

TECHNOLOGY UPGRADING PROGRAM

(AR-0141)

EXECUTIVE SUMMARY

**BORROWER AND
GUARANTOR:**

The Argentine Republic

EXECUTING AGENCY:

The Ministry of Economic Affairs, Works and Public Services, with the participation of the Economic Planning Secretariat, the Science and Technology Secretariat (SECYT) in the Office of the President of the Argentine Republic, and the National Scientific and Technical Research Council (CONICET).

AMOUNT AND SOURCE:

IDB:	US\$ 95.0 million (OC)
Local counterpart:	
National budget:	US\$ 62.5 million
Banco de la Nación Arg.:	<u>US\$ 32.5 million</u>
Total:	US\$190.0 million

**TERMS AND
CONDITIONS:**

Amortization period:	20 years
Disbursement period:	4 years
Interest rate:	variable
Inspection and supervision:	1% of the loan
Credit fee:	0.75% per annum

OBJECTIVES:

The basic purpose of the program is to help to enhance efficiency and competitiveness in Argentina's productive processes. The specific objectives sought are: (i) to promote activities in the area of technological innovation being carried out by companies producing goods and services for the market; (ii) to develop the capacity of public entities in the sector to conduct research and deliver science and technology services to the productive sectors concerned; (iii) to strengthen the linkages between existing research centers and productive enterprises; and (iv) to make the research being carried out by Argentina's science sector more relevant to the country's economic and social advancement.

DESCRIPTION:

Structurally, the program consists of two subprograms which, on the one hand, address the need to remove obstacles and stimulate innovative technological activities in small and medium-sized companies and, on the other, promote stronger linkages between existing research centers and productive enterprises.

The first subprogram is to be carried out by the Fondo Tecnológico Argentino [Argentine Technology Development Fund] (FONTAR), in cooperation with Banco de la Nación Argentina (BNA). This subprogram consists in providing financing to private companies for technology research and development (R&D) projects aimed at improving their competitiveness in domestic and international markets. There will be two lines of credit for private companies, one for loans which must be repaid in full and the other to provide venture capital with shared risk and reward. In addition, FONTAR will operate a third line, of limited size and duration, to finance technology projects developed by public institutes, other than universities, that provide technical services to productive enterprises.

The second subprogram will be the responsibility of SECYT/CONICET and will consist in awarding grants to the "Technology Linkage Units" recently created under Law 23,877, and to not-for-profit public and private research centers, to carry out technology linkage projects and research and development (R&D) projects whose results can be deployed to benefit the country's socioeconomic activity.

**ENVIRONMENTAL
CLASSIFICATION:**

The Environmental Management Committee, at its meeting of November 12, 1992, classified this as a Category II operation.

BENEFITS:

Since Argentina currently lacks facilities to finance R&D by private enterprise, the establishment and operation of FONTAR will provide a major stimulus and boost to technological innovation in productive activities, both directly and through technology upgrading services provided by public entities in the sector.

The SECYT/CONICET subprogram will basically serve to forge closer links between the research centers in Argentina's science and technology system and local productive enterprises, and to steer their already considerable scientific abilities toward activities more likely to raise the productivity and competitiveness of the economic system and deliver social services more efficiently.

RISKS:

In the case of FONTAR, the two main risks involve the kind of start-up problems experienced by any fledgling scheme and how to treat the technology risk of private R&D. With respect to the first risk, special care has been taken in shaping the organizational structure and operating mechanisms of

the new entity so that it can establish itself and begin lending with reasonable efficiency, while taking the greatest possible advantage of existing facilities such as those of the BNA. As for the technology risk, the aim has been to steer clear simultaneously of two opposite postures: that of subsidizing companies so that they can engage in R&D activities, and that of overlooking the fact that the private sector seldom embarks on such activities unless it has special incentives to do so. This program will offer private companies two distinct options: one in which they assume all profits and losses that may result from an R&D project, and the other in which they take on only part of the technological risk; in this case the company and FONTAR would together undertake to share the risk, as well as any benefits generated by an innovative R&D project.

In the case of the SECYT/CONICET subprogram, the chief risk consists of a dilemma: on the one hand, the public research centers, both university and non-university, which are accustomed to a basic research subsidy, will find it difficult to focus their efforts on solving production problems without powerful incentives to do so; on the other hand, the government subsidies to R&D centers could be passed along to private companies through collaboration between the two groups, which is contrary to Argentina's current economic policy. As a means of addressing this issue, projects would be classified by how close they are to commercial exploitation of the R&D results, and the technology linkage projects will require cost recovery in excess of the amounts of the grants, through charges to the companies which benefit from them.

A generic risk of the operation is that economic stability would not be maintained in Argentina. If interest rates rise, FONTAR's lines of credit might well find no takers because of the strong disincentive to innovate by going into debt. In the SECYT/CONICET subprogram, however, instability need not chill innovation in the same way, since it could shift demand for FONTAR credit from innovating companies toward the Technology Linkage Units. Faced with this eventuality, the Bank will need to monitor developments in the Argentine economy closely and watch what impact any changes have on the volume and direction of corporate demand for the financing of innovative activities.

**THE BANK'S
COUNTRY AND
SECTOR STRATEGY:**

The Bank's strategy in Argentina has been divided into two stages. The first, recently completed, consisted in backing the consolidation of economic stability through a series of sector adjustment operations, in tandem with the World Bank, for public sector reform and to support the privatization and/or franchising of State-owned enterprises and the process of renegotiating the country's external debt. The second stage, begun in 1993, comprises support to investments which are needed to consolidate the gains achieved but which were left off during the periods of instability and received low priority during the consolidation process. These investments are those needed to improve the delivery of services to the social sectors and for environmental protection and conservation efforts, and investments required by both the public and the private sector to enable them to compete more effectively on domestic and international markets.

I. FRAME OF REFERENCE

A. International framework of the program

- 1.1 Technological innovation and the associated phenomena of creativity, productivity and competitiveness are well defined features of modern economies. Companies, universities, workers and government are continuously striving and innovating to expand and diversify the production of goods and services. In such economies, the State characteristically acts to stimulate research and innovative activities among the population at large and entrepreneurs in particular. A review of international experience points to the development of a broad range of instruments for collaboration in this field between the public and private sectors. The experiences of the Small Business Innovation Research Program (SBIR) in the National Science Foundation in the United States, France's national research and development agency (ANVAR), Spain's center for the development of industrial technology (CDTI), and Japan's Ministry of International Trade and Industry, all illustrate specialized arrangements for financing scientific research and technology development, in which the State shares in the cost of the innovation process and encourages a spirit of innovation in the populace. The same thing is happening in other developed economies, such as Germany and Italy, and in newly industrializing countries such as Israel and South Korea.
- 1.2 Virtually all of the countries in Latin America have weak national science and technology systems, and as a group they lag far behind in this field, although this is by no means uniformly so throughout the region. Several countries have obtained Bank loans to strengthen their systems, and in all cases they included mechanisms to finance scientific research and technological innovation, in addition to other more traditional investments, for example in university infrastructure. In view of this international framework and against the backdrop of the economic policies being pursued in the countries of the region, there is growing interest in a more active role in this field.

B. The domestic economic setting

- 1.3 The Argentine economy is passing through a process of structural reform which began with the implementation of an economic plan that has restored macroeconomic equilibria and launched a fresh cycle of productive investments. These successes appear to represent a turning point in a trajectory which has been characterized for

decades by hyperinflation, spells of sharp disinvestment, financial speculation, the external debt crisis, and capital flight. In particular, economic gains include a fall in the inflation rate (effectively curbed by the Law on Convertibility, which restricted expansion of the money supply and set a fixed exchange rate), the lowering of interest rates, and the end of speculation (linked to the chronic instability in the ratio between the exchange rate and domestic interest rates). All this kindled expectations that favored economic stabilization and a substantial recovery in investment levels.

- 1.4 The foreign trade policy adopted by the government is characterized by a progressive lowering of tariffs, abolition of nontariff barriers, and reduction in the dispersion of the tariff structure. With specific regard to the export sectors, the increase in the competitiveness of production stems from implementation of policies which have a direct impact on what is referred to as the "Argentine cost." Particularly important in this respect are the system of enhanced labor flexibility, the privatization of energy and gas utilities, and a series of measures aimed at deregulating the country's overland, sea and air transportation systems, and intended both to streamline them and to reduce their operating costs. These developments were assisted by measures aimed at improving the effective real rate of exchange, such as the restoration of tax drawbacks on exports and the lifting of selected levies on foreign trade.
- 1.5 Cataloguing the major economic policy gains to date, however, does not imply that the instruments recently introduced are capable, on their own, of guaranteeing long-term growth in an economy that is opening up and is therefore increasingly exposed to the rules of international competition. In this connection, it is relevant to note that: (i) the structure of international trade is increasingly weighted in favor of technology-intensive goods which, directly or indirectly, have a growing research and development (R&D) content and which are manufactured as the result of product differentiation strategies as a way to win and hold on to markets; and (ii) Argentina's productive structure essentially rests on widely used agricultural commodities and industrial products, the international prices for which have been declining steadily in the last few decades and to which product differentiation strategies are virtually irrelevant.
- 1.6 This combination of circumstances raises the possibility that Argentina's entry into the world marketplace, in a context of opening-up policies like those now being pursued, will - at medium term - mean a resumption of structural balance-of-payments crises. Whether it can keep this threat at bay by developing high levels of genuine competitiveness - that is, levels that are sustainable over the long haul and capable at the same time of improving the living conditions of the population - will depend on how well the productive system can move beyond strategies centering on the

exploitation of natural factors and low wages, in order to place technical progress squarely at the heart of its competitive strategy. In Argentina's case, this could - for example, through efficient production of widely used industrial inputs - lead it to branch out into product lines with a higher value-added component, such as fine chemicals, novel materials, special papers, steels and aluminums, and agroindustries with a high technology content, all of which would entail more intensive use of skilled human resources and major efforts in terms of product design and engineering, process engineering, adoption of "total quality" management techniques, and so on.

- 1.7 The foregoing means that, alongside economic policy instruments that can create an investment-friendly climate, mechanisms are needed to encourage companies to incorporate technical progress. At present, the entrepreneurial sector as a whole does not possess the R&D capacity it would need for sustained competitiveness in world markets. For its part, the public science and technology sector was born and evolved with a structural organization geared to its own goals of excellence and academic independence, delinked from social and productive demands. Indeed, because of the belief that the teaching process combined with scientific advancement would automatically lead to greater technological development of the productive sector, only 6.3% of the R&D budget went into activities linked to the industrial sector.

C. Argentina's national science and technology system

- 1.8 Science and technology activities comprise four main, mutually complementary groups: (i) experimental research and development (R&D); (ii) training and education in science and technology; (iii) scientific and technological services; and (iv) leadership and governance activities, such as policy formulation, planning, promotion and coordination. These four major groups make up what is known by convention as the national science and technology system, that is, all institutions engaged in these activities and bound by more or less tight networking links.
- 1.9 In Argentina, the Science and Technology Secretariat [Secretaría de Ciencia y Tecnología] (SECYT), which is part of the Office of the President, and the Ministry of Economic Affairs, Works and Public Services set government policy for the national science and technology system and its level of public funding. The National Scientific and Technical Research Council [Consejo Nacional de Investigaciones Científicas y Técnicas] (CONICET), which comes under SECYT, is the primary executing agency for national policy in this field; it promotes, coordinates and carries out scientific and technological research, awards study grants for the training and specialization of research staff, and administers the "research worker career path" through a system of salary supplements and promotions for the country's top researchers.

- 1.10 R&D in Argentina is carried out mainly at universities and public research institutes and, to a lesser extent, in a number of companies that have their own technology development departments. The chief non-university public research entities are CONICET itself, the National Institute of Agricultural Technology [Instituto Nacional de Tecnología Agropecuaria] (INTA), the National Institute of Industrial Technology [Instituto Nacional de Tecnología Industrial] (INTI), the National Atomic Energy Commission [Comisión Nacional de Energía Atómica] (CONEA), and the National Institute of Water Science and Engineering [Instituto Nacional de Ciencia y Técnica Hídrica] (INCYTH).
- 1.11 Education in science and technology in Argentina takes place mainly at 69 universities, 34 of which are public and 35 private. At the intermediate level the technical education schools of the former CONET are still operating and, under the new Federal Education Act of 1993, are being transferred to the provinces. There are also several public and private organizations which offer nonformal technical training. The training of scientists and engineers, however, is fairly heavily concentrated in a handful of national universities - Buenos Aires, La Plata, Córdoba, Rosario, Santa Fe (Universidad del Litoral) and Bahía Blanca (Universidad del Sur) - which also conduct the lion's share of university research.
- 1.12 A variety of public institutes and private companies deliver science and technology services which employ the specialized staff and instrumentation of the sciences but do not generate new knowledge, products, or processes. Typical of this group are organizations engaged in compiling data on natural phenomena, standardization, metrology and quality control, extension agencies, consulting firms, analysis and testing laboratories, and information centers.
- 1.13 Internationally, Argentina occupies an intermediate position as far as scientific development is concerned and is relatively more advanced than the developing countries. Comparative studies on scientific activity in Latin America (Stanford Research Institute, 1985; IDB, 1988) generally place Argentina between Brazil and Mexico in overall scientific production, even though its population is much smaller than that of either. In terms of human resources, Argentina's science and technology system comprises some 19,000 researchers on a full-time equivalent, which gives it the largest supply in the region relative to population. Argentina is the only country in Latin America to have won Nobel prizes (three) in science.

D. The country's science and technology constraints and needs

- 1.14 Despite Argentina's relatively favorable position compared with other Latin American countries, it still lags far behind the industrialized and even the newly industrialized nations. For example, a comparison of indicators for Argentina and Israel shows

the number of researchers per 10,000 members of the work force to be 14 and 58.4, respectively; Argentina's total scientific output, measured by the number of publications of international repute, is about one-sixth that of Israel, while the level of resources earmarked for R&D - as a proportion of GDP - is 0.3% in Argentina and 3% in Israel. Absolute differences with such countries as Germany, Japan and the United States are, of course, much greater.

- 1.15 Not only is Argentina's present level of R&D funding inadequate compared with what is needed to compete successfully in world markets, but the structure of its effort in this field shows a very marked bias toward research unconnected with the productive apparatus. This can be seen, for example, in the proportion of researchers working in basic sciences and medicine, which account for 51.5% of the total, as compared with only 15.8% in branches of engineering. The percentage of R&D expenditure financed by the private sector is less than 10% in Argentina, contrasted with 19.8% in Brazil, 41.7% in Italy, 49.1% in the United States, 51.4% in Spain, and more than 60% in Germany and Japan.
- 1.16 The basic imbalance between science and technology found in Argentina is due partly to the general absence of R&D work by private companies, and partly to a longstanding Argentine tradition of basic research, arguably reinforced by the orientation imparted to CONICET and the scientific community by the values and international achievements of some prominent Argentine scientists.
- 1.17 From the standpoint of economic and social development, progress in science and technology is not an end in itself, but a means of achieving more development than would be possible without such progress. Although they laid the foundation for a solid base of scientific capacity - which is vital for technology development in today's world, and especially for high technology - the country's efforts in this field should now be brought to bear on the technological modernization of society, with special emphasis on the efficiency and competitiveness of productive enterprises.
- 1.18 Argentina would need to step up its science and technology effort significantly and rank its priorities better for the future. In particular, there is a need: (i) to augment corporate R&D; (ii) to foster all kinds of linkages, associations and contractual arrangements between production companies and existing R&D centers, so that the sizable capacity they have already achieved can be devoted increasingly to the technology upgrading that the country needs; (iii) to raise the share of public sector R&D resources earmarked for biddable projects whose results stand a reasonable chance of being transferred to the production apparatus; and (iv) to gradually correct the human resource imbalance by expanding the training and specialization of researchers in technological disciplines.

E. The government's science and technology policy

- 1.19 The document outlining the program referred to as "Argentina on the Move, 1993-1995" (*Argentina en Crecimiento, 1993-1995*), published by the Executive Branch, spells out the "policies for the advancement of science and technology and their application to production." The ultimate aim of these policies is to boost the percentage of GDP that is spent for this purpose and expand sector efforts aimed at upgrading the technology of the productive sectors.
- 1.20 A key thrust of the Argentine government's science and technology policy has been and continues to be to restructure the public science and technology system around the development needs of the productive sector. Some examples of this effort are: (i) SECYT was elevated from a department in the Ministry of Education and Culture to a Secretariat in the Office of the President, reporting directly to the President; (ii) Law 23,877 on the Promotion and Development of Technological Innovation was enacted in 1991 and regulations were issued thereunder in 1992, to establish "Technology Linkage Units" (institutions linking universities and R&D centers to the production sector), authorize the SECYT to accredit them, allocate resources to finance projects, and lay the foundations for the restructuring of SECYT to expand its capacity to administer this new law; (iii) new institutional arrangements were devised for consultation, coordination and joint action in the science and technology area between the public and the private sector, such as COFEA, COMAPCYT and Technology Linkage Units at various R&D universities and institutes; (iv) the restructuring of the INTA was completed; (v) the restructuring of the INTI was begun and continues at this writing; and (vi) under the program proposed herein, the Argentine Technology Development Fund [Fondo de Desarrollo Tecnológico Argentino] (FONTAR) is to be created to provide financial support for the technological upgrading of productive enterprises.
- 1.21 On the technology issue, the broad goal of the government's economic policy is to assure continuity and to deepen the ongoing process of restructuring the public science and technology sector, while creating incentives to the private sector to induce companies to adopt innovative technologies that will make them more competitive. One of the foremost instruments selected is financing of R&D through the creation of ad hoc mechanisms distinct from those intended for the incorporation of equipment and plant construction; in these last two areas, key elements are the management of bilateral and multilateral lines of credit and the creation of the Banco de Inversión y Comercio Exterior [Investment and Foreign Trade Bank] (BICE). In the case of financing for private R&D and other innovative activities by companies (which is almost totally lacking in Argentina), the central idea is to promote demand for know-how and techniques that are relevant to

commercial production and to sharpen competition among those offering technology, in the public and private spheres alike.

F. Conception of the program

- 1.22 The Argentine government has proposed the program described in this document within the framework of the decisions it is taking with the aim of renewing and modernizing the national economy. After instilling a situation of monetary and exchange stability which, despite its obvious advantages, has proved very costly in terms of loss of external competitiveness, the need now is to strengthen the position of Argentine production abroad by strengthening its efficiency and its ability to compete, in part through technological innovation and upgrading.
- 1.23 The program will address this problem on two main fronts. First, it is designed to mobilize the stock of knowledge and skills that has been built up in existing research centers, so that they can do more to help upgrade the productive activities of companies. The goal is thus to forge linkages between the science and technology sector and the day-to-day business of producing for the market. The incentives to technology upgrading that come naturally with the opening up of the economy are not enough to overcome the traditional reluctance of Argentina's scientific community to use and upgrade its skills for commercial gain. There is also a need to promote such a change in approach directly through appropriate resource allocation criteria and mechanisms that will encourage the linkages referred to and will make R&D more relevant to productive activities.
- 1.24 Second, the program is aimed at overcoming obstacles that small and medium-sized companies commonly face in bringing technological innovations into their production processes. The obstacles are sometimes the result of a fear of innovation, which can be lessened if proper technical assistance and information are provided. At other times, the obstacles arise from an aversion to the financial risk of innovation; the more limited the access to financing at medium and long term, the more understandable this risk becomes. As international experience has shown, special mechanisms for financing technological innovation that allow for and reduce this risk can lessen this aversion and generate a great deal more innovation than would be possible without them. Finally, where virtually no medium- and long-term credit exists to finance technology innovation, as in Argentina, the mere fact of establishing financing facilities for this purpose will encourage companies that are prepared to take the risk but cannot find the necessary financing to take the plunge.
- 1.25 Under the proposed program, the Argentine Technology Development Fund (FONTAR) will be created, as a new means of channeling funding for technology upgrading. FONTAR was designed by the Ministry of Economic Affairs, Works and Public Services to fill a crucial gap:

the financing of R&D and other innovative activities undertaken by the country's productive enterprises. Initially, for a limited time and amount, FONTAR will also have a window offering financial resources to strengthen entities that provide scientific and technological services to productive enterprises. FONTAR will help to ease the obstacles, identified earlier, which small and medium-sized companies face when it comes to financing innovative projects.

- 1.26 The program will affect one of CONICET's traditional funding-allocation mechanisms, namely the financing of research and development (R&D) projects. The difference will be that, under this program, financing will be restricted to biddable R&D projects, with ex ante economic appraisals, where there is a high probability of their results being transferable to socioeconomic activity. This change will further the efforts which the Argentine authorities have been making to correct the heavy bias in favor of basic science that CONICET has shown in the past and to lessen the basic imbalance which exists in Argentina between science and technology.
- 1.27 Finally, the program will support a new resource allocation mechanism of SECYT, created by Law 23,877, which consists in financing "Technology Linkage Unit" (TLU) projects at universities and public R&D centers that involve a partnership (with a formal contract) between at least one company and one TLU. Projects of this kind, referred to in this document as "technology linkage projects" (TLPs), will in particular encourage partnerships between the country's existing R&D centers and productive enterprises. As mentioned earlier, such linkages are one of the main needs of Argentina's science and technology system, and are essential to modernizing the technology of the productive apparatus.

G. The Bank's strategy

- 1.28 The Bank's strategy in Argentina has been divided into two stages. The first, recently completed, consisted in backing the entrenchment of economic stability through a series of sector adjustment operations, in tandem with the World Bank, for public sector reform and to support the privatization and/or franchising of State-owned enterprises and the process of renegotiating the country's external debt. The second stage, begun in 1993, comprises support to investments which are needed to consolidate the gains achieved but which were left off during the periods of instability and received low priority during the consolidation process. These investments are those needed to improve the delivery of services to the social sectors and further environmental protection and conservation efforts, and those required by both the public and the private sector to enhance competitiveness in domestic and international markets.
- 1.29 The program proposed here is in keeping with the guidelines set in the second stage of the Bank's strategy, in which high priority is

attached to raising the competitiveness of Argentine production by, among other things, strengthening the science and technology system.

H. Bank financing in the sector

1. Financing approved to date

- 1.30 The Bank's involvement in Argentina's science and technology sector dates back to 1979 with the granting of loan 348/OC-AR for US\$66 million, which paved the way for the financing of a second operation of US\$61 million in 1988 under loan 515/OC-AR. The objectives of the first program were to promote the decentralization of science and technology services and of research and development through the establishment or expansion, equipping and staffing of nine regional centers; to provide technical assistance; and to train skilled human resources. By the time of its completion in 1986, six regional centers had opened their doors, 234 person-months of specialized consulting services had been contracted, and 1,426 study grants had been financed for researchers and technicians in the sector. Work on the three remaining regional centers (INCYTH, the Bahía Blanca Research Center, and CERIDE II), which at the time of the last disbursement of Bank funds was still unfinished, is being financed by a local contribution of US\$8 million. Construction and equipping of CERIDE II and the Bahía Blanca Research and Development Center were recently completed, and 95% completion was reported at INCYTH. The centers are all expected to be in operation in 1994.
- 1.31 With the completion of loan 515/OC-AR, which has an expected termination date of March 1994, 950 research and development projects will have been successfully executed, 56 national laboratories for research and scientific and technological services will have been equipped, and 338 grants will have been awarded for advanced studies in different areas. As a special feature, this operation included, on a pilot basis, a technology exchange sub-program designed to build links between institutions that conduct research and provide science and technology services and the productive sector, and to facilitate the transfer of technology. As of October 31 of this year, 95% of the resources had been disbursed.
- 1.32 The two-year delay in this program was chiefly due to the changes introduced in 1986 in the laws and institutions governing the country's science and technology sector, which culminated in 1991 with the promulgation of Law 23,877 on the Promotion and Development of Technological Innovation, followed in 1992 by its regulations. These legal instruments laid the foundations for establishing Technology Linkage Units, which meant that the technology exchange component got off to a very slow start owing to the development of courses on science management and technology transfer and of an information network and a database on technology

available to the productive sector. At present, the funds are committed for activities related to technological innovation through the operation of 12 Technology Linkage Units.

- 1.33 Execution of both programs was also set back by numerous changes in authorities, as well as by lack of experience on the part of the executing units and periods of very high inflation, and indeed hyperinflation, which led to delays in the works and in the availability of local funding, and to bidding difficulties. The design work for execution of the program proposed in this document has taken into account these and other experiences in managing the portfolio of loans to Argentina.

2. Contribution to the program proposed herein

- 1.34 The support afforded by the Bank's two previous financing programs helped Argentina to substantially strengthen and expand the physical infrastructure of its science and technology sector nationwide, increase the number of researchers in the sector and upgrade their knowledge and skills, and bring in major changes in the handling and volume of national resources earmarked for the financing of science and technology activities. This institutional infrastructure has been used successfully to conduct research and technology development projects in areas pertaining to modernization of the nation's production apparatus, which will enable the program proposed herein to respond quickly and effectively to the demand detected in the production sector to improve its processes and products.

II. THE PROGRAM, ITS COST AND FINANCING

A. Objectives

- 2.1 The basic purpose of the program is to help make Argentina's productive enterprises more efficient and more competitive through a process of technology upgrading that will be reflected in higher productivity. This upgrading effort will also boost productivity and heighten efficiency in the delivery of goods and services by the public sector.
- 2.2 The specific objectives of the program are as follows:
- a. To promote activities in the area of innovation and technological upgrading carried out by companies that produce goods and services for the market.
 - b. To have technology projects conducted by public entities in the sector which provide technological services to the productive sector.
 - c. To strengthen the linkages between existing research centers and productive enterprises of all kinds.
 - d. To make research in the national science and technology system more relevant to the country's economic and social development.

B. General description of the program

- 2.3 The program will consist in the coordinated operation of two subprograms:
- Argentine Technology Development Fund (FONTAR)
 - Technological innovation by SECYT/CONICET
1. Argentine Technology Development Fund (FONTAR) (US\$80 million)
- 2.4 The basic purpose of FONTAR is to help upgrade the technology of local productive enterprises by mobilizing funding specially targeted to realize their potential for innovation. Its specific objective is to provide direct financing for activities that will further the development of the technological and innovative capacity of productive enterprises.
- 2.5 FONTAR will be created to execute this subprogram. The government will transfer to FONTAR the IDB funding for the technology upgrading program. Banco de la Nación Argentina (BNA) will provide the local counterpart for credit lines 1 and 2 and will also act as financial intermediary for all FONTAR resources.

- 2.6 The subprogram will offer three credit lines or facilities, depending on the nature, objectives and technical risks of the projects submitted for financing: (i) Line 1: credits to private companies, with compulsory repayment in full; (ii) Line 2: credits to private companies, with risk- and profit-sharing, for high-risk innovative activities; projects promoted under the Bolivar Program will be eligible for these lines of credit; and (iii) Line 3: credits, with compulsory repayment in full, for technology projects of public institutions, other than universities, which provide services to the private sector.

Line 1: Financing for private companies, with compulsory repayment in full, to fund activities in the area of technological innovation: This line will finance up to 80% of project costs with loans on the terms described below. The innovation projects to be financed by FONTAR from this line of credit may consist in: (i) research and development of new production processes; (ii) the development of novel materials and products, including the construction of pilot plants and the production of prototypes as a first step toward launching new products in the market; (iii) substantive modifications or improvements to technologies, processes or products already in use; (iv) technical instruction or training of human resources, related to project objectives; and (v) establishment within companies of quality assurance units. The assets acquired and gains achieved through such financing will be the property of the beneficiary company, which will undertake in return to reimburse FONTAR for the full amount of the loan and finance charges.

Line 2: Financing for private companies, with risk- and profit-sharing, to finance high-risk innovative activities: This line will finance up to 60% of project costs, the activities eligible for financing being the same as for credit line 1. The criteria for measuring technical success or failure will be established contractually on a case-by-case basis. If a project is declared successful according to these criteria, the company will repay the loan, plus a surcharge of 10% on the original sum lent. If, on the other hand, FONTAR's experts rule the project a failure, the company will be entitled to partial forgiveness of the debt, on terms that are also to be spelled out in advance in each contract.

- 2.7 Upon completion of each project, FONTAR will prepare an evaluation of the results achieved so as to compile the information needed to decide what steps should be taken to recover the funding provided. Only in cases where technological failure is due to technical causes beyond the company's control, according to the pre-agreed criteria, will FONTAR decide on a sum to be forgiven, which in no case would exceed 50% of the loan, with a ceiling of US\$300,000. Companies themselves will decide, based on a project's level of technical risk, whether to opt for a fully reimbursable credit (line 1) or for shared risk and reward (line 2).

- 2.8 Line 3: Financing, with compulsory repayment in full, for technology projects of public institutions, other than universities, which provide technology services to the private sector: This line will finance activities which are eligible for the other two lines of credit but are executed by public institutions which deliver technology services to the private productive sector. Half of the amount financed under the program will come from resources contributed directly by the government and half from the IDB loan. The upper limit of this line may not be increased by transfers from other facilities, and repayments will be used to replenish lines 1 and 2.

2. Technological innovation - SECYT/CONICET (US\$85 million)

- 2.9 This subprogram is designed to create links between research centers and productive enterprises, finance science and technology development projects submitted by public institutions in the sector, and provide specialized training for human resources to help companies upgrade their technology.
- 2.10 Grants to technology linkage projects (SECYT). The aim is to encourage Technology Linkage Units (TLUs) to carry out sound projects. These units will help to break down the institutional barriers that are impeding interaction between the science and technology sector and the productive economy. One of these barriers is statutory in nature and prevents scientists and technologists employed by public institutions from selling applications of their work to commercial firms or, as the case may be, from being hired by them to develop new products, processes or procedures, or simply from solving technological and organizational problems related to production. Promoting the set-up and smooth operation of TLUs will lead to greater interaction between the two sectors.
- 2.11 This component will finance operations under Law 23,877 on the Promotion and Development of Technological Innovation in Production, which provides for grants for projects presented by TLUs, i.e., public and nonprofit private institutions given accredited status as TLUs by SECYT, which is the authority responsible for implementing the law. Private commercial companies are precluded from becoming TLUs.
- 2.12 To receive a grant, a TLU must have a corporate pledge or formal contract whereby a company undertakes to acquire (or to use under license), upon payment to the TLU of a prescribed fee, the results of the research, development or service rendered by a research center associated with, or engaged by, the TLU. Grants are thus made to the TLUs, and not to the companies which use the results of the projects. To establish a cost recovery mechanism, the grant will be repaid by the TLU to SECYT should the project prove successful.

- 2.13 Grants for R&D projects with immediate transfer potential (CONICET). These are part of an effort to steer scientific and technological research toward applications that will be of value to private enterprise and to the social sectors. The aim is that the research should make a direct and immediate contribution to the country's industrial, agricultural or social development.
- 2.14 This component will be used to finance R&D projects in the academic and scientific sphere whose results can be applied immediately, that is, within four years of project completion. Projects of this kind are different from the technology linkage projects (TLPs) not only because of the promotional instruments they involve but also because they are further removed from commercial use. Whereas in the TLPs the initiative behind the process of innovation comes from a company which has identified and formulated a concrete requirement and is calling on the scientific community to solve it, the initiative behind the R&D projects tends to come from scientific and technological circles, which offer the company possible applications for their research.
- 2.15 The program will finance nonreimbursable grants, and any monetary gain from commercial application of the results will accrue to the research units. The rules for awarding grants are patterned on those for loan 515/OC-AR, except that in this operation the results of the projects are immediately transferable to the productive sector.

C. Scale of the program

- 2.16 FONTAR: The size of credit lines 1 and 2 was determined through an initial survey of 1,669 industrial companies, who were asked if they had technology upgrading projects they would like to see implemented. Replies were received from 350 companies, a 21% response rate. Once feasibility studies for the program were far enough along to furnish more details on the nature of the program, a second survey was conducted of 148 companies who had responded in the affirmative during the first round, who this time were asked if they would be interested in taking part in a program of the type proposed herein, which would offer reimbursable financing for technology projects at a pre-commercial stage, and with risk and profit sharing. From the replies, 45 project profiles were identified with a value of about US\$33 million for the first year of execution of the proposed program. The demand for each of the remaining three years was set conservatively at an additional 50% of estimated first-year demand. On the basis of these calculations, the total for credit lines 1 and 2 has been set at about US\$65 million.
- 2.17 The size of line 3 was based on the identification of profiles of technology projects at public institutions, other than universities, that deliver technology services to private

enterprise. By and large, the project list was put together on the basis of the technical units in the INTI and, on a limited scale, in the INTA, which together submitted 14 project profiles worth a total of about US\$28 million. However, in order to finance projects that will fully satisfy the eligibility criteria agreed upon, the size of this third facility was scaled for a maximum of US\$15 million, and it will be open to other non-university public institutions (in addition to the INTI and INTA) that have at least 10 years' experience in offering technology services to the private sector.

- 2.18 **SECYT/CONICET:** To decide upon the scale of the technology linkage project (TLP) component, project demand for the first year of the program was estimated on the basis of the portfolio of the Technology Linkage Units (TLUs) already accredited. In this way, 66 projects worth approximately US\$25 million were identified. For each of the following three years of the program, 50% of first-year demand was added. The size of this line thus was set at a conservative US\$41 million, which is less than twice the estimated first-year demand, largely because of the risks inherent in the novel project-financing vehicle the TLUs represent.
- 2.19 To establish the size of R&D projects, a survey was conducted of all the science and technology centers and institutes in CONICET's files, and 43 project profiles were identified worth about US\$46 million. This figure was adjusted to US\$44 million for the four years of the program, given the novel features of projects under this line.

D. Program cost and financing

- 2.20 As a result of the aforementioned calculations, the total cost of the program has been estimated at the equivalent of US\$190 million, broken down by source of financing and investment category as shown in Table II-1 below. The proposed Bank loan would be for US\$95 million, covering 50% of the total cost of the program, which is consistent with the project financing rules for Group A countries.
- 2.21 Local counterpart funds are estimated at the equivalent of US\$95 million, of which US\$32.5 million will come from the BNA and the US\$62.5 million balance from the government.

TABLE II-1
Cost by investment category and source of financing
(in US\$ thousands)

CATEGORY	IDB	LOCAL CONTRIBUTION		TOTAL	% TOTAL
		BNA	GOVERNMENT		
1. ADMINISTRATION	6,330	-	1,670	8,000	4.2
2. DIRECT COSTS	86,720	32,500	45,780	165,000	86.3
a. FONTAR subprogram	40,000	32,500	7,500	80,000	42.1
Line 1	29,500	29,500	-	59,000	31.2
Line 2	3,000	3,000	-	6,000	3.1
Line 3	7,500	-	7,500	15,000	7.8
b. SECYT-CONICET subprogram	46,720	-	38,280	85,000	44.2
a.Tech.link.proj.	21,720	-	19,280	41,000	21.6
b.R&D projects	25,000	-	19,000	44,000	23.1
3. ASSOCIATED COSTS	1,000	-	-	1,000	0.5
a. PPF	1,000	-	-	1,000	0.5
4. FINANCE CHARGES	950	-	15,050	16,000	8.4
a. Interest ^{1/}	-	-	13,720	13,720	7.2
b. Credit fee	-	-	1,330	1,330	0.7
c. Inspection and supervision	950	-	-	950	0.4
TOTAL	95,000	32,500	62,500	190,000	100.0
% funding source/ program	50.0	17.1	32.9	100.0	

1/ The current ordinary capital interest rate is 7.26%.

E. Bank financing

- 2.22 Of the funds from the Bank, US\$61.7 million (65%) will go to finance technology innovation projects (FONTAR and TLPs) and US\$25 million (25%) to fund science and technology R&D projects of immediate application to the productive sector. These projects, which will collectively absorb 91% of the proceeds of the loan, constitute the most novel feature of the program.
- 2.23 The availability of these resources would also serve to strengthen the operating performance of FONTAR and the Technology Linkage Units, which are the most innovative financing arrangements in the sector in Argentina.
- 2.24 The remaining US\$8.3 million (9%) would cover the costs of preparing and starting to execute the program (PPF funding of US\$1 million), in addition to administrative costs of US\$6.3 million and an inspection and supervision charge of US\$950,000.

- 2.25 The program was prepared using the proceeds of loan 750/OC-AR for US\$690,000 under credit line PPF-003/AR, and a new operation is being readied to defray the start-up costs of the program. All these funds are to be deducted from the first disbursement of the prospective loan (see Recommendations).

F. Local contribution

- 2.26 The local contribution would come from the national budget and from Banco de la Nación Argentina, and would be used for the following purposes:
1. National budget funds would be used as follows: US\$19.3 million (20%) of the SECYT funding provided for in Law 23,877 to finance technology innovation projects submitted by Technology Linkage Units; US\$7.5 million (8%) of fresh budgetary funds to finance technological innovation projects of public institutions, other than universities, which provide services to the productive sector; US\$19 million (20%) of CONICET's budget funds for innovative science and technology development projects with immediate application to the productive sector; US\$1.67 million (2%) from the budget of the Ministry of Economic Affairs, Works and Public Services to defray the program's administrative expenses; and US\$15.05 million (16%) to cover the financial costs of the program.
 2. Banco de la Nación Argentina funds would be used as follows: US\$32.5 million of BNA's own resources (34%) would go to finance technological innovation projects. Of this amount, US\$29.5 million (87%) will be earmarked to finance technology innovation projects and the balance of US\$3 million (13%) to finance projects with shared risk and profit.
- 2.27 In short, 87% of the entire local contribution is to be earmarked to finance innovative science and technology development projects with immediate application to the productive sector.

III. EXECUTION OF THE PROGRAM

A. Basic implementation arrangements

- 3.1 The program will be executed by the Ministry of Economic Affairs, Works and Public Services, through its Economic Planning Secretariat [Secretaría de Programación Económica] (SPE), supported by a General Coordination Unit (GCU). The executing agency will enter into interagency implementation agreements with the co-executing agencies (FONTAR and SECYT/CONICET) for the administration and execution of the respective subprograms.
- 3.2 The program will be supervised by the Secretary of Economic Planning in the economic affairs ministry and the Secretary of Science and Technology in the Office of the President, who will be responsible for the following functions: (i) to verify adherence to the program's objectives and its consistency with the country's science and technology development policy and its economic policy; (ii) to approve the overall implementation plan for the program and any adjustments required subsequently; and (iii) to foster, devise and approve national and international events to publicize and promote the program.
- 3.3 **General Coordination Unit:** This unit will report directly to the Secretary of Economic Planning. Its duties will be as follows: (i) to draw up the annual operational plans for implementing the program, coordinate their execution, and facilitate compliance with their targets by the co-executing agencies; (ii) to prepare the documentation needed, in timely fashion, to have the prospective loan declared eligible for disbursement, and perform other coordination tasks with the Bank; (iii) to submit periodic reports to the SPE on the progress of the program and the execution of investments; and (iv) to maintain an accounting and financial system to permit adequate control of the investments.
- 3.4 Prior to the first disbursement of funds from the prospective loan, the executing agency will be required to demonstrate to the Bank that: (i) the agreed implementing arrangement has been established; (ii) the planned agreements with FONTAR and SECYT have been signed; and (iii) the General Coordination Unit has been set up and assigned the human and financial resources needed for execution of the program (see proposed resolution).

B. Channeling of resources under the program

- 3.5 The use of the resources of the program will be governed by its Operating Regulations, which set out the rules, criteria and procedures to be observed by the executing agency in implementing the FONTAR and SECYT/CONICET subprograms. It is recommended that these regulations be put into effect, on the terms and conditions agreed

upon with the Bank, as a condition precedent to the first disbursement of the proceeds of the loan (see proposed resolution).

C. Execution of the FONTAR subprogram

- 3.6 Senior management of FONTAR will be exercised by a Management Board composed of representatives from the Economic Planning Secretariat (as chairman), Banco de la Nación Argentina (BNA), the Secretariat of Industry and Trade, the Secretariat of Agriculture and Fisheries, the scientific community, and the private industrial and agricultural sector.
- 3.7 The Management Board will be in charge of the following functions: (i) setting general policy guidelines and ensuring that they are adhered to; (ii) approving the financing of projects exceeding US\$500,000 in value; and (iii) approving FONTAR's annual budgets and financial statements. In addition, FONTAR will have an Executive Secretariat responsible for administering the resources allocated to the fund and approving projects of up to US\$500,000.
- 3.8 The intention also is that the BNA will assist in FONTAR's operation as financial intermediary for the FONTAR subprogram and cofinancier for FONTAR credit lines 1 and 2. To that end, a subsidiary participation agreement will be signed between the BNA and the Argentine Nation, represented by the Ministry of Economic Affairs, Works and Public Services. The BNA will take on, *inter alia*, the following functions: (i) contribution of the equivalent of US\$32.5 million in local counterpart funding; (ii) financial evaluation of applicant firms and security offered (the technical and economic evaluation will be carried out by FONTAR); (iii) disbursements on approved projects; (iv) administration, control, and supervision of the project portfolio; and (v) assumption of the customer risk in credit operations.
- 3.9 Before the first disbursement of the prospective loan, the executing agency would be required to demonstrate that FONTAR has been legally created, that its Executive Secretariat has been set up and assigned the necessary personnel for it to perform its functions, and that the subsidiary participation agreement has been executed with the BNA (see proposed resolution).

1. Operating Regulations

- 3.10 **Beneficiaries:** The following companies and institutions would be eligible for financing from the FONTAR subprogram:

For credit lines 1 and 2: Companies engaged in productive activity in Argentina that possess sufficient technical, administrative and financial capacity to execute the proposed project, together with the commercial know-how to market the product or service in question.

For credit line 3: Public institutions, other than universities, which provide scientific and technological services to private enterprise, are funded directly by the Treasury, have been validly established for over 10 years, have a nation-wide service organization, and are equipped to meet the real demand for services from the productive sector.

- 3.11 **Project eligibility:** To be eligible, projects must: (i) conform to the general and specific objectives of FONTAR; (ii) propose a combination of activities that will help develop or expand the applicant's own technological and innovative capacity; (iii) merit a positive BNA rating with respect to credit risk (financial evaluation of the applicant company and security offered); (iv) be economically viable, under conditions of uncertainty, with risk-adjusted rates in excess of 12%, to be appraised using the methodology agreed upon with the Bank; (v) comply with the environmental protection and bio-security standards established by the appropriate official agencies; and (vi) be gender-neutral. The technical appraisal of the projects will be performed by outside experts, and the economic evaluation by FONTAR's Executive Secretariat.
- 3.12 **Ceilings on credits:** Financing using program resources for any one project may not exceed US\$2,000,000. When a credit exceeds US\$750,000, FONTAR must consult the IDB before proceeding with approval of the project (see Recommendations).
- 3.13 **Financial terms of the contracts:** Execution periods for investments, and repayment and grace periods for subloans, will be established on the basis of a realistic analysis of the technical and financial factors, including cash flow, that determine the beneficiary's ability to pay. In no case will the investment period exceed three years.
- 3.14 **Repayment and grace periods**

For line 1 (financing for private companies): The grace period may be up to a maximum of four years, reckoned from the date of the first disbursement. The amortization period may be up to five years, reckoned from the end of the grace period.

For lines 2 and 3 (credits for risk- and profit-sharing projects, and projects with compulsory repayment in full): The grace period may be up to four years, reckoned from the date of the first disbursement. The period for repayment of credits under line 2 may be up to eight years and for line 3 up to six years, both computed from the end of the respective grace period.

- 3.15 **Setting of interest rates for the FONTAR subprogram:** As interest on lines of credit denominated in United States dollars, Banco de la Nación Argentina will charge the average - weighted according to

the share contributed by each source to the line in question - of the following rates:

- a. For resources contributed by FONTAR, the rate charged on the Bank's loan, plus an intermediation spread agreed upon between the BNA and the borrower.
 - b. For the BNA's own resources, the same rate agreed upon between the BNA and the borrower, which may in no case be lower than the sum of: (a) the rate charged by Banco de Inversión y Comercio Exterior to class "A" financial intermediaries and (b) the intermediation spread agreed upon between the BNA and the borrower.
- 3.16 The object of this interest-rate-setting mechanism is to ensure that FONTAR will not become decapitalized as a result of credit operations under lines 1, 2 and 3, since it will in every case recover the cost of the funds borrowed from the IDB (the Argentine Nation is assuming the currency-pool risk as it will pass the loan proceeds on to FONTAR on the same terms but in U.S. dollars). The BNA also will recover the cost of the funds it brings to the subprogram. Although it is an official bank, its interest rates may not contain subsidies, because the cost passed on may not be less than the cost applied to the premier financial intermediaries under the multisector global credit program. For both sources of funds a spread is added to cover the BNA's intermediation costs. This spread, and the BNA's cost of funds, will be reviewed by the Bank at semiannual supervision meetings.
- 3.17 As of November 1993 the cost of FONTAR funds was estimated at about 8% and the cost of BNA funds at about 12%, with a 2% intermediation spread for the BNA for each source of funding. This gives an interest rate on the order of 12% for lines 1 and 2 and 10% for line 3. Using as the cost of BNA funds the cost of credits under the multisector program for premier financial intermediaries, estimated at about 8.5%, the rates would be about 10.25% for lines 1 and 2 and 10% for line 3, which does not use BNA funds (all rates in U.S. dollars).
- 3.18 All FONTAR subprogram borrowers would be charged the same rate of interest, irrespective of the project or company risk. The financial operation would be strictly a normal lending transaction; a risk differential will be taken into account only where a company elects line 2 with shared risk and profit, if a portion of the debt were to be forgiven in the event of technical failure, which would be for the account of FONTAR and never chargeable to the credit.
- 3.19 The inducement to technological innovation lies in charging interest rates that allow all financial costs to be recovered and keep FONTAR from becoming decapitalized, but do not build in the risk premium that a purely financial transaction would entail. Such a risk premium would force companies to confine themselves to

purely commercial operations like those of the multisector credit program, and would preclude innovation.

- 3.20 The rates thus determined may be adjusted semiannually, and if so adjusted will apply also to credits already granted. The BNA may not levy other finance charges nor solicit other financial compensation from companies.
- 3.21 **Use of repayments:** Funds received in repayment of credits extended using proceeds of the IDB loan may be used only to grant new credits that conform substantially to the rules set forth in the Regulations, except that, five years after the date of the last disbursement on the loan, the IDB and the government could agree to use the repayments for another purpose. Recoveries from line 3 will be used to replenish lines 1 and 2.

D. Execution of the SECYT/CONICET subprogram

- 3.22 **Executing unit of the subprogram:** Within its Undersecretariat for Technical and International Affairs, SECYT will create an Executing Unit for the subprogram. This unit will report directly to the Under-Secretary and will draw support from all the administrative departments of SECYT and CONICET.
- 3.23 The objectives of the unit will be: (i) to plan, direct and administer the execution of the subprogram; and (ii) to coordinate its work with SECYT/CONICET departments and the General Coordination Unit. The executive of the subprogram's Executing Unit will be supported by three sections: (i) **Operational Coordination**, for the technical, economic and financial appraisal of technology linkage projects (TLPs) and R&D projects and their monitoring; (ii) **Accounting and Control**, with responsibility for administration, finance, and budgeting; and (iii) **Information Services**, in charge of the subprogram's information systems and data bases. Prior to the first disbursement on the prospective loan, SECYT will be required to demonstrate that the subprogram's Executing Unit has been established and has been assigned the necessary personnel to perform its functions (see Recommendations).
- 3.24 **Advisory Council and Advisory Committees:** The TLPs presented by the Technology Linkage Units (TLUs) will be approved by the Advisory Council for the Promotion and Development of Innovation, created by Law 23,877. This body is chaired by the Secretary of Science and Technology, and its membership includes representatives from the Ministry of Economic Affairs, CONICET, CONEA, INTI, INTA, the Council of University Presidents, and the private business sector. The subprogram's Executing Unit will submit projects to the Council following their approval by the Under-Secretary of SECYT.

- 3.25 The Advisory Committees established in CONICET will review the R&D projects in their respective areas and make technical recommendations to CONICET's board of directors, which will approve the projects.

1. Operating Regulations

a. Technology linkage projects for Technology Linkage Units

- 3.26 **Beneficiaries:** The beneficiaries will be the Technology Linkage Units (TLUs) accredited by the Science and Technology Secretariat under the terms of Law 23,877.
- 3.27 **Eligibility of TLUs:** A distinction must be made between the eligibility of Technology Linkage Units and the eligibility of technology linkage projects submitted by such units. For the purposes of this subprogram, the TLUs, apart from being duly accredited as such, must have sufficient technical, administrative and financial capacity to assume any obligations arising from acceptance of the grant assistance, and sufficient management capacity to mobilize the resources needed to carry out the project. The subprogram's Executing Unit must rule favorably on the TLU's specific capabilities in order for it to be eligible.
- 3.28 **Eligibility of projects:** To be eligible, projects must be: (i) presented by a TLU; (ii) relevant to the country's economic and social development; (iii) transferable, in the sense that their results can be used directly by one or more interested companies; (iv) technologically viable, so as to offer a reasonable likelihood of achieving the anticipated results; and (v) economically viable, under conditions of uncertainty, with risk-adjusted rates in excess of 12%, to be appraised using the methodology agreed with the Bank.
- 3.29 **Financing ceilings:** Project financing will take the form of contingent-recovery grants that may in no case exceed 80% of the total cost of a project, with the balance to be contributed by the Technology Linkage Unit. The maximum grant from program resources to a single project will be US\$1.5 million (see Recommendations).
- 3.30 **Financial conditions:** To obtain financing, the TLU must present a corporate pledge, that is, a formal contract in which a company legally domiciled in Argentina undertakes to purchase, or to use under license, the results of the project. The TLU will submit to the Executing Unit a detailed report on the scientific or technical equipment and on the infrastructure available to the research center associated with, or engaged to carry out, the contract. As a performance guarantee, the TLU will sign a promotional agreement with SECYT whereby it will receive the grant in exchange for guarantees in the form of either a joint and several bond signed by all partners or members of the management body, or a bank or third-party bond, or surety and/or credit insurance.

- 3.31 The grant will be reimbursable only if the project is successful, that is, if it achieves the planned technical result. The criteria for success will be defined in the corresponding promotional agreement. The TLU will reimburse the full amount of the grant, plus a surcharge of 25%. If the project fails, the TLU will be required to repay only the residual value of the equipment and the balance of the consumables purchased with the grant, repayment of the grant and any surcharge being forgiven. Should the promotional agreement be canceled for reasons imputable to the TLU, the latter will be obliged to repay in full the monies received under the grant program and interest accrued thereon.
- 3.32 **Use of recoveries:** Funds received in repayment of grants and payments of surcharges for successful projects, and any reflows resulting from cancellation of promotional agreements, will be used strictly to supplement the resources of the SECYT/CONICET subprogram for technology linkage projects.

b. Research and development (R&D) projects

- 3.33 **Beneficiaries:** The beneficiaries will be members of the science and technology community in the public and private sectors who are not engaged in profit-making activities. This includes universities, research centers, foundations and similar institutions that form research groups among themselves. Where the research group is composed of one or several private individuals not attached to an institution, its project must be sponsored by a not-for-profit public or private entity, which will be regarded as the project's beneficiary entity.
- 3.34 **Eligibility of projects:** To be eligible, projects must meet the following requirements: (i) they must conform to the general and specific objectives set forth in the Regulations; (ii) the beneficiaries must have sufficient legal, technical and administrative capacity to take on the obligations arising from the grant assistance; (iii) the results must be capable of immediate application, i.e. within a period of four years or less, to the production of goods (private and public) and services; (iv) they must be relevant to the development of production in the country and social advancement of the population; (v) they must be demonstrably viable from a technological standpoint and offer a reasonable likelihood of achieving the anticipated results; and (vi) they must be economically viable, under conditions of uncertainty, with risk-adjusted rates in excess of 12%, to be appraised using the methodology agreed with the Bank.
- 3.35 **Financing conditions:** Financing for R&D projects will consist of a nonreimbursable grant in an amount of up to 100% of the total cost of the project. The Executing Unit of the subprogram will propose to CONICET the amount of the grant to be awarded to each project. The shortfall, if any, is to be made up by the institution carrying

out or sponsoring the project. A maximum of US\$1.2 million may be granted from the subprogram resources for any one project (see Recommendations).

E. Other aspects of execution

1. Period of execution

- 3.36 The period proposed for execution and disbursement of the proposed loan from the Bank is four years.
- 3.37 Table III-1 below shows the tentative timetable for disbursement of the proceeds of the program.

TABLE III-1
DISBURSEMENT TIMETABLE
(thousands of US\$)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IDB	20,090	23,111	25,020	26,779	95,000
Banco de la Nación	8,500	8,500	8,000	7,500	32,500
Government	15,000	16,250	16,250	15,000	62,500
TOTAL	43,590	47,861	49,270	49,279	190,000
Percentage	22.9	25.2	25.9	25.9	100

2. Procurement of goods and services

- 3.38 Goods and services required for projects using FONTAR's lines 1 and 2 will be acquired following the Bank's rules for global credit programs, since all will be projects contracted by the private productive sector.
- 3.39 In the cases of FONTAR's line 3 and the TLPs and R&D projects in the SECYT/CONICET subprogram, the following procedures will be followed to obtain goods and services for projects:
- (i) For the purchase of machinery, equipment and other project-related goods and the awarding of construction contracts to be financed in whole or in part with the proceeds of the Bank's loan, the executing agency will use the system of competitive bidding whenever the cost of the purchases exceeds the equivalent of US\$250,000 or contracts for the execution of works exceed the equivalent of US\$1 million. Bidding will be subject to procedures to be included as Annex B to the loan contracts. In all cases, activities are to be packaged for purposes of bidding and contracting and to make them

attractive to major contractors and foreign firms. Justification must be provided for the grouping of activities or for the need to contract for them individually, if required.

- (ii) In the selection and hiring of consulting services to be financed in whole or in part from the proceeds of the loan: (i) the procedures agreed upon with the Bank, which will appear as Annex C to the loan contracts, must be applied; and (ii) no provisions or stipulations may be made that would restrict or preclude the participation of consultants from member countries of the Bank.
- (iii) With respect to consulting services to be financed with local counterpart funds, the Bank reserves the right, before the borrower formalizes any consulting contract, to review for approval the names and information furnished by the individual consultants selected, the terms of reference, and the fees agreed upon.

3. Monitoring of the program

3.40 Within the first 60 days of each year, the executing agency will submit to the Bank annual operational plans for the execution of the program. These plans will include at least the following (see Annex A to the loan contract):

- a. With respect to the program: Number, total cost, and approval status of project applications presented, by type of financing. Forecast of approvals for the next period. Disbursements made by source of financing, and reconciliation with expenditures incurred. Forecast of disbursements by source of financing for the next period. Description of measures taken to prevent, mitigate or remedy any adverse environmental impact, direct or indirect, arising from execution of projects financed under the program. Review of progress on the BNA restructuring program (see Chapter IV) and list of contractual clauses fulfilled and details of those to be fulfilled in the next period, with an indication in this case of the anticipated timetable for fulfillment. Any special circumstance that may be delaying execution of the program, and corrective measures needed.
- b. With respect to the subprograms:

FONTAR subprogram. Lines 1 and 2: For each project, a description of its characteristics, type, and amount financed, indicating the source of funds, investment categories, the beneficiary institution or company, and the interest rate and other charges levied by the BNA on the credits granted. Objectives and anticipated and actual results, type of

innovation being incorporated, internal rate of return, and industry sector of the company's principal line of business.

Line 3: The foregoing information plus full procurement details, showing in each case the type of goods and services acquired, source of financing, and cost. Timetable, type, and value of goods and services to be acquired in the next period.

SECYT/CONICET subprogram. (i) Technology linkage projects: For each project, a description of its characteristics, type, amount financed, source of funds, investment categories, level of subsidy granted as compensation for technical failure, and amounts recovered for technically successful ventures, by the TLU, the company and SECYT. Objectives and achievements, type of innovation incorporated, industry sector of the company's principal line of business, and identification of the TLU which carried out the project. For public sector TLUs, full procurement details as well, listing the type of goods and services, source of financing and cost, and a timetable and information on the type and value of goods and services to be purchased in the following period. (ii) R&D projects: For each project, a description of its characteristics, type, amount financed, source of funds, investment categories, and participating institutions. Objectives and anticipated and actual results, type of innovation incorporated, and industry sector of the principal line of business or branch of science involved in the project. For projects of public institutions, also the procurement information listed above.

- 3.41 During the loan disbursement period, meetings with the Bank will be held, before April 30 each year, to review the progress of the annual operational plan and work out any adjustments needed to achieve the agreed targets. At these meetings, a sample of the documents supporting the information presented may be examined (see Recommendations).
- 3.42 Within 30 days after each of the meetings referred to in the preceding paragraph, the borrower, by intermediary of the executing agency, must submit to the Bank the operational plan updated in accordance with what was agreed at the meetings (see Recommendations).
- 3.43 It is recommended that submittal of the first operational plan for the program be a condition precedent to the first disbursement of the loan (see proposed resolution).

4. Ex post evaluation

- 3.44 By virtue of the program's novel character, it was considered desirable to conduct an impact assessment. For this purpose, the borrower, through the executing agency, will present for consideration by the Bank (see Recommendations):

- a. Within two years after the effective date of the contract, the methodology for conducting the ex post evaluation of the program.
 - b. Within two years after the date of the last disbursement on the loan, an ex post evaluation report prepared following the methodology referred to in the foregoing subparagraph (a).
- 3.45 The annual data to be used in the ex post evaluation will be agreed upon by the borrower and the Bank at the annual meetings referred to in paragraph 3.38. The costs incurred in this connection and for preparation of the methodology will be charged to the local contribution.

5. External audits

- 3.46 The financial statements of the program, during its execution and for five years after the date of the last disbursement on the loan, must be presented to the Bank each year, after having been audited by a firm of independent public accountants acceptable to the Bank (see Recommendations).

6. Inspection and supervision

- 3.47 Responsibility for inspection and supervision by the Bank will rest with its Country Office in Argentina. For the annual meetings referred to above, that office may be supported by the project team.

IV. THE BORROWER, EXECUTING AGENCY AND CO-EXECUTING AGENCIES

A. The borrower and the executing agency

- 4.1 The borrower will be the Republic of Argentina, which will assume the exchange risk of the prospective loan. The executing agency will be the Ministry of Economic Affairs, Works and Public Services, through the Economic Planning Secretariat, which will transfer the resources of the program to the co-executing agencies. The funds allocated to FONTAR will be nonreimbursable capital contributions, thereby allowing for continuity through credit reflows.

B. Co-executing agencies

- 4.2 **Executive Secretariat of FONTAR:** responsible for administering the resources allocated to FONTAR, which will have the status of an operating unit within the public administration, as an office of the Economic Planning Secretariat in the Ministry of Economic Affairs. It will consist of three departments: (i) Operations, which will handle the technical and economic evaluation and the monitoring of projects; (ii) Legal, responsible for the legal aspects of the Board and of operations carried out; and (iii) Administration and Finance, in charge of the fund's administrative, financial and budgetary affairs. In addition, an Internal Audit Unit is to be created, which will report directly to the Executive Director and be responsible for controlling and monitoring, and for compliance auditing of the procedures and operations carried out by FONTAR. This unit will also conduct audits of those projects evaluated as technical failures. The Executive Secretariat of FONTAR will have eight permanent professionals and will use the services of consultants for the scientific, technological and economic evaluation of projects.
- 4.3 **SECYT:** assists the President of Argentina in policy formulation and planning in the areas of science, technology and information science. It is also charged with stimulating and promoting research and its application and with the financing and deployment of science and technology. The Secretary is appointed by the President and also serves as chairman of the board of directors of CONICET. Recently, this institution satisfactorily completed a large-scale and intensive assignment to implement the mechanisms provided for under Law 23,877. SECYT comprises the following under-secretariats: (i) the Undersecretariat for Technical and International Affairs, responsible for devising strategies related to the advancement of science and development of technological know-how and the transfer thereof to activities that produce goods and services; it has under its authority the departments of International Affairs, Technology Linkage and Transfer, and Administration; (ii) the Undersecretariat for Information Science

and Development, responsible for the scientific and technological aspects of the national policy on information science; and (iii) the Undersecretariat for Policy and Planning, responsible for drafting and proposing science and technology objectives, policies and strategies and for sector information and dissemination systems. SECYT also has an Internal Audit Unit, 68 professionals, and 44 technical support, 53 administrative, and 25 service staff.

- 4.4 The operations authorized by SECYT in 1992 within the framework of Law 23,877 totaled US\$20 million, which came from the country's general budget. Of this total, the equivalent of US\$15 million (75%) went to the provinces and the Municipality of Buenos Aires, through which 24 projects were financed. The remaining US\$5 million was allocated directly by SECYT to finance 19 projects. For 1993, an amount equivalent to US\$20 million has been budgeted.
- 4.5 CONICET: created by executive order in 1958 as a decentralized public agency, with independent legal status and assets. Its principal functions are: (i) to propose measures to foster and advance scientific research; (ii) to promote and subsidize studies and research, subject to the policies and plans set for it by SECYT; (iii) to create and promote institutes, laboratories and other research or service centers; (iv) to handle the organization and development of career paths for scientific and technological researchers and R&D support staff; and (v) to create and award study grants and similar types of assistance to provide training and skills upgrading for university leavers and technicians.
- 4.6 CONICET's management is overseen by a board of directors made up of nine members, seven of whom represent different disciplines and must be scientific researchers or technologists of recognized standing. The member representing SECYT is ex officio chairman of the board. CONICET has 12 advisory committees, which make technical decisions on applications for grants, R&D projects, scholarships, and promotions for scientific researcher and research support personnel.
- 4.7 CONICET's organization was recently the subject of a comprehensive analysis under the provisions of Argentina's Administrative Reform Program. The new structure is responsive to the changes which have taken place in the sector in the last few years and tailored to the growing demands arising in the area of science and technology. The institution is staffed as follows: (i) 450 administrative personnel; (ii) 3,112 scientific and technological researchers; (iii) 3,565 research support staff; and (iv) 3,239 scholarship holders.

C. Financing of the science and technology sector

- 4.8 From 1984 to 1988, public spending on the sector as a proportion of GDP held steady at about 0.27%. During the period 1989-1992 the figure fell to 0.23% in 1989 and to 0.22% in 1992 (excluding private expenditure on R&D). This was due to a reduction in the expenditure earmarked for decentralized public institutions and universities, as well as to the strong growth in GDP, on the order of 18%, between 1990 and 1992. As part of its policy to develop science and technology, the Argentine government is planning to raise the proportion of public spending on the sector, with allocations of 0.27% of GDP for 1994 and 0.30% in 1995. In absolute terms, it is planned to increase public spending on the sector from US\$508 million in 1992 to US\$978 million in 1995.
- 4.9 The present program is one of the high priority projects which the government is anxious to develop. The public budget allocated to science and technology for fiscal year 1992 was US\$466 million, broken down as follows: 40.8% to CONICET, 21.6% to the Secretariat of Agriculture and Fisheries, 17% to the National Atomic Energy Commission, 8% to the Education Secretariat, 4.3% to the Secretariat of Industry and Foreign Trade, 1.4% to SECYT, and 0.5% to the Housing Secretariat. SECYT and CONICET accounted for 42.2% of the sector's budget.

D. Banco de la Nación Argentina

- 4.10 The BNA was created by Law 2831 of October 15, 1891. Its charter was amended in 1978. Its main objective is to act as a development bank, supporting the financing of economic activities. The BNA has borrowed directly from the Bank to fund a number of operations. Its organization is headed by a board of directors, which is responsible for the senior management of the bank. The Office of the General Manager reports to the board and is made up of the following departments headed by Deputy General Managers: Commercial Banking, Official Banking, International Banking, Institutional Banking and Finance, Commercial Risk Control, and Systems and Administration. These departments are in turn made up of offices of regional, district and branch managers.
- 4.11 At the beginning of 1991, the BNA showed operating losses offset by profits from its international business; it was overstaffed, and its staff poorly paid. On the whole, its administrative expenses reflected inefficient use of resources. Over the last few years the quality of its services has deteriorated and the volume of its operations (loans and deposits) has declined. In practice, the BNA's relations with its stockholder (the government) were not clearly defined, a situation which led to a deterioration in the quality of its assets, with a high concentration of its loans in the public sector. Faced with this situation, the BNA's authorities will initiate a restructuring program for the primary purpose of recasting the bank's management set-up and giving it a

renewed commercial focus on profitable businesses, so as to draw efficiently on its competitive advantages.

- 4.12 The BNA's restructuring program includes: (i) reducing staff; (ii) improving procedures for contracting private services; (iii) restructuring its organization and introducing an incentive system to improve employee performance; and (iv) limiting its financial services to small and medium-sized companies in the private productive sector.
- 4.13 The progress of this program will be reviewed at the annual supervision meetings. Furthermore, unless the parties agree otherwise, before the BNA may extend financing using the FONTAR subprogram funds, the borrower, through the executing agency, would be required to submit for the Bank's consideration a status report on the BNA reorganization, which will form part of the operational plans for the program (see Recommendations and proposed resolution).
- 4.14 The BNA is one of the country's foremost State-owned development banks. As of April 30, 1993 the institution had total assets of US\$10.441 billion and a net worth of US\$1.8 billion. It had a loan portfolio of US\$10.1 billion and some US\$5.1 billion in deposits, including US\$2 billion in foreign currencies.
- 4.15 The conditionality for operations under the investment sector reform program (loan 733/OC-AR), approved in 1992, and for the multisector credit program (AR-0055), coming up for approval at the end of 1993, includes measures which are aimed at ensuring implementation of the BNA's restructuring program and will be closely supervised by the IDB.

V. JUSTIFICATION OF THE PROGRAM

A. General justification

- 5.1 To the extent that Argentina currently lacks facilities to finance the R&D efforts of small and medium-sized private companies, the establishment and operation of FONTAR will give a substantial stimulus and boost to technological innovation in productive activities, both directly and through the technical services for technology upgrading provided by such public entities in the sector as the INTI and INTA.
- 5.2 The SECYT/CONICET subprogram will basically help to forge closer links between the research centers in Argentina's science and technology system and local productive enterprises, and to steer their already considerable scientific abilities toward activities more likely to enhance productivity and competition in the economy and the efficiency of social services.

B. Institutional viability

- 5.3 Coordination and administration of the program by the Ministry of Economic Affairs, supported by a General Coordination Unit and by two co-executing agencies, FONTAR and SECYT/CONICET, constitutes a suitable arrangement for execution.
- 5.4 FONTAR will have an Executive Secretariat, whose organization has been carefully designed to assure that it has adequate capacity to manage, evaluate and supervise projects. FONTAR will also rely on support from the BNA in the areas of client risk analysis and portfolio management. The project team reviewed and analyzed this institutional set-up, including the agreement with the BNA, from the operational and administrative standpoint, and found it suitable for execution purposes.
- 5.5 From the institutional review of CONICET, it can be concluded that: (i) it has sound and longstanding experience in the approval and administration of research projects, through its scientific promotion department; and (ii) the support to be provided by the executing unit of the subprogram will strengthen its operating capacity still further. For these reasons, no difficulties are anticipated with the supervision or administration of activities that form part of the CONICET component.
- 5.6 Over the last two years, SECYT has accredited Technology Linkage Units and administered the resources allocated to it under Law 23,877 for projects submitted by those units. SECYT will also receive support from the executing unit of the subprogram on technical matters and especially in the area of economic evaluation. The Operating Regulations have been strengthened and

expanded on the basis of Law 23,877 and its regulations. No difficulties are foreseen in the execution and administration of this component.

- 5.7 It was decided to use an official bank as financial intermediary for the program since experience shows that the private financial sector views operations of this type as too risky, and would only participate if they were subsidized by the government - which in turn would make them economically inefficient. Likewise, the private finance sector would tend to wait passively for requests to arrive, whereas this type of program can only be successful if it is actively promoted. The alternative of direct government intermediation would end up creating a quasi financial structure that would swell the State bureaucracy and very likely prove to be less efficient than official banks as far as credit decisions and portfolio management were concerned. The solution proposed is an attempt to avert these problems, and assign responsibility where there is capacity.
- 5.8 The BNA has experience in the management of financial operations for the business sector and the capacity to handle the requirements of the program. The nonfinancial (i.e. technical and economic) evaluation of projects will be performed by FONTAR, which will round out the requirements as far as project analysis is concerned. With the implementation of the BNA's restructuring program, it is felt that the institution will continue to improve its operating efficiency, which will have a positive impact on the program by allowing FONTAR's funds to be on-lent at lower spreads.
- 5.9 With findings from the feasibility studies for the program financed by loan 750/OC-AR under credit line PPF/003-AR, documentation was drawn up regarding the following conditions precedent to disbursement of the loan: (i) the structure, functions, staff, and budget of the General Coordination Unit and co-executing units of the program; (ii) the agreements to be signed by FONTAR and SECYT/CONICET and by FONTAR and the BNA; and (iii) the Operating Regulations for the program, which were negotiated with government representatives.
- 5.10 In addition, a proposed annual operational plan was prepared, together with a methodology for the ex post evaluation of the program. A new loan of US\$260,000 is currently being processed under the same line to ensure continuity in the operation of the General Coordination Unit and the co-executing units, so work may continue on arrangements for the conditions precedent to the first disbursement and the fine-tuning of the methodology for the ex post evaluation of the program, among other preparatory activities for the program's execution. The experience acquired in executing the PPF has been extremely valuable, since it has served as a source of training for the new staff who will be handling the program and an opportunity to gain experience in the technical and economic evaluation of technology development projects.

C. Financial viability

- 5.11 The fund-transfer system devised for the FONTAR subprogram will allow for the recovery of funds provided to the private sector, and the charging of market-level interest rates will promote economic efficiency. The mechanism selected is not the product of Bank policy for this type of projects, though the Bank concurs, but rather meets the requirements of the Argentine government to not make nonreimbursable transfers to the private sector. The proposed operation will encourage technology innovation by sharing and diversifying the risk on a large number of individual operations.
- 5.12 The local counterpart required by the program totals US\$95 million, of which US\$62.5 million will be contributed by the government and the remaining US\$32.5 million by the BNA. At only 3% of the allocation for 1992, the government's counterpart, which averages the equivalent of US\$15.6 million a year, represents an insignificant proportion of public funding for the sector. Given the high priority which the government attaches to this program and the small amount of the sector's budget that the counterpart represents each year, funds are expected to be forthcoming as needed.
- 5.13 The BNA contribution to the program will be funded from its regular cash flow. In April 1993 the BNA's current account deposits alone stood at US\$6 billion; its contribution is thus insignificant compared with its total available funds.
- 5.14 In order to analyze FONTAR's financial viability, projections of sources and applications of funds were prepared, which are positive. The conclusions of the projections are as follows: (i) over a 10-year period, applications of about US\$278.5 million are forecast; (ii) the operation would bring about a net increase in the capitalization of FONTAR, since it would be exclusively recovering the portfolio of projects without being obliged to repay the debt to the IDB; (iii) the issue of delinquent loans would not arise, since the client risk is being assumed by the BNA; (iv) credit line 2 for financing projects with shared risk and profit would result in a total of some US\$3.4 million in obligations forgiven because of technical failure of projects, equivalent to 55% of the amount allocated to this line; and (v) line 3 for financing public, non-university institutes would yield favorable results since they would be backed by government guarantees. The negative results from line 2 would be offset by the return on lines 1 and 3.
- 5.15 In the case of SECYT, based on analysis of the sample, it has been estimated that, during the period of execution of the program, technology linkage projects totaling US\$41 million will be approved, 85% of which would see the funds transferred repaid in full plus a 25% surcharge, while only 15% would produce losses due to technical failures, in an amount of about US\$3.6 million.

- 5.16 The CONICET component, which will channel resources to public, not-for-profit institutes to finance R&D projects, does not require financial projections beyond 1997 since it is a single-stage operation that entails no lending.

D. Economic viability

- 5.17 The projects sampled for FONTAR credit lines 1 and 2 have a high economic rate of return. Since these results are highly sensitive to changes in market conditions, sufficient funds have been included for the engagement of consultants and for market surveys, so as to reduce the level of uncertainty in high-risk projects.
- 5.18 The sample projects chosen for FONTAR line 3 had two critical features: low economic returns and, in some instances, difficulty in making a clear distinction between technology services of a commercial nature and others entailing reference services. To prevent this from becoming an issue in the projects to be executed under the program, it is intended that any projects involving commercial services that have a low economic rate of return should be restructured on the basis of a survey of demand and ability to pay for such services. In the case of noncommercial services, adequate justification will be required for partial charges, and in all cases the present value of expected income must point to a profitable operation.
- 5.19 The two SECYT/CONICET lines of credit are intended to strengthen the capacity of the science and technology system to respond to the specific needs of the productive system. Each line is designed for a group of projects whose profiles are distinguished by how close they are to the commercial stage. In the case of the line for technology linkage projects (TLPs), a specific demand has been identified that is distinct from the profile of FONTAR projects. Whereas the TLPs are linkage projects which basically support the supply side of the science and technology system, the FONTAR lines are directly aimed at stimulating and supporting innovation in companies - the demand side.
- 5.20 In the case of the SECYT/CONICET lines, projects with high economic rates of return have been identified, but a number of critical aspects have been pinpointed with respect to current project selection procedures and operating capacity. These elements were considered when this operation was analyzed, and solutions have been provided for in the Operating Regulations.
- 5.21 As regards application of the evaluation methodology, the team employed by the institutions has been trained by an international consulting firm. In the case of SECYT/CONICET, it will be strengthened, for the technical and economic evaluation work, by a team of professionals specializing in specific areas. For the compilation of the information required, provision has been included for resources from consulting and market survey firms.

E. Environmental viability

- 5.22 The program was classified as a Category II operation at the November 12, 1992 meeting of the Environmental Management Committee, which recommended that environmental considerations be written up and included in the project eligibility criteria. The Operating Regulations of the FONTAR and SECYT/CONICET subprograms provide that, in order for a project to be eligible for financing, it must comply with the environmental and bio-security standards set by the pertinent sector institutions. These standards relate to the need for research institutions to institute waste control systems which do not dump untreated nondegradable materials, and for projects to favor nonpolluting technologies, including materials, equipment and processes, or to upgrade those already being used. To monitor this, comprehensive production quality assurance units will be set up in the companies.
- 5.23 The program does not call for major infrastructure construction, but merely minor additions, remodeling and repairs to, and equipping of, existing laboratories, none of which entails the likelihood of adverse impacts on the environment.

F. Participation of women

- 5.24 Argentina's science and technology system has a high percentage of female professionals and support staff. At this writing, 55% of research trainees holding CONICET study grants, 40% of researchers, and 51% of the technical support staff are women.
- 5.25 There are no restrictions in the country's legislation on women heading up R&D projects or managing institutions or units engaged in activities in the area of science and technology. As the total volume of scientific and technological activity increases as a result of execution of the proposed program, professional opportunities for women will expand.

G. Risks

- 5.26 A generic risk of the operation is that economic stability would not be maintained in Argentina. If interest rates rise, FONTAR's lines of credit might well find no takers because of the strong disincentive to innovate by going into debt. In the SECYT/CONICET subprogram, however, loss of stability need not chill innovation in the same way, since it could shift demand for FONTAR credit from innovating companies toward the Technology Linkage Units. Faced with this eventuality, the Bank will need to monitor developments in the Argentine economy closely and watch what impact any changes have on the volume and direction of corporate demand for the financing of innovative activities.
- 5.27 In the case of FONTAR, the two main risks involve the kind of start-up problems experienced by any fledgling scheme and how to

treat the technology risk of private R&D. With respect to the first risk, special care has been taken in shaping the organizational structure and operating mechanisms of the new entity so that it can establish itself and begin lending with reasonable efficiency, while taking the greatest possible advantage of existing facilities such as those of the BNA. As regards treatment of the technological risk, the aim has been to steer clear simultaneously of two opposite postures: that of subsidizing companies so that they can engage in R&D activities, and that of overlooking the fact that the private sector seldom embarks on such activities unless it has special incentives to do so. The proposed program will offer private companies two distinct options: one in which they assume all profits and losses that may result from an R&D project, and the other in which they take on only part of the technological risk; in this case the company and FONTAR undertake to share the risk, as well as any profits generated by an innovative R&D project.

- 5.28 In the case of the SECYT/CONICET subprogram, the chief risk consists of a dilemma: on the one hand, public research centers, both university and non-university, which are accustomed to the basic research subsidy, will find it difficult to focus their efforts on solving production problems without powerful incentives to do so; on the other, the government subsidies to R&D centers could be passed along to private companies through collaboration between the two groups, which is contrary to Argentina's current economic policy. As a means of addressing this issue, projects have been classified by how close they are to commercial exploitation of the R&D results, and the technology linkage projects will require cost recovery in excess of the amounts of the grants, through charges to the companies which benefit from them.

PROPOSED RESOLUTION 1/

ARGENTINA. LOAN /OC-AR TO THE NACION ARGENTINA
Technology Modernization Program

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Nación Argentina, as Borrower, for purpose of granting it a loan to cooperate in the execution of a technology modernization program, hereinafter referred to as the "Program". This financing shall be subject substantially to the following conditions:

1. Amount and Currencies: Up to US\$95,000,000, or its equivalent in other currencies, except that of Argentina, which are part of the ordinary capital resources of the Bank, to pay for goods and services originating in the member countries of the Bank and for such other purposes as may be specified in the loan contract. Payments of amortization and interest shall be made in the currency or currencies specified by the Bank, in a quantity equivalent to the corresponding amount owed, calculated in units of account in terms of dollars of the United States of America, in accordance with provisions to be included in the loan contract.
2. Source of Funds: The ordinary capital resources of the Bank.
3. Guarantee: The general responsibility of the Borrower.
4. Credit Fee: 0.75% per annum on the undisbursed portion of the financing, commencing to accrue 60 days after the date of the loan contract and payable in dollars of the United States of America on the same dates as the interest.
5. Amortization: The Borrower shall amortize the loan in a period of 20 years from the date of the loan contract, by means of semi-annual, consecutive and, insofar as possible, equal installments. The first installment shall be paid on the first interest payment

1/ The provisions contained in this Appendix I and in Appendices II and III will be final only when the Board of Executive Directors has approved the loan proposal.

date, six months after the date scheduled for the last disbursement of the financing.

6. Interest: The Borrower shall pay interest semiannually on the daily outstanding balances of the loan. The first payment shall be made six months after the date of the loan contract. The Bank shall determine the rates of interest to be applied during the life of the loan, in accordance with the lending rate policy of the Bank.
7. Disbursement: The term for disbursement of the financing shall expire four years after the effective date of the loan contract.
8. Special Conditions:
 - (a) The Program shall be executed and the resources of the loan used in their entirety by the Borrower, through the Secretaría de Programación Económica of the Ministerio de Economía y Obras y Servicios Públicos, hereinafter referred to as the "Executing Agency", with the participation of: (i) the Secretaría Ejecutiva del Fondo de Desarrollo Tecnológico Argentino, attached to the Secretaría de Programación Económica, for the execution of the FONTAR subprogram; (ii) the Secretaría de Ciencia y Tecnología and the Consejo Nacional de Investigaciones Científicas y Técnicas, hereinafter referred to respectively as "SECYT" and "CONICET", for the execution of the SECYT-CONICET subprogram; and (iii) Banco de la Nación Argentina, hereinafter referred to as "BNA". The provisions in Article 5.01(d) of the General Conditions for the Borrower and the Executing Agency shall be applicable to the participating institutions.
 - (b) The resources of the loan shall be used to participate in the execution of a program the total cost of which is estimated at the equivalent of US\$190,000,000. Consequently, the loan contract shall contain appropriate provisions to ensure that such resources as may be necessary, in addition to the loan, for the complete execution of the Program shall be duly provided, in an amount estimated at the equivalent of US\$95,000,000, which may include BNA resources in the amount of up to US\$32,500,000, in accordance with a schedule of investments satisfactory to the Bank.
 - (c) Prior to the first disbursement of the financing, the Borrower, through the Executing Agency, shall demonstrate to the satisfaction of the Bank that:
 - (i) It has set up a general coordination unit for the Program and assigned it the staff and financial resources needed for execution of the Program.

- (ii) The Fondo de Desarrollo Tecnológico Argentino (FONTAR) has been set up and its executive secretariat established, and it has been assigned with the functions and personnel needed to pursue its purpose.
 - (iii) SECYT has set up an executing unit for the SECYT-CONICET subprogram and has assigned it the functions and personnel needed to perform its duties.
 - (iv) It has entered into an agreement with SECYT and CONICET setting out the terms for the participation of those two agencies in the SECYT-CONICET subprogram and the transfer of funds for same, which terms shall be substantially the same as those contained in the model previously agreed upon with the Bank.
 - (v) It has signed an agreement with Banco de la Nación Argentina setting out the terms of that bank's participation in the FONTAR subprogram, which terms shall be substantially the same as those contained in the model previously agreed upon with the Bank.
 - (vi) It has adopted the Operational Plan for the Program, with full details on the stages envisaged and a timetable for same, in conformity with Section VII of Appendix III.
 - (vii) The Operating Regulations for the Program have been adopted and are substantially the same as those established for projects previously approved by the Bank.
- (d) From the resources of the first disbursement, the Bank shall withhold up to the equivalent of US\$1,000,000 to amortize loans made under line of credit 003/PPF-AF. The amounts so withheld shall be restored to said line of credit.
- (e) The beneficiaries of the credits shall be charged on account of interest, commissions, insurance, or any other charge, the annual rate or rates which, being consonant with the legislation and policies on interest rates of Argentina, are compatible with the policy of the Bank on rates of interest in this type of financing.
- (f) The resources of the financing shall not be used to grant credits for: (i) general and administrative expenditures of the beneficiaries; (ii) working capital; (iii) purchase of real property; (iv) refinancing of debts; or (v) purchase of shares.

- (g) In the acquisition of machinery, equipment, and other goods for projects financed by credits extended under the Program, and in the awarding of construction contracts, public sector entities shall follow the system of public bidding in each case in which the value of such acquisitions exceeds the equivalent of US\$250,000 or the value of construction contracts exceeds the equivalent of US\$1,000,000. The bidding shall be subject to the procedures to be attached as an annex to the loan contract.
- (h) The funds arising from recoveries under credits granted with the proceeds of the financing shall be used only to extend new credits to private companies for technology innovation activities and to provide such companies shared risk and benefit financing for high-risk technology innovation ventures which conform substantially to the rules laid down in the loan contract and in the Operating Regulations of the Program. Five years after the date of the last disbursement, the Bank and the Borrower may agree upon another use for recoveries that does not depart from the basic objectives of the financing, or agree to reduce the period of validity of this obligation.
- (i) The Bank shall establish such inspection procedures as it deems necessary to assure the satisfactory execution of the Program, and the Borrower shall extend all cooperation which is required for the most effective accomplishment of this purpose. From the amount of the financing the sum of US\$950,000 shall be allocated for credit to the income accounts of the Bank to meet expenses of general inspection and supervision.

RECOMMENDATIONS

A. It is recommended that the following conditions, to be met to the Bank's satisfaction, be included in the loan contract, in addition to those set forth in the proposed resolution:

1. Unless the parties agree otherwise, prior to issuing each call for public bids or, if there is no need for public bids, prior to the acquisition of the goods or the initiation of the works, the Borrower, through the Executing Agency, shall submit to the Bank for its consideration: (a) the general plans, specifications, budgets and other documents needed for the acquisition or construction and, where applicable, the specific requirements and other documents needed for the call for bids; and (b) in the case of works, evidence of the legal possession, easements or other pertinent rights to the lands required for the construction of the works.
2. Unless the parties agree otherwise, before BNA grants any financing chargeable to the funds allocated to the FONTAR subprogram, the Borrower, through the Executing Agency, shall present a report regarding the status of the reorganization of the BNA for the consideration of the Bank.
3. Project financing shall be subjected to the following ceilings:
 - (a) Prior approval from the Bank is required before using Program funds in excess of US\$750,000 for any single project.
 - (b) Not more than US\$2,000,000 of the Program resources shall be used in financing any single project involving the Fondo de Desarrollo Tecnológico Argentino.
 - (c) Not more than US\$1,500,000 of the Program resources shall be used in financing any single technology linkage project.
 - (d) Not more than US\$1,200,000 of the Program resources shall be used in financing any single research and development project.
4. During the execution of the Program, the Borrower and the Executing Agency, on the one hand, and the Bank, on the other hand, shall periodically review the interest rates which are applied to subloans. If necessary, the Borrower and the Executing Agency would take appropriate measures, consistent with the economic policies of the country, in order to harmonize the interest rates on subloans with the policy objective sought by the Bank.
5. The Borrower shall undertake as follows: (a) that before April 30 of each year throughout the period of disbursement of the financing,

meetings will be held with the Bank to review the execution of the Program's Operational Plan and the impact on resource allocation of the interest rates charged under the Program, and to agree on any adjustments needed to achieve the established goals; and (b) that one month before the scheduled date of each such meeting, the Executing Agency will provide the Bank with a report containing the necessary information and other documents required to carry out the pertinent review, including specific information on each of the areas listed in paragraph 7.01 of Appendix III.

6. Within 30 days after each of the meetings referred to in Recommendation A.5, above, the Borrower, through the Executing Agency, shall provide the Bank with the updated Operational Plan, on the basis of the agreement reached during the meetings.
 7. The Borrower and the Executing Agency shall assure that in the agreements executed with public sector agencies for the Program, such agencies shall undertake the following: (a) that the works and equipment involved in the Program shall be adequately maintained in accordance with generally accepted technical standards; and (b) to submit to the Bank, through the Executing Agency, during 10 years following completion of the first works of the Program and within the first quarter of each calendar year, a report on the condition of the works and equipment under the Program and the maintenance plan for the current year, in accordance with the provisions set forth in Section VI of Appendix III. If the inspections conducted by the Bank, or reports it receives, reveal that actual maintenance is below the agreed-upon levels, the Borrower and the Executing Agency shall take the appropriate action to have the deficiencies fully corrected.
 8. The Borrower, through the Executing Agency, shall submit the following for consideration by the Bank:
 - (a) Two years after the effective date of the contract, the methodology to be used to conduct an ex post evaluation of the Program.
 - (b) Two years after the date of the last disbursement of the financing, an ex post evaluation report prepared following the methodology referred to in subparagraph 7(a), above.
 9. The financial statements of the Program, during its execution and until the fifth year following the date of the last disbursement of the financing, shall be presented annually to the Bank after having been audited by a firm of independent public accountants acceptable to the Bank.
- B. The loan contract shall include an annex substantially similar to Appendix III of this document ("The Program").

THE PROGRAM

Annex A to the Loan Contract

I. Purpose

- 1.01 The purpose of the Program is to help develop and enhance the efficiency and competitiveness of Argentina's productive enterprises through a technological modernization process that shall ultimately raise productivity. Such modernization process shall also promote productivity and efficiency in the supply of goods and services by the public sector.
- 1.02 The specific objectives of the Program are as follows:
- (a) To foster activities related to technology innovation and upgrading among production companies generating goods and services for the market.
 - (b) To develop technology projects of sector public agencies that render technology services to the production sector.
 - (c) To strengthen the ties between existing research centers and productive enterprises of all kinds.
 - (d) Increase the level of significance of research being conducted in the national science and technology system to assist in the economic and social development of the country.

II. Description

- 2.01 To achieve the above-mentioned objectives, the Program has been divided into the following subprograms:
- (a) FONTAR subprogram. The purpose of this subprogram is to help local producing companies to upgrade their technology by mobilizing specific financial resources to implement their potential for innovation. This subprogram shall be carried out through the Fondo de Desarrollo Tecnológico Argentino (FONTAR) and its funds will be administered by Banco de la Nación Argentina (BNA).

Three credit lines will be available under this subprogram:

- (i) Line 1: Fully reimbursable financing for private companies for technology innovation activities.

- (ii) Line 2: Risk- and benefit-sharing financing to private companies for high-risk technology innovation activities.
 - (iii) Line 3: Financing to be fully reimbursed for public institutions, other than universities, which render technology services to the private sector, for the development of technology projects; repayment in full required.
- (b) SECYT-CONICET technology innovation subprogram. The purpose of this subprogram is to link research centers with companies in the production sector, and to finance science and technology development projects submitted by public agencies working in the sector. It entails the following:
- (i) Subsidies for technology linkage projects carried out by technology linkage units (UVTs), which will be public or nonprofit private organizations given UVT status by SECYT, the executing agency.
 - (ii) Subsidies for research and development projects whose results are immediately transferable, with CONICET as responsible agency. The objective is to gear scientific and technological research to practical applications for private enterprise and the social sectors, so that research will yield direct immediate benefits for the nation's industrial or agricultural development or for its social advancement.

III. Cost of the Program and Financing Plan

- 3.01 The estimated cost of the Program is the equivalent of US\$190,000,000. A breakdown by investment category and source of funding is given in the following table.

COST AND FINANCING
(in thousands of U.S. dollars)

CATEGORY	BANK	LOCAL CONTRIBUTION		TOTAL	% TOTAL
		BNA	GOVERNMENT		
1. ADMINISTRATION	6,330	-	1,670	8,000	4.2
2. DIRECT COSTS	86,720	32,500	45,780	165,000	86.3
a. FONTAR subprogram	40,000	32,500	7,500	80,000	42.1
Line 1	29,500	29,500	-	59,000	31.2
Line 2	3,000	3,000	-	6,000	3.1
Line 3	7,500	-	7,500	15,000	7.8
b. SECYT-CONICET subprogram	46,720	-	38,280	85,000	44.2
a. Tech.link.proj.	21,720	-	19,280	41,000	21.6
b. R&D projects	25,000	-	19,000	44,000	23.1
3. ASSOCIATED COSTS	1,000	-	-	1,000	0.5
a. PPF	1,000	-	-	1,000	0.5
4. FINANCE CHARGES	950	-	15,050	16,000	8.4
a. Interest	-	-	13,720	13,720	7.2
b. Credit fee	-	-	1,330	1,330	0.7
c. Inspection and supervision	950	-	-	950	0.4
T O T A L	95,000	32,500	62,500	190,000	100.0
% funding source/ program	50.0	17.1	32.9	100.0	

IV. Procurement

- 4.01 (a) When goods to be procured or services to be contracted for the Program, including those relating to transportation and insurance, are to be financed in whole or in part with foreign exchange from the financing, the procedures and specific requirements for the bidding or other forms of contracting shall permit the unrestricted participation of suppliers of goods and services from member countries of the Bank. Consequently, no conditions that would prevent or restrict the offer of goods or the participation of contractors from such countries shall be established in such procedures or specific requirements.
- (b) When sources of credit other than the resources of the financing or the local counterpart are to be used, the Borrower may agree with the creditor upon the procurement procedure to be followed. However, upon the Bank's request, the Borrower shall demonstrate the reasonableness of both the price agreed upon or paid for the purchase of the goods and services and the

financial conditions of the credits. The Borrower shall also demonstrate that the quality of the goods is in conformity with the technical requirements of the Program.

V. Consulting Services

- 5.01 In the selection and contracting of consulting services financed in whole or in part with resources from the financing: (a) the procedures agreed upon with the Bank shall apply, and (b) no conditions or stipulations may be established that would restrict or prevent the participation of consultants from the Bank's member countries.
- 5.02 With respect to consulting services financed with resources of the local counterpart, the Bank reserves the right to review and approve, prior to the Borrower proceeding with the corresponding hire, the names and background of the firms or individual consultants selected, their terms of reference, and the agreed fees. This provision does not apply when resources from suppliers' credits are used for such contracts.

VI. Maintenance

- 6.01 The purpose of the maintenance will be to conserve the works of the Program in the operating conditions in which they were upon their completion, at a level compatible with the services they should provide.
- 6.02 The first annual maintenance plan shall correspond to the fiscal year subsequent to that in which the first project was completed.
- 6.03 The annual maintenance plan shall include: (i) details of personnel responsible for maintenance and allocated maintenance equipment; (ii) the location, size, and condition of repair and storage facilities; (iii) information on the resources spent on maintenance the previous year and the amount to be allocated in the budget for the following year; and (iv) a report on maintenance conditions, based on the evaluation system established by the Borrower.

VII. Operational Plan for the Program

- 7.01 The Operational Plan for the Program referred to in condition 8(c)(vi) in Appendix I, which replaces the initial report referred to in Article 4.02(d) of the General Conditions of the loan contract, shall establish at least the planned activities, tasks, and targets, and shall provide information specifically on the following:

a. With regard to the Program:

- (i) The number, total value, and approval status of project requests submitted under each form of financing, and an estimate of approvals for the following period.
- (ii) Disbursements made by source of financing, and reconciliation with expenditures incurred, and an estimate of disbursements by source of financing for the following period.
- (iii) Description of measures taken to prevent, alleviate, or reverse environmental damage, both direct and indirect, caused by the execution of the projects financed by the Program.
- (iv) A report on contract clauses performed and those to be performed in the following period, indicating in the latter case the schedule for compliance.
- (v) Any special circumstances or problems which may be delaying execution of the Program, and the corrective action required.

b. With regard to the subprograms:

(i) FONTAR subprogram:

- 1. The status of the restructuring of the BNA.
- 2. Credit lines 1 and 2: For each project, a description of the amount, source of funds, investment categories, beneficiary organization or company, interest rate and other charges levied by BNA on credits extended is required, as well as the original objectives and anticipated results compared with actual results, type of innovation being incorporated, internal rate of return, and industry sector of the main line of business of the company.
- 3. Credit line 3: In addition to the information noted in the preceding paragraph for lines 1 and 2, under credit line 3 details of goods and services procured, source of financing, and costs shall be included, as well as the procurement schedule for the following period, indicating type of goods and services and amounts.

(ii) SECYT-CONICET subprogram:

1. Technology linkage projects: For each project, a description of its characteristics, amount financed, source of funds, investment categories, level of subsidy given to compensate for technical failure, and amounts recovered in the event of successful technical outcomes by UVT, company, and the SECYT. Also, objectives and results achieved, type of innovation incorporated, industry sector of the company's principal line of business, and particulars of the UVT that developed the project.

In the case of public-sector UVTs, describe also the goods and services procured, source of funding and costs, and the timetable, type and value of goods and services to be acquired in the following period.

2. Research and development projects: For each project, a description of its characteristics, amount financed, source of funds, investment categories, participating institutions, original objectives, anticipated and actual results, type of innovation incorporated, and industry sector of the main activity or branch of science of the project.

For projects carried out by a public institution, information on procurement shall also be provided as noted in paragraph 1, above.

- 7.02 At the annual meetings referred to in Recommendation A.5 in Appendix II, a sample of supporting documents for the information contained in the reports submitted by the Executing Agency.

VIII. Interest rate

- 8.01 Banco de la Nación Argentina will charge as interest rates for credit lines denominated in dollars of the United States of America the weighted average cost of the following rates, according to the percentage contributed to the pertinent line by each source of funding:
 - a. For funds contributed by FONTAR, the rate of interest being charged on the Bank's financing plus a spread to be agreed upon by BNA and the Borrower.
 - b. For the BNA's own funds, a rate to be agreed upon by BNA and the Borrower, which shall in no case be less than the sum of:
 - (a) the rate charged by Banco de Inversión y Comercio Exterior

to class "A" financial intermediaries and (b) the spread agreed upon by BNA and the Borrower.

The rates thus determined may be adjusted semiannually, in which case the adjusted rates shall apply also to credits already granted.