Materials Science Research Institute

MATERIALS SCIENCE RESEARCH INSTITUTE

CREATION . . .

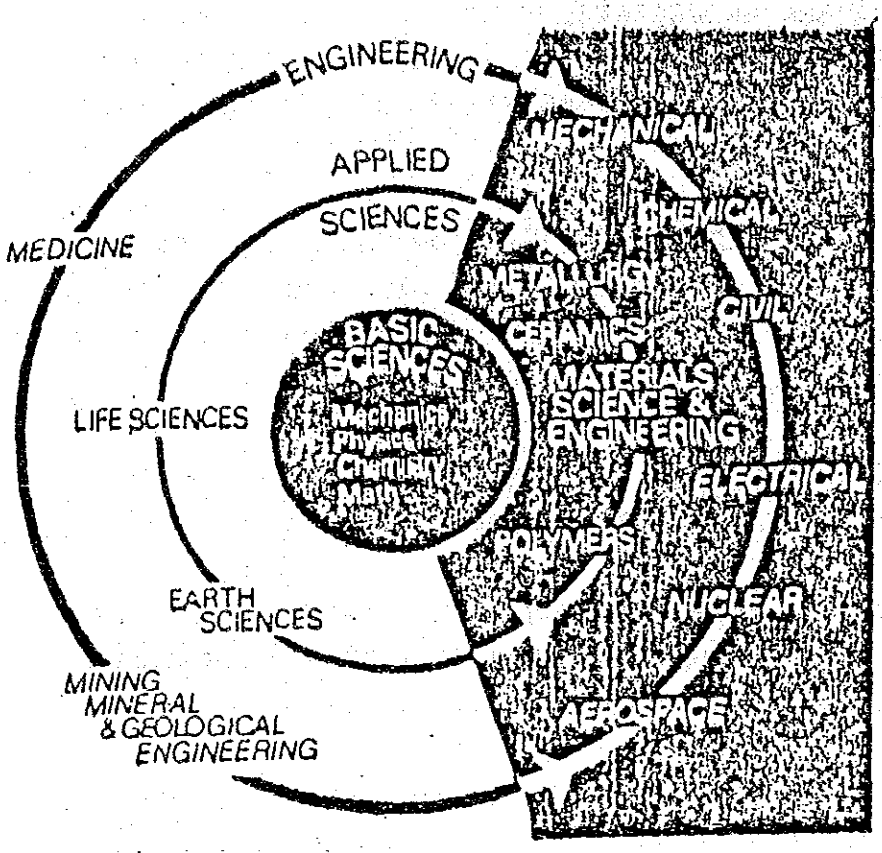
THE MATERIALS SCIENCE RESEARCH INSTITUTE WAS ESTABLISHED BY VIRTUE OF PRESIDENTIAL EXECUTIVE ORDER NO. 784 ON MARCH 17, 1982 AS A LINE AGENCY OF THE NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY.

PURSUANT TO SAID EXECUTIVE ORDER, MSRI ASSUMED THE RESEARCH FUNCTIONS OF THE METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER AND ABSORBED THE CERAMICS RESEARCH UNIT OF THE NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY.

MISSION . . .

TO CONDUCT BASIC AND APPLIED RESEARCH AND PROVIDE AN ADEQUATE BASE OF MATERIALS KNOW-HOW IN THE FIELD OF METALS, CERAMICS, AND PLASTICS AMONG OTHERS, FOR THE INCREASING DEMAND OF THE CONSTRUCTION, ENGINEERING AND THE DURABLE CONSUMER GOODS INDUSTRY.

SCOPE OF MATERIALS SCIENCE AND ENGINEERING



MANDATED FUNCTIONS . . .

(As embodied in the NSTA Administrative Order No. 2 issued on June 17, 1982)

- TO SPEARHEAD THE SCIENTIFIC INVESTIGATION ON THE NATURE AND PROPERTIES OF MATERIALS BOTH NATURAL AND SYNTHETIC MORE PARTICULARLY IN THE FIELD OF METALS, CERAMICS AND PLASTICS AND OTHER SYNTHETIC MATERIALS

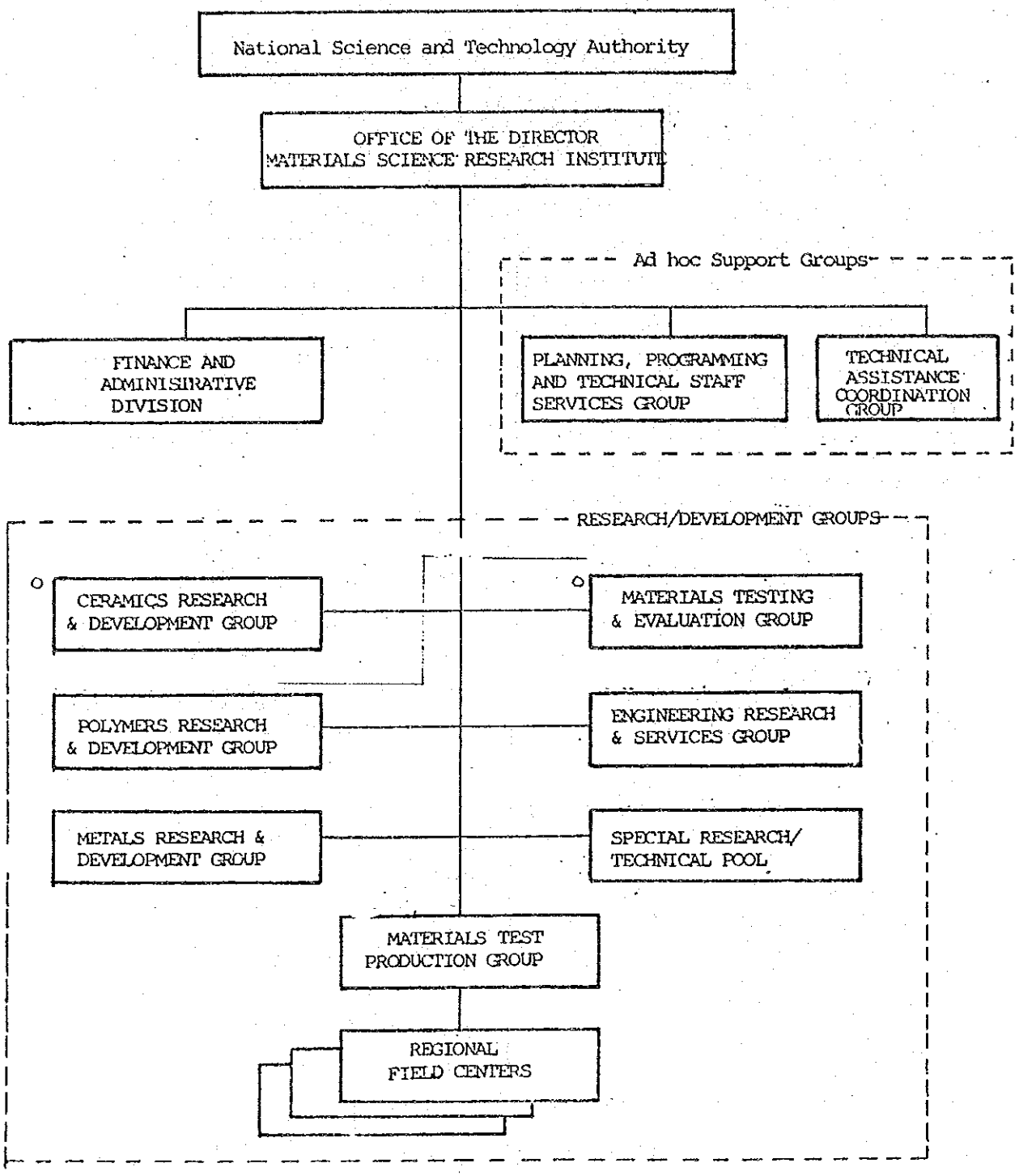
- TO CONDUCT RESEARCH STUDIES ON THE SYNTHESIS AND/OR DEVELOPMENT OF NEW MATERIALS WITH PROPERTIES TAILORED TO SPECIFIC APPLICATIONS AND REQUIRED IN ADVANCED TECHNOLOGICAL INNOVATIONS

- TO TRANSLATE TO PRACTICAL APPLICATIONS THE RESULTS OF SCIENTIFIC INVESTIGATIONS ON MATERIALS

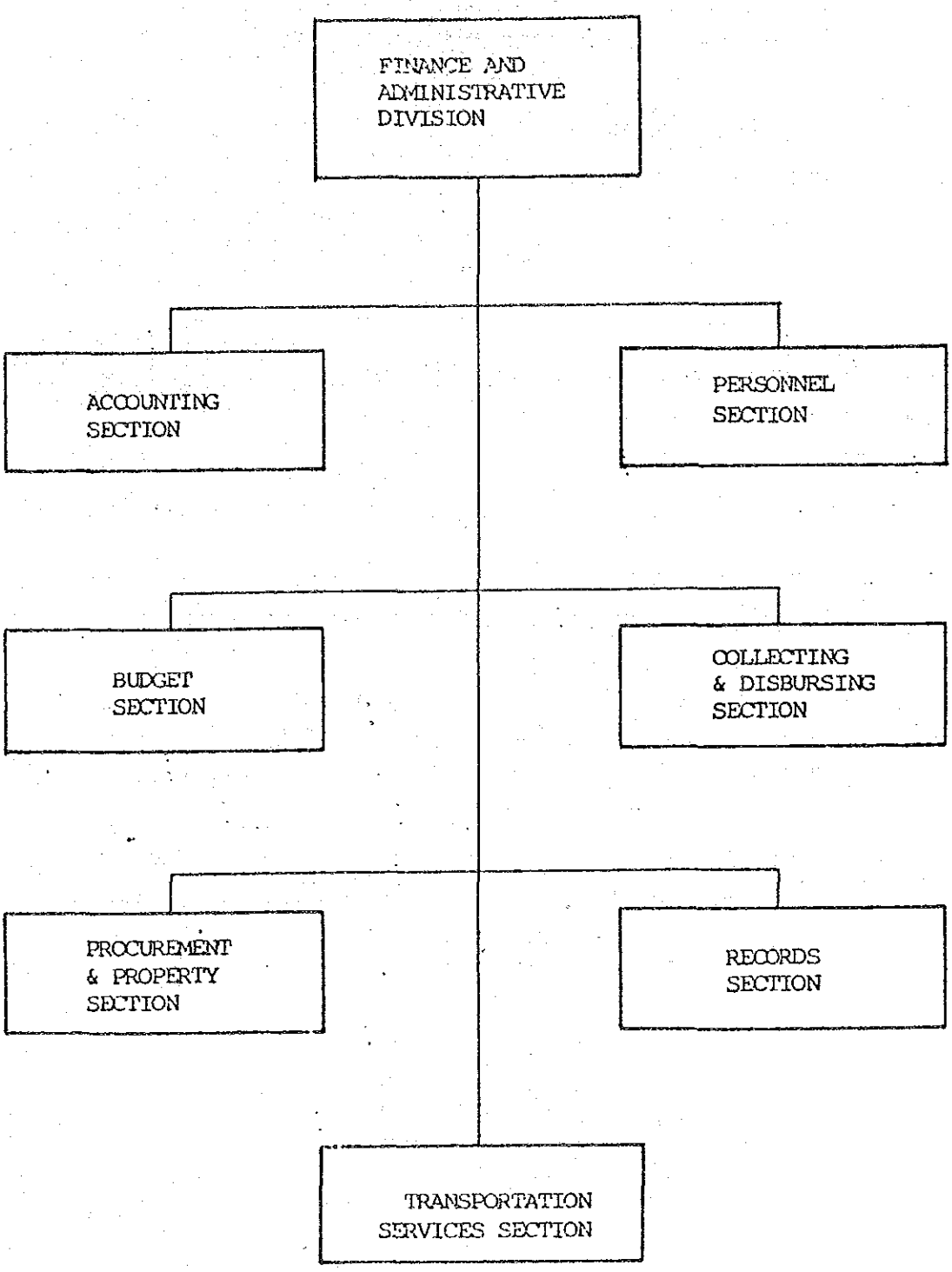
- TO PROVIDE TECHNICAL ASSISTANCE INCLUDING USE OF SOPHISTICATED LABORATORY FACILITIES IN THE FIELD OF MATERIALS SCIENCE AND DEVELOPMENT

- TO CONDUCT TRAINING PROGRAMS IN SCIENTIFIC AND TECHNOLOGICAL FIELDS AND IMPLEMENT AN AGGRESSIVE STAFF DEVELOPMENT PROGRAM

1986 ORGANIZATIONAL CHART



MATERIALS SCIENCE RESEARCH INSTITUTE



FUNCTIONAL STATEMENTS . . .

o CERAMICS RESEARCH AND DEVELOPMENT GROUP (CRDG)

CONDUCTS RESEARCH STUDIES ON CERAMICS, PARTICULARLY THE FORMULATION AND STANDARDIZATION OF CERAMIC BODIES AND GLAZES, GEOLOGICAL SURVEY AND CHARACTERIZATION OF CERAMIC RAW MATERIALS AND OTHER NON-METALLIC MINERALS; CONDUCTS BENEFICIATION STUDIES AND BENCH-SCALE PROCESSING OF CERAMIC RAW MATERIALS

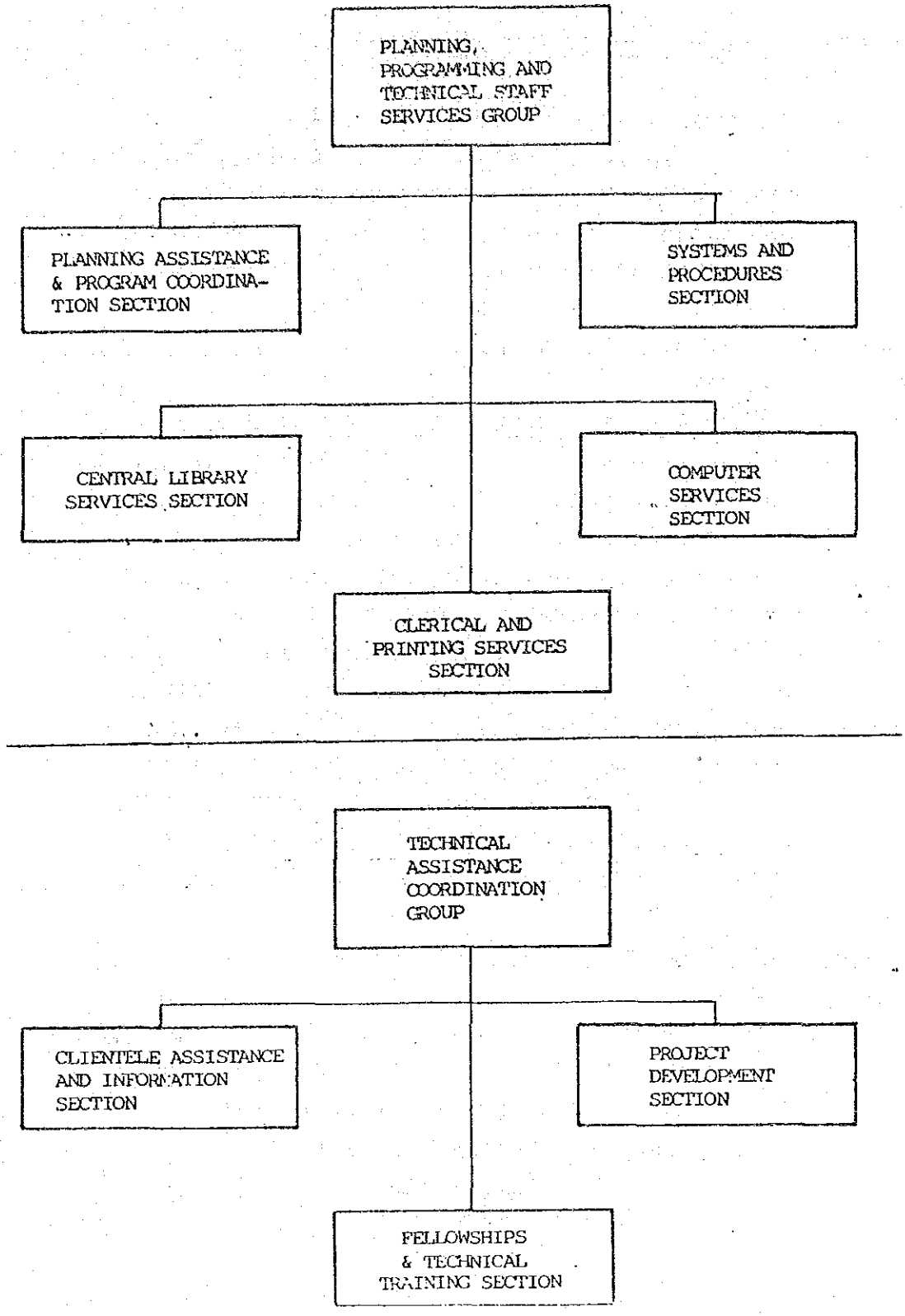
o METALS RESEARCH AND DEVELOPMENT GROUP (MRDG)

CONDUCTS RESEARCH STUDIES FOR THE ADAPTATION OF APPROPRIATE TECHNOLOGIES FOR METAL CASTING, METAL FABRICATION, METAL FINISHING, CORROSION AND METALS TREATMENT; CONDUCTS RESEARCH ON METAL SYSTEMS AND EVALUATES EFFECTS OF SERVICE ENVIRONMENT ON THE CHEMICAL, PHYSICAL, AND MECHANICAL PROPERTIES OF METALS AND ALLOYS; ADAPTS OR DEVELOPS METALLURGICAL PROCESSES TO MAXIMIZE UTILIZATION OF INDIGENOUS SOURCES TO PRODUCE THE METAL AND ALLOY REQUIREMENTS FOR LOCAL AND EXPORT ORIENTED INDUSTRIES

o POLYMERS RESEARCH AND DEVELOPMENT GROUP (PRDG)

CONDUCTS RESEARCH STUDIES IN POLYMER SYNTHESIS, PROCESSING, TESTING AND APPLICATION FOR THE PURPOSE OF DEVELOPING HIGH PERFORMANCE PLASTICS AND COMPOSITE MATERIALS AND PRODUCTS

MATERIALS SCIENCE RESEARCH INSTITUTE



o MATERIALS TESTING AND EVALUATION GROUP (MTEG)

CONDUCTS PHYSICAL, CHEMICAL, MINERALOGICAL AND OTHER RELATED TESTING AND EVALUATION OF CERAMICS, METALS, COMPOSITES, PLASTICS AND OTHER MATERIALS FOR THE R&D UNITS OF THE INSTITUTE AND FOR LOCAL MATERIALS PRODUCERS AND CONSUMERS; PROVIDE QUALITY CONTROL SERVICES FOR MATERIALS PRODUCTION; DEVELOPS MATERIALS STANDARDS IN COOPERATION WITH INDUSTRIES

o ENGINEERING RESEARCH AND SERVICES GROUP (ERSG)

CONDUCTS DESIGN, FABRICATION AND TEST OPERATION OF ENGINEERING SYSTEMS; MAINTAINS A CENTRAL WORKSHOP FOR MACHINING, WELDING, CARPENTRY WORKS, INSTRUMENTATION, REPAIR AND MAINTENANCE, ENGINEERING DRAFTING AND GRAPHICS

o MATERIALS TEST PRODUCTION GROUP (MTPG)

CONDUCTS DEMONSTRATIONS AND PILOT PLANT-SCALE PRODUCTION OF RAW MATERIALS, BRICKS AND TILES, POTTERIES, INDUSTRIAL CERAMICS AND OTHER MATERIALS; PROVIDES MACHINE AND FURNACE OPERATIONS SERVICES FOR RESEARCH AND TEST PRODUCTION ACTIVITIES; PROVIDES SUPPORT SYSTEMS FOR ESTABLISHED REGIONAL FIELD CENTERS FOR SUSTAINABILITY OF COMMUNITY PARTICIPATION, INTER-AGENCY LINKAGES AND UTILIZATION OF APPROPRIATE TECHNOLOGIES

- SPECIAL RESEARCH/TECHNICAL POOL (SRTP)

  CONDUCTS RESEARCH ON THE PREPARATION OF GLASSES, SPECIALTY MATERIALS, NEW MATERIALS PROCESSING TECHNOLOGIES AND OTHER RELATED R&D ACTIVITIES AS MAY BE ASSIGNED.

- TECHNICAL ASSISTANCE COORDINATION GROUP (TACG)

  PROVIDES COORDINATION OF THE INSTITUTE'S TECHNICAL SERVICES FOR GREATER ACCESSIBILITY; UNDERTAKES TECHNO-ECONOMIC EVALUATIONS AND ASSISTS IN THE PREPARATION OF TECHNOLOGY PACKAGES FOR FUNDING GRANTS AND/OR FOR COMMERCIALIZATION; COORDINATES THE INSTITUTE'S MANPOWER DEVELOPMENT PROGRAMS.

- PLANNING, PROGRAMMING & TECHNICAL STAFF SERVICES GROUP (PPTSSG)

  PROVIDES THE INSTITUTE WITH STAFF ASSISTANCE ON PLANNING AND PROGRAMMING; RENDERS SERVICES TO TECHNICAL STAFF FOR SYSTEMS AND PROCEDURES IMPROVEMENT, COMPUTERIZATION AND DATA PROCESSING, CLERICAL AND PRINTING, AND PROVIDES LIBRARY SERVICES.

MATERIALS SCIENCE RESEARCH INSTITUTE

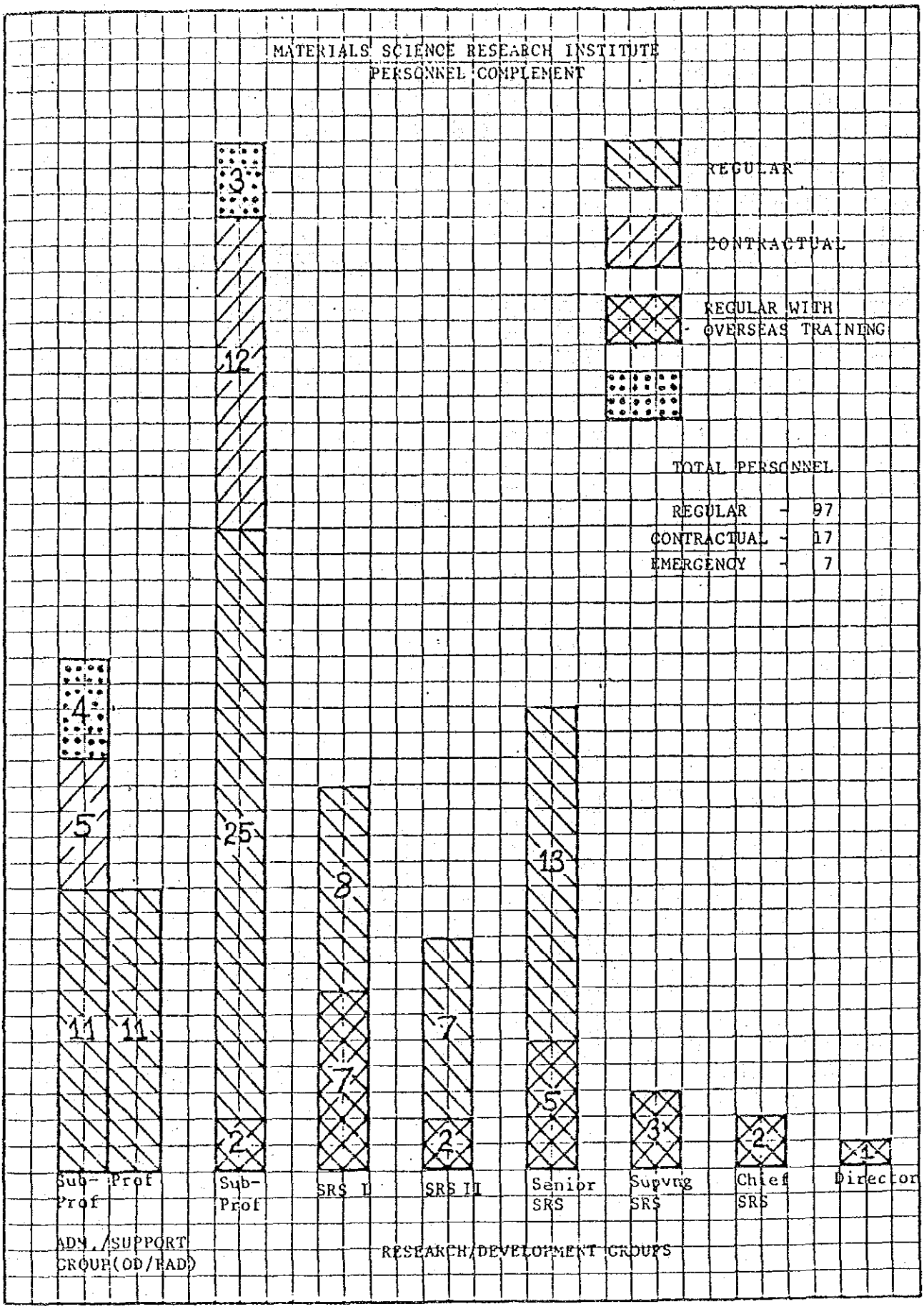
SOURCES OF FUNDS

	1982	1983	1984	1985
Regular Fund	1,167,350	4,000,000	5,552,000	5,675,000
N S T A	456,000	1,043,055	2,039,000	300,000
N I S T	1,219,000	798,876	-	-
J I C A	1,153,000	1,112,000	-	-
P C I E R D	-	500,000	500,000	-
Others (Outside Clients)	-	522,259,22	56,211.72	146,753.60
T O T A L	3,995,350	7,976,190.22	8,147,211.72	6,121,753.60

MATERIALS SCIENCE RESEARCH INSTITUTE

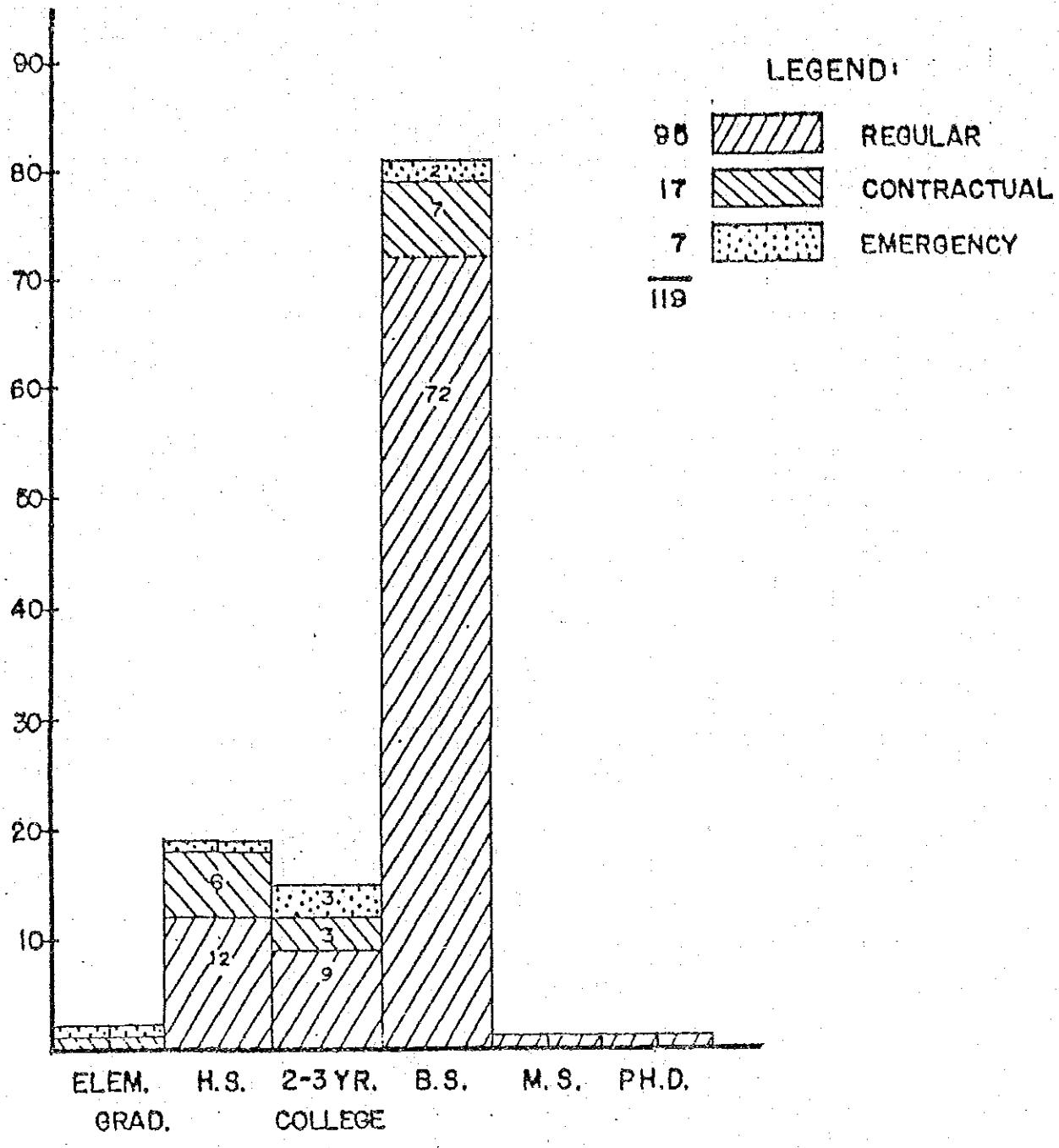
SUMMARY OF INCOME

Type/Source	1983		1984		1985	
	Amount	%	Amount	%	Amount	%
Test/Analyses	14,877.50	62.93	48,057.25	60.16	57,421.30	63.85
Training Fees	3,300.00	13.96	17,550.00	21.97	2,198.00	2.44
Sales	3,604.65	15.25	7,413.11	9.28	11,659.00	12.96
Ball Milling	30.00	.13	5,770.50	7.22	5,252.90	5.84
Use/Rental of Facilities	1,032.70	4.37	630.90	.79	8,130.74	9.04
Preliminary Evaluation	594.00	2.50	-	-	2,841.60	3.16
Firing Services	-	-	258.00	.32	-	-
Others	203.00	.86	206.65	.26	2,427.46	2.71
GRAND TOTAL	23,641.85	100%	79,886.41	100%	89,931.00	100%


MATERIALS SCIENCE RESEARCH INSTITUTE
PERSONNEL COMPLEMENT
REGULAR
CONTRACTUAL
REGULAR WITH OVERSEAS TRAINING
TOTAL PERSONNEL
REGULAR - 97
CONTRACTUAL - 17
EMERGENCY - 7
3
12
4
5
25
8
13
11
11
7
7
7
2
2
5
3
2
1
Sub-Prof
Prof
Sub-Prof
SRS I
SRS II
Senior SRS
Supvng SRS
Chief SRS
Director
ADM./SUPPORT GROUP(OD/RAD)
RESEARCH/DEVELOPMENT GROUPS

ACADEMIC LEVEL

(1986)



1986 ALLOCATION OF FUNDS
FOR 1ST & 2ND QUARTER
(In Thousand Pesos)

FIRST QUARTER

P/P/A 1.1.1	CRDG	MRDG	PRDG	SRTP	PPTSSG	FIXED EXP.	TOTAL
Personal Services	₱ 116	₱ 53	₱ 20	₱ 26	₱ 29		₱ 244
Maintenance & Operating Expenses (MOE):							
a) Fixed Expenses							
RTE						₱ 13	₱ 13
MERALCO						85	85
Janitorial						21	21
Security						40	40
Uniform						8	8
Sundries (Med./Dental, etc.)						7	7
b) For Research Activities	36	14	9	6	-		65
Total MOE Released for 1st Quarter	36	14	9	6	-	174	239
GRAND TOTAL	₱ 152	₱ 67	₱ 29	₱ 32	₱ 29	₱ 174	₱ 483

P/P/A 1.2.1	MTEG	MTPG	ERSG	TACG	FIXED EXP.	TOTAL
Personal Services	₱ 93	₱105	₱ 76	₱ 27		₱ 301
Maintenance & Operating Expenses (MOE):						
a) Fixed Expenses						
RTE					₱ 13	₱ 13
MERALCO					104	104
Janitorial					21	21
Security					40	40
Uniform					8	8
Sundries					13	13
b) For Research Activities	18	22	-	-		40
Total MOE Released for 1st Quarter	₱	₱	₱	₱	₱ 199	₱ 239
GRAND TOTAL	₱111	₱127	₱ 76	₱ 27	₱ 199	₱ 540

P/P/A 1.3.1	OD	FAD	FIXED EXP.	TOTAL
Personal Services	₱ 61	₱ 350	₱ -	₱ 411
Maintenance & Operating Expenses (MOE):				
a) Fixed Expenses				
RTE			₱ 8	₱ 8
MERALCO			68	68
Janitorial/ Security			21	21
Maintenance of Motor Vehicles			30	30
Registration of Motor Vehicles			29	29
Office Supplies			30	30
Sundries (Med./ Dental, etc.)			3	3
Total MOE Released for 1st Quarter	₱ -	₱ -	₱ 189	₱ 189
GRAND TOTAL	₱ 61	₱ 350	₱ 189	₱ 600

SECOND QUARTER

P/P/A 1.1.1	CRDG	MRDG	PRDG	SRTP	PPTSSG	FIXED EXP.	TOTAL
Personal Services	₱116	₱ 53	₱ 20	₱ 26	₱ 29	₱ -	₱ 244
Maintenance & Operating Expenses (MOE):							
a) Fixed Expenses							
RTE						₱ 13	₱ 13
MERALCO						47	47
Sundries (Med./ Dental, etc.)						5	5
b) For Research Activities	31	10	7	12	-	-	60
Total MOE Released for 2nd Quarter	₱ 31	₱ 10	₱ 7	₱ 12	-	₱ 65	₱ 125
GRAND TOTAL	₱147	₱ 63	₱ 27	₱ 38	₱ 29	₱ 65	₱ 369

P/A 1.2.1	MTEG	MTPG	ERSG	TACG	FIXED EXP.	TOTAL
Personal Services	₱ 93	₱105	₱ 76	₱ 27	₱ -	₱ 301
Maintenance & Operating Expenses (MOE):						
a) Fixed Expenses						
RTE					₱ 13	₱ 13
MERALCO					58	58
Sundries (Med./ Dental, etc.)					6	6
b) For Research Activities	26	18	5	-	-	₱ 49
Total MOE Released for 2nd Quarter	₱ 26	₱ 18	₱ 5	₱ -	₱ 77	₱ 126
GRAND TOTAL	₱119	₱123	₱ 81	₱ 27	₱ 77	₱ 427

P/P/A 1.3.1	OD	FAD	FIXED EXP.	TOTAL
Personal Services	₱61	₱350	₱ -	₱ 411
Maintenance & Operating Expenses (MOE):				
a) Fixed Expenses				
RTE			₱ 8	₱ 8
MERALCO			20	20
Maintenance of Motor Vehicles			30	30
Registration of Motor Vehicles			2	2
Office Supplies	5	-	30	35
Sundries (Med./Dental, etc.)			4	4
Total MOE released for 2nd Quarter	₱ 5	₱ -	₱ 94	₱ 99
GRAND TOTAL	₱66	₱350	₱ 94	₱ 510

TECHNICAL SERVICES

- CONSULTATIVE SERVICES, INCLUDING PROJECT FEASIBILITY STUDIES, ON MATTERS PERTAINING TO MATERIALS PROCESSING TECHNOLOGY AND PRODUCT DEVELOPMENT.

- GEOLOGIC SURVEY, CHARACTERIZATION AND IDENTIFICATION OF RAW MATERIALS RESOURCES FOR MINERAL-BASED INDUSTRIES

- CHEMICAL, PHYSICAL, METALLURGICAL, MINERALOGICAL, AND NON-DESTRUCTIVE TESTING AND EVALUATION OF MATERIALS AND PRODUCTS.

- DESIGN, FABRICATION, INSTALLATION, OPERATION, MAINTENANCE AND REPAIR OF KILNS, SIMPLE EQUIPMENT, TOOLS AND GADGETS FOR THE CERAMICS, METALS, POLYMERS AND OTHER MATERIALS PROCESSING INDUSTRIES.

- TECHNICAL INFORMATION SERVICES ON MATERIALS SCIENCE AND TECHNOLOGY.

- MANPOWER DEVELOPMENT THROUGH FORMAL TRAINING COURSES, ON-THE-JOB TRAINING AND RESEARCH ADVISORSHIP IN SPECIAL AREAS OF MATERIALS SCIENCE AND TECHNOLOGY.

- RESEARCH AND DEVELOPMENT ON MATERIALS AND MATERIALS PROCESSING TECHNOLOGY THROUGH RESEARCH CONTRACT AGREEMENTS, WITH CLIENTS.

LIST OF EXISTING LABORATORIES/FACILITIES

1. SAMPLES PREPARATION FACILITIES:

GRINDING MACHINES, 8 VIBRATING SAMPLE MILL, CORE PICKER, SIEVE SHAKER, CRYSTAL CUTTER, RIFLE DIVIDERS, ISODYNAMIC SEPERATOR, VACUUM DRYING OVEN, MAGNETIC SEPERATOR.

2. PHYSICAL TESTING AND EVALUATION FACILITIES:

THERMAL SHOCK RESISTANCE FURNACE, AUTOCLAVES, 3 DILATOMETERS, REFRACTORIES UNDER LOAD (RUL) MACHINE, 5 ROCKWELL HARDNESS TESTER, UNIVERSAL TESTING MACHINE, COMPRESSION MACHINE, PORTABLE HAND PRESS, CHARPY IMPACT TESTERS, REFRACTORIES TEST FURNACE, ABRASION TESTING MACHINE, LABORATORY EXTRUDER, SEDIMENTOGRAPH, COLOR DIFFERENCE METER, VISCOSIMETERS, CONSTANT TEMPERATURE WATER BATH, ULTRASONIC TESTER (DIGITAL ULTRASCOPE), MAGNETIC PARTICLE INSPECTION UNIT, MICROHARDNESS TESTER, BRINELL HARDNESS TESTER, ELECTRIC FURNACES, THERMOGRAVIMETRY-DIFFERENTIAL THERMAL ANALYZER, PYROMETER (CONE EQUIVALENT) FURNACE, RHEOMETER, TECURUNDUM FURNACE. 6

3. LABORATORY FOR CHEMICAL ANALYSIS:

FUME HOODS, BUNSEN BURNERS, DISTILLING APPARATUS, REFRIGERATORS, ELECTRONIC BALANCES, PH METERS, BOX FURNACES, DRYING OVENS, HOT PLATES, MAGNETIC MIXERS, HEAVY METAL ELIMINATOR, PHOTOELECTRIC PHOTOMETERS, ATOMIC-ABSORPTION/FLAME EMISSION SPECTROPHOTOMETER, INFRARED SPECTROPHOTOMETER. 10

4. X-RAY DIFFRACTION LABORATORY:

X-RAY DIFFRACTOMETER, GONIOMETERS, AUTOMATIC SAMPLE CHARGERS POWDER DATA FILES. 1

5. SCANNING ELECTRON MICROSCOPY LABORATORY:

SCANNING ELECTRON MICROSCOPE; DARK ROOM AND B & W FILM PROCESSING EQUIPMENT, POLAROID CAMERAS, FINE COAT ION SPUTTER, VACUUM OPERATOR. 2

6. OPTICAL MICROSCOPY LABORATORY:

K-TYPE REFRACTOMETER, METALLURGICAL MICROSCOPE, POLARIZING MICROSCOPE, STEREOSCOPE, ABBE REFRACTOMETER, PROFILE PROJECTOR.

7. PILOT PLANT FACILITIES FOR RAW MATERIALS PROCESSING AND REFRACTORY AND CERAMIC WARES TEST PRODUCTION:

JAW CRUSHERS, ROLL CRUSHERS, HAMMER MILL, STAMP MILL, CLAY CRUSHER, CLAY BLUNGER, BUCKET CONVEYOR, DRAG CONVEYOR, VIBRATING SCREEN, FERRO-FILTERS, MEMBRANE PUMPS, FILTER PRESS, 12
" BALL MILLS, ROTARY SCREENS, AGITATING TANKS, AUGER MACHINES, EXTRUDERS, POT MILLS, KNEADING MACHINES, SPONGING MACHINES, GRINDING MACHINES, PROCESS CAMERA, CONTACT PRINTER, DECAL MAKER, VACUUM PRINTING TABLE, FILM DRYERS, SCREEN TENSIONER, VACUUM FRAME WITH LIGHT SOURCE, DECAL FIRING KILNS, FRITTING KILN, GAS-FIRED PERIODIC KILN, OIL-FIRED SHUTTLE KILN, HIGH-TEMPERATURE FIRING KILN, 20 KW ELECTRIC KILN, 15 KW ELECTRIC KILN, 10 KW ELECTRIC KILN, 5 KW ELECTRIC KILN, VIBRATING SIEVE, PUG MILL,

EDGE HAMMER PAN MILL, DISINTEGRATOR, MUELLER INDEX, FRICTION PRESS, HYDRAULIC PRESS, ROTARY SCREENS, BOX FEEDERS, BELT CONVEYORS, ROLL KNEADERS, DE-AIRING EXTRUDER, DOUBLE-SHAFT MIXER, VERTICAL SCREEN PRESS, FORMING MACHINES, 200-TON PRESS, WOOD-FIRED KILN.

8. ENGINEERING WORKSHOPS:

LATHE MACHINE, WOOD-LATHE, BAND SAW, POWER HACK SAW, GRINDERS, ELECTRIC CUTTING SAW, WELDING MACHINES, DRILL PRESS, HAND TOOLS.

PREPARED AS BRIEFING MATERIALS
FOR THE VISIT OF MINISTER
ANTONIO V. ARIZABAL

Date Prepared: June 25, 1986

MGN/jss

MATERIALS SCIENCE RESEARCH INSTITUTE

LISTING OF 1986 STUDIES/ACTIVITIES

CERAMICS RESEARCH AND DEVELOPMENT GROUP:

86-01(C): Preliminary Study on the Development of Dental Porcelain

86-01(D): Preliminary Study on the Development of Spark Plug Ceramic

86-02(A): Evaluation and Improvement of Vigan Stoneware Body

86-02(B): Development of Overglaze Stains for Ceramic Decoration

86-02(C): Underglaze Stain as Ceramic Colorant

86-02(F): Utilization of Talakag Clay for the Development of Stoneware

86-02(G): Utilization of Talakag Clay in the Development of Earthenware

86-02(H): Development of Frit for Low Temperature Glazes

86-02(I): Development of High Temperature Luster Glazes

86-02(J): Development of Celadon Glaze out of Philippine Local Raw Materials

86-03(A): Utilization of Local Materials for the Development of Refractory Crucibles for the Fire-Assay of Certain Ores

86-03(B): Development of Refractory Crucibles for the Fritting Kiln

86-03(C): Development of Refractory Insulating Bricks

86-03(D): Production of Kiln Furnitures for Acceptability Test

86-04(A): Assessment and Identification of Silica Deposits for Beneficiation Studies

86-04(B): Recovery of Fe_2O_3 from Pyrite Cinders

86-04(C): Characterization, Beneficiation and Utilization of Gingoog Clay from Misamis Oriental

86-04(D): Recycling of Spent Plaster Molds for Ceramic Use

86-04(E): Beneficiation Studies on Magpet Clay

MATERIALS TEST PRODUCTION GROUP:

86-01(A): Studies on the Development of Tagbita Clay for Structural Products and Pottery Wares

86-01(B): Development of Glaze for Vigan Ceramic Tile

86-02(A): Provision of Production Services to Ceramic Industries

86-02(B) Illustrative Manual on Improved Forming Techniques of Ceramic Novelty

86-03(A): Production of Ceramic Wares for Exhibits and Promotional Purposes

86-03(B): Development of Kitchen/Oven Wares Using Locally Available Materials

86-03(C): Development of Bathroom/Toilet Fixtures Utilizing Locally Available Materials

86-03(D): Development of Ornamental Design

86-04 : Raw Materials Processing

86-05 : Technical Assistance for Field Center Operations

MATERIALS TESTING AND EVALUATION GROUP:

86-01 : Routine Chemical Test/Analysis of Materials

86-02 : Routine Physical Test/Analysis of Materials

86-03 : Mineralogical Test/Analysis of Materials

METALS RESEARCH AND DEVELOPMENT GROUP:

86-01(A): Assessment of the Silica Sand Waste for Possible Foundry Use

86-01(B): Adoption of Methods for Testing Nickel Coated Metal

86-02(A): Assistance and Coordination on the Design, Fabrication and Operation of a Charcoal Fired Cupola (PCIERD, PFS & MSRI Project)

86-03(A): Assistance on the JICA Project Evaluation of Corrosion Resistance of Metallic Materials by Atmospheric Corrosion Test

86-03(B): Recycling of Aluminum Dross and Brass/Bronze Residues

86 03(C): Literature Survey on the Detinning Process

86-03(D): Laboratory Scale Production of Ferrites from Iron Oxide Scales

ENGINEERING RESEARCH AND SERVICES GROUP:

86-01 : Test Firing of MSRI Down-Draft Oil-Fired High Firing Kiln

86-02(A): Fabrication and Installation of Ceramic Processing and Forming Equipment for Zamboanguita Project

86-02(B): Re-conditioning of the Wood-Fired Kiln at San Nicolas Ceramic Technology

86-02(C): Installation of a Water System at San Nicolas Ceramic Technology

86-03(A): Fabrication of Water Bath and Electric Stove for CRDG

86-03(B): Fabrication of Office Furnitures, Office Tables, Cabinets, Dividers, etc.

86-04 : Repair/Maintenance of R & D Instruments, Equipment, Machines and Other Facilities

86-05 : Preparation of Program for Building and Facilities Improvement

POLYMERS RESEARCH AND DEVELOPMENT GROUP:

86-01 : Examination of Polymeric Materials Using SEM/Optical Microscopes and XRD and Physical/Mechanical Testing Equipments

86-02 : Preliminary Study on the Recycling of Waste Plastic Materials

86-03 : Polytetrafluoroethylene Coating on Kitchen Cooking Wares

86-04 : Polymerization Behavior of Substitute Organic Oils to Linseed Oil in Alkyd Resin Production

SPECIAL RESEARCH AND TECHNICAL POOL:

86-01(A): A Survey of the Status of the Local Glass Production Technology

86-01(B): Characterization of Local Raw Materials for Glass Manufacturing

86-01(C): Effect of Grain Size of Cullets on their Melting Points

86-01(D): A Preliminary Study on Glass Fiber Materials

86-01(E): A Preliminary Study on Fiber Optics Materials

86-02 : Reformulation Studies on Developed Ceramic Bodies by Characterization and Linear Programming Methods and Techniques

TECHNICAL ASSISTANCE COORDINATION GROUP:

86-01 : Coordination of MSRI Activities Related to the Provision of Clientele Assistance

86-02 : Updating and Maintenance of the Institute's Information Resources for the Effective Provision of Info and Other Services

86-03 : Promotion of the Institute

86-04 : Updating of MSRI Directory of Technical Experts

86-05 : Survey on Training Needs of Local Ceramic Producers

86-06 : Evaluation of Technical Trainings Conducted at MSRI in 1984-85

PREPARED AS BRIEFING MATERIALS
FOR THE VISIT OF MINISTER
ANTONIO V. ARIZABAL

Date Prepared: June 25, 1986

MGN/jss

86-07 : Determination of Training Needs of MSRI Personnel

86-08 : Compilation of Technical Training Reports of MSRI Personnel on Trainings/Fellowships Attended

86-09 : Coordination and Monitoring of Activities related to Internal & External Manpower Development Program of the Institute

86-10 : Coordination in the Conduct of Technical Training Courses, Colloquia, Seminars, and Workshops in the Institute

86-11 : Design of the MSRI Training Program for the Year 1987

86-12 : Assistance in the Review of Completed In-House Studies/ Activities for Possible Development into Packaged Project Proposals

86-13 : Preparation of Memo of Agreement, Project/Research Agreement

86-14 : Inventory and Maintenance of a Record of Project Proposals

86-15 : Coordination of Activities related to Technical Assistance Grants

86-16 : Assistance to the R & D Groups in the Preparation of Project Proposals for External Funding

86-17 : Preparation/Documentation of MSRI Countryside Development Program

PLANNING, PROGRAMMING AND TECHNICAL STAFF SERVICES GROUP

86-01(A): Preparation of the MSRI Planning Systems and Procedure Manual

86-01(B): Gathering of Information Materials on Planning, Policies, and other related topics thru linkages with NST-PS and other counterpart Planning group of other agencies

86-02 : Provision of Staff Assistance to the MSRI Researchers regarding preparation of Annual Study/Activity Worknlans, among others.

86-03 : Monitoring the Operational Progress and Implementation of the Approved Study/Activity Worknlans

86-04 : Preparation of the Institute's Reporting Requirements (quarterly, semi-annual, annual) and other Consolidated Reports as required

86-05 : Installation and Operation of a Computerized Financial Monitoring and Information System (FMIS)

86-06 : Installation and Operation of Computerized Library Inquiry System

86-07 : Installation and Operation of Computerized Word Processing System

86-08 : Adoption of Computerized Reformulation Process and Creation of Ceramic Raw Materials Database

86-09 : Documentation on the Existing Systems and Procedures on Technical Services, plus Improvement, if any

86-10 : Builds and Maintains the Institute's Information Depository for Materials Science and Technology and Related areas

86-11 : Provides active library services to the Institute's staff and external users

86-12 : Provision of Typing, Printing, and other Clerical Services to the R & D Groups and other Organizational Units of the Institute

ANNUAL REPORT
1984

MATERIALS SCIENCE RESEARCH INSTITUTE
National Science and Technology Authority
Bicutan, Taguig, Metro Manila

CONTENTS

NTRODUCTION

Through the second year of its existence as an Institute, MSRI made tentative efforts to stabilize its operations and pool all available resources toward the effective execution of plans and programs. Modifications of the organizational set-up was made to further improve the whole system. Strengthening of the Finance and Administrative Division was achieved thru full staffing of its different sections and units. Research and technical groups were reordered, with functions of each clearly delineated. Committees were created to expedite the implementation of the different activities of the Institute.

A sense of new awareness pervaded the Institute such that priorities were given to R & D projects which answer the pressing needs of the industry, thus upholding the demand-pull strategy initiated by the NSTA. Researchers showed a marked interest toward conceptualization of new projects. Preliminary investigations on the development of silicon carbide, silica bricks, and polymers were initiated. On-going studies on electrical insulators, ferrite magnets, and refractory crucibles were vigorously pursued. Project proposals were prepared for possible technical cooperation with foreign countries like Japan and Germany.

Joint projects with private firms and other government agencies were established. Among these is the "Charcoal-Fed Cupola Project" which is being undertaken in collaboration with the Philippine Council of Industry and Energy Research and Development (PCIERD) and the Philippine Foundry Society (PFS). This venture was formalized with the signing of the Memorandum of Agreement among PFS Director Jose T. Marcelo, Dr. Antonio V. Arizabal of PCIERD, and MSRI Director, Manolito G. Natera, last October 15, 1984.

All means to upgrade the capabilities and skills of MSRI researchers were tried. Foreign technical trainings were sought and post-graduate or masteral studies encouraged. Library holdings were augmented with the purchase of valuable reference books and continued renewal of subscriptions to further enrich the stock knowledge of the staff and aid them in basic researches.

More attention was directed to the preparation of technical reports of completed studies. Recognizing the significance of this activity, the Institute was able to produce a number of technical papers for review and documentation. One such manuscript, entitled "Development of Porcelain Grinding Balls", even won secondprize in the 1984 NSTA award for outstanding researches.

Parallel to the R & D activities in the Central Laboratory, technical services in various forms were carried out for both government and private institutions. MSRI started making a name for itself, especially in the areas of tests and analyses of materials, training programs on ceramics technology, beneficiation of raw materials, and consultancy services. The influx of requests for technical assistance was a positive indication of a growing confidence in MSRI's credibility as a research institute.

While aiming to produce good results for on-going projects, MSRI, at the same time, intends to direct future activities toward other R & D tasks to broaden its realm of scientific know-how and contribute to the development of the local industry and the country in general. With the acquisition of additional laboratory equipment and other vital resources, it hopes to delve deeper into the study of metals, plastics, and other materials, as well as face new challenges in the dynamic field of ceramics technology.

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CERAMICS

Studies on the development of different kinds of glazes out of local materials were conducted. These include experiments on high-temperature luster glazes, medium-temperature base glaze designed for lime, ash, crystalline, matt, opaque as well as colored glazes, and low-temperature fritted glaze formulations. Further test applications on actual products still have to be conducted to confirm the acceptability of said glazes.

Casting properties of the talc body developed out of Iloilo white clay, Iloilo ball clay, Siruma silica, Cebu feldspar, and talc were further improved with the addition of 40% water and sodium silicate. A suitable base glaze formulation was chosen out of a number of glaze recipes and several colored glazes were prepared using metallic oxides and stains of varying amounts.

An adjustment of the Tiwi stoneware body was made to lower its expansion and make possible the application of low-temperature glazes. In the process, certain percentages of amorphous silica were used together with Siruma silica. The low-temperature glazes under study produced good results when tested on the adjusted Tiwi body. Further experiments are being conducted to come up with glazes of transparent and glossy finish.

Laboratory beneficiation studies on the raw ball clay from Lemery, Iloilo were undertaken to improve its properties. The beneficiated clay was later utilized in the pilot plant production of dolomite ware with good results.

Results of the trial production of chemical crucibles developed mostly out of local materials showed that the same body and glaze formulation can be used for the manufacture of a 25-ml capacity porcelain crucible of the high-form type. Forming by slip casting, glaze application by dipping method, and firing at 1300°C proved to be technically and economically suitable processes. Results of heat resistance, glaze adhesive, acid-proof, and constant weight tests further proved the efficiency of the developed crucibles based on Japan Industrial Standards (JIS) specifications. Consumer acceptability tests conducted in outside laboratories confirmed that said products perform as good as the imported ones.

Tests made on porcelain electrical insulators developed out of Iloilo clay, Siruma silica, Cebu feldspar, and alumina showed good results. To confirm laboratory findings, twenty (20) pieces of 1.5 kv insulators were produced and submitted to MERALCO for electrical testing. Evaluation of the results is presently being done.

Commercially available brick bodies were subjected to various tests and analyses to determine their physical, chemical and mineralogical properties and utilize the data compiled to guide entrepreneurs/investors intending to go into brick production. It was found out that the bricks produced by six different manufacturers in Metro Manila and the two experimental brick products from MSRI have an absorption range of 22-15% and a compressive strength of 121 to 429 kg/cm^2. The color shade varies from light to dark tone of brick orange. These properties/values are found to fall under the classification for building bricks as given in the Philippine Standard Specifications.

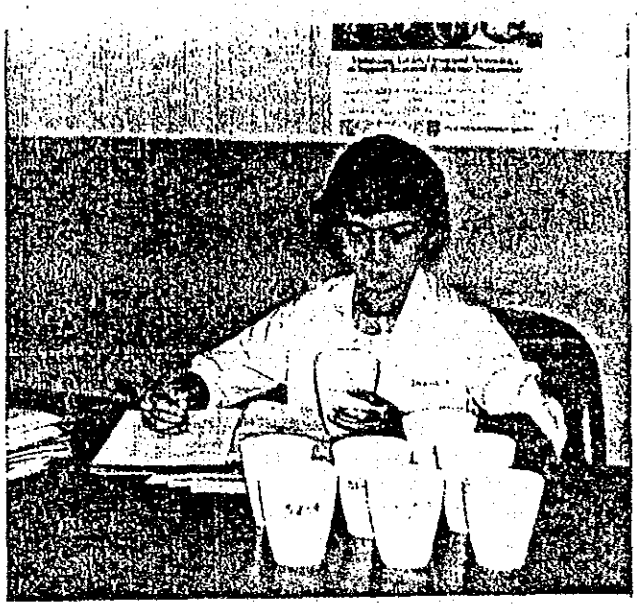
Research studies on semi-vitrified and vitrified ceramic tiles have made use of pumice tuff from Irosin, Sorsogon as one of the main material components. Body formulations were prepared, and when subjected to firing tests, these were found to vitrify at 1180°C. Further study is being conducted to improve the physical properties of the research product.

Refractory insulating bricks are being developed out of Iloilo ball clay, del Gallego clay, and grog materials. Trial body formulations were prepared with the addition of combustible ingredients for the determination of [illegible], water absorption, porosity, and compressive strength. Formulations which exhibited satisfactory qualities were scheduled for refractoriness underload tests (RUL).

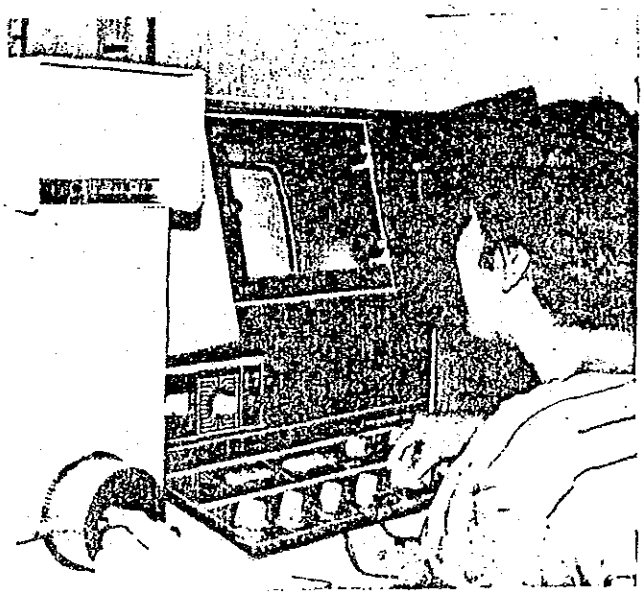
A research study on the recycling of plaster molds was undertaken and findings of preliminary experiments performed on MSRI-used molds revealed positive results. Further activities include the utilization of "truly spent" molds from ceramic shops and factories to test the viability of the recycling method being developed.

Substitutes for imported refractory crucibles used in the fire-assay of certain ores are being developed utilizing local materials. Trial formulations were prepared, test crucibles were made by jollying method, then fired. More samples were made of crucibles which showed good properties. These were submitted to other laboratories for acceptability tests and evaluation.

Research on silica bricks, silicon carbide, and dolomite refractories were initiated thru literature surveys/ preliminary investigations. Results gathered will be the basis for the preparation of project proposals toward actual R & D utilizing local materials.

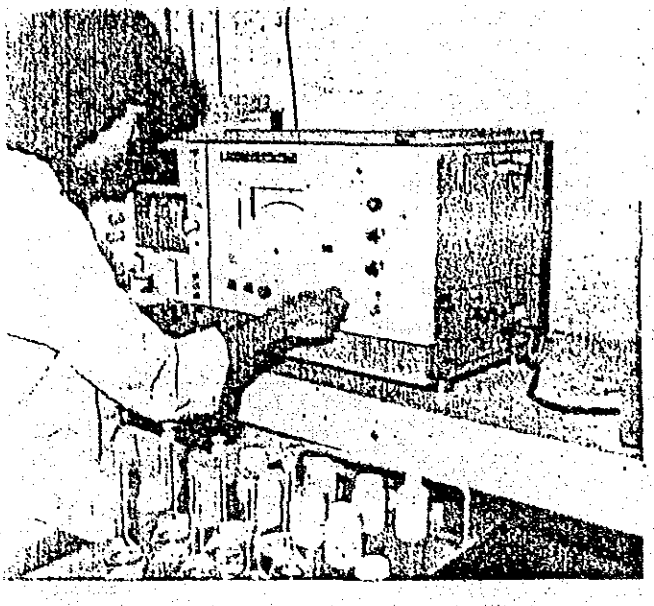


MATERIALS TESTING AND EVALUATION



A total of 678 tests/analyses were conducted during the year. Forty percent (40%) of the samples submitted were for physical testing, forty-two percent (42%) for mineralogical analysis and the remaining eighteen percent (18%) were for chemical analysis.

Of the samples tested/analyzed, fifty-five percent (55%) were submitted by clients and forty-five percent (45%) by MSRI researchers.



Quality control services by way of chemical, physical, and mineralogical tests/analyses were likewise rendered in support of pilot plant production of ceramic materials and products.

A study was conducted to improve MSRI testing methods without sacrificing accuracy of results. This led to the development, among others, of a method to shorten fusion time from 20 to only 3 hours in the determination of alumina content of high-grade refractories.

Toward the end of the 3rd quarter, three (3) research activities were initiated, to wit

- Test/Evaluation of Commercially Available Squat-Type Water Closets, a joint project with TUSS/TRC
- Test/Analysis of Ceramic Raw Materials, in support to the NSTA-MSRI Regional Field Centers
- Test/Analysis of Ceramic Raw Materials, in support to the CORIADP-NACIAD project

Periodic in-house training of analysts/technicians on the operation of available testing equipment was conducted to improve the over-all productivity of the Testing and Evaluation group through proper allocation and utilization of manpower. Researchers from other programs were also trained on the use and operation of various testing equipment.

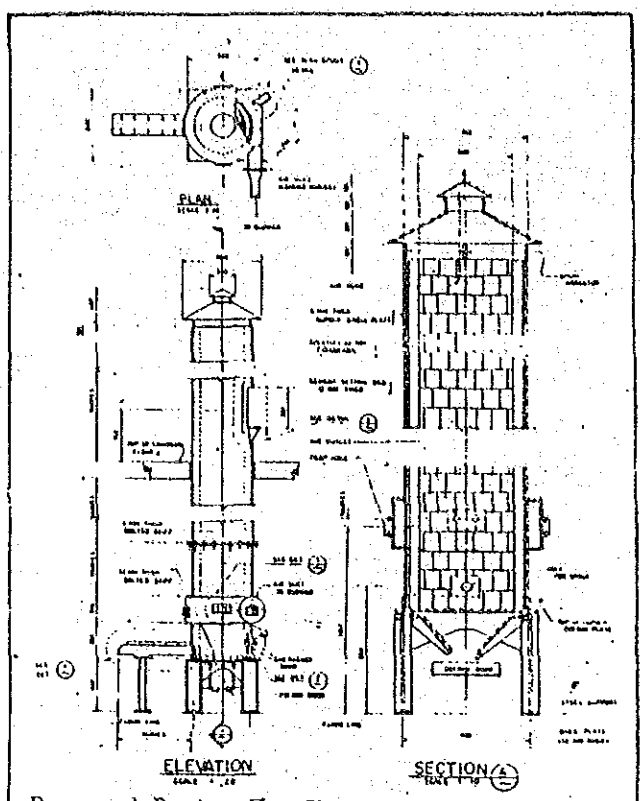
Technical reports on the following research studies were prepared and submitted for documentation:

- Study on Some Properties of Formulated Bodies from Philippine Ceramic Materials
- Mineralogical Composition and Microstructural Study of Fired Bricks
- Mineralogical Study of General Luna Weathered Diorite in Carranglan, Nueva Ecija
- Thermal Behavior of Selected Ceramic Raw Materials in the Philippines
- Mineralogical Study of Sedimentary Clay Deposits from Carranglan, Nueva Ecija
- Evaluation of Tests and Analyses Data of Some Tiwi Ceramic Materia for Development of Roof Tiles and Stoneware
- Tests/Analyses of Magpet Clay, Iloilo Ball Clay, and Talakag Cla for Development of Ceramic Produc
- Physical Properties of Clayey Raw Materials Deposited Regionwide (Regions I, II, V)
- Test/Analysis of White Clay from Mayantoc, Tarlac
- Materials Characterization of Bulala Flint Clay
- Analysis of Siliceous, Alumina-Silicate and Aluminous Materials

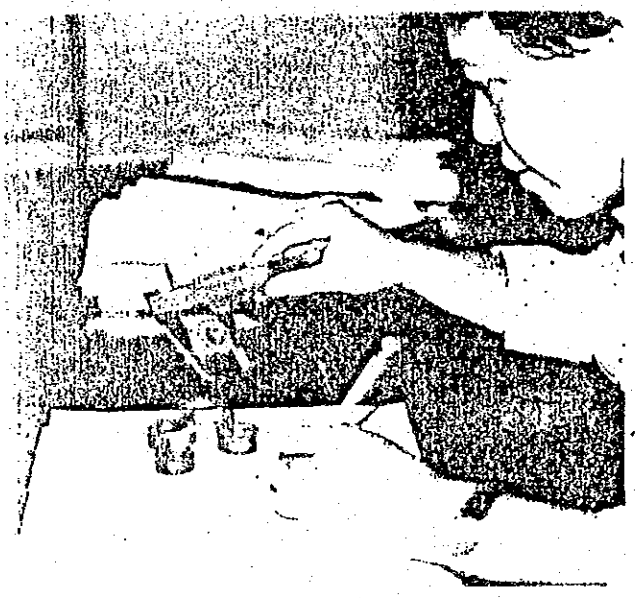
METALS

A project on the development of a charcoal-fired cupola was jointly initiated by the Institute, the Philippine Council for Industry and Energy Research and Development (PCIERD), and the Philippine Foundry Society (PFS) in the latter part of 1984. The study aims to come up with a suitable design of a cupola using charcoal as substitute fuel for coke, and to establish a methodology for its most efficient operation. PFS and PCIERD both shall provide financial support to the project. On the other hand, MSRI, in coordination with PFS, shall see to its implementation thru research and development of the right technology and/or provision of technical expertise.

Two gas furnaces were designed, fabricated, and operated using LPG, oxygen gas/compressed air as fuel. Further improvement on the design is being made to increase the efficiency of the furnaces.



Proposed Design For Charcoal-Fed Cupola By MSRI



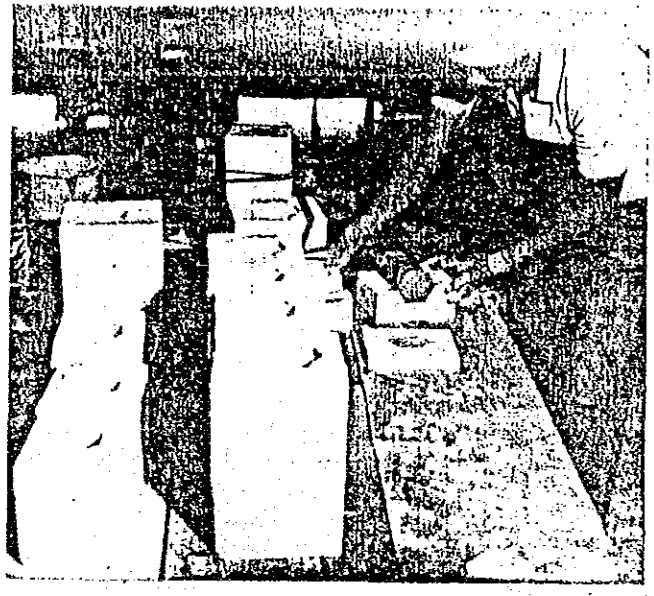
Pyrite cinder, a waste product from fertilizer plants, was utilized in the production of ferrites. The material was first beneficiated, then barium hydroxide and barium carbonate were added to it. The resulting ferrite exhibited a magnetic force after passing through a magnetizing machine. XRD analysis showed the formation of barium ferrite mineral. Studies are presently being conducted to determine other indigenous sources of iron oxide.

A survey of the plating and surface-finishing industry was conducted to find out how the Institute could effectively render technical assistance to this sector. Useful data were gathered from replies to questionnaires and actual plant visits made by the survey team. Findings show that the industry's major problem is inadequacy of working capital and decreasing market opportunities.

A design of a charcoal-fired crucible furnace for use in melting non-ferrous metals, especially aluminum and its alloys has been developed. Based on previous literature study, it was gathered that charcoal of suitably high fixed carbon content can be used for metallurgical purposes and is even preferable to coal because of its higher chemical reactivity and lower sulfur, phosphorus, and ash content. Another advantage is the abundant supply of raw materials from trees like the ipil-ipil.

MATERIALS TEST PRODUCTION

A pilot test production of the developed body and glaze was conducted to confirm laboratory findings. Materials were first beneficiated and the mixtures subjected to quality control tests. Articles, such as, candle holders, pencil holders, ash trays, small jars, and figurines were formed by slipcasting. Over-all results of the project proved to be satisfactory.

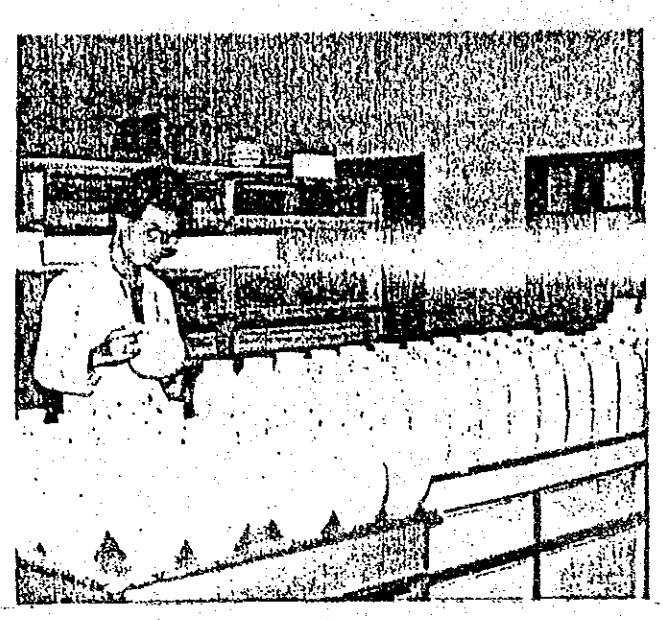


Modern geometric designs for ceramic artwares, such as, vases, ash-trays, pen holders, and candy jars were created. These were successfully adopted in the pilot test production of dolomite ware. More innovative designs are presently being developed to suit MSRI formulated clay bodies and come up with new and original shapes for pottery.

Brick body formulations were prepared out of the red clay from Gabaldon, Nueva Ecija. Test pieces were formed, fired, and subjected to physical tests to determine their compressive strength, porosity, water absorption, and bulk density. Results were collated for further development studies.

To test the efficiency of the locally fabricated 10-kw electric kiln, a comparative study using the Japanese-made kiln as model was conducted. This includes mineralogical tests by X-ray diffraction and optical microscopy, determination of common physical properties, compressive strength, and PCE. Heat loss on the kiln walls was also determined. Evaluation of results showed that the locally fabricated kiln is comparable to the Japanese kiln both in quality and efficiency.

Several stoneware pieces were produced from time to time out of Tiwi materials. Forming was done by hand-pressing and clay throwing. A number of finished products were sent to requesting NSTA regional offices for exhibit purposes. Others were added to the MSRI Showroom collections. Several others were set aside to form part of the memorabilia given away by the NSTA during the celebration of the National Science and Technology Week.

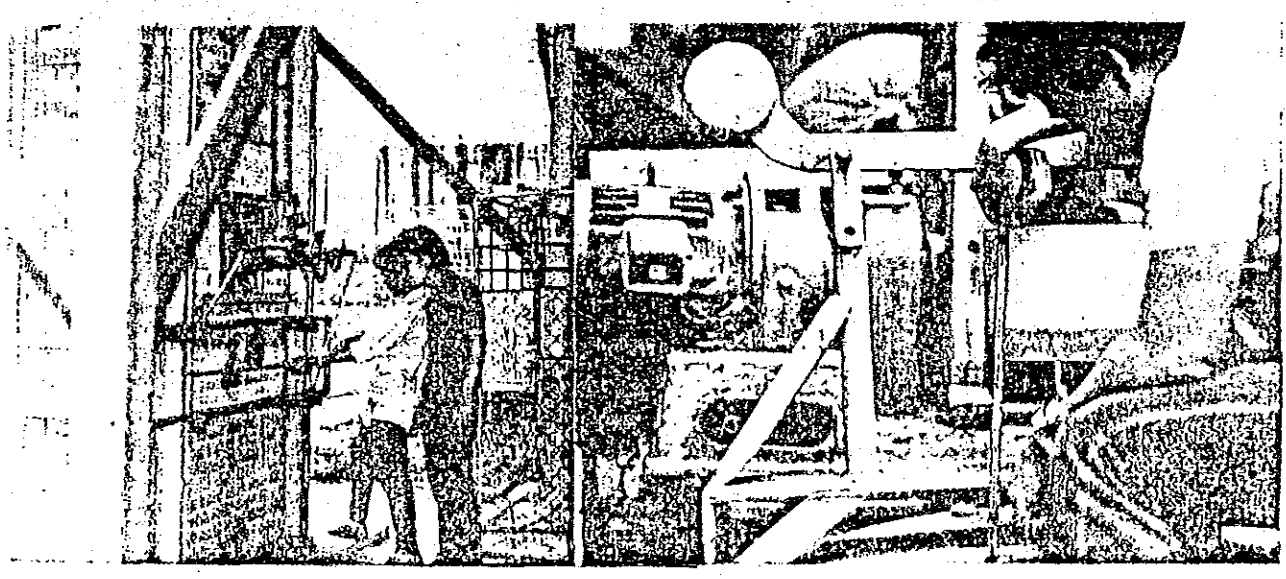


Beneficiation studies on Siruma materials were made as part of the Institute's commitment to the joint project with the Minerals Reservations and Development Board (MRDB) entitled "Evaluation of Siruma Raw Materials".

ENGINEERING

Research studies were made toward the preparation of designs and working drawings of simple equipment/tools needed in R & D activities. Based on these, the following were constructed/fabricated:

- Oil-fired downdraft high-firing kiln
- Thermal conductivity apparatus
- Salt-glazing kiln
- Jiggering machine with motor
- Vibrating screen attached to the roll kneader
- Tin plate for porcelain insulator



POLYMERS

Inasmuch as the work on polymers is still in its infancy stage, intensive laboratory studies have not yet been conducted in this direction. R & D projects will have to be implemented soon after the acquisition of necessary equipment and the set up of additional facilities. However, literature surveys and preliminary studies on the plastics industry and on plastics/polymeric materials have been made.

Based on these literature surveys, a study on the use of castor oil as secondary feedstock for polyol in polyurethane plastic preparation was done. This was in line with the request of the Technology Resource Center for the evaluation of a polyurethane squat-type water closet. The feasibility of this basic research will be tested as soon as the Institute secures the equipment needed for the project.

Scientific and technical literature relevant to the study of polymers were compiled and utilized as reference materials in the preparation of project proposals for possible technical assistance from foreign countries, particularly the Federal Republic of Germany and Japan. Project proposals submitted to PCIERD include:

- Utilization of Ethanol in the Production of Polyvinyl Chloride
- Research and Development of High-Performance Polymeric Materials
- Utilization of Hydrocarbon-Producing Plants in the Production of Polyvinyl Alcohol
- Research and Development in High Polymer Science

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S & T SERVICES

S & T services rendered to MSRI clients included tests and analyses of materials and products, use of facilities/ equipment, consultancy services, briefings/lectures/demonstrations, library services, manpower training, provision of information materials, plant survey and evaluation, and others. For 1984, the number of clients assisted reached a total of 111; 74 from the private sector, and 37 from the government sector.

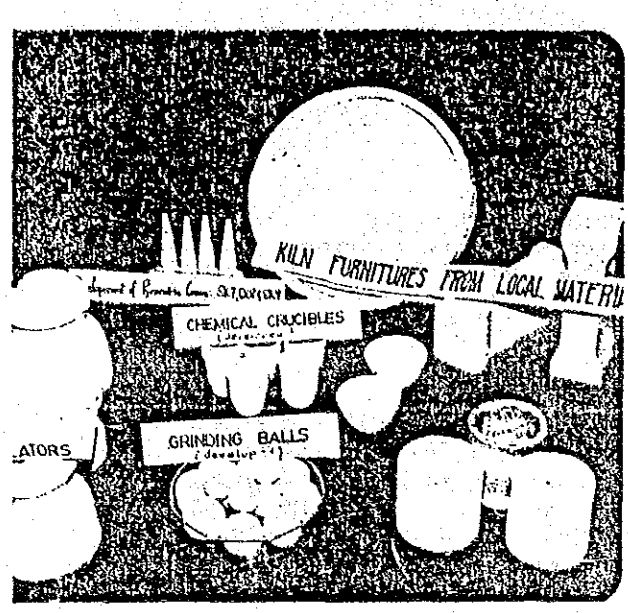
The Institute also accommodated a number of requests for laboratory/ plant visits from different schools. A total of 1,823 High School and College students and teachers were given briefings on R & D programs and laboratory procedures and shown the actual operations in ceramic forming.

As mentioned earlier, part of the Institute's technical assistance program is the conduct of trainings on different areas in ceramic production. Lecturers/Extension workers were likewise dispatched to rural communities upon request of sponsoring local government agencies such as the Small Business Assistance Center (SBAC) and some NSTA regional offices.

The main bulk of requests were for consultancy services, tests/analyses, and library services. The rest comprised only a comparatively smaller percentage of the total number of services extended to clients.

TRANSFER OF TECHNOLOGY

Among the mature technologies lined up for transfer and commercialization are the production of porcelain grinding balls, which incidentally won 3rd place in the 1984 awarding of NSTA outstanding researches, and the manufacture of chemical crucibles. Some private firms have already signified keen interest in utilizing these technologies, especially the latter. It is expected that negotiations for its transfer will materialize next year.



Meanwhile, MSRI field centers, such as the one operating in Daro, Dumaguete City, had continued to develop technologies on the production of traditional pottery as well as structural bricks. A number of these simple technologies are already being utilized by the local potters.

Following the turn-over of the Tiwi Ceramics Pilot Plant (TCPP) from the NIST to MSRI, plans for its reactivation were made. This project was designed to continue the Institute's program for technology transfer in Tiwi, Albay. Thru the TCPP, technologies developed out of raw materials available in the Bicol Region will be disseminated among the local potters. Trainings on improved techniques in ceramic production will be disseminated and assistance will be extended to entrepreneurs desiring to venture into the ceramics business.

Prior to the reactivation of the plant, a renovation of physical facilities and reconditioning of existing equipment was done; while back in the Central Laboratory, improvement of the Tiwi products was made thru further pilot plant study and creation of new product designs.

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MANPOWER DEVELOPMENT

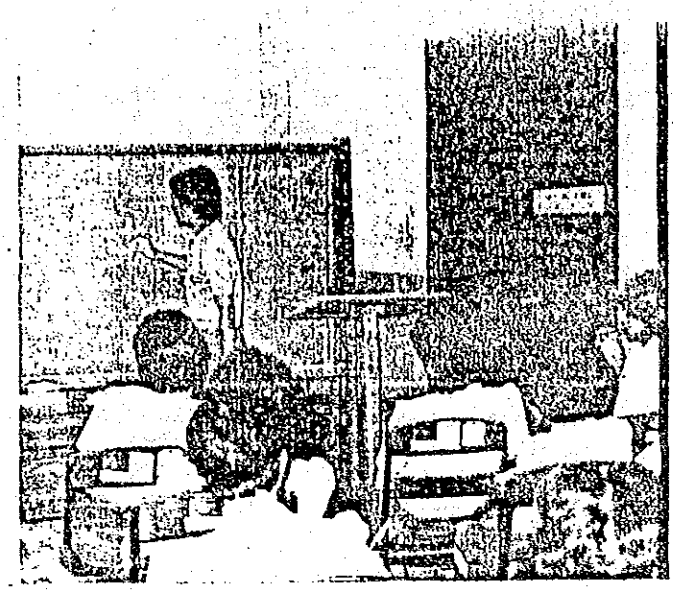
To upgrade the skills and capabilities of MSRI staff, foreign and local trainings/workshops were sought in coordination with the NSTA Staff Development office and other government and private agencies. A total of ten (10) foreign training slots were awarded to the Institute. The number of local trainings and seminar/workshops participated in amounted to twenty-two (22).

In addition to the aforementioned, in-house staff development programs were pursued through seminars and technical forums. For the seminars, resource speakers from other agencies, both government and private, were invited. Technical forums, on the other hand, were purely MSRI affairs, with MSRI staff comprising both participants and speakers.

MSRI has also expanded its manpower development program to include provision of technical assistance to outside researchers/students in the conduct of R & D projects. Guidelines have been formulated on the following programs: a) MSRI Thesis Advisorship, b) On-the-Job Training, and c) Visiting Scientist Program.

The Thesis Advisorship Program is designed for qualified students desiring to use the Institute 's laboratories and other facilities in the preparation of thesis research in the field of materials science and technology. Assistance involves thesis advice and instrumentation guidance by accredited MSRI research staff.

Individual who wish to acquire practical knowledge and skills in certain areas of ceramics, metals,



and polymers research and development, including materials testing and evaluation, materials processing, and related engineering activities, may avail of the Institute's On-the-Job Training Program. They will be placed under the tutorial guidance of an MSRI researcher. Certificates of training will be given upon completion of chosen projects.

On the other hand, the Visiting-Scientist Program is open to outside researchers and technologists who are interested and capable of conducting particular research and development studies in the area of materials science and technology but are usable to do so because of lack of facilities at their disposal.

Under this program, the interested individual may use MSRI's laboratories and/or equipment but he will be required to collaborate with a technical personnel of the Institute in the performance of his experiments.

PARTICIPATION OF THE PRIVATE SECTOR

At the latter part of the year, the Philippine Foundry Society (PFS) signed a memorandum of agreement with MSRI and PCIERD for the implementation of the "Charcoal-Fed Cupola Project". As the proponent, PFS will provide funding assistance to the project with an initial grant of ₱78,000.00. In addition, it will work in close coordination with the implementing agency, MSRI, in directing all targeted activities for the attainment of objectives within the specified two-year duration.

The project was conceived because of the restrictions placed on the importation of coke of which about 150,000 metric tons per annum are needed by the foundry sector in the Philippines. All things considered, the substitution of coke with charcoal to fire [illegible] designed cupola seems to be the best solution.

The experimental cupola which has an estimated fabrication cost of ₱120,000 will be installed at the MSRI. If the project succeeds, MSRI will then initiate training programs and extend technical assistance to the metals industry.

PCIERD, MSRI, and PFS have jointly pledged to fully cooperate with each other for the success of the Cupola project.

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FINANCIAL

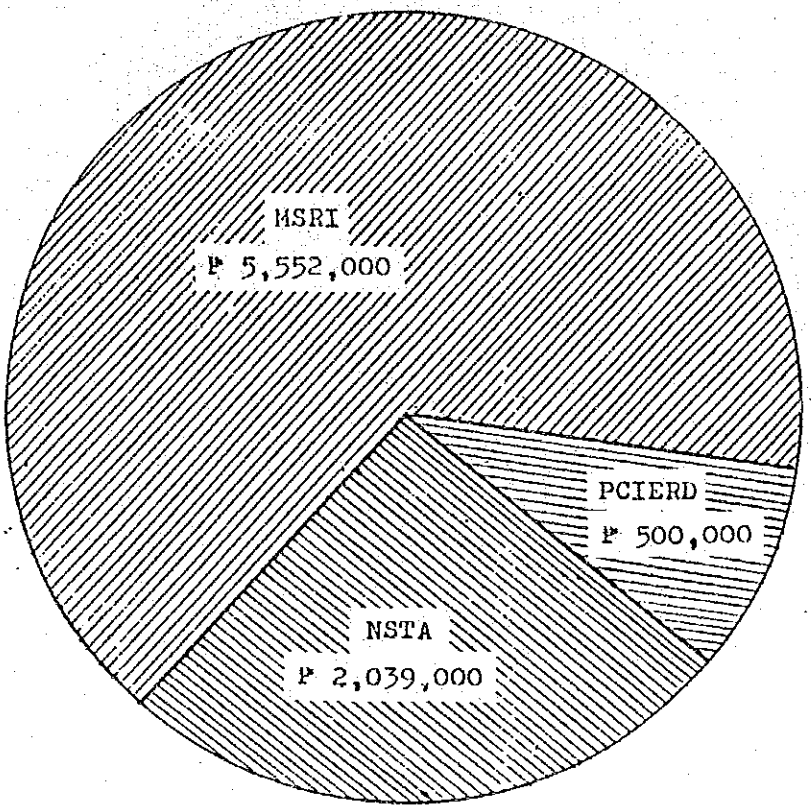
AND

HUMAN

RESOURCES

SOURCE OF FUNDS

CY 1984



TOTAL =
₱ 8,091,000

REGULAR FUND

P/P/A	DESCRIPTION	CY 1984	CY 1985	CY 1986
1.0	SCIENTIFIC AND TECHNOLOGICAL RESEARCH AND DEVELOPMENT ON MATERIALS			
1.1	Scientific and Technological Research on Synthetic Organic Based Materials, Non-Metallic Inorganic Based Materials and Composite Materials	₱ 1,301,000	₱ 1,348,000	₱ 1,987,000
1.2	Scientific and Technological Development on Synthetic Organic Based Materials, Non-Metallic Inorganic Based Materials, Metallic Materials and Composite Materials	₱ 1,302,000	₱ 1,349,000	₱ 1,944,000
1.3	General Administration and Support Services	₱ 1,314,000	₱ 1,343,000	₱ 1,966,000
2.0	ACQUISITION OF EQUIPMENT	₱ 1,635,000	₱ 1,635,000	₱ 2,000,000
	TOTALS	₱ 5,552,000	₱ 5,675,000	₱ 8,047,000

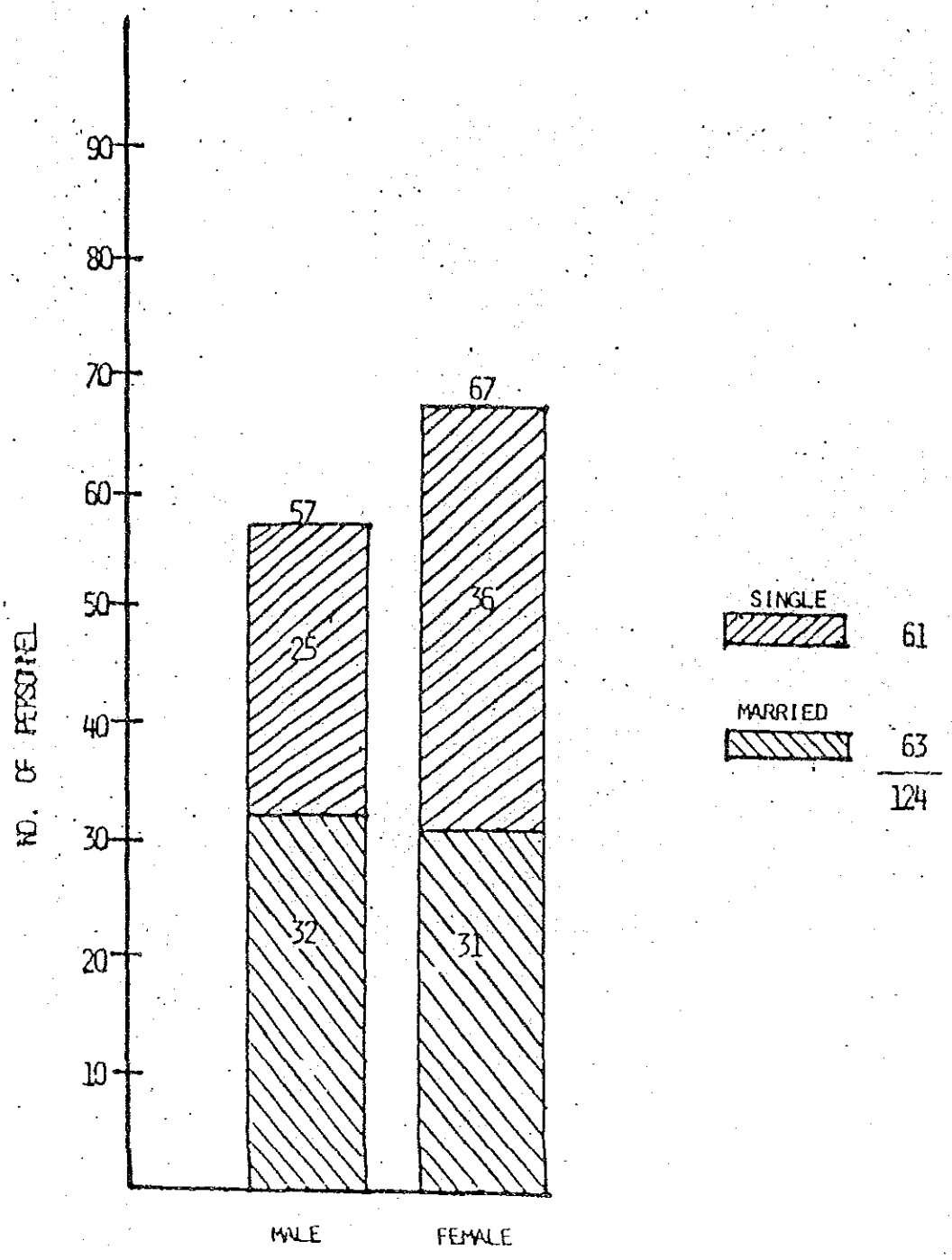
ALLOTMENTS FOR 1984

NSTA	Personnel Services	Other Personnel Services	MOE	Capital Outlay	TOTAL
1.1	₱790,000.00	₱47,000.00	₱316,000.00		₱ 1,153,000.00
1.2.1	₱791,000.00	₱47,000.00	₱316,000.00		₱ 1,154,000.00
1.3.1	₱312,000.00	₱610,000.00	₱233,000.00		₱ 1,155.000.00
2.0				₱552,500.00	₱ 552,500.00
					₱ 4,014,500.00

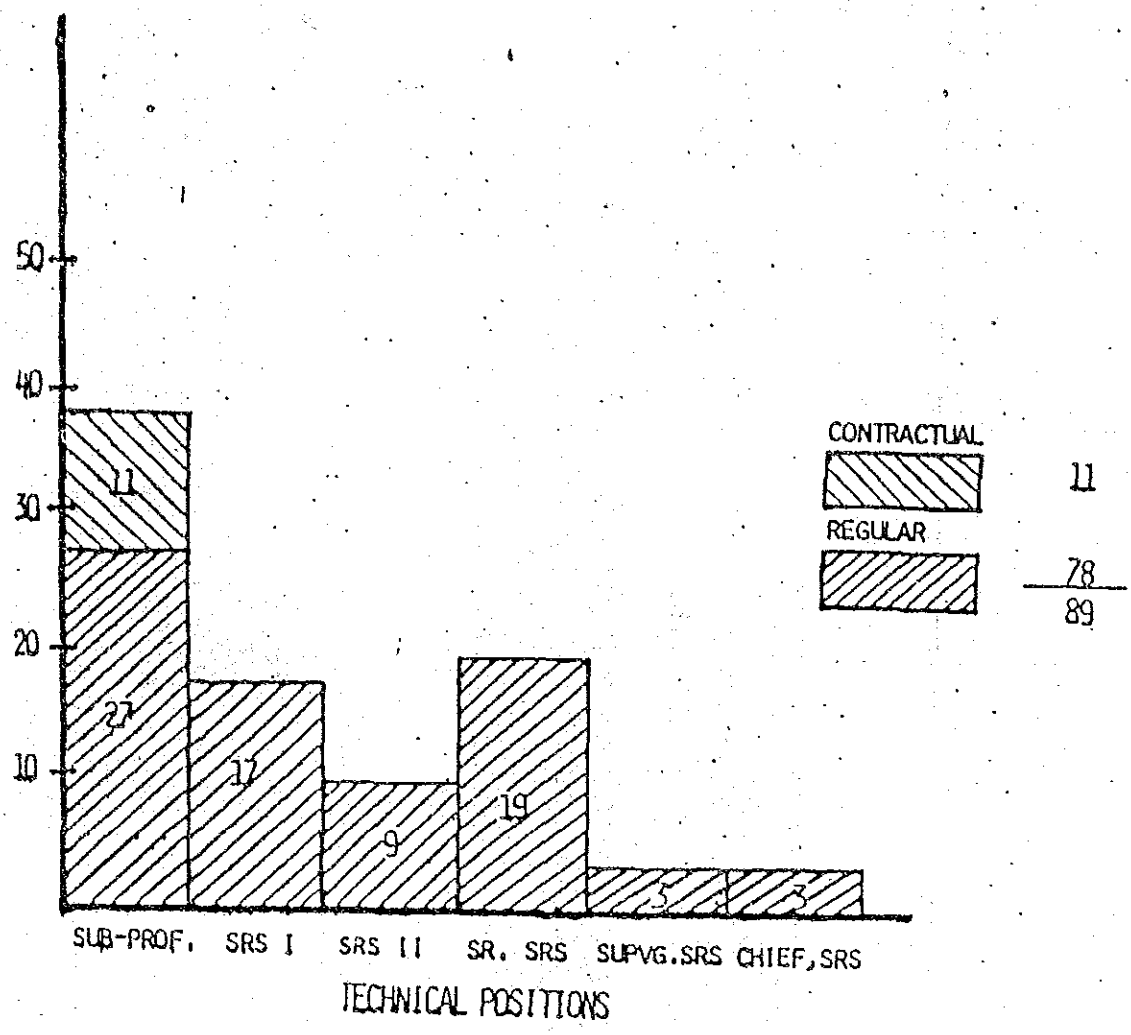
GRANTS-IN-AID
1984

Project	Personnel Services	MOE	Capital Outlay		TOTAL
			Equipment		
NSTA -					
1.4.2 - Polymers, Glass, Ceramics and Composites Research	₱7,800.00	₱1,132,200.00	₱560,000.00	₱300,000.00	₱2,000,000.00
1.2.1 - Expansion of Research Facilities		₱ 39,000.00			₱ 39,000.00
					₱2,039,000.00
PCIERD -					
83-002 Strengthening the Research Capabilities of NSRI			₱500,000.00		₱ 500,000.00

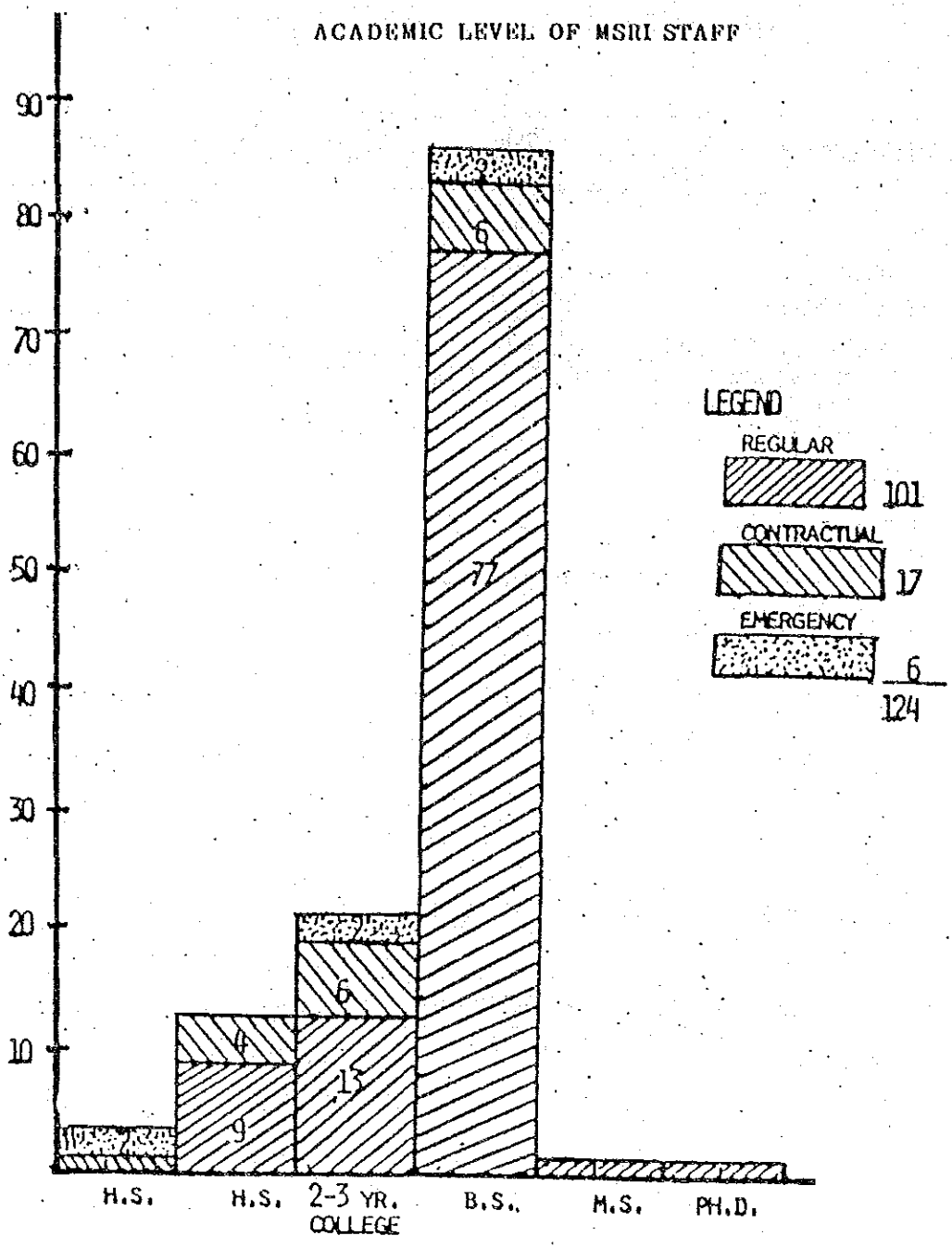
NUMBER OF PERSONNEL



NUMBER OF TECHNICAL POSITIONS



ACADEMIC LEVEL OF MSRI STAFF



ACADEMIC LEVEL

TABLE I. SUMMARY OF TESTS/ANALYSES

TESTS/ANALYSES	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
Physical	43	106	59	61	269
Chemical	26	34	27	31	118
Mineralogical	49	107	68	67	291
	118	547	154	159	678

IN-HOUSE TRAINING FOR MSRI ANALYSTS

Type of Analysis/Laboratory Activity	Training
1. Physical Testing	Operation and Use of Equipment Data Analysis
2. Thermal Analysis: Dilatometry	"
3. Optical Microscopy: Preparation of Thin-Sections	"
4. Sample Preparation	"
5. Chemical Analysis of Materials	"
6. Mineralogical Analysis: XRD, SEM, and TG-DTA	"

LIST OF INSTITUTIONS/COMPANIES ASSISTED BY THE MSRI

Name of Company/Agency	Services Rendered
I. Private	
1. Refractories Corporation of the Philippines	Tests/Analyses of products Information on equipment
2. ARMCO-MARSTEEL Alloy Corp.	Brick analysis
3. Copengco Enterprises	Testing of firebricks
4. Apex Mining Co. Inc.	Testing of materials
5. Royal Porcelain Corporation	Analyses of materials Test on lead release of dinnerware
6. San Miguel Corporation	Analyses of materials
7. Philippine Associated Smelting and Refining Corporation (PASAR)	Tests and analyses of materials
8. Benguet Corporation	Consultancy services Tests/analyses of materials
9. A. Soriano Foundation	Testing of materials
10. Meridian Industrial Corp.	Testing of firebricks
11. Mariwasa Manufacturing Corp.	Tests/Analyses of materials
12. Diamong Ceramics	Evaluation of glaze materials
13. Jupiter Marketing	Testing of quick lime
14. Pintar International	Frit ballmilling
15. Saranga Ceramics	Demonstration on the operation of the jiggering machine
16. Pacific Equipment Corp.	Observation tour of laboratories/ briefing
17. Saniwares Manufacturing Corp.	Consultancy Services Tests/Analyses of materials

Name of Company/Agency	Services Rendered
18. Aggre Ventures Inc.	Tests/analysis of materials
19. Macro-Per Ceramics	Tests/analysis of materials
20. Tagbita Silica Individual Corp.	Testing of materials
21. Welding Industries of the Phil.	Tests/analyses
22. Dynetics Incorporated	Qualitative analysis of brown spots on IC
23. ERA Industries Inc.	Tests/analysis of materials
24. Assistco	Test/analyses of material
25. Synclaire Manufacturing Corp.	Test/analyses of refractory bricks
26. Tala Foundation	Test/analysis of material Consultancy services

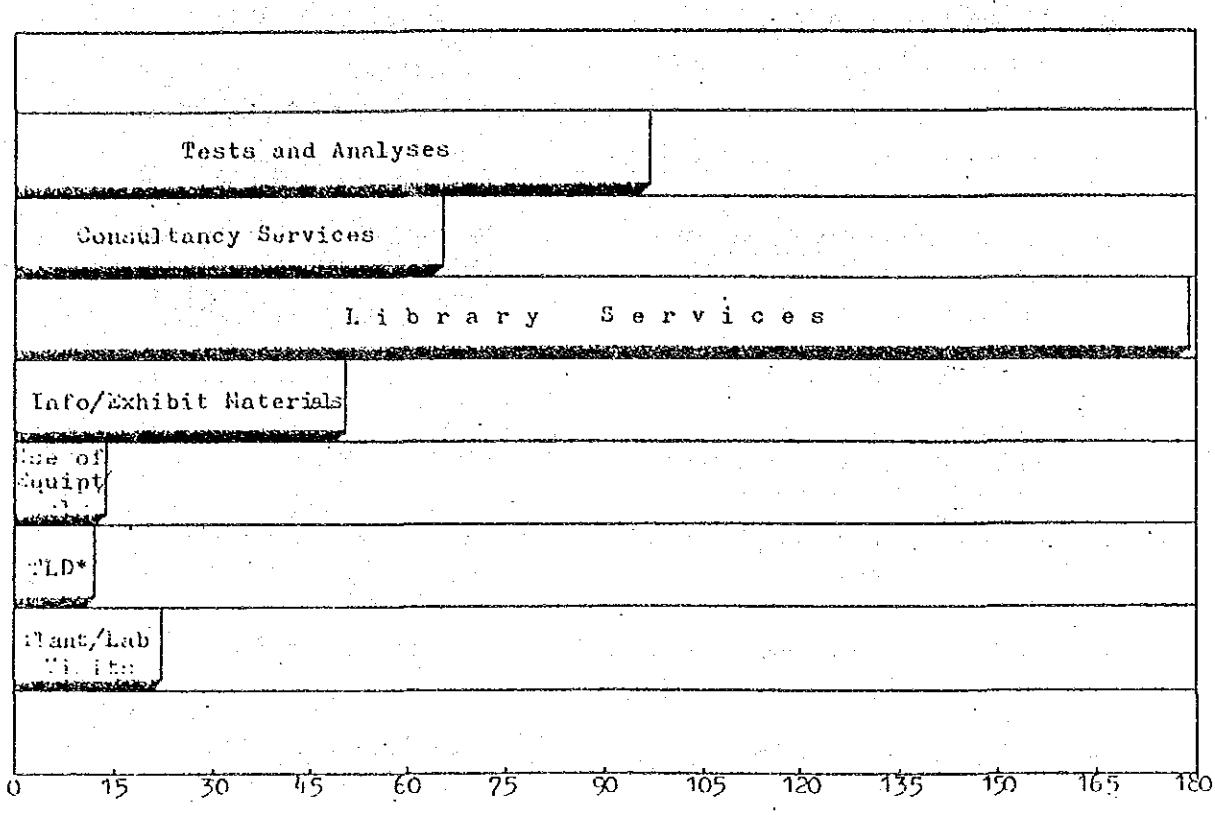
II. Government

1. Don Mariano Marcos State University	Demonstration of brick-making procedures
2. Scientific Instrumentation Division - NIST	Demonstration on pottery making for documentation purposes
3. Bureau of Soils	Consultancy Services
4. National Electrification Commission	Test/analysis of materials
5. National Power Corporation	Analysis of material
6. Bureau of Customs	Consultancy services
7. Philippine Institute of Volcanology	X-ray analysis on materials
8. Metals Industry Research and Development Center	X-ray analysis on crucibles
9. Mineral Reservations Development Board	Consultancy services Tour of facilities/pilot plant Test/Analyses of materials

Name of Company/Agency	Services Rendered
10. National Food Authority	Test-firing of rice hull briquettes Consultancy services Tests on cement products
11. Technology Resource Center (TRC)	Consultancy services Library services
12. Human Settlements Development Corporation (HSDC)	Firing services Evaluation of brick products Plant survey and assessment of production process
13. National Steel Corporation	Tests and analyses of materials
14. Forest Products Research and Development Institute (FPRDI)	Consultancy services
15. National Council on Integrated Area Development (NACIAD)	Consultancy services Tests/analyses of materials
16. National Manpower and Youth Council	Information services
17. ASEAN-PHTRC, UPLB	Firing services
18. Bureau of Mines and Geo-Sciences	Tests/analyses of materials
19. National Commission on the Role of Filipino Women (NCRFW)	Training on Brickmaking
20. Ceramic Educators Association of the Philippines (CEDAP)	Training on brickmaking
21. Small Business Assistance Center (SBAC)	Provision of resource persons/lectures on ceramics
22. Center for International Trade and Exhibit Missions (CITEM)	Consultancy services Test/analyses of materials
23. Construction Industry Authority of the Philippines (CIAP)	Consultancy services
24. Sabani Estate Agricultural College (SEAC), Nueva Ecija	Tests/analyses of materials
25. National Economic Development Authority (NEDA)	Consultancy services Tests/analyses of materials

TABLE II. BREAKDOWN OF SERVICES PROVIDED BY MSRI

1984

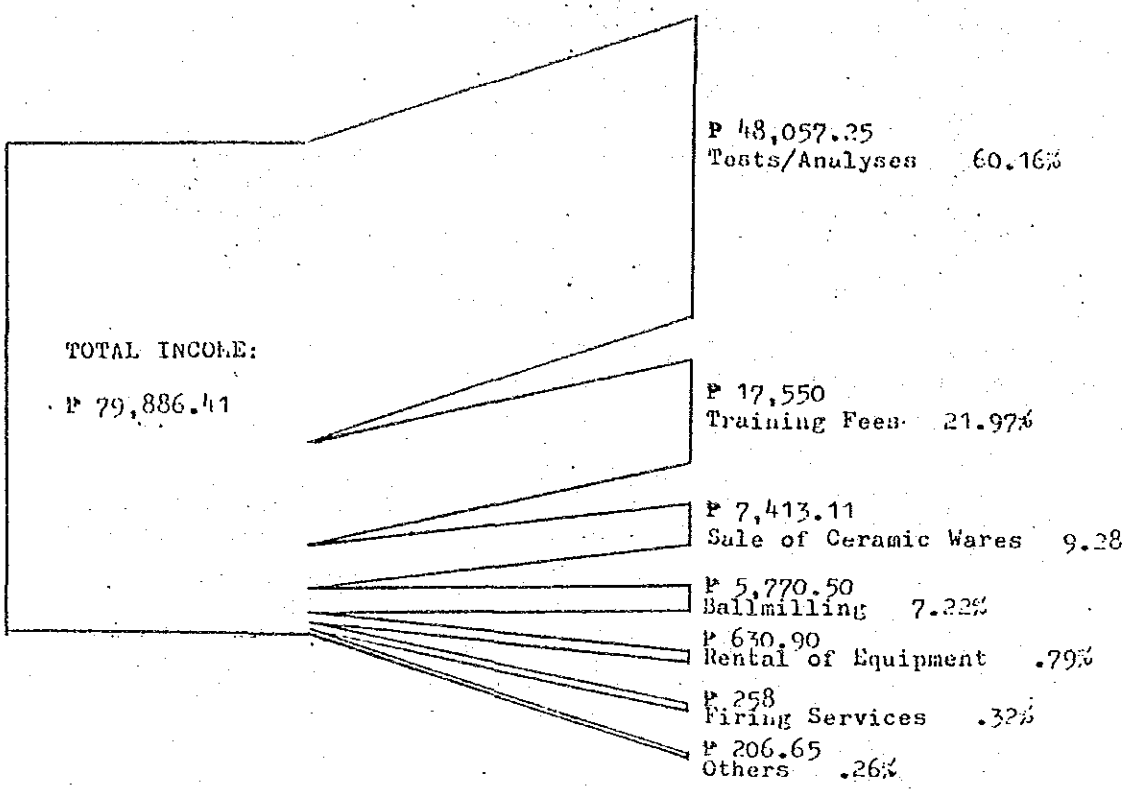


NO. OF SERVICES RENDERED

*Trainings/Lectures/Demonstrations

FIGURE I. MSRI INCOME

CY 1984



TRAINING PROGRAMS CONDUCTED IN ASSISTANCE TO CLIENTS

Area of Training	Trainee	Office/Agency
1. Brick and Tile Production	Melecio Quiachon	-
2. Brick and Tile Production	Augusto Somodio	-
3. Brick and Tile Production	Jessie Catalogo	Builder's Brick, Bo. Kaybanban, San Jose del Monte, Bulacan Metro Manila
4. Brick and Tile Production	Matildo Brigole	-
5. Design Methods and Techniques	Ralph Romano	-
6. Design Methods and Techniques	Evangeline Baranda	-
7. Brick and Tile Production for CEDAP Members	21 CEDAP Members	Ceramic Educators Association of the Philippines (CEDAP)
8. Glaze Preparation and Application	Bernardo Banuag	Bulua Ceramic [illegible] Inc., [illegible] Oro City
9. Glaze Preparation and Application	Joel Amante	Arte Ceramica
10. Glaze Preparation and Application	Evangeline Baranda	-
11. Glaze Preparation and Application	Feliza Gonzales	-
12. Glaze Preparation and Application	Delfin Sumabat, Jr.	University of Northern Philippines
13. Mineral Analysis	Susan Naranjo	National Museum
14. Brick and Tile Production	5 representatives	NCRFW

TRAINING PROGRAMS PARTICIPATED IN BY MSRI STAFF

	Name of Trainee	Area/Title of Training	Venue	Duration
A)	FOREIGN			
1.	Manuel Navarro	Electroplating	Malaysia	Feb. 20 to March 25, 1984
2.	Nestor Anicete	Regional Training Programme on Metal Working Technology	Malaysia	-do-
3.	Natividad Villos-tas	Seminar on Ceramic Development	Japan	Feb. 16 to March 20, 1984
4.	Napoleon Ladines	Group Training Course in Ceramic Engineering	Japan	April 3 to Dec. 27, 1984
5.	Ruben Vidallo	Multi-Country Study Mission on Ceramic Technology	Japan	May 14-25, 1984
6.	Brigida Antes	Group Training Course in Tile Manufacturing	Japan	Aug. 16, 19 84 to to March 29, 1985
7.	Elvira Mercado	Group Training Course in Plastics	Japan	Sept. 13 to Dec. 28, 1984
8.	Alicia Huelgas	Group Training Course on Chemical Technology	Japan	Sept. 6, 1984 to Sept. 5, 1985
9.	Severino Bernardo	Training Course in Materials Engineer-ing	Korea	Sept. 17-29, 1984
10.	Margarita Torre	Solar Collector Manufacturing Process and Select-ive Surface Tech-nology	Melbourne, Australia	Nov. 26-Dec. 7, 1984

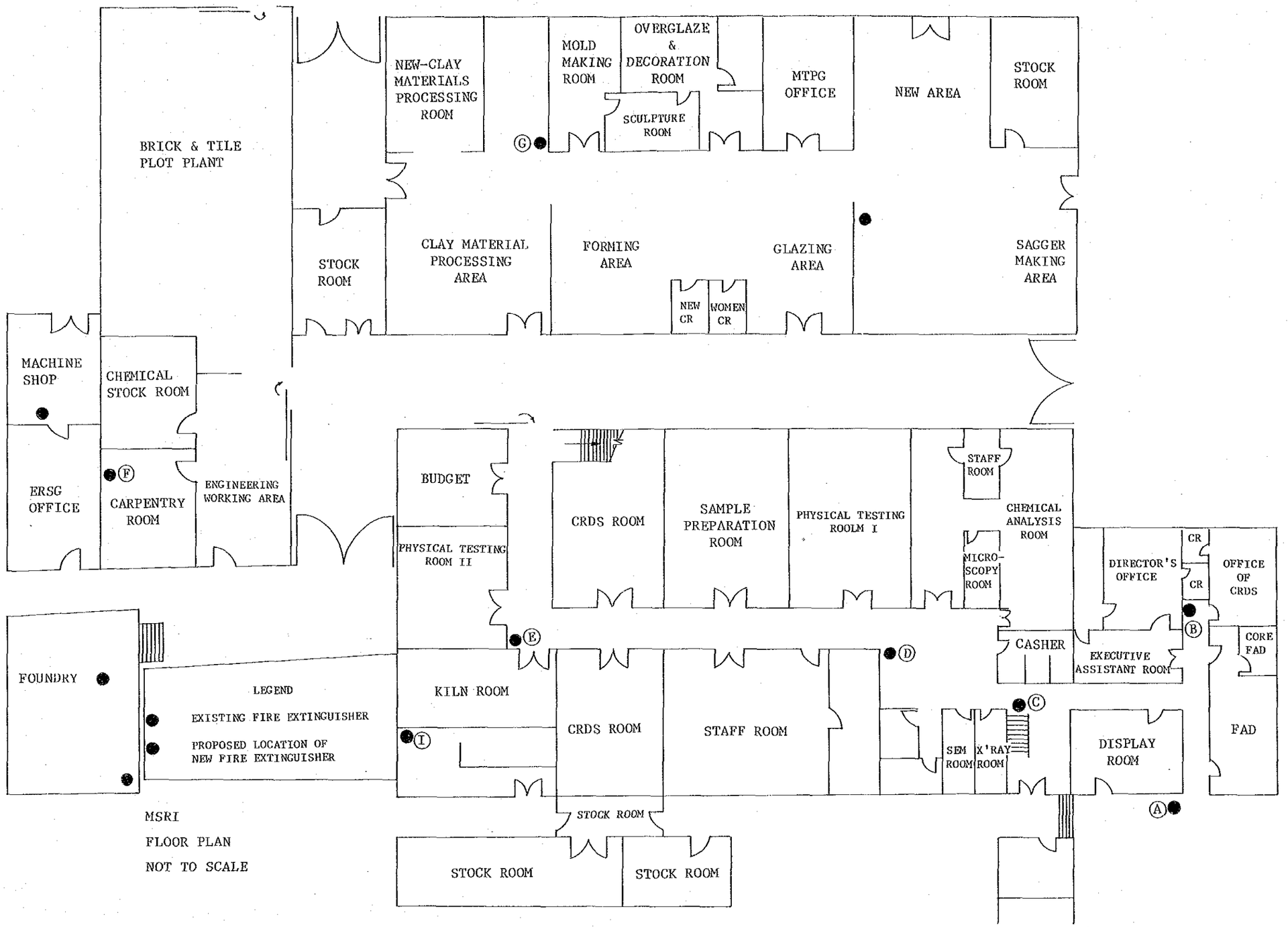
	Name of Trainee	Area/Title of Training	Venue	Duration
B)	LOCAL			
1.	Brigida Antes	Theoretical Basis of Self Reliance in Construction	NEC Bldg., UP Campus, Diliman Quezon City	Feb. 28-29, 1984
2.	Adoracion Cobile	Science Simplification	CEED, UPLB, Laguna	Feb. 6-10, 1984
3.	Asuncion Reyes	Training on Design Methods and Techniques	MSRI	March 5 to April 16, 1984
4.	Ruben Vidallo	Work Attitude Seminar	MERALCO Light House	April 13, 1984
5.	Virgilio Ables	Work Attitude Seminar	MERALCO Light House	April 13, 1984
6.	Leonora Meliza Serrano	Operationalizing the Demand-Pull Strategy and Technology	NSTA Executive Lounge	April 10, 1984
7.	Adoracion Cobile	Rural Immersion Project	Angat, Bulacan	May 2-5, 1984
8.	Susan Calvo	Rural Immersion Project	Angat, Bulacan	May 2-5, 1984
9.	Cecil Veloz	Glaze Preparation	MSRI	June 1 to July 15 1984
10.	Dominica Demiar	Glaze Preparation	MSRI	June 1 to July 15 1984
11.	Margarita Torre	Coal Utilization	UP Diliman	July 30 to Aug. 20 1984
12.	Anatalia de Guzman	Coal Utilization	UP Diliman	July 30 to Aug. 20 1984
13.	James Filio	Coal Utilization	UP Diliman	July 30 to Aug. 20 1984
14.	Virgilio Ables	Coal Utilization	UP Diliman	July 30 to Aug. 20 1984

IN-HOUSE TECHNICAL FORUMS / SEMINARS

Title of Seminar/Topic	Speaker	Agency
1. Development of Bone China	Ana de Guzman	MSRI
2. Design	Luzmin Esteban	MSRI
3. Principles of Cupola Operation	Perfecto Braganza	MSRI
4. Technical Report Writing	Virgilia V. Ragotero	MSRI
5. Technology Utilization of NSTA	Lydia G. Tansinsin	NSTA
6. Patenting and Licensing	Atty. Fidelino Adriano	PIDI
7. Technology Utilization Strategy	Dr. Roger Cuyno	Philippine Council for Agricultural. Resources Research and Development (PCARRD)
8. Technology of Kanthal Wire	William Yu	Unison Commercial

MSRI Key Officials
1984

Dr. Manolito G. Natera	Director
Mrs. Aida T. Ayran	Administrative Officer
Mr. Eduardo C. Rivera	Planning Officer
Mrs. Guillermina C. Manalac	Program Coordinator, Ceramics Research and Development Group
Mr. Severino T. Bernardo	Program Coordinator, Materials Evaluation Group
Mr. Tomas D. Recio	Program Coordinator, Materials Test Production Group
Mr. Christopher C. Salegumba	Program Coordinator, Regional Field Projects and Technical Assistance Coordination Group
Mr. Manuel M. Navarro	Program Coordinator, Metals Research and Development Group
Mr. Nestor G. Anicete	Program Coordinator, Engineering Research and Services Group
Mr. Angelo R. Torillo	Program Coordinator, Manpower Development and Information Services Group



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FLOOR PLAN

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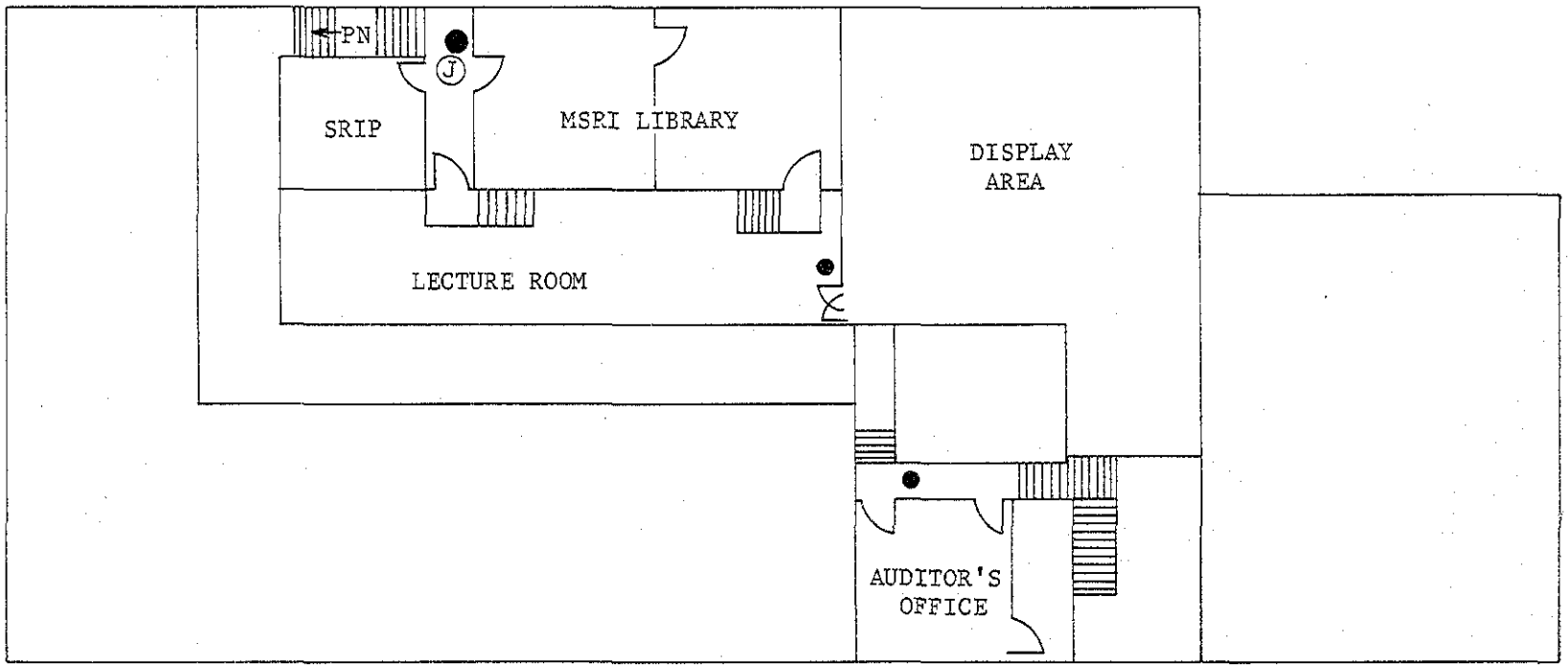

MSRI

2nd FLOOR PLAN STOCK ROOM STOCK ROOM

NOT TO SCALE