International Atomic Energy Agency

INDC(NDU) - 13/G

INDC-308

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

TRAVEL REPORT OF A MISSION ON NUCLEAR DATA TO MEXICO, CHILE ARGENTINA AND BRAZIL FROM 23 JUNE - 1 AUGUST 1969

T.A. Byer
Nuclear Data Unit

Vienna, October 1969

INDC(NDU)- 13/G

Travel Report of a Mission on Nuclear Data to Mexico, Chile, Argentina and Brazil from 23 June - 1 August 1969

T.A. Byer
Nuclear Data Unit

ABSTRACT

The mission was undertaken at the request of Brazil, Chile and Mexico in order to establish close contact with the pertinent authorities in the national nuclear energy commissions, and above all, to develop such contacts with the working nuclear physicists and engineers in the most importanat laboratories and institutes, in order to better ascertain the activities, demands and needs of these scientists concerning nuclear data and related fields, as well as to familiarize them with the services offered by the Agency in this area of activity.

The report is divided into two main sections, in the first of which the conclusions of the visit are presented and these are followed by a review of the activities, including those outside of the area of nuclear data, of each of the Institutes and Laboratories which were visited in Latin America.

SECTION I

Conclusions

Nuclear data activities can be grouped into two broad areas of endeavour. On the one hand, there are the producers of the basic experimental data whose primary facilities are accelerators, for both neutron and charged particle work, and research reactors. On the other hand, there are the groups of users who cover quite a broad spectrum of disciplines, from the reactor designers, evaluators and nuclear engineers to the experimental and applied nuclear physicists.

The existence of a well-defined group of users of neutron data, particularly the sophisticated users such as the evaluator, reactor physicist and reactor designer, is itself a measure of the level of development of the national nuclear programme. In this context, such groups of users are rather active in both Argentina and Brazil, whereas in Mexico and Chile such a user community is yet to emerge.

1. Amongst the four countries visited there are a total of nine new accelerators whose installation has either just been completed or will be completed by mid-late 1970. Of these new facilities five are in Brazil (a 22 Mev Tandem Van de Graaff, an 80 Mev and 50 Mev linear accelerator, a 4 Mev Van de Graaff and a variable energy Cyclotron), two are in Argentina (a 25 Mev linear accelerator and a 2 Mev Van de Graaff), one in Chile (a variable energy Cyclotron), one in Mexico (a 12 Mev Tandem Van de Graaff) and it was learnt that Colombia is acquiring a 12 Mev linear accelerator. A large fraction of the experimental physics programme of six of these new accelerators is being or will be devoted to neutron measurements and one of the needs expressed by these groups related to the question of foils and targets for performing experiments. Due either to the high cost of and/or the lack of adequate fabrication services locally, the availability of some targets remains a problem and particular interest was expressed about the possible role of the Agency in assisting to overcome this problem.

2. There was great interest on the part of the accelerator groups in the Compilation of Requests for Neutron Data Measurements, RENDA. This compilation contains over 900 requested experiments and will assist these groups in performing those measurements of the greatest importance. However, in view of the considerable increase in the number of accelerator facilities in the region, and the fact that most of the accelerator groups felt the need for some assistance in drawing up a detailed experimental programme and that these groups would benefit considerably, at this early stage of their development, in having greater contact both with each other and with other accelerator groups outside the region, makes the situation particularly favourable for the Agency to organize a Regional Study Group Meeting on Accelerator Utilization. This would afford an excellent means of enhancing, promoting and assisting in the effective utilization of these facilities, all of which will be installed by mid-late 1970.

3. Amongst the groups of sophisticated users of neutron data in Argentina and Brazil, the importance of a greater degree of exchange of evaluated neutron data and related information between the four Data Centres was expressed. In fact, the existing evaluated files stored at the Agency, though very small, provide these groups with one of the only means of direct access to such advanced data and information. The importance of this data was particularly stressed by the Thorium Group at the Instituto de Pesquisas Radioativas in Belo Horizonte, Brazil, which is presently working on the design and development of a prototype heavy-water reactor based on the thorium cycle. This Group has, to-date, been one of the main requestors in Latin America for evaluated neutron data. A similar view was also expressed by the Fast Reactor Group at the Comision Nacional de Energia Atomica in Argentina. During the discussions with both of the above mentioned groups of users on evaluated neutron data, they attached special importance to the review and evaluation activities of the Nuclear Data Section, as represented by the evaluation of the 2200 m/s constants of the four fissile nuclides and the recent survey on the α-value of Pu-239. It was generally felt that greater emphasis should be placed on these types of reviews, since this was an activity which the Data Centre was best equipped to perform and above all that such surveys would provide the users of neutron data with an immediate indication of where the data were inconsistent, inaccurate or non-existent.

4. At almost every Institute visited, the need for more direct contact with the Agency was stressed. This was particularly the case in those Institutes which were not part of the relevant national nuclear energy commission. In many cases the activities and functions of the Agency as a whole, quite apart from the more detailed programmes of its Divisions, were either not known or not clear. As a result of this situation, seminars were organized amongst the Reactor and Nuclear Physics Groups so as to familiarize them with the programme, activities and services offered by the Nuclear Data Section. These seminars were held at the Comision Chilena de Energia Nuclear in Santiago, the Centro Atomico Bariloche, the Comision Nacional de Energia Atomica in Buenos Aires, the Instituto de Energia Atomica in Sao Paulo and at the Instituto de Pesquisas Radioativas in Belo Horizonte.

5. A visit was made to CLAF, the Centro Latin Americano de Fisica, in Rio de Janeiro (this was not on the original itinerary), to ascertain the role played by this Latin American organization towards the further development of nuclear physics in the region. A few days prior to my visit a regional seminar on "Regional Cooperation in the Field of Fundamental Research in Physics" which was organized by CLAF and UNESCO had concluded. One of the recommendations of this seminar was that CLAF should explore the possibilities of cooperating and collaborating with the Agency in those areas of common interest. In this context, the Director of CLAF, Prof. Roberto Bastos da Costa, expressed an interest in paying a short informal visit to the Agency early in October, following the meeting in Paris of the UNESCO Executive Board of Directors. CLAF is now an established organ amongst the Latin American physics community and it would appear that a greater degree of collaboration and information exchange between the Agency and CLAF, particularly concerning those projects of regional significance, would be to the benefit of all parties concerned.

6. The community of both producers and users of neutron data attached great value to the bibliographic index, CINDA, and in particular the data index, CINDU, since the latter provides the only means of gaining access to the data and related information stored at the Nuclear Data Section.

7. The personal contact established with the personnel of both the Institutes and the Atomic Energy Commissions was particularly beneficial, in that it provided an opportunity to assess the needs and the growth of neutron physics activities in the region, as well as providing the scientific community with a better understanding of the services offered by the Nuclear Data Section. Developing countries cannot be expected to be as prolific producers of neutron data as the developed states and it is therefore clear that the dissemination of data (both evaluated and experimental) should have precedence over the collection of such data from these countries. In this context, the Nuclear Data Section provides those developing countries, more advanced in nuclear technology, with an information and 'data bank' service which they would otherwise not have. As a recommendation, future trips of this nature should be undertaken at a frequency of about once a year, (not including shorter visits to East Europe and the Near East) alternatively between the two farthest regions in the service area of the Nuclear Data Section, namely, "Latin America", and "Southern Africa, India and Southeast Asia".

SECTION II

This Section outlines some of the principal activities, including those outside of the nuclear data field, of each of the Institutes and Laboratories which were visited in Latin America. Those Institutes and/or Organizations which were visited though they were not on the original itinerary are indicated by an asterisk (*).

Mexico, 23-29 June

Mexico City

1. Centro Nuclear de Mexico - Comision Nacional de Energia Nuclear

The principal facilities at the Nuclear Centre at Salazar (about 30 kilometres outside Mexico City) are a 12 Mev Tandem Van de Graaff, under the direction of Prof. Marcos Mazari, and the 1 MW steady state Triga Mark III research reactor under the direction of Dr. Arnulfo Morales Amado. The reactor achieved criticality in November 1968 and the flux mapping had just been completed.

At the time of the visit, one of the problems the basic neutron physics programme faced was the absence of suitably qualified personnel, since there was no staff to carry out either (n,γ) studies or neutron resonance work. The Centre had lost some 50% of its professional staff, mainly to Mexican industry, and there appeared little likelyhood of this situation changing radically in the near future.

Despite these factors, the Reactor Physics and Engineering Group had carried out some experiments on the temperature distribution in concrete, whilst the neutron spectrometry group were developing theoretical models for liquids, since a Triple-Axis Spectrometer will be acquired in 1970 (with part Agency financing) and this will be used to study the structure of liquids and microscopic effects in liquids during phase transitions.

The Van de Graaff group consists of 6 graduate physicists under Prof. Mazari and they were performing the first experiment on the accelerator (total neutron cross-section measurements between 10-22 Mev on Hg and Sr) at the time of the visit. After the completion of these experiments it is planned to carry out further cross-section measurements on the medium-heavy elements in this energy range, as well as designing and setting up a small accelerator for injecting negative ions into the Tandem.

2. Instituto de Fisica, Universidad Nacional Autonoma de Mexico

There are two accelerator facilities in the Institute, however, neither of them are being utilized for basic neutron physics measurements and it was not envisaged that the existing accelerator utilization programme would include such experiments in the future.

The 3 Mev Dynamitron accelerator (1 mA of positive ions at 3 Mev), under the direction of Dr. George Richards, is being used primarily for polarisation and angular correlation work; whereas the 2 Mev Van de Graaff under the direction of Drs. Alba and Amando Lopez is utilized mainly as a service unit for the Radiobiology, Genetics and Agriculture Departments (food and crude oil irradiation) in the University.

A Nuclear Laboratory under the direction of Eng. Luiz Galvez, has been in existence since 1967 and provides irradiation services for the Departments of the University as well as for non-University Institutions, such as the Petroleum industry. A neutron generator (flux 10^{11}n/sq.cm/sec at 14 Mev) was being installed at the time of the visit, however, there was great need for additional equipment, of which the highest priority was assigned to a γ-radiation source of about 30,000 curies for food and seed irradiation.

3. Instituto Politecnico Nacional, Escuela Superior de Fisica y Matematicas*

A very brief visit was made to the Nuclear Engineering Department of this Institute. Dr. Pablo Mulas, head of this Department, pointed out that there was very little research activity in the Department and that this was unlikely to change in the near future. The Department was primarily concerned with teaching and its main facilities were a sub-critical assembly and a 14 Mev neutron generator.

Brazil, 30 June - 5 July and 20 July - 31 July

Porto Alegre, 30 June - 5 July

1. XXI Annual Meeting of Brazilian Society for the Advancement of Science, 30 June - 5 July

During this week, the 21st Annual Meeting of the Brazilian Society for the Advancement of Science (SBPC) was attended.

The SBPC is the principal professional scientific Society in Brazil in which all of the science disciplines from Physics to Agriculture are represented. There were over one thousand participants at the 21st Annual Meeting with over 800 papers being submitted, about 140 of which were in the field of Physics and Nuclear Engineering; however, very few of these 140 papers were delivered.

2. Instituto de Fisica, Universidade Federal do Rio Grande do Sul

A visit was made to this Institute - the Central Physics Department of the University - during the stay in Porto Alegre. The Institute was founded in 1959 and is presently under the direction of Prof. David Mesquita da Cunha. Within Latin American Universities as a whole, the organizational and scientific structure of this Institute was particularly impressive, particularly in view of the fact that it has only been in existence for ten years.

There are at present 5 Divisions in the Institute:

1). Theoretical Physics - Prof. Th. A.J. Marias, Prof. G. Jacob and Prof. D. Dillenburg

2). Experimental Physics - Dr. John Rogers, Dr. Pedro Andrade, Dr. Fernando Zawislak

3). Electronics

4). Radiochemistry - Dr. A.B. Todesco, Dr. Fraga

5). Teaching

The work in the Theoretical Division is all concentrated on Nuclear and Particle Physics with three main areas of research:

(a) Quasi-free particle interactions, of the type (p,2p) and (e,e'p)

(b) Perturbed angular correlations

(c) Quantum Electrodynamics

The Experimental Physics Division has three fields of research activity:

(a) Nuclear Spectroscopy - the measurement of γ-γ and e-γ angular correlations to study perturbed angular correlations - this is in connection with the Theoretical Division.

(b) Mössbauer Effect - An Agency expert, Dr. Sonnino, is presently directing the programme of this group which was started in 1968.

(c) Laser Group - This group was only recently created and the need was expressed for an expert to assist in defining and directing a detailed research programme.

In view of the absence of an accelerator, research reactor or neutron generator facility at this Institute, no research is being undertaken in the field of neutron physics.

Sao Paulo, 20 July - 23 July

3. Instituto de Energia Atomica

Two days were spent at this Institute, which possesses some of the most advanced nuclear facilities in Latin America. Discussions were held primarily with Prof. Marcelo Damy de Souza Santos, Head of the Nuclear Physics Division and Representative of Brazil on the INDC, as well as with Prof. P. Saraiva de Toledo, Head of the Reactor Physics Division. Foremost amongst the topics discussed were those of targets and evaluated neutron data, these being the most pressing needs of the two Divisions.

The Institute is one of the three Institues of the Comissao Nacional de Energia Nuclear and has a total staff of some 350 persons divided into 9 Divisions:

1). Division of Nuclear Physics
2). Division of Reactor Physics
3). Division of Radiochemistry
4). Division of Nuclear Metallurgy
5). Division of Chemical Engineering
6). Division of Nuclear Engineering
7). Division of Operations & Maintenance
8). Division of Radiobiology
9). Services Division - Health Physics, Isotope Production and Industrial Applications of Radioisotopes

The Institute's research reactor - 5 MW Swimming Pool - was working at a 2 MW power level at the time of the visit and was being fully utilized. In the experimental hall six experiments were either in progress or being set up. These were:

(a) Studies of positron annihilation with the K-shell electrons in heavy nucleii;

(b) Elastic scattering of cold neutrons in liquids; with preliminary studies being made on a vanadium sample for calibration purposes;

(c) Studies of the order-disorder transition in Ni$_3$Cr alloy;

(d) Photo-fission work on natural uranium and Th^{232}, for γ-ray energies between 5-10 Mev;

(e) A study of $(n\bar{e})$ processes using a sector type β-spectrometer of high resolution which was built at the Institute;

(f) Monochromatic γ-ray experiment to study γ-ray widths and lifetimes of excited states.

Some of the other principal facilities at this Institute are a slow neutron time-of-flight spectrometer, a Metro Vic MS2 Mass Spectrometer, a mass spectrograph used for analysis and experiments on isotope enrichment, a neutron diffractometer and a pulsed Van de Graaff used for measuring moderator parameters.

The professional staff of the Nuclear Physics Division is large comprising of 28 Ph.D and graduate level physicists.

4. University of Sao Paulo

Laboratorio do Accelerador Eletrostatico and the Betatron Group in the Department of Physics

The Laboratorio do Accelerador Eletrostatico is under the direction of Prof. Oscar Sala and consists of 17 senior staff at the Ph.D level. The main facilities are a 3 Mev Van de Graaff which was constructed in 1955-58 and a 22 Mev Tandem Van de Graaff which will be installed by the middle of 1970. At the time of the visit arrangements were being made to have this new accelerator "on-line" to the IBM 360/44 computer in the Department of Physics. The main line of research on the 3 Mev accelerator has been the study of deuteron induced

reactions on the light elements. For a given target absolute cross sections were measured for the elastic as well as reaction channels with the aim of studying to what extent nuclear reaction theories, first applied to medium and heavy elements, were able to account for the observed cross sections in the light nucleii where their validity is less certain. Work has also been proceeding on angular correlation experiments using proton capture reactions as well as He^3 induced reactions.

Research and development work is also being carried out on Ultra High Vaccua with studies being made on orbitron devices. In addition, the klystron bunching technique has been developed and was being tested for the neutron time-of-flight programme. It is planned to begin neutron measurements on absolute cross sections in the Kev region by the middle of 1970 and a Fast Neutron Group was presently being established for this purpose - this work will be performed on the 3 Mev accelerator.

The importance of a greater degree of regional cooperation in experimental nuclear physics was stressed by Prof. Sala and he envisaged that following the installation of the 22 Mev Tandem there will be a large number of visiting research scientists both from within Latin America and outside the region.

Also within the Department of Physics is the Betatron Laboratory under the direction of Prof. José Goldemberg. The principal facility in this laboratory is a Betatron with a maximum electron energy of 22 Mev. This group has a staff of 15 persons and has done much work on (γ,n) processes. A new facility was being installed at the time of the visit - an 80 Mev linear accelerator - which will be initially devoted to experiments on backward scattering of electrons by protons. It is expected that the installation of this accelerator will be completed in 1970.

Rio de Janeiro, 23 - 29 July

5. Instituto de Engenharia Nuclear

The principal facilities at this Institute are:

1). An Argonaut reactor 10 KW, with a flux which is too low for either (n,γ) studies or radioisotope production.

2). A 14 Mev pulsed neutron generator.

3). A γ-ray spectrometer.

4). A variable energy Cyclotron, whose installation was about to begin at the time of the visit.

The Nuclear Physics Division comprises of a staff of some six professional persons and the Division head, Dr. Arthur G. da Silva, pointed out that the Cyclotron will be utilized both for radioisotope work and neutron experiments. The maximum neutron energy available would be 5 Mev with a flux (pulsed) of 10^{13} n/sq.cm/sec and a flight path of 50 metres and the experimental neutron programme would include:

(a) Transmission measurements;
(b) (n,γ) studies; and
(c) (n, charged particle) measurements

6. Centro Brasileiro de Pesquisas Fisicas

This is one of the oldest Brazilian Centres of Research in the physical sciences, being founded in 1949. The principal Divisions within the Centre are:

1). Theoretical Physics - research mainly in Particle Physics.

2). Radioactivity.

3). Solid State - Mössbauer effect and paramagnetic resonance studies.

4). Corpuscular Physics - main work performed in collaboration with the Cosmic Ray Centre at Chacultaya, Bolivia.

5). Accelerators.

The Radioactivity Division is headed by Prof. H.G. de Carvalho and its principal research activities are in the field of fission using emulsion techniques. This group works in close collaboration with the groups at CERN and DESY. Experiments have been performed on high energy proton fission and γ-induced fission, whilst a programme of experiments on electron-induced fission is presently being drawn up. Furthermore, systematic studies are in progress on γ-induced reactions for all the elements utilizing γ-ray energies between 300 Mev-6 Gev. This work is being performed in collaboration with the above mentioned groups. Work is also in progress on the measurement of spontaneous fission and α-radioactivity lifetimes $\gtrsim 10^{12}$ years.

The construction of a 50 Mev linear accelerator which was built by the Accelerator Division at the Centre had recently been completed prior to my visit, and an experimental programme was being drawn up. It is planned to carry out research in neutron physics with this facility, with the neutrons being produced in a uranium target. The first time-of-flight experiments to be performed will be (n,γ) studies in gold, silver and tungsten and all the equipment necessary for these experiments had already been acquired. The research group using the linear accelerator is under the direction of Dr. Solange de Barros.

7. Centro Latin Americano de Fisica, CLAF*

'Towards the end of the fifties, UNESCO tried to establish in Latin America a network of regional centres in the basic sciences. The main functions of these Centres were to be:

1). To organize and stimulate research activities in Latin America;

2). To plan and assist in training of research workers;

3). To organize short courses, symposia and congresses;

4). To promote regional cooperation and the establishment of regional projects.

At the beginning of the sixties, four centres were established; one for Mathematics, one for Biology, one for Chemistry, and one for Physics. The agreement by which these Centres were established was designed so as to ensure the independence of the Centres from the host country'(1). In fact, only one of

(1) Paper 'On the possibilities of regional cooperation' by Augusto Forti -UNES Delivered at a Regional Seminar 'On Cooperation in the field of fundamental research in Physics', 22-24 July, 1969 at CLAF in Rio de Janeiro.

these Agreements, namely the one concerning the Latin American Centre of Physics, became operative and has been signed and ratified to-date by the ten member states listed below, all of which are Member States of the Agency:

Cuba	March 26, 1962
Ecuador	January 24, 1964
Mexico	July 28, 1964
Brazil	August 11, 1964
Peru	November 25, 1964
Nicaragua	June 10, 1965
Argentina	May 23, 1967
Chile	February 7, 1968
Venezuela	February 7, 1969
Uruguay	July, 1969

The representation of both the scientific community and the Latin American governments has characterized CLAF from the outset - a necessary condition if the Centre is to fulfil its objectives. In addition, a cooperation agreement was established between CLAF and UNESCO in August 1967.

The programme of CLAF is based upon the following areas of action:

I. Preparation of Personnel
II. Development of Research
III. Regional Cooperation
IV. Information and Communication.

I. The Programme of Preparation of Personnel is oriented towards the training of research scientists and university staff. Each student receives training at the Latin American institute best suited for the particular area of specialization.

II. The Research Programme is aimed at assisting research groups by means of the exchange of research scientists and, in certain cases, assistance in equipment.

III. The Regional Cooperation Programme supports regional courses, seminars and congresses.

IV. The Programme of Information and Communication aims at establishing better communication between Latin American physicists. Through this programme CLAF publishes a monthly bulletin NOTICIA, which has a circulation of 1500 throughout Latin America. This programme also involves the carrying out of statistical surveys, such as: Directory of Physicists, Directory of Institutes, Directory of Research Groups and a Directory of Physics Courses. Furthermore, in order to minimize the problems associated with "access to information", CLAF has started a Xerox-service. It supplies, on request, Xerox-copies of research papers which may be unaccessible at the library of a given Institute, and it is planned to improve this service by agreements with libraries and documentation centres. Further to the Information Programme, a new publication is being prepared by CLAF on "Particle Accelerators in Latin America".

In Appendix I, further information is given about these activities of the Organization aimed at enhancing regional cooperation in Latin America.

8. Comissao Nacional de Energia Nuclear

The Commission has three research Institutes, the Instituto de Energia Atomica in Sao Paulo, the Instituto Engenharia Nuclear in Rio de Janeiro and the Instituto de Pesquisas Radioativas. During the visit to the Commission, discussions with the Head of the Department of Scientific and Technological Research, Dr. Lygia Baptista, and the Director of the Education and Scientific Exchange Department, Prof. Wilson Bandeira de Melo, were concerned mainly with the question of targets for nuclear data measurements. Dr. Baptista undertook to draw up a detailed list of the targets which were needed by the experimental groups in Brazil and which were difficult to acquire locally.

9. Pontificia Universidade Catolica*

A very brief visit was made to the Instituto de Fisica in this University where a 4 MeV Van de Graaff accelerator was being installed. This will be completed early in 1970 and will be under the direction of Dr. Alceu Goncalves Pinho Filho. The Director of the Institute, Dr. Thomas L. Cullen, pointed out that the principal research activities in the Nuclear Physics Division, which has a professional staff of 6, have been in the field of nuclear spectroscopy; however, with the advent of the Van de Graaff it is planned to extend these activities to charged particle reaction studies and possibly to neutron physics if the necessary equipment is available and a neutron experimental hall constructed.

The largest division in the Institute was that of Theoretical Physics with a professional staff of 9, all of whom were involved in research in Particle Physics and Quantum Mechanics. This is not an atypical situation amongst many of the Universities visited in Latin America.

Belo Horizonte, 29 - 31 July

10. Instituto de Pesquisas Radioativas

Two and a half days were spent at this Institute having lengthy discussions on the question of evaluated data with the staff of the Reactor Engineering Division, which is under the direction of Dr. Witold Lepecki. This group is one of the most advanced and important users of experimental and evaluated neutron data in Brazil and they are presently beginning to establish comprehensive and systematic nuclear data libraries for their reactor calculations. The primary task of the Reactor Engineering Division, and in fact the Institute as a whole, is the TORUNA project, i.e. the development of national power reactors based on the thorium-natural uranium fuel cycles. Studies towards the realization of this project have been under way since 1966 and at the time of the visit steps were being taken towards the construction of a sub-critical assembly for further reactor physics studies on uranium oxide - heavy water lattices, prior to the construction of a prototype.

Since there are no plans to perform their own evaluations based on the existing experimental data, a greater degree of international exchange of evaluated neutron data is of particular importance to this Institute, as the Agency is one of its only reliable sources of this advanced type of data.

Chile, 6 - 10 July

Santiago, 6 - 10 July

1. Comision Chilena de Energia Nuclear

The Commission is presently establishing the Centro Nacional de Estudios Nucleares where the 5 MW Herald type research reactor will be installed. Since the reactor is not expected to achieve criticality before the end of 1970, Dr. Alex Trier, pointed out that as far as research in basic physics was concerned major emphasis was being placed on the preparation of personnel and the formulation of an experimental programme.

The research to be undertaken in the experimental physics programme will consist of three main areas of activity:

1). Nuclear Spectroscopy and Activation Analysis;

2). Irradiation Effects and Radiation Damage;

3). Utilization of Neutron Beams - inelastic neutron scattering and studies of the liquid and solid states.

There are possibilities that a chopper and time-of-flight spectrometer may be supplied with the reactor; however for the present, the most important need expressed was for an Expert for about 3 months in 1970 to assist in further defining and formulating the research programme in 3). above.

2. Facultad de Ciencias Fisicas y Matematicas, and Facultad de Ciencias, Universidad de Chile

The Nuclear Physics Section, under the direction of Dr. Patricio Martens Cook (Liaison Officer to the INDC), is one of the 14 research groups which make up the Department of Physics in the Facultad de Ciencias Fisicas y Matematicas. The principal facility in this Faculty is an 800 Kev Cockcroft-Walton accelerator which up to 1966 had been used primarily for neutron physics work. Dr. Martens Cook pointed out that the accelerator had been inactive for the past two and a half years, however, it was intended to re-activate the machine early in 1970 when a programme of neutron non-elastic experiments would commence.

The principal facility at the Facultad de Ciencias is a variable energy Cyclotron capable of accelerating protons to energies between 4 to 10 Mev, as well as accelerating alphas and deuterons. The Cyclotron is under the direction of Dr. Jorge Zamudio C. and at the time of the visit the first experiment, on backward alpha scattering at 180°, was being performed. Using this facility it is planned to carry out experiments on elastic scattering of 4-10 Mev protons on nucleii of intermediate mass and to study nuclear reactions induced by 10 to 20 Mev neutrons. Construction of the neutron experimental hall had just been completed at the time of the visit.

Argentina, 10 - 20 July

Buenos Aires, 10 - 13 July and 15 - 20 July

1. Comision Nacional de Energia Atomica

The Commission has four Research Centres, two of which are in Buenos Aires - one at the Administrative Headquarters on the Avenida del Libertador and the other at Constituyentes. The two other Centres are at Ezeiza and San Carlos de Bariloche.

Meetings were arranged by the Liaison Officer to the INDC, Lic. Clara Mattei, with the Reactor Physics and Nuclear Physics Groups in the Departments of Reactors and Nuclear Physics, respectively. The latter group has two principal facilities:

1). A 1.2 MeV Cockroft-Walton accelerator which was being used for work on isotope separation, on line with electromagnetic separators, for making the lighter targets.

2). A Synchrocyclotron for accelerating deuterons, protons and alphas to energies of 28, 14 and 55 MeV, respectively. This accelerator has been and is being used to study the nuclear reactions of charged particles.

It was pointed out by Dr. M.J. Sametband of the Cyclotron Laboratory that the construction of an Isochronous Cyclotron capable of accelerating protons from 10-130 MeV should begin in 1970. This new facility would be installed at the Ezeiza Centre and it is planned to begin a programme of fast neutron measurements as soon as the construction is completed.

The Reactor Physics Group has a staff of about 15 professional persons under the direction of Dr. Guillermo Ricabarra. This group is primarily concerned with Fast Reactor physics studies and from the experimental standpoint they were performing fission product measurements in the resonance region, as well as carrying out resonance integral measurements, whereas on the calculational and theoretical sice, work was being performed on the development of neutron thermalization codes. The most important needs which were expressed were for data on nuclear parameters, as well as for some of the fissile evaluated data files presently stored at the Nuclear Data Section.

A visit was made to the Centre at Ezeiza where the 5 MW research reactor, RA-3, is located; however, no neutron physics experiments were in progress at that time.

2. Laboratorio de Radiaciones, Instituto de Investigacion Aeronautica y Espacial

A visit was made to the Laboratorio de Radiaciones which is under the direction of Prof. Horacio E. Bosch. The main activities of the Laboratory are concerned with basic research on low-energy nuclear physics and its application to studies in the upper atmosphere with rockets and balloons. Apart from the basic equipment necessary for pulse analysis (scintillation, semi-conductor counters and pulse height analyzers) the Laboratory does not possess any major facilities and it was not envisaged that the research programme will include any work in neutron physics.

The basic nuclear physics studies at present range over 6 fields:

1). Systematic analysis of the properties of even-even nuclei;

2). Studies of the orbital electron-capture process and internal bremsstrahlung;

3). Studies of the internal conversion - electron process through the measurement of conversion coefficients and electron-gamma angular correlations;

4). General decay-scheme studies; and

5). Beta-decay studies.

The Laboratory has a professional staff of eight and five graduate students and six technical staff.

3. Scientific Documentation Centre of the National Council for Scientific and Technical Research

A very brief visit was made to the Scientific Documentation Centre which was established in October 1962 and began functioning in 1964 under the direction of Mr. Ricardo Gietz. The Centre's principal function is to provide documentation services (bibliographic, photographic reproduction and translation) to the Argentine scientific community.

Further information on the activities of this Centre are given in Appendix II.

San Carlos de Bariloche, 13 - 15 July

4. Centro Atomico Bariloche and Instituto de Fisica "Dr. Balseiro"

Whereas the Instituto de Fisica is financially supported by both the Commission and the Universidad Nacional de Cuyo and is concerned primarily with post-graduate teaching (there are about 80 post-graduate students), all research is performed at the Centro Atomico which is the fourth research centre of the Commission.

The principal facility at the Centro Atomico is a 25 Mev linear accelerator with an average current of 10 μA, a repetition rate of 100,50 or 25 pulses/second and an injection voltage of 80 kev for a duration of 1 μ sec. It is planned to

use this facility primarily for neutron experiments and at the time of my visit the time-of-flight equipment had already been assembled. The attainable neutron energies with this facility will be from thermal energies to about 10 kev and the experimental programme includes transmission measurements, as well as neutron spectra measurements in those materials which are of greatest interest for the Reactor Physics Group in Buenos Aires. During my visit, two experts from General Atomics, who were sponsored by the Organization of American States, were working with the Neutron Physics Group, for one month, to assist them in drawing up the detailed experimental programme for the linear accelerator based on the existing equipment. The Neutron Physics Group is under the direction of Dr. Hector Antunez (Director of both the Institute and the Centro Atomico) and Dr. Carlos Castro Madero.

The other facilities at the Centre include 2 Cockcroft-Walton accelerators of 360 and 60 kev, as well as a 2 Mev Van de Graaff which will be installed in 1970. The 2 Cockcroft-Waltons were being utilized by the Atomic Collisions Group under Dr. W. Meckbach, for the measurement of charge changing cross sections at very low energies ($\sim$2 eV in the centre-of-mass) by the method of alligned or merging beams.

APPENDIX I

A N N E X E I

COUNTRIES PARTICIPATING IN THE ACTIVITIES OF CLAF

All Latin American Countries but Haiti.

A N N E X E II

FELLOWSHIP PROGRAM

NACIONALITY	NUMBER	
Argentine	16	
Bolivia	5	
Brazil	63	(*)
Chile	10	
Colombia	5	
Costa Rica	7	
Ecuador	8	
Honduras	1	
Mexico	7	
Nicaragua	1	
Peru	5	
El Salvador	3	
Venezuela	3	
TOTAL	134	

(*) Including 22 fellowships under special program supported by Ministério de Educação e Cultura of Brazil.

A N N E X E III

VISITING PROFESSORS AND RESEARCHERS

NACIONALITY	NUMBER
Argentine	12
Bolivia	2
Brazil	23
Colombia	1
Costa Rica	1
Mexico	5
Panama	1
Peru	1
Rep. Dominicana	1
U.S.A.	6
Italy	1
France	4
Spain	1
TOTAL	59

A N N E X E IV

REGIONAL COURSES, SEMINARS AND MEETINGS

1 - Escola Latino Americana de Física (ELAF)
(Latin American School of Physics)

High level school (research level) meeting every year for one month with about 150 participants from Latin America and some from USA and Europe.

Host Countries:

1962	-	Mexico	1966	-	Venezuela
1963	-	Brazil	1967	-	Chile
1964	-	Argentine	1968	-	Mexico
1965	-	Mexico	1969	-	Brazil

Participating Countries:

Argentine	Colombia	Peru
Brazil	Costa Rica	Uruguay
Bolivia	Guatemala	Venezuela
Chile	Mexico	
England	Italy	USA
France	Israel	Yougoslavia
Germany	Noroway	

2 - Curso Centro Americano de Física (CURCAF)
(Central American Courses of Physics)

Meets each year for one mouth, at one of the Central American Countries. Aims the training of university teachers and advanced students.

Host Countries:

1966	-	Guatemala	1968	-	Honduras
1967	-	Costa Rica	1969	-	El Salvador

Participating Countries:

Costa Rica	Mexico
El Salvador	Nicaragua
Guatemala	Panama
Honduras	USA

Number of participants - 50

3 - Simposio Latino Americano de Física del Estado Solidos

(Latin American Simposium on Solid State Physics)

Meeting of solid state latin american research physicists, to discuss problems related to the field. Held for the first time in Caracas (1969) wil meet each two years. Next meeting being planned for Argentine.

Host Country:

1969 - Venezuela

Participating Countries:

Argentine	Colombia
Brazil	Mexico
Chile	Venezuela
	USA

Number of participants - 58

4 - Simposio Brasileiro de Física Teórica

(Brazilian Simposium on Theoretical Physics)

A national simposium, with research level, open to other countries of the region.

Host Country: Brazil

1968 and 1969 - Rio de Janeiro
Planned to meet in São Paulo in 1970

Participating Countries:

Brazil and Argentine

Number of participants: 100 to 150

5 - 1º Congresso Latino Americano de Física
(1st Latin American Congress of Physics)

An assembly of latin american physicists to discuss problems related to scientific policy in the field of physics, as well as, research papers. It is planned to meet each 3 or 4 years in different countries of Latin America.

Host Country:

1968 - Mexico

Participating Countries:

Argentine	Colombia	Guatemala	Uruguay
Bolivia	Costa Rica	Mexico	Venezuela
Brazil	Ecuador	Paraguay	
Chile	El Salvador	Peru	
France	Israel	USA	

Number of participants - 250

6 - Reunión Anual de la Sociedad Chilena de Física
(Annual Meeting of the Chilean Physics Society)

CLAF sponsors invited participants from other latin-american countries to discuss research papers.

1968 - 3 from Argentine
1969 - 1 from Mexico

7 - Cursos de Invierno de la Universidad de Puebla
(Winter Courses of Puebla University)

A national course, open to other countries of the region. Met from 1962 to 1965, up to the Puebla's physics group brake off.

8 - Round Table on the Teaching of Physics

A meeting convoked by CLAF, held in Bogota (Colombia) in 1965, with the participation of 10 physicists and invited representatives of international organizations, namely: UNESCO, OEA, NSF an ESI.

The meeting discussed problems related to the teaching of Physics in the 2 first years of the university.

Participating Countries:

Argentine	Colombia
Brazil	Guatemala
Chile	Mexico
	Venezuela

9 - Conference on Physics in General Education and Interamerican Conference on the Teaching of Physics

Both, well known conferences, held in June 1963 in Rio de Janeiro, were co-sponsored and organized by CLAF together with other international organizations, induding UNESCO, IUPAP and OEA.

10 - UNESCO Pilot-Project on the Teaching of Physics

CLAF supported 14 fellowships from 8 countries, in the final part of the Project.

A N N E X E V

RESEARCH GROUPS IN LATIN AMERICA WORKING IN COOPERATION WITH CLAF

1. - Argentine

   1.1 - Fundación Bariloche
   Theoretical Physics

   1.2 - Instituto José Balseiro (Bariloche)
   Theoretical Physics

   1.3 - Instituto de Investigación Aeronáutica y Espacial
   Nuclear Physics
   Radio Astronomy

2. - Bolivia

   2.1 - Cosmic Physics Research Group (Chacaltaya Laboratory)

3. - Brazil

   3.1 - Centro Brasileiro de Pesquisas Físicas: (Head-quarters of CLAF)
   Nuclear Physics
   Theoretical Physics
   Solid State Physics
   Computation Sciences

   3.2 - Pontificia Universidade Católica do Rio de Janeiro
   Theoretical Physics

   3.3 - Universidade de São Paulo (at São Carlos)
   Solid State Physics

4. - Central America

   4.1 - Solid State Physics-group in the University of Costa Rica.

   4.2 - A research group is being established under the

sponsorship of CLAF, in cooperation with the University of São Paulo (São Carlos, Brazil), for the University of El Salvador.

5. - Chile

5.1 - Universidad Nacional de Chile:

Solid State Physics

Theoretical Physics

Nuclear Physics

6. - Mexico

6.1 - Universidad Nacional Autónoma de México

Theoretical Physics, Solid State Physics and Nuclear Physics

6.2 - Instituto Politécnico Nacional

Solid State Physics (established by a cooperation agreement with the University of São Paulo, São Carlos, Brazil, under the sponsorship of CLAF)

7. - Paraguay

7.1 - Laboratorio de Radio-Isotopos y Eletronica Nuclear of the Universidad Nacional de Asunción

8. - Peru

8.1 - Universidad de San Marcos

Theoretical Physics

8.2 - Universidad Nacional de Ingenieria

Nuclear Physics

Solid State Physics

9. - Venezuela

9.1 - Solid State Physics in the Instituto Venezolano de Investigaciones Científicas.

A N N E X E VI

JOINT PROGRAM CLAF-ICTP (TRIESTE)

Latin American Physicists fellows in Trieste under the Program: (1968/69)

Peru	1
Brazil	2
Argentine	1
Chile	1
TOTAL	5

A N N E X E VII

RESUME OF ACTIVITIES FOR 1969

1. - Preparation of personnel

Fellowship Program

NAME	NACIONALITY	FELLOW IN	PROGRAM
L. M. Moya	Costa Rica	CBPF (Brazil)	M. Sc.
D. Clarke Binns	Costa Rica	CBPF (Brazil)	M. Sc.
M. H. Villavicencio V.	Ecuador	CBPF (Brazil)	M. Sc.
G. Gónzalez A.	Peru	Univ. Católica (Brazil)	M. Sc.
R. Armando Moreno	El Salvador	Univ. São Paulo (Brazil)	M. Sc.
F. Sánchez S.	Mexico	Univ. São Paulo (Brazil)	Ph. D.
I. C. Lima	Brazil	Centro Atomico Bariloche (Argent.)	Ph. D.
A. P. Malboisson	Brazil	Centro Atomico Bariloche (Argent.)	Ph. D.
R. Baquero P.	Venezuela	I. P. N. (México)	Ph. D.
L. C. Pardo	Colombia	Porto Rico	Ph. D.

2. - Development of Research

2.1. Program Lima/Santiago

NAME	FROM	TO
Marticorena	Peru (Univ.Nac. Ingenieria)	Chile (Univ. N. Chile)
Rostworowsky	Peru (Univ.Nac.Ingenieria)	Chile (Univ. N. Chile)

2.2. Program CLAF/ICTP (Trieste)

NAME	FROM	PROGRAM
F. Krmpotic	Argentine	Nuclear Matter Course
A. Pinho	Brazil	Nuclear Matter Course
P. Cordero	Chile	Elementary Particles

Plus 6 months-men to be appointed in 1969.

2.3. . Visiting Researcher

NAME	FROM	TO	PROGRAM
N. Clarke B.	Costa Rica	CBPF (Brazil)	Solid State Research Gro

3. - Regional Cooperation

3.1. II Brazilian Symposium on Theoretical Physics

Host Country - Brazil (Pontificia Univ. Catolica)
Number of Participants - 149
Countries Participating - Brazil and Argentine

3.2. I Latin American Symposium on Solid State Physics

Host Country - Venezuela (IVIC - Caracas)
Number of Participants - 58
Countries Participating - Argentine, Brazil, Chile, Colombia, Mexico, Venezuela and U.S.A.

3.3. CURCAF IV

Host Country - El Salvador (University of El Salvador)
Number of Participants - 50
Countries Participating - Costa, Rica, El Salvador, Guatemala, Honduras and Nicaragua

3.4. ELAF IX (in organization)

Host Country - Brazil
Number of Participants - about 150
Countries Participating - Argentine, Brazil, Chile, Mexico etc.

3.5. Regional Seminar on Cooperation in the field of Fundamental Research in Physics (CLAF/UNESCO joint Program) (in organization)

Host Country - Brazil
Number of Participants - about 30
Countries Participating - Argentine, Brazil, Chile, Colombia Ecuador, El Salvador, Mexico, Nicaragua, Peru, Uruguay and Venezuela.

4. - Information and Communication

4.1. NOTICIA

Monthly Bulletin

4.2. Publications:

Directory of Particle Accelerators in Latin America

4.3. Statistics

Directory of Physicists
Directory of Institutions
Directory of Courses of Physics
Directory of Programs of Research
Directory of Research Groups

APPENDIX II

National Council of Scientific and Technical Research

SCIENTIFIC DOCUMENTATION CENTRE

Avda. Rivadavia 1917
Buenos Aires, Argentina

Under Article 2(h) of Legislative Decree 1291/58, one of the functions of the National Council for Scientific and Technical Research (CNICT) is to accumulate and facilitate the use of the bibliographic material and documentation necessary for scientific research and, with this object in view, to make available the maximum possible information.

The Scientific Documentation Centre was established on 5 October 1962 by a resolution of the Board of the CNICT. It began functioning in 1964, after approval of the rules and regulations governing its operation and the appointment of its Director in December 1963.

The Council accorded the Centre a certain degree of functional autonomy so that it might act with greater flexibility and hence more efficiently.

Its task is to organize and provide documentation services to the Argentine scientific community and to promote at the national level the development and co-ordination of the bibliographic and documentation resources essential for research.

The functions assigned to it are as follows:

(a) To provide documentation services for research workers (for example, the provision of photocopies, translations and bibliographic information);

(b) To compile and maintain collective catalogues (union lists), bibliographies, publication lists and other material of interest to research workers in Argentina;

(c) To promote the preparation and provision in adequate numbers of abstracts relating to scientific work done in Argentina and to encourage standardization in the writing of such abstracts and in the preparation and presentation of papers describing the work in question;

(d) To contribute to the training of documentalists through the dissemination of new ideas, the organization of relevant activities and collaboration with institutions engaged in training in this field;

(e) To accumulate as much information as possible about the organization and activities of the research councils and similar institutions of other countries, about the organization of scientific work and the resources devoted to such work, about international scientific institutions, etc.;

(f) To serve as secretariat in the Council's relations with the International Documentation Federation (FID), with its Commission for Latin America and with other similar bodies and to perform all tasks arising out of membership of these bodies;

(g) To maintain relations with foreign and international documentation bodies and with those departments within major institutions which are responsible for scientific documentation and information, and to try to conduct and/or co-ordinate Argentina's international relations in this field;

(h) In general, to serve as a centre for the co-ordination and promotion of the activities enumerated above in the field of documentation and bibliographic work.

A Consultative Committee advises the Board on all matters relating to the promotion and co-ordination of documentation and bibliographic work. The Consultative Committee is made up of scientists representing different fields of research and of librarians and documentalists. Three sub-committees have also been set up: (a) for the Universal Decimal Classification; (b) for study of the nation's bibliographic resources; (c) for the Argentine scientific bibliography.

LIBRARY

The Scientific Documentation Centre has a small library designed essentially to meet the information requirements of the Council and of the Centre itself. At the very outset the CNICT decided not to create a large scientific library, which would have been very expensive, but rather to contribute to the improvement of libraries in existence at universities and other research institutions. Economic assistance has already been given on a number of occasions to libraries of this kind.

Essentially, the library gathers bibliographic material on subjects of general research interest, including scientific organization and policy and new developments in the world of science and technology. It also tries to gather the maximum possible information about the scientific activities of international organizations and about research councils and similar institutions in foreign countries. In addition, it collects reference works necessary for the bibliographic services provided by the Centre.

COLLECTIVE CATALOGUES (union lists)

The task of this Section is primarily to maintain the "Collective catalogue of periodic publications existing in scientific and technical libraries in Argentina". For this purpose it maintains card indexes and prepares new additions of and supplements to this catalogue. Persons interested in obtaining information about the existence in Argentina of a certain periodic publication and about library holdings of that publication may apply personally or by letter to this Section. It is also possible to make enquiries by telephone between midday and 6 p.m., each caller being limited for obvious reasons to three titles.

In addition, this Section gathers information for the "Collective catalogue of proceedings, reports and conclusions of congresses and other scientific meetings".

BIBLIOGRAPHIC INFORMATION

The main function of this service is to identify in appropriate lists, find in libraries and documentation centres, and obtain on loan, publications and scientific works requested by research workers for reproduction in the Centre's laboratory. The Section also keeps in touch and collaborates with similar services in Argentina and abroad with a view to obtaining those scientific works which cannot be found in Buenos Aires and the surrounding region. It also tries to help the scientific research worker in his search for bibliographic material by directing him towards those sources where the necessary information can be found.

The Centre has two bibliographic series which may be consulted: the "Bulletin signalétique", published by the Centre de Documentation of the Centre National de la Recherche Scientifique in France, of which there is a complete collection going back to 1951, and the "Science Citation Index". The latter is particularly useful as a means of supplementing the

information obtainable through other bibliographic series. The Centre has been subscribing to this publication since 1964. The Science Citation Index is produced mechanically and involves a novel form of indexing which provides the research worker with a new means of assembling the bibliography which he needs. The search begins with a work of whose existence the research worker is aware through a bibliographic reference. From there he goes on to obtain all other related references. These are listed in alphabetical order of authors and each entry is followed by the names of the authors and bibliographic data relating to those works in which reference has been made to that entry. An index gives under the name of the first author (with cross-references from the co-authors) the titles of these works. As can be seen, the common denominator of different works are the bibliographic references, so that it is possible to list for each entry (without limitation in time) contributions from different scientific fields. Classification by subject is eliminated, and with it the difficulty of dealing with concepts common to different disciplines and problems of nomenclature and language.

The PHOTOGRAPHIC REPRODUCTION SERVICE has developed furthest of all the Centre's activities. It may be used by all research workers who, for reasons of distance or because of other circumstances, are unable to consult works relating to their special field in local libraries. Accordingly, the following limitations are imposed:

(1) Works are not reproduced in cases where the research worker can find them in local public libraries or in local libraries where access entails easily surmountable difficulties (special permission);

(2) With the exception of urgent requests from abroad, works are also not produced if they have appeared in recent Argentine publications which can be obtained in the original free of charge;

(3) The Photographic Reproduction Service may also turn down a request if it finds that the original can be obtained by the user at a price lower than the cost of reproduction (in such cases, the Service will provide the necessary information).

Requests are accepted from:

(1) Research workers connected with the CNICT (members of commissions, full-time research workers, staff of institutes and laboratories, fellowship and grant holders);

(2) Research workers and teachers at non-profit-making institutions (official and private);

(3) Scientific and technical libraries and documentation and information centres for the purpose of meeting the needs of persons in the categories referred to in the preceding paragraphs, whose names and functions must be indicated).

The Photographic Reproduction Service covers all scientific and technical fields, including social sciences. As a rule, it supplies microfilm negatives (35 mm) and electrostatic copies produced by the Bruning system. In order to produce photocopies the Service:

(1) Requests the loan of originals from libraries in Buenos Aires and the surrounding region and carries out the necessary reproduction work at the Centre's laboratory;

(2) Requests photocopies from libraries which have the necessary reproduction equipment and are in a position to supply copies rapidly;

(3) Addresses requests to similar services in Argentina and abroad with which it has an exchange arrangement.

Users are required to submit requests on forms designed for this purpose. These are supplied to research workers together with instructions for filling them out and the rules and regulations of the Photographic Reproduction Service. Requests which do not comply with these requirements are not processed.

Although variations in demand make it impossible to specify the waiting period involved, it may be said that reproductions made at the Centre are ready within ten days on the average. For requests met with the help of services abroad, the average waiting period is normally about one month.

The prices for photocopies made at the Centre's laboratory are based on the cost of the materials used (film, chemicals etc.). In the case of microfilms requested from abroad, the invoiced price is converted into Argentine currency.

Within Argentina, payment is made on receipt of the photocopies. In the case of photocopies made abroad there are different forms of payment (for example, reciprocal accounts with annual liquidation of the balance) based on individual agreements.

TRANSLATION SERVICE

The object of this service is to provide research workers with access to major areas of scientific literature which might otherwise remain unknown owing to the items being written in languages not normally understood. Works in English, French, Italian and Portuguese are excluded.

The service operates in the following manner:

(1) A pool is being organized of translations made at other institutions in Argentina (especially those done officially), copies being supplied to research workers on request.

(2) The collaboration is obtained of leading translation services abroad which produce translations from Russian, Japanese and other languages into Spanish, French and English. When a request is received from a research worker, the Centre arranges for the translation to be sent from abroad, making the necessary payment in advance.

(3) Where a translation has not yet been made in Argentina and cannot be obtained from abroad (because it does not exist or because a Spanish version is required), or when a translation is required urgently, the Translation Service has one made by a specialized translator. For this purpose it keeps a register of professional translators for various languages and subjects.

Under the circumstances described in paragraph (1) above and where the Translation Service has already dealt with a similar request, the rates are approximately 20% of those for a new translation.

Under the circumstances described in paragraph (2), the price is stipulated by the organization abroad providing the translation.

Under the circumstances described in paragraph (3), the rates are based on the payment received by the translator who does the work.

When a request is submitted by a scientific research worker belonging to a non-profit-making official or private institution engaged in science, technology or higher education, the CNICT undertakes to pay 50% of the cost of translations made through the Translation Service. The Centre reserves the right to decide whether or not this facility should be granted and to limit the amount of work involved and the number of times the facility is granted to a particular user or institution.

The rates are 25% higher for translations from Spanish into other languages.

Requests must be presented in writing on a form which can be obtained from the Translation Service. Wherever possible, the text of the work for translation should be sent together with the request.

The Centre has acquired for the use of translators a collection of scientific and technical dictionaries and glossaries. In selecting these, efforts have been made not to duplicate the holdings of other specialized libraries. Lists are also kept of translations made and catalogues published by various translation services abroad.

Copies of translations made through the Translation Service are sent to the European Translation Centre in Delft, Netherlands.

Under the terms of an agreement with UNESCO, the Centre is headquarters of the Information Service for Scientific Translations in Spanish and Portuguese, the purpose of which is - as the name indicates - to gather and disseminate information about scientific translations made in Latin America, Spain and Portugal. Efforts are made to maintain contact with all institutions in Spanish- and Portuguese-speaking countries where scientific translations are made or commissioned and to make them aware of the value of translations, and of the need to record and keep copies of them and to submit such information to the Translation Service for subsequent dissemination.

DECIMAL CLASSIFICATION TABLES

The publication of Universal Decimal Classification (UDC) tables in Spanish is the responsibility of the National Institute for the Rationalization of Work, in Spain, to which this activity was entrusted by the International Documentation Federation (FID), the organization whose intellectual property the UDC is. The CNICT is a member of FID (representing Argentina) and the Scientific Documentation Centre deals with matters arising out of the Council's membership. In this capacity, the Centre has arranged with the National Institute in Spain to distribute the UDC tables in Argentina and to facilitate thereby the use of the system in Argentine libraries. Copies are received on consignment and the replacement of stocks is subject to prior payment for the tables sold. For this reason, and in order to ensure constant and uninterrupted distribution, sales are made on a cash basis.