アルゼンティン共和国
燐酸肥料計画調査
報告書
(付録)

1984年8月

国際協力事業団

アルゼンティン共和国
燐酸肥料計画調査
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国際協力事業団

CONTENTS
(ANNEX)

ANNEX I

ANNEX I-1

SCOPE OF WORK FOR THE FEASIBILITY STUDY

SCOPE OF WORK

FOR

THE FEASIBILITY STUDY

ON

THE ESTABLISHMENT OF A PHOSPHATE FERTILIZER PLANT

IN

THE ARGENTINE REPUBLIC

AGREED UPON BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

DIRECCION GENERAL DE FABRICACIONES MILITARES

HIERRO PATAGONICO DE SIERRA GRANDE S.A.M.

In response to the request of the Government of the Argentine Republic, the Government of Japan has decided to extend technical cooperation in conducting a Feasibility Study on the Establishment of a Phosphate Fertilizer Plant Complex using the Phosphorous Concentrate (hereinafter referred to as "the Study") under the Agreement on Technical Cooperation between the Government of Japan and the Government of the Argentine Republic signed on 11 October 1979.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched a preliminary survey team headed by Mr. Kenji Iwaguchi from 4 to 17 December 1982 to work out the scope of work of the Study with the Dirección General de Fabricaciones Militares (hereinafter referred to as "DGFM") and Hierro Patagónico de Sierra Grande Sociedad Anónima Minera (hereinafter referred to as "HIPASAM") the counterpart organizations on the part of the Government of the Argentine Republic.)

As a result of a series of discussions, JICA, DGFM and HIPASAM hereto agreed upon the scope of work of the Study.

In agreement, three (3)copies of this text in Spanish and three (3) copies of the same in English are signed, so that one Spanish version and one English version will remain in hands of each undersigner.

The parts constitute their legal adresses for all purposes related with this document: DGFM in Cabildo 65, in the City of Buenos Aires, HIPASAM in Belgrano 1370, in the city of Buenos Aires, and JICA in Shin Juku Mitsui Bldg 2-1-1 Nishi-Shiu Juku, Shinjuku-ku, Tokyo, Japan.

Date: 17 December 1982

Place: Buenos Aires, Argentine Republic

KENJI IWAGUCHI
Leader, Preliminary Survey Team
Director, Industry Division
Japan International Cooperation Agency

ARNOLDO ROLANDO
Colonel
Development Director
Dirección General
de Fabricaciones Militares

ANGEL ZIADI
Brigadier General (E.R.)
Chairman of the Board
Hierro Patagónico de Sierra Grande
Sociedad Anónima Minera

I. Objective of the Study

The objective of the Study is to examine the technical, financial and economic feasibility of the establishment of a phosphate fertilizer plant complex using the phosphorous concentrate (apatite concentrate) which will be recovered from the tails (disposal ore) disposed from the iron ore processing plant operated by HIPASAM in Sierra Grande (hereinafter referred to as "the Project").

II. Scope of the Study

In order to achieve the above objective, the Study will cover the following items:

1. Review on the background of the Project

1.1 To review worldwide supply & demand and price movement of phosphate fertilizer

1.2 To review present situation of and policy on agriculture in Argentine

1.3 To review present situation of and policy on fertilizer in Argentine

1 Supply and demand of fertilizer

2 Fertilizer industry

2. Study on the detailed fertilizer market and its distribution system in Argentine

2.1 To review present and past supply and consumption of phosphate fertilizer

2.2 To investigate present and past prices of phosphate fertilizer

2.3 To project demand and supply of phosphate fertilizer in Argentine for coming ten years

2.4 To assess present marketing and distribution system and to propose the future distribution system which is most suitable for the envisaged project

2.5 To estimate the cost of transport and distribution from the manufacturing site to major market area

3. Study on the raw materials for the fertilizer production

3.1 To investigate present situation of the iron ore processing plant in Sierra Grande and the future plan for supplying tails

3.2 To analize the characteristics of tails to be fed to the phosphorous concentration plant

1 To review various data on the contents of tails

2 To analize the contents of samples picked up during the commercial operation of the plant

3 To study in laboratory and pilot plant on the concentrability of tails

3.3 To investigate availability of essential raw materials other than phosphorous concentrate

4. Study on the project location and site

4.1 To investigate the natural conditions of the site and its surrounding area

1 Meteorology

2 Geology and topography

4.2 To investigate the socio-economic conditions

1 Population, labour force and wages etc.

2 Industries

3 Regional development plan

4.3 To investigate utilities and infrastructure such as electricity, gas, water, transportation (road, port and railway) and communication

4.4 To select the plant site based on the results of the study on the availability of raw materials, utilities, infrastructure and other factors

5. Study on a prospective product or product-mix

5.1 To conduct the comparative study on the possibility of producing the

following products

1 Single superphosphate (S.S.P)

2 Triple superphosphate (T.S.P)

3 Fused magnesium phosphate (F.M.P)

4 Compound fertilizer

5 Phosphoric acid

6 Others

5.2 To select prospective product or product-mix

5.3 To examine optimum production scale

6. Preparation of the basic plan and the philosophy of the design of the fertilizer plant

6.1 To determine condition for the design of the proposed facilities

6.2 To prepare the philosophy of the design

1 Plant design of following items

Processing plants, facilities receiving raw materials, product storing and shipping facilities, utilities, off-site facilities, land and access roads

2 Process flow sheet

3 Plant layout

6.3 To propose transport plan of materials for plant construction

6.4 To prepare implementation program of plant construction

6.5 To propose the operation program on the commercial basis

6.6 To prepare organization and manpower plan for plant construction and operation on the commercial basis

7. Study on environmental protection

8. Estimation of construction cost of the propose facilities

8.1 To estimate construction cost of the manufacturing plant

8.2 To estimate construction cost of the auxiliary facilities

9. Financial analysis

9.1 Capital requirements

1 Fixed capital (land, plant construction, auxiliary facilities and pre-operation cost etc.)

2 Working capital

3 Expenditure schedule

9.2 Procurement of capital

9.3 Production cost

9.4 Projected balance sheet

9.5 Projected income statement

9.6 Projected flow statement

9.7 Financial internal rate of return

9.8 Sensitivity analysis based on possible variations in (a) Investment cost, (b) price of raw materials, (c) sales price, (d) interest rate and (e) inflation rate

10. Economic and social evaluation

11. Conclusion and recommendations

III. Framework and schedule of the Study

The Study will be carried out by the following four steps:

(a) Step 1 : Preparatory work in Japan

(b) Step 2 : Field work in Argentine

(c) Step 3 : Home office work in Japan

(d) Step 4 : Presentation of and discussion on the Draft Final Report in Argentine

The tentative schedule of the Study is as shown in the Annex.

IV. Reports

JICA will prepare and present the following reports to the Government of the Argentine Republic

(1) Interim Report written in English and Spanish, at the end of the Step 2 in the III

: 10 copies

(2) Draft Final Report written in English and Summary written in Spanish, within five (5) months after the commencement of the Step 3 in the III

: 15 copies

(3) Final Report written in English and Summary written in Spanish, within two (2) months after the receipt of comments on the Draft Final Report by DGFM and HIPASAM

: 30 copies

V. Undertaking of the Argentine Side

The Argentine Side will:

(1) assign a certain number of its own personnel to be agreed upon

(2) prepare the visit of the Study Team to the pertinent authorities and facilitate the access of the Study Team to all the information available required for the purpose of the Study,

(3) provide the Study Team with appropriate office space and sufficient office supplies and equipment,

(4) provide appropriate transportation means whenever necessary for the Study

(5) arrange for the exporting of samples from the Study Team for their experiments and analysis in Japan,

(6) provide the pertinent information available from the Argentine counterpart to the Study Team,

(7) indemnify the Study Team in respect of damages claimed against them for actions performed in the course of their official duties.

VI. Undertaking of the Japanese Side

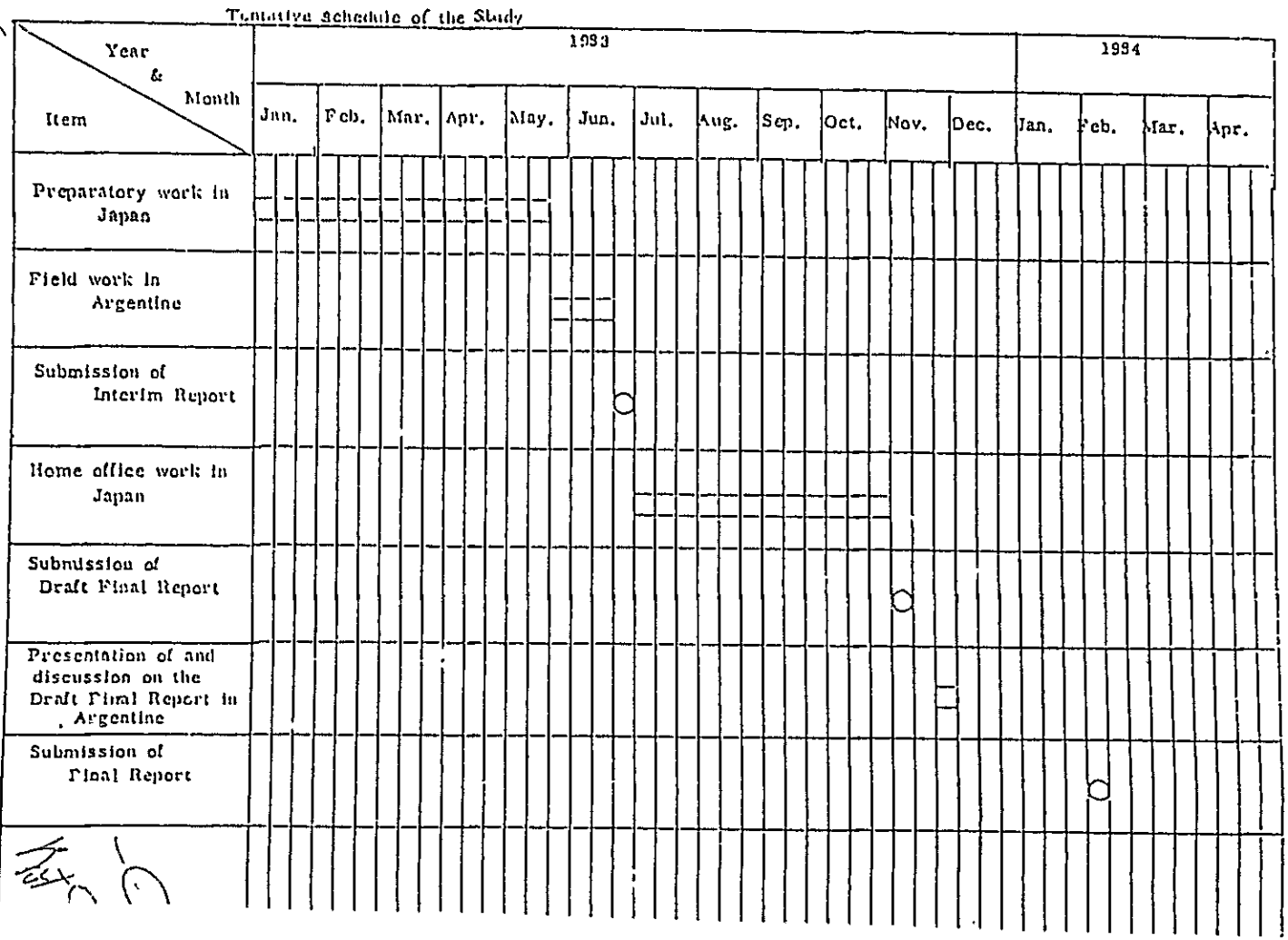
JICA will:

(1) dispatch the Study Team for the implementation of the Study,

(2) dispatch a team for presentation of and discussion on the Draft Final Report,

(3) transfer the technology related to the Project to the Argentine counterparts in the course of the Study.

Tentative Schedule of the Study



Annex

M I N U T E

BUENOS AIRES,

In accordance with the Technical Cooperation Agreement between the Goverment of JAPAN and the Government of the ARGENTINE REPUBLIC dated 11 october. 1979, an agreement has been celebrated today between JAPAN INTERNATIONAL COOPERATION AGENCY (hereinafter referred to as "JICA") as one part, and the DIRECCION GENERAL DE FABRICACIONES MILITARES (hereinafter referred to as"DGFM") and HIERRO PATAGONICO DE SIERRA GRANDE SOCIEDAD ANONIMA MINERA (hereinafter referred to as "HIPASAM") as the Counterpart, about the performance by "JICA" of a Feasibility Study for the establishment of a phosphated fertilizers plant in the Argentine Republic, utilizing phosphated tails from HIPASAM iron ore processing plant.

Both parts agreed that at the end of the field work in Argentina the Feasibility Study Team will show in the interim report, at least three (3) high priority products in consultation with "DGFM" and "HIPASAM".

Since now, the preliminary survey team expressed that "JICA" will make its utmost efforts to invite the personnel assigned by "DGFM" and "HIPASAM" to travel to Japan so as to perform jointly with "JICA" the final selection of the product or products upon which the economic study will be performed.

In agreement, in this city of Buenos Aires, three (3) copies of this text in Spanish and three (3) copies of the same in English are signed so that one spanish version and one english version will remain in hands of each undersigner.

KENJI IWAGUCHI
Leader, Preliminary Survey Team
Director, Industry Division
Japan International Cooperation Agency

ARNOLDO ROLANDO
Colonel
Development Director
Dirección General de Fabricaciones Militares

ANGEL ZIADI
Brigadier General (E.R.)
Chairman of the Board
Hierro Patagónico de Sierra Grande

29 de septiembre de 1983
Buenos Aires,
República Argentina

Coronel Arnoldo Eleuterio ROLANDO
Director de Desarrollo
Dirección General de Fabricaciones Militares
S / D

De nuestra consideración:

Con relación al progreso del Estudio de Factibilidad para el Establecimiento de una Planta de Fertilizantes Fosforados por parte de la Agencia de Cooperación Internacional del Japón (JICA), hemos revisado los resultados de los ensayos de concentración de roca fosfórica que se realizaron utilizando las muestras de colas obtenidas en HIPASAM, Sierra Grande, en el curso de nuestro estudio local en Argentina entre el 23 de mayo y el 17 de junio de 1983, y advertimos que la recuperación y la calidad del producto de roca fosfórica obtenida por medio de procesos de flotación convencionales no son satisfactorios.

En consecuencia, hemos llegado, en consulta con JICA, a la conclusión de que la etapa siguiente de ensayos para la producción de mezclas de fertilizantes fosforados a partir de la muestra de roca fosfórica obtenida en las pruebas de concentración antes citadas debería suspenderse, y de que debería desarrollarse ensayos exhaustivos de investigación y desarrollo sobre la concentrabilidad de la roca fosfórica mediante la toma de muestras adicionales de colas y su envío a Japón para procurar y confirmar procesos mejorados para la concentración de roca fosrórica a partir de las colas de Sierra Grande.

Para desarrollar tales ensayos adicionales,

deseamos proponer las siguientes modificaciones al cronograma y puntos de estudio originales que se ilustraran en el Informe Inicial de fecha 23 de Mayo de 1983 (páginas 4 a 8).

A pesar de que opinamos que algunos de los ensayos adicionales están obviamente fuera de los alcances del trabajo del estudio, consideramos que tales ensayos son necesarios para completar dicho estudio.

1.- Items de estudio adicionales y ulteriormente especificados

1.1. Tomar una muestra adicional de colas en Sierra Grande en Octubre de 1983 (aproximadamente 0,5 toneladas secas de material).

1.2. Desarrollar ensayos exhaustivos de flotación de roca fosfórica para confirmar las condiciones óptimas de proceso.

1.3. Efectuar ensayos de flotación inversa de roca fosfórica para mejorar la concentrabilidad.

1.4. Efectuar ensayos de separación magnética de alto gradiente para mejorar la concentrabilidad de la roca fosfórica y reducir el hierro residual en la roca fosfórica.

1.5. Investigar las características de las colas y los procesos para separación de magnetita y roca fosfórica que se aplican en otros paises, especialmente en una planta comercial recientemente terminada en Suecia.

2.- Modificaion del cronograma del Estudio

	Cronograma original en Informe Inicial	Cronograma modificado
2.1. Borrador de Informe en japonés	Octubre 15, 1983	Marzo 15, 1984
2.2. Borrador del Informe Final	Noviembre 10, 1983	Abril 10, 1984
2.3. Presentación y discusión en Argentina	Noviembre 25, 1983	Abril 25, 1984
2.4. Informe final	Enero 15, 1984	Junio 15, 1984

Mucho agradeceríamos si Uds. quisieran revisar la actual situación asi como nuestras arriba citadas propuestas de modificación y proporcionarnos vuestra orientación y asistencia para mejorar el Estudio de Factibilidad.

Es nuestra sincera esperanza que vuestro estimado proyecto sea investigado en profundidad, especialemente en lo relativo a la concentrabilidad de la roca fosfórica, tomando plenamente en cuenta las características específicas de las colas que actualmente se procesan en Sierra Grande a partir de mineral de magnetita de las partes más profundas de la mina, con vistas a procurar la factibilidad o la implementación del Proyecto.

Al agradecerles vuestra amable atención a los expuesto más arriba, saludamos Uds. con renovado aprecio y nuestros mejores deseos.

M. KUWABARA

Jefe de Equipo Misión de Estudio

Agencia de Cooperación Internacional del Japón

Copias a:

Lic. Masaji SAITO, Director, Agencia de Cooperación Internacional del Japón en Buenos Aires (JICA)

29 de Septiembre de 1983
Buenos Aires,
República Argentina

General de Brigada (R.E.) Angel ZIADI
Presidente del Directorio
Hierro Patagónico de Sierra Grande S.A.M.
S / D

De mi mayor consideración:

Con relación al progreso del Estudio de Factibilidad para el Establecimiento de una Planta de Fertilizantes Fosforados por parte de la Agencia de Cooperación Internacional del Japón (JICA), hemos revisado los resultados de los ensayos de concentración de roca fosfórica que se realizaron utilizando las muestras de colas obtenidas en HIPASAM, Sierra Grande, en el curso de nuestro estudio local en Argentina entre el 23 de mayo y el 17 de junio de 1983, y advertimos que la recuperación y la calidad del producto de roca fosfórica obtenida por medio de procesos de flotación convencionales no son satisfactorios.

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M. KUWABARA

Jefe de Equipo Misión de Estudio

Agencia de Cooperación Internacional del Japón

Copias a:

Lic. Masaji SAITO, Director, Agencia de Cooperación Internacional del Japón (JICA)

Buenos Aires, June 22, 1984

Dirección General de Fabricaciones Militares,
Hierro Patagónico de Sierra Grande Sociedad Anónima Minera,
Buenos Aires, Argentine

Dear Sirs:

We are pleased to inform you that the presentation of the Draft Final Report for the Feasibility Study on the Establishment of a Phosphate Fertilizer Plant in Argentine Republic which was undertaken by the Japan International Cooperation Agency, Japan in 1983 to 1984 has been successfully completed here in Buenos Aires.

Extensive discussion, clarification, explanation and exchange of views on the Report has been carried out at the DGFM and HIPASAM from June 19 to 22, 1984 in Buenos Aires and reached mutual understandings and agreements in general on the major issues and conclusions of the Study.

Several technical items were discussed in details and agreed which should be taken into consideration prior the preparation of the Final Report for the Study, such as;

- Description and study on the production of DAP as an alternative product.

- Suppliability of industrial water in Bahía Blanca.

- Utilization of by-product gypsum from phosphoric acid production.

- Official method of phosphate fertilizer analysis in Japan.

It was also proposed that the DGFM and HIPASAM will prepare a questionnaire on the Report within a thirty days and which should be duly examined and incorporated in the Final Report for the Study. The Final Report is expected to be made available within a fifty days from the receipt of the questionnaire.

We would like to take this opportunity to express once again our sincere appreciation for your guidance and cooperation extended on our study activities in Argentine and look forward to have another cooperation in near future.

Sincerely yours,

Makoto Kuwabara

M. KUWABARA

Leader of JICA Study Team,
Tokyo, Japan

Copy to: Dr. Masaji SAITO,
Director, Agencia de Cooperación
Internacional del JAPON en Buenos Aires (JICA)

Dirección General de
Fabricaciones Militares

HIPASAM

Buenos Aires, 22 de junio de 1984

Mr.
M. KUWABARA
Hotel Crillón
Buenos Aires

Tenemos el agrado de dirigirnos a Ud. en relación al convenio de Cooperación Técnica entre los gobiernos del JAPON y la ARGENTINA firmado entre la Agencia de Cooperación Internacional del JAPON (JICA) y la Dirección General de Fabricaciones Militares e HIPASAM y al contenido de vuestra nota del 22 de junio de 1984, cumplimos en informarles la aceptación de la propuesta en cuanto a la preparación de un cuestionario, dentro de los 30 días de recibida la presente, sobre las dudas y aclaraciones que el Estudio merezca, así como en lo relativo a la finalización del mismo dentro de los 50 días de recibidas nuestras aclaraciones.

Queremos destacar que hemos de comprometer nuestros mejores esfuerzos en lograr que el Estudio que ustedes han realizado con tanta dedicación pueda arribar a conclusiones que definan muy claramente la realidad sobre el aprovechamiento de las colas fosforadas de HIPASAM.

Saludamos a Ud. muy atentamente.

Ing. LORENZO BOTTAZZI
HIPASAM

Tcnl. EDGARDO MARTINI
D.G.F.M.

ANNEX I-2

MEMBER LIST OF JAPANESE STUDY TEAM

AND

STUDY ITENERARY DURING LOCAL STUDY IN ARGENTINE

JICA STUDY TEAM MEMBERS

Name	Function	Employment
- Makoto KUWABARA	Study Team Leader	UNICO International Corp. Tokyo, Japan
- Yoshiaki NAKAMURA	Fertilizer Project	UNICO International Corp. Tokyo, Japan
- Masaaki SHIRAISHI	Techno-Economist	UNICO International Corp. Tokyo, Japan
- Tetsuo INOOKA	Agricultural Economist	UNICO International Corp. Tokyo, Japan
- Chikashi ISHII	Minerals Processing Process Engineer	NIKKO Consulting and Engineering Co. Ltd., Japan
- Takahiko OHYA	Minerals Processing Process Engineer	NIKKO Consulting and Engineering Co. Ltd., Japan
- Kazuyuki DAINICHI	Civil Engineer	NIKKO Consulting and Engineering CO. Ltd., Japan
- Shoji SAITO	Study Coordinator	JICA, Buenos Aires, Argentine

STUDY ITENERARY DURING
LOCAL STUDY IN ARGENTINE

JICA STUDY TEAM

Date	M. Kuwabara *	Y. Nakamura *	M. Shiraishi	T. Inooka *	C. Ishii	T. Ohya	K. Dainichi
May, 1983							
23 (M)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
24 (T)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
25 (W)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
26 (T)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
27 (F)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
28 (S)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
29 (S)	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd
30 (M)	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd
31 (T)	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd	Sr Gd
June, 1983							
01 (W)	Sr Gd	Sr Gd	Bs As	Bs As	Sr Gd	Sr Gd	Sr Gd
02 (T)	SAO	Sr Gd	Bs As	Bs As	SAO	Sr Gd	SAO
03 (F)	Bh Bc	Sr Gd	Bs As	Bs As	Bh Bc	Sr Gd	Bh Bc
04 (S)	Bs As	Sr Gd	Bs As	Bs As	Bs As	Sr Gd	Bs As
05 (S)	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As	Bs As
06 (M)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
07 (T)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
08 (W)	Salta	Salta	-	Salta	Bs As	Bs As	Bs As
09 (T)	Jujuy	Jujuy	-	Jujuy	Bs As	Bs As	Bs As
10 (F)	Mza	Mza	-	Mza	Bs As	Bs As	Bs As
11 (S)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
12 (S)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
13 (M)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
14 (T)	Campana	Bs As	-	Bs As	Bs As	Bs As	Bs As
15 (W)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
16 (T)	Bs As	Bs As	-	Bs As	Bs As	Bs As	Bs As
17 (F)	-	-	-	-	-	-	-

Notes: Bs As = Buenos Aires,
Sr Gd = Sierra Grande, Río Negro
SAO = San Antonio Oeste, Río Negro
Mza = Mendoza
Bh Bc = Bahia Blanca

* M. Kuwabara, Y. Nakamura and T. Inooka visited Bs As from June 18 to 23, 1984 for the presentation and discussion of the Draft Final Report for the Study.

ANNEX I-3

COUNTERPARTS ORGANIZATION AND MEMBER LIST

COUNTERPARTS ORGANIZATION IN ARGENTINE

1. Secretaría de Planeamiento, Buenos Aires:

- Lic. Lilian M. GOENAGA	- Coordinadora Cooperación Técnica Bilateral

2. DGFM, Buenos Aires:

- Ing. Mil. Arnoldo ROLANDO	- Coronel Director de Desarrollo
- Ing. Mil. Edgardo MARTINI	- Tcnl. A/C Subdirección Desarrollo Químico y Manufacturero
* Dr. Luis Alderto GARCIA	- Jefe Departamento Químico
* Sr. Wilfredo J. LOJO	- Jefe División Potencial Químico y Mercado
* Sr. Roberto SAMUEL	- Traductor
- Lic. Guillermo Enrique CONTESTIN	- Jefe División Estudios y Evaluación de Proyectos
- Dr. Aldo NAVARINI	- Jefe Sección Geología

3. HIPASAM, Buenos Aires:

- Ing. Mil. Angel ZIADI	- General de Brigada (R.E.), Chairman of the Board
- Ing. Lorenzo R. BOTTAZZI	- Gerente Técnico y de Desarrollo
** Ing. Héctor F. PASTORINO	- Gcia. Técnica y de Desarrollo
* Ing. Santiago BRARDA	- Asesor
* Lic. Miguel A. COSENZA	- Jefe División Impuestos
* Sr. Lucio ZELADA	- Jefe de Seguros
* Lic. Aldo O. VICARIO	- Planeamiento Financiero
* Sr. Carlos GALLI	- Jefe de Relaciones Públicas

4. HIPASAM, Sierra Grande and Punta Colorada:

-	Agr. Delfor A. CADARIO	- Gerente Producción
-	Ing. Enrique A. PESL	- Jefe Departamento Ingeniería Industrial
-	Ing. José A. LUCAS	- Superintendente de Mina
**	Ing. Oscar POBLETE AMARO	- Jefe de Proceso - Concentración
*	Ing. Agustín CHANG WONG	- Jefe Departamento Apoyo Minero
-	Ing. Amilcar E. CARIAC	- Superintendente Planta Peletización
-	Ing. Manlio GUAZZOTTI	- Superintendente de Mantenimiento
*	Ing. René CARBAJAL	- Jefe División Metalurgia
*	Ing. Eduardo MORENO	- Metalurgista
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-	Dr. Masaji SAITO	- Director
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Notes: * Acting counterpart member for the feasibility study

** Counterpart members who visited Japan from November 14 to November 27, 1983 for JICA training program on the Analysis of the Results of Tests on Tailings samples

ANNEX I-4

LIST OF DATA, DOCUMENTS AND DRAWINGS RECEIVED

Annex I-4

(1) General

1.1	La Argentina	Editorial Kapelusz	1974
1.2	Atlas Fisico de la Republica Argentina Volumen 1 Volumen 2	 Centro Editor de América Latina Centro Editor de América Latina	 1981 1982
1.3	Geografia de la Argentina	Angel Estrada y CIA. SA	1981
1.4	Geografia Economica, General y Argentina	Editorial Ergon	1979
1.5	Atlas de la Republica Argentina	Instituto Geográfico Militar	1979
1.6	Atlas Economico	Editorial Ergon	
1.7	Tendencias Económicas - Informe Especial - 1983	Consejo Tecnico de Inversiones SA	1983
1.8	Geografia Politica y Economica de la Republica Argentina	Editorial Kapelusz	1981
1.9	La Argentina - Geografia Humana y Económica - 7a Edicion	Isidro J.F. Carlevari, Editorial Ergon	1979

(2) HIPASAM

2.1	Hierro Patagónico de Sierra Grande SAM Memoria y Balance - 1978 - 1979 - 1981	Hierro Patagónico de Sierra Grande SAM	 1978 1979 1981
2.2	Balance General al 31 de Diciembre de 1982	HIPASAM	1983
2.3	HIPASAM	Ing. Santiago Brarda, Centro de Estudios Comparados, Lima, HIPASAM	1976
2.4	Market Forecast for HIPASAM Pellet Production	HIPASAM	1983
2.5	Planta de Concentracion	HIPASAM	-
2.6	Composicion Quimica Tipo de los Productos Utilizades en Planta para la Peletizacion	HIPASAM	1981

(3) DGFM

3.1	General Organization Chart of DGFM	DGFM	1978

(4) Financial Analysis

4.1	Guía Practica del Exportador e Importador	Guía Practica del Exportador e Importador SACI	1983
4.2	Index Económico	Banco de Analysis y Computacion SRL	1983
4.3	Evolucion Mensual de Los Indices de Precios INDEC, Nueva Ley N. 22.604 Gravamen de Emergencia 1982	Ghaem	1982
4.4	Indice de Precios, Al por Mayor 1973-1981	Instituto Nacional de Estadistica y Censos	1982
4.5	Precios al por Mayor	Instituto Nacional de Estadistica y Censos	1983
	Costo de la Construction	Instituto Nacional de Estadistica y Censos	1983
	Indice de Precios al Consumidor y Salarios Industriales	Instituto Nacional de Estadistica y Censos	1983
4.6	Leyes Impositivas	Editorial Bregna	1983

(5) Chemical Industries in Argentine

5.1	Estudio de la Situacion de la Industria Petroquimica Argentina Tomo I El Marco Internacional Tomo II El Mercado Argentino Tomo III Perspectivas Argentinas	Instituto Petroquimico Argentino, Presidencia de la Nacion Secretaria de Planeamiento, Subsecretaria de Ciencia y Technologia	1981
5.2	Promocion Industrial Declárase a la firma Inpagro SA, Industrial, Comercial y Financiera comprendida en el régimen del Decreto No. 81479 Reglamentario sectorial de la Ley No. 21.608. Déjanse sin efecto los Decretos Nros. 9.49363 y 74868, Decreto No. 2.233, Bs As 18, 12, 81	Boletin Oficial	1981
5.3	Secretaria de Industria y Mineria Promocion Industrial, Resolucion No. 332, Bs As 19, 11, 82	El Secretario de Industria y Mineria	1982
5.4	Industria y Quimica, Revista de la Asociacion Quimica Argentina, Numero 260, 262, 263, 264, 265, 267, 268	Asociacion Quimica Argentina	1981 -1983
5.5	Petroquimica General Mosconi, SAI y C	Petroquímica General Mosconi	1975

(6) Fertilizer

6.1	Fertilizacion de Viñas (Normas Basicas)	Petrosur SA (Archilnit)	
6.2	Norma IRAM	Instituto Argentino de Racionalizacion de Materiales	
	- 12 402 .Fertilizantes, Definiciones		1962
	- 12 402 Extraccion y Preparacion de Muestras, Fertilizantes		1964
	- 22 420 Fertilizantes, Guano de frigorifico		1965
	- 22 419 SSP		1977
	- 22 419 SSP		1979
	- 22 420 Guano de frigorifico		1965
	- 22 423 Superfosfato Amoniacal		1965
	- 22 425 Urea		1979
	- 22 441 Fosfatos naturales para aplicación directa		1979
	- 22 450 TSP		1963
	- 22 407 Métodos de determinación del fósforo		1963
	- 22 407(I) Métodos de determinación del		1979
	- 22 407(II) Métodos de extracción del fósforo soluble en aqua		1979
	- 22 407(III) Extraccion del fósforo soluble en aqua y en citrato de amonio (neutro)		1978
	- 22 407(IV) Método gravimétrico de determinación de fósforo por precipitacción con fosfomololibdato de Quinolina		1979
	- 22 407(V) Determinación espectrofotométrica de fósforo		1978
	- 22 407(VI) Método de determinación del fosforo por la Técnica espectrofotomérrica del vanadomolibdate		

6.3	Direccion Nacional de Fiscalizacion y Comercializacion Agricola	Departamento de Fertilizantes	1973
	Servicio Nacional de Laboratorios de Microbiologia y Quimica Agricola	Departamento de Fertilizantes	1982
6.4	Abastecimiento de Fertilizantes y Enmiendas Producion Nacional, Importaciones, Precios Promedio, Exportaciones		
6.5	Consumo de Fertilizantes en la Republic Argentina	Instituto Nacional de Technologia Agropecuaria	1969
6.6	Informe, Sobre la Problematica Agropecuaria de la Region Salta-Jujuy	INTA	-
6.7	Effcto de la Fertilizacion con Fosforo sobre el Rendimiento de Pasturas Perennes Durante el Primer Año	INTA y IICA	-
6.8	Demanda de Fertilizantes en la Argentina, Tercer Congreso Nacional de Petroquimica	Ing. Quim. Carlos C. Zárate, Buenos Aires	1974

(7) Minerals

7.1	Ministerio de Economia, Secretaria de Estado de Industria y Mineria, Direccion de Mineria, Recursos Mineros	Direccion de Mineria Provincia de Salta	1980
7.2	Padron Minero - 1980	Ministerio de Economia Provincia de Salta	1980
7.3	Gobierno de la Provincia de Salta	Ministerio de Economia Provincia de Salta	1980
7.4	Gobierno de la Provincia de Salta	Ministerio de Economia Provincia de Salta	1980
7.5	Serpentine of Zona Alta Gracia y Santa Rosa de Calamuchita, Córdoba	Molinos Tarquini SAIC, Buenos Aires	1983
7,6	Serpentine of Río de los Sauces, Calamuchita, Córdoba	Maquinalna Minerales SAMIC, Buenos Aires	1983
7.7	Natural Gas Specification	Gas del Estado	1982
7.8	Natural Gas Pipeline Map	Gas del Estado	1983

(8) Site Selection and Cost Information

8.1	Informe tecnico hidrometeologico Direccion de servicio y administracion del agua Ano 1977 Provincia de Rio Negro, Departamento provincia de agua. DPA	PRN	1977
8.2	Generalized stratigraphical Sequence of Sierra Grande South deposit group	DEMAG	1971
8.3	Informe Geologico. Planta de concentracion	IDS	1973
8.4	Geologia Regional Fotointerpretada	HIPASAM	1982
8.5	Planta conforme a obra finalizada Viviendas tipo "F" 05-A-001	ESUCO SA	
8.6	Plano conforme a obra Viviendas Al-5 05-A-001	HIPASAM	1982
8.7	Tablero Principal 6.6KV Esquema Unifilar Substacion electrica A.I N°1 566-008a		[illegible]
8.8	Provision y consumo de agua	HIPASAM	
8.9	Relative Humidity	HIPASAM	[illegible]
8.10	Construction material cost & major local contrator Sierra Grande	HIPASAM	1983
8.11	Relevamiento de datos meteorologicos de Sierra Grande	PRN	1978
8.12	Organizacion 1982, Sierra Grande	HIPASAM	1982
8.13	PFD & Major Equipment List of Concentractor	HIPASAM	1983
8.14	Informacion tecnica preparade para JICA, Junio 1983	HIPASAM	1983
8.15	Informe de resutados diarios del proceso de concentracion Abril de 1983	HIPASAM	1983
8.16	Siemens cat. Motores generadores 1981	SIEMENS	1981
8.17	Siemens cat. Aparatos de maniobra, control y protection	SIEMENS	1981

8.18	Siemens alternadores sincronicas	SIEMENS	1981
8.19	Siemens motores trifasicos	SIEMENS	1981
8.20	Teleperm M process control system catalog MP29 1981	SIEMENS	1981
8.21	Codigo de la edificacion (Building Code)	PBA	
8.22	Derrotero Argentino parte II Costa del atlantico desde cabo san antonio a cabo virgenes y punta dungenes 7a edicion, Buenos Aires 1978	AAN	1978
8.23	Higiene y sequridad enel trabajo Ley No. 19.587 - decreto No. 351/79 disposiciones complementarias prevencion y control dela contaminacion atmosferica ley no. 20.284 Buenos Aires 1981	DNRO	1981
8.24	Vivienda, rerista de la Construccion	RV	1983
8.25	Gaceta, estadistica mayo 1983 N°29 Indices Abril 1983	BIE	1983
8.26	Ley N° 1334, Province of Rio Negro	PRN	1978
8.27	Ingenieria Tauro, Company brouchure, construction equipment list, experience	TAURO	1983
8.28	Reglamento general del transito en todos los caminos y calles del pais, ley N° 13.893 codigo de transito de la prov. de Buenos Aires Ley 5.800	PBA	1982
8.29	Tarifas de carga a la costa sur vigentes a partir Del 01-06-83	AAT	1983
8.30	Puerto San Antonio muelle Este	PSA	1981
8.31	Indice de precios al consumidor y salarios industriales, Abril 1983	INEC	1983
8.32	Costo de la contruccion capital federal, Abril 1983	INEC	1983
8.33	Informacion, indice del costo de la construccion en la capital federal, Maya 1983	INEC	1983
8.34	-ditto- Abril de 1983, Ajuste cifras	INEC	1983
8.35	Informacion indice de precios al consumidor, Mayo 1983	INEC	1983
8.36	Numero indice del costo de la construccion, de la capital federal y alrededores, base 1981 y sus variaciones mensuales	CAC	1983
8.37	Numero indice del costo de materiales de la capital federal y alre dedores base 1981 y sus variaciones mensuales	CAC	1983
8.38	Numero indice del costo de mano de obra de la capital federal y alrededores, base 1981 y sus variasiones mensuales	CAC	1983
8.39	Techint, Projectos y Obras	TECHINT	1983
8.40	The Techint Group	TECHINT	1983
8.41	Estadistica minera de la Republica Argentina Ano 1980	SDM	1980
8.42	Mineria No. 235, Sept. 1982	MINERIA	1982
8.43	Exportaciones de Minerales Enro-1982~Marzo-1983	SDM	1983
8.44	Importacion de Sustancias Minerales y derivados 1981	SDM	1981
8.45	Prospeccion de Fostatos Sedimentarios en la Republica Argentine	QCG	1982
8.46	PFD, planta de peletization	HIPASAM	
8.47	Documentacion para la licitacion de la planta de concentracion (Partly copied) Capitulo 4	SWECO	1971
8.48	Documentacion para la licitacion de la planta de concentracion (Partly copied) Capitulo 5 (mechanical)	SWECO	1971
8.49	Documentation para la licitacion de la planta de concentracion (Partly copied) Capitulo 5 (control)	SWECO	1971
8.50	Documentation para la licitacion de la planta de concentracion (Partly copied) Capitulo 5 (electrical)	SWECO	1971
8.51	Documentation para la licitacion de la planta de concentracion (Partly copied) Capitulo 6 (civil)	SWECO	1971
8.52	Zona industrial 1 Plano general	HIPASAM	1977

8.53	Carta general	SWECO	1971
8.54	Carta geografica	SWECO	1971
8.55	Villa HIPASAM	HIPASAM	
8.56	Characteristics del almirante segundo s. storni	PM	1983
8.57	Price of construction equipment & materials	HIPASAM	1983
8.58	Price of agitator, transformer, panel	HIPASAM	1983
8.59	Calculation sheet of electricity price	HIPASAM	1983
8.60	Price list of electrical equipment	SIEMENS	1983
8.61	Tariff of Railway Transportation	FA	1983
8.62	Information of Serpentine	MTS	1983
8.63	Information of Serpentine	MMM	1983
8.64	Construction Costs	TAURO	1983
8.65	Information of Mining	HIPASAM	1983

(9) Fertilizer Marketing

9.1	Informacion Sintetizada de la Encuesta sobre el Uso de Fertilizantes	Departmento de Suelos, INTA, Buenos Aires	1975
9.2	Uso de Fertilizantes en la Provincia de Mendosa	INTA, Mendoza	
9.3	Abastecimiento de Fertilizantes Importados y Exportaciones Realizadas	Departmento de Fertilizantes, SNLMQA	N°.1 - 1977 N°.3 - 1979
9.4	Abastecimiento de Fertilizantes y Enmiendas	Departmento de Fertilizantes, SNLMQA	N°.5 - 1980 N°.7 - 1982
9.5	Produccion e Importacion de Fertilizantes Simples	Departmento de Fertilizantes, SNLMQA	1974/75 - 1976/77
9.6	Estadistica de Produccion, Importacion y Consumo de Fertilizantes y Enmiendos	Departmento de Fertilizantes, SNLMQA	1972/1973
9.7	Utilizacion de Fertilizantes en la Republica Argentina	Estimaciones Agricolas, SNESR	
9.8	Cropped Area, Yield and Production by Province and by Crop	Estimaciones Agricolas, SNESR	
9.9	Cotizaciones Internas of Agricultural Products	Coste e Insumos Agropecuarios, SNESR	
9.10	Ventas de Fertilizantes de Fabricacion Nacional	Coste e Insumos Agropecuarios, SNESR	
9.11	Cuenta Cultural	Coste e Insumos Agropecuarios, SNESR	
9.12	Estimacion de la Evolucion de los Terminos de Intercambio Fertilizante Trijo	Coste e Insumos Agropecuarios, SNESR	
9.13	Boletin Mesual de Precios de Insumos Agropecuarios (N°.55, N°.64 and N°.66)	SNESR	
9.14	Fertilizacion de Viñas, Normas Basicas	Petrosur SA	

ANNEX II

ANNEX II-1

NATURAL CONDITIONS IN ARGENTINE

- CLIMATIC TYPES IN ARGENTINE
- AVERAGE TEMPERATURE IN ARGENTINE
- AVERAGE ANNUAL PRECIPITATION IN ARGENTINE
- AGRICULTURAL APTITUDE POTENTIALITY OF SOIL IN AGRICULTURE

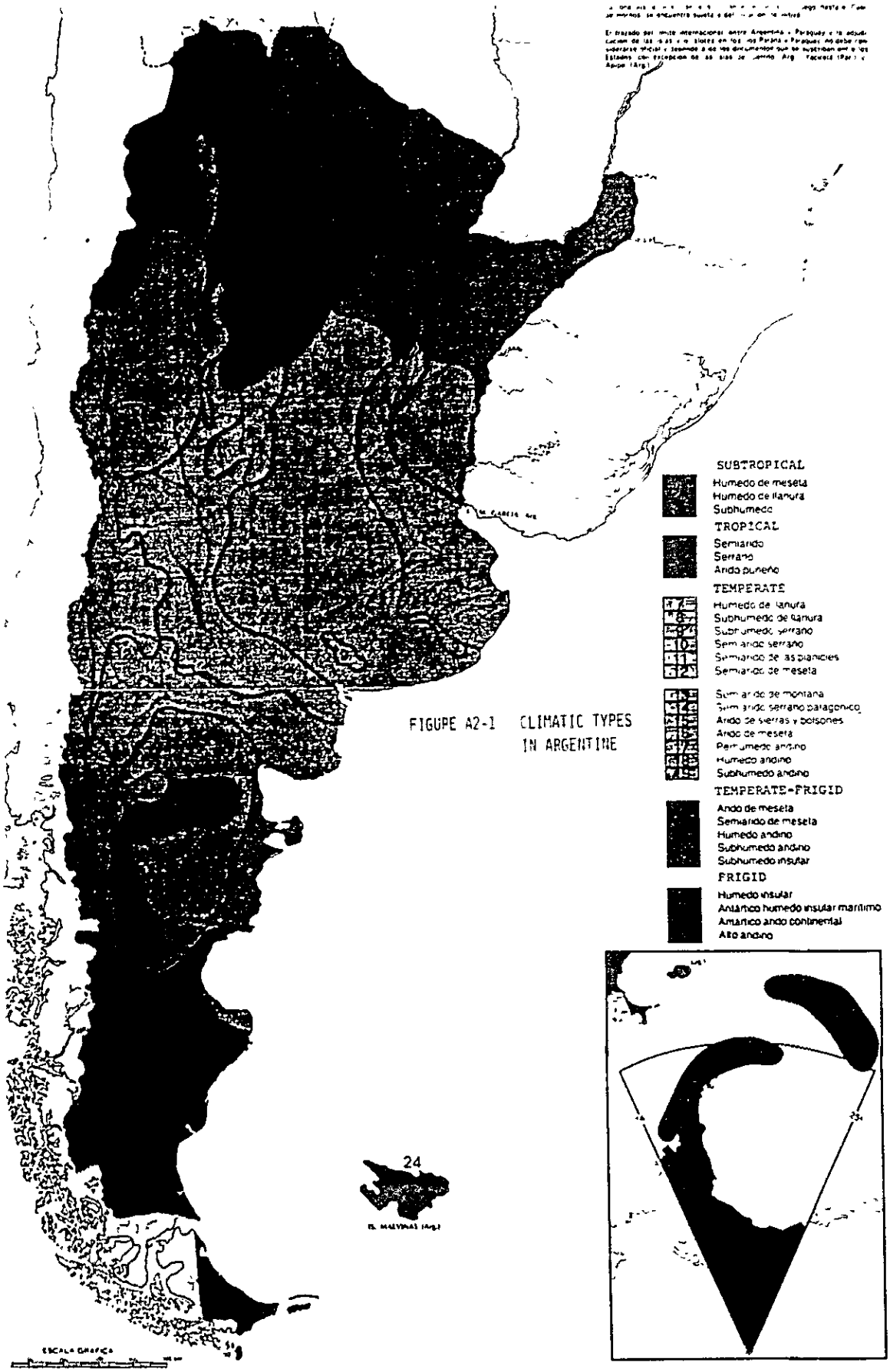


FIGURE A2-1 CLIMATIC TYPES IN ARGENTINE

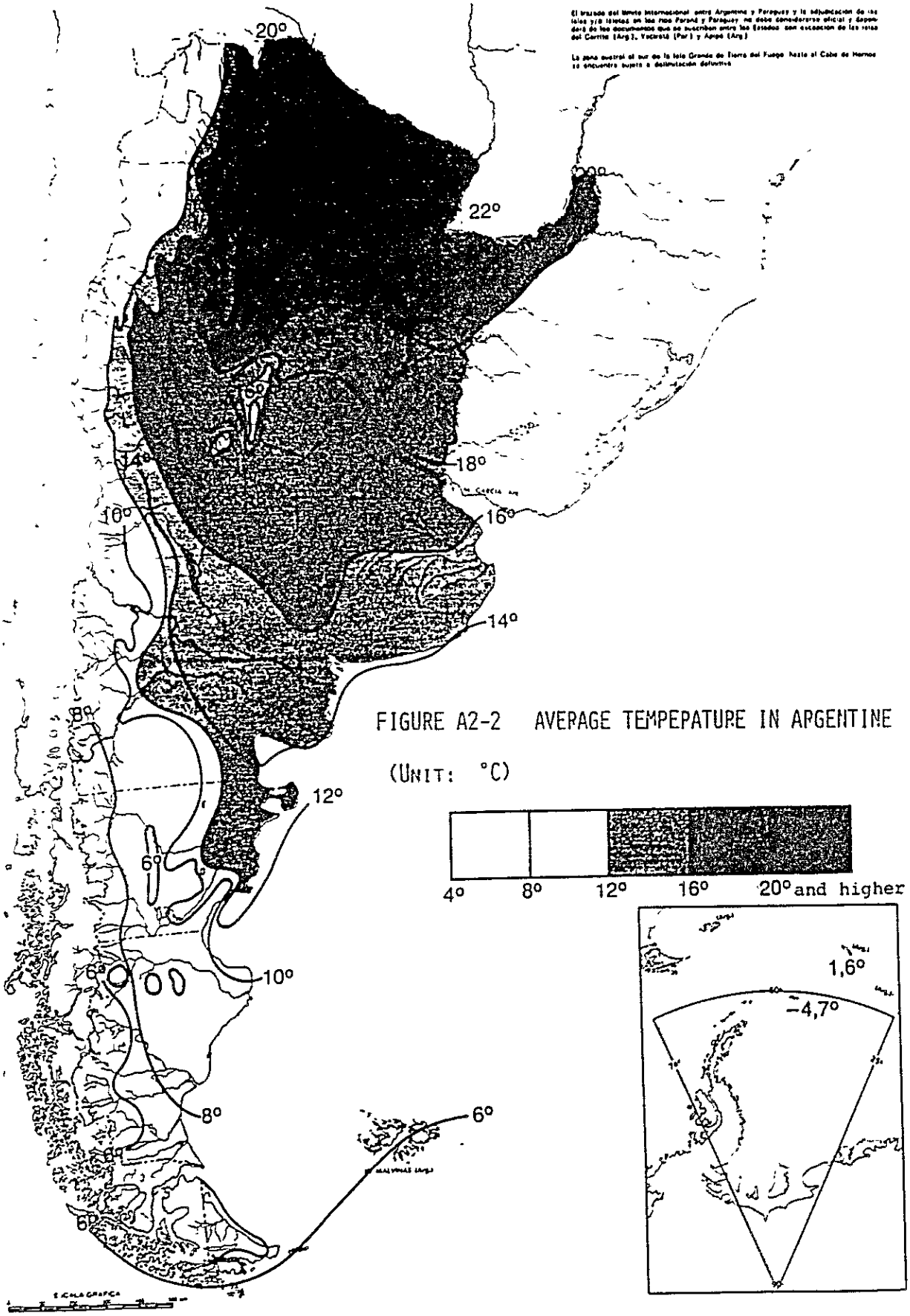


FIGURE A2-2 AVERAGE TEMPERATURE IN ARGENTINE

(UNIT: °C)

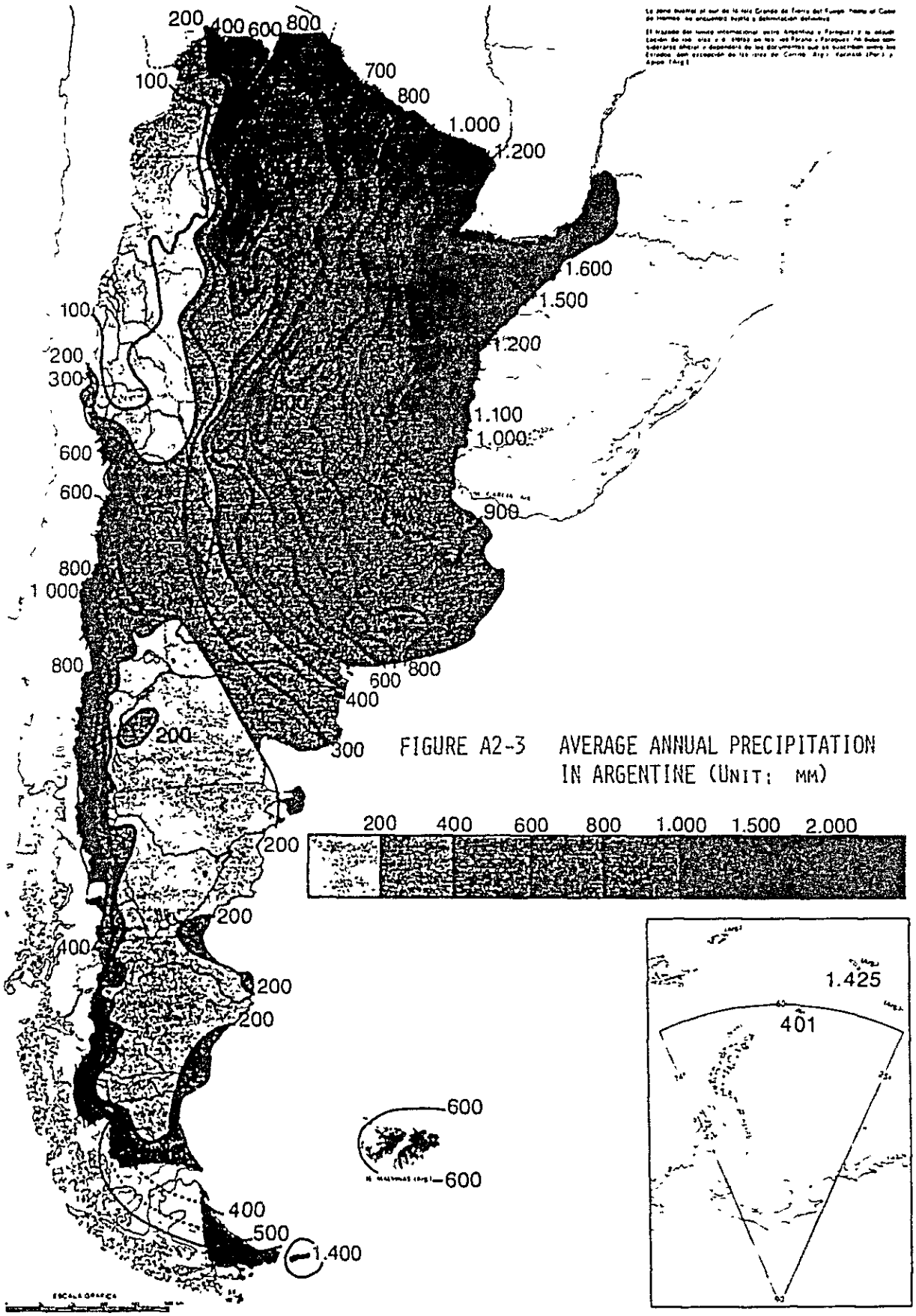


FIGURE A2-3 AVERAGE ANNUAL PRECIPITATION IN ARGENTINE (UNIT: MM)

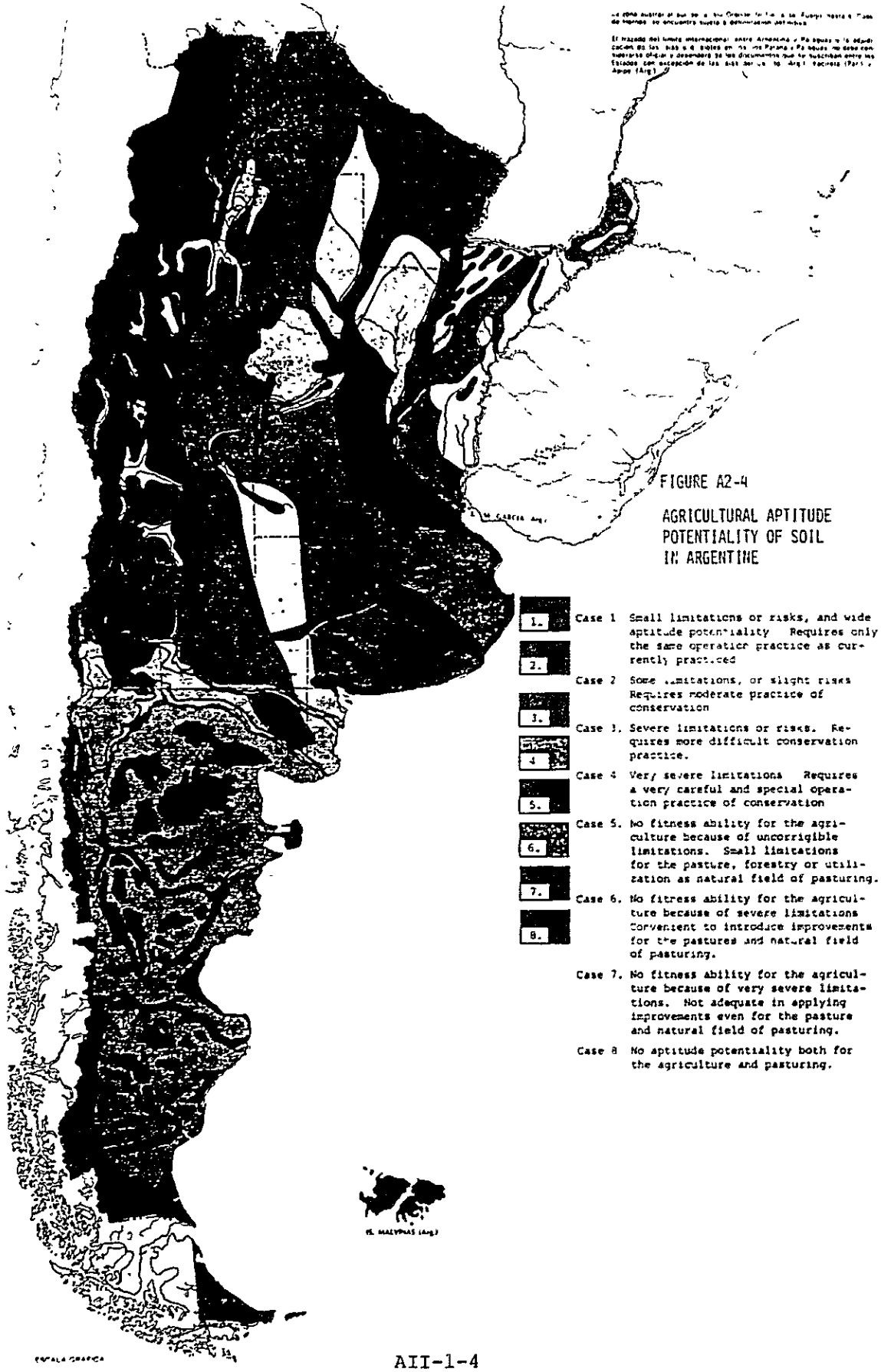


FIGURE A2-4

AGRICULTURAL APTITUDE POTENTIALITY OF SOIL IN ARGENTINE

ANNEX II-2

MARKET SIZE OF PHOSPHATE FERTILIZER IN ARGENTINE

ANNEX II-2

MARKET SIZE OF PHOSPHATE FERTILIZER IN ARGENTINE
-- WITH THE DETAIL OF DEMAND PROJECTION --

1. Introduction

This Annex includes the detail situation of the phosphate fertilizer market in Argentine, and the detail methodology and procedure of demand projection of phosphate fertilizer. The officially available data regarding fertilizer market are limited to that of import and domestic production as an Argentine total without any regional breakdowns. The data and informations described in the following sections on type-wise fertilizer consumption, region-wise consumption, crop-wise consumption, etc. are compiled and estimated based on the informations obtained from the fertilizer industry, INTA, and people and reports related to the fertilizer use.

2. Fertilizer consumption by type of fertilizer

The data on fertilizer consumption by type is available only for 1972/73 (Table A2-1). The type-wise consumption in other years has to be estimated using the data on type-wise import and production in case it is necessary. No data is available on compound fertilizer with respect to not only production but also raw materials used in the production. Table A2-1 shows the estimated consumption of raws materials in production of compound fertilizer using the fertilizer statistic in 1972/73. Urea is estimated to have accounted for 45% of nitrogen used in compound fertilizer production, whereas DAP accounted for 20% and ammonium sulphate 35%. In the case of phosphate nutrient, TSP accounted for 55% and DAP 45%. The potassium source of compound fertilizer was mostly muriate of potash.

Table AII-1 BREAKDOWN OF FERTILIZER CONSUMPTION, ARGENTINE
- 1972/1973 -

	Production and Import[1]				Consumption								
	Product ton	N ton	P_2O_5 ton	K_2O ton	Total	Raw material for NP/NPK[2]	Direct Application[1]						
							Sub-total	Pampeana	Andina	Noroeste	Mesopotamia	Patagonia	Chquena
Ammonia	2,900	2,400	-	-	3,600	-	3,600	3,600	-	-	-	-	-
Ammonium Nitrate	2,800	700	-	-	-	-	-	-	-	-	-	-	-
Sodium Nitrate	14,600	2,300	-	-	11,800	-	11,800	2,400	900	500	7,900	100	-
Ammonium Sulphate	66,800	14,000	-	-	66,800	17,700	49,100	7,300	22,100	10,200	200	9,200	-
Urea	43,300	19,500	-	-	43,300	10,600	32,700	7,300	2,900	19,900	1,000	1,500	100
Thomas-P	9,100	-	1,500	-	9,100	-	9,100	2,900	100	500	4,900	700	-
SSP	1,000	-	200	-	1,000	1,000	0	-	-	-	0	-	-
TSP	31,500	-	14,400	-	31,500	14,900	16,600	12,800	700	400	1,700	900	0
Rock Phosphate	16,800	-	5,000	-	16,800	-	16,800	13,800	0	0	2,900	0	0
MOP	6,500	-	-	3,900	6,500	4,900	1,600	400	300	0	700	100	-
SOP	2,600	-	-	1,300	3,600	-	3,600	500	300	200	2,600	100	-
SPM	4,100	-	-	900	2,700	-	2,700	100	-	0	2,600	-	-
DAP	54,300	9,800	24,900	-	54,300	12,100	42,200	29,700	8,600	1,300	1,000	1,700	0
Others	8,400	400	1,300	500	6,000	-	6,000	1,200	2,500	2,700	100	100	-
NP/NPK	100	0	0	0	-	-	-	-	-	-	-	-	-
Sub-total	264,600	49,100	47,300	6,700	257,000	61,200	195,800	82,000	37,800	35,800	25,600	14,400	200
NP/NPK(Domestic)	52,600	5,800	5,900	6,400	58,200	-	58,200	6,700	13,100	10,600	16,300	11,000	600
Total Production 264,600													
N ton		49,100				10,800	44,800	14,600	9,600	12,800	3,800	3,900	100
P_2O_5 ton			47,300			12,600	39,800	25,000	5,800	2,200	4,300	2,300	100
K_2O ton				6,700		2,900	11,100	1,400	2,000	2,600	4,000	1,100	0

Notes: 1/ Departments de Fertilizantes, SEAG, "Estadistica de Produccion, Importacion y Consumo de Fertilizantes y Enmiendas, 1972/1973."

2/ UNICO Estimate.

3. Region-wise and crop-wise fertilizer consumption

The fertilizer statistics on region-wise consumption was only available for 1972/73, and no data have been collected after that. The compile of information on crop-wise consumption is now under processing by INTA, as explained before, and therefore, the latest data now available are that of 1975. It is understood by those who are related to fertilizer industry and fertilizer use such as INTA, the industry, Secretary de Agricultura y Ganaderia, that the situation regarding the fertilizer use in the 1975 data is still valid basically.

(1) Pampeana

Pampeana may be devided into three areas in view of phosphate supply ability of soils as shown in Figure 2-10. Wheat, pasture and potato are the major crops on which phosphate fertilizer has been applied in this region. The cultivation of wheat distributes from north area of Pampeana including north Buenos Aires province, South Santa Fe, southeast Cordoba, to south area of Pampeana with south Buenos Aires province and east La Pampa in the area. In the north area of Pampeana, where the sandy soils are distributed and nitrogen deficit is observed but phosphate can be supplied naturally, only such straight nitrogen fertilizers as urea and ammonia are applied. INTA has recommended to use phosphate fertilizer there, but only nitrogen fertilizer is still used. In this area, maize, sorghum, soybean are also grown in addition to wheat, and nitrogen fertilizer is used only on a part of maize.

The south Pampeana is the monoculture area of wheat and phosphate deficit area. The inbetween area of south and north

Pampeana is the phosphate deficit area but used mainly for cow fattening because of the frequent flood and draught without sufficient drainage facilities. Wheat in this area is cultivated in quite extensive manner. Pasture is also grown mainly in this phosphate deficit area, but the expansion of fertilized area of pasture is hard to expect because of the unfavorable cultivation conditions as described above.

Southeast area of province of Buenos Aires centered by Mar del Plata is the major cultivation area of potato, and DAP is mainly used on potato.

The fertilizer application on maize is observed in a very limited area. In the case of nitrogen fertilizer, since the maize is grown in summer season and the irrigation water is not sufficient, the application of fertilizer is very difficult. Besides this, the bacteria in the soil are active in this area, and the nitrogen is naturally supplied almost sufficienly.

The maize is grown in the phosphate deficit area, also, and phosphate application is required, but this area (south Pampeana) is unfavorable area for agricultural production as stated before, and phosphate fertilizer is seldom applied. In addition to these crops, vegetables and fruit trees are grown mainly in the outskirt of city areas, and fertilizer is used on these crops. The estimated situation and projection of fertilizer use in Pampeana is shown in Table A2-2.

(2) Andina

In the valley area in Mendosa, intensive agriculture is observed. Table A2-3 shows the estimated situation of fertilizer application in Andina. The expansion of cultivation area is limited by the availability of irrigation water. There

Table A2-2(1) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

- PAMPEANA -

<PAMPEANA>

CROP	POTENTIAL DOSAGE (Kg/ha)		ITEM	1972		1982		1990		1995	
	N	P205		N	P205	N	P205	N	P205	N	P205
WHEAT	45	46	CROPPED AREA (A)	5270	5270	5748	5748	6147	6147	6281	6281
			FERTILIZED AREA (B)	280	125	632.3	344.9	1051.1	866.7	1400.7	1432.1
			(B/A : %)	5.3	2.4	11	6	17.1	14.1	22.3	22.8
			POTENTIAL DEMAND (C)	12.6	5.8	28.5	15.9	47.3	39.9	63	65.9
			ESTIMATED/PROJECTED CONSUMPTION (D)	8.7	5.8	28.2	15.9	47.3	39.9	63	65.9
			(D/C : %)	69	100	99	100	100	100	100	100
MAIZE	30	30	CROPPED AREA (A)	3346	3346	2854	2854	2930	2930	2984	2984
			FERTILIZED AREA (B)	50.2	25.1	42.8	22.8	43.9	23.4	44.8	23.9
			(B/A : %)	1.5	0.75	1.5	0.8	1.5	0.8	1.5	0.8
			POTENTIAL DEMAND (C)	1.5	0.8	1.3	0.7	1.3	0.7	1.3	0.7
			ESTIMATED/PROJECTED CONSUMPTION (D)	1.5	0.8	1.3	0.7	1.3	0.7	1.3	0.7
			(D/C : %)	100	100	100	100	100	100	100	100
GARLIC	70	100	CROPPED AREA (A)	7	7	7	7	5	5	5	5
			FERTILIZED AREA (B)	4.4	0.9	4.4	0.9	3.1	0.6	3.1	0.6
			(B/A : %)	63	12.5	63	12.5	63	12.5	63	12.5
ONION	70	100	CROPPED AREA (A)	1	1	2	2	3	3	3	3
			FERTILIZED AREA (B)	0.6	0.1	1.3	0.3	1.9	0.4	1.9	0.4
			(B/A : %)	63	12.5	63	12.5	63	12.5	63	12.5
PEPPER	70	100	CROPPED AREA (A)	1	1	1	1	1	1	1	1
			FERTILIZED AREA (B)	0.6	0.1	0.6	0.1	0.6	0.1	0.6	0.1
			(B/A : %)	63	12.5	63	12.5	63	12.5	63	12.5
TOMATOE	70	100	CROPPED AREA (A)	4	4	4	4	5	5	5	5
			FERTILIZED AREA (B)	2.5	0.5	2.5	0.5	3.1	0.6	3.1	0.6
			(B/A : %)	63	12.5	63	12.5	63	12.5	63	12.5
			POTENTIAL DEMAND (C)	0.6	0.2	0.6	0.2	0.6	0.2	0.6	0.2
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.6	0.2	0.6	0.2	0.6	0.2	0.6	0.2
			(D/C : %)	100	100	100	100	100	100	100	100
POTATOES	33	70	CROPPED AREA (A)	99	99	93	93	101	101	108	108
			FERTILIZED AREA (B)	67.3	67.3	63.2	63.2	68.7	68.7	73.4	73.4
			(B/A : %)	68	68	68	68	68	68	68	68
			POTENTIAL DEMAND (C)	2.2	4.7	2.1	4.4	2.3	4.8	2.4	5.1
			ESTIMATED/PROJECTED CONSUMPTION (D)	2.2	4.7	2.1	4.4	2.3	4.8	2.4	5.1
			(D/C : %)	100	100	100	100	100	100	100	100

Table A2-2(2) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

- PAMPEANA -

<PAMPEANA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P205	ITEM	1972 N	1972 P205	1982 N	1982 P205	1990 N	1990 P205	1995 N	1995 P205
ORANGE	130	130	CROPPED AREA (A)	9	9	5	5	5	5	5	5
			FERTILIZED AREA (B)	3.4	3.4	1.9	1.9	1.9	1.9	1.9	1.9
			(B/A : %)	38	38	38	38	38	38	38	38
GRAPE FRUITS	130	130	CROPPED AREA (A)	1	1	0	0	0	0	0	0
			FERTILIZED AREA (B)	0.4	0.4	0	0	0	0	0	0
			(B/A : %)	38	38	38	38	38	38	38	38
M. ORANGE	130	130	CROPPED AREA (A)	5	5	2	2	2	2	2	2
			FERTILIZED AREA (B)	1.9	1.9	0.8	0.8	0.8	0.8	0.8	0.8
			(B/A : %)	38	38	38	38	38	38	38	38
APPLE	130	130	CROPPED AREA (A)	2	2	1	1	1	1	1	1
			FERTILIZED AREA (B)	0.8	0.8	0.4	0.4	0.4	0.4	0.4	0.4
			(B/A : %)	38	38	38	38	38	38	38	38
			POTENTIAL DEMAND (C)	0.8	0.8	0.4	0.4	0.4	0.4	0.4	0.4
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.8	0.8	0.4	0.4	0.4	0.4	0.4	0.4
			(D/C : %)	100	100	100	100	100	100	100	100
PASTURES	8.5	64	CROPPED AREA (A)	16000	16000	16000	16000	16000	16000	16000	16000
			FERTILIZED AREA (B)	128	208	128	208	128	208	128	208
			(B/A : %)	0.8	1.3	0.8	1.3	0.8	1.3	0.8	1.3
			POTENTIAL DEMAND (C)	1.1	13.3	1.1	13.3	1.1	13.3	1.1	13.3
			ESTIMATED/PROJECTED CONSUMPTION (D)	1.1	13.3	1.1	13.3	1.1	13.3	1.1	13.3
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	14.9	25.6	33.7	34.9	53.0	59.3	68.8	85.6

Table A2-3(1) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

- ANDINA -

<ANDINA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P205	ITEM	1972 N	1972 P205	1982 N	1982 P205	1990 N	1990 P205	1995 N	1995 P205
OLIVE	38	100	CROPPED AREA (A)	7	7	7	7	7	7	7	7
			FERTILIZED AREA (B)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
			(B/A : %)	23	23	23	23	23	23	23	23
			POTENTIAL DEMAND (C)	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
			(D/C : %)	100	100	100	100	100	100	100	100
GARLIC	140	60	CROPPED AREA (A)	3	3	7	7	11	11	14	14
			FERTILIZED AREA (B)	2.3	2.3	5.5	5.5	8.6	8.6	10.9	10.9
			(B/A : %)	78	78	78	78	78	78	78	78
			POTENTIAL DEMAND (C)	0.3	0.1	0.8	0.3	1.2	0.5	1.5	0.7
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	0.1	0.8	0.3	1.2	0.5	1.5	0.7
			(D/C : %)	100	100	100	100	100	100	100	100
ONION	140	60	CROPPED AREA (A)	5	5	7	7	12	12	17	17
			FERTILIZED AREA (B)	3.6	3.6	5	5	8.6	8.6	12.2	12.2
			(B/A : %)	72	72	72	72	72	72	72	72
			POTENTIAL DEMAND (C)	0.5	0.2	0.7	0.3	1.2	0.5	1.7	0.7
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.5	0.2	0.7	0.3	1.2	0.5	1.7	0.7
			(D/C : %)	100	100	100	100	100	100	100	100
POTATOES	84	275	CROPPED AREA (A)	9	9	8	8	11	11	13	13
			FERTILIZED AREA (B)	5.5	5.5	4.9	4.9	6.7	6.7	7.9	7.9
			(B/A : %)	61	61	61	61	61	61	61	61
			POTENTIAL DEMAND (C)	0.5	1.5	0.4	1.3	0.6	1.8	0.7	2.2
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.5	1.5	0.4	1.3	0.6	1.8	0.7	2.2
			(D/C : %)	100	100	100	100	100	100	100	100

Table A2-3(2) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

<ANDINA> - ANDINA -

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
PEPPER	120	50	CROPPED AREA (A)	2	2	1	1	2	2	2	2
			FERTILIZED AREA (B)	1.9	1.9	0.9	0.9	1.9	1.9	1.9	1.9
			(B/A : %)	93	93	93	93	93	93	93	93
			POTENTIAL DEMAND (C)	0.2	0.1	0.1	0	0.2	0.1	0.2	0.1
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.2	0.1	0.1	0	0.2	0.1	0.2	0.1
			(D/C : %)	100	100	100	100	100	100	100	100
TOMATOE	130	50	CROPPED AREA (A)	10	10	9	9	11	11	12	12
			FERTILIZED AREA (B)	4.3	4.3	3.9	3.9	4.7	4.7	5.2	5.2
			(B/A : %)	43	43	43	43	43	43	43	43
			POTENTIAL DEMAND (C)	0.6	0.2	0.5	0.2	0.6	0.2	0.7	0.3
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.6	0.2	0.5	0.2	0.6	0.2	0.7	0.3
			(D/C : %)	100	100	100	100	100	100	100	100
GRAPES	80	45	CROPPED AREA (A)	310	310	310	310	310	310	310	310
			FERTILIZED AREA (B)	65.1	65.1	65.1	65.1	65.1	65.1	65.1	65.1
			(B/A : %)	21	21	21	21	21	21	21	21
			POTENTIAL DEMAND (C)	5.2	2.9	5.2	2.9	5.2	2.9	5.2	2.9
			ESTIMATED/PROJECTED CONSUMPTION (D)	5.2	2.9	5.2	2.9	5.2	2.9	5.2	2.9
			(D/C : %)	100	100	100	100	100	100	100	100
OTH VEGETABL	120	10	CROPPED AREA (A)	8	8	8	8	8	8	8	8
			FERTILIZED AREA (B)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
			(B/A : %)	47	47	47	47	47	47	47	47
			POTENTIAL DEMAND (C)	0.5	0	0.5	0	0.5	0	0.5	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.5	0	0.5	0	0.5	0	0.5	0
			(D/C : %)	100	100	100	100	100	100	100	100
APPLE	97	18	CROPPED AREA (A)	12	12	15	15	20	20	21	21
			FERTILIZED AREA (B)	2.2	2.2	2.7	2.7	3.6	3.6	3.8	3.8
			(B/A : %)	18	18	18	18	18	18	18	18
PEACH	97	18	CROPPED AREA (A)	4	4	8	8	13	13	16	16
			FERTILIZED AREA (B)	0.7	0.7	1.4	1.4	2.3	2.3	2.9	2.9
			(B/A : %)	18	18	18	18	18	18	18	18
			POTENTIAL DEMAND (C)	0.3	0.1	0.4	0.1	0.6	0.1	0.6	0.1
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	0.1	0.4	0.1	0.6	0.1	0.6	0.1
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	8.2	5.3	8.7	5.3	10.2	6.3	11.2	7.2

is a irrigation project under consideration in which water reservoir is constructed and waster is introduced from Rio Negro. Without such irrigation projects, the cultivation area in this region will not be increased greatly.

In this region, grape trees are grown extensively and the produced wines are shipped to both domestic and export markets. The fertilizer consumed by grape accounts for 60% of total consumption in this region, and the dosage level of fertilizer on grape fluctuates depending on the price of wines. The fertilized area ratio of grape is around 20%. The vegetable cultivation is also popular in this region, and the vegetables include such vegetables, which are suitable for long distance transportation, as garlic, onion, carrot, tomato, green pepper and potato, etc. The fertilization on these vegetables are fairly stable, and the fertilizer consumption by vegetables account for 25% of total. The fertilized area ratio varies by kinds of vegetables with that of garlic and onion being 70 - 80%, while that of others 40 - 50%. Fruits are grown in orchards as commercial crop, but fertilization on fruits is limited to large scale orchards. The fertilized area ratio is slightly less than 20%, and the consumption by fruits accounts for 15% of total with fluctuation observed depending on the market situation of fruits. In the case of olive, there are two types of cultivation patterns. One is the olive grown in orchard and another is those grown as a windbreak of grape orchards. Fertilizer is applied only on a part of former olive cultivation. Besides these crops, rye is grown as a rotation crop with vegetables, but generally fertilizer is not used on the rye.

(3) Noroeste

As shown in Table A2-4, major crops fertilized in this region

Table A2-4(1) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

<NOROESTE> - NOROESTE -

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
SUGAR CANE	80		CROPPED AREA (A)	272		320		332		338	
			FERTILIZED AREA (B)	136		160		166		169	
			(B/A : %)	50		50		50		50	
			POTENTIAL DEMAND (C)	10.9		12.8		13.3		13.5	
			ESTIMATED/PROJECTED CONSUMPTION (D)	10.9		12.8		13.3		13.5	
			(D/C : %)	100		100		100		100	
TOBACCO	18	70	CROPPED AREA (A)	37	37	30	30	26	26	25	25
			FERTILIZED AREA (B)	18.1	18.1	14.7	14.7	12.7	12.7	12.3	12.3
			(B/A : %)	49	49	49	49	49	49	49	49
			POTENTIAL DEMAND (C)	0.3	1.3	0.3	1	0.2	0.9	0.2	0.9
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	1.3	0.3	1	0.2	0.9	0.2	0.9
			(D/C : %)	100	100	100	100	100	100	100	100
POTATOES	53	140	CROPPED AREA (A)	10	10	6	6	7	7	7	7
			FERTILIZED AREA (B)	4.3	4.3	2.6	2.6	3	3	3	3
			(B/A : %)	43	43	43	43	43	43	43	43
			POTENTIAL DEMAND (C)	0.2	0.6	0.1	0.4	0.2	0.4	0.2	0.4
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.2	0.6	0.1	0.4	0.2	0.4	0.2	0.4
			(D/C : %)	100	100	100	100	100	100	100	100
PEPPER	40	25	CROPPED AREA (A)	7	7	4	4	3	3	3	3
			FERTILIZED AREA (B)	4.1	4.1	2.3	2.3	1.7	1.7	1.7	1.7
			(B/A : %)	58	58	58	58	58	58	58	58
TOMATOE	40	25	CROPPED AREA (A)	6	6	6	6	1	1	1	1
			FERTILIZED AREA (B)	3.5	3.5	3.5	3.5	0.6	0.6	0.6	0.6
			(B/A : %)	58	58	58	58	58	58	58	58
			POTENTIAL DEMAND (C)	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1
			(D/C : %)	100	100	100	100	100	100	100	100
GREEN PEPPER	46		CROPPED AREA (A)	14		14		14		14	
			FERTILIZED AREA (B)	14		14		14		14	
			(B/A : %)	100		100		100		100	
			POTENTIAL DEMAND (C)	0.6		0.6		0.6		0.6	
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.6		0.6		0.6		0.6	
			(D/C : %)	100		100		100		100	

Table A2-4(2) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

- NOROESTE -

<NOROESTE>

CROP	POTENTIAL DOSAGE (Kg/ha)		ITEM	1972		1982		1990		1995	
	N	P205		N	P205	N	P205	N	P205	N	P205
LEMON	34	40	CROPPED AREA (A)	14	14	19	19	30	30	35	35
			FERTILIZED AREA (B)	4.9	4.9	6.6	6.6	10.5	10.5	12.3	12.3
			(B/A : %)	35	35	35	35	35	35	35	35
ORANGE	34	40	CROPPED AREA (A)	13	13	14	14	18	18	20	20
			FERTILIZED AREA (B)	4.5	4.5	4.9	4.9	6.3	6.3	7	7
			(B/A : %)	35	35	35	35	35	35	35	35
GRAPE FRUITS	34	40	CROPPED AREA (A)	6	6	4	4	6	6	6	6
			FERTILIZED AREA (B)	2.1	2.1	1.4	1.4	2.1	2.1	2.1	2.1
			(B/A : %)	35	35	35	35	35	35	35	35
M. ORANGE	34	40	CROPPED AREA (A)	5	5	6	6	9	9	9	9
			FERTILIZED AREA (B)	1.8	1.8	2.1	2.1	3.1	3.1	3.1	3.1
			(B/A : %)	35	35	35	35	35	35	35	35
			POTENTIAL DEMAND (C)	0.5	0.5	0.5	0.6	0.7	0.9	0.8	1
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.5	0.5	0.5	0.6	0.7	0.9	0.8	1
			(D/C : %)	100	100	100	100	100	100	100	100
BANANA	125	125		2	2	2	2	2	2	2	2
			FERTILIZED AREA (B)	2	2	2	2	2	2	2	2
			(B/A : %)	100	100	100	100	100	100	100	100
			POTENTIAL DEMAND (C)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	16.3	2.9	18.1	2.4	15.9	2.6	16.2	2.7

is sugarcane, but only nitrogen fertilizer is used on this crop. The sugarcane is grown in large scale farming in Salta and Jujuy area and almost all of the sugarcane in this area is estimated to have been fertilized. However, the sugarcane in Tucuman is cultivated in small scale and the fertilized area ratio is around 60%.

In addition to sugarcane, such crops as tobacco, fruits, and vegetables, etc., which are grown in irrigated area in Salta and Jujuy, are fertilized by fairly high fertilized area ratio (80 - 100%). The vegetable is shipped to Buenos Aires as off-season vegetable.

In non-irrigated area, such crops as sorghum, maize, dry beans, etc., are grown, but these crops are not applied fertilizer.

(4) Patagonia

In this region, the intensive agriculture is observed in such a limited irrigated areas as Neuquén and Rio Negro valley, and such crops as vegetables, fruits and grapes are grown. The estimated fertilizer application situation is as shown in Table A2-5. The total cultivation area in this region is small, and the increase in the fertilizer consumption is not expected. Other areas in Patagonia is covered by barren grass area which is used only for raising sheep.

(5) Mesopotamia

The estimated fertilizer application level by crop is shown in Table A2-6. Vegetables, tobacco, and pasture are the crops on which fertilizer is applied, and maize is the sole crop on which fertilization is expected because other crops are not so profitable to expect fertilizer application.

Table A2-5(1) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

- PATAGONIA -

<PATAGONIA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
ALFALFA		55	CROPPED AREA (A)		31		22		18		18
			FERTILIZED AREA (B)		2		2.4		3		3.7
			(B/A : %)		6.5		11		16.4		20.8
			POTENTIAL DEMAND (C)		0.1		0.1		0.2		0.2
			ESTIMATED/PROJECTED CONSUMPTION (D)		0.1		0.1		0.2		0.2
			(D/C : %)		100		100		100		100
POTATOES	170	275	CROPPED AREA (A)	2	2	3	3	7	7	9	9
			FERTILIZED AREA (B)	1	1	1.5	1.5	3.5	3.5	4.5	4.5
			(B/A : %)	50	50	50	50	50	50	50	50
			POTENTIAL DEMAND (C)	0.2	0.3	0.3	0.4	0.6	1	0.8	1.2
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.2	0.3	0.3	0.4	0.6	1	0.8	1.2
			(D/C : %)	100	100	100	100	100	100	100	100
PEPPER	125	115	CROPPED AREA (A)	1	1	1	1	1	1	1	1
			FERTILIZED AREA (B)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
			(B/A : %)	40	40	40	40	40	40	40	40
TOMATOE	125	115	CROPPED AREA (A)	5	5	7	7	11	11	14	14
			FERTILIZED AREA (B)	2	2	2.8	2.8	4.4	4.4	5.6	5.6
			(B/A : %)	40	40	40	40	40	40	40	40
			POTENTIAL DEMAND (C)	0.3	0.3	0.4	0.4	0.6	0.6	0.7	0.7
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.3	0.3	0.4	0.4	0.6	0.6	0.7	0.7
			(D/C : %)	100	100	100	100	100	100	100	100
GRAPES	82	105	CROPPED AREA (A)	17	17	17	17	17	17	17	17
			FERTILIZED AREA (B)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
			(B/A : %)	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
			POTENTIAL DEMAND (C)	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.5
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.5
			(D/C : %)	100	100	100	100	100	100	100	100

Table A2-5(2) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

- PATAGONIA -

<PATAGONIA>

CROP	POTENTIAL DOSAGE (Kg/ha)		ITEM	1972		1982		1990		1995	
	N	P205		N	P205	N	P205	N	P205	N	P205
HOPS	100	100	CROPPED AREA (A)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
			FERTILIZED AREA (B)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
			(B/A : %)	100	100	100	100	100	100	100	100
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
APPLE	97	100	CROPPED AREA (A)	36	36	47	47	66	66	76	76
			FERTILIZED AREA (B)	19.8	7.2	25.8	9.4	36.3	13.2	41.8	15.2
			(B/A : %)	55	20	55	20	55	20	55	20
PEACH	97	100	CROPPED AREA (A)	8	8	13	13	25	25	31	31
			FERTILIZED AREA (B)	4.4	1.6	7.1	2.6	13.8	5	17	6.2
			(B/A : %)	55	20	55	20	55	20	55	20
			POTENTIAL DEMAND (C)	2.3	0.9	3.2	1.2	4.9	1.8	5.7	2.1
			ESTIMATED/PROJECTED CONSUMPTION (D)	2.3	0.9	3.2	1.2	4.9	1.8	5.7	2.1
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	3.2	1.1	4.3	1.7	6.5	4.1	7.6	5.5

Table A2-6(1) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

- MESOPOTAMIA -

<MESOPOTAMIA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
MAIZE	80	40	CROPPED AREA (A)	419	419	178	178	89	89	44	44
			FERTILIZED AREA (B)	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
			(B/A : %)	0.1	0.1	0.3	0.3	0.6	0.6	0.9	0.9
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
SOYBEENS		50	CROPPED AREA (A)		43		98		114		119
			FERTILIZED AREA (B)		18.5		42.1		49		51.2
			(B/A : %)		43		43		43		43
			POTENTIAL DEMAND (C)		0.9		2.1		2.4		2.6
			ESTIMATED/PROJECTED CONSUMPTION (D)		0.9		2.1		2.4		2.6
			(D/C : %)		100		100		100		100
ALFALFA		60	CROPPED AREA (A)		26		17		9		5
			FERTILIZED AREA (B)		26		17		9		5
			(B/A : %)		100		100		100		100
			POTENTIAL DEMAND (C)		1.6		1		0.5		0.3
			ESTIMATED/PROJECTED CONSUMPTION (D)		1.6		1		0.5		0.3
			(D/C : %)		100		100		100		100
TOBACCO	114		CROPPED AREA (A)	40		14		0		0	
			FERTILIZED AREA (B)	11		3.8		0		0	
			(B/A : %)	27.5		27.5		27.5		27.5	
			POTENTIAL DEMAND (C)	1.3		0.4		0		0	
			ESTIMATED/PROJECTED CONSUMPTION (D)	1.3		0.4		0		0	
			(D/C : %)	100		100		100		100	
RICE	40	40	CROPPED AREA (A)	63	63	88	88	104	104	104	104
			FERTILIZED AREA (B)	0.6	0.6	0.9	0.9	1	1	1	1
			(B/A : %)	1	1	1	1	1	1	1	1
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100

Table A2-6(2) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

- MESOPOTAMIA -

<MESOPOTAMIA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	POTENTIAL DOSAGE (Kg/ha) P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
PEPPER	65	65	CROPPED AREA (A)	1	1	1	1	1	1	1	1
			FERTILIZED AREA (B)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
			(B/A : %)	70	70	70	70	70	70	70	70
TOMATOE	65	65	CROPPED AREA (A)	2	2	1	1	0	0	0	0
			FERTILIZED AREA (B)	1.4	1.4	0.7	0.7	0	0	0	0
			(B/A : %)	70	70	70	70	70	70	70	70
			POTENTIAL DEMAND (C)	0.1	0.1	0.1	0.1	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.1	0.1	0.1	0.1	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
MATE	20	20	CROPPED AREA (A)	60	60	0	60	0	60	0	60
			FERTILIZED AREA (B)	1	1	0	1	0	1	0	1
			(B/A : %)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
TEA	100		CROPPED AREA (A)	35		47		58		64	
			FERTILIZED AREA (B)	4.5		6.1		7.5		8.3	
			(B/A : %)	13		13		13		13	
			POTENTIAL DEMAND (C)	0.4		0.6		0.8		0.8	
			ESTIMATED/PROJECTED CONSUMPTION (D)	0.4		0.6		0.8		0.8	
			(D/C : %)	100		100		100		100	

Table A2-6(3) ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE (Continued)

- MESOPOTAMIA -

<MESOPOTAMIA>

CROP	POTENTIAL DOSAGE (Kg/ha) N	P2O5	ITEM	1972 N	1972 P2O5	1982 N	1982 P2O5	1990 N	1990 P2O5	1995 N	1995 P2O5
LEMON	45	53	CROPPED AREA (A)	7	7	9	9	11	11	14	14
			FERTILIZED AREA (B)	2.8	2.8	3.6	3.6	4.4	4.4	5.6	5.6
			(B/A : %)	40	40	40	40	40	40	40	40
ORANGE	45	53	CROPPED AREA (A)	53	53	65	65	85	85	91	91
			FERTILIZED AREA (B)	21.2	21.2	26	26	34	34	36.4	36.4
			(B/A : %)	40	40	40	40	40	40	40	40
GRAPE FRUITS	45	53	CROPPED AREA (A)	11	11	12	12	14	14	14	14
			FERTILIZED AREA (B)	4.4	4.4	4.8	4.8	5.6	5.6	5.6	5.6
			(B/A : %)	40	40	40	40	40	40	40	40
M ORANGE	45	53	CROPPED AREA (A)	21	21	27	27	42	42	52	52
			FERTILIZED AREA (B)	8.4	8.4	10.8	10.8	16.8	16.8	20.8	20.8
			(B/A : %)	40	40	40	40	40	40	40	40
			POTENTIAL DEMAND (C)	1.7	2	2	2.4	2.7	3.2	3.1	3.6
			ESTIMATED/PROJECTED CONSUMPTION (D)	1.7	2	2	2.4	2.7	3.2	3.1	3.6
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	3.5	4.6	3.1	5.6	3.5	6.1	3.9	6.5

(6) Chequena

There are various agricultural projects under implementation, but the crops on which fertilizer is used is very rare. The estimated present situation of fertilizer application is shown in Table A2-7.

4. Methodology and procedure of demand projection

(1) General

The demand for fertilizer was projected through the following process.

1. Projection of cultivated area of major crops by region
2. Projection of demand for fertilizer
3. Projection of type-wise demand for fertilizer

Details are described in the following sections.

(2) Projection of cultivated area of major crops

i) Method of projection

The future cultivated area (trend) of major crops was projected by province at each projection levels shown below on the basis of past trend of change in the cultivation area.

Level 1: Change in the area devided into the following groupes, namely, agricultural area, pasture land, forest, and other area including industrial area and urban area.

Table A2-7 ESTIMATED/PROJECTED CONSUMPTION OF FERTILIZER BY CROP AND BY REGION, ARGENTINE

- CHAQUENA -

<CHAQUENA>

CROP	POTENTIAL DOSAGE (Kg/ha)		ITEM	1972		1982		1990		1995	
	N	P205		N	P205	N	P205	N	P205	N	P205
POTATOES	50	150	CROPPED AREA (A)	2	2	1	1	0	0	0	0
			FERTILIZED AREA (B)	0.1	0.1	0	0	0	0	0	0
			(B/A : %)	5	5	5	5	5	5	5	5
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
PEPPER	50	50	CROPPED AREA (A)	1	1	1	1	1	1	0	0
			FERTILIZED AREA (B)	1	1	1	1	1	1	0	0
			(B/A : %)	100	100	100	100	100	100	100	100
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
ORANGE	50	50	CROPPED AREA (A)	1	1	0	0	0	0	0	0
			FERTILIZED AREA (B)	0.5	0.5	0	0	0	0	0	0
			(B/A : %)	50	50	50	50	50	50	50	50
GRAPE FRUITS	50	50	CROPPED AREA (A)	1	1	1	1	2	2	2	2
			FERTILIZED AREA (B)	0.5	0.5	0.5	0.5	1	1	1	1
			(B/A : %)	50	50	50	50	50	50	50	50
			POTENTIAL DEMAND (C)	0	0	0	0	0	0	0	0
			ESTIMATED/PROJECTED CONSUMPTION (D)	0	0	0	0	0	0	0	0
			(D/C : %)	100	100	100	100	100	100	100	100
			TOTAL CONSUMPTION	0	0	0	0	0	0	0	0

Level 2: Change in the area devided into the following groupes out of agricultural area, namely, short term crops (multi-cropping crops), long term crops (less than one copping annually), and perennial crops.

Level 3: Change in the cultivated area of individual crops.

The total of each projected areas in Level 1 in the province in question are adjusted to be equaled to total area of the province. The total of each projected area in Level 2 in the province in question are adjusted to be equaled to the agricultural area projected in Level 1. Further, the total of cultivated areas of each crops projected in Level 3 in a same group shown in Level 2 are adjusted to be equaled to the adjusted area projected in Level 2. Here, the total of cultivated area of short-term crops means the total of cultivated area multiplied by multi-cropping ratio of each crops.

The areas of each components (for example, agricultrual area and pasture land, etc. in Level 1) included in each Levels have either increased or decreased affected by economic and/or social factors. If the agricultural area has been expanded, then the expansion will be limited in the future because of the limit of available land. In other words, the urban area may also been expanded at the same time, and the expansion of agricultural area may be depressed by the expansion of urban area. These pressures for expansion by each component and the adjustment function among these components have been reflected on the past trend of changes in the area of individual factors. These trend shown in the past is expected to continue in the future if there is no significant change in the

economy, policy or technology, etc. The projection procedure described above represents the adjustment of descrepancies between the projected result of total of individual factors and aggregated factor with calculating the expanding (or shrinking) pressure of each factors by time series analysis.

The cultivated area by Province and by crop thus obtained were totaled to the following regions, and the result is shown in Table A2-8 of Annex II-3.

1.	Pampeana	:	Buenos Aires, Santa Fe, Cordoba, and La Pampa
2.	Andina	:	San Juan, San Luis, and Mendoza
3.	Noroeste	:	Jujuy, Salta, Tucuman, Catamarca, Santiage del Estero, and La Rioja
4.	Mesopotamia	:	Misiones, Corrientes, and Entre Rios
5.	Patagonia	:	Neuquen, Rio Negro, Chubut, Santa Cruz, and Tierra del Fuego
6.	Chaquena	:	Formosa and Chaco

ii) Data and data Sources

The projection of cultivation area was based on the past 10 years data of 1972/73 through 1981/82 provided by the Dirrection Nacional de Economia y Sociologia Rural, Ministris de Agricultura y Ganaderia.

(3) Projection of fertilizer demand

i) Methodology of projection

"Physically optimum dosage level of fertilizer" may be calculated on each crops. The level varies depending on the soil condition, climatic condition of the area as well

as fertilizer response of the crop, and represents the dosage level at which maximum additional output per unit input in terms of volume is expected. However, this level does not necessarily represents the economic optimum dosage level. When the application of fertilizer is increased gradually in the same manner as described above, then there will be the dosage level at which maximum output in terms of value is expected by input of unit value of fertilizer. This level is called "Economic optimum dosage level of fertilizer": Every farmers have potentiality to increase the application level up to this level. However, due to the following factors which affect adversely on the use of fertilizer, the actual application level is usually lower than the economic optimum dosage level.

1. The natural disasters such as draught and flood.
2. Delay in the supply of irrigation water or inadequate drainage.
3. In sufficient purchasing ability of farmers to buy fertilizer, or lack of adequate credit system for fertilizer . purchase.
4. Unstable yield of crops.
5. Lack of sufficient knowledge on fertilization technic or effects of fertilization on crop yield.
6. Shortage or delay in supply of fertilizer.
7. Other factors which discourage farmers from fertilization.

When the "economic optimum dosage level" multiplied by "cultivation area" is defined as "potential demand", then the difference between the "potential demand" and actual consumption was understood to have been caused by the factors described above. The ratio of actual consumption to the potential damand is called the "realization rate" of the potential demand. The past trend of improvement of restricting factors of fertilization may be applicable to

the future, as long as there is no significant changes in the policies on agriculture and fertilizer distribution. In other words, the past trend of realization rate can be applicable to the future. However, it should be noted that if there will be significant changes in the factors, which affect influences on the fertilizer use, then the past trend of the realization rate can not be applied to the future. If such is the case, the future realization rate should be examined year by year taking into account the change in the factors. These factors include followings.

1. Construction or improvement projects of irrigation/drainage facilities.
2. Large scale interference by the government on price formation of either agricultural products or fertilizers, including introduction of subsidy system and/or price support system.
3. Development or introduction of crop varieties which have high fertilizer response.
4. Improvement of agricultural extension system.
5. Improvement of fertilizer distribution system.
6. Other changes in the factors which stimulate the farmers to increase the fertilizer application.

The "potential demand" was defined in the above as "optimum dosage per unit cultivation area" mutiplied by "cultivation area". If appropriate data are available, then the better estimate may be obtained regarding the "potential demand" using "per hectare economic optimum dosage" multiplied by "fertilized area" in replace of "cultivation area". In this case, the "cropped" area will be devided into two, namely, "fertilized area" and "non-fertilized area", and the trend of rate of fertilized area to total cropped area will be first projected with examination on the probability of upper limit of the rate. This projection process is better than that

explained before, in that maximum potential rate of fertilized area is sometimes less than 100% because of natural condition, lack of irrigation facilities, and other reasons, and therefore, the area, on which fertilization is impossible, should be deducted from the objective area for calculation of fertilization in the future.

ii) Process of demand projection

The projection procedure of the future demand was as follows.

1. Comparison of the potential demand with actual demand in the past analyzing factors affecting fertilizer consumption and extent of their effects.
2. Estimation of fertilized area in the past.
3. Projection of potential demand on the basis of projected cultivated area and the rate of fertilized area.
4. Projection of future realization rate of potential demand.
5. Calculation of total demand multiplying the potential demand with realization rate.

iii) Data and data sources

The available data on fertilizer consumption as well as application level is very limited. the data used in the projection of demand are as follows.

1. Data on fertilizer supply and demand provided by Department de Fertilizantes, Secretaria de Agricultura y Ganaderia.
2. Reports on fertilizer consumption provided by INTA, etc.
3. Informations obtained through the interviews with the industry and INTA in Buenos Aires, Salta, and Mendoza.

(4) Projection of type-wise demand for fertilizer

Based on the result of total demand projection, type-wise demand was projected as follows.

1. Examination of crops (or regions) on which the type of fertilizer in question is applicable.
2. Calculation of potential demand from the above crops (or regions).
3. Projection of type-wise fertilizer demand taking into account the future supply ability and past trend of type-wise fertilizer consumption.

Table A2-8(1) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- PAMPEANA -

<PAMPEANA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	5270	4055	4963	5440	6818	3640	5010	4824	5946	6392	5748	5946	6147	6281
MAIZE	3346	2565	3129	2952	2393	2594	2769	2702	3234	2978	2854	2887	2930	2984
SORGHUM	2529	2634	2191	1901	2229	2218	1723	1513	1801	1881	1586	1392	1089	830
OATS	1040	990	1026	1145	1247	1318	1392	1519	1553	1479	1606	1759	1931	2035
RYE	2470	2433	2293	2317	2202	2043	1618	1393	1403	1259	1140	728	407	219
BARLEY	519	524	471	472	431	402	371	307	313	242	243	164	70	42
SOYBEENS	107	280	294	368	591	1026	1404	1821	1739	1862	2156	2774	3673	4436
SUN FLOWER	1400	1136	972	1127	1314	1888	1530	1659	1253	1600	1636	1760	1929	2061
ALFALFA	2831	2342	2179	2083	2265	2201	2030	2046	1842	1635	1679	1468	1092	789
TOTAL EXTENSIVOS	19512	16959	17518	17805	19490	17330	17847	17784	19084	19328	18648	18877	19271	19676
SUGAR CANE	13	13	16	16	16	15	15	16	15	15	14	14	13	12
TOBACCO	0	0	0	0	0	1	0	0	0	0	0	0	0	0
COTTON	65	72	77	65	71	77	74	69	61	0	61	56	50	44
DRY BEAN	9	24	25	13	9	11	7	4	5	5	2	0	0	0
OTHER FIBER CROPS	377	345	376	355	516	645	561	686	516	510	618	690	796	898
RICE	11	10	11	12	9	7	9	9	8	8	6	5	3	2
OTHER PERMANENT CROPS	45	49	49	44	47	75	60	56	50	51	58	63	70	78
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	7	10	8	0	0	0	11	10	8	3	7	6	5	5
ONION	1	2	0	0	0	2	2	2	2	2	2	2	3	3
POTATOES	99	89	0	0	0	96	90	96	97	87	93	96	101	108
PEPPER	0	1	0	0	0	1	1	1	1	1	1	1	1	1
TOMATOE	0	0	0	0	0	4	4	4	4	4	4	4	5	5
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	627	615	554	505	668	934	834	953	767	686	865	937	1048	1155
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	9	9	9	5	5	5	9	2	4	4
GRAPE FRUITS	0	0	0	0	1	1	1	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	5	3	3	2	2	2	2	1	0	0
APPLE	0	0	0	0	2	1	1	1	1	1	2	12	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	17	14	14	8	8	8	13	15	19	20
GRAND TOTAL	20139	17574	18072	18310	20175	18278	18695	18745	19859	20022	19526	19829	20338	20851

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(2) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- ANDINA -

<ANDINA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	8	9	16	20	19	6	3	13	6	4	6	3	0	0
MAIZE	271	274	268	267	223	140	153	214	263	281	213	205	199	188
SORGHUM	50	52	55	57	70	25	0	30	44	47	31	27	22	17
OATS	13	15	16	14	17	15	17	17	13	11	14	13	10	4
RYE	47	51	53	57	66	64	59	67	52	52	62	64	66	68
BARLEY	20	23	24	25	26	25	25	28	21	13	21	19	15	7
SOYBEENS	0	2	1	0	0	0	0	0	0	0	0	0	0	0
SUN FLOWER	40	41	38	22	23	32	35	52	28	30	32	32	31	30
ALFALFA	93	85	92	95	92	85	85	72	58	46	56	41	24	19
TOTAL EXTENSIVOS	542	552	563	557	536	392	377	493	485	484	435	407	368	333
SUGAR CANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTON	0	0	0	0	0	1	1	0	0	0	0	0	0	0
DRY BEAN	0	0	0	0	0	0	0	0	1	2	1	2	4	7
OTHER FIBER CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	3	3	0	0	0	0	5	7	6	3	7	8	11	14
ONION	5	6	0	0	0	5	6	6	4	7	7	9	12	17
POTATOES	9	10	0	0	0	7	8	8	7	8	8	9	11	13
PEPPER	0	2	0	0	0	1	1	1	1	2	1	1	2	2
TOMATOE	0	0	0	0	0	10	8	8	4	11	9	10	11	12
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	17	21	0	0	0	24	29	30	23	33	32	39	52	65
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	12	14	14	14	12	13	15	18	20	21
PEACH	0	0	0	0	4	0	5	7	6	6	8	10	13	16
TOTAL PERMANENT CROPS	0	0	0	0	16	14	19	21	18	19	23	28	33	39
GRAND TOTAL	559	573	563	557	552	430	425	544	526	536	490	474	453	437

NOTE 1972-1981:ACTUAL 1982 1995:PROJECTED

Table A2-8(3) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- NOROESTE -

<NOROESTE>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	56	48	48	48	68		53	47	47	35	148	158	160	158
MAIZE	169	131	113	116	116	125	127	143	121	158	110	105	96	106
SORGHUM	52	41	44	46	64	60	58	63	135	180	127	157	191	214
OATS	11	13	11	11	11	11	13	13	13	14	11	12	14	14
RYE	14	26	17	25	22	22	21	36	23	24	27	28	28	27
BARLEY	10	11	10	10	9	10	10	10	11	10	10	10	10	9
SOYBEENS	16	28	25	25	47	76	120	156	111	108	140	180	242	300
SUN FLOWER	3	2	1	1	1	4	5	3	2	4	2	3	3	4
ALFALFA	125	101	88	96	91	93	95	57	52	42	39	19	17	15
TOTAL EXTENSIVOS	456	401	357	378	429		502	528	515	575	615	671	760	848
SUGAR CANE	272	324	318	321	329	327	322	308	327	325	320	325	332	338
TOBACCO	37	41	40	41	46	38	37	42	34	38	30	28	26	25
COTTON	67	52	52	44	47	46	48	28	9	0	12	2	2	2
DRY BEAN	73	84	123	135	174	139	227	235	212	225	170	195	213	227
OTHER FIBER CROPS	0	0	3	3	3	4	4	4	0	0	2	1	0	0
RICE	1	1	1	0	0	1	1	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	1	1	0	0	0	0	0	0	0	0	1	1	1	0
ONION	8	9	0	0	0	6	6	6	3	3	3	1	0	0
POTATOES	10	7	0	0	0	8	7	6	7	5	6	6	7	7
PEPPER	0	7	0	0	0	6	6	6	5	4	4	3	3	3
TOMATOE	0	0	0	0	0	6	11	9	7	8	6	3	1	1
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	469	526	537	544	599	581	669	644	604	608	550	565	585	603
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	14	13	15	16	18	16	19	24	30	35
ORANGE	0	0	0	0	13	13	13	13	12	13	14	16	18	20
GRAPE FRUITS	0	0	0	0	6	6	6	5	5	5	4	5	6	6
MANDARIN ORANGE	0	0	0	0	5	4	4	4	5	5	6	8	9	9
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	38	36	38	38	40	39	43	50	62	70
GRAND TOTAL	925	927	894	922	1066	617	1209	1210	1159	1222	1208	1286	1407	1521

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(4) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- MESOPOTAMIA -

<MESOPOTAMIA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	226	81	92	100	252	131	116	84	75	102	93	83	69	56
MAIZE	419	424	317	329	220	192	202	190	314	224	178	142	89	44
SORGHUM	199	238	153	187	194	195	119	81	164	230	154	147	147	150
OATS	151	130	139	158	186	121	92	94	102	101	91	71	36	7
RYE	1	1	0	0	0	0	0	0	0	0	0	0	0	0
BARLEY	24	20	20	22	23	14	8	8	7	8	4	0	0	0
SOYBEENS	43	64	46	46	70	96	114	120	74	68	98	107	114	119
SUN FLOWER	16	10	10	9	10	23	22	23	18	12	20	21	24	28
ALFALFA	45	27	29	31	28	20	23	22	21	18	17	13	9	5
TOTAL EXTENSIVOS	1124	995	806	882	983	792	696	622	775	763	655	585	488	410
SUGAR CANE	5	6	6	6	6	6	6	6	5	6	5	4	0	0
TOBACCO	40	47	50	40	33	31	39	20	15	18	14	6	0	0
COTTON	23	19	28	25	27	28	27	19	12	0	17	14	6	4
DRY BEAN	1	1	2	2	2	3	2	3	3	3	3	2	0	0
OTHER FIBER CROPS	132	70	141	113	204	302	327	378	265	340	397	487	635	777
RICE	63	67	73	73	75	81	90	69	71	101	88	94	104	104
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	4	3	0	0	0	2	1	1	1	1	2	2	1	0
PEPPER	0	0	0	0	0	0	1	1	1	0	1	1	1	1
TOMATOE	0	0	0	0	0	0	2	2	2	1	1	0	0	0
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	268	213	300	259	347	453	495	499	375	470	526	609	746	886
TEA	35	39	41	45	42	43	41	41	42	42	47	51	58	64
LEMON	0	0	0	0	7	7	7	7	7	7	9	9	11	14
ORANGE	0	0	0	0	53	53	56	54	53	51	65	73	85	91
GRAPE FRUITS	0	0	0	0	11	11	10	10	10	10	12	13	14	14
MANDARIN ORANGE	0	0	0	0	21	21	21	21	22	22	27	33	42	52
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	35	39	41	45	134	135	135	133	134	132	159	181	211	235
GRAND TOTAL	1427	1247	1147	1186	1464	1380	1326	1254	1284	1365	1340	1375	1445	1531

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(5) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- PATAGONIA -

<PATAGONIA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	2	16	10	16	19	25	18	16	17	16	17	19	22	24
MAIZE	4	3	3	5	4	4	4	4	4	3	4	4	4	4
SORGHUM	0	0	0	0	0	1	1	1	1	1	1	2	2	2
OATS	4	4	7	11	13	13	29	33	33	4	26	28	34	38
RYE	1	3	4	8	9	9	23	10	11	4	13	15	17	20
BARLEY	2	3	5	8	9	10	17	17	20	3	16	18	21	23
SOYBEENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUN FLOWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALFALFA	31	31	28	28	27	23	12	24	24	21	22	19	18	18
TOTAL EXTENSIVOS	44	60	57	76	81	85	104	105	110	52	101	109	121	132
SUGAR CANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DRY BEAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER FIBER CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	2	2	0	0	0	2	2	3	4	3	3	5	7	9
PEPPER	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TOMATOE	0	0	0	0	0	5	5	6	4	5	7	8	11	14
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	2	2	0	0	0	8	7	9	8	8	10	13	18	23
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	36	36	38	36	37	40	47	55	66	76
PEACH	0	0	0	0	8	0	9	10	10	11	13	17	25	31
TOTAL PERMANENT CROPS	0	0	0	0	44	36	47	46	47	51	60	72	91	107
GRAND TOTAL	46	62	57	76	125	129	158	160	165	111	171	194	230	262

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(6) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- CHAQUENA -

<CHAQUENA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	66	43	53	88	16	43	30	16	46	17	21	13	5	0
MAIZE	44	38	43	29	25	45	45	57	64	53	57	63	71	77
SORGHUM	144	148	158	167	223	154	189	191	255	373	298	347	425	497
OATS	3	4	3	2	0	2	2	5	6	5	4	5	6	6
RYE	0	2	1	1	0	0	0	1	1	0	0	0	0	0
BARLEY	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SOYBEENS	3	4	3	4	3	3	2	4	0	2	1	1	0	0
SUN FLOWER	193	152	175	252	112	253	174	264	88	87	139	117	83	49
ALFALFA	12	13	11	10	9	8	6	4	4	3	2	0	0	0
TOTAL EXTENSIVOS	465	405	447	553	388	508	448	542	464	540	522	547	588	629
SUGAR CANE	9	8	8	8	9	8	7	7	4	4	3	2	0	0
TOBACCO	1	1	1	1	0	1	1	1	1	1	1	0	0	0
COTTON	379	414	358	300	400	469	551	470	262		265	212	123	55
DRY BEAN	0	0	0	0	0	0	0	0	0	3	1	1	0	0
OTHER FIBER CROPS	0	0	0	0	0	0	1	1	0	1	1	1	1	0
RICE	11	11	12	13	13	11	15	9	6	9	6	3	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	0	0	0	0	0	2	1	4	3	1	1	1	0	0
PEPPER	0	0	0	0	0	1	0	0	1	1	1	1	1	0
TOMATOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	400	434	379	322	422	492	576	492	277		277	220	126	56
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	1	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	1	1	1	1	1	1	1	2	2	2
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	2	1	1	1	1	1	1	2	2	2
GRAND TOTAL	865	839	826	875	812	1001	1025	1035	742	541	800	769	716	687

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(7) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

<TOTAL> - TOTAL -

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	5628	4252	5182	5712	7192	3845	5230	5000	6137	6566	6033	6222	6403	6519
MAIZE	4253	3435	3873	3698	2981	3100	3300	3310	4000	3697	3416	3406	3389	3403
SORGHUM	2974	3113	2601	2358	2780	2653	2090	1879	2400	2712	2197	2072	1876	1710
OATS	1222	1156	1202	1341	1474	1480	1545	1681	1720	1614	1752	1888	2031	2104
RYE	2533	2516	2368	2408	2299	2138	1721	1507	1490	1339	1242	835	518	334
BARLEY	575	582	530	537	498	461	431	370	372	276	294	211	116	81
SOYBEENS	169	378	369	443	711	1201	1640	2101	1924	2040	2395	3062	4029	4855
SUN FLOWER	1652	1341	1196	1411	1460	2200	1766	2001	1389	1733	1829	1933	2070	2172
ALFALFA	3137	2599	2427	2343	2512	2430	2251	2225	2001	1765	1815	1560	1160	846
TOTAL EXTENSIVOS	22143	19372	19748	20251	21907	19107	19974	20074	21433	21742	20976	21196	21596	22028
SUGAR CANE	299	351	348	351	360	356	350	337	351	350	342	345	345	350
TOBACCO	78	89	91	82	79	71	77	63	50	57	45	34	26	25
COTTON	534	557	515	434	545	621	701	586	344	0	355	284	181	105
DRY BEAN	83	109	150	150	185	153	236	242	221	238	177	200	217	234
OTHER FIBER CROPS	509	415	520	471	723	951	893	1069	781	851	1018	1179	1432	1675
RICE	86	89	97	98	97	100	115	87	85	118	100	102	107	106
OTHER PERMANENT CROPS	45	49	49	44	47	75	60	56	50	51	58	63	70	78
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	11	14	0	0	0	0	16	17	14	6	15	15	17	19
ONION	14	17	0	0	0	13	14	14	9	12	12	12	15	20
POTATOES	124	111	0	0	0	117	109	118	119	105	113	119	127	137
PEPPER	0	10	0	0	0	10	9	9	9	8	8	7	8	7
TOMATOE	0	0	0	0	0	25	30	29	21	29	27	25	28	32
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	1783	1811	1770	1630	2036	2492	2610	2627	2054	1805	2260	2383	2575	2788
TEA	35	39	41	45	42	43	41	41	42	42	47	51	58	64
LEMON	0	0	0	0	21	20	22	23	25	23	28	33	41	49
ORANGE	0	0	0	0	76	75	78	72	70	69	88	91	107	115
GWAPE FRUITS	0	0	0	0	19	19	18	16	16	16	17	20	22	22
MANDARIN ORANGE	0	0	0	0	31	28	28	27	29	29	35	42	51	61
APPLE	0	0	0	0	50	51	53	51	50	54	64	85	86	97
PEACH	0	0	0	0	12	0	14	17	16	17	21	27	38	47
TOTAL PERMANENT CROPS	35	39	41	45	251	236	254	247	248	250	299	348	418	473
GRAND TOTAL	23961	21222	21559	21926	24194	21835	22838	22948	23735	23797	23535	23927	24589	25289

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-9 SUPPLY (IMPORT AND PRODUCTION) OF FERTILIZER IN ARGENTINE

(Nutrient ton)

	1972/73	1973/74	1974/75	1975/76	1976/77	1977	1978	1979	1980	1981	1982
Nitrogen (N ton)											
NH_3	2,360	3,360	1,107	2,125	2,257	2,007	2,505	3,279	3,467	2,036	2,994
A N	-	-	-	-	-	-	-	-	-	-	-
S N	2,336	2,283	1,251	1,396	222	270	803	948	529	618	672
A S	14,019	10,630	8,483	6,919	7,205	7,842	8,441	7,287	7,379	4,011	4,288
Urea	19,499	22,335	17,169	14,191	35,355	22,222	22,198	31,487	15,726	32,252	26,391
D A P	9,769	4,845	5,229	2,281	8,030	5,383	8,687	12,904	17,578	9,683	14,406
Others	1,112	1,835	1,870	721	1,318	2,480	1,376	4,655	19,383	2,175	1,785
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	49,111	45,264	35,109	27,633	54,387	40,214	44,412	60,576	65,355	51,173	50,926
Phosphate (P_2O_5 ton)											
Thomas-P	1,453	653	665	271	902	1,120	1,120	1,280	580	104	-
S S P	160	-	642	-	1,873	-	416	-	48	-	-
T S P	14,499	5,203	7,038	438	4,070	6,422	7,046	25,591	2,186	3,103	1,380
R-Phos	5,025	5,946	8,952	2,627	2	3,767	1,185	2,467	1,530	642	921
D A P	24,964	12,382	13,363	5,829	20,522	16,508	22,201	32,978	44,922	24,746	36,815
Others	1,180	654	52	53	2,009	-120	581	2,328	-546	-108	6,213
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	47,297	24,838	30,712	9,218	29,378	27,707	32,551	64,660	50,013	28,885	45,719
Potash (K_2O ton)											
M O P	3,907	7,648	3,853	2,299	2,920	2,054	3,367	4,495	4,140	2,021	1,693
S O P	1,280	1,659	870	844	911	1,073	982	2,851	2,050	489	1,890
S P M	909	1,322	185	352	835	704	887	1,173	880	923	-
Others	571	1,029	2,105	292	234	457	456	3,726	389	1,470	1,687
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	6,683	11,658	7,013	3,787	4,900	4,298	5,694	12,261	8,752	5,301	5,660

Table A2-10(1) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE

(Product ton)

	1972/1973			1973/1974			1974/1975		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	2,000	878	2,878	-	4,068	4,068	-	1,350	1,350
A N	-	-	-	-	-	-	-	-	-
S N	14,600	-	14,600	14,268	-	14,268	7,820	-	7,820
A S	9,934	56,821	66,755	-	50,621	50,621	3,000	37,396	40,396
Urea	7,000	36,330	43,330	10,000	39,633	49,633	16,130	22,024	38,154
Sub-toal	33,534	94,029	127,563	24,268	94,322	118,590	26,950	60,770	87,720
Thomas-P	-	9,083	9,083	-	4,080	4,080	700	3,459	4,159
S S P	1,000	-	1,000	-	-	-	4,013	-	4,013
T S P	31,520	-	31,520	11,310	-	11,310	15,301	-	15,301
R-Phos	16,750	-	16,750	19,820	-	19,820	29,840	-	29,840
Sub-total	49,270	9,083	58,353	31,130	4,080	35,210	49,854	3,459	53,313
M O P	6,511	-	6,511	12,747	-	12,747	6,421	-	6,421
S O P	2,559	-	2,559	3,318	-	3,318	1,740	-	1,740
S P M	4,132	-	4,132	6,009	-	6,009	842	-	842
Sub-total	13,202	-	13,202	22,074	-	22,074	9,003	-	9,003
DAP	54,270	-	54,270	26,918	-	26,918	29,051	-	29,051
Others	4,121	7,002	11,123	7,477	3,905	11,382	8,826	423	9,249
NP/NPK	106	-	106	-	-	-	-	-	-
Sub-total	58,497	7,002	65,499	34,395	3,905	38,300	37,877	423	38,300
Total	154,503	110,114	264,617	111,867	102,307	214,174	124,684	64,652	188,336

Table A2-10(2) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1975/1976			1976/1977			1977		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	-	2,592	2,592	-	2,752	2,752	-	2,448	2,448
A N	-	-	-	-	-	-	-	-	-
S N	8,724	-	8,724	1,388	-	1,388	1,690	-	1,690
A S	-	32,947	32,947	-	34,308	34,308	-	37,341	37,341
Urea	6,068	25,467	31,535	32,676	45,890	78,566	20,808	28,575	49,383
Sub-total	14,792	61,006	75,798	34,064	82,950	117,014	22,498	68,364	90,862
Thomas-P	-	1,693	1,693	-	5,640	5,640	-	7,000	7,000
S S P	-	-	-	11,709	-	11,709	-	-	-
T S P	953	-	953	8,848	-	8,848	13,960	-	13,960
R-Phos	8,755	-	8,755	7	-	7	12,556	-	12,556
Sub-total	9,708	1,693	11,401	20,564	5,640	26,204	26,516	7,000	33,516
M O P	3,832	-	3,832	4,867	-	4,867	3,424	-	3,424
S O P	1,688	-	1,688	1,822	-	1,822	2,146	-	2,146
S P M	1,600	-	1,600	3,796	-	3,796	3,200	-	3,200
Sub-total	7,120	-	7,120	10,485	-	10,485	8,770	-	8,770
D A P	12,672	-	12,672	44,612	-	44,612	35,887	-	35,887
Others	485	2,659	3,144	4,196	195	4,391	10,071	-	10,071
NP/NPK	-	-	-	-	-	-	65	-	65
Sub-total	13,157	2,659	15,816	48,808	195	49,003	46,023	-	46,023
Total	44,777	65,358	110,135	113,921	88,785	202,706	103,807	75,364	179,171

Table A2-10(3) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1978			1979			1980		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	-	3,543	3,543	-	3,999	3,999	-	4,228	4,228
A N	-	-	-	-	-	-	-	-	-
S N	5,020	-	5,020	5,925	-	5,925	3,305	-	3,305
A S	-	40,197	40,197	-	34,699	34,699	479	34,660	35,139
Urea	7,358	41,970	49,328	33,782	36,190	69,972	32,076	42,808	74,884
Sub-total	12,378	85,710	98,088	39,707	74,888	114,595	35,860	81,696	117,566
Thomas-P	-	7,000	7,000	-	8,000	8,000	-	3,622	3,622
S S P	2,598	-	2,598	-	-	-	300	-	300
T S P	15,317	-	15,317	55,633	-	55,633	4,752	-	4,752
R-Phos	3,951	-	3,951	8,224	-	8,224	5,101	-	5,101
Sub-total	21,866	7,000	28,866	63,857	8,000	71,857	10,153	3,622	13,775
M O P	5,611	-	5,611	7,492	-	7,492	6,900	-	6,900
S O P	1,963	-	1,963	5,702	-	5,702	4,100	-	4,100
S P M	4,034	-	4,034	5,333	-	5,333	4,000	-	4,000
Sub-total	11,608	-	11,608	18,527	-	18,527	15,000	-	15,000
D A P	48,262	-	48,262	71,691	-	71,691	97,656	-	97,656
Others	3,981	-	3,981	24,184	-	24,184	4,984	-	4,984
NP/NPK	15	-	15	106	-	106	8,617	-	8,617
Sub-total	52,258	-	52,258	95,981	-	95,981	111,257	-	111,257
Total	98,110	92,710	190,820	218,072	82,888	300,960	172,270	85,318	257,588

Table A2-10(4) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1981			1982		
	Import	Production	Total	Import	Production	Total
NH_3	-	2,483	2,483	-	3,651	3,651
A N	-	-	-	-	-	-
S N	3,860	-	3,860	4,200	-	4,200
A S	-	19,908	19,908	500	19,918	20,418
Urea	30,198	41,472	71,670	7,735	50,912	58,647
Sub-total	34,058	63,053	97,111	12,435	74,481	86,916
Thomas-P	-	650	650	-	-	-
S S P	-	-	-	-	-	
T S P	6,746	-	6,746	3,000	-	3,000
R-Phso	2,140	-	2,140	3,070	-	3,070
Sub-total	8,886	650	9,536	6,070	-	6,070
M O P	3,369	-	3,369	2,822	-	2,822
S O P	978	-	978	3,780	-	3,780
S P M	4,194	-	4,194	-	-	-
Sub-total	8,541	-	8,541	6,602	-	6,602
D A P	53,795	-	53,795	80,033	-	80,033
Others	7,962	-	7,962	21,602	-	21,602
NP/NPK	2,651	-	2,651	2,600	-	2,600
Sub-total	64,408	-	64,408	104,235	-	104,235
Total	115,893	63,703	179,596	129,342	74,481	203,823

Table A2-11 ASSUMED CRUDE OIL AND NATURAL GAS PRICES

	(AT 1982 CONSTANT US DOLLARS)				
	1982	1985	1990	1995	2000
Crude Oil (FOB. Arabian Light. US$/BBL)	34.0	28.6	31.4	34.4	37.4
(US$/MMBTU)	(5.73)	(4.82)	(5.29)	(5.80)	(6.31)
Natural Gas (For fertilizer production, US$/MMBTU)	3.02	3.56	5.04	5.75	6.26

Assumptions:

1. Crude oil price was assumed to remain unchanged at the 1983 price level up to 1985, and after that the price increase rate (in terms of constant price) was assumed as follows:
   - 1985-1990 1.9% p.a.
   - 1990-1995 1.8% p.a.
   - 1995-2000 1.7% p.a.
2. Natural gas price in the U.S.A. was assumed to increase so that the N.G. price become close to the crude oil price in terms of equivalent thermal unit value.

Table A2-12 ESTIMATED PRODUCTION COSTS —— PHOSPHATE ROCK[1/]

	(AT 1982 CONSTANT US DOLLARS)				
	1982	1985	1990	1995	2000
Operating costs					
Mining	4.9	4.7	4.8	4.9	5.0
Beneficiation	4.2	4.1	4.1	4.2	4.3
Handling, storaging	3.5	3.5	3.5	3.5	3.5
Depreciation	4.0	4.0	4.0	4.0	4.0
Sub-total	16.6	16.3	16.4	16.6	16.8
Transportation, loading costs	5.5	5.5	5.5	5.5	5.5
Sales and administrative expenses	19.0	19.0	19.0	19.0	19.0
Total	41.1	40.8	40.9	41.1	41.3

Notes: 1/ Assuming the mining site in a developing country with some infrastructure.

2/ Assuming 20% of total of these costs to increase by the same increase rate as crude oil. (see Table AII-).

Table A2-13 ESTIMATED PRODUCTION COSTS —— PHOSPHORIC ACID

	1982	1985	1990	1995	2000
Phosphoric acid					
Phosphate rock (3.352 tons)	55.6	54.6	55.0	55.6	56.3
Sulphur (0.976 tons)	87.5	87.5	87.5	87.5	87.5
Other variable costs	20.9	20.9	20.9	20.9	20.9
Fixed costs	80.0	80.0	80.0	80.0	80.0
Sub-total	244.0	243.0	243.4	244.0	244.7
Sales and admin. expenses transp. costs, capital charge,. etc.	36.5	36.5	36.5	36.5	36.5
Total	280.5	279.5	279.9	280.5	281.2

Table A2-14 ESTIMATED PRODUCTION COSTS —— DAP, TSP

	1982	1985	1990	1995	2000
DAP					
Phosphoric acid (0.47 tons P_2O_5)	114.7	114.2	114.4	114.7	115.0
Ammonia (0.225tons)	27.0	31.0	41.9	47.1	50.9
Other variable costs	4.5	4.5	4.5	4.5	4.5
Fixed costs	17.0	17.0	17.0	17.0	17.0
Sub-total	163.2	166.7	177.8	183.3	187.4
Sales and administrative expenses, transp. costs, etc.	24.5	24.5	24.5	24.5	24.5
Total	187.7	191.2	202.3	207.8	211.9
TSP					
Phosphate rock (0.44 tons)	7.3	7.2	7.2	7.3	7.4
Phosphoric acid (0.34 tons)	83.0	82.6	82.8	83.0	83.2
Other variable costs	4.1	4.1	4.1	4.1	4.1
Fixed costs	29.0	29.0	29.0	29.0	29.0
Sub-total	123.4	122.9	123.1	123.4	123.7
Sales and administrative expenses, transp. costs, etc.	18.5	18.5	18.5	18.5	18.5
Total	141.9	141.4	141.6	141.9	142.2

Table A2-15 ESTIMATED PRODUCTION COSTS —— AMMONIA, UREA

(AT 1982 CONSTANT US DOLLARS)

	1982	1985	1990	1995	2000
Ammonia					
Natural gas	99.0	116.7	165.2	188.5	205.2
Other Variable costs	4.0	4.0	4.0	4.0	4.0
Fixed costs	17.0	17.0	17.0	17.0	17.0
Sub-total	120.0	137.7	186.2	209.5	226.2
Sales and administrative expenses	18.0	18.0	18.0	18.0	18.0
Total	138.0	155.7	204.2	227.5	244.2
Urea					
Ammonia (0.575 tons)	69.0	79.2	107.1	120.5	130.1
Other variable costs	26.0	26.0	26.0	26.0	26.0
Fixed costs	39.0	39.0	39.0	39.0	39.0
Sub-total	134.0	144.2	172.1	185.5	195.1
Sales and administrative expenses, transp. costs	20.0	20.0	20.0	20.0	20.0
Total	154.0	164.2	192.1	205.5	215.1

ANNEX II-3

PAST TREND AND OUTLOOK OF CROP CULTIVATION AREA IN ARGENTINE

Table A2-8(1) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- PAMPEANA -

<PAMPEANA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	5270	4055	4963	5440	6818	3640	5010	4824	5946	6392	5748	5946	6147	6281
MAIZE	3346	2565	3129	2952	2393	2591	2769	2702	3234	2978	2854	2887	2930	2984
SORGHUM	2529	2634	2191	1901	2229	2218	1723	1513	1801	1881	1586	1392	1089	830
OATS	1040	990	1026	1145	1247	1318	1392	1519	1553	1479	1606	1759	1931	2035
RYE	2470	2433	2293	2317	2202	2043	1618	1393	1403	1259	1140	728	407	219
BARLEY	519	524	471	472	431	402	371	307	313	242	243	164	70	42
SOYBEENS	107	280	294	368	591	1026	1404	1821	1739	1862	2156	2774	3673	4436
SUN FLOWER	1400	1136	972	1127	1314	1888	1530	1659	1253	1600	1636	1760	1929	2061
ALFALFA	2831	2342	2179	2083	2265	2201	2030	2046	1842	1635	1679	1468	1092	789
TOTAL EXTENSIVOS	19512	16959	17518	17805	19490	17330	17847	17784	19084	19328	18648	18877	19271	19676
SUGAR CANE	13	13	16	16	16	15	15	16	15	15	14	14	13	12
TOBACCO	0	0	0	0	0	1	0	0	0	0	0	0	0	0
COTTON	65	72	77	65	71	77	74	69	61	0	61	56	50	44
DRY BEAN	9	24	25	13	9	11	7	4	5	5	2	0	0	0
OTHER FIBER CROPS	377	345	376	355	516	645	561	686	516	510	618	690	796	898
RICE	11	10	11	12	9	7	9	9	8	8	6	5	3	2
OTHER PERMANENT CROPS	45	49	49	44	47	75	60	56	50	51	58	63	70	78
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	7	10	0	0	0	0	11	10	8	3	7	6	5	5
ONION	1	2	0	0	0	2	2	2	2	2	2	2	3	3
POTATOES	99	89	0	0	0	96	98	96	97	87	93	96	101	108
PEPPER	0	1	0	0	0	1	1	1	1	1	1	1	1	1
TOMATOE	0	0	0	0	0	4	4	4	4	4	4	4	5	5
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	627	615	554	505	668	934	834	953	767	686	865	937	1048	1155
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	9	9	9	5	5	5	9	2	4	4
GRAPE FRUITS	0	0	0	0	1	1	1	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	5	3	3	2	2	2	2	1	0	0
APPLE	0	0	0	0	2	1	1	1	1	1	2	12	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	17	14	14	8	8	8	13	15	19	20
GRAND TOTAL	20139	17574	18072	18310	20175	18278	18695	18745	19859	20022	19526	19829	20338	20851

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(2) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- ANDINA -

<ANDINA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	8	9	16	20	19	6	3	13	6	4	6	3	0	0
MAIZE	271	274	268	267	223	140	153	214	263	281	213	205	199	188
SORGHUM	50	52	55	57	70	25	0	30	44	47	31	27	22	17
OATS	13	15	16	14	17	15	17	17	13	11	14	13	10	4
RYE	47	51	53	57	66	64	59	67	52	52	62	64	66	68
BARLEY	20	23	24	25	26	25	25	28	21	13	21	19	15	7
SOYBEENS	0	2	1	0	0	0	0	0	0	0	0	0	0	0
SUN FLOWER	40	41	38	22	23	32	35	52	28	30	32	32	31	30
ALFALFA	93	85	92	95	92	85	85	72	58	46	56	41	24	19
TOTAL EXTENSIVOS	542	552	563	557	536	392	377	493	485	484	435	407	368	333
SUGAR CANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTON	0	0	0	0	0	1	1	0	0	0	0	0	0	0
DRY BEAN	0	0	0	0	0	0	0	0	1	2	1	2	4	7
OTHER FIBER CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	3	3	0	0	0	0	5	7	6	3	7	8	11	14
ONION	5	6	0	0	0	5	6	6	4	7	7	9	12	17
POTATOES	9	10	0	0	0	7	8	8	7	8	8	9	11	13
PEPPER	0	2	0	0	0	1	1	1	1	2	1	1	2	2
TOMATOE	0	0	0	0	0	10	8	8	4	11	9	10	11	12
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	17	21	0	0	0	24	29	30	23	33	32	39	52	65
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	12	14	14	14	12	13	15	18	20	21
PEACH	0	0	0	0	4	0	5	7	6	6	8	10	13	16
TOTAL PERMANENT CROPS	0	0	0	0	16	14	19	21	18	19	23	28	33	39
GRAND TOTAL	559	573	563	557	552	430	425	544	526	536	490	474	453	437

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(3) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- NOROESTE -

<NOROESTE>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	56	48	48	48	68		53	47	47	35	148	158	160	158
MAIZE	169	131	113	116	116	125	127	143	121	158	110	105	96	106
SORGHUM	52	41	44	46	64	60	58	63	135	180	127	157	191	214
OATS	11	13	11	11	11	11	13	13	13	14	11	12	14	14
RYE	14	26	17	25	22	22	21	36	23	24	27	28	28	27
BARLEY	10	11	10	10	9	10	10	10	11	10	10	10	10	9
SOYBEENS	16	28	25	25	47	76	120	156	111	108	140	180	242	300
SUN FLOWER	3	2	1	1	1	4	5	3	2	4	2	3	3	4
ALFALFA	125	101	88	96	91	93	95	57	52	42	39	19	17	15
TOTAL EXTENSIVOS	456	401	357	378	429		502	528	515	575	615	671	760	848
SUGAR CANE	272	324	318	321	329	327	322	308	327	325	320	325	332	338
TOBACCO	37	41	40	41	46	38	37	42	34	38	30	28	26	25
COTTON	67	52	52	44	47	46	48	28	9	0	12	2	2	2
DRY BEAN	73	84	123	135	174	139	227	235	212	225	170	195	213	227
OTHER FIBER CROPS	0	0	3	3	3	4	4	4	0	0	2	1	0	0
RICE	1	1	1	0	0	1	1	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	1	1	0	0	0	0	0	0	0	0	1	1	1	0
ONION	8	9	0	0	0	6	6	6	3	3	3	1	0	0
POTATOES	10	7	0	0	0	8	7	6	7	5	6	6	7	7
PEPPER	0	7	0	0	0	6	6	6	5	4	4	3	3	3
TOMATOE	0	0	0	0	0	6	11	9	7	8	6	3	1	1
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	469	526	537	544	599	581	669	644	604	608	550	565	585	603
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	14	13	15	16	18	16	19	24	30	35
ORANGE	0	0	0	0	13	13	13	13	12	13	14	16	18	20
GRAPE FRUITS	0	0	0	0	6	6	6	5	5	5	4	5	6	6
MANDARIN ORANGE	0	0	0	0	5	4	4	4	5	5	6	8	9	9
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	38	36	38	38	40	39	43	50	62	70
GRAND TOTAL	925	927	894	922	1066	617	1209	1210	1159	1222	1208	1286	1407	1521

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(4) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- MESOPOTAMIA -

<MESOPOTAMIA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	226	81	92	100	252	131	116	84	75	102	93	83	69	56
MAIZE	419	424	317	329	220	192	202	190	314	224	178	142	89	44
SORGHUM	199	238	153	187	194	195	119	81	164	230	154	147	147	150
OATS	151	130	139	158	186	121	92	94	102	101	91	71	36	7
RYE	1	1	0	0	0	0	0	0	0	0	0	0	0	0
BARLEY	24	20	20	22	23	14	8	8	7	8	4	0	0	0
SOYBEANS	43	64	46	46	70	96	114	120	74	68	98	107	114	119
SUN FLOWER	16	10	10	9	10	23	22	23	18	12	20	21	24	28
ALFALFA	45	27	29	31	28	20	23	22	21	18	17	13	9	5
TOTAL EXTENSIVOS	1124	995	806	882	983	792	696	622	775	763	655	585	488	410
SUGAR CANE	5	6	6	6	6	6	6	6	5	6	5	4	0	0
TOBACCO	40	47	50	40	33	31	39	20	15	18	14	6	0	0
COTTON	23	19	28	25	27	28	27	19	12	0	17	14	6	4
DRY BEAN	1	1	2	2	2	3	2	3	3	3	3	2	0	0
OTHER FIBER CROPS	132	70	141	113	204	302	327	378	265	340	397	487	635	777
RICE	63	67	73	73	75	81	90	69	71	101	88	94	104	104
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	4	3	0	0	0	2	1	1	1	1	2	2	1	0
PEPPER	0	0	0	0	0	0	1	1	1	0	1	1	1	1
TOMATOE	0	0	0	0	0	0	2	2	2	1	1	0	0	0
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	268	213	300	259	347	453	495	499	375	470	526	609	746	886
TEA	35	39	41	45	42	43	41	41	42	42	47	51	58	64
LEMON	0	0	0	0	7	7	7	7	7	7	9	9	11	14
ORANGE	0	0	0	0	53	53	56	54	53	51	65	73	85	91
GRAPE FRUITS	0	0	0	0	11	11	10	10	10	10	12	13	14	14
MANDARIN ORANGE	0	0	0	0	21	21	21	21	22	22	27	33	42	52
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	35	39	41	45	134	135	135	133	134	132	159	181	211	235
GRAND TOTAL	1427	1247	1147	1186	1464	1380	1326	1254	1284	1365	1340	1375	1445	1531

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(5) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- PATAGONIA -

<PATAGONIA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	2	16	10	16	19	25	18	16	17	16	17	19	22	24
MAIZE	4	3	3	5	4	4	4	4	4	3	4	4	4	4
SORGHUM	0	0	0	0	0	1	1	1	1	1	1	2	2	2
OATS	4	4	7	11	13	13	29	33	33	4	26	28	34	38
RYE	1	3	4	8	9	9	23	10	11	4	13	15	17	20
BARLEY	2	3	5	8	9	10	17	17	20	3	16	18	21	23
SOYBEANS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUN FLOWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALFALFA	31	31	28	28	27	23	12	24	24	21	22	19	18	18
TOTAL EXTENSIVOS	44	60	57	76	81	85	104	105	110	52	101	109	121	132
SUGAR CANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DRY BEAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER FIBER CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	2	2	0	0	0	2	2	3	4	3	3	5	7	9
PEPPER	0	0	0	0	0	1	0	0	0	0	0	0	0	0
TOMATOE	0	0	0	0	0	5	5	6	4	5	7	8	11	14
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	2	2	0	0	0	8	7	9	8	8	10	13	18	23
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	36	36	38	36	37	40	47	55	66	76
PEACH	0	0	0	0	8	0	9	10	10	11	13	17	25	31
TOTAL PERMANENT CROPS	0	0	0	0	44	36	47	46	47	51	60	72	91	107
GRAND TOTAL	46	62	57	76	125	129	158	160	165	111	171	194	230	262

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(6) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

- CHAQUENA -

<CHAQUENA>

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	66	43	53	88	16	43	30	16	46	17	21	13	5	0
MAIZE	44	38	43	29	25	45	45	57	64	53	57	63	71	77
SORGHUM	144	148	158	167	223	154	189	191	255	373	298	347	425	497
OATS	3	4	3	2	0	2	2	5	6	5	4	5	6	6
RYE	0	2	1	1	0	0	0	1	1	0	0	0	0	0
BARLEY	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SOYBEENS	3	4	3	4	3	3	2	4	0	2	1	1	0	0
SUN FLOWER	193	152	175	252	112	253	174	264	88	87	139	117	83	49
ALFALFA	12	13	11	10	9	8	6	4	4	3	2	0	0	0
TOTAL EXTENSIVOS	465	405	447	553	388	508	448	542	464	540	522	547	588	629
SUGAR CANE	9	8	8	8	9	8	7	7	4	4	3	2	0	0
TOBACCO	1	1	1	1	0	1	1	1	1	1	1	0	0	0
COTTON	379	414	358	300	400	469	551	470	262		265	212	123	55
DRY BEAN	0	0	0	0	0	0	0	0	0	3	1	1	0	0
OTHER FIBER CROPS	0	0	0	0	0	0	1	1	0	1	1	1	1	0
RICE	11	11	12	13	13	11	15	9	6	9	6	3	0	0
OTHER PERMANENT CROPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POTATOES	0	0	0	0	0	2	1	4	3	1	1	1	0	0
PEPPER	0	0	0	0	0	1	0	0	1	1	1	1	1	0
TOMATOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	400	434	379	322	422	492	576	492	277		277	220	126	56
TEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEMON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ORANGE	0	0	0	0	1	0	0	0	0	0	0	0	0	0
GRAPE FRUITS	0	0	0	0	1	1	1	1	1	1	1	2	2	2
MANDARIN ORANGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEACH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL PERMANENT CROPS	0	0	0	0	2	1	1	1	1	1	1	2	2	2
GRAND TOTAL	865	839	826	875	812	1001	1025	1035	742	541	800	769	716	687

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

Table A2-8(7) ACTUAL/PROJECTED CROPPED AREA BY REGION, ARGENTINE

<TOTAL> - TOTAL -

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985	1990	1995
WHEAT	5628	4252	5182	5712	7192	3845	5230	5000	6137	6566	6033	6222	6403	6519
MAIZE	4253	3435	3873	3698	2981	3100	3300	3310	4000	3697	3416	3406	3389	3403
SORGHUM	2974	3113	2601	2358	2780	2653	2090	1879	2400	2712	2197	2072	1876	1710
OATS	1222	1156	1202	1341	1474	1480	1545	1681	1720	1614	1752	1888	2031	2104
RYE	2533	2516	2368	2408	2209	2138	1721	1507	1490	1339	1242	835	518	334
BARLEY	575	582	530	537	498	461	431	370	372	276	294	211	116	81
SOYBEENS	169	378	369	443	711	1201	1640	2101	1924	2040	2395	3062	4029	4855
SUN FLOWER	1652	1341	1196	1411	1460	2200	1766	2001	1389	1733	1829	1933	2070	2172
ALFALFA	3137	2599	2427	2343	2512	2430	2251	2225	2001	1765	1815	1560	1160	846
TOTAL EXTENSIVOS	22143	19372	19748	20251	21987	19107	19974	20074	21433	21742	20976	21196	21596	22028
SUGAR CANE	299	351	348	351	360	356	350	337	351	350	342	345	345	350
TOBACCO	78	89	91	82	79	71	77	63	50	57	45	34	26	25
COTTON	534	557	515	434	545	621	701	586	344	0	355	284	181	105
DRY BEAN	83	109	150	150	185	153	236	242	221	238	177	200	217	234
OTHER FIBER CROPS	509	415	520	471	723	951	893	1069	781	851	1018	1179	1432	1675
RICE	86	89	97	98	97	100	115	87	85	118	100	102	107	106
OTHER PERMANENT CROPS	45	49	49	44	47	75	60	56	50	51	58	63	70	78
GROUND NUTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GARLIC	11	14	0	0	0	0	16	17	14	6	15	15	17	19
ONION	14	17	0	0	0	13	14	14	9	12	12	12	15	20
POTATOES	124	111	0	0	0	117	109	118	119	105	113	119	127	137
PEPPER	0	10	0	0	0	10	9	9	9	8	8	7	8	7
TOMATOE	0	0	0	0	0	25	30	29	21	29	27	25	28	32
GREEN PEPPER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL INTENSIVOS	1783	1811	1770	1630	2036	2492	2610	2627	2054	1805	2260	2383	2575	2788
TEA	35	39	41	45	42	43	41	41	42	42	47	51	58	64
LEMON	0	0	0	0	21	20	22	23	25	23	28	33	41	49
ORANGE	0	0	0	0	76	75	78	72	70	69	88	91	107	115
GRAPE FRUITS	0	0	0	0	19	19	18	16	16	16	17	20	22	22
MANDARIN ORANGE	0	0	0	0	31	28	28	27	29	29	35	42	51	61
APPLE	0	0	0	0	50	51	53	51	50	54	64	85	86	97
PEACH	0	0	0	0	12	0	14	17	16	17	21	27	38	47
TOTAL PERMANENT CROPS	35	39	41	45	251	236	254	247	248	250	299	348	418	473
GRAND TOTAL	23961	21222	21559	21926	24194	21835	22838	22948	23735	23797	23535	23927	24589	25289

NOTE 1972-1981:ACTUAL 1982-1995:PROJECTED

ANNEX II-4

DETAIL STATISTICS OF FERTILIZER SUPPLY (APPARENT CONSUMPTION) IN ARGENTINE

Table A2-9 SUPPLY (IMPORT AND PRODUCTION) OF FERTILIZER IN ARGENTINE

(Nutrient ton)

	1972/73	1973/74	1974/75	1975/76	1976/77	1977	1978	1979	1980	1981	1982
Nitrogen (N ton)											
NH_3	2,360	3,360	1,107	2,125	2,257	2,007	2,905	3,279	3,467	2,036	2,994
A N	-	-	-	-	-	-	-	-	-	-	-
S N	2,336	2,283	1,251	1,396	222	270	803	948	529	618	672
A S	14,019	10,630	8,483	6,919	7,205	7,842	8,441	7,287	7,379	4,011	4,288
Urea	19,499	22,335	17,169	14,191	35,355	22,222	22,198	31,487	15,726	32,252	26,391
D A P	9,769	4,845	5,229	2,281	8,030	5,383	8,687	12,904	17,578	9,683	14,406
Others	1,112	1,835	1,870	721	1,318	2,480	1,376	4,655	19,383	2,175	1,785
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	49,111	45,264	35,109	27,633	54,387	40,214	44,412	60,576	65,355	51,173	50,926
Phosphate (P_2O_5 ton)											
Thomas-P	1,453	653	665	271	902	1,120	1,120	1,280	580	104	-
S S P	160	-	642	-	1,873	-	416	-	48	-	-
T S P	14,499	5,203	7,038	438	4,070	6,422	7,046	25,591	2,186	3,103	1,380
R-Phos	5,025	5,946	8,952	2,627	2	3,767	1,185	2,467	1,530	642	921
D A P	24,964	12,382	13,363	5,829	20,522	16,508	22,201	32,978	44,922	24,746	36,815
Others	1,180	654	52	53	2,009	-120	581	2,328	-546	-108	6,213
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	47,297	24,838	30,712	9,218	29,378	27,707	32,551	64,660	50,013	28,885	45,719
Potash (K_2O ton)											
M O P	3,907	7,648	3,853	2,299	2,920	2,054	3,367	4,495	4,140	2,021	1,693
S O P	1,280	1,659	870	844	911	1,073	982	2,851	2,050	489	1,890
S P M	909	1,322	185	352	835	704	887	1,173	880	923	-
Others	571	1,029	2,105	292	234	457	456	3,726	389	1,470	1,687
NP/NPK	16	-	-	-	-	10	2	16	1,293	398	390
Total	6,683	11,658	7,013	3,787	4,900	4,298	5,694	12,261	8,752	5,301	5,660

Table A2-10(1) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE

(Product ton)

	1972/1973			1973/1974			1974/1975		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	2,000	878	2,878	-	4,068	4,068	-	1,350	1,350
A N	-	-	-	-	-	-	-	-	-
S N	14,600	-	14,600	14,268	-	14,268	7,820	-	7,820
A S	9,934	56,821	66,755	-	50,621	50,621	3,000	37,396	40,396
Urea	7,000	36,330	43,330	10,000	39,633	49,633	16,130	22,024	38,154
Sub-toal	33,534	94,029	127,563	24,268	94,322	118,590	26,950	60,770	87,720
Thomas-P	-	9,083	9,083	-	4,080	4,080	700	3,459	4,159
S S P	1,000	-	1,000	-	-	-	4,013	-	4,013
T S P	31,520	-	31,520	11,310	-	11,310	15,301	-	15,301
R-Phos	16,750	-	16,750	19,820	-	19,820	29,840	-	29,840
Sub-total	49,270	9,083	58,353	31,130	4,080	35,210	49,854	3,459	53,313
M O P	6,511	-	6,511	12,747	-	12,747	6,421	-	6,421
S O P	2,559	-	2,559	3,318	-	3,318	1,740	-	1,740
S P M	4,132	-	4,132	6,009	-	6,009	842	-	842
Sub-total	13,202	-	13,202	22,074	-	22,074	9,003	-	9,003
DAP	54,270	-	54,270	26,918	-	26,918	29,051	-	29,051
Others	4,121	7,002	11,123	7,477	3,905	11,382	8,826	423	9,249
NP/NPK	106	-	106	-	-	-	-	-	-
Sub-total	58,497	7,002	65,499	34,395	3,905	38,300	37,877	423	38,300
Total	154,503	110,114	264,617	111,867	102,307	214,174	124,684	64,652	188,336

Table A2-10(2) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1975/1976			1976/1977			1977		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	-	2,592	2,592	-	2,752	2,752	-	2,448	2,448
A N	-	-	-	-	-	-	-	-	-
S N	8,724	-	8,724	1,388	-	1,388	1,690	-	1,690
A S	-	32,947	32,947	-	34,308	34,308	-	37,341	37,341
Urea	6,068	25,467	31,535	32,676	45,890	78,566	20,808	28,575	49,383
Sub-total	14,792	61,006	75,798	34,064	82,950	117,014	22,498	68,364	90,862
Thomas-P	-	1,693	1,693	-	5,640	5,640	-	7,000	7,000
S S P	-	-	-	11,709	-	11,709	-	-	-
T S P	953	-	953	8,848	-	8,848	13,960	-	13,960
R-Phos	8,755	-	8,755	7	-	7	12,556	-	12,556
Sub-total	9,708	1,693	11,401	20,564	5,640	26,204	26,516	7,000	33,516
M O P	3,832	-	3,832	4,867	-	4,867	3,424	-	3,424
S O P	1,688	-	1,688	1,822	-	1,822	2,146	-	2,146
S P M	1,600	-	1,600	3,796	-	3,796	3,200	-	3,200
Sub-total	7,120	-	7,120	10,485	-	10,485	8,770	-	8,770
D A P	12,672	-	12,672	44,612	-	44,612	35,887	-	35,887
Others	485	2,659	3,144	4,196	195	4,391	10,071	-	10,071
NP/NPK	-	-	-	-	-	-	65	-	65
Sub-total	13,157	2,659	15,816	48,808	195	49,003	46,023	-	46,023
Total	44,777	65,358	110,135	113,921	88,785	202,706	103,807	75,364	179,171

Table A2-10(3) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1978			1979			1980		
	Import	Production	Total	Import	Production	Total	Import	Production	Total
NH_3	-	3,543	3,543	-	3,999	3,999	-	4,228	4,228
A N	-	-	-	-	-	-	-	-	-
S N	5,020	-	5,020	5,925	-	5,925	3,305	-	3,305
A S	-	40,197	40,197	-	34,699	34,699	479	34,660	35,139
Urea	7,358	41,970	49,328	33,782	36,190	69,972	32,076	42,808	74,884
Sub-total	12,378	85,710	98,088	39,707	74,888	114,595	35,860	81,696	117,566
Thomas-P	-	7,000	7,000	-	8,000	8,000	-	3,622	3,622
S S P	2,598	-	2,598	-	-	-	300	-	300
T S P	15,317	-	15,317	55,633	-	55,633	4,752	-	4,752
R-Phos	3,951	-	3,951	8,224	-	8,224	5,101	-	5,101
Sub-total	21,866	7,000	28,866	63,857	8,000	71,857	10,153	3,622	13,775
M O P	5,611	-	5,611	7,492	-	7,492	6,900	-	6,900
S O P	1,963	-	1,963	5,702	-	5,702	4,100	-	4,100
S P M	4,034	-	4,034	5,333	-	5,333	4,000	-	4,000
Sub-total	11,608	-	11,608	18,527	-	18,527	15,000	-	15,000
D A P	48,262	-	48,262	71,691	-	71,691	97,656	-	97,656
Others	3,981	-	3,981	24,184	-	24,184	4,984	-	4,984
NP/NPK	15	-	15	106	-	106	8,617	-	8,617
Sub-total	52,258	-	52,258	95,981	-	95,981	111,257	-	111,257
Total	98,110	92,710	190,820	218,072	82,888	300,960	172,270	85,318	257,588

Table A2-10(4) IMPORT AND PRODUCTION OF FERTILIZER IN ARGENTINE (Continued)

	1981			1982		
	Import	Production	Total	Import	Production	Total
NH_3	-	2,483	2,483	-	3,651	3,651
A N	-	-	-	-	-	-
S N	3,860	-	3,860	4,200	-	4,200
A S	-	19,908	19,908	500	19,918	20,418
Urea	30,198	41,472	71,670	7,735	50,912	58,647
Sub-total	34,058	63,053	97,111	12,435	74,481	86,916
Thomas-P	-	650	650	-	-	-
S S P	-	-	-	-	-	
T S P	6,746	-	6,746	3,000	-	3,000
R-Phso	2,140	-	2,140	3,070	-	3,070
Sub-total	8,886	650	9,536	6,070	-	6,070
M O P	3,369	-	3,369	2,822	-	2,822
S O P	978	-	978	3,780	-	3,780
S P M	4,194	-	4,194	-	-	-
Sub-total	8,541	-	8,541	6,602	-	6,602
D A P	53,795	-	53,795	80,033	-	80,033
Others	7,962	-	7,962	21,602	-	21,602
NP/NPK	2,651	-	2,651	2,600	-	2,600
Sub-total	64,408	-	64,408	104,235	-	104,235
Total	115,893	63,703	179,596	129,342	74,481	203,823

ANNEX II-5

BASE DATA FOR PROJECTION OF FERTILIZER MARKET PRICE

Table A2-11 ASSUMED CRUDE OIL AND NATURAL GAS PRICES

	(AT 1982 CONSTANT US DOLLARS)				
	1982	1985	1990	1995	2000
Crude Oil (FOB. Arabian Light. US$/BBL)	34.0	28.6	31.4	34.4	37.4
(US$/MMBTU)	(5.73)	(4.82)	(5.29)	(5.80)	(6.31)
Natural Gas (For fertilizer production, US$/MMBTU)	3.02	3.56	5.04	5.75	6.26

Assumptions:

1. Crude oil price was assumed to remain unchanged at the 1983 price level up to 1985, and after that the price increase rate (in terms of constant price) was assumed as follows:
   - 1985-1990 1.9% p.a.
   - 1990-1995 1.8% p.a.
   - 1995-2000 1.7% p.a.
2. Natural gas price in the U.S.A. was assumed to increase so that the N.G. price become close to the crude oil price in terms of equivalent thermal unit value.

Table A2-12 ESTIMATED PRODUCTION COSTS —— PHOSPHATE ROCK[1/]

	(AT 1982 CONSTANT US DOLLARS)				
	1982	1985	1990	1995	2000
Operating costs					
Mining	4.9	4.7	4.8	4.9	5.0
Beneficiation	4.2	4.1	4.1	4.2	4.3
Handling, storaging	3.5	3.5	3.5	3.5	3.5
Depreciation	4.0	4.0	4.0	4.0	4.0
Sub-total	16.6	16.3	16.4	16.6	16.8
Transportation, loading costs	5.5	5.5	5.5	5.5	5.5
Sales and administrative expenses	19.0	19.0	19.0	19.0	19.0
Total	41.1	40.8	40.9	41.1	41.3

Notes: 1/ Assuming the mining site in a developing country with some infrastructure.

2/ Assuming 20% of total of these costs to increase by the same increase rate as crude oil. (see Table AII-).

Table A2-13 ESTIMATED PRODUCTION COSTS —— PHOSPHORIC ACID

	1982	1985	1990	1995	2000
Phosphoric acid					
Phosphate rock (3.352 tons)	55.6	54.6	55.0	55.6	56.3
Sulphur (0.976 tons)	87.5	87.5	87.5	87.5	87.5
Other variable costs	20.9	20.9	20.9	20.9	20.9
Fixed costs	80.0	80.0	80.0	80.0	80.0
Sub-total	244.0	243.0	243.4	244.0	244.7
Sales and admin. expenses transp. costs, capital charge, etc.	36.5	36.5	36.5	36.5	36.5
Total	280.5	279.5	279.9	280.5	281.2

Table A2-14 ESTIMATED PRODUCTION COSTS —— DAP, TSP

	1982	1985	1990	1995	2000
DAP					
Phosphoric acid (0.47 tons P_2O_5)	114.7	114.2	114.4	114.7	115.0
Ammonia (0.225tons)	27.0	31.0	41.9	47.1	50.9
Other variable costs	4.5	4.5	4.5	4.5	4.5
Fixed costs	17.0	17.0	17.0	17.0	17.0
Sub-total	163.2	166.7	177.8	183.3	187.4
Sales and administrative expenses, transp. costs, etc.	24.5	24.5	24.5	24.5	24.5
Total	187.7	191.2	202.3	207.8	211.9
TSP					
Phosphate rock (0.44 tons)	7.3	7.2	7.2	7.3	7.4
Phosphoric acid (0.34 tons)	83.0	82.6	82.8	83.0	83.2
Other variable costs	4.1	4.1	4.1	4.1	4.1
Fixed costs	29.0	29.0	29.0	29.0	29.0
Sub-total	123.4	122.9	123.1	123.4	123.7
Sales and administrative expenses, transp. costs, etc.	18.5	18.5	18.5	18.5	18.5
Total	141.9	141.4	141.6	141.9	142.2

Table A2-15 ESTIMATED PRODUCTION COSTS —— AMMONIA, UREA

(AT 1982 CONSTANT US DOLLARS)

	1982	1985	1990	1995	2000
Ammonia					
Natural gas	99.0	116.7	165.2	188.5	205.2
Other Variable costs	4.0	4.0	4.0	4.0	4.0
Fixed costs	17.0	17.0	17.0	17.0	17.0
Sub-total	120.0	137.7	186.2	209.5	226.2
Sales and administrative expenses	18.0	18.0	18.0	18.0	18.0
Total	138.0	155.7	204.2	227.5	244.2
Urea					
Ammonia (0.575 tons)	69.0	79.2	107.1	120.5	130.1
Other variable costs	26.0	26.0	26.0	26.0	26.0
Fixed costs	39.0	39.0	39.0	39.0	39.0
Sub-total	134.0	144.2	172.1	185.5	195.1
Sales and administrative expenses, transp. costs	20.0	20.0	20.0	20.0	20.0
Total	154.0	164.2	192.1	205.5	215.1

ANNEX IV

PHOSPHATE ROCK CONCENTRATION TEST AND MINERALOGICAL STUDY

ANNEX IV PHOSPHATE ROCK CONCENTRATION TEST AND MINERALOGICAL STUDY

1. Preface

2. Mineralogical Study

3. Phosphate Rock Concentration Test

ANNEX IV

PHOSPHATE ROCK CONCENTRATION TEST AND MINERALOGICAL STUDY

1. Preface

The raw iron ore of HIPASAM, Sierra Grande, Rio Negro, Argentine contains high phosphate minerals which are removed at the iron ore concentration plant of HIPASAM, Sierra Grande, to produce iron ore pellet with low phosphate content as the steel production raw materials. The removed phosphate minerals are at present discarded as non-magnetic tails and flotation tails.

The phosphate content in the raw ore is 3.28% as P_2O_5 and the major phosphates are removed in the non-magnetic tails which contain 7.08% of P_2O_5 and 27.53% of Fe. The total amount of the available non-magnetic tails is estimated annually 921,621 TPY when the iron ore concentration plant is operated at the design capacity. Therefore, the phosphate minerals in the non-magnetic tails are calculated as 58,171 TPY as P_2O_5.

At HIPASAM preliminary tests were carried out since 1972 to recover the phosphate minerals from the tails as phosphate rock for the phosphate fertilizer raw materials. Due to the specific characteristics of minerals at Sierra Grande, the recovery of phosphate rock expressed in terms of P_2O_5 yield is found lower and the residual iron expressed in terms of Fe is found higher. Generally the iron minerals in the phosphate rock is harmful for the production of phosphate fertilizer, and the upper limit of iron content in the commercial phosphate rock rock is accepted less than 1.0%.

It is reported that there are three commercial operations in the world to recover phosphate rock from the tails of iron ore concentration plant; namely SSAB, Grängesberg, Sweden with 75,000 TPY capacity, KLAB, Kiruna, Sweden with 200,000 TPY and a small recovery at Pea Ridge, the USA. The performances in Sweden are high in P_2O_5 recovery and low residual iron. The product phosphate rock is partly exported as international commodity.

To investigate the techno-economic feasibility of the phosphate rock recovery from the non-magnetic tails at Sierra Grande, the representative sample of the tails were taken on October 6, 1983 and sent to Japan for the concentration test in the laboratory and pilot plant, and also for the mineralogical study. Simultaneously samples were taken at SSAB, Grängesberg, for the mineralogical comparison study.

The concentration test results conclude that from the non-magnetic tails of HIPASAM, Sierra Grande, the phosphate rock with 35.65% of P_2O_5 and 5.80% of Fe content is extracted with 55.50% recovery of P_2O_5 by grinding, rougher flotation, cleaner flotation, filtration and drying processes. Further concentration test by HGMS (High Gradient Magnetic Separator) shows that the residual iron will be reduced down to 1.84% of Fe, however the overall recovery of P_2O_5 is 22.0% and is concluded not practical as industrial operation.

The mineralogical study reveals that the phosphate minerals in the ore of Sierra Grande is closely locked with iron minerals and fine grinding is required for the concentration and separation. The flotation characteristics of chlorite (iron alumino-silicate) in the ore is similar to that of apatites and is one reason for the high residual iron content in the product phosphate rock.

The ore of SSAB, Grängesberg, Sweden is characterized of larger crystal size of apatite and higher associated minerals of calcium, magnesium and silicate instead of higher iron and aluminium minerals observed in the ore of HIPASAM, Sierra Grande, Argentine.

Although there is possibility for further technical improvements in the concentration of phosphate rock, due to the mineralogical specific natures of the non-magnetic tails at Sierra Grande, the requirements for electric power for grinding and also collector chemicals for flotation will be higher, and the residual iron concentration in the product phosphate rock will be higher.

Based upon the results of the concentration test, the basis of conceptual design of the phosphate rock concentration plant consuming non-magnetic tails and located in Sierra Grande were developed for the production of phosphate rock with an anuual production of 100,000 TPY with 35.65% of P_2O_5 and 5.80% of Fe quality and 55.5% of P_2O_5 recovery from non-magnetic tails.

The mineralogical study were carried out on following items and study results are explained briefly;

- Size Distribution
- Chemical Analysis
- Microscope
- X-Ray Diffraction
- X-Ray Micro-Analyzer

2. Mineralogical Study

2-1 Study Sample

For the mineralogical study, four samples were selected to make comparison between the non-magnetic tails of the iron concentration plant and phosphate rock extractred from the tails of HIPASAM, Sierra Grande, Argentine and SSAB, Grängesberg, Sweden.

The sampling date of these samples are summarized as follows;

	HIPASAM Sierra Grande, Argentine		SSAB Grängesberg, Sweden	
	Non-Magnetic Tails	Phosphate Rock	Non-Magnetic Tails	Phosphate Rock
- Sampling Date	- Oct. 6, 1983	- Feb. 20, 1984	- Oct. 11, 1983	- Oct. 11, 1983
- Sampling Point	- Outlet of Magnetic Separator (828/829), Sierra Grande, Argentine	- Prepared at Nippon Mining Co.,LTD, Japan	- Outlet of Magnetic Separator (45) Grängesberg, Sweden	- Outlet of Filter (54), Grängesberg, Sweden
- Note	- Commercially Operating	- Experimentally Produced	- Commercially Operating	- Commercially Operating
	- Non-Magnetic Tails of Primary and Secondary Magnetic Separators	- Flotating Concentration	- Non-Magnetic Tails of Primary Flotation froth	

2-2 Size Distribution and Chemical Analysis

The size distribution analysis by sieve analysis and cyclocyzer, and chemical analysis of the each fraction of the size distribution were carried out for the four samples and the test results are presented in Table AIV-1 and Table AIV-2.

The test results show distict differences in chemical analysis and size distribution between the two non-magnetic tails of Sierra Grande and Grangesberg.

The non-magnetic tails at Sierra Grande contains 7.08% of P_2O_5 and 27.53% or Fe while the non-magnetic tails at Grangesberg contains 11.4% of P_2O_5 and 10.48% of Fe. Further there are a large differece observed in SiO_2, Al_2O_3, CaO and MgO contents. The concentration of Fe_2O_3 and Al_2O_3 are much higher and the average size is much smaller at Sierra Grande while the concentration of SiO_2 and CaO are much higher and the average size is much larger at Grangesberg.

The maximum concentration of phosphate is observed at the size fraction of 0.011mm in Sierra Grande and 0.032mm in Granbesberg.

There are also several distinct differences among phosphate rock extracted between Sierra Grande and Grangesberg, the former contains 35.6% of P_2O_5, 5.80% of Fe, 2.75% of Al_2O_3, 4.24% of SiO_2 with 0.022mm of average size while the later contains 39.48% of P_2O_5, 1.10% of Fe, 2.30% of Al_2O_3, 1.52% of SiO_2 with 0.054mm of average size.

The iron in phosphate rock extracted from Sierra Grande contains high percentage (75%) of ferrous iron [Fe (II)].

Table AIV-1 CHEMICAL ANALYSIS OF RAW MATERIAL TAILS AND PRODUCT PHOSPHATE ROCK

	HIPASAM Sierra Grande, Argentine		SSAB Grängesberg, Sweden	
	Non-Magnetic Tails	Phosphate Rock	Non-Magnetic Tails	Phosphate Rock
Chemical Analysis, %				
P	3.09	15.56	4.98	17.23
P_2O_5	(7.08)	(35.65)	(11.41)	(39.48)
Total Fe	27.53	5.80	10.48	1.10
Fe (III)	13.75	1.44	7.24	0.90
Fe (II)	13.78	4.36	3.24	0.20
CaO	3.93	44.30	17.41	52.50
MgO	1.14	0.36	7.96	0.30
Al_2O_3	14.23	2.75	7.05	2.30
SiO_2	19.29	4.24	33.44	1.52
Na_2O	0.23	0.20	1.32	0.16
K_2O	0.67	0.08	2.32	0.07
CO_2	0.16	0.33	0.41	0.61
S	2.28	0.48	0.02	0.01
F	0.40	1.50	3.23	4.76
Cl	0.001	0.01	0.01	0.01
Average Size by Rosin-Rammler - Bennett Diagram, d', mm	0.028	0.022	0.049	0.054
Sampling Date	October 6, 1983	February 20, 1984	October 13, 1983	October 13, 1983

Notes: $P_2O_5/2P = 2.2914$

Table AIV-2 SIZE DISTRIBUTION AND CHEMICAL ANALYSIS OF RAW MATERIAL TAILS AND PRODUCT PHOSPHATE ROCK

	HIPASAM, Sierra Grande, Argentine										SSAB, Grängesberg, Sweden									
	Non-Magnetic Tails					Phosphate Rock					Non-Magnetic Tails					Phosphate Rock				
	Analysis, %		Distribution, %			Analysis, %		Distribution, %			Analysis, %		Distribution, %			Analysis, %		Distribution, %		
Size, mm	P2O5	Fe	Weight	P2O5	Fe	P2O5	Fe	Weight	P2O5	Fe	P2O5	Fe	Weight	P2O5	Fe	P2O5	Fe	Weight	P2O5	Fe
Sieve;																				
(+)0.152	-	-	-	-	-	-	-	-	-	-	0.02	5.7	1.6	0.0	0.9	-	-	-	-	-
(-)0.152, (+)0.110	2.91	15.9	1.0	0.4	0.6	-	-	-	-	-	1.26	4.0	3.9	0.4	1.4	-	-	-	-	-
(-)0.110, (+)0.076	4.74	19.5	2.7	1.5	1.9	-	-	-	-	-	8.09	3.9	8.5	6.2	3.1	-	-	-	-	-
(-)0.076, (+)0.053	6.46	21.1	4.4	3.5	3.5	-	-	-	-	-	13.98	5.2	9.3	11.7	4.5	40.81	0.7	19.1	19.7	15.3
(-)0.053, (+)0.037	8.66	21.8	7.4	8.0	6.0	-	-	-	-	-	14.18	8.9	9.7	12.3	8.0	40.88	1.1	18.4	19.0	25.0
(-)0.037, (+)0.025	8.57	27.8	13.9	14.7	14.3	36.20	7.1	15.6	14.3	18.8	13.02	12.4	11.3	13.2	13.0	40.28	1.1	19.9	20.2	26.8
Cyclocyzer;																				
(+)0.042	0.69	56.0	1.2	0.1	2.5	-	-	-	-	-	8.34	47.9	1.0	0.7	4.4	-	-	-	-	-
(+)0.032	3.00	48.4	1.8	0.6	3.2	-	-	-	-	-	15.67	28.8	2.6	3.7	7.0	-	-	-	-	-
(+)0.022	9.53	32.3	10.0	11.8	12.0	-	-	-	-	-	14.46	14.5	8.7	11.2	11.7	-	-	-	-	-
(+)0.015	9.74	27.5	9.0	10.8	9.2	39.18	6.7	24.2	42.2	27.6	10.72	12.7	8.2	7.9	9.6	39.92	0.4	24.5	24.7	13.3
(+)0.011	10.08	26.5	6.6	8.2	6.5	-	-	-	-	-	10.68	11.9	6.6	6.3	7.3	-	-	-	-	-
(+)0.011	7.79	25.9	42.0	40.4	40.3	40.09	5.2	60.2	61.5	53.6	10.29	11.0	28.6	26.4	29.1	36.09	0.9	18.1	16.4	19.6
Total:	8.11	27.0	100	100	100	39.18	5.8	100	100	100	11.16	10.78	100	100	100	39.64	0.8	100	100	100
Average Size by Rosin-Rammer-Bennett Diagram, d', mm:			0.028					0.022					0.049					0.054		

2-3 Microscopic Observation

The microscopic observation by transmitted light was made to identify the minerals in non-magnetic tails and extracted phosphate rock. The observation results are shown in Figure AIV-1.

(1) Non-Magnetic Tails of Sierra Grande

The minerals identified in the non-magnetic tails of Sierra Grande are;

Major Minerals	: Iron Minerals (Magnetite, Hematite and Limonite), Chlorite
Associated Minerals	: Apatite, Quartz, Feldspar, Mica, Garnet, Tourmaline, Amphibole, Calcite, Phosphate Minerals (Blue Colored and Brown Colored)

Approximately a half of apatite is locked with iron minerals or chlorite in a variety of locking types of simple locking, to complex locking, and approximately a half of apatite crystal is found liberated. In the case of iron minerals locking with apatite, the inclusion of small grains of iron minerals with 0.01 to 0.03 mm diameter in apatite crystals are observed.

The unidentified phosphate minerals besides apatite are also found by microscopic observation which show blue or brown color and contain a small amount of iron and magnesium which were identified by X-ray micro-analyzer observation. These phosphate minerals are also forming locked grain with apatite.

Figure AIV-1 MICROSCOPE AND ELECTRON PROBE MICRO ANALYZER OBSERVATION OF NON-MAGNETIC TAILS AND PHOSPHATEROCK

Notes;

(1) Sample: - Non-Magnetic Tails of Iron Concentration Plant
- Phosphate Rock Extracted

(2) Source: - HIPASAM, Sierra Grande, Argentine - 1983
- SSAB, Grängesberg, Sweden - 1983

(3) Symbols of Minerals:

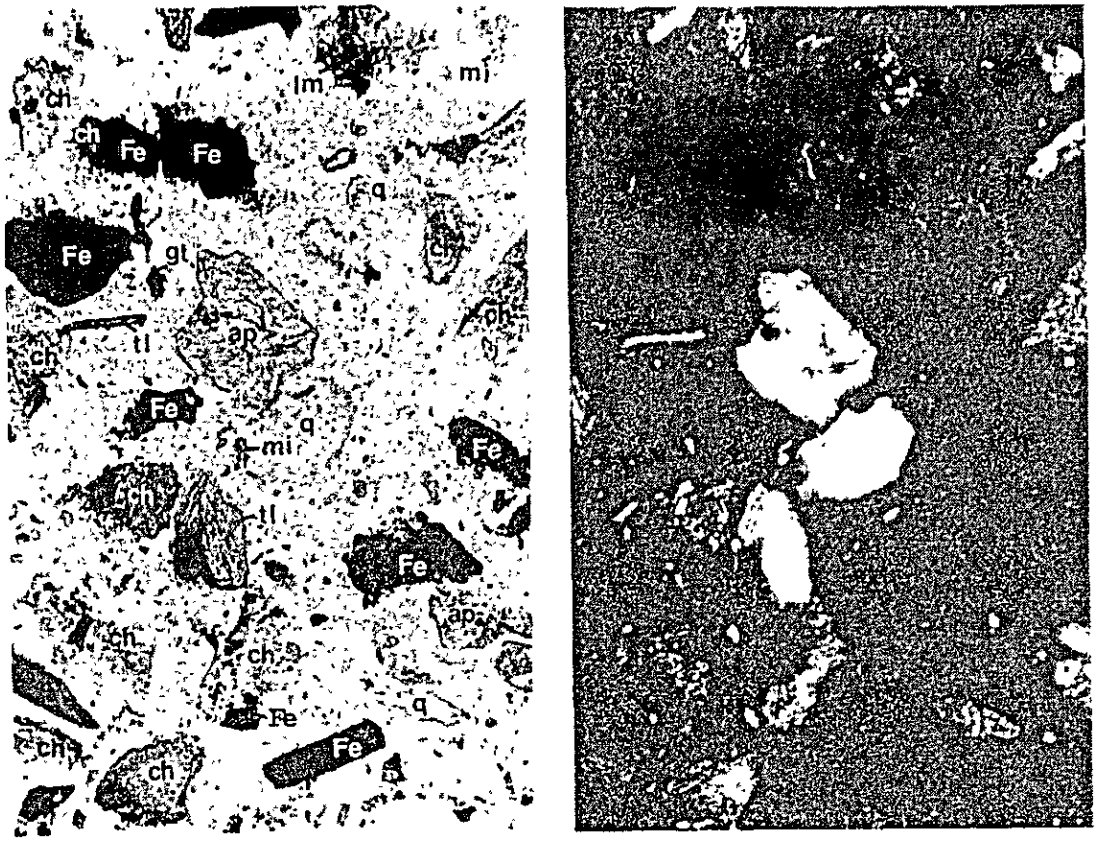
- am	Amphibole
- ap	Apatite
- B	Bubble (Contamination)
- bl-P	Phosphate Minerals (Blue Colored)
- br-P	Phosphate Minerals (Brown Colored)
- carb	Carbonate Minerals
- ch	Chlorite
- Fe	Iron Minirals
- fl	Fluorite
- fs	Feldspar
- gt	Garnet
- lm	Limonite
- mi	Mica
- g	Quartz
- tl	Tourmaline

(4) Microscope Scale:
- (x)110, (x)220, (x)440

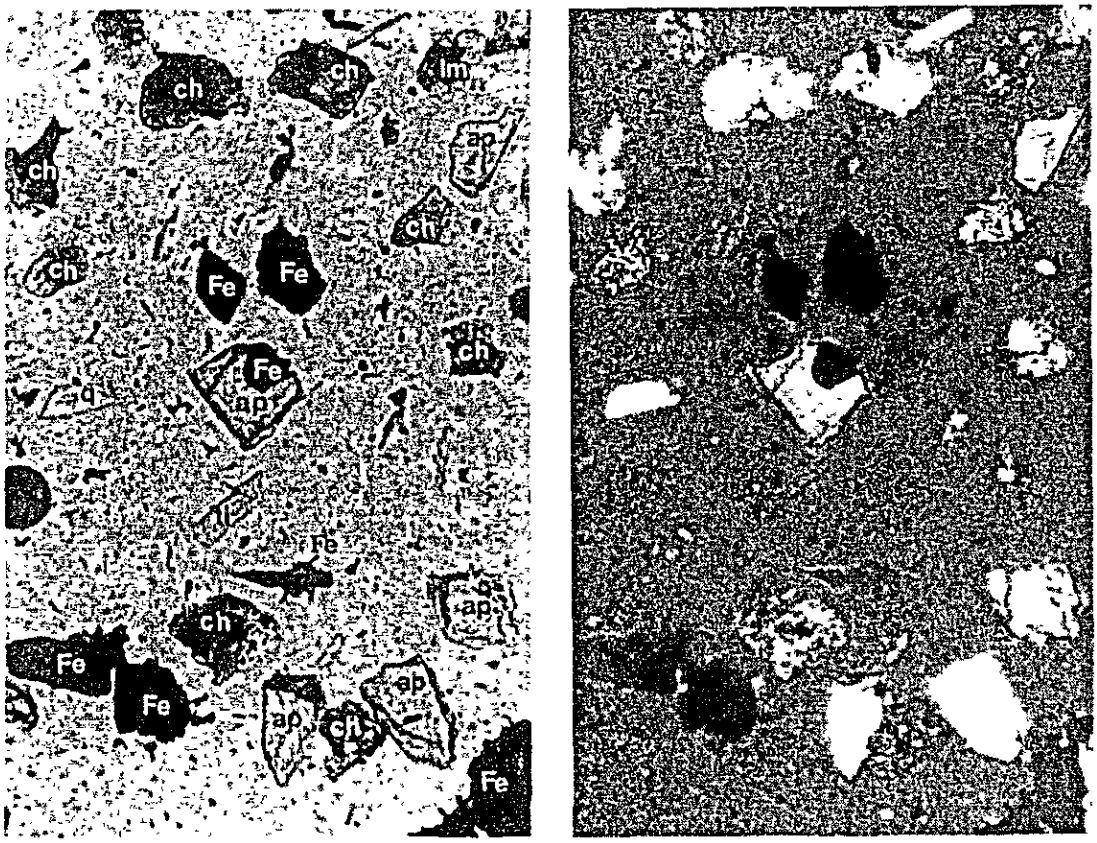
(5) Microscope Nicol Prism:
- Left Hand Side; Single
- Right Hand Side; Crossed

(6) Electron Probe Micro Analyzer
- Secondary Electron Image
- X-Ray Image (Energy Dispersed Method)
  Ca-K alpha, Fe-K alpha,
  Mg-K alpha, P-K alpha

Figure AIV-1(1) Microscope Observation of Non-Magnetic Tails, HIPASAM, Sierra Grande, Argentine

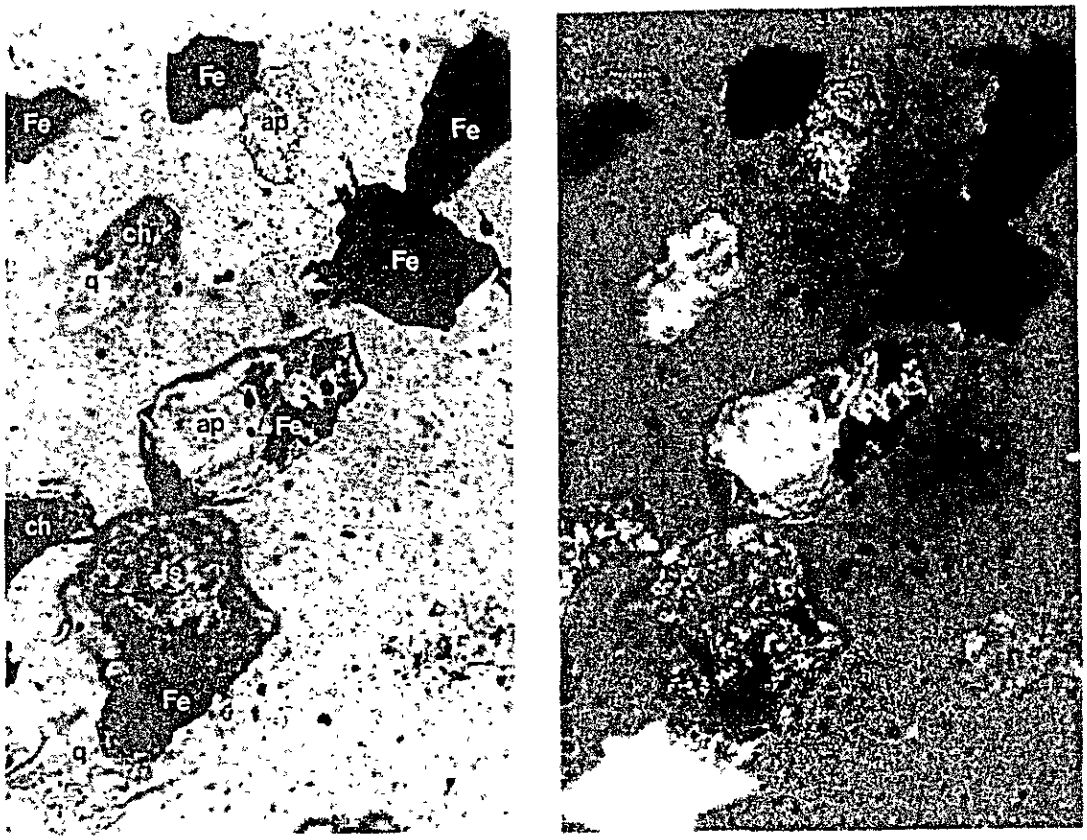


Scale: X220

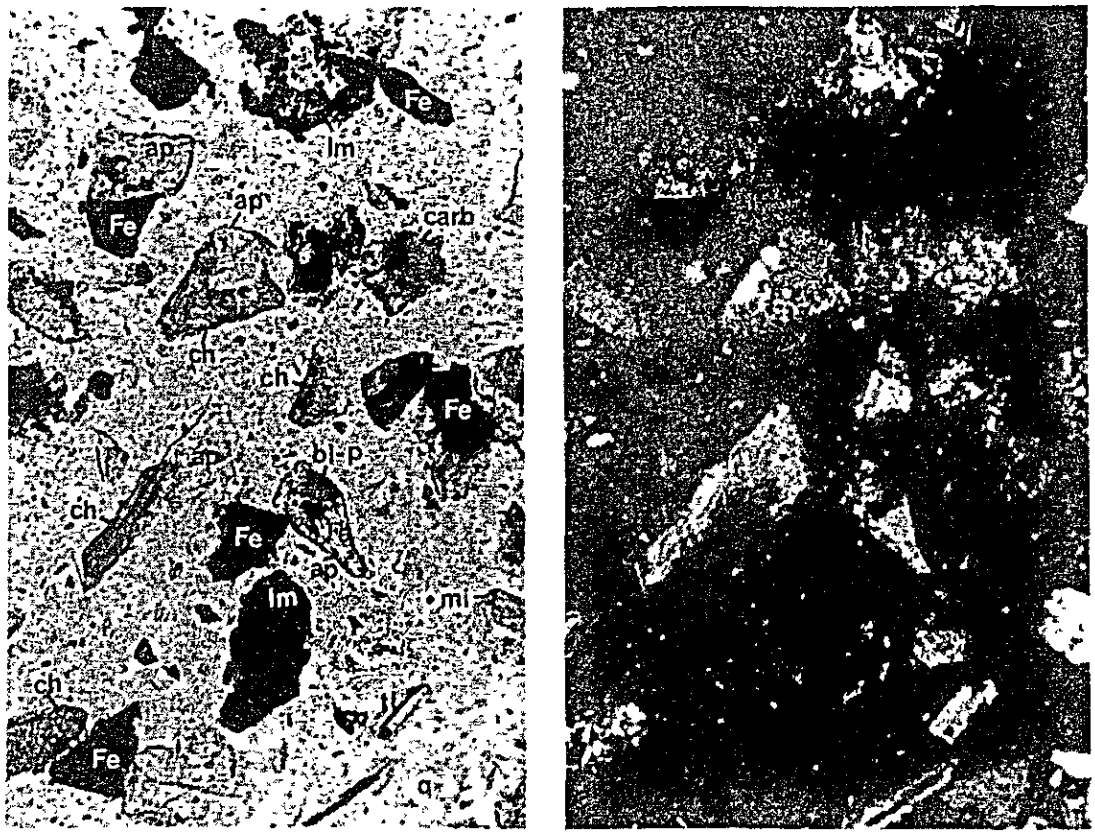


Scale: X220

Figure AIV-1(2) Microscope Observation of Non-Magnetic Tails, HIPASAM, Sierra Grande, Argentine



Scale: X440



Scale: X220