DOCKET NO. 70-58

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THE MARTIN COMPANY

APPLICATION FOR GENERAL LICENSE TO RECEIVE,

POSSESS, USE AND TRANSFER SPECIAL NUCLEAR

MATERIAL (PART 70, CFR 10)

DOCKETED
USNRC
Division of
Contract Application
DEC 13 1967
Office

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DEC 13 1957

APPLICATION FOR GENERAL LICENSE TO RECEIVE, POSSESS, USE AND TRANSFER SPECIAL NUCLEAR MATERIAL (PART 70, CFR 10)

I. The Martin Company is engaged in design, research, development and construction of nuclear reactors and nuclear components at its Middle River Plant near Baltimore, Maryland. For the purpose of development and fabrication of reactor fuel elements, a Nuclear Materials Laboratory and a Pilot Manufacturing Plant have been constructed in the basement of "D" Building at Plant I. A critical experiment facility for zero power testing of proto-type reactor cores is in the final stage of completion. This facility is located near the Martin airport some two thousand feet southeast of Plant I.

Research and development work on fuel elements is conducted under Special Nuclear Material License No. 11, as amended, in accordance with procedures described in the Company's applications of May 22, 1957 and September 19, 1957. The most recent revision of this license permits special operations involving fully clad fuel elements to be performed in the pilot manufacturing plant and in other buildings at Plant I in addition to the laboratory areas.

Initial operation of the Pilot Manufacturing Plant involves fabrication of stainless steel tubular elements containing highly enriched UO_2, for a proto-type MPR core to be tested to zero power for the Atomic Energy Commission under Contract AT (30-3)-277. Government-owned fuel has been handled through Accountability Station MND, which was authorized by the Schenectady Operations Office after approval of the Martin Nuclear Division's procedures regarding criticality control, accountability, health and safety, and security.

In addition to MPR type tubular elements, The Martin Company plans to fabricate other fuel element types in the Pilot Manufacturing Plant. Certain special operations will be performed in other buildings at Plant I. Some of the work to be undertaken will be on a commercial basis and therefore must be done under a Special Nuclear Material License issued by the Commission. In this connection, note is made that the Commission issued SNM License 53 to The Martin Company on November 26, 1956 permitting receipt and possession of fifty (50) kilograms of UO_2 enriched to over 90% in the isotope U235.

Several types of fuel elements including rods, tubes and plates will be manufactured. These elements will utilize uranium metal or uranium dioxide in a fuel marrow clad with such materials as stainless steel, aluminum alloys and zirconium alloys.

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In view of these varied contemplated activities, The Martin Company pursuant to Part 70, CFR 10 hereby applies for a general license to receive, possess and use up to five hundred kilograms of contained U235 in special nuclear materials at its Middle River facilities, including uses in the Critical Experiment Facility other than activities licensed under Part 50, CFR 10. Application is made for a license extending for three years from date of issuance. The experience gained by the Nuclear Division during the past three years in safe handling of nuclear materials is reflected in the general procedures outlined in this application in sections which follow.

II. Information required pursuant to Section 70.22, Title 10, Chapter 1, CFR:

(1) Applicant is The Martin Company, Baltimore 3, Maryland incorporated in the State of Maryland and having its principal plant and place of business at Middle River, Maryland.

Principal officers are:

G. M. Bunker, President, The Martin Company, Baltimore 3, Maryland - USA

W. B. Bergen, Executive Vice President, The Martin Company, Baltimore 3, Maryland - USA

W. L. Lucas, Secretary and Treasurer, The Martin Company, Baltimore 3, Maryland - USA

The Martin Company is not owned, controlled, or dominated by an alien, a foreign corporation, or foreign government. The applicant is the real party in interest and is not making this application as an agent for any undisclosed principal.

(2) Activities:

Attached for reference are plans of the nuclear facilities at the Martin Middle River plant showing work areas and quantities of special nuclear material (in terms of contained isotope U235) permitted in each work area:

Plate 1 - Plan of Engineering Materials Laboratory
Plate 2 - Plan of Pilot Manufacturing Plant
Plate 3 - Plan of Critical Experiment Facility located near Martin airport.

General procedures in connection with activities contemplated are:

(a) Receiving -

SNM will be received at Gate 5 of Plant I by the Accountability Representative. After monitoring by Health Physics Services for radiation hazards, shipments will be conveyed to Vault Annex Room, (Work Area IB) or Vault, (Work Area IA) for unpacking and weighing of special nuclear material.

(b) Storage -

The storage vault is a fully enclosed room, 22'8" by 13'9" by 11'0" high. It is designed to hold up to 600 kilograms of enriched uranium in powders, foils, elements or ingots stored in birdcage devices approximately 12" x 12" to 17" x 17" in cross-section. Walls, ceiling, and floor are constructed of a minimum of 9 inches of reinforced concrete. Sole entrance to the vault is through a $1\frac{1}{2}$" steel door equipped with a three-way combination lock. There are no water or service piping or drains within the vault.

Materials will be stored in separate containers containing quantities which are less than the theoretical critical masses calculated for optimum conditions with respect to geometry of container, moderators, and reflector according to the calculating procedures outlined in the Martin Criticality Precautions Manual, MND-1063 (Appendix A) and its reference "A Guide to the Calculation of Criticality Limits for Enriched Uranium" by Dr. Chernick. Each container will be at least 12" x 12" in cross-section with a length about 12" longer than the material to be held. Containers and birdcages will vary in design according to the form of the material. For example:

Uranium dioxide powders will be stored in metal bottles of approximately 150 cubic centimeters capacity. No more than 600 grams of uranium dioxide enriched to over 90% in the isotope U235 or more than 550 grams of contained isotope U235 will be stored in each metal bottle. One and only one bottle will be suspended inside a cubical "birdcage" type structure of welded metal construction having dimensions of 16 5/8" x 16 5/8" x 21 3/8".

Uranium metal foil will be stored in birdcages 12" x 12" x 34" with bundles of foil each containing no more than 1000 grams of U235 held roughly in the center by inserts.

Fuel elements, tubular or plate, will be held in cradles in storage devices or similar dimensions (12" x 12" x 30-40"). Each cradle will hold a prescribed number of tubes or plates, the total U235 content of which will be within the allowable limits established for the particular form of material involved.

Solid scrap will be stored in metal boxes 9 1/2" x 11 3/4" x 26", each held in a birdcage 12" by 12" x 40" long.

Insofar as it is practical, all birdcages will be placed in rows along the walls of the vault to permit easy access. The lowest rows will be placed on platforms about 17 inches above the floor to prevent accidental contact with water. Even if flooding occurred above the height of 22" required to reach any special nuclear material, no hazard would exist since (1) all materials will be in latched birdcages in amounts less than the theoretical critical limits and (2) powders will be in water-tight metallic containers within the birdcages.

All material will be stored during non-work hours either in the vault or in locked repository safes in the manufacturing area.

When special nuclear material must be taken from the nuclear facilities to other areas within the Martin plant, it will always be in the custody of a "Q" cleared accountability designee.

(c) Forms of material -

Forms with corresponding allowable limits in contained U235 have been established as shown on the following two pages.

(d) Work Areas and Criticality Control -

Reference is made to Plates 1, 2 and 3 and to the Martin Criticality Precautions Manual, MND-1063, filed with the AEC, April 22, 1957. A revised copy of this manual is attached as Appendix A. The manufacturing area and the critical experiment area have been divided into Work Areas for purposes of control of criticality. The laboratory except for a few designated work areas is considered to be one integral work area. Limits (in terms of U235) are shown on the plates for the various

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
Ia	all enrichments	UO_2 powder, density when loose approx. 5 gr/cc	800 grams
Ib	all enrichments	UO_2 powder, pressed and sintered shapes density approx. 10 gr/cc	800 grams
Ic	0.72% to 20.0%	UO_2 and ThO_2, powder and sintered shapes	* grams
IIa	highly enriched	UO_2 and stainless steel mixture, density approx. 8.4 gr/cc	1600 grams
IIb	highly enriched	Sintered cermet of UO_2 and stainless steel density approx. 8.4 gr/cc	1850 grams
III	all enrichments	Uranium in aqueous solution	2 grams/liter (1)
IV	highly enriched	Stainless steel clad tubes, with Form IIb as fuel marrow	2000 grams
V	over 20.0%	Stainless steel clad plates with uranium metal as fuel marrow	1600 grams
VIa	over 20.0%	Uranium metal in thin forms; ribbon, foil wire, etc.	500 grams
VIb	over 20.0%	Uranium metal in fine cuttings, dust., etc.	500 grams
VIIa	all enrichments	UO_2 and powdered Al mixture, approx. density 2.5 gr/cc	800 grams
VIIb	all enrichments	Pressed or sintered UO_2 and Al mixture in (VIIa) approx. density 5.0 gr/cc	800 grams

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
VIIIa	all enrichments	Aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
VIIIb	all enrichments	Iron-aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
IX	over 20.0%	Uranium metal in buttons, derbies, etc.	10000 grams (2)
X	over 20.0%	Uranium metal in ingots, bars, machined shapes, smallest dimension 70.25 inches	3000 grams
XI	0.72% to 20.0%	Stainless steel clads filled with solid pellets of Form Ib or Ic	2000 grams
XII	over 20.0%	Zirconium, titanium, molybdenum and other "special" alloy-clad plates with uranium metal fuel marrow	grams (3)
XIII	over 20.0%	Uranium-thorium molybdenum alloys	grams (3)

(1) Except when total amount in any one container in all forms is less than 400 grams of U235

(2) Subject to review with regard to minimum dimensions and reflecters

(3) To be determined

forms of SNM (pages 5 and 6) which can be present in each work area at any one time. In the event that several forms are present at one time in a work area, the lowest allowable limit for U235 applies to all materials present.

All transfers between work areas are made by the courier acting as a designee of the Accountability Representative. Enforcement of criticality procedures within work areas is a responsibility of each facility supervisor. Material, under close weighing control, is transported to an "Off-Spot" in work boxes in "carrier" devices. Amounts present in each work area are shown on prominent signs posted by the Accountability Representative.

(e) Manufacturing -

Fabrication of fuel elements will be performed in the pilot shop located in "D" Building.

A few special operations such as brazing of fully clad tubes to end castings will be done in other buildings at Plant I.

Processes, either developed or being developed include:

(1) Fabrication of stainless steel clad plates enclosing uranium metal foil (Form [illegible])

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV)

(3) Aluminum and aluminum alloy clad tubes enclosing pressed uranium dioxide-aluminum blended compacts as fuel marrow (Form VIII)

(4) Stainless steel clads filled with solid compacts of uranium dioxide or uranium dioxide and thoria (Form XI)

General descriptions of these processes are outlined in Appendix B with corresponding manufacturing flow charts shown in Appendix C.

(f) Accountability -

The Martin Nuclear Division accountability procedures for strict control of valuable special nuclear materials

apply to both government-furnished SNM and to licensed SNM. Each lot received is assigned a ledger number. All material withdrawn is kept separate from other lots throughout processing. Scrap is kept segregated by contract or project. Thus there is no risk of intermingling materials or several contracts or of different enrichments.

(g) Security -

All facilities are controlled areas with only authorized personnel permitted access. An escort-control pass system is applied to authorized visitors.

Materials are given security protection in accord with the categories outlined in the AEC manual.

(h) Transport to Critical Experiment Facility -

Finished fuel tubes, plates or rods are moved to the facility in "birdcage" transporting devices in a guard-escorted motor vehicle. No more than 800 grams of U235 contained in sealed elements are allowed per "birdcage" device. These birdcage devices are 12" by 12" by 34" and retain in a center position wooden cradles 9 1/2" by 11 3/4" by 23 3/4" which hold the fuel tubes or plates.

(i) Receipt and Storage at Critical Experiment Facility -

After verification by the Accountability Designee of the Facility of the number of tubes or plates delivered the birdcages will be placed in the storage vault. The vault is of similar construction to the vault in the pilot manufacturing plant and has a floor area of 175 square feet. It is accessible only through a 1 1/2" steel door equipped with a three-way combination lock.

(j) Assembly at Critical Experiment Facility -

Tubes or plates are assembled into experimental bundles in Work Area 102, adjacent to the Storage Vault and Test Cells.

Following assembly, the fuel elements (bundles or boxes) will be placed in wooden cradles which are held in the birdcage storage devices. The dimensions of the cradle holding a bundle of thirty-seven (37) MPR tubes are 9 1/2" by 11 3/4" by 23 3/4".

The birdcage devices are then transferred to the storage vault for retention until withdrawal for experimental work authorized by a Class 104 c license.

(k) Shipping procedures -

Shipments of special nuclear material to the Commission or to other licensees will be made as follows:

(1) If the shipment contains no more than 100 grams of U235, the material will be securely packed in a container with resilient material between this container and the outside package. In addition, the parcel will be checked for possible radiation hazards and marked in accordance with ICC regulations.

No more than one package containing up to 100 grams of contained U235 will be transported or delivered to a carrier in any one shipment.

(2) If the shipment contains over 100 grams of U235, the material, depending on its form, will be packed in a container in either one of the Martin "birdcage" devices described in part 2(b) or an equivalent device to be furnished by the shipper. The quantity of U235 in any shipping device will be within the allowable limits for various forms shown on pages 7 and 8 of the manual, MND-1063.

(3) A general license is requested for a period of three years.

(4) Special Nuclear Material will be used in the forms shown in section 2(c). The general categories are:

Uranium dioxide powder; low-enrichment to over 90% enriched in isotope U235
Uranium metal foil, ribbon and wire; low-enrichment to over 90% enriched in isotope U235
Uranium metal ingots, slugs, billets, bars, derbies; all enrichments.

It is not possible to estimate amounts of each type required. However, a total requirement at one time of up to 500 kilograms of contained U235 in SNM is foreseen.

(5) The contemplated requirements for Special Nuclear Material for the last quarter of 1957 and the first quarter of 1958 are shown on the next page.

(6) The Martin Nuclear Division has been engaged in handling special nuclear materials for over two years in research and development of fuel elements. The new laboratory and pilot manufacturing plant have been in operation since June, 1957.

Several new concepts of fuel elements have been developed including the highly-enriched stainless steel clad, UO_2 cermet marrow tubular type. The first core loading of 1700 of these tubes will be completed in November. The technical staff of the Nuclear Division includes some 200 engineers. The manufacturing plant supervisor has had fifteen years of precision shop experience. Health Physics personnel include two senior health physicists each with over 5 years of training at AEC and industrial installations. The Accountability Representative is a public accountant with 10 years experience including 9 months in the handling of nuclear materials.

(7) Equipment and facilities used to protect health and safety -

Storage facilities are described in (2b) and (2i). The manufacturing and laboratory areas are under negative pressure with respect to adjacent working areas of "D" Building. Air flow is from non-contaminated areas to slightly-contaminated areas to more-contaminated areas, with the highest ventilation rates in those rooms or areas where the greatest air-borne contamination is possible.

Exhaust air that may contain appreciable radioactive particulate matter (that is from the hoods or dry boxes) is passed through absolute filters before being released to the atmosphere.

Hoods are used for handling uranium dioxide powders. These hoods, exhausting ducts and glove boxes are equipped with absolute filters. Machining of uranium metal will be done using an oil bath.

A partial list of available instruments and equipment appears as Appendix D.

MATERIAL	ENRICHMENT	QUANTITY ON HAND	4TH QUARTER 1957		1ST QUARTER 1958	
			Receipts	Returns	Receipts	Returns
UO_2 Powder	20%	5 kg	-	3	-	2
UO_2 Powder	over 90%	50 kg	20	25	10	25
Uranium foil	over 90%	0.5 kg	-	-	-	-
Uranium foil	over 90%	-	31	-	-	-
Uranium metal ingot	31%	-			40	40
Uranium metal ingot	over 90%	-			100	100

(8) Health and Safety measures -

Personnel working with radioactive materials (including SNM) or in radiation areas are routinely monitored for external radiation exposure by means of film badges and pocket chambers. Contamination is controlled by surveying likely objects or areas with appropriate detecting instruments or by making filter paper smears (which must be counted with an appropriate detector), recording results, and informing proper supervision. All operating personnel must be constantly alert to contamination possibilities involved in their operations and must continually strive to keep contamination to a minimum. Health Physics takes air samples in areas where air-borne contamination is possible (frequency of sampling depends on operation). A tolerance of no more than 5×10^{-11} microcuries per milliliter air is established. If this tolerance is approached all personnel in the area affected are required to wear respirators. Uranium urinalyses and blood tests will be made every three months to check on internal deposition on people assigned to work in these areas.

From receipt of material to shipping or storage, Health Physics will be concerned with contamination and radiation levels from the SNM. External radiation measurements will be made on the received package and recorded. The Accountability Representative will open these packages. Health Physics shall assist in examination for breakage or other damage and subsequent contamination control in case of damage. During weighings of received SNM, Health Physics will make necessary smear checks. Samples to be sent for outside laboratory analysis will be packaged to conform with all pertinent ICC regulations.

Contamination control effectiveness will be checked by Health Physics throughout the operations in the laboratory and in the pilot manufacturing plant.

Protective clothing will be used to reduce personnel contamination.

Disposal of radioactive wastes: There will be no radioactive gaseous effluent from the Martin facilities. The incineration of radioactive combustible materials will be controlled by monitoring the exhaust stack of the incinerator.

Liquid wastes will be stored in polyethelene lined 55 gallon drums until ready for concentration. Batches containing no more than 400 grams of U235 will be reduced nearly to dry salt and these residues will be sent to AEC installations for recovery.

Solid wastes such as incinerator ashes will be mixed with a prepared cement mix before disposal by land or sea burials in accordance with Part 20, CFR 10.

The large volumes of slightly contaminated liquid wastes from the Decontamination Laundry will be held in collecting sumps until filtered, sampled, and counted for radioactivity before discharge to the sanitary sewer. Tap water dilution will be used, if necessary, to reduce the concentration to the levels required by 10 CFR Part 20.

(9) Emergency procedures -

An outline of the procedures to be followed in case of incidents involving nuclear materials is contained in the Criticality Precautions Manual, MND-1063, pages 5 and 5a.

(10) Financial Qualifications -

The Martin Company has done business under its present charter in the State of Maryland for a period of over twenty-five years. Total current assets on December 31, 1956 were $96,000,000 and sales for the year totalled about $360,000,000. The Nuclear Division, headed by a General Manager, is part of the company organization and draws its budgetary support therefrom.

The Martin Company will assume financial responsibility for all special nuclear materials received and will pay to the Commission the presented use charge based on the value of the material until the material is returned to the latter.

A copy of the 1956 Annual Report of the Company is attached as Appendix E.

III. Pursuant to Section 70.32, The Martin Company stipulates that:

(1) Title to all special nuclear material shall at all times be in the United States.

(2) No right to the special nuclear material shall be conferred by the license except as defined by the license.

(3) Neither the license nor any right under the license shall be assigned or otherwise transferred in violation of the provisions of the act.

(4) All special nuclear material shall be subject to the right of recapture or control reserved by section 108 and to all other provisions of the act.

(5) No special nuclear material may be used in any utilization or production facility except in accordance with the provisions of the act.

(6) The licensee shall not use the special nuclear material to construct an atomic weapon or any component of an atomic weapon.

(7) The licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee.

(8) The license shall be subject to, and the licensee shall observe, all applicable rules, regulations, and orders of the Commission.

I certify that the statements made in this application and its attachments are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

THE MARTIN COMPANY

BY: Tibor F. Nagey

Tibor F. Nagey
General Manager
Nuclear Division
Baltimore 3, Maryland

Subscribed and sworn to before me this 6th day of December, 1957.

Henrietta Marie Peters
Notary Public

My commission expires May 4, 1959.

APPENDIX B

DESCRIPTION OF PROCESSES EITHER DEVELOPED OR BEING DEVELOPED

(1) Stainless steel clad plates enclosing enriched uranium metal foil, Form V.

The process is diagrammed in the flow sheet for Form V, Appendix B. Material is received from processor in clean flat strips of foil, (Form VI) cut to size and enclosed in polyethylene bags. It is stored in birdcage boxes, 12" x 12" x 34" in lots not exceeding 1000 grams of U235 per container. Batches not exceeding 500 grams of contained U235 are withdrawn from storage vault, (Work Area 1a) and transferred by courier to Work Area 10 for assembly between stainless steel plates. Assembly is seam welded, evacuated at a low temperature and a final end seam weld made in Work Area 10. After radiography in Work Area 7, batches of plates will be autoclaved in Work Area 22 to determine porosity reliability.

Destructive and non-destructive testing will be performed on selected plates in Work Area 11.

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV).

A description of the process is contained in the confidential manual, MND-1069 which is furnished as a supporting document to this application, (Appendix F). A flow sheet for the process is also included in Appendix C.

(3) Aluminum and aluminum alloy clad tubes enclosing pressed UO_2 -Al blended compacts (Form VIII).

Enriched uranium dioxide is blended with three parts by volume of powdered aluminum in Work Area 2. This blend is compacted to pressed bushings in Work Area 5. The bushings are assembled on a tube of aluminum or aluminum alloy and a second tube is passed over the bushings to complete the assembly. The assembly is swaged and drawn in Work Area 4 and then annealed to complete the metallurgical bonding in Work Area 5. Cleaning of the finished tubes is accomplished in Work Area 9. After radiography in Work Area 7, the assembly is sheared to size (Work Area 4) and the ends seam-welded in Work Area 10. Radiography, non-destructive testing, and porosity testing are done in Work Areas 7, 11 and 20 respectively to complete the tube manufacturing process. Brazing and welding of sealed tubes into bundles will be done in other facilities at Plant I under security and health safety safeguards required.

(4) Stainless steel clads filled with pressed compacts of uranium dioxide or uranium dioxide and thoria (Form XI).

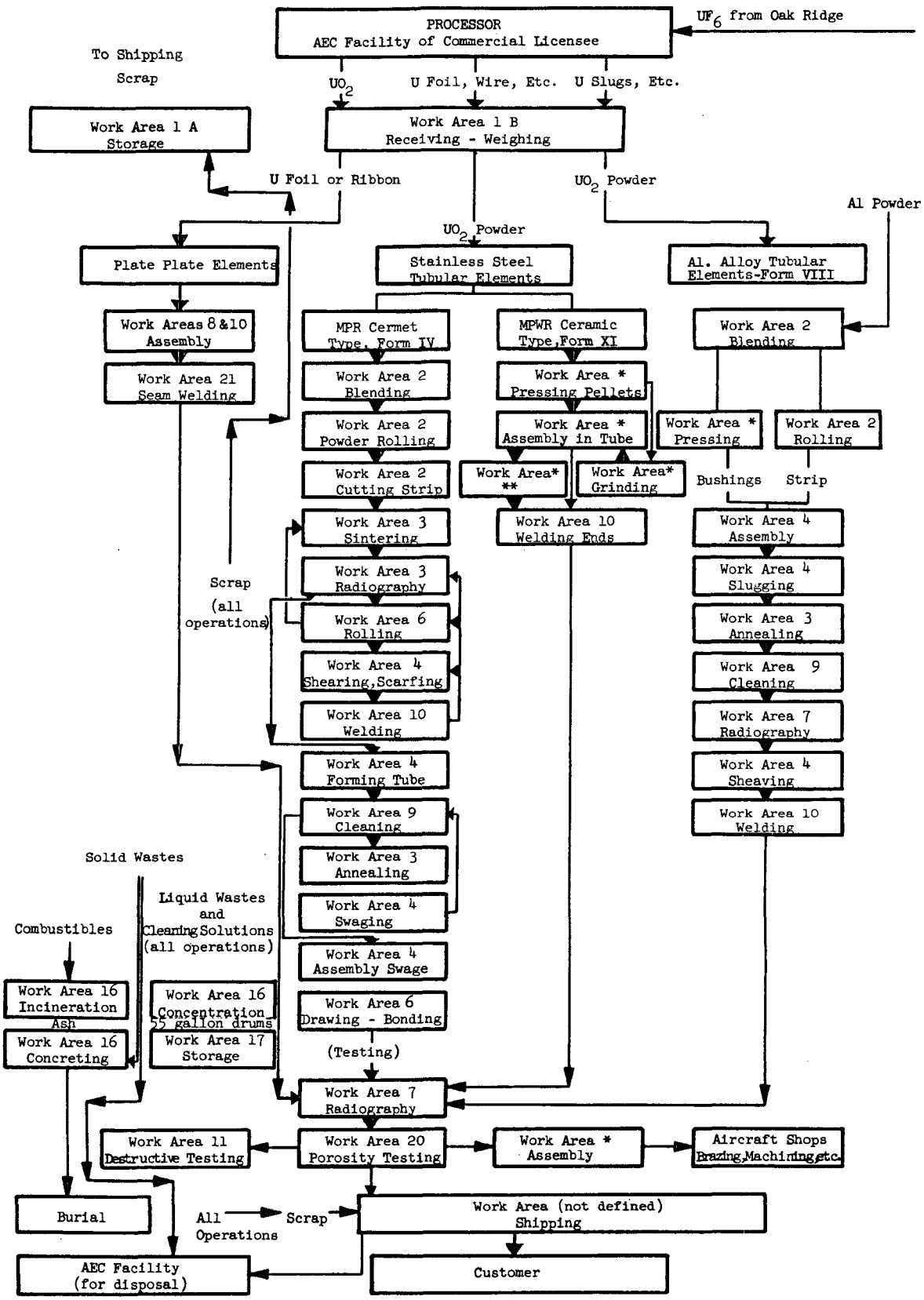
Uranium dioxide powder of low enrichment in the isotope U235 is pressed into pellets. These pellets are assembled in stainless steel tubes and the interstices filled with a liquid metal to provide for efficient heat transfer between the fuel and the outside tube.

(An alternate method using ground pellets fitting to close tolerances in the tube may be used.)

The ends of the tubes are welded in Work Area 10 and the completed tubes are radiographed, porosity tested and cleaned.

Appendix C

MANUFACTURING FLOW CHARTS



* To Be Designated
** Filling With Metal

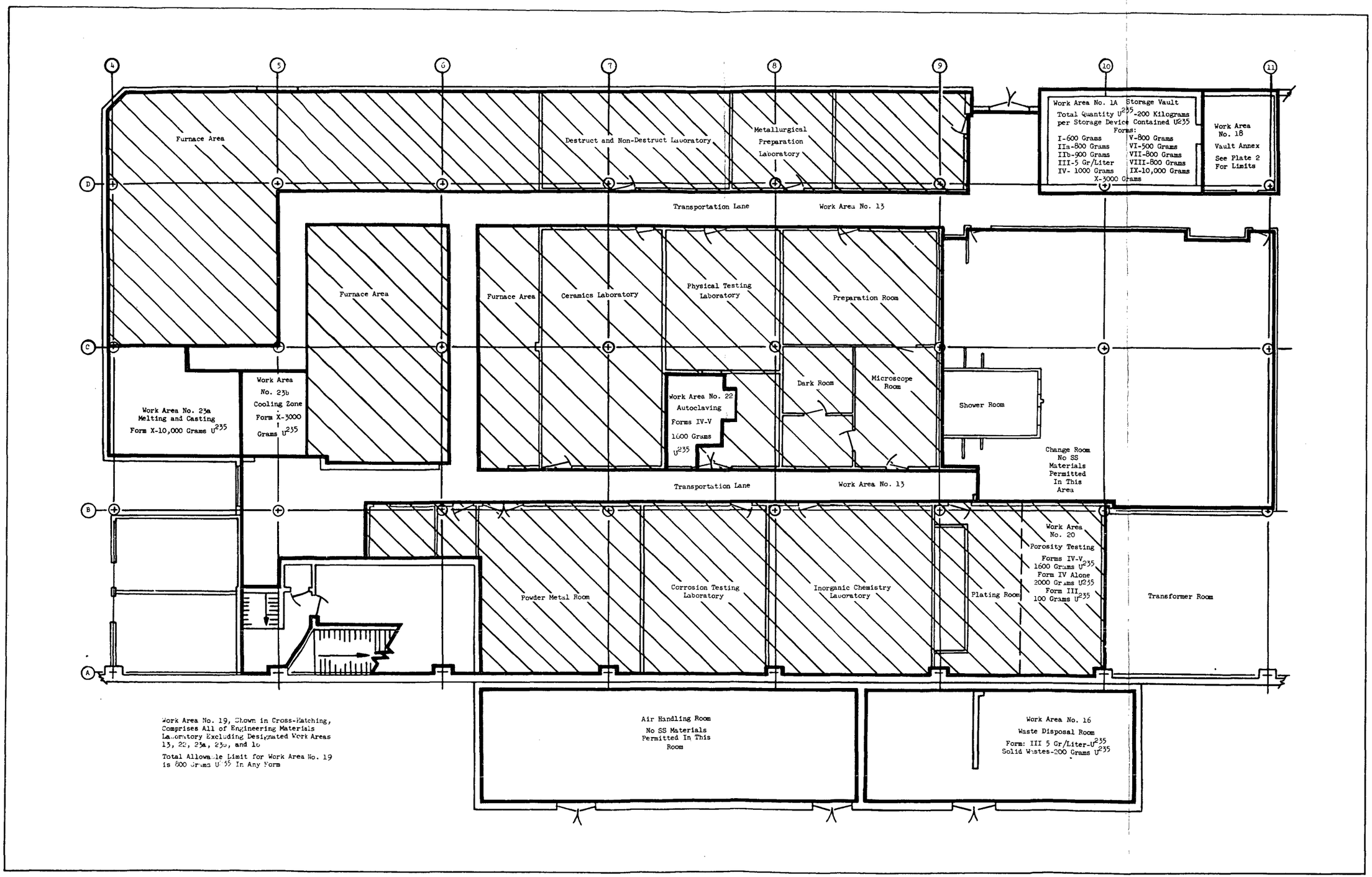
APPENDIX D

List of Health Physics Instruments

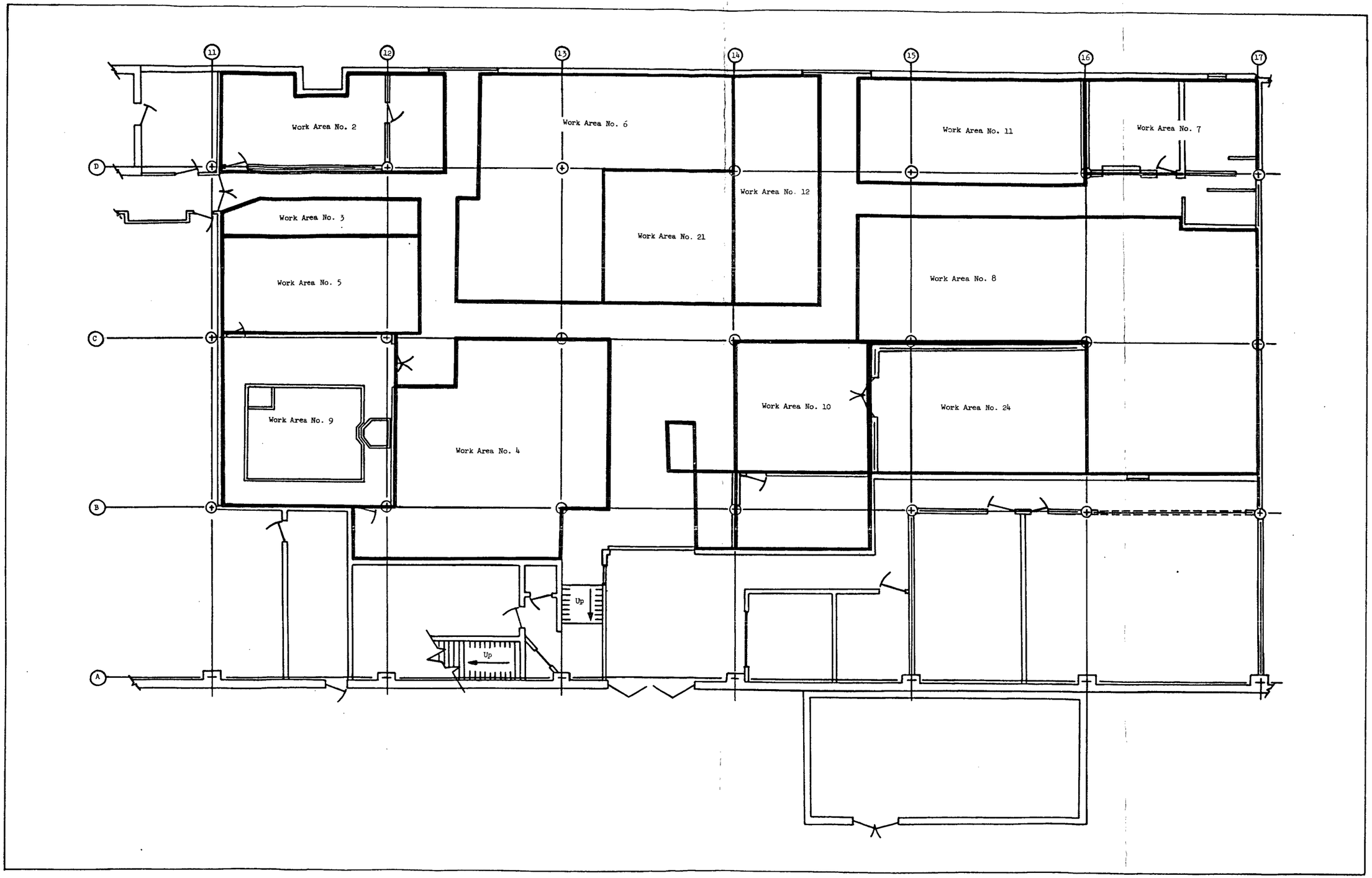
No.	Type of Instrument	Manufacturer	Model No.
4	Alpha Survey Meters	Nuclear-Chicago	2112
1	" " -Samson	NED Instrument Co.	D-6
2	Alpha Probes	Nuclear-Chicago	AP-4
1	G.M. Survey Meter	Berkley	2750
4	" " Meters	Victoreen	592
5	" " Meters	Nuclear-Chicago	2612
3	"Cutie Pie" Survey Meters	Nuclear-Chicago	2586
2	" " " "	Tracerlab	SU-1H
2	" " " "	NRD Instrument Co.	CS-40
4	Count Rate Meters	Tracerlab	SU-3C
1	" " "	Nuclear-Chicago	1619
2	" " "	" "	1615-B
1	" " "	" "	1613-A
1	" " "	Nuclear Instrument and Chemical Corporation	MR-10
1	" " "	Nuclear Measurements Corp.	LCRM-2M
1	Pee Wee	Nuclear-Chicago	2111
1	Fast Neutron Counter	NRD Instrument Co.	E-1A
1	" " " Probe	" " "	F-1
1	Poppy Probe	General Electric	
1	Scaler	Nuclear-Chicago	1310
2	Scalers	" "	161-A
1	Scaler	Radiation Instrument Lab.	1201-T
1	Scaling Unit	Nuclear-Chicago	183
1	Ultra Scaler	Nuclear-Chicago	192
1	Scaler-Decade	Radiation Counter Lab. Mark 13	10-D
1	Proportional Counter	Nuclear Measurements Corp.	PC-1
1	" " Converter	" "	PC-16

List of Health Physics Instruments Cont'd

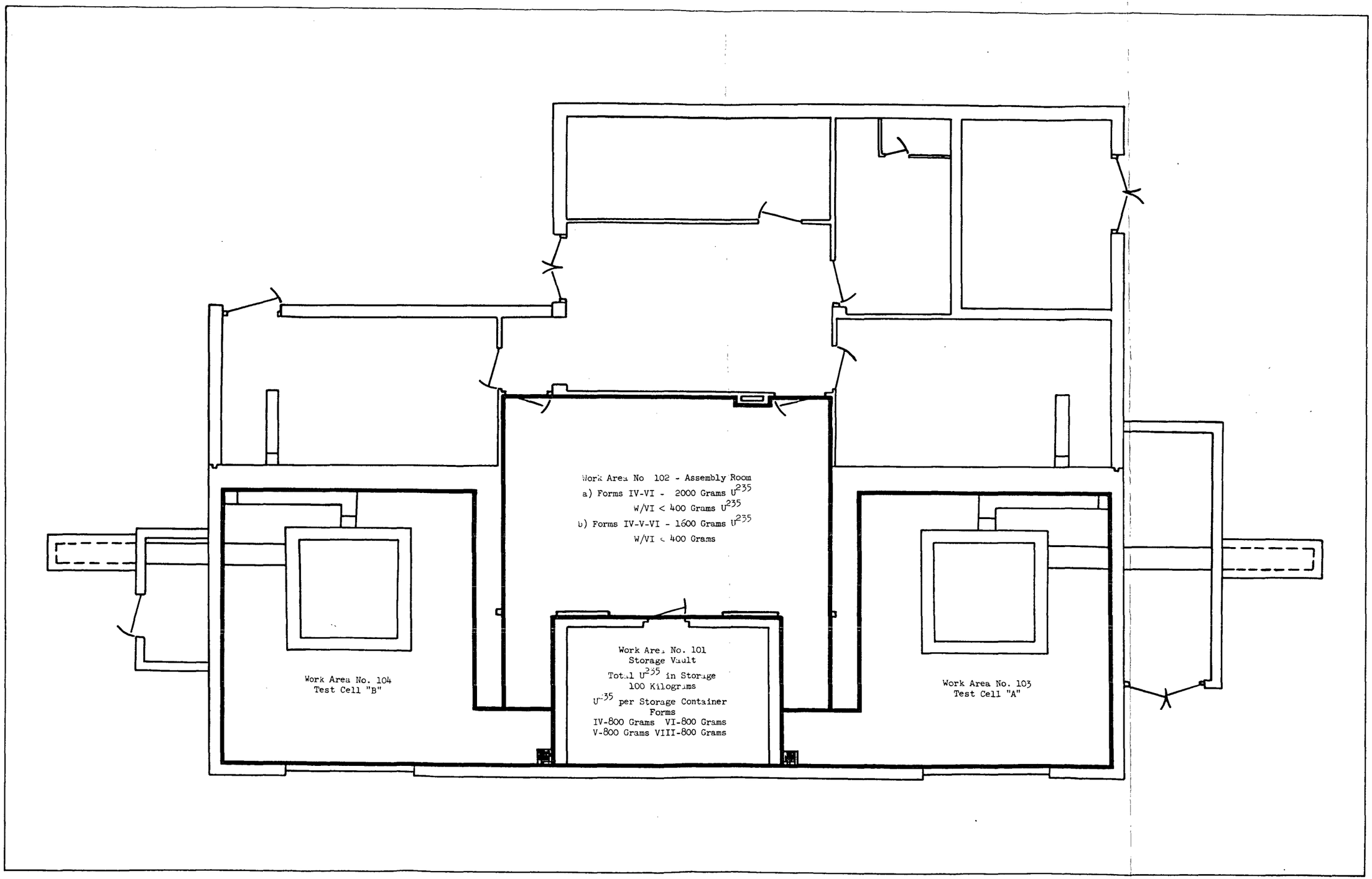
No.	Type of Instrument	Manufacturer	Model No.
1	Scintillation Probe	Radiation Counter Labs	Used with Decade Scaler Model #10-D
1	Alpha Scintillation Detector	Tracerlab	P-12
2	Air Samplers	Millipore	
2	Air Monitors	"	S44AK-978
1	" "	Staplex	TF-1A
1	Fluorimeter	Jarrell-Ash Company	JA-2600
2	Jordan RAMS Systems	Jordan Electronics, Inc.	
1	Decade Scaler used with P10 A Proportional Counter	Tracerlab	
1	Gamma Survey Meter K-350B	Tracerlab	
1	Neutron Probe N-C Model DN3 for NC-2112 Unit	Nuclear-Chicago Radiation-Counter Laboratories	
2	BF_3 Probes		
1	Mobile Continuous Air Monitor NMC Model AM-2A	Nuclear Measurements Corp.	



Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas Plate 1



Martin Nuclear Division Criticality Work Areas
Pilot Manufacturing Plant



Martin Critical Experiment Facility Criticality Work Area Plate 3