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 12-00621-03

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

Abbott Laboratories

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION

312-937-6100

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

Ronald L. Fredrickson

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION

312-937-5276

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

Ms. Marijane Sidote
Abbott Laboratories D.49C/AP-6C
North Chicago, IL 60064

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

(See attachment A)

(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. | Radioactive materials are to be used by or under the direct supervision of | |
| b. | individuals designated by the Corporate Radiation Safety Committee, | |
| c. | Ralph M. Robinson, Chairman. | |

7. RADIATION PROTECTION OFFICER

Ronald L. Fredrickson, M.S.

*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) | | | | |
| (2) | | (See attachment B) | | |
| (3) | | | | |
| (4) | | | | |

Sept 4 80
Applicant
Check No. 069945
Amount/Fee Category A.1.60-3A
Type of Fee Renewal
Date Check Rec'd 9/17/80
Received By

| | E DESCRIBE USE OF LICENSED MATERIAL |
|---|---|
| (1) | |
| (2) | (See attachment C) |
| (3) | |
| (4) | |

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NRC FORM 313 I (12-81)

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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) | Not applicable. | | |
| (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) | | | | | | |
| (2) | | (See attachment D) | | | | |
| (3) | | | | | | |
| (4) | | | | | | |

## 11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

☒ b. CALIBRATED BY APPLICANT

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

(See attachment E)

## 12. PERSONNEL MONITORING DEVICES

| TYPE (Check and/or complete as appropriate.) A | SUPPLIER (Service Company) B | EXCHANGE FREQUENCY C |
|---|---|---|
| ☒ (1) FILM BADGE<br>☒ (2) THERMOLUMINESCENCE DOSIMETER (TLD) (FINGERS)<br>☐ (3) OTHER (Specify): _____ | R.S. Landauer Jr. & Company<br>Science Road<br>Glenwood, Illinois 60425<br>(See attachment F) | ☒ MONTHLY<br>☐ QUARTERLY<br>☒ OTHER (Specify): WEEKLY |

## 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 attachment G)

## 14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

(See attachment H)

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:

(See attachment I)

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.

## 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)* $460.00 | b. CERTIFYING OFFICIAL *(Signature)* Ronald L. Fredrickson |
| | c. NAME *(Type or print)* Ronald L. Fredrickson |
| (1) LICENSE FEE CATEGORY: 3.A. Renewal | d. TITLE Corporate Radiation Protection Officer |
| (2) LICENSE FEE ENCLOSED: $ 460.00 | e. DATE August 26, 1983 |

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment A - Item 5

Street Addresses Where Licensed Material Will Be Used

1. 1400 Sheridan Road
   North Chicago, Illinois 60064

2. Abbott Park
   Route 43 (Waukegan Road) at Route 137 (Buckley Road)
   Lake County, Illinois

3. 13750 Laurel Lane
   Rondout,
   Lake Bluff, Illinois

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment B - Item 8A, 8B, 8C, 8D

Licensed Material

| Line No. | Element and Mass Number | Chemical and/or Physical Form | Name of Manufacturer and Model Number (If Sealed Source) | Maximum Number of Millicuries and/or Sealed Sources and Maximum Activity Per Source which will be Possessed at any one time. |
|---|---|---|---|---|
| | A | B | C | D |
| (1) | Any byproduct material with atomic number 1 through 83, inclusive. | Any | | Not to exceed 25 curies per radionuclide except:<br>Phosphorus-32:15 Curies<br>Iodine-129: 1 Curie<br>Iodine-131: 3.3 Curies<br>Not to exceed 25 Curies total. |
| (2) | Iodine-125 | Any | | 75 Curies |

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment C - Item 8E

Use of Licensed Material

1. Manufacture of radioimmunoassay diagnostics products.

2. Process and product research, development, and quality control.

3. Demonstration of product to customers in non-agreement states.

4. Storage for physical decay for radionuclides with half-lives of 60 days or less.

5. Calibration of radiation survey instruments.

August 26, 1983

Form NRC-3131
Abbott Laboratories
North Chicago, Illinois

Attachment D - Item 10

## Radiation Detection Instruments

Radiation Survey Instruments - 7

Laboratory Ratemeters, Low Energy Gamma - 4

Laboratory Ratemeters, Beta/Gamma - 5

High Volume Air Samplers - 2

Low Volume Air Samplers* - 5

Precision Beta Spectrometers - 10

Multi-Channel Gamma Analyzers - 4

This listing includes primarily equipment in the possession of the health physics group and is, in most cases, the minimum number available.

*Many other air samples are taken by using our house vacuum lines as the pump.

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment E - Item 11

## Calibration of Instruments

Analytical counting units (Tri-Carbs, gamma spectrometers, etc.) are calibrated with NBS traceable standards about once each year. Simulated standards are used more frequently when counting samples; in some cases standards are run with each set of samples.

Portable survey meters are calibrated every six months with a 1 Curie cesium-137 source in a J.L. Shepherd Model 28-6A Calibrator. Low level readings with this same unit are obtained by the use of an attenuator from J.L. Shepherd, calibrated to provide a reduction factor of 11.9. With this equipment it is possible for us to calibrate in the range of about 0.25 mR/hr up to about 400 mR/hr.

Decay corrections for the decreased output of the calibrator are made at 6 month intervals. Meter readings are taken at various distances from the calibrator, making use of the inverse square law to determine theoretical readings at each point. Meters are adjusted, if necessary, to measure this calculated value for the radiation field.

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment F - Item 12

## Personnel Monitoring

### Bioassays

Urine samples from persons working with beta-emitting radionuclides (e.g., $^{3}H$, $^{14}C$, $^{35}S$, $^{32}P$) are counted about once each quarter or at any time that ingestion of radioactive material is suspected. Samples are counted on a Packard Tri-Carb beta spectrometer along with suitable standards.

Persons working with millicurie quantities of radioiodine, particularly if volatile activity is present, are measured for thyroid radioiodine uptake. This procedure is performed with a gamma scintillation probe connected to a multichannel analyzer. Frequency of measurement is determined by the nature of the work and probability of uptake of radioiodine.

### Film Badges

Film badges are assigned in accordance with the requirements of our Operating Procedures (see attachment I). Films are changed monthly or weekly as dictated by the magnitude of the expected exposures, and wrist films are used to monitor extremity exposures where necessary. TLD rings are also used in some cases to monitor extremity exposures, mostly for persons handling relatively large amounts of phosphorus-32.

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment G - Item 13

## Facilities and Equipment

Buildings in which most of our work with radionuclides is carried out are R-1, R-1-A, R-1-B, and L-3 (1400 Sheridan Road, North Chicago); AP-1, AP-1A, AP-8, AP-8A, AP-9, and AP-9A (Abbott Park, Lake County, Illinois); and J-11 (Rondout, Lake Bluff, Illinois). The latter location is a distribution center only, handling the packaging and shipping of assembled radioimmunoassay diagnostic kits.

Laboratories used for low-level tracer work have no special construction requirements, although a fume hood is recommended. Most of the work in our radionuclide restricted laboratories is in this tracer category, and we presently have no high-level (100 millicuries or more) beta-gamma laboratories nor laboratories using alpha emitters. Our high level laboratories do, however, use multi-millicurie amounts of iodine-125, sometimes in amounts greater than 100 millicuries, for iodinations. Attached is a copy of the specifications for these high-level laboratories (see Abbott Engineering Standards - Environmental Standards for Buildings Restricted Radionuclide Laboratories). Laboratories are generally classified according to the scheme of the International Atomic Energy Agency: "Classification of Isotopes According to Relative Radiotoxicity Per Unit Activity" from SAFE HANDLING OF RADIOISOTOPES, Safety Series No.1, I.A.E.A., Vienna, 1958. Within that scheme, our Green Restricted Laboratories should correspond to Type C chemical laboratories, and our iodination laboratories to Type B radioisotope laboratories.

Waste storage is located in building R-1-B, room 1040; building AP-1A, room S-04; building AP-8, room 808; and building AP-9, room L-9. All of these rooms are somewhat isolated and are used mainly for storing soft beta or low-energy gamma-emitting radionuclides (e.g., iodine-125) not requiring special shielding. Storage of short half-life (60 days or less) radionuclides for decay is done in our building AP-15A in an isolated corner used only for this purpose. All material in this storage area is brought in in closed drums which have been checked for presence of external contamination.

Remote handling equipment, if needed, is available, as are lead bricks and lead storage containers. Volatile or potentially volatile radioactive materials are stored in fume hoods.

August 26, 1983

ENGINEERING STANDARDS

ENVIRONMENTAL STANDARDS

FOR BUILDINGS

# CLASS XIII



## RESTRICTED RADIONUCLIDE LABORATORIES

NOTE - The Corporate Radiation Safety Committee is required by the provisions of Title 10 Code of Federal Regulations Part 33.13 (c) (3) (ii and iii) (Nuclear Regulatory Commission Rules & Regulations) to review, approve and record safety evaluations of new and modified facilities for handling radioactive materials. Therefore, the Corporate Radiation Safety Committee must be involved in all phases of planning, design, construction and start up of such facilities.

### XIII-1 GENERAL

Radionuclide laboratories at Abbott are divided into the following classifications:

- High level restricted radionuclide laboratory - more stringent classification assigned to laboratories where more hazardous (higher radiation levels, larger quantities, etc.) materials are handled.
- Restricted radionuclide laboratory - less stringent classification for laboratories where less hazardous materials are handled.

It is the responsibility of the Corporate Radiation Safety Committee to assign the classification to each radionuclide laboratory.

If a building is to consist mainly or entirely of high level restricted radionuclide laboratories, its distance from other buildings not carrying out similar work, and from the perimeter of company property, shall be determined by the Corporate Radiation Safety Committee.

Restricted radionuclide laboratories should be kept, whenever possible, in general proximity to one another within a building, and should be kept away from areas of heavy pedestrian traffic such as hallways leading to building exits.

Space allotment per worker in restricted radionuclide laboratories should normally be at least 200 square feet. For routine production where most work is done in a hood, this figure may be somewhat reduced.

### XIII-2 BARRIERS

Walls between high level restricted radionuclide laboratories and their surroundings should be of material of suitable density to provide adequate shielding for the type of radiation involved.

Counting rooms should be in the general area of the laboratories but far enough removed that low background conditions will prevail.

Counting rooms should not be located where radioactive material in quantity passes nearby.

Radioactive waste storage rooms should be provided with adequate shielding and be located where traffic of workers is at a minimum.

XIII-3 CONSTRUCTION AND FINISHES

Because of the use of dense walls and heavy lead shielding in some restricted radionuclide laboratories, the structure may have to support more weight than in a conventional laboratory.

XIII-3.1 Floors. Floors should be of concrete with a continuous, seamless covering so that contamination from spills cannot become lodged in cracks.

XIII-3.2 Walls. Walls shall be sealed and painted to provide a glossy, non-porous surface for ease of decontamination. Strippable paints shall be used where unusual contamination problems are known to exist.

XIII-3.3 Ceilings. Ceilings may be hard finish plastered and painted, or acoustical tile.

XIII-3.4 Doors. All radionuclide laboratories shall be equipped with locking doors.

XIII-3.5 Windows. Window treatment will be as required by the functional and aesthetic needs of the area.

XIII-4 ATMOSPHERE

XIII-4.1 Temperature. Temperature shall be controlled at $68^{0}$F ($+ 2^{0}$ $-0^{0}$) during heating season, and $78^{0}$F $\pm$ $2^{0}$ during cooling season.

XIII-4.2 Humidity. As required by materials being handled, with a tolerance of +5 % R.H. In the absence of any such special need, humidity should be between 25 and 60% R.H. In winter, 20% may be used if necessary to minimize condensation on cold window surfaces (see Chapter 19 of the ASHRAE Guide).

XII-4.3 Air Filters. Except for laboratories where microbiological or other sensitive work is performed, air filters should be 50% ASHRAE efficiency (55% NBS efficiency).

XIII-4.4 Air Pressure and Flow. Air flow shall be from the non-restricted to the low level restricted to the high level restricted laboratories, not the reverse. Final discharge to the atmosphere is done via the hoods; air from radionuclide restricted laboratories shall not be recirculated through the building.

XIII-4.5 Dust and Vapor Removal. In a radionuclide laboratory, proper hood design is critical. The hood surface must be non-porous, smooth and suitable for easy decontamination. Stainless steel is excellent for this purpose and offers additional advantages of flame and chemical resistance. The hood should also have a 1/2 inch deep recessed floor so that radioactive material will be contained in the event of a spill.

The hood shall be provided with a vertical sliding door containing a window. For hoods to be used for low energy gamma-emitting radionuclides (e.g., iodine-125), this window shall contain a section fabricated from leaded glass bonded to lucite. For hoods to be used for high energy gamma-emitters, special glass is not required (shielding is accomplished by physically placing lead barriers inside the hood).

Hoods shall be designed to maintain an airflow face velocity of 125 lineal feet per minute with the door opened wide, and should be equipped with a bypass to keep face velocity constant as the door position is changed. If required, approved types of laminar flow hoods may be used for radionuclide work if they are equipped with proper filters.

Hoods should be equipped with switches connected to audiovisual alarms to indicate that air flow has fallen below acceptable levels. In the event of total air failure in the hood, manual or automatic cutoff of the room air supply should be possible to prevent backflow of air from the laboratory to surrounding areas.

Hood ducts from high level restricted radionuclide laboratories may be connected with ducts from other high level radionuclide laboratories, but shall not be interconnected with ducts from regular chemical laboratories. All sheet metal ducts should have soldered seams or be well caulked to prevent leakage.

Exhaust stacks discharging air from high level restricted radionuclide laboratory hoods should extend an optimum height above roof level and be located away from any air intakes; conversely, air intakes should be located away from fume hood exhausts.

Suitable charcoal filters shall be installed on all hood exhaust ducts to minimize or prevent discharge of radioactive material to the environment. Experience in removing radioiodine from hood exhaust air has shown that frequently the manufacturer's recommended charcoal bed depth and flow capacity are inadequate to meet Abbott

requirements. Typically, Abbott is using 2 - 4 times more charcoal per cu. ft. of air than the manufacturer recommends. Following are specifications for the charcoal filters to be used for radioactive applications:

- 1" deep Series FE 24" x 24" cells containing Type 727 charcoal - manufactured by Barneby Cheney Company, Columbus, Ohio. This filter is stocked in the North Chicago Maintenance stockroom as Item No. 40-24-515. (Equivalent charcoal filters from other manufacturers may be substituted if approved by the Corporate Radiation Safety Committee).

- Two of the above cells shall be installed in series for each 500 SCFM of hood exhaust air flow.

Hood fans and all controls shall be designed and constructed to appropriate explosion-proof standards. Minimum classification shall be Class I Division I Group C. Final decision on actual classification must be approved by Corporate Loss Prevention Department.

Because the major part of high level work will be done in the hood, radioactive waste drains should be provided in all hoods located in buildings equipped with liquid waste retention systems.

Various utilities will be needed within the hoods, but controls for these should be located outside the hoods.

Hoods arranged back-to-back and containing multi-millicurie levels of high energy gamma-emitting radionuclides shall have shielding between them. Shielding may also be needed at each end of the hood as well as at the floor and top of the hood in high level radionuclide laboratories using these gamma emitters. This shielding plus lead bricks occasionally placed inside the hood will probably necessitate reinforced hood construction to support the weight.

XIII-4.6 Particulate Matter. A glove or containment box or specially ventilated laboratory area should be provided where dry or dusty radioactive material is handled.

XIII-4.7 Viable Microorganisms. Usually not monitored.

XIII-5 PROCESS EQUIPMENT

In general, requirements shall be defined for individual laboratories. Instrument selection shall consider section 17402, "Selection of Critical Instruments".

All refrigerators and freezers must be modified electrically - usually by the Abbott Maintenance Department - to eliminate or relocate all arcing devices so they are outside the storage chamber, to minimize explosion hazard. See Standard 1813.5.

XIII-6 FURNITURE

Stainless steel bench tops with an elevated lip at all edges are recommended, but stainless steel trays on standard laboratory benches may be used instead.

Sink surfaces should be of stainless steel construction throughout. Each laboratory should have at least one deep sink with foot or knee-operated faucets. Additional cup sinks with conventional faucets will be needed and should also be of stainless steel. Each hood should be equipped with an easily accessible radioactive waste drain which runs to a holding pit or container isolated so that no workers are exposed to a radiation hazard. Pipes from these radioactive waste drains should be constructed without traps and be as leak resistant as possible.

Office and desk space for workers in high level restricted laboratories should not be located in the laboratories in order to minimize exposure of the workers to radiation and radioactive materials.

XIII-7 ILLUMINATION

As provided in the lighting section of the Abbott Electrical Standards.

XIII-8 AUXILIARY SERVICES

Appropriate health physics instruments should be provided for each high level restricted laboratory. Among these instruments are audio monitor ratemeters, portable survey meters and, where applicable, alarm devices or air samplers for detecting and measuring airborne radioactivity.

Various audible and/or visible alarms (redundant systems desirable) should be used in high level restricted laboratories to call the attention of personnel to existing or potential hazards.

a. Level control alarms should be used to provide warning when hot drain receptacles or pits are nearly full.

b. Doors to high radiation areas must be provided with a lock and/or an interlocking alarm system which operates when the door is opened.

c. Hood air flow alarm systems are discussed under paragraph 4.4.

XIII-8 AUXILIARY SERVICES (Contd.)

Although much equipment can, and should, be decontaminated in the laboratory where it is used, an equipment decontamination room may be provided, with a hood, to serve the needs of several high level laboratories.

Animal quarters suitable for metabolic studies with high levels of radioactive material should be provided as necessary to support the work of the high level laboratories. Metabolism cages with containers for collecting excreta should be available. In those cases where radioactive material is present in the air expired by experimental animals, provision must be made to exhaust and discharge this air through a hood, or other, exhaust to remove it from the work areas. A freeze chest should be provided for storage of carcasses and excreta until radioactivity is gone by decay or, for long-half-life radionuclides, the material can be shipped away for burial.

Proximity of shower and change rooms for persons working in high level laboratories is desirable.

# OPERATING PROCEDURES - RADIOACTIVE WASTE DISPOSAL

## ABBOTT LABORATORIES

## NUCLEAR REGULATORY COMMISSION (NRC) BYPRODUCT MATERIAL LICENSES

## 12-00621-02 AND 12-00621-03

Each person working with radioactive material must know and understand the applicable portions of the Operating Procedures set forth below, and put them into practice in his work.

Supervisory personnel must in addition, correct any infractions of these Operating Procedures by their employees.

All persons will receive training in those sections of the Operating Procedures appropriate to their work.

### I. RADIOACTIVE WASTE CATEGORIES

#### A. Solid Waste

Solid (or dry) radioactive waste is that which does not contain visible liquid. It may consist of radioactive powders, contaminated paper materials, contaminated gloves, contaminated glassware, etc., or combinations of all of these. Throughout these procedures, "contamination" or "contaminated" refers to radioactive, not biological, contamination. For the latter, the terms infectious or biohazardous will be used.

#### B. Liquid Waste

##### 1. Liquid Radioactive Waste

Liquid radioactive waste is any liquid, slurry, wet sludge, etc., which is not free-standing when removed from its supporting container. In general, liquid radioactive wastes from laboratories at Abbott are aqueous or organic-solvent solutions of radioactive material.

##### 2. Scintillation Vials

Liquid scintillation vials are a subgroup in the liquid radioactive waste category because they are disposed of separately from other liquid wastes.

##### 3. Product Vials

Returned or rejected product vials containing less than 10 microcuries/vial of radioactivity are a subgroup in the liquid radioactive waste category because they are disposed of separately from other liquid wastes.

C. Biological Waste

Radioactive carcasses, excreta, tissues, blood, etc., are not regarded either as solids or liquids for waste disposal purposes, and they must be kept separate from solids or liquids as defined in I. A. and I. B.1, I. B.2., and I. B.3. Urine, however, is to be treated as liquid waste.

D. Non-contaminated Waste

Empty, non-contaminated containers bearing radioactive caution labels must be treated as radioactive until the labels are defaced, removed, or obliterated.

E. Other Radioactive Waste

For types of waste not defined in this section contact Health Physics, i.e., if you have radioactive wastes with unusual chemical (e.g., explosive, pyrophoric, highly toxic) or physical (e.g., highly volatile) properties. Non-radioactive toxic or hazardous waste must not be placed with radioactive waste.

CAUTION: THE VARIOUS CATEGORIES OF WASTE MUST BE KEPT SEPARATED FROM EACH OTHER.

II. LABORATORY WASTE DISPOSAL PROCEDURES

See Section III. A. for instructions for biohazardous radioactive waste.

The label below must be placed on your cans and bags of radioactive waste before the material is taken to the radioactive waste storage room. The label must be filled out completely.

**RADIOACTIVE WASTE**

Room No. _____ Date _____

Dept. No. _____ Nuclide _____

Total Activity _____

Type of Radioactive Waste:

Solid _____

Liquid _____

Liquid in Glass Vials _____

Liquid in Plastic Vials _____

Further, labels as below are available to identify waste as long (greater than 60 days) or short (60 days or less) half-life. Waste should be segregated into one of these two categories because of the different disposal route for each.

**LONG HALF-LIFE**
(OVER 60 DAYS)
WASTES ONLY:
Tritium, Carbon-14,
Cobalt-57, etc.

(RED)

**SHORT HALF-LIFE**
(60 DAYS OR LESS)
WASTES ONLY:
Iodine-125, Iron-59,
Phosphorus-32, etc.

(YELLOW)

A. Solid Radioactive Waste

Place all solid radioactive waste in containers marked with a sign bearing the legend, "Do Not Empty! Contaminated Waste. Caution Radioactive Materials", and the standard radiation warning symbol. Line the container with a 4 mil polyethylene bag of appropriate size before adding radioactive waste. Transfer the filled bag to the nearest waste holding room (see below) and place it inside a 4 mil plastic-lined 55 gallon drum. Label the bag with your initials, department number, date, radionuclide(s), and an estimate of the amount of radioactivity, if possible. Keep the volume of waste to the necessary minimum - do not place non-radioactive, non-contaminated material into the radioactive waste.

B. Liquid Waste

1. Liquid Waste

If your laboratory has a liquid radioactive waste drain (presently only AP-1A and AP-8 are so equipped), pour your liquid wastes down this drain. Caution! Pour liquid waste only into properly designated radioactive material drains; do not put liquid radioactive waste into a non-radioactive waste drain without Health Physics approval. If your laboratory does not have a radioactive waste drain, collect all liquid radioactive waste in containers of suitable size and construction. Adjust the solution pH to the range of 6 to 8. Place a standard radioactive warning label on the container. Label filled containers with your initials, department number, date, radionuclide(s), and an estimate of the amount of radioactivity, if possible. Transfer filled containers to the nearest waste holding room (see below) without delay. Keep the volume of waste to the necessary minimum - do not place non-radioactive solutions into the liquid radioactive waste container.

2. Scintillation Vials

Place filled liquid scintillation vials into the flats in which they were received or into 4 mil polyethylene bags, then transfer them to the nearest waste holding room (see below). Do not mix glass and plastic scintillation vials - they must be packaged separately, never intermixed in one container.

3. Product Vials

Empty liquid-containing product vials as described in Section II. B.1. above unless you have so many that it is impractical to do so. In that case place the vials into a Department of Transportation (DOT) Specification 17H 55 gallon drum after lining it with a 4 mil polyethylene liner. Put plastic vials into one drum and glass vials into another; do not intermix them in one container. Do not put any other type of radioactive waste material into these drums.

C. Biological Waste

Put perishable biological radioactive waste such as carcasses, excreta, tissues, blood (but not urine, which is considered liquid waste) into a 4 mil sealed polyethylene bag in a freezer unit. Contact Health Physics for final disposal of this material. Do not mix other types of waste, solid or liquid, with this biological material.

D. Non-Contaminated Waste

Remove, obliterate, or deface the radioactive caution label on non-contaminated, empty containers (e.g. a kit package or an unfilled vial) before disposing of them in non-radioactive waste containers.

E. Radioactive Waste Rooms - Locations

For purposes of this section, waste receiving and handling rooms are located as follows:

| | |
|---|---|
| R-1-B | Room 1040 |
| AP-9 | Room L-9 |
| AP-8 | Room 808 |
| AP-1, AP-1A | Room S04 in AP-1A |

For purposes of this section, Health Physics phone numbers are as follows:

| | |
|---|---|
| R-1-B | Ext. 4588 |
| AP-9 | Ext. 5276 |
| AP-1A | Ext. 5448 |
| AP-8 | Ext. 6134 or 6078 |

Contact Health Physics for information regarding containers, labels, etc., necessary for proper handling and disposal of radioactive waste.

CAUTION: KEEP RADIOACTIVE WASTES TO THE PRACTICAL MINIMUM. DO NOT PUT NON-RADIOACTIVE, NON-CONTAMINATED MATERIAL INTO RADIOACTIVE WASTE CONTAINERS OR DRAINS. DO NOT PLACE SOLID AND LIQUID RADIOACTIVE WASTES AND RADIOACTIVE CARCASSES IN THE SAME CONTAINER.

## III. WASTE PROCESSING PROCEDURES

A. Biohazard Radioactive Waste

If your radioactive waste is biohazardous, treat it as necessary to deactivate the biohazard before transferring it for radioactive waste disposal. Autoclave if possible or use chemical agents as recommended by the Biohazard Control Office for the infectious material being used. Chemical agents must also be approved by Health Physics because some of these produce airborne radioactivity problems. After biohazard deactivation, handle the wastes as described in Section II.

B. Solid Waste

As a measure to reduce the volume of solid radioactive waste at Abbott Laboratories, some wastes are compacted. Compactor operators must observe the following instructions:

1. Refer to and follow the instructions in the operating manual for the Consolidated Baling Machine Company, Model No. DOS-RAW-GE1 unit, or manuals for other units obtained in the future.

2. Wear a full face mask (Mine Safety Appliances Co. Mask and GMA-H Cartridge for organic vapors, iodine vapors and toxic particulate) for protection against ingestion or inhalation of airborne radioactive particulates or vapors. Operate only with adequate ventilation to prevent work area contamination.

3. Do not compact wastes marked with the long half-life (red) label unless instructed to do so by Health Physics.

C. Liquid Waste - Evaporation

As a measure to reduce the volume of liquid radioactive waste at Abbott Laboratories, some wastes are concentrated in a Ray-Di-Pak 50 vacuum evaporator. Concentrator operators must observe the following instructions:

1. Refer to and follow the instructions in the operating manual provided for this unit.

2. Adjust the liquid pH to 10 to 12 in order to minimize the evolution of volatile radioiodine.

3. Prior to release of the distillate to the sanitary sewer, provide Health Physics with a sample for assay.

4. Health Physics will record the quantity released in the Health Physics record of liquid waste disposal.

5. The concentrate will be held for decay until suitable for release to the sanitary sewer.

D. Liquid Waste - Solidification

All liquid radioactive waste to be consigned to a commercial radioactive waste burial facility must first be solidified. Acceptable processes at this time are:

1. To a 55 gallon DOT Spec. 17H drum lined with a 4 mil polyethylene liner are added alternating layers of absorbent* and liquid to a total of 11 gallons of liquid and enough absorbent to fill the drum. This may then be shipped as solid radioactive waste.

*Approved absorbents are:

Perlite (medium grade)
Diatomaceous Earth (medium grade)
Pel-E-Cel
Super Fine (Diatomite)
Speedi-Dry

E. Scintillation Vials

Transfer liquid scintillation vials to a DOT Spec. 17H 55 gallon drum lined with a 4 mil polyethylene liner. Place plastic and glass vials in separate drums, not intermixed. Transfer the drums to S-4 (Salvage) for shredding of plastic vials and hammermilling of glass vials (a Health Physics observer must be present during this process). Flush the vials with copious quantities of water to remove the radioactive material plus chemical scintillators to the chemical treatment plant. Perform these operations only with adequate ventilation because of chemical hazards. Transfer the well-washed plastic and glass debris to a sanitary landfill. In calculating releases to the sanitary sewer, assume that each vial contains 1/20th microcurie of mixed hydrogen-3 and carbon-14. Collect representative sewer samples for three days following the destruction and determine radionuclide concentration. Take smears of the disposal area to assure that contamination is controlled. Enter the quantities in the Health Physics liquid waste disposal records.

F. Product Vials

Pack surplus product vials containing liquids in DOT Spec. 17H 55 gallon drums lined with a 4 mil polyethylene liners and transfer, in accordance with all applicable DOT Regulations, to building AP-15A. Hold all drums for as long as possible in order to permit decay to reduce the amount released to the environment. Transfer the decayed material to Building S-4 (Salvage) for destruction as in III. E., above. Remove five bottles from each drum at random in order to obtain an assay sample of activity released. (A Health Physics observer must be present during this process.)

G. Biological Waste

To a 30 gallon steel drum lined with a 4 mil polyethylene bag, add animal carcasses and/or other biological materials previously described. Add absorbent* and lime (one part lime to 10 parts absorbent) to the biological material. Seal the plastic liner and the 30 gallon drum. Place the 30 gallon drum into a DOT Spec. 17H 55 gallon drum, and place absorbent between the 30 gallon drum and the 55 gallon drum.

*Approved absorbents are:

Perlite (medium grade)
Diatomaceous Earth (medium grade)
Super Fine (Diatomite)
Speedi-Dry

This may now be shipped as solid radioactive waste. See Section IV of these procedures.

Animal tissues which meet the test of Title 10 CFR Part 20.306(b) (0.05 microcuries or less of hydrogen-3 or carbon-14, per gram of animal tissue averaged over the weight of the entire animal;) will be destroyed by incineration.

## IV. FINAL PACKAGING, SHIPPING PAPERS, RADIOACTIVE WASTE SHIPMENT AND DISPOSAL FORMS

All persons involved in the work described in this section will receive adequate instruction in the appropriate DOT Regulations for final packaging and shipment of low-level radioactive waste.

A. All material must be packaged in accordance with the appropriate portions of Title 49 Code of Federal Regulations.

1. Pack material in DOT Spec. 17H 55 gallon steel drums with gasketed lid and bolt and ring closure.

2. Take radiation readings with a calibrated survey instrument at the surface of the closed container and at a distance of three feet from the portion of the container showing the highest surface reading.

3. Complete U.S. Ecology, Inc.'s, "Radioactive Waste Shipment & Disposal Form", filling in all applicable columns (use a dash in those columns not needed). Health Physics will make estimates of quantities shipped where absolute values are not known.

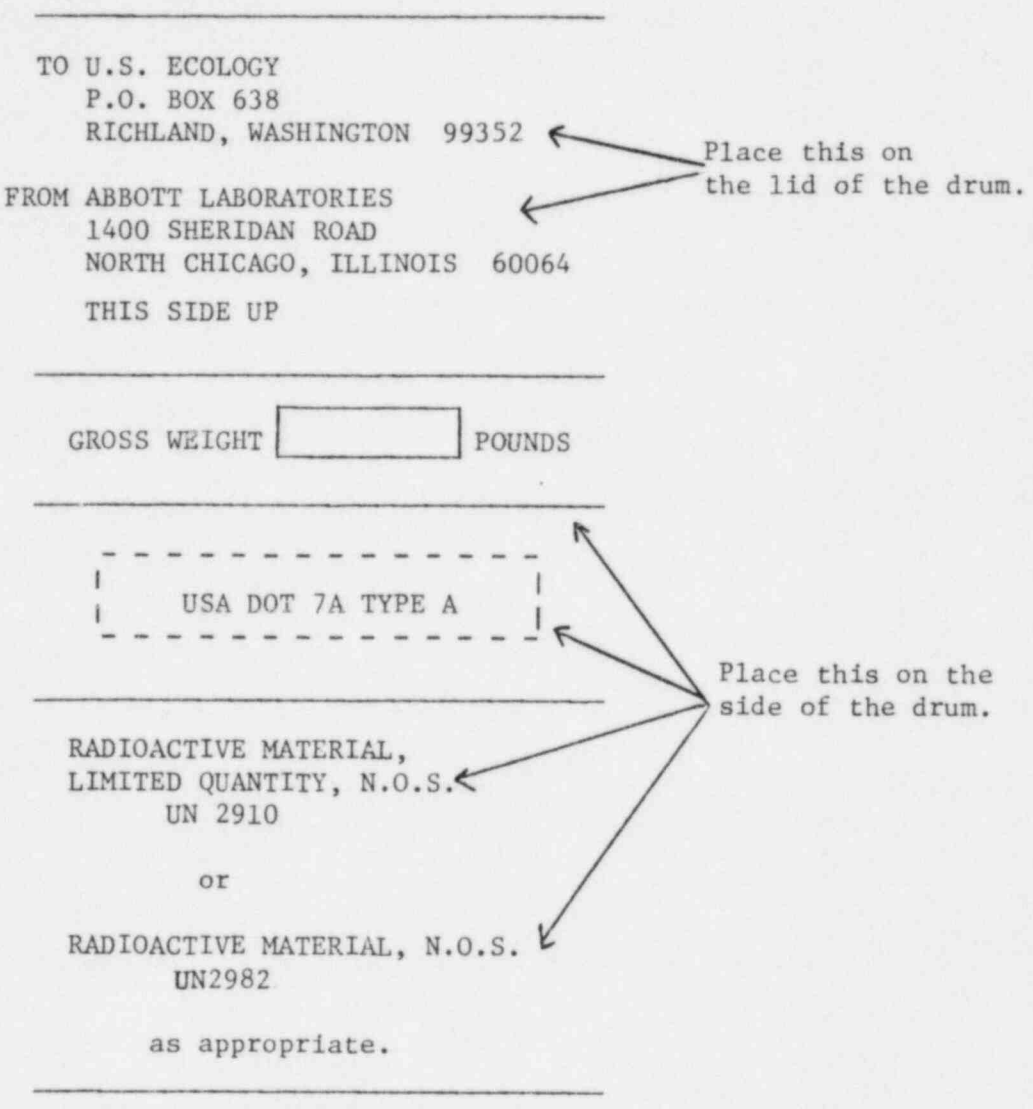
4. Complete an Abbott "No Charge Shipment Shipping and Accounting Memorandum" for billing purposes.

5. Complete a Bill of Lading for the trucker receiving the shipment. This is not needed for shipments picked up by U.S. Ecology.

6. Smear drums to evaluate the extent of surface contamination.

7. Based on radiation readings measured by procedures of 2., above, determine the appropriate DOT label to be affixed to the Shipment.

8. The following information must be stenciled on the shipping container (drum):




Adopted by the Abbott Laboratories Corporate Radiation Safety Committee on July 12, 1983.

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment I - Items 15, 16, and 17

## Radiation Protection Program

Please refer to additional attachments to this section: Abbott Diagnostics Division - Operating Procedures - Radiation Workers, the Corporate Radiation Protection Officer - (R.P.O.) job description which sets forth the responsibilities and authority of the R.P.O., and Corporate Radiation Safety Committee (RSC) which describes the RSC operation and responsibilities.

The current members of the RSC are:

Dr. Carl Bodo - Project Manager, Sterilization
Mr. Robert Dal Bello - Operations Manager, Physiologic Diagnostics
Mr. Ronald Fredrickson, Secretary - Corporate Radiation Protection Officer
Mr. Ralph Robinson, Chairman - Operations Manager, PPD Production
Mr. Stephen Smurthwaite - Director, Corporate Loss Prevention
Dr. Robert Sonders - Manager, PPD Drug Metabolism
"Open" - Director, Corporate Employee Health Services

### Dr. Carl Bodo

Training: BA. 1963, Gettysburg College (Science)
Ph.D., 1973, Syracuse University (Microbiology)

Parts C. and d. were covered in lectures in the following one-semester courses:

1. Determinative and Physiological Bacteriology at Syracuse University (1967).

2. Virology at Syracuse University (1969).

Experience:

Over two years experience supervising the operation of a 12,500 (nominal) Curie Gammacell 220 radiation sterilizer.

### Mr. Robert Dal Bello

Training: B.S., University of Illinois (Mechanical Engineering)
M.B.A., University of Chicago (Marketing)

Parts a. and d. were covered in in-house training at Abbott Laboratories.

Experience:

Nine years experience in manufacture of various radioactive products (radiopharmaceuticals and RIA's) at Abbott Laboratories.

Mr. Ronald Fredrickson, Secretary

Training: B.S., 1950, North Dakota State University (Chemistry)
M.S., 1951, North Dakota State University (Biochemistry)

Parts a., b., c., and d. were covered in the following courses:

1. Basic Isotope Methodology at Abbott Laboratories, conducted by Dr. Arthur Wase, 1961. 15 weeks-one two hour lecture and one four hour laboratory session each week.

2. Basic Radiological Health and Occupational Radiation Protection at Taft Sanitary Engineering Center, Cincinnati, Ohio, 1962.

3. Review Course for American Board of Health Physics Certification Examination at Argonne National Laboratory - 26 weeks with one 3 hour lecture each week, 1969 and 1970

Experience:

Two years laboratory radiosynthetic work at Abbott Laboratories using arsenic-73 and arsenic-74, 1960-1962.

Twenty-one years of applied health physics as Corporate Radiation Protection Officer at Abbott Laboratories, 1962 to present.

Typical amounts of radioactive material handled:

| Radionuclide | Maximum Amount | Type of Use |
|---|---|---|
| Arsenic-74 | 30 millicuries | Research |
| Cesium-137 | 1 Curie | Instrument Calibration |
| Hydrogen-3 | 30 Curies | Waste Disposal |
| Iodine-131 | 1 Curie | Waste Disposal |
| Mercury-203 | 500 millicuries | Waste Disposal |
| Iodine-125 | 1 Curie | Waste Disposal |

Mr. Ralph Robinson, Chairman

Training: M.S., 1950, University of Michigan (Chemical Engineering)
Basic Isotope Methodology course at Abbott Laboratories (1961).

Experience:

Argonne National Laboratory, Reactor Engineering Division, 1951-53.

Mr. Stephen Smurthwaite

Training: B.S., 1969, Utah State University (Manufacturing Engineering)
M.S., 1970, Texas A & M (Industrial Engineering)
M.B.A., 1981, Lake Forest School of Management
Basic Radiological Safety Protection and Occupational Radiation Protection (in-service training 1970-71) at USALHA and USPHS training centers.

Experience:

Radiation Protection Officer, U.S. Army Materials and Mechanics Research Center, Watertown, Massachusetts, 1971-72.

Radiation Protection Officer, Picatinny Arsenal, Dover, New Jersey, 1972-73.

Dr. Robert Sonders

Training: Ph.D., 1965, St. Louis University (Biochemistry).
Included radiation biology, nuclear theory, counting techniques.

Experience:

Carbon-14 synthetic work at St. Louis University, Carbon-14, hydrogen-3, and sulfur-35 radiosynthetic work at Abbott Laboratories. Presently manager of Drug Metabolism which includes radiosynthesis laboratories.

Sealed Source Leak Testing

Sealed sources are leak tested by the R.P.O. or a trained Radiation Monitor. All accessible surfaces of the source holder and its surroundings are carefully swabbed with a cotton swab on a stick (e.g., Q-Tip). The swab is counted in a test tube in a gamma scintillation well for cesium-137 sources or in a liquid scintillation counter for nickel-63 sources. Suitable calibrated standards are counted with each set of leak tests in order to determine counter efficiency and express results in microcuries.

Radiological Contingency Plan

In accordance with an NRC Order to Modify License dated February 11, 1981 (Docket No. 30-04038), a Radiological Contingency Plan (RCP) was written for Byproduct Material License 12-00621-03 to cover buildings AP-8 and AP-15A. As required by part 7.4 of the RCP we reviewed and updated the RCP in June of 1983. Enclosed with this section of our application are six copies of the revised pages which reflect the updated status of the RCP.

August 26, 1983

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment H - Item 14

## Waste Disposal

Please refer to Operating Procedures - Radioactive Waste Disposal which is part of this attachment and applies to both of our broad scope NRC licenses.

Solid radioactive waste material of long half-life (arbitrarily set at greater than 60 days) is given to U.S. Ecology for burial at its Richland, Washington site.

Other radioactive waste may be released in accordance with the provisions of 10CFR20.303, 10CFR20.106, or 10CFR20.306.

As mentioned in attachment G, radionuclides with half-lives of 60 days or less are held for decay until no residual activity is detected on any item with an Eberline RM-15 (or equivalent) with a low-energy gamma scintillation probe.

August 26, 1983

orm NRC-3131
bbott Laboratories
orth Chicago, Illinois

ttachment I - Items 15, 16, and 17

ABBOTT DIAGNOSTICS DIVISION

OPERATING PROCEDURES - RADIATION WORKERS

Byproduct Material License 12-00621-03

## I. GENERAL PROVISIONS

A. Purpose

To provide standards of conduct relative to radiation safety for persons working in or entering restricted areas. Standards of conduct for nonradiation workers who work in restricted areas are covered in another set of operating procedures.

B. Each individual radiation worker must understand the operating procedures set forth below, and put them into practice in his work, in order to ensure safety for himself and his fellow workers.

C. Supervisory personnel must ensure safety of all operations by correcting any infractions of these operating procedures by their employees.

## II. DEFINITIONS

A. Personnel

1. A nonradiation worker is any person who does not work with or handle radioactive material but who may enter or work in restricted areas where ionizing radiation exists.

2. A radiation worker is any person who may enter or work in radioactive material in any form.

B. Area*

1. A Red Restricted Area is one in which radioactive material is used in open or loose form in any quantity greater than the following:

| Radionuclide | Quantity |
|---|---|
| Iodine-125 | 0.2 millicurie |
| Iron-59 | 0.2 millicurie |
| Cobalt-57 | 1 millicurie |
| Phosphorus-32 | 1 millicurie |
| Carbon-14 | 5 millicuries |
| Sulfur-35 | 5 millicuries |
| Hydrogen-3 | 25 millicuries |

Limits for other radionuclides will be established by the RSC as necessary, based on considerations of the type of radiation, hazard of the radiation, and radiotoxicity of the nuclide.

2. A Yellow Restricted Area is one in which radioactive material is transported through in closed or sealed form in quantities greater than specified in 1, above, defining a Red Restricted Area.

3. A Green Restricted Area is one in which radioactive material is used in quantities less than those which define a Red Restricted Area.

* The ADD Radiation Safety Committee has the authority to take exception to the following definitions with a majority agreement and the subsequent approval of the Corporate Radiation Safety Committee.

## III. AREAS AND AREA CONDUCT

### A. Area Designation

1. Restricted areas are classified into three categories and posted with signs of the appropriate color:

   a. Green
   b. Yellow
   c. Red

2. Other posting required by NRC regulations will accompany these area-designating signs, as applicable. These areas may be posted as follows:

   a. Caution - Radiation Area
   b. Caution - High Radiation Area
   c. Caution - Radioactive Material
   d. Caution - Airborne Radioactivity Area

   Areas not so marked are unrestricted. In some cases these may be marked with a sign "Radioactive Material is not permitted in this area".

### B. Area Access

1. All restricted areas may be entered by authorized employees as their work requires. Women with suspected or confirmed pregnancies will be permitted in restricted areas if their radiation exposure is kept at less than 10% of applicable limits, external or internal. Women of childbearing age will sign a pregnancy agreement when hired, if their work requires them to enter restricted areas.

2. No employee under 18 years of age will be permitted to be exposed occupationally to ionizing radiation greater than 10% of the limits specified in 10CFR Part 20.

3. Visitors under 18 years of age will not be permitted to enter a Yellow or Red Restricted Area.

4. Visitors entering Yellow or Red Restricted Areas must be escorted by, or authorized to enter by, staff personnel who may further require them to wear lab coats, shoe covers, and hats.

C. Restricted Area Conduct

1. Green Restricted Areas

a. The area is posted as a Green Restricted Area.

b. Smoking, eating, and drinking in Green Restricted areas are not specifically prohibited but will be allowed only at desks, not where radioactive material is handled.

c. This area must be separated from a Red Restricted Area by means of a door that can be closed plus a full height wall.

d. Personnel monitoring should be performed before entry into a Green Restricted Area from a Red Restricted Area.

e. All personnel working in this area will be adequately instructed in accordance with 10CFR 19.12.

2. Yellow Restricted Areas

a. This area is posted as a Yellow Restricted Area.

b. Workers and visitors will wear designated monitoring equipment.

c. Clothing, shoes and hands should be monitored when leaving a Yellow Restricted Area. Persons finding contamination should decontaminate by using soap, water, and, if necessary, a brush. If the contamination resists decontaminating procedures, notify Health Physics promptly. Persons finding shoe contamination which cannot be accounted for, i.e., known or suspect spills, must report to the Health Physics Office or to supervisory personnel immediately after decontamination.

d. There is no eating, drinking, or smoking allowed in a Yellow Restricted Area, but personnel may carry food and beverages through the area to a Green Restricted or Unrestricted Area.

e. All personnel working in Yellow Restricted Areas will be adequately instructed in accordance with 10CFR Part 19.12.

f. This area must be separated from a Red Restricted Area by a clear and defined boundary.

g. Any potentially radioactive equipment to be transferred from a Yellow Restricted Area to an unrestricted area must be checked by Health Physics for contamination.

3. Red Restricted Areas

   a. This area is posted as a Red Restricted Area.

   b. All workers and visitors will wear monitoring equipment provided.

   c. Clothing, shoes and hands must be monitored when leaving a Red Restricted Area. Persons finding contamination should decontaminate by using soap, water, and, if necessary, a brush. If the contamination resists decontaminating procedures, Health Physics must be notified immediately. Persons finding shoe contamination which cannot be accounted for, i.e., known or suspect spills, must report to the Health Physics Office immediately after decontamination.

   d. There is no eating, drinking, or smoking allowed in a Red Restricted Area and no carrying of food or beverages through a Red Restricted Area.

   e. All personnel working in Red Restricted Areas will be adequately instructed in accordance with 10CFR Part 19.12.

   f. Any equipment to be transferred from a Red Restricted Area to an unrestricted area must be checked by Health Physics for contamination.

   g. Gloves, masks, caps, shoe covers, glasses, long-sleeved shirts or lab coats, or other protective garments, are to be worn as indicated by the work and the condition of the work area. The minimum clothing requirement is a lab coat to be worn over street clothes for persons working with radioactive material in a Red Restricted Area.

   h. Health Physics must be notified prior to a physical entry by any person into a hood where radioactive material is present. Health Physics must be notified prior to decontamination of hoods so that suitable monitoring may be done and necessary protective clothing and equipment designated.

   i. Persons working in Red Restricted Areas must place their film badge in the designated rack before leaving the facility after work.

4. All company uniforms and clothing worn by radiation workers must be checked for contamination before being sent to the laundry.

D. Area Contamination

1. Smear testing will be carried out as appropriate in all areas. Health Physics will notify supervisory personnel responsible for the areas if the values listed below are exceeded so they may take appropriate action.

2. Removable contamination guides for the various work areas are as follows:

| | |
|---|---|
| Unrestricted Area | 100 dpm/$ft^2$ |
| Green Restricted Area Floors | 2,000 dpm/$ft^2$ |
| Yellow Restricted Area Floors | 2,000 dpm/$ft^2$ |
| Red Restricted Area Floors, Benches, Counters | 10,000 dpm/$ft^2$ |

IV. PERSONNEL MONITORING

A. All personnel will wear radiation exposure monitoring devices provided.

1. All persons who regularly work in Red Restricted Areas will be provided with film badges. Other persons-visitors, transient workers, etc., - will be provided with film badges or other suitable monitoring devices, if they enter Red Restricted Areas for over eight hours per week.

a. Film badges should be worn exposed on the upper part of the body (e.g., shirt pocket, lab coat pocket, collar) by all entrants to restricted areas and must be worn in this manner by those persons actually working with radioactive material.

b. Film badges and other dosimeters must not be left in Yellow or Red Restricted Areas when not in use. Workers in unrestricted or Green Restricted Areas may leave them in their desks; other workers must leave them on the badge board.

2. Wrist badges or other suitable extremity monitoring equipment will be issued to those persons using or handling quantities of radioactive material which may cause extremity exposures in excess of 10% of the quarterly limit.

a. The wrist badge must be worn on the inside of the wrist of the arm most used (for this purpose, right-handed persons should wear it on the right wrist and left-handed persons on the left wrist).

3. Other monitoring devices may be used from time to time for special purposes and must be worn as directed. This may include thermo-luminescent dosimeters, chirpers, breathing zone samplers, and others.

B. All persons will be monitored for internal exposure as their work indicates.

1. Thyroid counting will be done for persons working with radioiodine, or potentially exposed to airborne radioiodine. The frequency of thyroid counting will be varied according to the probability of internal exposure.

2. Counting of urine, feces, nose swabs, etc., for radioactive material may be necessary after possible ingestion, inhalation, or absorption of radionuclides, or after the measurement of an appreciable body burden of a radionuclide.

3. Whole body counting may be required from time to time to provide or compare measurements of internal exposure.

C. Exposure Guidelines

To provide appropriate communication to operating management, a series of Abbott guidelines have been selected. Health Physics will provide reports accordingly.

| | Abbott Reportable | NRC Reportable |
|---|---|---|
| Film Badge | 150 Mr/week | Not applicable |
| Film Badge (Gamma) | 1.7 Rem: 2.0 Rem* | 3.0 Rem* |
| Film Badge (Beta + Gamma) | 2.75 Rem* | 7.5 Rem* |
| Wrist Badge (Beta + Gamma) | 9.0 Rem: 12.0 Rem* | 18.75 Rem* |
| Thyroid | 50%; 66% | 520 MPC-hours* |

*Per Quarter

V. WASTE DISPOSAL

All radioactive waste must be retained and taken to a waste holding room for proper disposal. Please refer to Operating Procedures - Radioactive Waste Disposal for more complete instructions on this subject.

VI. TRAINING

A. At time of starting employment, radiation workers will have Health Physics training on responsibilities involved and safety procedures to be observed before working with radionuclides. All radiation workers will receive further on the job training by qualified, designated workers commensurate with the safety precautions and skills required to work safely with radionuclides.

VII. EMERGENCY PROCEDURES (Do not apply to buildings AP-8 and AP-15A, which are covered under a separate Radiological Contingency Plan).

EMERGENCY PLANS for building evacuation have been prepared for all North Chicago and Abbott Park locations of ADD laboratories.

At any time that the building evacuation alarm sounds, these plans are to be followed by all persons except those required to survey and restore the operational status of the building. In emergency situations where the evacuation alarm does not sound, please observe the following instructions:

A. Fire

1. At first detection of a fire, activate one of the alarms located in the building. Become familiar with the location of the alarm nearest your work area.

2. For small fires, particularly where radioactive material is not present, attempt to extinguish with one of the extinguishers located in the building after you have sounded the alarm. Become familiar with the location of the extinguisher nearest your work area.

3. For large fires, or fires in areas where radioactive material is present, sound alarm but do not attempt firefighting without wearing respiratory protective equipment. If a fire is out of control, beyond your firefighting ability, or you do not have protective equipment, evacuate the building by a safe exit and reassemble as instructed.

4. If a fire is preceded by an explosion, or if an explosion occurs without a fire, take action as described above, but be sure that no injured persons are left behind.

5. Reentry into the building will be authorized only by Health Physics or a Department Manager. Permission to leave the evacuation assembly point must also be given by Health Physics or a Department Manager.

B. Hood Alarms

1. If the hood airflow alarm bell and light above any hood are activated, evacuate the laboratory, first closing the hood door if possible. Hold your breath. Notify Health Physics and your supervisor immediately. The hood alarm may be accompanied by a warning blast from the central annunciator panel if a system failure has occurred.

2. Reentry to the affected area must have the approval of Health Physics or Department Manager.

C. Annunciator Panel

1. Remain in your work area when the annunciator panel sounds unless other alarms (such as the hood airflow warning) indicate a problem where you are working. Health Physics, your supervisor, or the building evacuation alarm will notify you if further action on your part is necessary.

D. Power Failure

1. At any indication of power failure, failure of all electrical utilities and equipment, close hood doors, if possible; hold your breath and leave the building by the nearest exit and reassemble as instructed. Remain calm. Emergency battery-powered lights will come on with the interruption of electrical service.

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2. Reentry into the affected areas must have the approval of Health Physics or a Department Manager. Permission to leave the evacuation assembly area must also be obtained from Health Physics or a Department Manager.

E. Spills of Radioactive Material

1. If you have a spill of radioactive material such that severe contamination of the area or persons in the area may result, notify Health Physics or your Supervisor immediately.

   a. Isolate the contaminated area by closing doors, going no farther than necessary to protect yourself from further contamination, ingestion, inhalation, or external exposure. Notify persons mentioned above by telephone or by another person who is not contaminated. Do not spread contamination by leaving the area or permitting other persons to enter before cleanup is completed.

   b. If you are not in the area affected by the spill, keep out unless you are asked by Health Physics or your Supervisor to help in decontamination.

F. Injuries and Severe Personal Contamination

1. Any cuts or scrapes incurred at work should be reported immediately to Health Physics so that the wound can be checked for contamination. Cuts or bruises, regardless of where they happened, must be reported if they prevent the wearing of gloves or other protective equipment.

2. Any contamination about the face or hair must be reported immediately to Health Physics or your Supervisor for evaluation and cleanup.

3. Hand and skin contamination, other than about the face, must be reported to Health Physics or your Supervisor if it resists normal decontamination efforts.

4. As an aid to discovering personal contamination, workers in Red Restricted Areas should monitor themselves frequently during the work day, using the monitoring equipment provided in the various work areas. Before going home, all designated workers must survey themselves with suitable equipment.

VIII. PROPER USE OF EQUIPMENT

A. Ventilation

1. Many fume hoods are designed to provide adequate airflow only when closed to 16 inches or less face opening. As much as possible keep the doors closed to this level. This rule does not apply to hoods which have been modified by the addition of a Lucite or leaded glass panel to restrict the face opening.

B. Remote Handling Devices

1. Tongs, airplane fingers, etc., should be used whenever possible to reduce hand exposure when handling reaction vessels, control samples, or other radioactive sources.

C. Pipetting

1. Radioactive material should never be pipetted by mouth. Use pipettor bulbs or other appropriate equipment to provide suction for transfer.

Adopted by the Corporate Radiation Safety Committee on July 12, 1983.

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

TITLE: CORPORATE RADIATION PROTECTION OFFICER (RPO) Attachment I - Items 15, 16, and

DEPARTMENT: EMPLOYEE HEALTH

NATURE AND BACKGROUND:

The Employee Health Department is responsible for evaluation, protection, maintenance and even the enhancement of the health of all Abbott employees, national and international, particularly as related to their work, work environment, product integrity. and job stresses, and also to show due regard for varied aspects of their personal welfare. To accomplish this goal, a comprehensive program of preventive medicine, environmental control, treatment, and health education is provided. The department is divided into three sections - Medical, Biohazards and Industrial Hygiene, and Health Physics. All section heads of the department report to the Corporate Manager of Employee Health Services.

Health Physics designates a broad program of preventative medicine designed to protect the Health of employees who may encounter radiological hazards (ionizing radiation from X-ray machines and radioactive materials; non-ionizing radiation from lasers) in their work environment, be it laboratory, production area, or in the field. The Health Physics Section is responsible for the evaluation and control of environmental and occupational ionizing radiation, promotion of good work practices in the use of radiation - producing equipment and radionuclides, safe operation of laser units, and enforcement of all pertinent local, state, and federal regulations in these areas. This work is carried out at North Chicago, Abbott Park, the Chemical and Agricultural Products Division Research Center, and all other corporate locations as necessary.

The Company has only one RPO whose position is a legal requirement of our Nuclear Regulatory Commission (NRC) Byproduct Material Licenses. A Health Physicist and three Radiation Monitors report to the RPO. The objectives of the RPO are to effect whatever training of personnel is necessary to accomplish the Section objectives and to maintain strict adherence to all internal regulations and legal requirements. Training may be accomplished by means of lectures or by consultations with individual employees.

The Abbott Laboratories Corporate Radiation Safety Committee (RSC), of which the RPO is the Secretary, is charged with the responsibility for proper conduct of all operations involving ionizing radiation. Much of the work of the Health Physics Section is determined by RSC or legal requirements related to evaluation of ionizing radiation hazards and their control. Special assignments may be made by the RSC, the Manager of Corporate Employee Health Services, or by the needs of individual radiation workers with special problems regarding hazards, work techniques, or equipment.

Most assignments or operations used in carrying out the Section objectives begin with instrumental measurements and data gathering. Hazard control begins with hazard evaluation, and the Health Physics Section must measure personnel radiation exposure, work-area radiation fields, air concentrations of radioactive material, personnel contamination, area contamination, and environmental concentrations of radioactive material.

From the evaluations, corrective measures may be proposed, then implemented, in order to minimize or eliminate hazards. This solution may range from something as simple as using lead bricks for shielding to the evaluation of and recommendation for changes in, a complex air filtration system. The solution may also involve changing an individual's equipment or work techniques if they are deemed unsuitable for the job.

Extensive record-keeping for all the measurements mentioned is required to satisfy the laws relating to our Byproduct Material Licenses. These records require calculations, analysis, and interpretation on the part of the RPO. All such records must be available for scrutiny by NRC representatives or by state inspectors. These persons, during an inspection, may make independent measurements to confirm the accuracy of our records, techniques, and instruments.

RPO duties which indirectly help achieve our objectives are control of radioisotope purchases, checking packages upon receipt, and maintaining an inventory of quantities on hand. Included is the receipt and retention of all radioactive waste until final disposition is arranged. These all relate to our accountability to the NRC for byproduct material which we have received, including control or prevention of its release to the environment.

KNOW HOW:

The formal training of the RPO will be a Ph.D. in Radiological Health or the equivalent in training and experience. In all cases the minimum

requirement will be a Master's degree in a life science and at least six years of experience in the special areas of health physics and radiological health or certification by the American Board of Health Physics. This position requires a sound knowledge of nuclear physics, lasers, radiobiology, and methods of radiation detection and measurement so that hazards can be measured, interpreted and controlled. Enforcing the legal provisions surrounding our work with ionizing and non-ionizing radiation is a type of police function and involves tactful relationships with a variety of people. Implicit here is the matter of communication, oral and written, with the RSC, government regulatory agencies, the Health Physics and Radiation Monitors and, at various times, with many radiation workers of different educational levels. The RPO's knowledge and experience make frequent contributions in consultations with design and ventilation engineers, research workers in the Pharmaceutical Products Division, the safety department, and production managers. The RPO must apply his abilities in health physics to a variety of problems with insight and ingenuity. He must be responsive to emergency duties for which he is constantly on call.

PROBLEM SOLVING:

The principal problem of the RPO is evaluating data relating to radiological health, followed usually by the more difficult problem of taking corrective action. This latter problem frequently involves persuasion and tactful firmness while dealing with individuals - - - for example, convincing a production manager that he must approve a costly change or an employee that his work habits need to be improved. The use of ionizing and non-ionizing radiation is growing rapidly, and new techniques grow simultaneously. Keeping abreast of these as they apply to health physics

work is another problem requiring continuous attention on the part of the RPO.

ACCOUNTABILITY:

The RPO is accountable to the Manager of Corporate Employee Health Services, the RSC, and a number of federal and state regulatory agencies for the safety of operations involving ionizing radiation or lasers and the protection of the health of workers exposed to them.

R. L. Fredrickson
Radiation Protection Officer

May 16, 1978

Form NRC-313I
Abbott Laboratories
North Chicago, Illinois

Attachment I - Items 15, 16, and 17

# CORPORATE RADIATION SAFETY COMMITTEE (RSC)

## CHARTER

"THIS COMMITTEE IS TO DIRECT ITSELF TO THE MAJOR POLICY AND PHILOSOPHIC QUESTIONS AND PROBLEMS INVOLVING RADIOACTIVITY, TO SERVE AS THE MONITOR UNDER ALL CORPORATE AEC LICENSES OR LAWS APPLICABLE NOW OR IN THE FUTURE, TO REVIEW PRACTICES NOT SPECIFICALLY COVERED BY LICENSE OR LAW, AND TO WORK WITH SPECIFIC OPERATING MANAGEMENT AS MAY BE APPROPRIATE." (PER DIRECTIVE BY P. GERDEN, MARCH 26, 1968)

## RESPONSIBILITIES

- TO ESTABLISH POLICY FOR AND ASSURE PROCEDURES ARE DEVELOPED TO PROTECT THE HEALTH AND SAFETY OF INDIVIDUALS WORKING WITH RADIOACTIVE BYPRODUCT MATERIAL OR OTHER SOURCES OF IONIZING RADIATION.
- TO ESTABLISH POLICY FOR AND ASSURE PROCEDURES ARE DEVELOPED TO PREVENT CONTAMINATION OF THE ENVIRONMENT THROUGH WASTE DISPOSAL OR RELEASE TO THE ATMOSPHERE OR AIR.
- TO ASSURE COMPLIANCE WITH GOVERNMENT REGULATIONS. (FEDERAL AND STATE)
- TO REVIEW AND APPROVE SPECIFIC WORK PROCEDURES AND TECHNIQUES WHICH MUST BE DEVELOPED BY OPERATING AREAS. THESE PROCEDURES WILL BE COMMUNICATED EDUCATIONALLY TO EMPLOYEES AS JOB REQUIREMENTS BY THE OPERATING GROUP.
- TO MAINTAIN AN AWARENESS OF PROBLEMS, QUESTIONS, AND OPERATING ACTIVITY THROUGH THE COMMUNICATING REPORTS OF THE RADIATION PROTECTION OFFICER, (RPO), SO THAT THE RSC CAN RESPOND TO REPORTED FACTS.

## COMMITTEE OPERATION

- THE OFFICIAL FILES OF THE RSC WILL BE MAINTAINED BY THE RPO. THIS INCLUDES MINUTES OF MEETINGS, REPORTS, CORRESPONDENCE AND THE LICENSE DOCUMENTS.

- The Chairman and members of the RSC are approved through the office of the Vice-President, Personnel, and the Division Vice-President supplying the appointee.
- The RSC is dependent upon divisional management to study proposals, suggest courses of action, and to adopt the RSC's recommendations.

An Abbott Diagnostic Division Radiation Safety Committee (ADD-RSC) has been formed for these purposes related to the RSC:

- To monitor licensed activity and related RSC policy within this Division.
- To examine personnel survey readings and prepare responses for RSC as needed.
- To review environmental readings.
- To adopt RSC recommendations.
- To evaluate new product procedures for radiation hazards and report to RSC.
- To be aware of and participate in inspection activities by NRC and state representatives.

The RSC believes this ADD-RSC is a responsive step in moving our concerns closer to the operational scene. However, the RSC cannot delegate its responsibility, but it can improve its vision, understanding and response through the co-operation of the ADD-RSC.

R. L. Fredrickson
Secretary, Corporate Radiation Safety Committee

## 6.5 EMERGENCY MONITORINGT EQUIPMENT

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Jordan Model AGB-10KG-SR | Beta, gamma radiation surveys | 0.01-$10^7$ mR/hr | 6 months | 1 | Portable, very high range | AP-9 |
| Eberline Model E-510 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 2 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-520 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 1 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-530 | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 5 | Portable; Geiger-Muller | AP-8<br>AP-1A<br>AP-9<br>R-1-B |
| sNuclear Chicago Model 2650 | Beta, gamma radiatikon surveys | 0-100 mR/hr | 6 months | 4 | Portable; Geiger Muller | AP-8<br>AP-9<br>R-1-B |
| Eberline Model RM-15 with low energy gamma scintillation probe or equivalent | Personnel and area contamination surveys | 0-500K CMP | 6 months | 12 | Portable; battery operated | AP-1A<br>AP-8<br>AP-9<br>R-1-B |
| Air Sampler, Staplex Model TFIA | High volume air sampling for radioactive material | 70 $ft^3$/min | - | 2 | Portable; requires 110v power | AP-8 |
| Eberline Model RAP-1 regulated air pump with Bendix 2 $ft^3$/min flowmeter | Air sampling for radioactive material | 0-2 $ft^3$/min | - | 6 | Portable; requires 110v power | AP-9<br>AP-8<br>AP-12<br>R-1-B |

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Anemometer | Wind velocity measurement | - | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| Wind direction indicator | Wind direction measurement | 360° | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| ANSR | Analytical counting of smears and air sample pads | - | 6 months | 1 | Needs 110v power; not portable | AP-8 Rm 240 |
| Packard Multichannel Analyzer Model 9012 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Needs 110v power; not portable | AP-1A, Rm L-04 |
| Packard Spectrazoom Multichannel Analyzer Model 930 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Portable; operates on 110v or battery | R-1-B, Rm 0133A |
| Nuclear Chicago Scaler Model 8703 with gamma scintillation well | Analytical counting of smears and air sample pads | - | 6 months | 1 | Requires 110v power | AP-1A, Rm L-04 |

# 6.0 EQUIPMENT AND FACILITIES

## 6.1 Control Point

The control point for a radiation emergency situation shall be the AP6C, C-4 North conference room for an incident in AP-8 or the interstitial level AP-1A large conference room will be used as the control point for an incident occuring in AP-15A.

## 6.2 Communications Equipment

Normal telephone communication facilities are available in both control points. Abbott Security will be contacted to provide mobile communication service.

## 6.3 Facility for Assessment Teams

The main conference room on the fourth floor of AP-6C (Room C-4 North) will be used as the facility for the Assessment Team. The room is centrally located; has complete telephone services (including speaker phones); and is near most management and regulatory personnel.

## 6.4 Onsite Medical Facilities

In the event of an accident in AP-8 that involves individuals who are contaminated with radioactive material, any first aid or medical treatment necessary will be provided at a suitable location. The clinic facilities in AP-6B WILL NOT be used.

During the normal workday, available medical personnel in the Abbott Park Employee Health Department will respond to the call and provide any care deemed appropriate. The medical personnel responding will carry with them an emergency response kit containing medical materials to provide initial first aid and emergency care to a limited number of casualties. An exact list of the contents of the kit is attached.

At other times, available first aid trained personnel will render first aid prior to transportation of the injured by ambulance to Victory Memorial Hospital. Medical and first aid personnel will be required to don protective clothing to include gown, mask, cap, rubber gloves, and shoe covers as directed by the Health Physics personnel before administering aid to those injured.

## 6.4 Onsite Medical Facilities

In Emergency Bag:

Dextrose
Kling Gauze
Needles, 23 & 25 gauge
Syringes, 2, 5, & 10 cc
Tongue Blades (one padded)
Tourniquet
(Mosquito forceps and scalpel out for sterilization)
Alcohol Sponges
Ammonia Inhalants
Bandaids
Eye Pads
Sterile Dressings
Tape
Triangular Bandage
Thermometer
Daily Visits Slips
Taxie Slips
Case Forms
List of Telephone Nos.
Koldpack
Tensors (two)
Laerdal Pocket Mask
Pencil and Pen

Demerol
Caffeine and Sodium Benzoate
Coramine
Benadryl
Atropine Sulfate
Dilantin
Aminophyllin
Adrenalin Chloride
Thorazine Injection
Nitroglycerin Tab
Amyl Nitrite
Alcohol
Zepharin Chloride
Sheet
Wash Cloth
Waxed Bag
Barrier Sterile Field
Sphygmomanometer
Stethoscope
Flashlight
Rubber Gloves
Orange Juice and Sugar
Scissors
Air Way
PLUS AMBU BAG

Radiation Kit (In Each Clinic):

Syringes, 2, 5, & 10 cc
2x2 Gauze Squares
Lugol's Solution
Tourniquet
1000 cc Sodium Chloride
Bandaids
Venoset (20-gauge needle)
Needles, 18 & 20 gauge

Suture Towel
3x3 Gauze Squares
Ammonia Inhalant
Sterile Water Injection, 10 ml
Preptic Pads
Adhesive
Disposable Gloves

Medical

The Medical section will be responsible for evaluation of the extent of injuries of workers. Those not injured will be checked for contamination by Health Physics and, if not contaminated, will be released from the area of the emergency. Persons with minor injuries requiring medical attention will be taken to Victory Memorial Hospital, Waukegan, Illinois, by the Libertyville, Illinois, Fire Department Rescue Squad. The Medical section will provide onsite medical care only for those persons will life-threatening injuries requiring immediate attention. After these grave injuries are given proper first treatment, the victims will be taken to Victory Memorial Hospital as above. Transportation priority will be given to those severely injured persons.

The authority of the medical groups is to make all decisions related to the care and treatment of injured persons, assisted by Health Physics workers who will determine the extent of radiation contamination of victims. Information regarding contaminated persons will be provided to Victory Memorial Hospital before these persons actually arrive for treatment.

Regulatory Affairs

Regulatory Affairs (Diagnostics Division) is responsible for the maintenance of all byproduct material licenses with the NRC. Therefore, Health Physics will advise Regulatory Affairs when an emergency occurs and the actions taken.

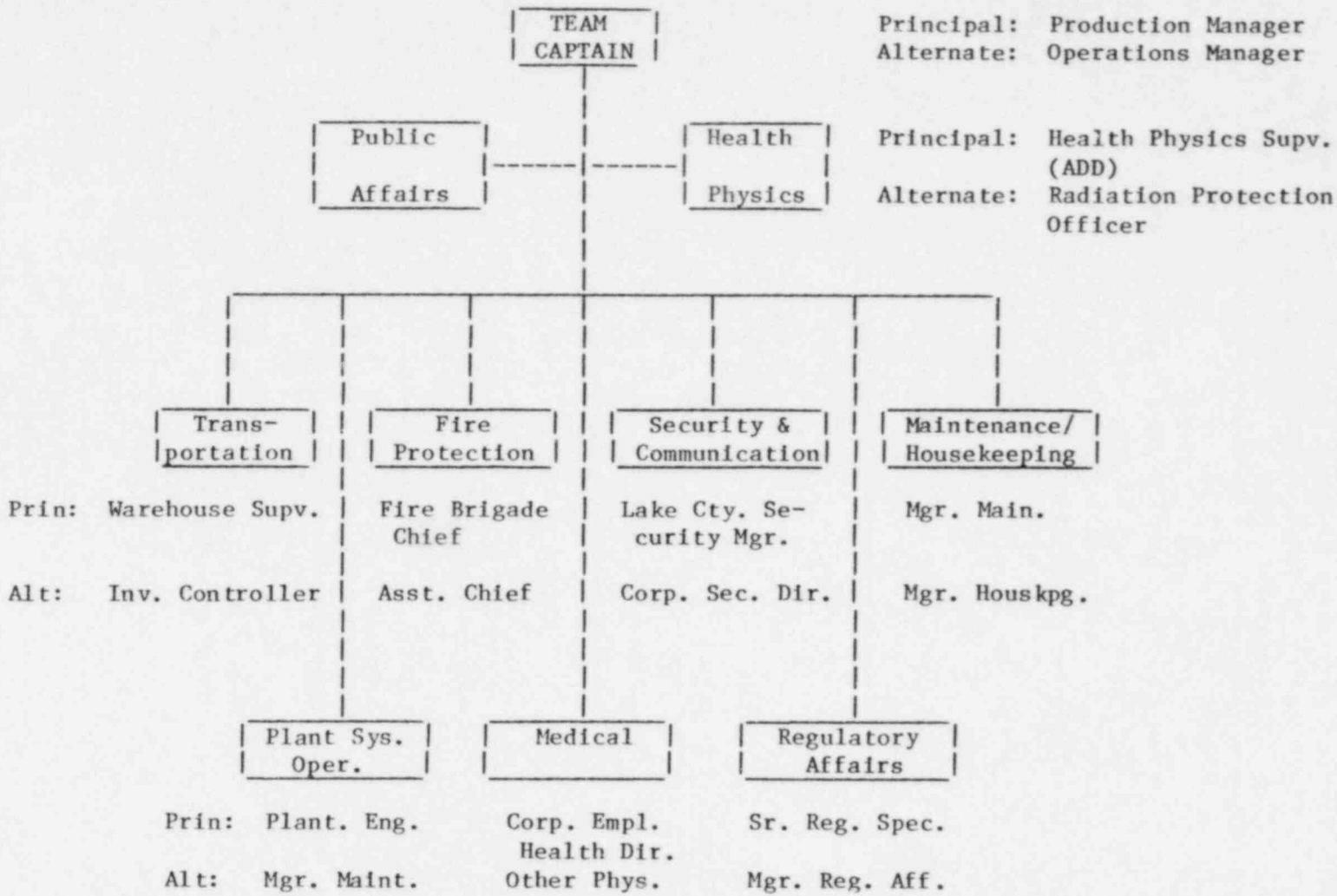
Materials Management

The Materials Management personnel will be responsible for assessing a transportation accident involving transfer of radioactive waste materials to building AP-15A. The Materials Management personnel, in cooperation with Health Physics personnel, will determine the nature and extent of the emergency and advise the team captain. The team captain, in turn, may activate the Radiological Contingency Response team or part thereof, if necessary.

Plant Systems Operations

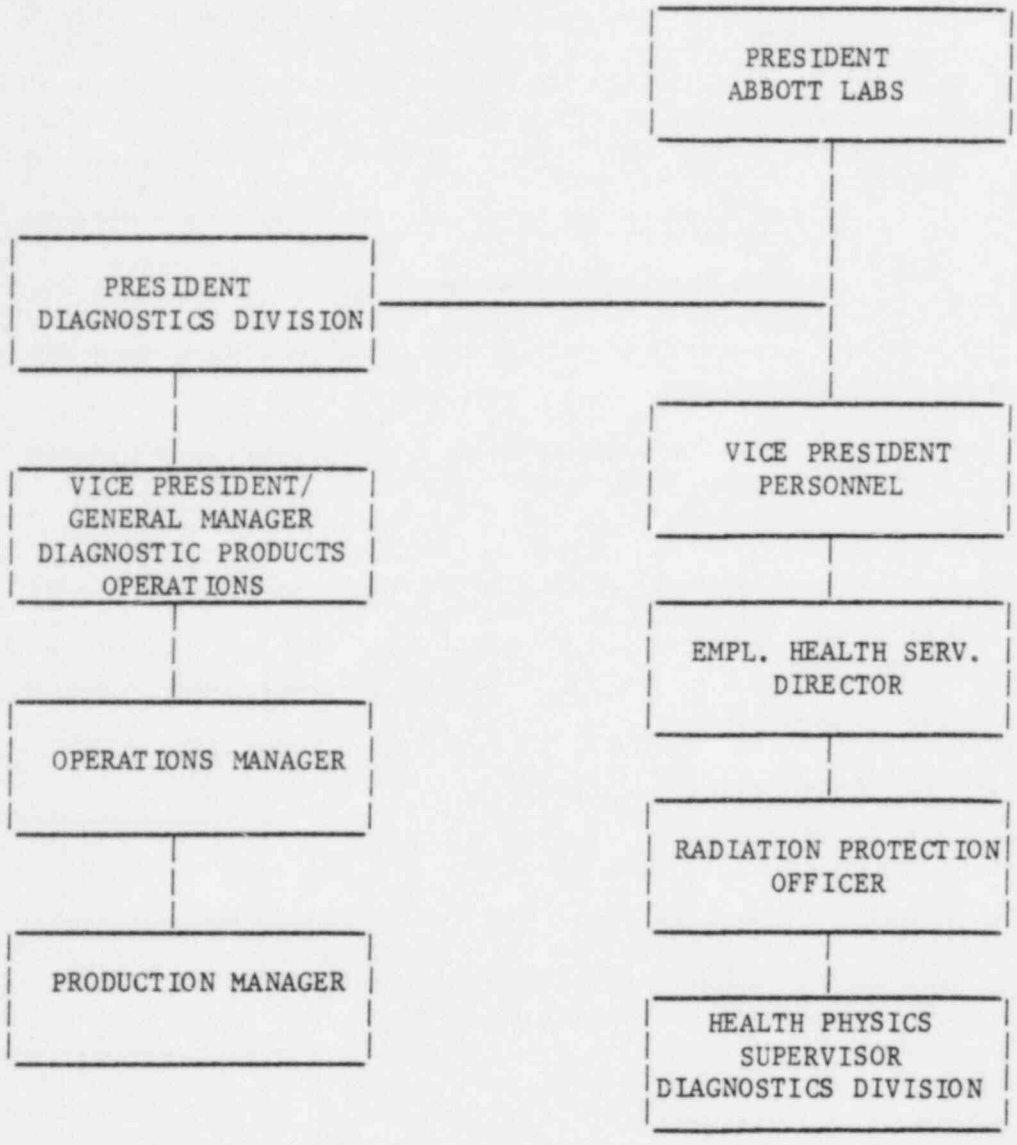
The Plant Systems Operations personnel will be responsible for safe shutdown of manufacturing and other operations and facilities. They will assess the emergency conditions and report to the team captain. They will have the authority to evacuate the personnel, if necessary. In addition, they will immediately report the emergency condition (e.g., fire, hood alarm, power failure, etc.) to the appropriate functional group(s) on the Radiological Contingency Response team.

TABLE 4.2.1
Radiological Contingency Response Organization



# 4.0 ORGANIZATION FOR CONTROL OF RADIOLOGICAL CONTINGENCIES

## 4.1 Normal Plant Organization




At Operation Level, the Production Manager or Health Physics Supervisor have the authority to declare an emergency and initiate proper corrective action (see section 4.2.1).

## 4.2 Onsite Radiological Contingency Response Organization

The onsite Radiological Contingency Response Organization for building AP-8 and building AP-15A is described in Table 4.2.1. The Production Manager for Diagnostic Products will be the team captain for both the buildings. Alternates for all responsible groups are also listed in the table. These response teams will be responsible for controlling each class of emergency including the times when normal operations are not being conducted.

### 4.2.1 Direction and Coordination

The Production Manager will have the overall responsibility for implementing and directing the radiological contingency procedures for building AP-8 and building AP-15A.

When an evacuation alarm is sounded, all personnel will cease work immediately, perform any emergency shutdown procedures related to their work, and leave the building in orderly fashion, following the posted exit routes. They will then proceed by the most direct route to the Emergency Assembly Area, to report to their supervisors (or their alternates), and remain in the immediate area until further instructed.

The Emergency Assembly Area for building AP-8 is the parking lot south of the building and east of building AP-4 (AP-4 parking lot). The alternate location is the northeast parking lot of AP-5.

All department heads will complete a headcount of their personnel immediately upon arrival in the Emergency Assembly Area. They will then report to the Radiological Contingency Plan team captain and advise him of any persons who are not accounted for.

Health Physics personnel will determine the nature and probable extent of the emergency and advise the team captain and the Abbott Park gatehouse.

Immediately after receiving reports from the department heads and Health Physics personnel, the team captain may instruct the Fire Brigade to enter the building to locate any missing persons and verify completion of evacuation. The Fire Brigade may be assisted by Health Physics or Security personnel, as appropriate.

The team captain will meet all emergency teams (Fire Brigade, Rescue Squad, Police, etc.) as they arrive and advise them of the location and nature of the emergency, potential hazards, etc.

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-8 III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Large Fire | 3.1 AP-8 III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Explosion | 3.1 AP-8 III.C. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Leaking Barrels | 3.1 AP-15A I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Severely Leaking Barrels | 3.1 AP-15A II.A. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Four housekeepers |
| Fire Not in Storage Area | 3.1 AP-15A II.B. | Standby as needed if fire spreads | Two Health Physics workers |

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-15A II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Housekeeping crew<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-15A III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Outside assistance as required |
| Severe Fire | 3.1 AP-15A III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Firefighters<br>Housekeeping crew<br>Outside assistance as required |

| Class Description (from 3.1) | Action |
|---|---|
| II.C. | Pump out all water after ascertaining that it is low or lacking in radioactive contamination. Dry floors thoroughly, then smear to evaluate radiological status. Check all barrels for damage if they have fallen over. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local police and fire authorities that AP-15A is involved. Check for ruptured drums in AP-15A. If none are damaged, check inventory to see if any are missing. If drums are found damaged in the building or on-site, evaluate the radiological status of the area with survey equipment, air samples, smears. Clean up as necessary. Restoration of the warehouse may require temporary storage of drums in another restricted location. |
| III.B. | Call Fire Department. Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement officials of fire in the waste storage area. When fire is out, check all drums for damage. Smear drums, floors, and take air samples to determine radiological status of the area. Clean up as necessary, calling for assistance from Radiological Assistance Teams from the Illinois Department of Nuclear Safety and the U.S. Department of Energy. Special attention should be given to water from sprinklers; do not discharge until it has been assayed for radioactive material content. |

## 3.3 RANGE OF POSTULATED ACCIDENTS

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Minor Spill | 3.1 AP-8 I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Contaminated Worker | 3.1 AP-8 I.B. | Eberline RM-15 or equivalent | One health physicist |
| Elevated Air Sample | 3.1 AP-8 I.C. | Multichannel analyzer | One health physicist |
| Minor Wounds | 3.1 AP-8 I.D. | Eberline RM-15 or equivalent | One health physicist |
| Severe Spill | 3.1 AP-8 II.A. | Eberline RM-15 or equivalent<br>Eberline E-510 | Four Health Physics workers<br>Three housekeepers |
| Hood Exhaust Failuer | 3.1 AP-8 II.B. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Maintenance workers |
| Power Outage | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1 (after restoration of power) | Four Health Physics workers<br>Maintenance workers |
| Small Fire | 3.1 AP-8 II.D. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Two Health Physics workers<br>Three housekeepers<br>Firefighters |
| Broken Water Line | 3.1 AP-8 II.E. | Eberline RM-15 or equivalent | Three Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Broken Steam Line | 3.1 AP-8 II.F. | Depends on location of break as to need or lack of need for instruments | Three Health Physics workers if break affects restricted areas<br>Maintenance workers |

| Class Description (from 3.1) | Action |
|---|---|
| II.D. | Summon Fire Department. Fight fire with building fire protection equipment. Evacuate all personnel not needed for fire-fighting or building status evaluation. After fire is out, Health Physics must evaluate radiological status of the building before reentry is permitted. |
| II.E. | Turn off water main and call maintenance personnel to repair line and restore service. Pick up all water from floors and other surfaces, retaining until it is known that it may be discarded or, alternately kept as radioactive waste. |
| II.F. | Turn off steam main and call maintenance personnel to repair line and restore service. If anyone was burned, evaluate medical status and extent of radiological contamination, if any. Transport burned or injured to the hospital. Clean and evaluate radiological status of affected areas. |
| II.G. | Flooding can occur in the liquid radioactive waste concentrator at AP-8. Pump all liquid into drums pending assay of radioactive materials content. Correct cause of flooding. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities that AP-8 was involved. Evaluate building status from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |

| Class Description (from 3.1) | Action |
|---|---|
| III.B. | Notify Fire Department, Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities (Sheriff, Civil Defense, etc.) of the possible radiological consequences of the fire. Evaluate building sites from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| III.C. | Call the Fire Department. If explosion has occurred in an area where radioactive material is used or stored, contact Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement authorities. Evaluate radiological status of affected area, performing cleanup as indicated. If needed for evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| AP-15A | |
| I.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. |
| II.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. Materials Management should be on hand to move pallets of barrels as necessary. |
| II.B. | Alert all Health Physics personnel to be on hand should the fire spread. All material stored is in heavy gauge steel drums which are heat-resistant, and the area is equipped with sprinklers. Proceed as shown below in III.B. if the fire spreads. |

# 1.0 GENERAL DESCRIPTION OF THE PLANT/LICENSED ACTIVITY

## 1.1 Licensed Activity Description

The Diagnostics Division of Abbott Laboratories is involved in the manufacture and distribution of in vitro diagnostic products and accessories employed in hospital and private clinical laboratories. These products fall into two broad categories: diagnostic instruments and diagnostic products.

Abbott has established itself as a leader in the hepatitis-testing market as well as other segments of the diagnostic industry that includes: thyroid, cancer, microbiology, cardiovascular, infectious diseases, and clinical chemistry. Approximately 35% of our diagnostic products employ the use of a radioisotope (Iodine-125) to detect minute quantities of a specific analyte from a blood sample. This type of in vitro diagnostic product that uses radiolabeled material is referred to as a radioimmunoassay or competitive protein binding radioassay. Presently, there is a shift in technology to employ nonradioactive tracers (e.g., enzyme-labeled conjugates) for in vitro diagnostic products.

The Diagnostics Division does research and manufacturing of diagnostic products at Corporate Headquarters in North Chicago, IL. Presently, Abbott Laboratories' Material License No. 12-00621-03 authorizes the possession of 75 curies of Iodine-125 and 25 curies total of all other byproduct materials combined. The majority of radioactivity, with levels greater than 8 curies of I-125, is confined to buildings AP-8 and AP-15A at Abbott Park. Building AP-8 is for research and manufacturing, while building AP-15A is for storage of radioactive waste.

Radioactive waste consists of both solid and liquid waste. The radioactivity consists of I-125 radioisotope.

## 1.2 Site and Facility Description

AP-8 is of steel and reinforced concrete construction with brick exterior. Floor plan is attached (Appendix 1).

Primary protection for workers against inhalation of radioactive byproduct material is provided by fume hoods designed to operate at 125 lineal feet per minute face velocity. The majority of these hoods are of stainless steel construction with controls for the various utilities (gas, water, steam, lights, air, etc.) on the outside. Air from these hood exhausts is not recycled, but is filtered through a dust filter, a HEPA filter, and an impregnated activated charcoal filter (Barnaby-Cheney Type 727 or its equivalent) before discharge to the atmosphere. Each hood exhaust discharging activity is sampled continuously at a point beyond the filters in order to assure compliance with the provisions of 10 CFR 20.106. Air in the laboratory itself is monitored with a fixed air sampler positioned approximately at the breathing zone of a worker at the hood (see Appendix 2). This sample, taken during the work day, is used to determine compliance with 10 CFR 20.103 and to identify problem areas if they develop.

A sketch of a typical Iodination Laboratory (Appendix 2) shows a representative laboratory in building AP-8.

AP-15 is an approximately 200,000 sq. ft. single story, exterior brick wall warehouse. It is basically used for packaging material and general warehouse operations.

Within the AP-15 building, a 6400 sq. ft. area has been isolated for radioactive waste drum storage (AP-15A). The area is 80 x 80 ft. Floor is a concrete slab on grade, the south and east walls are floor to ceiling concrete block, the west and north walls are metal partitions 20 ft. high to the bottom of existing roof trusses. Metal partition walls are sited on top of a 2 ft. wide by 6 in. high concrete dike to retain any spill. Entrance to the area is through a truck type door with controlled access. An emergency exit pedestrian door has been installed in the main warehouse area. This door is alarmed if used as an exit and further access cannot be obtained to the drum storage area from the warehouse through this door.

Drum warehouse facilities have emergency lighting, space is heated by unit heaters; no air conditioning has been supplied. Area contains fire protection sprinkler system and is equipped with a fire hose, safety showers and fire extinguishers.

## 6.5 EMERGENCY MONITORINGT EQUIPMENT

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Jordan Model AGB-10KG-SR | Beta, gamma radiation surveys | 0.01-$10^7$ mR/hr | 6 months | 1 | Portable, very high range | AP-9 |
| Eberline Model E-510 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 2 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-520 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 1 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-530 | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 5 | Portable; Geiger-Muller | AP-8<br>AP-1A<br>AP-9<br>R-1-B |
| sNuclear Chicago Model 2650 | Beta, gamma radiatikon surveys | 0-100 mR/hr | 6 months | 4 | Portable; Geiger Muller | AP-8<br>AP-9<br>R-1-B |
| Eberline Model RM-15 with low energy gamma scintillation probe or equivalent | Personnel and area contamination surveys | 0-500K CMP | 6 months | 12 | Portable; battery operated | AP-1A<br>AP-8<br>AP-9<br>R-1-B |
| Air Sampler, Staplex Model TFIA | High volume air sampling for radioactive material | 70 $ft^3$/min | - | 2 | Portable; requires 110v power | AP-8 |
| Eberline Model RAP-1 regulated air pump with Bendix 2 $ft^3$/min flowmeter | Air sampling for radioactive material | 0-2 $ft^3$/min | - | 6 | Portable; requires 110v power | AP-9<br>AP-8<br>AP-12<br>R-1-B |

## 6.5 EMERGENCY MONITORING EQUIPMENT (continued)

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Anemometer | Wind velocity measurement | - | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| Wind direction indicator | Wind direction measurement | 360° | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| ANSR | Analytical counting of smears and air sample pads | - | 6 months | 1 | Needs 110v power; not portable | AP-8 Rm 240 |
| Packard Multichannel Analyzer Model 9012 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Needs 110v power; not portable | AP-1A, Rm L-04 |
| Packard Spectrazoom Multichannel Analyzer Model 930 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Portable; operates on 110v or battery | R-1-B, Rm 0133A |
| Nuclear Chicago Scaler Model 8703 with gamma scintillation well | Analytical counting of smears and air sample pads | - | 6 months | 1 | Requires 110v power | AP-1A, Rm L-04 |

# 6.0 EQUIPMENT AND FACILITIES

## 6.1 Control Point

The control point for a radiation emergency situation shall be the AP6C, C-4 North conference room for an incident in AP-8 or the interstitial level AP-1A large conference room will be used as the control point for an incident occuring in AP-15A.

## 6.2 Communications Equipment

Normal telephone communication facilities are available in both control points. Abbott Security will be contacted to provide mobile communication service.

## 6.3 Facility for Assessment Teams

The main conference room on the fourth floor of AP-6C (Room C-4 North) will be used as the facility for the Assessment Team. The room is centrally located; has complete telephone services (including speaker phones); and is near most management and regulatory personnel.

## 6.4 Onsite Medical Facilities

In the event of an accident in AP-8 that involves individuals who are contaminated with radioactive material, any first aid or medical treatment necessary will be provided at a suitable location. The clinic facilities in AP-6B WILL NOT be used.

During the normal workday, available medical personnel in the Abbott Park Employee Health Department will respond to the call and provide any care deemed appropriate. The medical personnel responding will carry with them an emergency response kit containing medical materials to provide initial first aid and emergency care to a limited number of casualties. An exact list of the contents of the kit is attached.

At other times, available first aid trained personnel will render first aid prior to transportation of the injured by ambulance to Victory Memorial Hospital. Medical and first aid personnel will be required to don protective clothing to include gown, mask, cap, rubber gloves, and shoe covers as directed by the Health Physics personnel before administering aid to those injured.

## 6.4 Onsite Medical Facilities

In Emergency Bag:

Dextrose
Kling Gauze
Needles, 23 & 25 gauge
Syringes, 2, 5, & 10 cc
Tongue Blades (one padded)
Tourniquet
(Mosquito forceps and scalpel out for sterilization)
Alcohol Sponges
Ammonia Inhalants
Bandaids
Eye Pads
Sterile Dressings
Tape
Triangular Bandage
Thermometer
Daily Visits Slips
Taxie Slips
Case Forms
List of Telephone Nos.
Koldpack
Tensors (two)
Laerdal Pocket Mask
Pencil and Pen

Demerol
Caffeine and Sodium Benzoate
Coramine
Benadryl
Atropine Sulfate
Dilantin
Aminophyllin
Adrenalin Chloride
Thorazine Injection
Nitroglycerin Tab
Amyl Nitrite
Alcohol
Zepharin Chloride
Sheet
Wash Cloth
Waxed Bag
Barrier Sterile Field
Sphygmomanometer
Stethoscope
Flashlight
Rubber Gloves
Orange Juice and Sugar
Scissors
Air Way
PLUS AMBU BAG

Radiation Kit (In Each Clinic):

Syringes, 2, 5, & 10 cc
2x2 Gauze Squares
Lugol's Solution
Tourniquet
1000 cc Sodium Chloride
Bandaids
Venoset (20-gauge needle)
Needles, 18 & 20 gauge

Suture Towel
3x3 Gauze Squares
Ammonia Inhalant
Sterile Water Injection, 10 ml
Preptic Pads
Adhesive
Disposable Gloves

Medical

The Medical section will be responsible for evaluation of the extent of injuries of workers. Those not injured will be checked for contamination by Health Physics and, if not contaminated, will be released from the area of the emergency. Persons with minor injuries requiring medical attention will be taken to Victory Memorial Hospital, Waukegan, Illinois, by the Libertyville, Illinois, Fire Department Rescue Squad. The Medical section will provide onsite medical care only for those persons will life-threatening injuries requiring immediate attention. After these grave injuries are given proper first treatment, the victims will be taken to Victory Memorial Hospital as above. Transportation priority will be given to those severely injured persons.

The authority of the medical groups is to make all decisions related to the care and treatment of injured persons, assisted by Health Physics workers who will determine the extent of radiation contamination of victims. Information regarding contaminated persons will be provided to Victory Memorial Hospital before these persons actually arrive for treatment.

Regulatory Affairs

Regulatory Affairs (Diagnostics Division) is responsible for the maintenance of all byproduct material licenses with the NRC. Therefore, Health Physics will advise Regulatory Affairs when an emergency occurs and the actions taken.

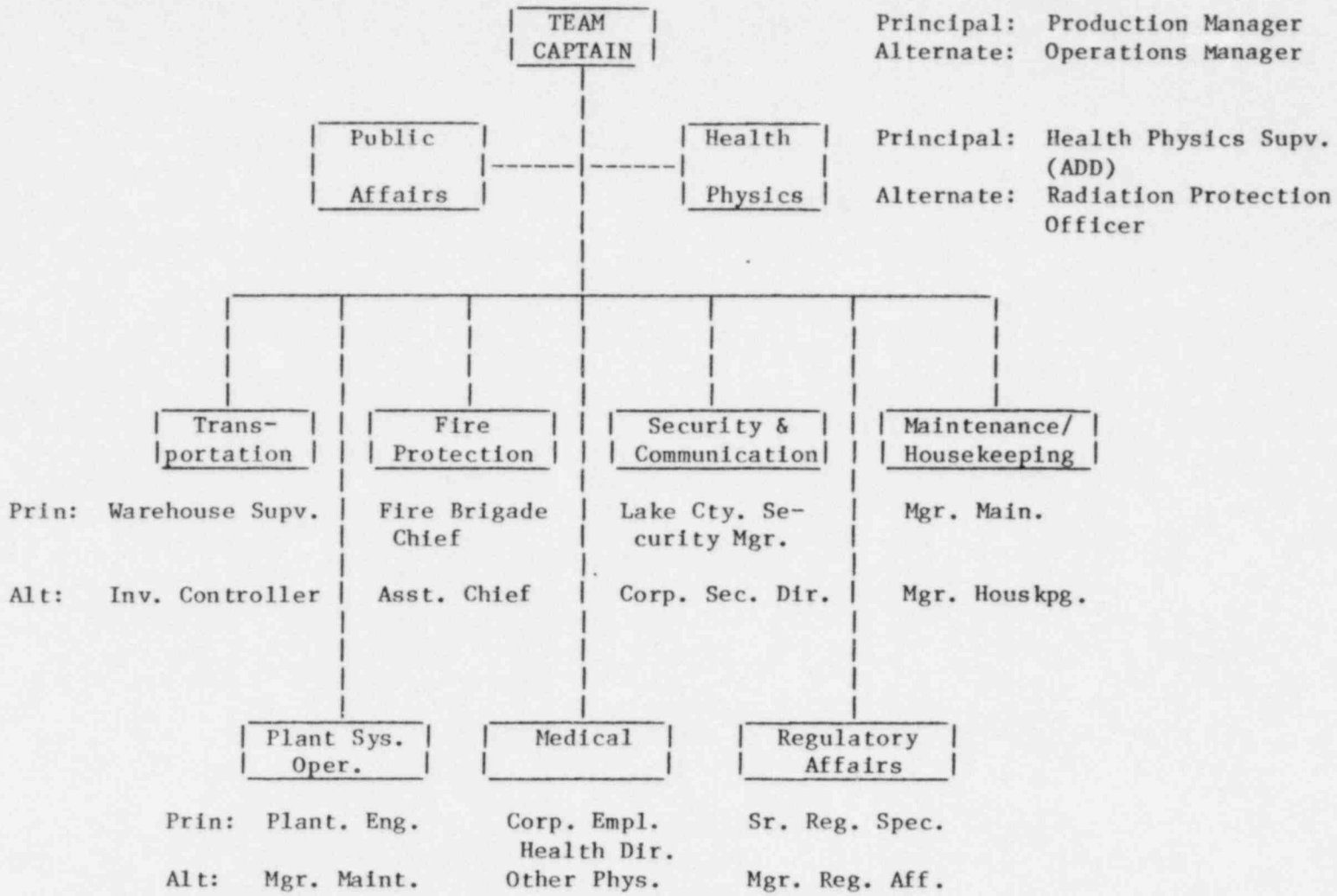
Materials Management

The Materials Management personnel will be responsible for assessing a transportation accident involving transfer of radioactive waste materials to building AP-15A. The Materials Management personnel, in cooperation with Health Physics personnel, will determine the nature and extent of the emergency and advise the team captain. The team captain, in turn, may activate the Radiological Contingency Response team or part thereof, if necessary.

Plant Systems Operations

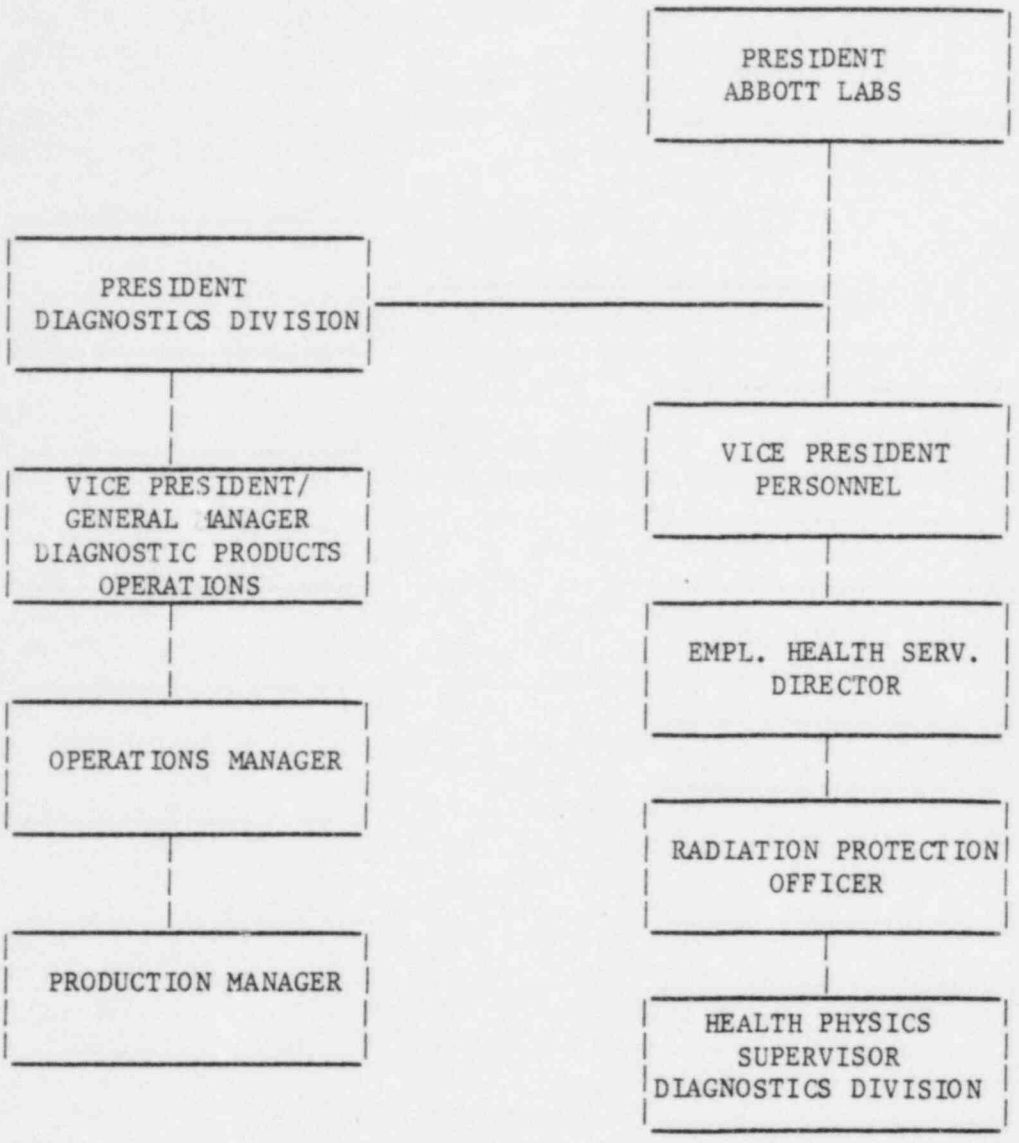
The Plant Systems Operations personnel will be responsible for safe shutdown of manufacturing and other operations and facilities. They will assess the emergency conditions and report to the team captain. They will have the authority to evacuate the personnel, if necessary. In addition, they will immediately report the emergency condition (e.g., fire, hood alarm, power failure, etc.) to the appropriate functional group(s) on the Radiological Contingency Response team.

TABLE 4.2.1
Radiological Contingency Response Organization



# 4.0 ORGANIZATION FOR CONTROL OF RADIOLOGICAL CONTINGENCIES

## 4.1 Normal Plant Organization




At Operation Level, the Production Manager or Health Physics Supervisor have the authority to declare an emergency and initiate proper corrective action (see section 4.2.1).

## 4.2 Onsite Radiological Contingency Response Organization

The onsite Radiological Contingency Response Organization for building AP-8 and building AP-15A is described in Table 4.2.1. The Production Manager for Diagnostic Products will be the team captain for both the buildings. Alternates for all responsible groups are also listed in the table. These response teams will be responsible for controlling each class of emergency including the times when normal operations are not being conducted.

### 4.2.1 Direction and Coordination

The Production Manager will have the overall responsibility for implementing and directing the radiological contingency procedures for building AP-8 and building AP-15A.

When an evacuation alarm is sounded, all personnel will cease work immediately, perform any emergency shutdown procedures related to their work, and leave the building in orderly fashion, following the posted exit routes. They will then proceed by the most direct route to the Emergency Assembly Area, to report to their supervisors (or their alternates), and remain in the immediate area until further instructed.

The Emergency Assembly Area for building AP-8 is the parking lot south of the building and east of building AP-4 (AP-4 parking lot). The alternate location is the northeast parking lot of AP-5.

All department heads will complete a headcount of their personnel immediately upon arrival in the Emergency Assembly Area. They will then report to the Radiological Contingency Plan team captain and advise him of any persons who are not accounted for.

Health Physics personnel will determine the nature and probable extent of the emergency and advise the team captain and the Abbott Park gatehouse.

Immediately after receiving reports from the department heads and Health Physics personnel, the team captain may instruct the Fire Brigade to enter the building to locate any missing persons and verify completion of evacuation. The Fire Brigade may be assisted by Health Physics or Security personnel, as appropriate.

The team captain will meet all emergency teams (Fire Brigade, Rescue Squad, Police, etc.) as they arrive and advise them of the location and nature of the emergency, potential hazards, etc.

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-8 III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Large Fire | 3.1 AP-8 III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Explosion | 3.1 AP-8 III.C. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Leaking Barrels | 3.1 AP-15A I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Severely Leaking Barrels | 3.1 AP-15A II.A. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Four housekeepers |
| Fire Not in Storage Area | 3.1 AP-15A II.B. | Standby as needed if fire spreads | Two Health Physics workers |

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-15A II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Housekeeping crew<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-15A III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Outside assistance as required |
| Severe Fire | 3.1 AP-15A III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Firefighters<br>Housekeeping crew<br>Outside assistance as required |

| Class Description (from 3.1) | Action |
|---|---|
| II.C. | Pump out all water after ascertaining that it is low or lacking in radioactive contamination. Dry floors thoroughly, then smear to evaluate radiological status. Check all barrels for damage if they have fallen over. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local police and fire authorities that AP-15A is involved. Check for ruptured drums in AP-15A. If none are damaged, check inventory to see if any are missing. If drums are found damaged in the building or on-site, evaluate the radiological status of the area with survey equipment, air samples, smears. Clean up as necessary. Restoration of the warehouse may require temporary storage of drums in another restricted location. |
| III.B. | Call Fire Department. Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement officials of fire in the waste storage area. When fire is out, check all drums for damage. Smear drums, floors, and take air samples to determine radiological status of the area. Clean up as necessary, calling for assistance from Radiological Assistance Teams from the Illinois Department of Nuclear Safety and the U.S. Department of Energy. Special attention should be given to water from sprinklers; do not discharge until it has been assayed for radioactive material content. |

## 3.3 RANGE OF POSTULATED ACCIDENTS

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Minor Spill | 3.1 AP-8 I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Contaminated Worker | 3.1 AP-8 I.B. | Eberline RM-15 or equivalent | One health physicist |
| Elevated Air Sample | 3.1 AP-8 I.C. | Multichannel analyzer | One health physicist |
| Minor Wounds | 3.1 AP-8 I.D. | Eberline RM-15 or equivalent | One health physicist |
| Severe Spill | 3.1 AP-8 II.A. | Eberline RM-15 or equivalent<br>Eberline E-510 | Four Health Physics workers<br>Three housekeepers |
| Hood Exhaust Failuer | 3.1 AP-8 II.B. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Maintenance workers |
| Power Outage | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1 (after restoration of power) | Four Health Physics workers<br>Maintenance workers |
| Small Fire | 3.1 AP-8 II.D. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Two Health Physics workers<br>Three housekeepers<br>Firefighters |
| Broken Water Line | 3.1 AP-8 II.E. | Eberline RM-15 or equivalent | Three Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Broken Steam Line | 3.1 AP-8 II.F. | Depends on location of break as to need or lack of need for instruments | Three Health Physics workers if break affects restricted areas<br>Maintenance workers |

| Class Description (from 3.1) | Action |
|---|---|
| II.D. | Summon Fire Department. Fight fire with building fire protection equipment. Evacuate all personnel not needed for fire-fighting or building status evaluation. After fire is out, Health Physics must evaluate radiological status of the building before reentry is permitted. |
| II.E. | Turn off water main and call maintenance personnel to repair line and restore service. Pick up all water from floors and other surfaces, retaining until it is known that it may be discarded or, alternately kept as radioactive waste. |
| II.F. | Turn off steam main and call maintenance personnel to repair line and restore service. If anyone was burned, evaluate medical status and extent of radiological contamination, if any. Transport burned or injured to the hospital. Clean and evaluate radiological status of affected areas. |
| II.G. | Flooding can occur in the liquid radioactive waste concentrator at AP-8. Pump all liquid into drums pending assay of radioactive materials content. Correct cause of flooding. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities that AP-8 was involved. Evaluate building status from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |

| Class Description (from 3.1) | Action |
|---|---|
| III.B. | Notify Fire Department, Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities (Sheriff, Civil Defense, etc.) of the possible radiological consequences of the fire. Evaluate building sites from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| III.C. | Call the Fire Department. If explosion has occurred in an area where radioactive material is used or stored, contact Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement authorities. Evaluate radiological status of affected area, performing cleanup as indicated. If needed for evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| AP-15A | |
| I.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. |
| II.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. Materials Management should be on hand to move pallets of barrels as necessary. |
| II.B. | Alert all Health Physics personnel to be on hand should the fire spread. All material stored is in heavy gauge steel drums which are heat-resistant, and the area is equipped with sprinklers. Proceed as shown below in III.B. if the fire spreads. |

# 1.0 GENERAL DESCRIPTION OF THE PLANT/LICENSED ACTIVITY

## 1.1 Licensed Activity Description

The Diagnostics Division of Abbott Laboratories is involved in the manufacture and distribution of in vitro diagnostic products and accessories employed in hospital and private clinical laboratories. These products fall into two broad categories: diagnostic instruments and diagnostic products.

Abbott has established itself as a leader in the hepatitis-testing market as well as other segments of the diagnostic industry that includes: thyroid, cancer, microbiology, cardio-vascular, infectious diseases, and clinical chemistry. Approximately 35% of our diagnostic products employ the use of a radioisotope (Iodine-125) to detect minute quantities of a specific analyte from a blood sample. This type of in vitro diagnostic product that uses radiolabeled material is referred to as a radioimmunoassay or competitive protein binding radio-assay. Presently, there is a shift in technology to employ nonradioactive tracers (e.g., enzyme-labeled conjugates) for in vitro diagnostic products.

The Diagnostics Division does research and manufacturing of diagnostic products at Corporate Headquarters in North Chicago, IL. Presently, Abbott Laboratories' Material License No. 12-00621-03 authorizes the possession of 75 curies of Iodine-125 and 25 curies total of all other byproduct materials combined. The majority of radioactivity, with levels greater than 8 curies of I-125, is confined to buildings AP-8 and AP-15A at Abbott Park. Building AP-8 is for research and manufacturing, while building AP-15A is for storage of radioactive waste.

Radioactive waste consists of both solid and liquid waste. The radioactivity consists of I-125 radioisotope.

## 1.2 Site and Facility Description

AP-8 is of steel and reinforced concrete construction with brick exterior. Floor plan is attached (Appendix 1).

Primary protection for workers against inhalation of radioactive byproduct material is provided by fume hoods designed to operate at 125 lineal feet per minute face velocity. The majority of these hoods are of stainless steel construction with controls for the various utilities (gas, water, steam, lights, air, etc.) on the outside. Air from these hood exhausts is not recycled, but is filtered through a dust filter, a HEPA filter, and an impregnated activated charcoal filter (Barnaby-Cheney Type 727 or its equivalent) before discharge to the atmosphere. Each hood exhaust discharging activity is sampled continuously at a point beyond the filters in order to assure compliance with the provisions of 10 CFR 20.106. Air in the laboratory itself is monitored with a fixed air sampler positioned approximately at the breathing zone of a worker at the hood (see Appendix 2). This sample, taken during the work day, is used to determine compliance with 10 CFR 20.103 and to identify problem areas if they develop.

A sketch of a typical Iodination Laboratory (Appendix 2) shows a representative laboratory in building AP-8.

AP-15 is an approximately 200,000 sq. ft. single story, exterior brick wall warehouse. It is basically used for packaging material and general warehouse operations.

Within the AP-15 building, a 6400 sq. ft. area has been isolated for radioactive waste drum storage (AP-15A). The area is 80 x 80 ft. Floor is a concrete slab on grade, the south and east walls are floor to ceiling concrete block, the west and north walls are metal partitions 20 ft. high to the existing roof trusses. Metal partition walls are on top of a 2 ft. wide by 6 in. high concrete dike to retain any spill. Entrance to the area is through a truck type door with controlled access. An emergency exit pedestrian door has been installed in the main warehouse area. This door is alarmed if used as an exit and further access cannot be obtained to the drum storage area from the warehouse through this door.

Drum warehouse facilities have emergency lighting, space is heated by unit heaters; no air conditioning has been supplied. Area contains fire protection sprinkler system and is equipped with a fire hose, safety showers and fire extinguishers.

## 6.5 EMERGENCY MONITORINGT EQUIPMENT

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Jordan Model AGB-10KG-SR | Beta, gamma radiation surveys | 0.01-$10^7$ mR/hr | 6 months | 1 | Portable, very high range | AP-9 |
| Eberline Model E-510 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 2 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-520 with SK-1 Audio | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 1 | Portable; Geiger-Muller | AP-8 |
| Eberline Model E-530 | Beta, gamma radiation surveys | 0-200 mR/hr | 6 months | 5 | Portable; Geiger-Muller | AP-8<br>AP-1A<br>AP-9<br>R-1-B |
| sNuclear Chicago Model 2650 | Beta, gamma radiatikon surveys | 0-100 mR/hr | 6 months | 4 | Portable; Geiger Muller | AP-8<br>AP-9<br>R-1-B |
| Eberline Model RM-15 with low energy gamma scintillation probe or equivalent | Personnel and area contamination surveys | 0-500K CMP | 6 months | 12 | Portable; battery operated | AP-1A<br>AP-8<br>AP-9<br>R-1-B |
| Air Sampler, Staplex Model TFIA | High volume air sampling for radioactive material | 70 $ft^3$/min | - | 2 | Portable; requires 110v power | AP-8 |
| Eberline Model RAP-1 regulated air pump with Bendix 2 $ft^3$/min flowmeter | Air sampling for radioactive material | 0-2 $ft^3$/min | - | 6 | Portable; requires 110v power | AP-9<br>AP-8<br>AP-12<br>R-1-B |

## 6.5 EMERGENCY MONITORING EQUIPMENT (continued)

| DESCRIPTION | PURPOSE | SENSITIVITY/ RANGE | CALIBRATION FREQUENCY | NUMBER AVAILABLE | COMMENTS | BUILDING LOCATION |
|---|---|---|---|---|---|---|
| Anemometer | Wind velocity measurement | - | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| Wind direction indicator | Wind direction measurement | 360° | - | 1 | On building AP-7 roof; results not routinely recorded | AP-7 |
| ANSR | Analytical counting of smears and air sample pads | - | 6 months | 1 | Needs 110v power; not portable | AP-8 Rm 240 |
| Packard Multichannel Analyzer Model 9012 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Needs 110v power; not portable | AP-1A, Rm L-04 |
| Packard Spectrazoom Multichannel Analyzer Model 930 with gamma scintillation probe and well | Analytical counting of smears and air sample pads; internal exposure measurements | - | 6 months | 1 | Portable; operates on 110v or battery | R-1-B, Rm 0133A |
| Nuclear Chicago Scaler Model 8703 with gamma scintillation well | Analytical counting of smears and air sample pads | - | 6 months | 1 | Requires 110v power | AP-1A, Rm L-04 |

# 6.0 EQUIPMENT AND FACILITIES

## 6.1 Control Point

The control point for a radiation emergency situation shall be the AP6C, C-4 North conference room for an incident in AP-8 or the interstitial level AP-1A large conference room will be used as the control point for an incident occuring in AP-15A.

## 6.2 Communications Equipment

Normal telephone communication facilities are available in both control points. Abbott Security will be contacted to provide mobile communication service.

## 6.3 Facility for Assessment Teams

The main conference room on the fourth floor of AP-6C (Room C-4 North) will be used as the facility for the Assessment Team. The room is centrally located; has complete telephone services (including speaker phones); and is near most management and regulatory personnel.

## 6.4 Onsite Medical Facilities

In the event of an accident in AP-8 that involves individuals who are contaminated with radioactive material, any first aid or medical treatment necessary will be provided at a suitable location. The clinic facilities in AP-6B WILL NOT be used.

During the normal workday, available medical personnel in the Abbott Park Employee Health Department will respond to the call and provide any care deemed appropriate. The medical personnel responding will carry with them an emergency response kit containing medical materials to provide initial first aid and emergency care to a limited number of casualties. An exact list of the contents of the kit is attached.

At other times, available first aid trained personnel will render first aid prior to transportation of the injured by ambulance to Victory Memorial Hospital. Medical and first aid personnel will be required to don protective clothing to include gown, mask, cap, rubber gloves, and shoe covers as directed by the Health Physics personnel before administering aid to those injured.

## 6.4 Onsite Medical Facilities

In Emergency Bag:

Dextrose
Kling Gauze
Needles, 23 & 25 gauge
Syringes, 2, 5, & 10 cc
Tongue Blades (one padded)
Tourniquet
(Mosquito forceps and scalpel out for sterilization)
Alcohol Sponges
Ammonia Inhalants
Bandaids
Eye Pads
Sterile Dressings
Tape
Triangular Bandage
Thermometer
Daily Visits Slips
Taxie Slips
Case Forms
List of Telephone Nos.
Koldpack
Tensors (two)
Laerdal Pocket Mask
Pencil and Pen

Demerol
Caffeine and Sodium Benzoate
Coramine
Benadryl
Atropine Sulfate
Dilantin
Aminophyllin
Adrenalin Chloride
Thorazine Injection
Nitroglycerin Tab
Amyl Nitrite
Alcohol
Zepharin Chloride
Sheet
Wash Cloth
Waxed Bag
Barrier Sterile Field
Sphygmomanometer
Stethoscope
Flashlight
Rubber Gloves
Orange Juice and Sugar
Scissors
Air Way
PLUS AMBU BAG

Radiation Kit (In Each Clinic):

Syringes, 2, 5, & 10 cc
2x2 Gauze Squares
Lugol's Solution
Tourniquet
1000 cc Sodium Chloride
Bandaids
Venoset (20-gauge needle)
Needles, 18 & 20 gauge

Suture Towel
3x3 Gauze Squares
Ammonia Inhalant
Sterile Water Injection, 10 ml
Preptic Pads
Adhesive
Disposable Gloves

Medical

The Medical section will be responsible for evaluation of the extent of injuries of workers. Those not injured will be checked for contamination by Health Physics and, if not contaminated, will be released from the area of the emergency. Persons with minor injuries requiring medical attention will be taken to Victory Memorial Hospital, Waukegan, Illinois, by the Libertyville, Illinois, Fire Department Rescue Squad. The Medical section will provide onsite medical care only for those persons will life-threatening injuries requiring immediate attention. After these grave injuries are given proper first treatment, the victims will be taken to Victory Memorial Hospital as above. Transportation priority will be given to those severely injured persons.

The authority of the medical groups is to make all decisions related to the care and treatment of injured persons, assisted by Health Physics workers who will determine the extent of radiation contamination of victims. Information regarding contaminated persons will be provided to Victory Memorial Hospital before these persons actually arrive for treatment.

Regulatory Affairs

Regulatory Affairs (Diagnostics Division) is responsible for the maintenance of all byproduct material licenses with the NRC. Therefore, Health Physics will advise Regulatory Affairs when an emergency occurs and the actions taken.

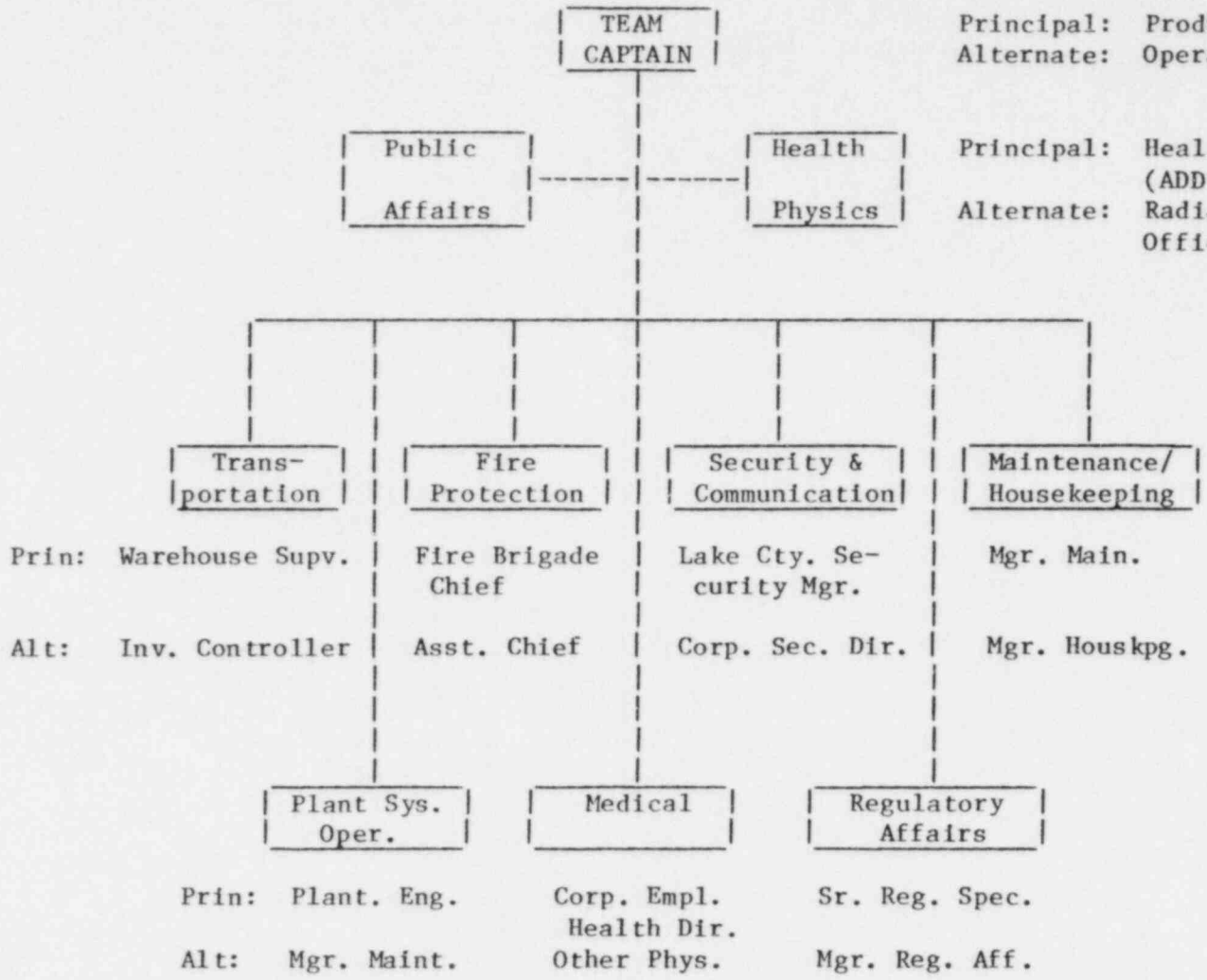
Materials Management

The Materials Management personnel will be responsible for assessing a transportation accident involving transfer of radioactive waste materials to building AP-15A. The Materials Management personnel, in cooperation with Health Physics personnel, will determine the nature and extent of the emergency and advise the team captain. The team captain, in turn, may activate the Radiological Contingency Response team or part thereof, if necessary.

Plant Systems Operations

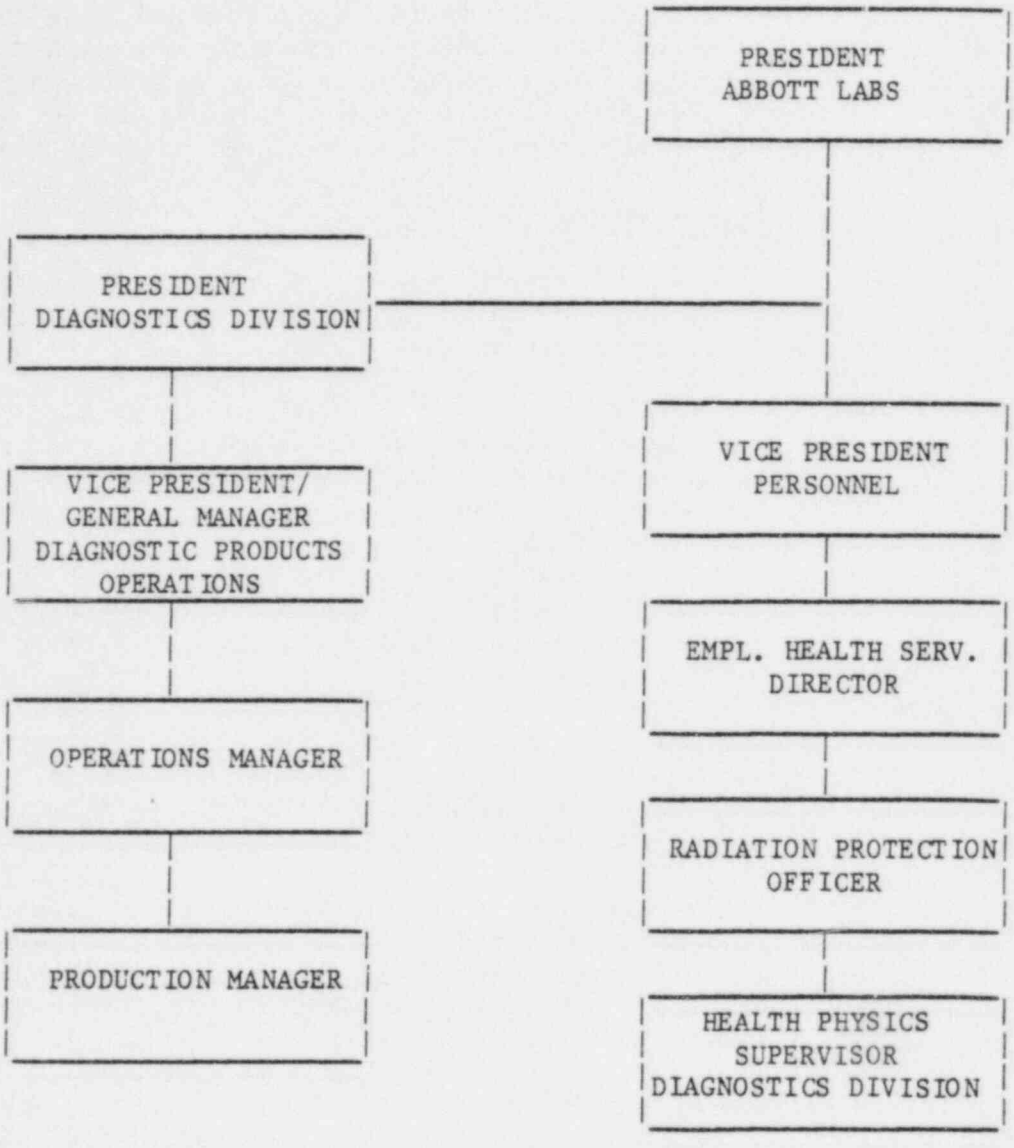
The Plant Systems Operations personnel will be responsible for safe shutdown of manufacturing and other operations and facilities. They will assess the emergency conditions and report to the team captain. They will have the authority to evacuate the personnel, if necessary. In addition, they will immediately report the emergency condition (e.g., fire, hood alarm, power failure, etc.) to the appropriate functional group(s) on the Radiological Contingency Response team.

TABLE 4.2.1
Radiological Contingency Response Organization



# 4.0 ORGANIZATION FOR CONTROL OF RADIOLOGICAL CONTINGENCIES

## 4.1 Normal Plant Organization




At Operation Level, the Production Manager or Health Physics Supervisor have the authority to declare an emergency and initiate proper corrective action (see section 4.2.1).

## 4.2 Onsite Radiological Contingency Response Organization

The onsite Radiological Contingency Response Organization for building AP-8 and building AP-15A is described in Table 4.2.1. The Production Manager for Diagnostic Products will be the team captain for both the buildings. Alternates for all responsible groups are also listed in the table. These response teams will be responsible for controlling each class of emergency including the times when normal operations are not being conducted.

### 4.2.1 Direction and Coordination

The Production Manager will have the overall responsibility for implementing and directing the radiological contingency procedures for building AP-8 and building AP-15A.

When an evacuation alarm is sounded, all personnel will cease work immediately, perform any emergency shutdown procedures related to their work, and leave the building in orderly fashion, following the posted exit routes. They will then proceed by the most direct route to the Emergency Assembly Area, to report to their supervisors (or their alternates), and remain in the immediate area until further instructed.

The Emergency Assembly Area for building AP-8 is the parking lot south of the building and east of building AP-4 (AP-4 parking lot). The alternate location is the northeast parking lot of AP-5.

All department heads will complete a headcount of their personnel immediately upon arrival in the Emergency Assembly Area. They will then report to the Radiological Contingency Plan team captain and advise him of any persons who are not accounted for.

Health Physics personnel will determine the nature and probable extent of the emergency and advise the team captain and the Abbott Park gatehouse.

Immediately after receiving reports from the department heads and Health Physics personnel, the team captain may instruct the Fire Brigade to enter the building to locate any missing persons and verify completion of evacuation. The Fire Brigade may be assisted by Health Physics or Security personnel, as appropriate.

The team captain will meet all emergency teams (Fire Brigade, Rescue Squad, Police, etc.) as they arrive and advise them of the location and nature of the emergency, potential hazards, etc.

## 3.3 RANGE OF POSTULATED ACCIDENTS (continued)

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-8 III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Large Fire | 3.1 AP-8 III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Explosion | 3.1 AP-8 III.C. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Grounds crew<br>Outside assistance as required |
| Leaking Barrels | 3.1 AP-15A I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Severely Leaking Barrels | 3.1 AP-15A II.A. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Four housekeepers |
| Fire Not in Storage Area | 3.1 AP-15A II.B. | Standby as needed if fire spreads | Two Health Physics workers |

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Flooding | 3.1 AP-15A II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1<br>Packard MCA | Four Health Physics workers<br>Housekeeping crew<br>Maintenance workers |
| Tornado, etc. | 3.1 AP-15A III.A. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Outside assistance as required |
| Severe Fire | 3.1 AP-15A III.B. | Most listed in Section 6.5 | All Health Physics<br>Maintenance crew<br>Firefighters<br>Housekeeping crew<br>Outside assistance as required |

| Class Description (from 3.1) | Action |
|---|---|
| II.C. | Pump out all water after ascertaining that it is low or lacking in radioactive contamination. Dry floors thoroughly, then smear to evaluate radiological status. Check all barrels for damage if they have fallen over. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local police and fire authorities that AP-15A is involved. Check for ruptured drums in AP-15A. If none are damaged, check inventory to see if any are missing. If drums are found damaged in the building or on-site, evaluate the radiological status of the area with survey equipment, air samples, smears. Clean up as necessary. Restoration of the warehouse may require temporary storage of drums in another restricted location. |
| III.B. | Call Fire Department. Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement officials of fire in the waste storage area. When fire is out, check all drums for damage. Smear drums, floors, and take air samples to determine radiological status of the area. Clean up as necessary, calling for assistance from Radiological Assistance Teams from the Illinois Department of Nuclear Safety and the U.S. Department of Energy. Special attention should be given to water from sprinklers; do not discharge until it has been assayed for radioactive material content. |

## 3.3 RANGE OF POSTULATED ACCIDENTS

| POSTULATED ACCIDENT | REFERENCE | INSTRUMENT CAPABILITIES (See Section 6.5) | MANPOWER |
|---|---|---|---|
| Minor Spill | 3.1 AP-8 I.A. | Eberline RM-15 or equivalent | One health physicist<br>One housekeeper |
| Contaminated Worker | 3.1 AP-8 I.B. | Eberline RM-15 or equivalent | One health physicist |
| Elevated Air Sample | 3.1 AP-8 I.C. | Multichannel analyzer | One health physicist |
| Minor Wounds | 3.1 AP-8 I.D. | Eberline RM-15 or equivalent | One health physicist |
| Severe Spill | 3.1 AP-8 II.A. | Eberline RM-15 or equivalent<br>Eberline E-510 | Four Health Physics workers<br>Three housekeepers |
| Hood Exhaust Failuer | 3.1 AP-8 II.B. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Four Health Physics workers<br>Maintenance workers |
| Power Outage | 3.1 AP-8 II.C. | Eberline RM-15 or equivalent<br>Eberline RAP-1 (after restoration of power) | Four Health Physics workers<br>Maintenance workers |
| Small Fire | 3.1 AP-8 II.D. | Eberline RM-15 or equivalent<br>Eberline RAP-1 | Two Health Physics workers<br>Three housekeepers<br>Firefighters |
| Broken Water Line | 3.1 AP-8 II.E. | Eberline RM-15 or equivalent | Three Health Physics workers<br>Two housekeepers<br>Maintenance workers |
| Broken Steam Line | 3.1 AP-8 II.F. | Depends on location of break as to need or lack of need for instruments | Three Health Physics workers if break affects restricted areas<br>Maintenance workers |

| Class Description (from 3.1) | Action |
|---|---|
| II.D. | Summon Fire Department. Fight fire with building fire protection equipment. Evacuate all personnel not needed for fire-fighting or building status evaluation. After fire is out, Health Physics must evaluate radiological status of the building before reentry is permitted. |
| II.E. | Turn off water main and call maintenance personnel to repair line and restore service. Pick up all water from floors and other surfaces, retaining until it is known that it may be discarded or, alternately kept as radioactive waste. |
| II.F. | Turn off steam main and call maintenance personnel to repair line and restore service. If anyone was burned, evaluate medical status and extent of radiological contamination, if any. Transport burned or injured to the hospital. Clean and evaluate radiological status of affected areas. |
| II.G. | Flooding can occur in the liquid radioactive waste concentrator at AP-8. Pump all liquid into drums pending assay of radioactive materials content. Correct cause of flooding. |
| III.A. | Notify Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities that AP-8 was involved. Evaluate building status from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |

| Class Description (from 3.1) | Action |
|---|---|
| III.B. | Notify Fire Department, Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local authorities (Sheriff, Civil Defense, etc.) of the possible radiological consequences of the fire. Evaluate building sites from the radiological point of view (surveys, air sampling, smearing, visual observation). If needed in evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| III.C. | Call the Fire Department. If explosion has occurred in an area where radioactive material is used or stored, contact Nuclear Regulatory Commission, Illinois Department of Nuclear Safety, and local law enforcement authorities. Evaluate radiological status of affected area, performing cleanup as indicated. If needed for evaluation and cleanup, contact Radiological Assistance Teams from the State of Illinois and the U.S. Department of Energy. |
| AP-15A | |
| I.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. |
| II.A. | Isolate area. Clean up leakage, then evaluate area with smears to assure adequacy of cleanup. Materials Management should be on hand to move pallets of barrels as necessary. |
| II.B. | Alert all Health Physics personnel to be on hand should the fire spread. All material stored is in heavy gauge steel drums which are heat-resistant, and the area is equipped with sprinklers. Proceed as shown below in III.B. if the fire spreads. |

# 1.0 GENERAL DESCRIPTION OF THE PLANT/LICENSED ACTIVITY

## 1.1 Licensed Activity Description

The Diagnostics Division of Abbott Laboratories is involved in the manufacture and distribution of in vitro diagnostic products and accessories employed in hospital and private clinical laboratories. These products fall into two broad categories: diagnostic instruments and diagnostic products.

Abbott has established itself as a leader in the hepatitis-testing market as well as other segments of the diagnostic industry that includes: thyroid, cancer, microbiology, cardio-vascular, infectious diseases, and clinical chemistry. Approximately 35% of our diagnostic products employ the use of a radioisotope (Iodine-125) to detect minute quantities of a specific analyte from a blood sample. This type of in vitro diagnostic product that uses radiolabeled material is referred to as a radioimmunoassay or competitive protein binding radio-assay. Presently, there is a shift in technology to employ nonradioactive tracers (e.g., enzyme-labeled conjugates) for in vitro diagnostic products.

The Diagnostics Division does research and manufacturing of diagnostic products at Corporate Headquarters in North Chicago, IL. Presently, Abbott Laboratories' Material License No. 12-00621-03 authorizes the possession of 75 curies of Iodine-125 and 25 curies total of all other byproduct materials combined. The majority of radioactivity, with levels greater than 8 curies of I-125, is confined to buildings AP-8 and AP-15A at Abbott Park. Building AP-8 is for research and manufacturing, while building AP-15A is for storage of radioactive waste.

Radioactive waste consists of both solid and liquid waste. The radioactivity consists of I-125 radioisotope.

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## 1.2 Site and Facility Description

AP-8 is of steel and reinforced concrete construction with brick exterior. Floor plan is attached (Appendix 1).

Primary protection for workers against inhalation of radioactive byproduct material is provided by fume hoods designed to operate at 125 lineal feet per minute face velocity. The majority of these hoods are of stainless steel construction with controls for the various utilities (gas, water, steam, lights, air, etc.) on the outside. Air from these hood exhausts is not recycled, but is filtered through a dust filter, a HEPA filter, and an impregnated activated charcoal filter (Barnaby-Cheney Type 727 or its equivalent) before discharge to the atmosphere. Each hood exhaust discharging activity is sampled continuously at a point beyond the filters in order to assure compliance with the provisions of 10 CFR 20.106. Air in the laboratory itself is monitored with a fixed air sampler positioned approximately at the breathing zone of a worker at the hood (see Appendix 2). This sample, taken during the work day, is used to determine compliance with 10 CFR 20.103 and to identify problem areas if they develop.

A sketch of a typical Iodination Laboratory (Appendix 2) shows a representative laboratory in building AP-8.

AP-15 is an approximately 200,000 sq. ft. single story, exterior brick wall warehouse. It is basically used for packaging material and general warehouse operations.

Within the AP-15 building, a 6400 sq. ft. area has been isolated for radioactive waste drum storage (AP-15A). The area is 80 x 80 ft. Floor is a concrete slab on grade, the south and east walls are floor to ceiling concrete block, the west and north walls are metal partitions 20 ft. high to the bottom of existing roof trusses. Metal partition walls are sited on top of a 2 ft. wide by 6 in. high concrete dike to retain any spill. Entrance to the area is through a truck type door with controlled access. An emergency exit pedestrian door has been installed in the main warehouse area. This door is alarmed if used as an exit and further access cannot be obtained to the drum storage area from the warehouse through this door.

Drum warehouse facilities have emergency lighting, space is heated by unit heaters; no air conditioning has been supplied. Area contains fire protection sprinkler system and is equipped with a fire hose, safety showers and fire extinguishers.