

VIII ATOMIC ENERGY

Project Title: POWER SYSTEMS FOR PHILIPPINE ELECTRICAL GRIDS

Name and Address of Principal Investigator: Magno Yoshisaki
Philippine Atomic Energy Commission (PAEC)
Diliman, Quezon City

Description of the Project: The purpose of this project is to investigate the adaptability of various types of nuclear power reactor systems to future Philippine electrical grids as regards operating experience, economics, adaptability and safety.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: November 1978

Expected Date of Completion: CY 1981

Present Status of Project: Continuing the compilation of additional information on Pressurized Heavy Water Reactor's (PHWR'S), Gas Cooled Reactor's (GCR'S) and Fast Breeder Reactor's (FBR'S) for comparative assessment.

Project Title: NUCLEAR INSTRUMENTATION DEVELOPMENT AND FABRICATION

Name and Address of Principal Investigator: Jose G. Reyes
Philippine Atomic Energy Commission
Diliman, Quezon City

Description of the Project: The project aims to design and develop electrical/electronic circuits adaptable to locally available components and to fabricate low-cost nuclear instruments for PAEC, government and private agencies.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: FY 1970

Expected Date of Completion: Continuing

Present Status of Project: Fabrication of digital scaler, survey meter thyroid uptake system and development of high voltage power supply to solid State circuit, single channel analyzer and photo-type well counter is being continued.

Project Title: SULFIDE GEOCHEMICAL SURVEY IN DAWAHAN, CAMARINES NORTE (SOUTHERN LUZON) PHILIPPINES

Name and Address of Principal Investigator: Gabriel Santos Jr.
Philippine Atomic Energy Commission
Diliman, Quezon City

Description of the Project: This project aimed to determine some minor and trace element contents (Cu, Fe, Mo, V, Au, As) of rocks and/or ore samples and to study the geochemical relationships among these elements by statistical treatment of the analytical/geochemical data and to search mineralized areas with the use of trace elements as path finders in Dawahan, Camarines Norte.

Source of Funding: PAEC and International Atomic Energy Agency.

Project cost not available

Cooperating Agencies: International Atomic Energy Agency (IAEA)

Date Started: FY 1977

Duration: Two years

Date of Completion: FY 1979

Present Status of Project: Completed

Other Relevant Information: A paper entitled "Sulfide Geochemical Survey in Dawahan, Camarines Norte Philippines" was recommended for publishing in the NRCP bulletin. Results indicated that there is a positive mineralization of Ag, Pb, with Cu. Fair geochemical correlation between Cu-Mn, Cu-Vu and Cu-Au. Silver is a suitable pathfinder for possible copper deposits in Dawahan, Larap area and probably in the region.

Project Title: GEOCHEMICAL STUDIES OF SOME PHILIPPINE PORPHYRY COPPER DEPOSITS

Name and Address of Principal Investigator: Gabriel P. Santos, Jr.
Philippine Atomic Energy Commission
Diliman, Quezon City

Description of the Project: This study deals with the application of trace elements in classifying types of copper deposits using statistical techniques. Trace elements like As, Cu, Co, Sb, Zn, Au, and Fe were determined in forty three (43) sulfide samples by Neutron Activation Analysis (NAA) using radiochemical separation. The determination of copper using the biquinoline extraction method was tried using Coleman spectrophotometer.

Project Cost and Source of Funding: Project Cost not available

Cooperating Agencies: National Research Council of the Philippines

Date Started: June 1973

Date of Completion: March 1975, final report prepared

Project Title: NEUTRON ACTIVATION ANALYSIS: NAA OF HAIR IN RELATION TO GEOGRAPHICAL AND EXTENT OF INDUSTRIALIZATION

Name and Address of Principal Investigator: Paz A. Kapauan, PAEC

Description of the Project: This project aims to establish workable techniques in the analysis of trace elements in human hair using Neutron Activation Analysis (NAA), Differential Pulsed Anodic Stripping Voltametry (DPASV) and flameless Atomic Absorption Spectrometry

(AAS) and to correlate levels obtained with geographical location and extent of industrialization.

Hair samples are being analyzed for Pb and Cd by polarography; Zn, Na, As and other pollutants by NAA, pulse polarography and cold vapor AAS.

Source of Funding: PAEC and International Atomic Energy Agency.

Project cost not available

Cooperating Agencies: International Atomic Energy Agency

Date Started: CY 1978

Present Status of Project: Continuing

Other Relevant Information: Several elements were identified to be present in hair samples analyzed by NAA; Mn, Cl, Al, Br, Au, Zn, Sb, Na, K, and Hg.

The Sb content of the six samples analyzed by DPASV ranged from 3-7 ppm while the Cd content ranged from 0.06-0.2 ppm.

Project Title: REJUVENATION AND FABRICATION OF GEIGER-MULLER (GM) TUBES

Name and Address of Principal Investigator: Gonzalo Puga
Philippine Atomic Energy Commission, Diliman Quezon City

Description of the Project: The project aims to fabricate and to rejuvenate old and defective GM tubes i.e. improvement of its operating characteristics, using isobutane and helium.

Source of Funding: PAEC, Project cost not available

Date Started: FY 1970

Date of Completion: FY 1978

Other Relevant Information: Exhaustive experimentation done with variable vacuum pressures, variable GM tube evaluation pressures, variable GM tube filling gas pressures, and different quenching gas/main gas mixtures. Subsequent tests of each filled GM tube with emphasis on plateau length, plateau slope, operating voltage, lower and upper threshold voltages, and pressure where failures of GM counter occurs, i.e. presence of arcing between anode and cathode. The above method was used for isobutane and halogen quenching. A number of rejuvenated GM tubes were manufactured and tested.

Project Title: URANIUM RECOVERY PROJECT

Name and Address of Principal Investigator: Ofelia T. Palabrica
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: The project aims to establish and maintain a uranium-processing laboratory for use in conducting ore testing of Philippine uranium ores in the production of nuclear grade uranium

oxides. Also being studied are the techniques in the extraction and recovery of uranium from uranium bearing ores in Larap, Camarines Norte and other selected areas.

Source of Funding: PAEC and Ministry of Energy. Project cost not available

Cooperating Agencies: Ministry of Energy

Date Started: FY 1973

Present Status of Project: Continuing

Project Title: WASTE HEAT UTILIZATION (FORMERLY INDUSTRIAL APPLICATION OF HEAT PRODUCED/DISCHARGED FROM PNPP-I)

Name and Address of Principal Investigator: Pilar C. Roceles
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: This project aimed to study the conditions and parameters on the selected application of waste heat from the Philippine Nuclear Power Plant (PNPP-I). The areas of interest as a possible industrial processes in the utilization of heat discharge are desalination mariculture and aquaculture.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: November 1978

Expected Date of Completion: CY 1984

Present Status of Project: Continuing

Literature search presently being done on the possibility of culturing seaweeds at a temperature above ambient and procedures for cultivating algae, oysters and shelf-fish culture.

Project Title: FABRICATION OF SEMI-CONDUCTOR DETECTORS

Name and Address of Principal Investigator: Ricardo S. Palabrica — FY 1972-1974
Renato Valencia — FY 1970-1972
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: The project aimed to fabricate and develop semiconductor detectors for research activities of the Commission particularly the 400 channel analyzer

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Duration: Six years

Date of Completion: Fy 1976

Present Status of the Project: Terminated

Other Relevant Information: Finished set-up and testing of the vacuum system. Completed development work on metal deposition technique on glass. Partially completed installation of fume hood chemical rack and work booths. Stimulated deposition of gold on silicon wafer

deposited poorly on the glass. Completed fume hood and auxiliary attachments.

This project was terminated in December 1975 due to lack of qualified personnel.

Project Title: INDUSTRIAL PLANT CONSULTATION AND SERVICE

Name and Address of Principal Investigator: Domingo B. Domondon and Linda G. Lumba
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: This project aims to promote the use of nuclear techniques in quality and process control in industrial plants with emphasis on construction inspection and testing.

Source of Funding: PAEC. Project cost not available

Cooperating Agencies: None

Date Started: FY 1977

Present Status of Project: Continuing

Other Relevant Information: Research and development efforts are continuously being undertaken to service industrial establishments that approach PAEC regarding their systems and process problems.

Project Title: RADWASTE TREATMENT DEVELOPMENT STUDIES

Name and Address of Principal Investigator: Edilberto Cabalfin
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: This project aims to study the effective application of the techniques and technology of radwaste management under local conditions. The project also involves the development of an integrated guide on criteria, limits and techniques involved in radwaste disposal in local marine environment. The use of solar energy for the management of liquid radioactive wastes.

Source of Funding: PAEC. Project cost not available

Cooperating Agencies: None

Date Started: CY 1978

Expected Date of Completion: CY 1982

Present Status of Project: Studies are being continued particularly on the following:

- a. Studies in radioactive waste disposal into aquatic systems.
- b. Solidification of high and intermediate level radioactive wastes.
- c. Concentration of low to intermediate level liquid radioactive waste of solar energy.

Project Title: PROSPECTING STUDIES FOR COPPER, GOLD AND RELATED METALS BY NUCLEAR TECHNIQUES

Name and Address of Principal Investigator: Gabriel Santos Jr.
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: The project aimed to determine trace element contents of ore samples from Luzon and the Visayan Regions (Southern Negros and Leyte in particular) and to search mineralized areas containing gold, copper molybdenum, and vanadium nuclear techniques.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: FY 1975

Expected Date of Completion: FY 1978

Present Status of the Project: This project is temporarily deferred and will resume on opportunity basis and in cooperation with interested private companies.

Project Title: CONVERSION OF AGRICULTURAL WASTES INTO BUILDING MATERIAL

Name and Address of Principal Investigator: Leticia F. Bonoan — FY 1971-1975
Susana A. Cunanan — FY 1972
Philippine Atomic Energy Commission, Diliman, Quezon City

Description of the Project: The project aimed to improve structural properties of compressed boards (made out of agricultural waste such as bagasse, rice straw etc.) by combining with plastic monomers and its subsequent polymerization by gamma rays. Among the monomers used were methacrylate styrene, styrene-unsaturated polyester.

For bagasse boards at a dose rate of 100 krad/hr. maximum polymerization was attained at 2.75 Mrads for the pure monomer (MMA). A 90% polymerization at 100 krad/hr. was attained at a total dose of 1 Mrad using polymer (MMA:USP). Testing of the mechanical properties of the wall boards was made in cooperation with the FORPRIDECOM. Results indicated:

- a. The hardness of treated bagasse boards increased by as much as 200%.
- b. Water resistance improved by as much as 50% for MMA:USP treated bagasse receiving a 20% increase in weight due to absorbed monomer.

On the other hand, rice straw and coconut trunk board were so porous that the monomers tended to drip out during irradiation. This resulted in uneven distribution of the plastic which concentrated on only one side of the board.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: Forest Products Research and Industries Development Commission (FORPRIDECOM)

Duration or Expected Date of Completion: Five years

Date of Completion: Terminated FY 1975, 75% completed

Present Status of Project: Due to the limited availability of Co-60 irradiated facility and limited size of the material that can be irradiated plus the failure of vinyl monomers requisitioned from Japan in FY 1971 and FY 1972 to arrive due to some procurement difficulties, the irradiation experiments were not done as extensively as desired.

Other Relevant Information: One paper was written on the subject: S. A. Cunanan, L. S. Bonoan, E. A. Azucena, and F. P. Verceluz, Graft Polymerization of Vinyl Monomers with Cellulosic Fibrous Materials, Philippine Atomic Energy Commission.

Project Title: WOOD PLASTIC COMBINATION -PHASE I (LABORATORY SCALE STUDIES)

Name and Address of Principal Investigator: Susana A. Cunanan
Philippine Atomic Energy Commission,
Diliman, Quezon City

Description of the Project: The purpose of the project was to upgrade and improve the structural properties of local inferior quality wood species by irradiation-induced graft polymerization with plastic monomers.

Both untreated and 1:1 MMA-USP treated wood samples are subjected to mechanical and structural properties testing such as compression strength, hardness, liability and water resistance.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Duration: Three years

Date of Completion: FY 1975

Present Status of Project: Completed

Other Relevant Information: Papers written in connection with this project:
S. A. Cunanan, Preparation of Wood Plastic Combination Using Gamma Radiation, PAEC
S. A. Cunanan, L. S. Bonoan, E.A. Azucena and F.P. Verceluz Graft Polymerization of Vinyl Monomers with Cellulosic Fibrous Materials, PAEC
L. S. Bonoan, L. Aliño, Plastic Impregnated Fibrous Materials in the Philippines, PAEC

Project Title: WASTE TREATMENT STUDIES: STORAGE PROPERTIES OF VARIOUS MEDIA FOR WASTE TREATMENT III (BITUMERIZATION TECHNIQUES)

Name and Address of Principal Investigator: Angeles Ph. Salomon
Philippine Atomic Energy Commission,
Diliman, Quezon City

Description of the Project: This project aimed to determine the best condition for storing low to medium level radioactive waste absorbed in volcanic tuff mixed with portland cement using oxidized asphalt and to relate the storage properties of these cement blocks in terms of strength of the blocks, leaching characteristics, weathering, radiation stability, and chemical stability.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: FY 1975

Duration: Three years

Date of Competition: FY 1978

Present Status of Project: Completed

Other Relevant Information: Terminal report was completed.

Project Title: GEOLOGICAL AGE DETERMINATION OF MINERALS AND ORES BY NEUTRON ACTIVATION ANALYSIS

Name and Address of Principal Investigator: Gabriel P. Santos, Jr.
Philippine Atomic Energy Commission,
Diliman, Quezon City

Description of the Project: The project aims to set up a potassium-argon dating laboratory and to determine the geological age of minerals and ores from different mining districts in the Philippines.

Source of Funding: PAEC, Project cost not available

Cooperating Agencies: None

Date Started: FY 1970

Duration or Expected Date of Completion: 5 years

Date of Completion: FY 1975, forty percent completed

Other Relevant Information: Collected rock samples from various mining districts in Baguio, Paracale, Marinduque and Davao del Sur. The project was terminated due to lack of qualified personnel.

Project Title: GAMMA STERILIZATION OF MEDICAL SUPPLIES

Name and Address of Principal Investigator: Carmen Singson
Philippine Atomic Energy Commission,
Diliman, Quezon City

Description of the Project: This project aims to introduce the technology and practice of radiation sterilization of medical products, to widen the application of radioisotopes in the manufacturing industries and to help improve public health standards through the availability of sterilized single use and disposable medical supplies.

Samples such as surgical gauze, absorbent cotton, and blood collection sets were analyzed through physico-chemical, toxicity and microbiological tests.

Source of Funding: PAEC. Project cost not available

Cooperating Agencies: International Atomic Energy Agency

Date Started: FY 1972

Expected Date of Completion: CY 1980

Present Status of Project: Continuing