TYPE | (b) CHEMICAL FORM | (c) PHYSICAL FORM (Including % U or Th.) | (d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds) | NATURAL URANIUM |  |  |  | URANIUM DEPLETED IN THE U-235 ISOTOPE |  |  |  | THORIUM (ISOTOPE) | <b>Thorium Nitrate</b> | <b>Granular</b> | <b>2,000 lbs.</b> |
| (a) TYPE   | (b) CHEMICAL FORM      | (c) PHYSICAL FORM (Including % U or Th.)   | (d) MAXIMUM AMOUNT AT ANY ONE TIME (in pounds) |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| NATURAL URANIUM  |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| URANIUM DEPLETED IN THE U-235 ISOTOPE  |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| THORIUM (ISOTOPE)  | <b>Thorium Nitrate</b> | <b>Granular</b>  | <b>2,000 lbs.</b>                              |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL RADIATION HAZARDS ASSOCIATED WITH EACH OF THOSE PROCESSES.</p> <p><b>See Attached</b></p>   |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>10. DESCRIBE THE MINIMUM TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE THAT MAY BE REQUIRED OF APPLICANT'S SUPERVISORY PERSONNEL INCLUDING PERSON RESPONSIBLE FOR RADIATION SAFETY PROGRAM, (OR OF APPLICANT IF APPLICANT IS AN INDIVIDUAL).</p> <p><b>See Attached</b></p>  |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9. INCLUDE (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air sampling, and other survey equipment as appropriate. The description of radiation detection instruments should include the instrument characteristics such as type of radiation detected, window thickness, and the range(s) of each instrument).</p> <p><b>See Attached</b></p>  |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |
| <p>(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE, INCLUDING AIR SAMPLING EQUIPMENT (for film badges, specify method of calibrating and processing, or name supplier)</p> <p><b>See Attached</b></p>   |                        |  |  |          |                   |  |  |                 |  |  |  |                                       |  |  |  |                   |                        |                 |                   |

**RECEIVED BY LFMB**

Date **FEB 1 1979**

Log. **Feb Po 2 Renewal**

By **[Signature]**

Orig. To .....

Action Compl. **2/2/79**

Applicant **1793**

Check No. **1793**

Amount, Fee Category **\$10 (25)**

Type of License **Renewal**

Issued to **Brown**

DATE **FEB 1 1979**

Received by **[Signature]**

A-49

11(c). VENTILATION EQUIPMENT WHICH WILL BE USED IN OPERATIONS WHICH PRODUCE DUST, FUMES, MISTS, OR GASES, INCLUDING PLAN VIEW SHOWING TYPE AND LOCATION OF HOOD AND FILTERS, MINIMUM VELOCITIES MAINTAINED AT HOOD OPENINGS AND PROCEDURES FOR TESTING SUCH EQUIPMENT.

See Attached

12. DESCRIBE PROPOSED PROCEDURES TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY AND RELATE THESE PROCEDURES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE (a) SAFETY FEATURES AND PROCEDURES TO AVOID NONNUCLEAR ACCIDENTS, SUCH AS FIRE, EXPLOSION, ETC., IN SOURCE MATERIAL STORAGE AND PROCESSING AREAS

See Attached

(b) EMERGENCY PROCEDURES IN THE EVENT OF ACCIDENTS WHICH MIGHT INVOLVE SOURCE MATERIAL.

See Attached

(c) DETAILED DESCRIPTION OF RADIATION SURVEY PROGRAM AND PROCEDURES.

See Attached

13. WASTE PRODUCTS: If none will be generated, state "None" opposite (a), below. If waste products will be generated, check here  and explain on a supplemental sheet:

- (a) Quantity and type of radioactive waste that will be generated.
- (b) Detailed procedures for waste disposal.

14. IF PRODUCTS FOR DISTRIBUTION TO THE GENERAL PUBLIC UNDER AN EXEMPTION CONTAINED IN 10 CFR 40 ARE TO BE MANUFACTURED, USE A SUPPLEMENTAL SHEET TO FURNISH A DETAILED DESCRIPTION OF THE PRODUCT, INCLUDING:

- (a) PERCENT SOURCE MATERIAL IN THE PRODUCT AND ITS LOCATION IN THE PRODUCT.
- (b) PHYSICAL DESCRIPTION OF THE PRODUCT INCLUDING CHARACTERISTICS, IF ANY, THAT WILL PREVENT INHALATION OR INGESTION OF SOURCE MATERIAL THAT MIGHT BE SEPARATED FROM THE PRODUCT.
- (c) BETA AND BETA PLUS GAMMA RADIATION LEVELS (Specify instrument used, date of calibration and calibration technique used) AT THE SURFACE OF THE PRODUCT AND AT 12 INCHES.
- (d) METHOD OF ASSURING THAT SOURCE MATERIAL CANNOT BE DISSOCIATED FROM THE MANUFACTURED PRODUCT.

### CERTIFICATE

(This item must be completed by applicant)

15 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 40, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

S. & F. Appliances, Ltd.

(Applicant named in Item 2)

Dated January 26, 1979

BY: K. G. Calaway

(Print or type name under signature)

**Ken G. Calaway, Vice President**

(Title of certifying official authorized to act on behalf of the applicant)

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.

SOLUTIONING OPERATIONS PERFORMED ON KNITTED RAYON FOR INCANDESCENT  
MANTLE FABRICATION

- 1 - Rayon thread is knitted into continuous open mesh seamless hollow tubular webbing by automatic knitting machines.
- 2 - Solution is prepared by dissolving thorium nitrate in water in the ratio 72 pounds thorium nitrate in 9 gallons water. This is done in a 40 gallon stainless steel tub equipped for mechanical agitation with a stainless steel propeller type mixer, the tub is covered during mixing.
- 3 - 18 pounds of webbing is placed in solution and soaked for one hour. Excess solution is removed by centrifugal extraction for 3 minutes and is drained back into tub for re-use, all personnel handling the wet webbing wear rubber gloves, aprons and plastic booties.
- 4 - The impregnated webbing is then hung on stainless steel racks and air dried.
- 5 - The dried webbing is placed in solution of distilled water and triethylamine for 15 minutes. Webbing is then drained over solution tank for 10 minutes and placed in extractor for removing excess solution.
- 6 - The webbing is washed 2 times in distilled water, after each wash the water is extracted. Each drainage from the washing operations is diluted with plain water, at a ratio of three parts water to one part drainage solution before emptying into sanitary sewer system.
- 7 - The solutioned and washed webbing is then dried on portable stainless steel racks at room temperature, after which it is coned into two pound rolls, then passed over steam vapors and sized to the proper width and reconed.
- 8 - Cones of dried and solutioned webbing are then placed on a special rack and passed through a diluted lacquer solution into rubber rollers and excess solution is removed.
- 9 - The lacquered webbing is then hung on racks to dry for about one hour, after which it is removed and once again placed on cones by use of a coning machine.

Note: All personnel performing the solutioning operations listed are provided with rubber gloves and aprons, to be used when handling solutioned webbing.

SOLUTIONING OPERATIONS PERFORMED ON KNITTED RAYON FOR INCANDESCENT  
MANTLE FABRICATION

SUPPLEMENT TO ITEM 9 OF SOURCE MATERIAL LICENSE APPLICATION

- 10 - Cones of solutioned webbing are now removed from solutioning department to mantle fabricating department and are cut off and sewn to pre-determined length for fabrication into mantles.
- 11 - The sewn mantles are then placed on a special machine where they are turned inside out, and steam pressed to proper size and shape.
- 12 - Head hardening solution (a mixture of alkaline salts and colored dye in water) is applied to the open end, or tope of the mantle.
- 13 - The open or top end of the mantle is folded inside and an asbestos thread is sewn into the hem.
- 14 - The finished mantle is stamped with a trademark or a number as required, inspected and packed in polyethylene bags to be packed for shipment.
- 15 - Mantles are packed for shipment in cell type cartons containing 3,000 - 5,000 mantles each.

SUPPLEMENT TO ITEM 10 OF SOURCE MATERIAL LICENSE APPLICATION

- 1 - Personnel responsible for operations:
  - a. Ken Calaway, B.S., M.E. has been involved in thorium processing operations for the past 30 years.
  - b. Mrs. Ada Fannin, plant manager, has been involved in thorium processing operations for 23 years at the Morris plant.
  - c. All personnel are supervised and instructed by above before performing any duties at the plant.

SUPPLEMENT TO ITEM 11 OF SOURCE MATERIAL LICENSE APPLICATION

- A -
  1. Monthly film badge service from R. S. Landauer, Jr. & Co.
  2. Annual external gamma, total and removable alpha and air samples are collected by a private radiation safety consultant.
  3. Beta, gamma survey meter is maintained on the premises.
  4. Wash water analyzed annually for thorium content.
- B -
  1. Survey meter calibrated annually by Health Physics Associates, Ltd. Air samples collected using Staplex-HiVolume air sampler by Health Physics Associates, Ltd.

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**SOLUTIONING OPERATIONS PERFORMED ON KNITTED RAYON FOR INCANDESCENT  
MANTLE FABRICATION**

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**SUPPLEMENT TO ITEM 11 OF SOURCE MATERIAL LICENSE APPLICATION**

- C - 1. An exhaust hood with a 20,000 C.F.M. blower unit is installed over the thorium mixing area (see exhibit 3).
2. Ventilation blower has been installed in the sub basement to exhaust air through a dedicated stack. Gratings have been installed between floors to draw air from the upper levels to the sub basement where it is exhausted. Doors between levels are kept open with thermostatic controlled check valves to close such doors in the event of a fire emergency.

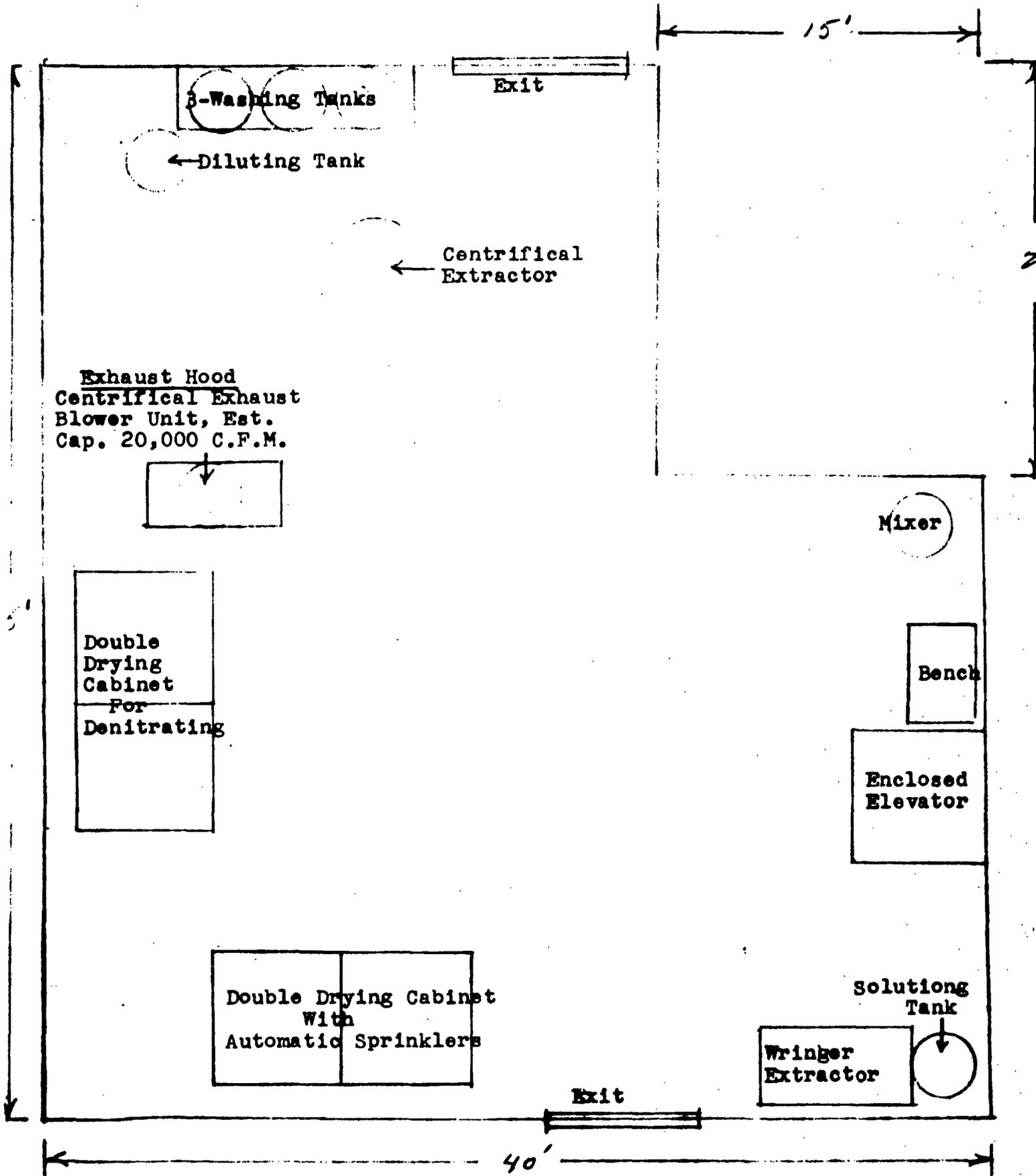
**SUPPLEMENT TO ITEM 12 OF SOURCE MATERIAL LICENSE APPLICATION**

- A - All personnel working with, and in the area containing radioactive material are informed and instructed in the hazards of exposure to such radioactivity and the necessary precautions to minimize exposure, and are advised as follows:
1. That they are working with radioactive materials.
  2. That under normal conditions of operation and on the basis of currently accepted permissible doses of radiation, there is no occupational hazard.
  3. That radioactive materials should not be ingested, and they should refrain from or avoid putting in their mouths any cigarettes, impregnated thread or other materials containing thorium, and to wash their hands carefully before eating.
  4. That they are required to change shoes and wear aprons when in the plant.
    - a. Good housekeeping is maintained at all times by thorough detergent scrubbing and cleaning of all floors, walls and equipment weekly.
    - b. Normal fire and safety protection is provided throughout the plant including automatic sprinklers in drying cabinets (exhibit 3) and certain other areas.
    - c. Proper radioactive caution and danger signs are posted in areas where these materials are used and stored.
    - d. All tanks and containers containing thorium, dry and in solution are kept and stored in their proper location, and labeled with radioactive caution or danger labels and signs.
    - e. Permanent records and reports are studied and kept of all radiation surveys, and of personnel monitoring data obtained by monthly film badge reports of each employee.

EXHIBIT 3 - ITEM 11(c)

LAYOUT OF MANTLE SOLUTIONING AND DRYING ROOM - MORRIS, ILL.

S. F. Appliances Limited  
80 Broad Street  
New York, N. Y. 10004



**SOLUTIONING OPERATIONS PERFORMED ON KNITTED RAYON FOR INCANDESCENT  
MANTLE FABRICATION**

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**SUPPLEMENT TO ITEM 12 OF SOURCE MATERIAL LICENSE APPLICATION**

- B - In the event of a catastrophic incident, the local fire department would be notified. In view of the several reactors and fuel storage facilities in the proximity of Morris, our fire department is well acquainted in the handling of source material incidents. Further information has been given them to further acquaint them with our product.

Ken Calaway and Ada Fannin would also be notified.

- C - Annual surveys are conducted by our radiation safety consultants as to:

1. External gamma levels.
2. Total surface alpha contamination levels.
3. Removable alpha contamination levels, as well as total thorium in discarded wash water.

**SUPPLEMENT TO ITEM 13 OF SOURCE MATERIAL LICENSE APPLICATION**

- A.- Waste products are accumulated in steel 55 and 10 gallon drums and shipped to licensed burial sites for disposal.