



ACADEMY NEWS

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Experts Address the Academy's First Yearly Presentation of Papers

Dr. Raymundo O. Favila, one of the recently-named Academicians read his paper titled "Geometry of a System of Linear Homogenous Partial Differential Equation".

Other papers read were Dr. Bogden Czaplinski's "On Specificity of Helminths" and "Fertility Behavior and Labor Force Participation: A Model of Lexicographic Choice" by Or. Jose Encarnacion, Jr.

(Excerpts taken from the rest of the papers read and presented are published in this issue and the forthcoming issue, March 1980. — Ed.)

Occasion was the presentation of papers of the Academy which coincided with its annual meeting held at AIT in Oilim an last summer.

Dr. del Mundo on The H-Fever Incidence (1977-79)

Giving out details on the studies on H-fever for a stretch of 13 long years, is a medical stateswoman, Dr. Fe del Mundo, one of our newly-sworn Academicians. Trends and findings conducted under the 1977-79 study were compared to those of '66 study. On age distribution for example, 5-9 years showed the highest incidence as in the '66 results. While sex incidence displayed a hairline difference, with other reports pointing insignificant factor under the sex category.

She cited the symptoms of the disease, in the order of frequency: a) fever; b) abdominal pain; c) epistaxis; d) cough and colds; e) vomiting; f) restlessness; g) headache; h) hematemesis/melena; i) other

bleedings; j) anorexia; k) convulsion; l) joint pains; m) dyspnea.

Positive tourniquet test was the most consistent physical findings, including petechiae, rashes, hepatomegaly, cold extremities, bradycardia, pleural effusion, lymphadenopathy, purpura ecchymosis, arrhythmia, abdominal distension. Important manifestations watched for were indifference or lethargy, anxiety, restlessness, cyanosis, coldness of extremities, together with pulse and blood pressure.

We are quoting hereunder her conclusion, verbatim:

In order to determine trends in the clinical manifestations of dengue hemorrhagic fever, a study was made of 102 serologically proven dengue cases among children in Metro Manila from December 1977 to April 1979.

It is evident from this and other reports that the disease has become endemic and at low levels in Metro Manila.

Of 399 dengue suspects, 102 cases (39%) were serologically positive for dengue infection.

The incidence by month gave September, October and November as the peak months with 5 to 9 years as the susceptible ages. There was no sex prediction noted.

Hyperpyrexia, abdominal pain and epistaxis were early and consistent manifestation. Hepatomegaly (35%) and pleural effusions (19%) were observed more frequently than in past reports, which were 12% and 0 in a

(Continued on next page)

Royal Society Extends Invitation to Academy Head

The officers of the Royal Society of Carlton House Terrace London has extended their invitation for a 7-day visit to the United Kingdom to the President of the NAST this summer.

This was contained in a letter of Ronald Keay, executive secretary of the Society, who was here in Manila last May. He called on Minister Melecio S. Magno and Dr. Paulo Campos, NAST president.

While here, he discussed the possibilities in which the Royal Society could cooperate with the

NAST. These may include one to three week visit of the UK scientists to the Philippines to give lectures and advise, as well as British scientists to participate in field studies here. In exchange grant study visit of Philippine scientists to the UK and four-month stay here of visiting British professors as well as exchange of publications.

In his reply to the Society, Dr. Campos intimated his plan to meet and invite here British experts on wave and tidal energy generation as well as a visit to observe the major medical facilities in London.

Starch, Protein and Eating Quality of Milled Rice

Can you still enrich grain quality with post harvest operations and processing? Yes, But, the International Rice Research Institute believes otherwise—blending that desirable properties into the rice variety. For 20 years now, the IRRI have been employing that so-called Genetic Evaluation and utilization approach.

Dr. Bienvenido O. Juliano's paper dealt on the related properties of grain constituents such as starch and protein with the eating quality of milled rice. By the way, he serves at the Institute as chemist and head of the Chemistry department. He is one of the newly-named Academicians.

An extract from his piece follow:

Although we have studied in detail the major proteins of milled rice, glutelin, prolamin and O-globulin, and are studying the major albumin and the second major globulin, our discussion will be limited to the effect of boiling on protein digestibility. The 85% digestibility of milled rice protein in man is less than the 90% reported for wheat flour protein. In the mid 1960's, Dr. George Graham concluded there was no advantage of rice over wheat in baby food and UNICEF dropped its project to use the overmilling fraction of milled rice (with 15% protein) as a baby food.

... Cooking evidently resulted in more protein-protein interaction resulting in reduced extractability of protein and increased extractability of the lipid. Fecal protein particles can be simulated by pepsin treatment of amylase-destarched milled rice.

The core portion had higher lipid content (~20%) than whole PB (7-9% lipids) and proportionately less protein. Lipids had identical ratio of lipid fractions and fatty acid composition methionine content of whole PB but protein showed drastically different composition. Core protein had lower lysine content but higher cysteine/methionine content of whole PB protein, which explains its insolubility by disulfide bond formation. These results explain why the net protein utilization of rice protein does not deteriorate on cooking as the protein rendered less digestible is of poorer quality than the whole protein. Digestibility alone is not a reliable indicator of protein quality. Rice protein is better retained in man than wheat protein because of its higher biological value. . .

We have studied lipids (1%) of milled rice as an eating quality factor. Waxy rice has more nonstarch rice. These lipids are important in the gel consistency test as defatted rice all have soft gel values. Parboiling also makes gel consistency values softer, probably because of the lower oil content of milled parboiled rice as compared to raw milled rice.

Cell wall polysaccharides have been a popular research subject recently in view of the nutritional interest on "dietary fiber." Our studies in 1968-69 showed very little hemicellulose in milled rice. Cell walls are probably important in grain integrity and direction of expansion of rice grain during cooking. We reactivated our work on cell wall polysaccharides with the 4-month stay in Nov. 1978-Feb. 1979 of Dr. B.A. Stone, Department of Biochemistry, LaTrobe University, Victoria, Australia.

Crude ash (minerals) is also important in nutrition and may also alter the cooking characteristics of starch. The identification in the CEU program of varieties such as IR42, with tolerance to a variety of problem soils, justifies the checking of the extent to which mineral content of milled rice is affected by the different soils on which IR42 can be grown without a decrease in yield.

H-FEVER INCIDENCE . . .

(Continued fr. p. 1)

1966 report. Bradycardia was commonly observed during convalescence.

Approximately 90% were leucopenia with lymphocytosis of more than 50% in 39% of the cases. Low platelet counts occurred in 8.8% of 90 cases. Hematocrit levels of 36 to 45 were noted in more than half of 67 patients.

By WHO criteria of severity, 20 or 19.6% were classified as Grade III (impending shock) and 7 or 6.9% as Grade IV (in shock). Of 102 cases, there was only one death.

Management was mainly symptomatic and intravenous fluids was the mainstay of therapy. There were not enough cases of impending or actual shock to carry out and compare different modalities of treatment.

The Biological Basis of Imagination

Knowledge normally grows by such progressive steps as clarifying and isolating a problem, identifying the variables relevant to it, and following their correlations. Only later, often much later, does the nature of the basic entities begin to become manifest and does it become to grapple with them.

R. W. Gerard

The Round Table Conference on

The Nuclear Issue

(Continued from last issue, September 1979)

1. Reactor Building

This building houses the Nuclear Steam Supply System (NSSS) and others not requiring access during operation. It is served by a circular travelling bridge crane. It prevents the release of fission products to the atmosphere. The primary containment is a standing steel containment vessel housing the high temperature pipes, highly radioactive reactor coolant system components. The secondary containment is designed to withstand atmospheric temperature and pressure variations, earthquakes and missiles. It is of reinforced concrete, 120 feet in diameter, 2 feet and 5 inches thick with ellipsoidal dome 2 feet thick and functions as radiation shield and prevents leakage of fission product materials.

A 5 feet wide circular annulus between the two containment vessels serves to contain leakage, if any, from the steel containment vessel.

2. Reactor Auxiliary Building

This structure which is about 260 square feet surrounds the reactor building on three sides. It encompasses the residual heat removal pit, the Auxiliary Building South, the Auxiliary Building North, the Component Cooling Area, and the Control Complex.

3. Fuel Handling Building

4. Emergency Diesel Generator Building

5. Turbine Building

This houses the turbine-generator, condensers, feed water heaters, condensate and feed water pumps, and turbine auxiliaries.

6. Service Building

Here are the warehouse, electrical, mechanical and instrument machine shops, and personnel facilities.

Reactor and Steam Electric System

PNPP-1 will utilize Westinghouse pressurized water nuclear reactor system. The Nuclear Steam Supply System (NSSS) consists of 2 loop, 2 pump pressurized water reactor with the following features:

- (1) NSSS Power, Mw 1882 (2) Core Power, Mwt 1876
- (3) Reactor Coolant Inlet Temperature, 5495°F
- (4) Primary Pressure, 2250 psia
- (5) Primary Coolant Flow Rate, 71.1×10^6 lb/hr
- (6) Secondary Steam Pressure, 920 psia
- (7) Reactor Vessel Inside Diameter, 132 in.

Design is similar to Krsko Plant in Yugoslavia. S & P Conversion System produces the steam that drives a regenerative cycle turbine-generator that produces the electricity. The steam is expanded in the turbines, condensed in the condenser and led to the steam generator. Rejected heat is dissipated in the condensing circulating water system.

The fuel consists of uranium dioxide (UO_2) pellets in Zircaloy tubes. The core has 121 fuel assemblies with 3 fuel enrichments. The rod cluster control assemblies are cylindrical neutron absorber rods of silver-iodine-cadmium in stainless steel tubes. The reactor vessel is made from low alloy carbon steel, clad internally with stainless steel. The turbine has a guaranteed capability of 651 Mwe. The boiler provides steam to radioactive water equipment during shut-downs and prior to start-ups. The diesel generators are for start-ups and emergencies.

Atomic Energy Training.

A Continuing Support to the PNPP-1 Project

To meet the demands of the Philippine Nuclear Power Program,

atomic energy training that was started in the early years of the Philippine Atomic Energy Commission was intensified even before work in the PNPP-1 project began. Both NPC and PAEC took advantage of the fellowships abroad under the auspices of the UNDP, IAEA, and the Colombo Plan. To this date 93 fellowship slots have been awarded to PAEC of which 10 participants earned their Ph O's. Out of these PAEC personnel, 9 are now with NPC, including 2 Ph D's and one with an MSc degree.

The Philippine Atomic Energy Commission has ever since been in active support of NPC's efforts to go nuclear. PAEC has two active support training programs for NPC. The first is a Training Program for Headquarters Personnel consisting of three courses; namely, (1) Introduction to Nuclear Power, (2) Health Physics, and (3) Health Physics and Radiation Safety. One hundred twenty six NPC Headquarters personnel have gone through these courses. The second program in Plant Engineers and Operators Training Program which includes (1) Nuclear Power Plant Operators Course, (2) On the Job Operators Training Course, and (3) Reactor Physics Course. Ninety two NPC personnel have gone through these courses.

The National Power Corporation (NPC) has a training program of its own and conducts training of its personnel in the various aspects of nuclear power administration and management.

In addition to all these local training programs in atomic energy, the University of the Philippines, under a UP-NPC-PAEC understanding, offers a graduate program leading to the degree of M.S. (Nuclear Engineering). Eight PAEC engineers have completed the academic requirements of this course. A like number of NPC

(Continued on page 6)

• The New Academicians

PEDRO B. ESCURO, Ph.D.

Dr. Pedro B. Escuro was born on August 2, 1923 in Nabua, Camarines Sur. He obtained his BSA (magna cum laude) at UP College of Agriculture, (UPCA), 1952; M.S. at Cornell University, 1954; and Ph.O. at the University of Minnesota, 1959. He was conferred with a Ph.D. *honoris causa* at the UP. He has special training in Corn and Rice breeding in 1954:

Or. Escuro is at present a Plant Breeder at the International Rice Research Institute, (IRRI) UPLB since 1978 with a salary of \$24,000 p.a. Prior to this, he was UNDP-FAO Rice Improvement Specialist in Burma, 1975-76. He was connected with UP from 1952-75. From Instructor in Agronomy he rose to become Asst. Professor, then Professor and later on promoted to Head, Agronomy Dept. He occupied a Professorial Chair in Plant Breeding in 1973-75.

He was recipient of numerous honors and fellowships among which are: Bailon-Dela Rama and University Scholarships, UPCA, 1948-52; Philcusa-FAO Fellowship Training, U.S. Gov't., 1953-54; Rockefeller Foundation Fellowship for Ph.D. degree, 1956-59; Presidential Plaque of Merit for Outstanding Accomplishments in Rice Improvement, 1967 and Rizal Pro Patria Award, 1968 both by the Philippine gov't.; UP Distinguished Professional Award in Agriculture, 1973; The Ayala Award for 1974 in Agricultural Science, Filipinas Foundation; and Outstanding Alumnus Award, UPCA, 1976.

He has attended a number of foreign and local conventions and conferences, mostly sponsored by FAD/IAEA, IRRI and UPCA. His main researches are especially on rice and corn breeding and most of the publications which he co-authored dealt on these studies.

Or. Escuro is married to the former Manuela Sales with whom he has two sons: Ruben and Edgar.

RAYMUNDO ACOSTA FAVILA, Ph.D. FRANCISCO M. FRONDA, Ph.D

Dr. Raymundo Acosta Favila was born on March 15, 1909, in Bangued, Abra. He was educated in Berkeley, California, U.S.A., where he obtained his undergraduate (AB), master and doctorate degrees at the University of California. His field of specialization is Mathematics. He has special training in Mathematics Education and in the use of topological methods in geometry.

Started out as Teaching Assistant in Mathematics, University of California, 1937-1939, he later on joined in the same year as Instructor at the UP Dept. of Mathematics where he was promoted from the rungs to become its Chairman in 1954 up to 1971. In 1967-1974, he was named Director and Dean at UP Clark Air Base. From 1976 to the present, he is Professor Emeritus of Mathematics. He is also consultant in Mathematics at Centro Escolar University and at Pamantasan ng Maynila.

Or. Favila has co-authored five books on Mathematics namely: *First Course in College Algebra*; *First Course in Algebra*; *First Year Mathematics for Secondary Schools*; *Advanced Algebra and Modern Trigonometry*.

He has twice attended international conferences in Mathematics. He was detailed at Stanford University of California, and University of London to observe modern Trends in Mathematics, especially the role of Topology in Contemporary Mathematics.

He is a member of academic honor societies and professional organizations. He is a professorial lecturer and resource speaker in universities, seminars and conferences.

Dr. Favila is married to Leonarda F. Favila. They have nine children: Caesar, Oliver, Susana, Alexander, Federico, Oigracias, Graciano, Horacio and Melchor.

Dr. Francisco M. Fronda was born on December 22, 1896 in Aliaga, Nueva Ecija. He obtained his Bachelor of Science in Agriculture, major in Animal Husbandry at the University of the Philippines. He finished his Master of Science and Doctor of Philosophy at Cornell University. He has undertaken a number of important studies on poultry industry and husbandry. As writer-researcher, he had published a total of 150 scientific and technological articles covering the period of sixty years.

Dr. Fronda has served as Agricultural Officer for FAD-UN. He was connected with the Department of Animal Husbandry since 1919 as graduate assistant up to June, 1963 as Professor Emeritus. He was Head of the Department on November 1, 1955 to June 30, 1957. He was research coordinator at UP College of Agriculture from January 1, 1956 to June 30, 1957.

Dr. Fronda has been a recipient of fellowships, academic honors and awards. Among these were the grant as Philippine Government Pensionado to the U.S., 1919-1922; UP outstanding alumnus in Agriculture, 1957; Philippine Society of Animal Science Distinguished Fellow Award, 1970; lifetime member of the World's Poultry Science Association, 1975; PANTAS AWARD by the Philippine Council for Agriculture and Resources Research (PCARR) for outstanding leadership in poultry research spanning five decades, 1977 and plaque of merit (NRCP), 1977.

He has been participant/delegate to international as well as national science congresses and conferences since 1920. He has also done survey and observation trips abroad on scientific and technological knowhow especially in poultry industries.

As a researcher, teacher, agricultural writer and member of the Technical Program Planning and Review Board (TPPRB), he has continuously dedicated his efforts toward the local poultry industry.

(Continued on next page)

**BIENVENIDO OCHOA JULIANO, Ph.D. FE VILLANUEVA DEL MUNDO,
M.D. & DSC (Hon.)**

Dr. Bienvenido Ochoa Juliano was born on August 15, 1936 at Los Baños, Laguna. He was the youngest at the age of 22, Ph.D (organic chemistry) graduate of Ohio State University where he got a straight A grades. He graduated M. Sc. (organic chemistry) also at Ohio State University. He graduated his B.S. Agriculture, *magna cum laude*, however, at the University of the Philippines.

Dr. Juliano is at present Chemist and Head, Chemistry Dept., The International Rice Research Institute since 1968 and visiting Professor, Dept. of Chemistry, Graduate Faculty, UP, Los Baños since 1962. He was visiting Professor, Dept. of Botany, University of Durham, England, 1975; Research Fellow MSU/AEC Plant Research Laboratory, Michigan State University, U.S.A., 1968; teaching (1956-57) and research (1957) Assistant, Ohio State University; Fellow, C.F. Kettering Research Foundation, (1958-59) National Science Foundation Grant, (1958), Dept. of Chemistry, OSU, 1958-59. Other positions held: Project Chemist, Philippine Refining Co., Manila, 1959-61. Head, Laboratory and Development Sections, Philippine Refining Co., Inc. 1961; and Professor, Dept. of Chemistry, Institute of Technology, Far Eastern University, 1959-61.

He was a recipient of various awards and honors. Among these are: The President of the Philippines' Jose Rizal Pro Patria Award to Outstanding Scientists, Manila, 1976; TOYM (Ten Outstanding Young Men) award for Science, 1964; First Prize, Outstanding Graduate Research Paper, Chemical Society of the Philippines, 1968; Included in Philippine Men of Science, "Vol. 2, 1966, included in World's Who's who in Science, 1700 B.C.-1968 A.D., Marquis-Who's Who, Inc., 1958;

A widower, Dr. Fronda has four living children. All of them are professionals and like their father are alumni of the University of the Philippines.

Dr. Fe Villanueva del Mundo was born on November 27, 1911 in Manila. She obtained her Doctor of Medicine degree at the University of the Philippines in 1933. She is a Master of Arts (Bacteriology), graduate of Boston University and Massachusetts Institute of Technology in 1940. She was conferred three Doctor *Honoris Causa* degrees by: Philippine Women's University, 1968; Medical Woman's College of Pennsylvania, 1970; and Smith College, Northampton, Massachusetts. She was awarded the title of Professor Emeritus of FEU in 1976.

Dr. del Mundo's present positions are: Director and Founder, The Children's Medical Center Philippines, Inc.; Director, Institute of Community and Family Health; Panel Member, Export Advisory Committee, Maternal and Child Health, WHO, Geneva; Member, Board of Commissioner, Commission on Population; Chairman, Training Committee, Population Commission; President, Maternal and Child Health Association of the Philippines; Fellow, Philippine Pediatric Society; Board Diplomate, American Academy of Pediatric (since 1957); Honorary Member, American Pediatric Society and Member for Life, National Research Council of the Philippines.

Past positions held: First Director and Founder, North General Hospital,

1974 National Science Award of Merit, Most Outstanding Published Works, 1972-73; Ayala Award for 1974 in Physical Science, 1975; UP Distinguished Alumnus Award (Pure Research), 1977. He is included in the Roster of Scientists for the Major Food Crops of the Developing World, USAIO, 1973 and in the Registry of Scientific and Technical Services for the Asia and Pacific Region, Canberra, 1974

1943-48; First Director, Manila Children's Hospital, 1950-51; President, Philippine Medical Women's Association, 1949-54; President, Philippine Pediatric Society, 1952-55; President, Medical Women's International Association, 1962-66 and President, Philippine Medical Association, 1969-70.

Dr. del Mundo had for 20 years, a weekly Health Column in the Sunday Times Magazine, (Philippines). She published for lay group; Baby and You (English and Pilipino), and Preventing Common Children's Ailments. She had published 105 scientific articles on various pediatrics topics mostly original articles, clinical trials, review on literature and case reports.

She has been a recipient of numerous awards, medals, plaques, honors and citations, yearly; from 1933 up to the present. Among of which are the following: Elizabeth Blackwell Award Medal and engraved Steuben Crystal Vase for "Outstanding Service to Mankind," given her by the Hobart and William Smith College, New York, 1966; Ramon Magsaysay Award for "Public Service by a Private Citizen," 1977; and most distinguished Alumnus of 1960, UP Medical Society.

Daughter of lawyer Bernardo del Mundo and P. Villanueva (both deceased), Dr. del Mundo is single.

His most important researches conducted are on starch and protein as grain quality factors. He has published 118 studies/ papers to be found both in local and international journals. Of 48 international and national scientific and technological meetings he attended (outside of IRRRI), he presented papers in 42 of these.

Dr. Juliano is married to Linda C. Alvarez and has three children, namely: Bienvenida Jose, Carmelinda and Benedict.

The Nuclear Issue . . . *(Continued from page 3)*

engineers have similarly finished this UP course.

A Mid-Stream Look into the PNPP-1 Project

The PNPP-1 Project had reached about 20% completion when President Ferdinand E. Marcos ordered stoppage of the work in Morong, Bataan. Ever cautious in his decisions and prompted by his undying love for the welfare, health and safety of his people, the President appointed a Nuclear Investigating Commission headed by Assemblyman Ricardo Puno to conduct public hearings and look into the safety features in the design, construction and eventual operation of the PNPP-1. He also ordered the Ministry of Justice to examine the legal aspects of the contract between NPC and Westinghouse.

This Presidential action was triggered by the Three Mile Island Incident (TMI) in Harrisburg, Pennsylvania on 28 March-2 April 1979. His deep concern was also aroused by a letter to him from former Senator Lorenzo Tanada who, in turn, received a letter dated 10 May 1979 from Mr. Augusto Almeda Lopez of Camp Hill, Penn. about 10 miles away from Harrisburg.

The Hearings

Most of the hearings conducted by the Presidential Investigation Commission took place at the Philippine International Convention Center (PICC). The Commission conducted a look-see visit of the reactor site in Morong, Bataan and also made an on-the-spot hearing at the site.

These hearings should be able to give clear, satisfactory answers to the nine questions asked by the President in his letter of instructions to the Commission. The findings of the Commission, to my mind, should be able to answer the following questions:

(1) Shall we resume the work on the PNPP-1 at Napot Point, Morong, Bataan, Now?

(2) Shall we continue the present temporary suspension of the work on the PNPP-1 until every Juan de la Cruz is convinced and satisfied that the

facility poses no danger to the health and safety of the Philippine public?

(3) Shall we stop the PNPP-1 project for good and prefer never to have any nuclear power plant at all?

(4) Shall we cancel the present contract with Westinghouse and start anew to establish a nuclear power plant with design safety features to our satisfaction and built on a site which was selected with previous agreement of the Philippine public?

The following questions have been taken up in the hearing:

QUESTION #1

What specific safeguards, if any, have been taken against repetition in the Bataan Nuclear Power Plant of the Three Mile Island incident which occurred in Pennsylvania, USA on March 28, 1979?

NPC POSITION

Raymond Sero of Westinghouse testified before the Commission that the basic design differences between the TMI Nuclear Power Plant Unit 2 (TMI-2) and the PNPP-1 make very unlikely a repetition in PNPP-1 of the March 28, 1979 TMI incident. He said that the specific additional short term safeguards required by the USNRC in the light of the TMI incident are already incorporated in the PNPP-1.

The NPC shall be responsible that such additional safeguards are actually incorporated as mentioned in the Sero testimony. Whatever additional safeguards that the PAEC may require shall be adopted in the Project.

OTHER VIEWS

The Bataan Nuclear Power Plant is inherently unsafe in design and location and has not benefitted from stringent regularity tests. The reactors being built in Egypt, Korea and the Philippines all sold by Westinghouse are referenced to a similar two-loop plant under construction in Yugoslavia which is being referenced to the one being built in Brazil, which is referenced to the one in Puerto Rico. But this one in Puerto Rico was

stopped by the United States Government in 1972.

The TMI incident was caused by failure of valves to open and let the coolant water to extract the heat generated by the fissioning fuel in the reactor vessel. There was also human error not to have detected this malfunctioning of the equipment. The rising temperature in the reactor vessel and the hydrogen bubble that was detected in the system were real causes of a potential explosion.

Dr. David Ferg of Westinghouse said that there are three safety machines incorporated in the PNPP-1 functioning independently of one another so that failure of any one to function leaves two more to operate. Some 200 nuclear plants are in operation in the world for the last 20 years and there had been no accidents. The safety features found necessary to prevent repetition of the TMI incident are incorporated in the PNPP-1.

The hydrogen bubble in the containment tank of the TMI plant could cause an explosion, then radioactive water could leak out from the plant. (There was, of course, no explosion and no leak to the surrounding area during the TMI incident.)

About 200 teachers, nuns and priests marched to the reactor site from the towns of Mariveles, Morong and Bagac and aired their fear that their lives and livelihood are treated by the PNPP-1 in Napot Point.

A.S. Friedman, former Director of the Division of International Programs of the defunct USAEC said, "U.S. Manufacturers have extremely poor records of information disclosure to foreign purchasers. Designs at times do not reflect all the regulatory items required by the U.S. At times design innovations are first tried by US manufacturers in overseas reactors."

QUESTION # 2

Who are the people who will operate the Bataan Nuclear Power Plant and what are their qualifications?

NPC POSITION

The PNPP-1 will be operated by Filipino engineers and technicians who have been scientifically selected to meet and even surpass the requirements of the USA or the American Nuclear Standards Institute. They will be trained intensively here and in PWR-typed nuclear plants abroad. They will be duly licensed to operate nuclear power plants by the PAEC. They will have full understanding of the complexities of the plant design and will be capable of properly operating safely and efficiently the plant, manipulating controls, and maintaining and repairing the plant equipment throughout its operational lifetime.

Manning and Initial Qualifications

The basic organization of the PNPP-1 for plant operation consists of professional-technical personnel, control room engineers and technicians. The professional-technical personnel will be responsible for reactor engineering and physics, instrumentation and control, radiation protection and chemistry. Control room engineers are responsible for manipulating plant control, monitoring and instrumentation, repair and maintenance and calibration. A group of Filipino nuclear engineers and staff specialists will provide technical support to the operating personnel by reviewing the operations of the power plant and providing consultancy or technical services related to plant safety and other engineering aspects. Another group with equal responsibility in the safe and reliable maintenance of the plant consists of professional technical personnel exemplified in such positions by electrical, mechanical, piping and welding engineers. A distinct group of senior nuclear engineers will perform quality control at all times.

PNPP-1 observes stringent qualifications requirements for all levels of plant personnel, namely, (a) a combination of education, experience, psychological and emotional stability, health and skills that will provide reasonable assurance that decisions and actions during all normal and abnormal conditions result in the plant

being operated in a safe and efficient manner, and (b) nuclear power plant experience acquired in the design, construction, start-up and operation of nuclear plants or on the job training that simulates the experience.

Selection of PNPP Personnel

To ensure the appointment of qualified plant personnel, the NPC developed open competitive recruitment and highly scientific testing systems. These started with newspaper advertisements for 41 initial vacant positions. A total of 1240 applicants took the initial tests of which 812 passed. The selection process continued for 12 months, consisting of second stage screening by a committee of NPC engineers and an independent psychologist consultant which trimmed down the group to 173. Further aptitude, intelligence and in-dept psychological testing was made using at least seven different cross-validating tests for personality dimensions considered critical to successful and safe nuclear power plant operations, namely, emotional stability, seriousness, responsibility, work interest, flexibility, human relations, anxiety and fears, attention, personal competence and self esteem and response to stress. After a final interview with the participation of a psychologist consultant nuclear engineer psychologist from EBASCO OVERSEAS CORPORATION, the top 41 were selected to start intensive training.

The Training System

Training for PNPP-1 is a four year program involving the PAEC, the Meralco Thermal Plants, the National Computer Center (NCC), and the University of the Philippines (UP). Training abroad is given by Westinghouse-USA, EBASCO, the IAEA and the Colombo Plan. The program consists of training of 140 managerial and technical personnel for a period of Jan 1977-Dec 1982, involving about 500 man-years of training. Of this 111 man-years are with Westinghouse.

The training covers various aspects of plant operations including design engineering and review activities, fuel management, quality assurance, balance of plant maintenance, health physics, plant chemistry, supplemented with management training. Retraining and refresher course during plant operation will be provided on a regular basis to constantly prepare these personnel to respond capably to possible plant abnormalities.

To date, a total of 39 PNPP-1 operating personnel are under training, here and abroad. One hundred six additional personnel will be hired by July 1979 to complete the professional technical manning requirements of the plant. This number allows for a 20 to 40% attrition. Despite normal resignations transfers and other personnel turnover, the plant can be assured of the right number of well-trained, competent personnel at all times.

QUESTION #3

In case there is an accident similar to the TMI incident in the Bataan Nuclear Power Plant, what resources, both scientific and industrial, are available to prevent contamination of the surrounding areas and atmosphere as well as the people residing thereat? Who will finance and provide facilities to prevent contamination and how much would it cost? Who will pay for the damages and costs?

NPC POSITION

Even before the occurrence of the TMI incident, the NPC with its consultant, EBASCO, has been developing an action plan to cope with emergency situations, that of the TMI incident included.

PAEC as the regulatory body requires that such emergency action plan should be submitted and incorporated in the NPC Final Safety Analysis Report (FSAR). PAEC requires that the FSAR should be submitted by September 1980 and shall conform to PAEC guidelines before PAEC issues Operation License.

In the unlikely incidence of a nuclear

(Continued on next page)

accident, the damages and costs will be paid by NPC and, for this purpose, nuclear liability and property insurance policies shall be secured. A Philippine nuclear insurance pool is proposed to be organized, with the GSIS as lead insurer. These insurance policies will be in effect prior to the scheduled arrival of the fuel assemblies in the Philippines on February 1982.

SEN. TANADA

Quoting from a book, "Nuclear Power, the Faustian Bargain": The Price Anderson Act of 1957 fixes the maximum liability in a nuclear accident at \$560 million although studies showed that a major accident could cause property damages "several times as large". "The US Government decided to encourage electric utilities to venture into nuclear power, the companies at first were enthusiastic; but after studying the consequences of a major nuclear accident, they and such equipment manufacturers as

General Electric and Westinghouse backed out. The utilities and equipment manufacturers asked the US Congress that before they could build nuclear plants they should first be immunized from full liability. This prompted the passage of the Price Anderson Act of 1957. It was insinuated in the book that the passage of this Act was "artfully concealed from public view" to prevent public debate as to whether "nuclear power was needed and whether its risks are acceptable". Under the Act, the liability of \$560 million is shared with the US Government putting \$435 million and private industry shouldering \$135 million.

A. A. SIMONS of WESTINGHOUSE

The insurance put up by NPC would answer for any damage caused by the operation of the plant.

SEN. TANADA interpellating SIMONS made the Westinghouse Executive commit that Westinghouse

would introduce additional safeguards to the plant if required even if the cost would run up to \$50 million which would be charged to the Westinghouse account.

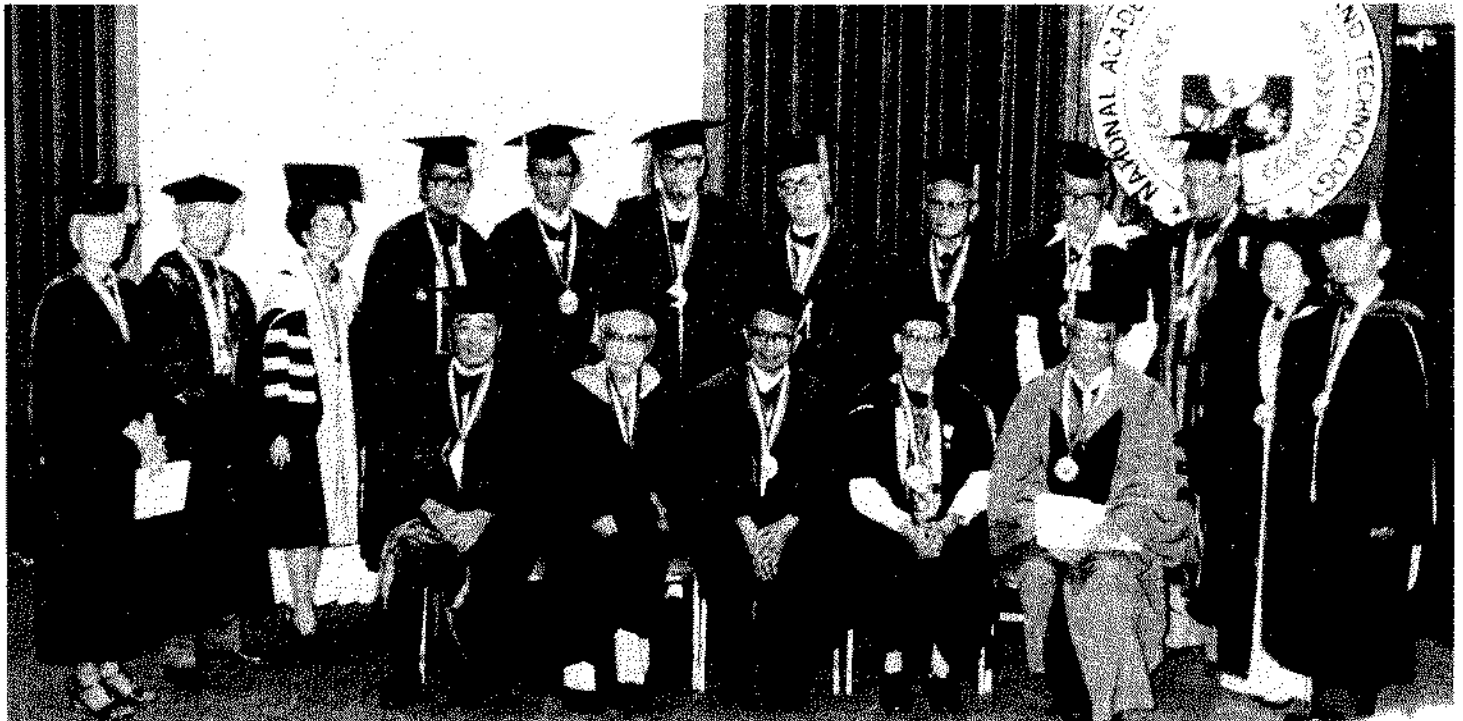
DR. DAVID FERG of WESTINGHOUSE

"Nuclear Power, the Faustian Bargain" is not an official document and its arguments were merely opinions of the authors.

QUESTION # 4

Are we exchanging with or obtaining information on nuclear safeguards from other countries, like the USA through its Nuclear Regulatory Commission or the IAEA which originally recommended the establishment of the Bataan Nuclear Power Plant in 1961? What are the maximum and minimum acceptable safeguards to prevent nuclear contamination?

(to be continued)



The National Scientists and the Academicians pose for this picture, right after the investiture of new members to the Academy, last May at AIT auditorium.

From left to right, seated are: Paulo C. Campos, M.D.; Juen S. Salcedo, Jr., M.D., National

Scientist; Melecio S. Magno, Ph. D.; Alfredo C. Santos, Dr. phil., National Scientist and Tito A. Mijares, Ph.D.

Standing, same order: Carman C. Velasquez, Ph.D; Cecilio F. Lopez, Dr. phil.; Fa Villanueva del Mundo, M.D., Josa Encarnacion,

Jr., Ph.D.; Bienvenido D. Juliano, Ph.D.; Eduardo Quisumbing, M.D.; Geminiano de Dcampo, M.D.; Reymundo A. Fevila, Ph.D.; Jose N. Rodriguez, M.D.; Francisco Fronda, Ph.D.; Encarnacion Alzona, Ph.D. and Gregorio T. Velasquez, Ph.D.

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