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TO : John A. Hall, Acting Assistant General Manager for International Activities DATE: Sept. 2, 1958

FROM : Frank K. Pittman, Acting Director Division of Reactor Development R.C. Livingston, for

SUBJECT : FIFTH INTERNATIONAL CONFERENCE ON ELECTRONICS AND NUCLEONICS

SYMBOL : RD:DIR:RCL

Attached is the final version of Ken Davis' report as Chairman of the U.S. delegation to the Fifth International Conference on Electronics and Nucleonics held in Rome, Italy, June 16-27, 1958. We assume you will forward the necessary twelve copies to the Department of State, Office of Industrial Conferences, and arrange for any desirable distribution within the AEC.

Enclosure:
Report as stated above
(15 copies)

cc: W. Kenneth Davis, Bechtel Corp. (3 copies)
Edward Diamond, Office of the General Counsel
Dr. Clifford K. Beck, Division of Licensing and Regulation
Dr. Harry D. Bruner, Division of Biology and Medicine
Dr. Paul C. Aebersold, Office of Industrial Development
Dr. James F. Schumar, Argonne National Laboratory
Dr. Joseph M. Harrer, Argonne National Laboratory
Dr. Sidney Siegel, AI, North American Aviation
Dr. Harris D. LeVine, New York Operations Office
Dr. Ernest C. Anderson, Los Alamos Scientific Laboratory
Paul F. Foster, General Manager
A. Tammaro, Assistant General Manager
Edward R. Gardner, Director, Special Projects
N. F. Sievering, Assistant to the Director, DRD
John C. Vinceguerra, Assistant Manager, SROO
William C. Harrop, U.S. Embassy, Rome, Italy
Adm. Lewis L. Strauss, Executive Offices, White House

OFFICIAL REPORT

of the

UNITED STATES DELEGATION

to the

FIFTH INTERNATIONAL CONGRESS ON ELECTRONICS AND NUCLEONICS

Rome, Italy

June 16-27, 1958

Submitted to the SECRETARY OF STATE
Orig[illegible]ned by
Nelson [illegible]ing
Assistant to the Director
W. KENNETH DAVIS
Chairman of the Delegation

August 25, 1958

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BACKGROUND

The conference was the Fifth International Conference on Electronics and Nucleonics (Fifth Rassegna Internazionale Elettronica e Nucleare). It was held at the Palazzo dei Congressi-E.U.R. on the outskirts of Rome, Italy during the period between June 16-27, 1958. It was the third conference in which atomic energy has been included and is actually only the fourth conference which has been held since one year was skipped.

The conference consisted of one week of technical sessions on atomic energy, June 16-20, 1958 and one week of technical sessions on electronics, June 23-27, 1958. The nuclear energy sessions were sponsored by the Comitato Nazionale Ricerche Nucleari (CNRN). A large exhibit was conducted as an adjunct of the technical sessions and consisted of both governmental and commercial exhibits on electronics and nuclear energy.

The technical sessions were open to members of the various technical delegations. Simultaneous translation was available for Italian, English, French, and Russian. The exhibits were open to the public upon payment of a small fee.

AGENDA

NUCLEAR ENERGY SESSION - June 16-20, 1958

I. June 16 - 4:30 P.M.

Nuclear Industry in the World

1.	W. Kenneth Davis, USAEC	Development of Nuclear Power in the U.S.
2.	J. M. Harrer, Argonne National Laboratory, USA	A Review of Boiling Water Reactor Performance
3.	Sergio Callone Agip-Nucleare	Applied Research in the Nuclear Field
4.	Vincenzo Gervasio Agip-Nucleare	A Simulator of Reactor Kinetics
5.	M. Chiappini, Ansaldo G. Previti and A. Ridolfo FIAT	Preliminary Project of the Nuclear Propulsion Apparatus for a 70,000 Ton Turbo-Tanker

II. June 17 - 9:30 A.M.

Sites for Nuclear Plants

6.	C. K. Beck USAEC	Considerations in the Choice of Sites for Reactors
7.	Marcello Quojani SIMEA	Location of Electronuclear Plants with Reference to the Situation of Regional Electric Consumption
8.	Marcello Pagliari SENN	Special and General Aspects of Electronuclear Plant Safety

III. June 17 - 4:30 P.M.

Fuel and Its Exposure Time

9.	J. F. Schumar, Argonne National Laboratory, USA	Manufacture and Exposure History of Boiling Water Reactor Fuels
10.	M. Englander CEA	Lifetime of Some Fuels Based on Uranium Metal
11.	S. Siegel Atomics International	Fuel Recycling in Power Reactors

Application of Radioisotopes in Industry

12.	P. C. Aebersold USAEC	Growing Industrial Uses of Radioisotopes

IV. June 18 - 9:30 A.M.

Determination of Age by Nuclear Methods

13.	E. C. Anderson LASL	Low-Level Counting: from Archeological Artifacts to Nuclear Reactors
14.	G. G. Houtermans University of Bern	Radiation Damage in Geological and Archeological Research

V. June 18 - 4:30 P.M.

15.	S. Deutsch Belgium	Application of the Pleochroic Halos in Determination of Age of Rocks
16.	J. Geiss University of Bern	Present State of Age Determinations on Uranium, Thorium, and Lead-Bearing Minerals

VI. June 19 - 9:30 A.M.

Application of Radioisotopes in Agriculture, Medicine, and Biology

17.	F. D'Amato, University of Cagliari; S. Avanzi, Dept. of Agriculture and Forests; G. T. Scarascia, CNRN	First Italian Results on the Effect of Ionizing Radiations in Plants
18.	A. Gustaffson Stockholm	Plant Breeding and Mutations
19.	G. E. Vladimirov USSR	Use of Radioactive Isotopes in the Specification of the Plastic Exchange of Brain
20.	O. F. Joklik Liechtenstein	Fully Automatic Mechanized Irradiation Installations With Multikilocurie Cobalt 60 Irradiation Sources for Scientific Research
21.	R. Paoletti University of Milan	Carbon-14 in the Study of Steroid Structure Molecules
22.	Albarelli and Vidal, Parigi	Conservation of Agricultural Products and Foods Thru Irradiation

VII. June 19 - 4:30 P.M.

23.	E. Baldacci University of Milan	Radioactive Isotopes as Tracers in Vegetal Pathology
24.	H. D. Bruner USAEC	The Challenge of Nuclear Energy to the Life Sciences
25.	F. Mainx University of Vienna	Ray-Produced and Natural Chromosomes Bridges
26.	R. Sconsirroli University of Pavia	Polygenic Mutations Thru the Use of X-Rays
27.	G. Magni University of Pavia	Inactivation Thru X-Rays of Asci With a Different Number of Spores in "Saccharomyces Cerevisiae"
28.	L. Aloi	Applications of Nuclear Energy to Agriculture
29.	E. Zarmorani Agip-Nucleare	Removal of Radioactive Strontium from Waters

VIII. June 20 - 9:30 A.M.

Liability and Insurance Problems for Nuclear Plants

30.	B. DeMori Rome	Technical and Statistical Aspects of Problems Connected With Atomic Insurance
31.	A. G. M. Batten UKAEA	Problems Arising Out of the Evaluation of Hazards for the Insurance of Nuclear Reactors

IX. June 20 - 4:30 P.M.

32.	G. Belli Rome	Third Party Civil Liability by the User of Atomic Installations
33.	H. Maury France	Atomic Insurance and Legislation
34.	E. Diamond USAEC	Third-Party Liability Associated With Nuclear Installations

ELECTRONICS SESSION - June 23-28, 1958

Subjects for the Scientific Congress

1. Manufacturing methods for transistors, particularly in connection with the extension of the frequency bonds
2. Application of transistors in industry and telecommunications
3. Color television
4. Technique of electronic switching in power stations
5. New techniques in electronics
   a) Electronic instruments
   b) Automation in calculation and progress in mathematical analysis
   c) Technology and Components

Special Conferences

June 21 - 10:00 A.M. - Main Hall

Meeting for the Study of Problems
Connected With Electronic Material Export

1.	Prof. Guido Carli, Chairman	Credits to Exporters
2.	V. Sanguinetti Rome	Productive and Commercial Organization of the American Electronics Industry

June 21 - 10:00 A.M. - Hall #36

Seminar on International Scientific
and Technical Cooperation

1.	C. Crescini Rome	Maritime Radars With True Movement

Scientific Congress

I. June 23 - 9:30 A.M. - Opening Sessions

1.	B. Focaccia Rassegna	Welcoming Address
2.	A. Marino Rome	Introduction to the Works on the Modern Evolution of Electronics

3.	D. Sette	Official speaker on subject number 1 of the Congress
4.	A. Puglisi Pavia	New Basic Structures in the Construction of Very High Frequency Transistors
5.	R. Manfrino Rome	Official speaker on subject number 2 of the Congress
6.	G. Zoldan University of Trieste	Unilateralization Systems for Amplifiers and Transistors

II. June 23 - 4:30 P.M.

7.	V. Cimagalli Rome	Distortion of Non-Linearity of Transistors in Amplifiers for Telecommunications
8.	A. Carlevaro CEA, Milan	Transistor Power Inverters

III. June 23 - 5:30 P.M.

Enrico Fermi Commemoration

IV. June 23 - 6:30 P.M.

9.	P. Schiaffino FATME, Rome	Tracing Equipment for Quick Control of Parameters in a Transistor
10.	N. O. Johannesson Stockholm	Some Problems in the Design of Transistorized Carrier Systems
11.	P. Baldin Rome	Problems of Heat Stability in Transistor Amplifiers
12.	M. Saba Rome	Germanium Power Transistors in Static Tension Convertors Under Continuous Current

V. June 24 - 9:30 A.M.

13.	B. Fabbri Milan	Application of Transistors in Measuring Equipment
14.	A. Pasini Milan	Application of Transistors in Telephone Transmission Equipment in the 100 c/s - 1 Mc/s range
15.	L. DeLuca Milan	Transistorized Equipment for Telephone Signals

16. E. DeCastro and R. Rossi, University of Bologna — Use of Transistor Choppers in CC-AA Conversion for Low Powers

17. V. Andreasciani and A. Lepschy, Rome — Application of Transistors to Servomechanisms

VI. June 24 - 4:30 P.M.

18. V. Floriani, Milan — Problems Connected With the Transistorization of Equipment for Vector Frequency Telephones

19. M. Biagioni, Milan — Extension of Vector Frequency Telephone Installations to Short-Distance Connections

20. G. Genzatti, Milan — Transistor Application in a Carrier Microwave System With Small Telephonic Capacity

21. E. Lyghounis, Milan — New Armonic Telegraphic Transistorized Equipment

22. S. Rotella, Rome — Completely Transistorized Harmonic Telegraph Equipment

23. F. Vallese, Rome — Evolution of Underwater Cables With Submerged Repeaters

24. R. L. Patriz, U.S. N.O.L. — Recent Development in Transistor and Semi-Conductor Noise Studies

VII. June 24 - 6:30 P.M.

Round-Table Discussion

Subject: Sun Batteries and Their Possibilities

VIII. June 25 - 9:30 A.M.

25. A. Banfi — Official speaker on subject number 3 of the Congress

26. M. Vitolo and M. D'Atri, Rome — Qualities of Black-and-White and of Color TV

Fourth Subject

27. G. Svala, Stockholm — Transmission Problems in Time Division Switching Systems and A Push-Button Dialing System

28. A. Olsson
Stockholm
Ferrite Memory With Non-Destructive Readout

29. C. Pisani and A. Tramontozzi
Milan
Present Tendencies of Electronic Switching

30. M.L.B. Caracciolo
Rome
Development of Electronic Switching

31. S. Giustini
Rome
Special Gas Tubes for Telephonic Circuit Changes

IX. June 25 - 4:30 P.M.

32. G. B. Peroni
Rome
Official speaker on subject number 5 of the Congress

33. R. Manfrino
Rome
Italian Language Entropy Compared with that of English and German

34. E. Greco
SIMEA
Characteristics of the Human Element in the Control of Electronuclear Plants

35. C. Ficai and V. Bertazzoni
University of Bologna
Automation and Electronic Measurements on Large Production Presses

36. B. Alessandroni
Rome
Electronic Method for the Direct Measurement of a Geodetic Distance With Multiple Repetition of Radio-Electronic Impulses

37. M. Frank
An Electronic Impulses Recorder and its Application in the Field of Radiochromatography

and

A Transistorized Densitometer with a Barrier Laying Photocell

and

A Balanced Circuit for Nephemetric Measures and its Applications in Automatic Controls

38. A Professor of the
Innsbruck University
Electronic Microscopes

X. June 26 - 9:30 A.M.

39.	H. D. LeVine USAEC Speaker for Part A	The Application of Solid State and Other New Components in Circuits for Nuclear Instruments and Recently Developed Components for Application to Nuclear Electronics Equipment
40.	J. Becquemont France	Geiger-Muller Counters
41.	V. Nitti C.A.M.E.N.	Applications of Diodes for Logrithmic Measures in Nuclear Reactors
42.	N. Raoult and M. Rebull France	Normalized Functional Elements in Nuclear Electronics
43.	M. Picone Rome	Speaker for Part B
44.	A. Ferrari-Toniolo	Office Work Organization and Modern Electronic Machines
45.	-------	Remington Computers

XI. June 26 - 4:30 P.M.

46.	F. Pinolini FIAT	Analogical Computers and Their Use in the Motorcar Industry
47.	D. Nanni and A. Ruberti Rome	Analogical-Numerical Computers
48.	P. B. Timofeev USSR Speaker for Part C	Transmitting Tubes in TV
49.	M. Baiada Milan	Method to Establish Dislocations in a Germanium Monocrystal
50.	G. Della Pergola Milan	Effects of Technical Treatments on Monocrystals Undergoing a Diffusion Process

51.	E. Sommer Milan	Construction and Technology of High Precision Carbon Resistors
52.	J. Raux France	Interesting Characteristics of French Photoreproducers

XII. June 27 - 9:30 A.M.

Specialized Technical Meetings

1.	E. Medi Euratom	Official Speaker for the First Meeting
2.	F. Valentin France	Realization of a Lyot Monochromatic Heliograph
3.	L. Broglio Rome	Official speaker for the Second Meeting
4.	W. J. Zable USA	Satellite Vehicle Tracking
5.	W. J. Thompson USA	Precision Electronic Missile Tracking
6.	G. Righini	Official speaker for the Third Meeting

XIII. June 28 - 9:30 A.M.

Technical Meeting on Cinematography

1.	A. Fattori Rome Speaker	Cinema as a Means of Progress for Science and Technology
2.	R. Persichetti Rome	Transistorization of Sound-Track Recording Equipment
3.	P. Pallottino Rome	Television at the Service of Technique and Public Teaching
4.	L. Innamorati Rome	Still Valid Scientific Cinematographic Equipment

PARTICIPATION

The following table has been compiled from the official list of participants in the Rome Congress:

Country	No. of Representatives
Australia	4
Austria	4
Belgium	6
Brazil	1
Czechoslovakia	3
Finland	2
France	31
Germany	11
Great Britain	12
Greece	1
Indonesia	1
Iraq	2
Israel	6
Italy	658
Liberia	1
Pakistan	2
Rumania	2
Spain	4
United States	23
Mexico	2
Sweden	4
Switzerland	3
South Africa	1
Tunisia	1
USSR	17
Hungary	4

It was not possible to ascertain from the official attendance list which countries were represented by observers and whether or not these observers were present as official representatives of their governments or present in their capacity as individual experts.

Personnel from several international organizations were present, but again it was not possible to determine from the official attendance list whether they were present as representatives of the international organization, their country or themselves.

UNITED STATES DELEGATION

The United States was represented by the following delegation:

Mr. W. Kenneth Davis, Director of Reactor Development, U. S. Atomic Energy Commission, Washington, D. C., Chairman

Mr. Edward Diamond, Associate General Counsel, U. S. Atomic Energy Commission,Washington, D. C., Deputy Chairman

Dr. Clifford K. Beck, Chief, Hazards Evaluation Branch, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington, D. C.

Dr. Harry D. Bruner, Chief, Medical Research Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission, Washington, D. C.

Dr. Paul C. Aebersold, Assistant Director for Isotope Development, Office of Industrial Development, U. S. Atomic Energy Commission, Washington, D. C.

Dr. James F. Schumar, Associate Director, Metallurgy Division, Argonne National Laboratory, Lemont, Illinois

Dr. Joseph M. Harrer, Associate Director, Reactor Engineering Division, Argonne National Laboratory, Lemont, Illinois

Dr. Sidney Siegel, Technical Director, Atomics International Division, North American Aviation, Inc., Canoga Park, California

Dr. Harris D. LeVine, Chief, Instruments Branch, Health and Safety Laboratory, New York Operations Office, U. S. Atomic Energy Commission, New York, N. Y.

Dr. Ernest C. Anderson, Health Division, Los Alamos Scientific Laboratory, Los Alamos, New Mexico

In addition to the above official delegation the following also participated as working members of the U. S. Delegation:

Mr. John V. Vinceguerra, Assistant Manager, Savannah River Operations Office, U. S. Atomic Energy Commission, Aiken, South Carolina, Manager of the U. S. Exhibit in Rome, Italy

Mr. William C. Harrop, Second Secretary, Economics, U. S. Embassy, Rome, Italy

ORGANIZATION OF THE CONGRESS

General Chairman of the Congress

Sen. Prof. BASILIO FOCACCIA

Nuclear Session

Chairman:	- Prof. Francesco GIORDANI
Secretary:	- Dr. Roberto LEVI
Chairman of the Scientific Committee:	- Prof. Eduardo AMALDI
Chairman of the Applications Committee:	- Prof. Arnaldo Maria ANGELINI

Electronics Session

Chairman:	- Prof. Algeri MARINO
Vice Chairman:	- Prof. Giuseppe FRANCINI
Secretary:	- Dr. Ing. Filippo SALZA
Chairman of the Scientific Committee:	- Prof. Enrico MEDI
Chairman of the Technical Committee:	- Prof. Ing. Albino ANTINORI

Cinematography Session

Honorary Chairman:	- IL SOTTOSEGRETARIO ALLA PRESIDENZA DEL CONSIGLIO DEI MINISTRI
Chairman:	-Avv. Nicola DE PIRRO
Vice Chairman:	- Avv. Eitel MONACO - Gr.Uff. Italo GEMINI
Secretary:	- Avv. Achille VALIGNANI
Chairman of the Technical Committee:	- Dr. Amleto FATTORI
Chairman of the Regular Committee:	- Dr. Annibale SCICLUNA
Secretary:	- Dr. Goffredo LOMBARDO
Chairman of the Sub-Committee:	- Dr. Giuseppe TAVAZZA
Vice Chairman:	- Prof. Luigi VOLPICELLI

PARTICIPATION BY U.S. DELEGATES IN THE CONGRESS

The Scientific Congress consisted of two weeks of papers. The first week was devoted to Nucleonics and opened on Monday afternoon, June 16, 1958. Nuclear energy papers were presented in morning and afternoon sessions throughout the week with the final session on Friday morning, June 20, 1958. The papers of all the U. S. delegation except those of Dr. LeVine were presented during this period. Dr. LeVine's papers were delivered during the second week, June 23-27, 1958, during the Electronics sessions.

The delegation had an opportunity to meet with Ambassador Zellerbach on Monday morning June 16, 1958.

The Congress and Exhibition were formally opened by President Gronchi on Tuesday, June 17, 1958, with a formal address by the Chairman of the Congress, Senator Professor Ing. Basilio Focaccia.

About half the delegation went on a tour to the Frascati Laboratory of the C.N.R.N. on Wednesday morning, June 18, 1958.

Thursday, June 19, 1958, was designated "American Day" at the Exhibition and a special tour and reception for prominent guests was sponsored by the U. S. Embassy and Ambassador Zellerbach.

Messrs. Harrer, Schumar, Beck and Davis made a trip to visit the sites of the SIMEA/AGIP Nucleare and SENN power reactors on Friday, June 20, 1958. These sites are located about 40 and 100 miles south of Rome on the ocean respectively.

On Saturday morning, June 21, 1958, a seminar was held by members of the delegation with about 15 scientists and engineers representing the C.N.R.N., the National Productivity Committee, and including former Italian students at the Argonne and Oak Ridge reactor courses. The seminar was conducted with one session on Nuclear Power Reactors in parallel with a discussion on Medical Research and the Use of Isotopes. Prof. Adriano Buzzati-Traverso of Pavia University and the University of California, Berkeley, was Chairman of the seminar.

Monday, June 23, 1958, was designated "Enrico Fermi Day" at the Exhibition and Congress. Dr. Harrer gave a talk on the contributions of Dr. Fermi to atomic energy in the United States (see Appendix B) and AEC Commissioner J. F. Floberg who was in Rome for the day to see the exhibit also made a brief speech (in Italian).

Opportunities for informal discussions with leaders of the nuclear power activities in Italy were provided by a series of cocktail parties sponsored by Ambassador Zellerbach, Mr. Harrop, Prof. Ing. Matteini of SENN, and Prof. Ing. Ippolito for EURCHEMIC. In addition, many members of the delegation had opportunities to visit with scientists and leaders in atomic energy at private discussions.

COMMENTS ON SPECIFIC CONFERENCES

Fuel and Its Exposure Time - J. F. Schumar

Unfortunately, during the time of the Congress there was little discussion held with regard to metallurgy, ceramics and fuel elements. There was one French paper on the irradiation damage on low alloys of uranium. We were familiar with this work, however, as the result of the fuel element meeting in Paris last November. Mr. Erlander of the Saclay Laboratories presented the results of their natural uranium low-alloy fuel development. He reported that the beta heat treated fine-grained uranium has good dimensional stability up to 600 megawatt days per ton. The alloy studies were selected on the basis of reactivity loss and he reported on 0.04 wt.% aluminum in uranium, natural uranium and 1 wt.% molybdenum in uranium. Mr. Erlander reported that molybdenum alloys in the range of 0.5 to 1 wt.% had good dimensional stability under irradiation up to 500 megawatt days per ton. He also referred to some of the work in the United States.

Professor Galone of Agip Nucleare stated that his laboratory was doing some wear tests on graphite with ferrous metals in a $CO-CO_2$ atmosphere at high temperatures. This work is in connection with their interest in a Calder-Hall type reactor that they plan to procure from the British. He also stated that they have a gas loop (wind tunnel) in which they will investigate the oxidation resistance, etc., of the graphite and graphite-bearing fuels in CO and $CO-CO_2$ atmospheres.

Dating by Nuclear Methods - E. C. Anderson

With the exception of the U. S. paper, "Low-Level Counting: From Archaeological Artifacts to Nuclear Reactors," the formal papers came entirely from Professor G. G. Houtermans and his colleagues at the University of Bern. Dr. J. Geiss reviewed the present status of the U-Pb and Th-Pb methods. The comparatively new Pb-Pb techniques offer a considerable simplification of the chemical problems, since only Pb specific activities (e.g., RaD and ThB) need be determined. Multiple determinations on a single sample are possible and agreement is excellent (e.g., + - 50 million years in 1,000 million).

Professor Houtermans discussed his current work with thermoluminescent materials. The studies are still preliminary but offer some promise of providing a method of dating in the present gap between a few thousand and a few million years. The fact that the method is apparently applicable to such universal materials as pottery or brick is of great importance. The basis of the method is that the thermoluminescence induced in the material by radiation from natural radioactivities increases with time. Flash heating of the sample and oscilloscope display of photomultiplier tube output are used to measure the nature and intensity of the luminescence. Besides measuring the thermoluminescence itself, one must determine the radiation dose rate in the sample. So far, Houtermans has shown only that a contemporary flower-pot and a Roman brick show little thermoluminescence, while a Neolithic ceramic gave a considerable effect. He has also applied

the technique to meteorites, in which case the excitation is due primarily to cosmic radiation. Evidence on the thermal history of the meteorite can be obtained because of thermal destruction of the luminescence. Professor Houtermans suggests possible use of thermoluminescence as a dosimeter (estimated sensitivity 0.1 r), e.g., to diagnose internal radiation dose during fluoroscopy.

Finally, S. Deutch (now at Brussels) reviewed the pleochromic halo method of dating rocks.

Biological and Medical Problems - E. C. Anderson

Scientifically, the most rewarding of the sessions. The Italian group interested in biological and medical problems was very small, however. There appears to be essentially no work in Italy on fission product determination in people and foods, except for a small health group with Agip-Nucleare.

Application of Radioisotopes in Agriculture, Medicine and Biology - H. D. Bruner

The sessions on June 19 were devoted to biological papers, five being related to plant breeding, and one each to fruit fly breeding, a description of an irradiation chamber, the process of food preservation by radiation, the metabolism of the brain using P^{32} and the U. S. Paper.

The outstanding paper was by Gustavson of Stockholm on "Plant Breeding and Mutations". He seems to be very well liked and influential with the Italian geneticists. The other five papers on plant, yeast and fly genetics and breeding were of high caliber; most had originated from experiments started or carried out during visits to the USA, Scandinavia, or Western Europe. I would judge that there was more discussion than the number of experiments and the data warranted but nevertheless there is a reservoir of mutual goodwill among these men which ought to be maintained.

Vladimirov, the Russian biochemist, spoke on the use of P^{32} in studying the oxidative mechanisms of the brain tissue (grey layer). He started from the point that more oxygen is used by the brain than can be accounted for by means of the oxidation of glucose and so, where is it used and for what? By combining paper chromatography with P^{32} he determined that it might be used to oxidize some of the amino acids preparatory to certain unspecified cell functions. It is a sophisticated method of procedure, he knew the literature, and the problem was well set up. There was some question as to the elegance with which he worked, but we should not sell him or the scientific effort the least bit short.

The U. S. paper was placed between data papers and by comparison probably was not as interesting. In any event, I tried to establish clearly the fact that the production of nuclear energy for power was a safe operation provided that people used their intelligence, spent enough

to engineer properly and were vigilant. I described only briefly some of the experimental work going on because everything was running very late. I made a plea for more opportunities for younger men by pointing out that it did no good to stimulate interest and then permit only a few eventually to be able to carry out work.

An added-on paper by a German, described the design, construction and loading of a Co^{60} irradiation unit for things such as seeds and plants. The company is at Muehlheim; the Co^{60} source of 5000 curies (a 1.5 cm. x 12 cm. rod). It is supposed to give 45,000 rad/hour at 20 cm. The production of the machine was illustrated by a movie.

Third Party Liability - E. Diamond

The writer's participation in the Rome Conference involved the preparation and reading of a paper on June 20th, dealing with Third Party Liability in the field of Nuclear Energy. Other speakers on the program that day addressed themselves principally to the problems with which the insurance industry is confronted in trying to work out coverage for nuclear activities, i.e., lack of adequate actuarial experience on which to base rates; causal relationship of symptoms to radiation exposure, and the determination of an appropriate period of time within which claims must be filed.

From what was said at the Conference itself as well as remarks made at various social functions during the course of the Conference, it became quite clear that the current thinking in Italy is that every effort must be made to solve the Third Party Liability problem through an international convention as proposed by OEEC, -- and that no attempt will be made for the time being at least, to enact legislation in Italy dealing with the problem on a unilateral basis.

VISITS BY INDIVIDUAL DELEGATES

University of Rome - E. C. Anderson

Discussions were held with Professors Sciuti, Mezzetti, and Bella of the Marconi Institute of Physics, and with Professors Fornaseri and Conversi of the Geochemical Institute. The first two are concerned with instrumentation for meson experiments and are using conventional Cerenkow systems. They use American photomultipliers and bemoan the high cost of importation (final price about twice the U. S. cost). Electronics are Italian. Professor Bella operates the radiocarbon dating counters, which still use solid black carbon. The system is being converted to CO_2 gas counting in the near future. Chemical preparation of the sample is performed by Professor Conversi. The system has a limited range and their older samples have been sent to DeVries at Groningen. Only date list was published in La Ricerca Scientifica, 27, No. 9, 2677 (1957). They are not working on the problems of the contemporary assay, but are interested in liquid scintillation counting techniques.

Instituto Superiore de Sanita - H. D. Bruner

On Friday, I went to the Instituto Superiore de Sanita to visit Professors Bovet and Chain by virtue of Letters of Introduction from Dr. C. Artom of Wake Forest, School of Medicine. This is a peculiar set-up by our standards. It is Government supported and serves the combined functions of the National Bureau of Standards, the Food and Drug Administration, and the Bureau of State Services and the NIH of the USPHS. Their present interest is to take on the radiation standardization and the control of all types of radiation.

The Italian Atomic Energy Committee and the Instituto de Sanita have formed a joint Committee to write up an enabling law which would permit them to set radiation standards and limits for production, shipping, use, etc. In fact the complete chain from production to disposal will be regulated by such a committee. The numbers and figures are to be provided when the empowering law is passed, perhaps next year. I tried to point out what a tremendous service job this could become, but Dr. G. B. Marind-Bettolo, who will have charge of the standardization part of this work, felt that it would not amount to much. He frankly admitted that the Instituto di Sanita would like the honor and prestige of acting as the center for such work in Italy, but also admitted that they didn't purpose to let their personal research suffer because of this service function. I gather that the CNRN group would also like the honor and prestige but is not too anxious to get involved with the duties. It will be interesting to see what happens because the proposed law also covers control of X-radiation from medical and industrial X-ray machines and radium needles.

Another complication is that the procedures and values which they settle on must be compatible with the six European Nation Industrial Trade Coalition (of which Italy is a member and the headquarters of which is to be installed at Milano very shortly).

SPECIAL CONFERENCE WITH FORMER U. S. A. TRAINEES

At the suggestion of the U. S. Embassy, a special session was arranged for Saturday, June 21, following the formal Nuclear Congress, for an informal meeting between the U. S. Team and former recipients of reactor and isotope training at Argonne and Oak Ridge. The purposes were: (1) to bring the trainees up-to-date on developments of interest to them since their visit to the U. S., (2) to interpret any new policies on U. S. assistance and training, and (3) to reinforce the ties already established between the trainee and the U. S.

This session was well attended by former trainees, coming from various cities of Italy. After initial general discussion of the purposes of the meeting and desire of the U. S. to continue to be of assistance to these trainees, the session divided into two discussion groups, one on reactors and one on isotopes.

The reactor group discussed the organic moderated, boiling water, sodium graphite and homogeneous reactors, and the economics of nuclear reactors in some detail. There was some discussion of general fuel material problems. There was a notable lack of interest in discussing the Shippingport PWR.

The second group discussed general problems in medicine, the application of reactors in medical research, and the use of isotopes in medicine, industry, and agriculture.

Both groups spent several hours of very active, give-and-take discussion. This informal meeting served the purposes well--as a matter of fact, it appeared to be the most valuable session of the Congress both for the U. S. Team and the Italian participants. It is highly recommended that similar informal sessions be arranged in the future between visiting U. S. Teams and former U. S. trainees.

INFORMATION ON THE ATOMIC ENERGY PROGRAM IN ITALY

General

Prof. Carlo Matteini of the University of Rome Faculty of Engineering, and president of SENN, in a discussion with one of the U. S. delegates, summarized the present opinions on atomic energy in Italy as follows:

1. The Italians have qualms about the economy of operation of the British gas cooled reactors.

2. They understand that enriched fuel elements may be the only way to secure the kind of operation they need.

3. The specific weight loading of the reactor is so much greater in the British than the American proposals that this may be a major deterrent to installation of the British gas cooled reactor at the first site.

4. They are not favorably disposed to the Organic Moderated Reactor but only because it is a new type. They understand its qualities and its important differences over other versions of reactors but cannot risk a reactor that has not been proven elsewhere.

SENN and SIMEA Projects

There exist at present two projects for atomic power plants in advanced planning stages: SENN and SIMEA. Sites have been selected and detailed examination of the sites are in progress.

The SENN project is supported by both private (20%) and public (80%) power companies. The plant is scheduled for 150 MWE; the type of plant has not yet been chosen. Bids from different groups in America and England

have been submitted and evaluation is in progress. The plant is to be located on the western seacoast just south of Gaeta and Formia, and north of Naples.

The SIMEA project is for 200 MWE, for which a Calder Hall type gas cooled reactor, without a sealed containment building, has been selected. The site for this reactor is also on the west coast, about mid-way between the SENN reactor site and Rome.

These sites appear to be satisfactory from a safety standpoint, though the dimensions are relatively small and certain additional calculations, as well as further environmental data on the site, are needed before satisfactory evaluation can be made.

Isotope and Radiation Applications

Italians have been active in nuclear physics and chemistry since the work over 20 years ago of Fermi, Amaldi, Segre and co-workers. Slow neutron induced radioactivity has since that time been studied and employed by numerous Italian groups. Today the physics groups of the major universities are active in all phases of nuclear investigations. The Physics Department of the University of Rome, headed by Prof. Edoardo Amaldi, is completing construction of a 500 Mev electron syncrotron at Frascatti, a short distance from Rome. All components of this machine, magnet, condensers, generators and electronics, are entirely Italian produced. The U. S. Team visited the Laboratorio del Sincrotrone and were impressed with the excellent facilities and workmanship. It should add significantly to research in high energy physics.

The 37 medical schools of Italy are all using isotopes. Several are giving formal isotope training courses or including isotope instruction as a regular part of the medical curriculum. Several of the investigators were trained at Oak Ridge, but more were trained at Harwell or Saclay. It is now unnecessary for Italians to go abroad for isotope training in research and medical uses, except for advanced techniques. The emphasis in the medical schools is on research and diagnostic uses. Several Co 60 teletherapy machines are in operation, but radiation therapy is not as popular as in France where, following the Curie tradition, over 30 teletherapy units are in use.

Some of the Italian isotope research is outstanding, as, for example, the group of Professor E. B. Chain in Chemical Microbiology at the Instituto Superiore di Sanita, Rome, is world renown for its C 14 tracer studies of carbohydrate metabolism. This institute has an extremely clever device for automatic scanning and counting of C 14 two-dimentional paper chromatograms. Several U. S. students are doing research with this group under U. S. fellowships, such as from the National Science Foundation.

Another group visited was that of Prof. Giordano Giacomello, Director of the Institute of Chemical Pharmacy of the University of Rome. His Institute is using radioisotopes in biochemistry and radiation chemistry.

He has about 25 students training in radioisotopes and radiochemistry and has rather generous laboratory space and facilities, including a good variety of modern radioactivity measuring equipment -- scintillation counters, beta-gamma coincidence counters, gamma spectrometers and radiation sources. He has done much work in photo-chemistry and is particularly interested in all the U. S. activity in high-level radiation applications. He believes practical industrial applications will result.

The Food and Agricultural Organization headquarters are in Rome. There is much interest in FAO in agricultural research with isotopes and in radiation preservation of food. This interest is spearheaded by Dr. R. A. Silow who presented papers on the subject at the 1955 Geneva Conference and the 1957 Paris UNESCO Isotopes Conference. Dr. Silow has encouraged Italian work in this field and has plans for FAO to sponsor research and seminars in agricultural countries.

Discussions were held with several groups interested in radiation preservation of food. Points of special interest are the following: (1) In the Mediterranean and other warm climate areas, preservation of fruits, grains and potatoes are difficult and of major economic importance; (2) Food items undergo considerable export-import commerce and refrigeration is difficult and expensive; (3) Keen interest was shown in the fact that only 150,000 rad retarded greatly the spoilage of citrus fruit and berries; (4) Neither canning nor freezing is extensively practiced for food preservation in most countries. Unlike the U. S., therefore, where canning and freezing are commonplace and economic, radiation preservation in other countries could become more of an immediate commercial possibility (provided low cost radiation is available); (5) Demonstration of radiation preservation of food on a practical scale in a suitable country would be a very desirable objective in our Atoms for Peace Program.

It was frequently emphasized in Italy, as well as in all other countries visited, that the U. S. "Dollar Curtain" is the most serious deterrent to closer scientific and technical ties with the U. S. Some scientists said our "Dollar Curtain" is as bad as the U.S.S.R. "Iron Curtain". Scientific and technical equipment from the U. S. costs about 3 times more than in the U. S. in actual dollar exchange (for example, 480,000 lira, almost $1,000, for a well-scintillation crystal selling for $300 in the U. S.). This is due to tariffs and all the export-import handling required. Furthermore, the paper work required to import an item is formidable. Some American instrument companies are attempting to alleviate this problem by licensing local companies to manufacture equipment on U. S. designs, specifications, and trade name. Travel to and living expenses in the U. S. for technical liaison are prohibitive for the budgets of universities, research institutes and many private firms. Even with a fellowship the recipient usually incurs a substantial loss due to U. S. living costs.

Radiobiology

A conference was held with Dr. Buzzati-Traverso of Pavia, and the University of California, Berkeley, a geneticist-biologist in charge of

the biological aspects for CNRN. His plans for a program were discussed in some detail. In some respects it seems somewhat opportunistic, but it must be kept in mind that he does not have a full panel of trained scientists and radiobiologists to draw from; rather, it appears that many of the older, established biologists and Medical School professors have adopted a non-cooperative attitude which makes his task more difficult because they frequently have influence out of proportion to their output and progressiveness. In any case, it will be to our advantage to assist Buzzati in every way we can, for he appears to be the moving spirit behind radiobiology and therefore health protection for the reactor program. They have plans to establish training in radiobiology and health physics, perhaps for EURATOM and SENN as well as CNRN. One such course has already been given this year which seems well organized but might be further developed from the standpoint of practical health physics.

Training

The only new information was the expanded training programme for reactor technicians which involved the use of extensive laboratory space. Apparently, this is the result of using the key people, trained in the U. S., to further the training programme in Italy. Their laboratories are not too well equipped.

INFORMATION ON THE ATOMIC ENERGY PROGRAMS OF OTHER COUNTRIES

USSR-Instrumentation

U. S. Delegate H. D. LeVine had the opportunity to visit the USSR exhibit, accompanied by Dr. Leonard Konstantinov of the Institute of Physics of Moscow who was the Director of the USSR pavilion. He is a physicist interested in high energy physics but had a working knowledge of the instrumentation there. The instruments shown were of various vintages and included the models of 1958 manufacture as well as some which were much older, i.e., an aerial survey equipment which takes both magnetic and aerial radiation measurements simultaneously. This unit appeared to be 3 to 4 years old, was badly battered and was one of a limited product according to Prof. Konstantinov. Their most modern survey meters used transistor techniques, the construction is good; if the state of the equipment at the exhibit was any indication, their maintenance is poor.

They do not lean heavily towards scintillation counting and still display equipment with very small sodium iodide phosphors or scintillation counters with cesium iodide phosphors. The multiplier phototubes shown had been reported by Dr. LeVine's memorandum of March 19, 1958.

The tendency in Russian instrumentation seems to be toward the design of universal types of basic instruments coupled with modified detectors. This is good practice but of course can only exist where a central organization determines what instruments are supplied.

The mechanical design oftheir instruments are improving, along with improvement in electrical design. Of especial interest was a light weight beta-gamma floor monitor which consists of a survey meter and a hand held probe. The probe contained two or three small steel-bodied thin-wall geiger counters in a light casing with metal runners attached on the bottom. Also provided was a plastic shield that could be inverted to eliminate beta particles.

Bubble chamber work in the U. S. was discussed briefly and although Prof. Konstantinov is a high energy physicist he was not familiar with any large bubble chambers under construction in Russia. He spoke of a 6 liter bubble chamber to be used on a large machine and seemed to be surprised that we were building the large bubble chamber at Berkeley for high energy particle work.

He also mentioned, as a result of a discussion on policy, that he found it difficult to secure the kind of equipment that he needed for his specific kinds of work. His group was now beginning to train a technical group for instrumentation design and fabrication to meet their needs and implied that this was becoming a general situation.

Switzerland - Radioactive Krypton

In a private discussion, Professor Houtermans expressed concern over the increase of fission product krypton in the atmosphere. His measurements indicate a threefold increase from 1955 to 1957. He is interested in obtaining pre-war, non-radioactive krypton for low-level counting.

He has developed a simple, but sensitive, water monitor for the Swiss government. An annular Geiger counter is surrounded by anion-exchange resin through which the water sample flows. A large concentration factor is obtained by the resin action. Appearance of radioactivity in second unit in series signals break-through, whereupon flow is shifted to parallel system while first is being eluted. Sensitivity is about 1 c/m for fission product concentration, giving a dose rate of 10^{-4} r/yr in the water.

COMMENT ON THE ORGANIZATION OF THE CONGRESS

The physical facilities for the Congress and Exhibit were excellent. The Palazzo Dei Congressi is a large, beautiful building, employing much marble, with much space for exhibits, a large auditorium (Aula Magna) and many meeting rooms.

However, it must be stated that the over-all organization of the Conference was relatively poor. The schedule was very flexible and it was difficult to learn what papers were going to be given at a particular time. However, the sessions were all conducted and all the papers given during the weeks scheduled.

Advance planning of the program was poor. The program, and particular areas for discussion, were not announced in advance of the meeting. As a consequence, there was considerable mis-matching between the interests of many delegates and the subject of many papers.

The proceedings of the conferences in particular were not well-organized, especially so far as facilitating the presentation and exchange of information was concerned. Reprints were not available, the multilingual translation worked under severe handicaps and was rather ineffective, and the slide projecting equipment was so inadequate as to make much of the information so conveyed unintelligible. During several of the sessions, the chairman did not call for discussion at all, but simply went on to the next paper at the conclusion of the preceding one.

The Conference office did not obtain a list of the scientific delegates; only a few delegates had name tags; it was difficult or impossible to find out who was present from each country or their field of interest.

On the other hand, many purposes of the Congress seemed to be well served, and the sponsors were apparently well pleased with the meeting. There were at least some high quality papers; there was the general atmosphere of a "big" scientific meeting; there was much publicity; numerous Italian scientists were pleased to have opportunity to present papers at such a meeting, even though the papers dealt chiefly with plans, laboratory organizations and anticipated programs, and discussions of preliminary work.

There is a vigorous and widespread interest in Italy in the development of nuclear programs, and this interest is certain to result in a strong nuclear industry. In several intangible ways, this Congress was of value to this development.

COMMENT ON THE TECHNICAL STANDARD OF THE CONGRESS

In general, there was very little if anything reported on which was new and the conference could hardly be considered worthwhile solely from the point of view of technical exchange.

About 35 papers were presented at the Nucleonics Sessions of the Congress. Of these papers, 9 were presented by the U. S. delegation and most of the balance were by Italian authors, although there were papers by French, Austrian, U.K., U.S.S.R. and Belgian authors. The only U.S.S.R. nuclear paper was in the field of medicine, the bulk of their delegation being present for the Electronics session (though they attended the nuclear session regularly).

The U. S. papers were clearly outstanding by comparison although there were one or two very interesting papers, one in particular by Dr. Gustaffson of Stockholm on the genetic effects of different types of radiation.

The numerous Italian papers were mostly general and qualitative, long and uninterestingly detailed. The Italian papers on their design studies of a nuclear-powered tanker, (given in exhaustive detail), received a great deal of attention though the design work was clearly directly taken from U. S. work.

Neither the British nor Russians presented papers on their reactor programs -- the Congress program on reactors developed by the Italians was solely a U. S. show. In other sessions of the Congress, however, dealing with metallurgy, instrumentation, isotopes and insurance, there was general European representation. The Russian presentations were limited to isotope research.

COMMENT ON DISCUSSION OF THE PAPERS

There was very limited discussion of any of the papers, although in general, time was allowed for such discussion. This was particularly true of the reactor papers and seemed to reflect a reluctance towards semi-public discussion of areas in which many of those present did not feel expert. There was much more informal discussion after the sessions and outside of the conference hall.

REACTION TO U.K. EFFORTS TO SELL REACTORS IN ITALY

There appears to be a divided opinion in Italy between the scientists in charge of the engineering of reactors and the industrialists who intend to buy the reactors and sell the power from them. In general, among the engineers and physicists, there seemed to be a great opposition to the use of the U.K. reactors. On the other hand, among the top ranking industrialists, there seemed to be a general acceptance of the U.K. efforts. These ideas were difficult to pin down, but there was evidence that the SENN group would like very much to buy a reactor from the U. S. Especially since the reactor now nearing construction is a British gas-cooled type.

Professor Matteini, President of SENN, indicated that they would be much happier to buy a low-priced reactor than one which cost a lot of money, even though the claims for the more expensive type might be more attractive at the present time.

Professor Matteini gave the impression that he was quite skeptical of the British claims for performance of the gas-cooled reactors; that the reactors of the future would be high performance, and the use of American fuels would be increasingly attractive as our development program progresses. In general, the British efforts to sell reactors will be successful only through political maneuvering; that technically, the Americans will easily win the work in that country.

THE U. S. EXHIBIT

The U. S. exhibit "The Atom in the Service of Humanity" was outstanding in every way. The exhibit was very attractive and well laid out. The theme

was carried out very well without appearing to be a high pressure sales or propaganda effort. The individual exhibits were generally well-selected and effectively displayed. There was not so much as to be confusing and yet the individual exhibits were good examples of the story being told. The designers of the exhibit should be congratulated.

The Rome exhibit also had the great advantage of controlled flow of viewers in an orderly sequence from the start to end of the exhibit. This permitted a smooth and logical presentation from one subject to the next -- from the birth of atomic energy research in international science, on through all the various peaceful applications and potentialities, to the U. S. Programs of Atoms for Peace and International Cooperation. The exhibit was attended by many notables -- the President of Italy and high officials of the government, the U. S. Ambassador and staff and many leading scientific and professional people. Many pictures resulted in the press.

Particularly to be noted is the effectiveness of Mr. John Vinciguerra in accomplishing this outstanding exhibit within such a short time schedule. It is doubtful that anyone without his native language ability and background, plus cordial personality, could have met the schedule and still have maintained such friendly, eager cooperation with the many local groups involved. Also, his assistance in the translation of captions andlecture training of the Italian guides was invaluable. This illustrates the importance insofar as possible of finding a project leader familiar with our atomic program and also knowing the language and people in the exhibit country.

In summary our exhibit was by far the superior one in the conference and would rank on a par with or above any U. S. exhibit thus far displayed.

THE UNITED KINGDOM EXHIBIT

The only U. K. exhibit on atomic energy was a commercial one by the Nuclear Power Plant Company which is the group negotiating for the SIMEA/ AGIP Nucleare nuclear power plant. The exhibit contained models of the Bradwell Plant which this group is building in England and contained large photographs of early stages of construction of this plant. The pictures were the most impressive part of the exhibit and clearly showed the immense size and scope of the construction necessary for a 300 EMW plant of this type. The NPPC representatives attending the exhibit were salesmen and the literature distributed was completely of a sales character. There did not seem to be much interest in this exhibit by the Italians.

THE U.S.S.R. EXHIBIT

The U.S.S.R. exhibit was quite large and devoted entirely to atomic energy. It was not a very attractive appearing exhibit being quite somber in appearance and poorly illuminated. It consisted of very large panels, most of which were in Russian though in some cases there were both Russian and Italian legends. The number of guides available was inadequate, so that on several occasions the exhibit appeared to be unattended.

There were some rather neat appearing instruments and a pair of remote control manipulators were on display, although in no way did they compare with American ones. Theirs were much stiffer and clumsy to operate.

A considerable portion of the exhibit was devoted to the nuclear icebreaker "Lenin". There were pictures of it under construction and at its launching. There were panels showing comparative performance with conventionally powered icebreakers and illustrating polar routes. There was no new information nor any information on the type of reactor nor the completion date for the ship.

No doubt everyone was impressed by the icebreaker ship exhibit; but of more importance was the fact that below this exhibit were three diagrams showing the modes of producing atomic power being followed in the U.S.S.R.

The first was the pressurized water system already well known.

The second was the pressurized water reactor combined with the superheat cycle within the same reactor. The details of the reactor were not given. The moderator was apparently graphite; however, the technical factors were not discussed in the Exhibit - nor could one find out much about them from the engineers and attendents. It seems that this reactor may be one of those that they will make a strong stand for in Geneva.

The third reactor shown was a liquid metal cooled reactor, possibly at thermal neutron energy, which did not seem very unusual in any of its aspects. The model of their full-scale power plant was displayed quite nicely, and in looking at this Exhibit, one felt that we would have been better off had our models been displayed in the center of the room, rather than along the sides of the walk-ways. The visitors to the U.S.S.R. Exhibit were impressed with this model far beyond its importance because they could inspect it from four sides.

The exhibit also contained panels and models on the following areas of isotope application:

Agriculture

Fertilizer uptake
Soil fertility
New crops by radiation -- induced mutations
Animal husbandry -- cows, sheep, poultry
Food sterilization -- model of food irradiator

Medicine

Teletherapy -- models, spectacular cancer cures "before" and "after"
Thyroid diagnosis and treatment -- thyroid scanning devices
Brain tumor detection -- gamma and positron annihilation

Industry

Thickness gages -- actual devices and pictures of plant applications
Radiography devices -- actual units and pictures of use
Wear studies -- airplane engine parts, rubber tires
Level gages for molten metal in furnaces
Blast furnace tracer studies in steel making
Oil-well logging -- devices and pictures
Pipe line flow -- flow control and measurement
Density and mass flow devices
Dredging and movement of silt studied with tracers

There were also a series of panels on "International Cooperation" describing the assistance by the U.S.S.R. to countries cooperating with it. These were quite general and did not appear to give very specific details on the cooperation programs.

As an interesting side-light to the Russian exhibit there was a hi-fi booth at one end playing hot jazz which completely pulled the Italians away from the exhibit. This was unintentional, but it would be a very useful technique to minimize the effectiveness of a competitor's exhibit.

FILMS SHOWN AT THE CONGRESS

Three motion picture films were brought to the Congress by the U. S. delegation. These films were not shown at the technical sessions but were shown several times each in a special motion picture auditorium which was open not only to the technical delegations but to the public visiting the Exhibition as well. The three films, all produced for the U. S. Atomic Energy Commission, were the following:

Sodium Reactor Experiment Fabrication. Produced by Atomics International (a Division of North American Aviation, Inc.), Canoga Park, California, as contractor to the Atomic Energy Commission (19 minutes, 16mm, color, sount).

> The fabrication and testing of major reactor components for the Sodium Reactor Experiment (SRE) are shown in this technical film. The SRE incorporates a 20,000 thermal kilowatt reactor having the basic design features of a central station sodium graphite reactor. The goal of this program is the study and improvement of technology associated with the sodium graphite type of nuclear reactor, and to demonstrate the technical feasibility of this approach to economical nuclear power. A brief animated section shows some of the engineering features and describes the basic layout of the reactor and associated facilities. Detailed information is presented on fuel element fabrication and testing, grid plate fabrication, control rod system testing, core tank fabrication, thermal shield ring fabrication, top plug fabrication, sodium pump inspection, heat exchanger and coolant piping inspection, and fuel handling system check-out.

Living With Radiation. Produced by the U. S. Air Force (Lookout Mountain Laboratory) for the Atomic Energy Commission (30 minutes, 16mm, color, sound).

> This popular-level film pictures the techniques employed at the National Reactor Testing Station, Idaho, in dealing with radiation problems associated with its reactor complex and chemical processing facilities, to protect its employees and the surrounding population. Practices described and illustrated cover: disposal of gaseous, liquid and solid radioactive wastes, including filtration, dilution, storage, transportation, and burial practices; meteorological studies and air sampling in relation to disposal of gaseous effluents; sampling and testing of drinking water, plants and crops to ensure that their radioactivity contents remain within accepted tolerances; use of gummed paper to collect fallout samples; wearing of special protective clothing by plant employees and use of film badges to record degree of personnel exposure; measurement of radioactivity by counters and other electronic equipment; shielding and decontamination methods; use of mechanical manipulators.

The Argonne Gamma Irradiation Facility. Produced by Argonne National Laboratory, Lemont, Illinois (12 minutes, 16mm., color, sound).

> The Argonne Gamma Irradiation Facility utilizes the radiation from fission products to provide a gamma irradiation flux up to two million roentgens per hour for research purposes. Irradiation service is made available to private and Governmental research organizations. This semi-technical documentary film shows how the intense gamma rays from spent fuel elements removed from the MTR are used at Argonne for irradiation services. The arrangement for handling the fuel elements and the samples to be irradiated are described. Pictures of the results of typical food irradiation studies are included.

Statistics are not available as to the number of showings of each of the films or as to the total number of the audience which viewed them.

NEWSPAPER, RADIO AND TELEVISION COVERAGE

The Conference and the Exhibit received very widespread coverage in Italian newspapers and on radio and TV. The U. S. exhibit received very widespread and favorable coverage even in the communist press. The AGN-201 reactor was of particular interest as an operating reactor and the first one in Italy. The technical papers received considerable notice, particularly the Italian paper on an atomic-powered ship.

ASSESSMENT OF U. S. PARTICIPATION

It is believed that U. S. participation in both the Conference and the Exhibit was very worthwhile and very much appreciated by the Italians. Senator Focaccia made a particular point in his official opening address of the U. S. Exhibit and the cooperation by the U. S. The substantial

participation was very timely in view of the political situation in Italy and the very serious consideration being given U. S. developed reactor types in Italy.

On the other hand, that the size and stature of the delegation were somewhat greater than was really necessary (or desirable for the future) and the magnitude of the exhibit was also greater than really necessary though it was probably desirable for initial participation in the exhibit program.

However, in view of the relatively small cost of sending the delgation and the moderate cost of the exhibit, it is believed that the participation was well worthwhile in terms of goodwill with the Italians and enhancement of U. S. prestige in Italy and Western Europe. It is recommended that the U. S. participate in the future in both the Congress and the Exhibit, but on a more modest basis.

SUGGESTIONS FOR FUTURE CONFERENCES

Members of the U. S. delegation, upon reviewing their participation in this conference, have formulated suggestions which they believe may be of value in the future. These are:

1. A more intermediate level of presentation, by people and on subjects closer to the working level, and particularly wherever possible, presented in Italian. We have many scientists and engineers in the U. S. Atomic Energy effort who could do this.

2. It would be preferable to have adequate notice of participation; the subject matter on which a paper is to be prepared should be clearly stated, whether review, experimental, summary, ideological, etc., and how it will fit into the over-all program.

3. Delegates should be warned that the technical participation will not be at a level comparable to that in other countries, and that amenities and politics must be carefully blended into the technical discussions of reactors.

4. The Italians seem to have only the vaguest concept about how to approach the AEC as to scientific contacts, exchange of ideas, etc. They may be most uncertain about lines of communication, since they tend to be very careful in matters of protocol. They may actually feel that we are not interested in this work (biological aspects) because except for Dunsati and visitors from the United States their potential radiobiologists have had minor scientific contact with us.

5. Our local people in Rome diplomatically offer assistance on the physical arrangements in the future, to get a more smoothly working conference.

6. It should be borne in mind that a delegation to Rome will always be required to establish a certain comradeship with the Italians.... that the Italians are "starved" for recognition....and that any remarks we make with respect to their contribution to the world effort on atomic energy (even though marginal in truth) will further the American cause in this area.

7. Take to Rome more information on reactors and less on the auxiliary or technique sides of atomic energy. It was quite evident that they were very interested in fuel, fabrication, material performance, and the like, for reactors. The Delegations in the future should be heavily weighted in this area. Some papers on research reactors would be desirable.

8. It is important to recognize that the effort to sell reactors in Italy will never be furthered by strong sales methods advanced by the industrialists, if not backed up by impartial observations of the scientists associated with the U. S. atomic energy program.

9. The Italians can use much more information on instrumentation techniques especially with reference to the automation of data processing and the application of our new miniaturization technology to reliable instrument fabrication.

APPENDIX A

SUMMARY OF U. S. PAPERS

Speaker	Title of Paper	Italian Agenda Topic
W. K. Davis	Development of Nuclear Power in the U. S.	Nuclear Industry in the World
J. M. Harrer	A Review of Boiling Water Reactor Performance	Nuclear Industry in the World
C. K. Beck	Considerations in the Choice of Sites for Reactors	Sites for Nuclear Plants
J. F. Schumar	Manufacture and Exposure History of Boiling Water Reactor Fuels	Fuel and Its Exposure Time
S. Siegel	Recyling of Pu and U-233 Through Power Reactors	Fuel and Its Exposure Time
H. D. Bruner	The Challenge of Nuclear Energy to the Life Sciences	Application of Radioisotopes in Agriculture, Medicine and Biology
P. C. Aebersold	Growing Industrial Uses of Radioisotopes	Application of Radioisotopes in Industry
E. Diamond	Third-Party Liability Associated With Nuclear Installations	Liability and Insurance Problems for Nuclear Plants
E. C. Anderson	Low-Level Counting: from Archaeological Artifacts to Nuclear Reactors	Determination of Age with Carbon-14
H. D. LeVine	The Application of Solid State and Other New Components in Circuits for Nuclear Instruments	Electronic Instrumentation in Applications of Nuclear Energy
H. D. LeVine	Recently Developed Components for Application to Nuclear Electronic Equipment	New Techniques in Electronics, with Reference to Nuclear Applications

APPENDIX B

ADDRESS DELIVERED BY JOSEPH M. HARRER ON ENRICO FERMI DAY, JUNE 23, 1958, Fifth International Electronic and Nuclear Congress, Rome, Italy

As we rise on this occasion to pay tribute to a man, his philosophy, his work and the heritage he gave us, we are humble in the knowledge that we are speaking not as his intimate friend, but as one whose life this man has greatly affected. We Americans, all eleven of us, who were privileged to come here in this delegation, knew Enrico Fermi only slightly. But, was this not true of most of his associates? For, here was a man about whom everyone remembers some different incident, some different trait, some different greatness.

Here present today, in addition to his sister, Maria, are some of his close Italian collaborators, such as Prof. Amaldi, who knew him so much more intimately than was our privilege to know this great scientist. We are proud to work near the site of his greatest accomplishment, at the place now known as Argonne National Laboratory, which resulted directly from his work with nuclear reactors.

The story of Enrico Fermi will be told many times again, but we are greatly indebted to his wife, Laura, for the human story of his work in our land. We know he found the American type acceptance of the foreigner somewhat perplexing, because in our land we do not tend to the heart warming amenities practiced so beautifully here in Italy. Laura tells during this early stay in America of the surprise rendered by Americans that they were not citizens. America being a great new melting pot was happy to find a genial, lovable, well-liked and easily-accepted Italian in their midst.

We are proud that this was their finding and I am sure that the many of you who came to our country for study, work, or visiting find the same acceptance today.

Enrico Fermi became a citizen of the United States in the year 1945 after he had worked for many years in a field guarded most closely by military secrecy. This alone was a tribute to the man, for seldom is such a concession made in such trying times.

The Fermis went to America in January, 1939, where he became a Professor of Physics at Columbia University. Only those who have been to Rome and New York can appreciate what he gave up to take this post. He loved his homeland, as do we all; add to this the ravaging winters of our east coast and one has a picture of real personal sacrifice.

Enrico Fermi had won the Nobel Prize for his identification of new radioactive elements produced by neutron bombardment and his discovery of nuclear reaction produced by slow neutrons. Here, we learn of the

characteristic which endeared him to so many. He loved the elementary or fundamental. He wanted to teach the youngest student. He wanted to plant in the first year class the seeds of learning which would grow and flourish. So many great scientists are not teachers, but Enrico Fermi was a teacher. His explanations of the disciplines related to nuclear physics would alone have been a lasting monument to him.

But he was not content to lecture. His mind was continually seeking the new and wonderful truths of science. It has been said of Fermi that the stimulation he gave to his co-workers was one of his greatest contributions. Many of those who were privileged to work directly with him were the leaders and teachers of the men in this delegation. In my own experience, I was privileged to work with Walter Zinn, Norman Hilberry, and the late Arthur Barnes, whose untimely death - like Fermi's - shocked the scientific world.

These were men fired with the drive and the zeal of Fermi. Many times they would quote his exortation, as our experiments required our working days on end, with practically no sleep. As Zinn would say, "I'm always in a hurry". We were trained to move under this kind of leadership to accomplish today and rest tomorrow. This driving leadership which sprang from Fermi inoculated these men and has spread to the second generation of workers. If we are successful in passing this enthusiasm on to others, perhaps we will in some small measure repay the debt we owe this great man. Time will perhaps show that the spirit of Fermi lives in every nuclear scientist, every nuclear engineer, every nuclear reactor builder who is truly worthy of the title.

For Fermi was truly the father of the nuclear reactor. His devotion to the principle that slow neutrons would produce a chain reaction produced the basis for all our work today, which is related to peace and unity of peoples and which we know Enrico Fermi wanted most of all.

We know that the path he followed to success was not a short or an easy one. The fundamental discovery took place here in Rome as early as 1934. Working with a source of neutrons, his associates were producing artificial radioactivity in metals. The cylinders of metal were placed around the source and the assembly was placed inside of lead. The particular incident of note concerns the irradiation of silver metal to produce artificial radioactivity. They observed that the induced radioactivity was increased when these assemblies were moved to different points in the lead container. Fermi suggested removing the metal and source of neutrons from the container entirely. This produced a higher intensity of activity exactly as he had suspected. The experiments were carried further and it was found that hydrogen bearing materials greatly increased the activity.

This led to the idea of neutron moderation. Fermi placed parafin around the source of neutrons and the metal was again irradiated. The artificially induced radioactivity was increased 100 times.

Simple as this experiment seems today, it is repeated frequently in our universities to bring home to the student the important effect of neutron moderation, which forms the basis for our whole field of nuclear reactor

design. It was Fermi who worked out the theory which explained the phenomena which had been observed. He could not rest until this had been proven. Water contained much more hydrogen than did parafin and it was in a goldfish pond that the sequel of this experiment was carried out. The result made history, for here again - the induced activity in silver was increased.

It was perhaps appropriate that in our United States Exhibit we should erect a model of a reactor in which the moderator is represented by large white blocks. As this is viewed, the importance of this substance is probably not sufficiently brought out. Here was born, and from this work grew an entirely new concept of the effect of materials on neutrons. The light atoms interfere with the rapid passage of the neutrons and make them slow down or linger in the region of the target atoms for a longer time. One concept of this effect is that this gives the atom a better change of capturing the neutron and thus the efficiency of the capture process is enhanced.

It is wonderful that this great work was carried on here in Rome and that Fermi could bring this concept to America. Certainly the path which led from this to the self-sustained chain reaction was tedious and paved with many frustrations.

It was a happy marriage of ideas which led to the building of the Chicago Pile of Graphite and Uranium. Fermi believed that natural Uranium would produce a self-sustained chain reaction. Most other workers believed that the separation of the U-235 from the U-238, as it occurred in nature, would be necessary before the chain reaction could be successful. But Fermi had worked with the irradiation of Uranium and had found that it became radioactive.

An incorrectly quoted statement from Fermi led to the announcement of the creation of the element 93, now known as Neptunium. In June of 1934, the Press had announced that the element had been produced. In the true scientific manner, Fermi was not in agreement and insisted that he considered it only likely that element 92 had become 93 when the former absorbed a neutron. It is of great importance to note this commendable attitude in a man, when we see so many today who dare to rush into print with poor or insufficient data making claims for discoveries which could easily be shown false.

Here was a case where the man-made element, Plutonium, actually did exist as suspected, and again, Fermi was the first to indicate the existence. But he was not sure and he hastened to ask that the Press issue a correct statement. Students and investigators could do well to note this incident in the life of this great man who did not compromise accuracy for fame.

After hearing of the process known as fission while at Columbia University, Enrico Fermi advanced the hypothesis that Uranium might omit neutrons. Allow me to quote Fermi's explanation of a chain reaction. Fermi said, "It takes one neutron to split one atom of Uranium". "We must first produce and then use up that one neutron". "Let's assume",

he continued, "that my hypothesis is correct and that an atom of Uranium undergoing fission emits two neutrons". "There would now be two neutrons available without the need of producing them". "It is conceivable," he continued, "that they might hit two more atoms of Uranium, split them, and make them emit two neutrons each". "At the end of this second process of fission, we would have four neutrons which would split four atoms". "After one more step,eight neutrons would be available and could split eight more atoms of Uranium. "In other words," said Fermi, "starting with only a few man-produced neutrons to bombard a certain amount of Uranium, we would be able to produce a set of reactions that would continue spontaneously until all Uranium atoms were split." This was the simple straight-forward manner in which Fermi advanced his ideas. Could anyone fail to understand a complicated process when he reduced it to these simple terms?

To prove this theory, Fermi again became the experimentalist. His idea, to become a reality, required a moderator, as he had pointed out earlier. To succeed in producing the chain reaction, it would first be necessary to discover a mechanical arrangement of Uranium and moderator, in which this process could be carried out. He knew that the Pile, or Reactor as we now call it, would be large. Strong structural materials would be needed. Graphite was selected as the moderator because it met all requirements.

One should not forget that again the move from theory to practical experiment was neither direct nor rapid. Fermi and others of a team working under the direction of Compton gradually built larger and larger Piles of material in many different mechanical arrangements and under many different conditions. Gradually, the data became clear and the size and arrangement required to produce the self-sustained chain reaction was calculated.

The Site selected was the now-famous, but recently demolished squash court at the University of Chicago.

Many people have asked why we would demolish this historic site. I'm sure, after inspecting the ruins here in Rome, that you at least will understand how in time all great things give way to progress. Lest we fear, however, that all is lost, we should point out that at Argonne National Laboratory, there is still standing one of Fermi's source Piles which he used to predict the size of this first chain reactor. However, it is not shrouded in gold or marked with a plaque as some might think it should be. No, this stands as we think Fermi would want it, as a place where students at our International School of Nuclear Engineering carry out experiments and try to discover for themselves the truths of science. Perhaps the instructors forget to point this out to all students at times, but it is nevertheless true. We think this is a true Fermi monument dedicated to teaching the science he so firmly established.

Many times each day at the present United States Exhibit the AG 201 reactor is started just as Fermi started the reactor at Chicago. The equipment is compact and polished to make it commercial, but the fundamental

actions are still there. But only one who actually started a reactor for the first time---one who has borne on his shoulders this exciting yet great responsibility can appreciate what must have gone on in his mind.

Evidence of his confidence in being able to, as we say, "call his shots" is brought out by the fact that he allowed even the Army officials to observe this final experiment. Only too well do we in America know the price we pay for announcing the schedules of difficult experiments. But this was a truly American trait which Fermi must have absorbed in his stay with us. He described his every action and predicted every move. His complete composure is shown by the fact that just as he reached the critical point, a safety rod failed and terminated the experiment. A lesser man could not have said only, "Let's go to lunch." It is well known now how the after-lunch business went. The Pile did chain react and in true American style, Compton pronounced the famous code message to Conant: "The Italian navigator has reached the New World." This statement alone will place Fermi in a class with that of the other great Italian who gave us a place to live.

In looking back, it all seems so straight-forward, but we should remember that Fermi knew, as did his co-workers on that project, that instead of a controlled chain reaction, he could have produced one which was uncontrollable. Yet, they were willing to stake their lives on their scientific facts.

Even though it has been my job many times to start a new reactor, I never fail to think of how truly unknown is the reaction which might be produced. In truth, all we know is that the peaceful, friendly neutron reaction has always resulted. But could there be yet an added effect which is to be discovered? Here, then, one joins in true brotherhood with Fermi as he bore in his hand the full responsibility of the experiment and the lives of his associates.

At Argonne National Laboratory we start new nuclear reactors quite frequently. We have five full power reactors now and many critical or zero power experiments in operation. I should like to point out that on all new reactors which we start, we install the same counter used on that first reactor. In addition, we install a light beam galvanometer similar to the one used there. True, we have better instruments today, more compact and better response, but we are a nostalgic, superstitious bunch and we just feel better when these instruments are in place. Somehow, we know the direction must be correct and the operation a success.

At this Conference, we have heard tell of the progress and good which the work of Fermi has produced. This is especially true in the medical field of cancer treatment and diagnosis. It is a sad commentary that this science which he advanced so far could not have saved him from the disease it may some day conquer.

In closing, then, we pay tribute to this great Italian and to all that Italians have meant to the greatness of the United States. We welcome the official co-operation agreements with you, and I am sure there will never be a question among scientists in America, of our sharing with Italy all the benefits we reap from the work of Enrico Fermi.

The world will long remember the story we recall here today and it will be told in different ways by many better qualified to tell it than I.

The date of the first nuclear chain reaction, December 2, 1942, should always be remembered as the day science took one of its most important steps. Each year, we in the States try to announce something new in atomic science on the date. In 1956, it was the day on which we made the Experimental Boiling Water Reactor critical. This was the first of the demonstration power plants built on the simple principle first suggested by Fermi.

He had said that to make power from his process, you simply let the heat generated boil water. We worked hard to bring this reactor into reality on this Fourteenth Anniversary of Fermi's great experiment. We felt it was a much overdue tribute.

In 1957, this was the date for the Shippingport Pressurized Water Reactor to be made critical. But these are only unofficial attempts by our engineers and scientists to show the world how well we remember Fermi's great contribution. I should like to suggest that this date, December 2, be adopted as "Enrico Fermi Day" - as a day when all people will remember him always.

You will soon reap the benefits of his work. Your engineers and industrialists will soon begin to make power for your homes and factories from the source of energy given to the world by that great Italian, Enrico Fermi. In this endeavor, we know that your success will be in the true tradition of accomplishment always so characteristic of Italy.

APPENDIX C

REGULATION OF THE NUCLEAR CONGRESS

The Scientific Congress, to be held in connection with the Fifth Rassegna Internazionale Elettronica e Nucleare, will take place from the 16th to the 21st of June under the auspices and with the participation of the National Nuclear Research Council (C.N.R.N.).

Officers of the Congress:

Our officers of the Congress: The President of the Rassegna, the President of the Nuclear Section and the relative Committees.

Proposed topics:

The introduction of the proposed topics has been entrusted by the National Nuclear Research Council to prominent experts.

The topics under discussion are the ones listed on the programme. General rapporteurs have 40 minutes at their disposal for the introduction of their paper. Each general report will be followed by a discussion of not more than ten minutes. The discussion is free and open to all participants in the Congress. It is subject to the decision to be taken by a presiding committee composed of one or several of the Officers of the Congress.

In view of the large programme on hand, eventual written communications will be delivered to the Secretariat of the Congress and will be read only if there is sufficient time to do so. It is the Presidency's privilege to decide on the publication of these communications in the Official Proceedings of the Congress.

Facilities at disposal of participants:

All participants will be issued a personal card and a badge giving them free access to the Palazzo dei Congressi. They will thus have the right to attend all manifestations organized during the period of the Rassegna (Film Festival, Special Days, etc.).

The running of the Congress may form the object of a further detailed daily programme to be issued before the beginning of procedure.

A special bus service reserved to the participants will assure the liaison between the principal hotels and the Palazzo dei Congressi. The busses will run on scheduled hours.

Italian and French State Railways have granted a 20 and 25 per cent reduction on fares in favour of visitors of the Rassegna. These reductions apply to the roundtrip tickets issued from the starting station.

Sightseeing tours and visits to industrial plants will be organized for participants and their families during the period of the Rassegna.

Ladies accompanying participants will be able to visit Rome by means of a special bus placed at their disposal during official Congress hours.

A fashion show to be held by one of Rome's principal fashion houses will be organized for the ladies accompanying participants. There will also be cocktail parties for participants and their ladies.

Participants will enjoy a 40% reduction on the price of the Official Transactions of the Congress.

Official reporters will receive one copy of the proceedings free of charge and are further entitled to a certain number of printed abstracts containing their report.

The following services are at the disposal of participants:

Simultaneous translation in four languages in the conference hall of the Palazzo dei Congressi,

Linguistic secretariat,

Hotel reservations,

Bank and Exchange office,

Post and Telecommunications office.

Persons wishing to participate in the Congress and who wish to fill out the special form which will be mailed to them upon written request to be sent to: Direzione della Rassegna Elettronica e Nucleare - Via della Scrofa 14 - Rome, telephone: 556.343 - 556.344 - 556.345.