B-III PAMPA DEL TAMARUGAL-BASIN

TABLE OF CONTENTS

B-III PAMPA DEL TAMARUGAL BASIN

LIST OF TABLES

B-III PAMPA DEL TAMARUGAL BASIN

LIST OF FIGURES

B-III PAMPA DEL TAMARUGAL BASIN

Chapter I TOPOGRAPHY AND GEOLOGY

1.1. Topography

The Pampa del Tamarugal Basin consists of the parts of Altiplano, Precordillera and Intermediate Depression, as shown in Fig. B-I, 1.1. The Pampa del Tamarugal is lying over the Intermediate Depression and is bounded by the Coastal Range to the west and the Precordillera to the east. It is located at an altitude between 1,000 and 1,600 m.

Drainage patterns of the basin extracted from LANDSAT images are shown in Fig. B-III, 1.1, and these form two different types; a dendritic pattern at the Altiplano and a subparallel pattern at the Precordillera and Intermediate Depression. Main rivers in the basin are Aroma, Tarapacá, Quipisca, Tambillo, Quisma, Chacarilla and Guatacondo rivers. All the streams of Aroma, Tarapaca, Quipisca and Tambillo flow into the Salar de Pintados.

1.2. Geology

1.2.1. Methodology of Geological Analysis

On the details of the methodology, refer to the part of San José River basin.

1) Interpretation of LANDSAT images

As for the Pampa del Tamarugal Basin, six (6) scenes of images were used, whose path and row are: 001-073; 001-074; 001-075; 002-073; 001-074 and 002-075. Details of the used data are shown in Table B-I, 1.1.

2) Interpretation of Aerial Photographs

One hundred ninety seven sheets of black and white aerial photographs taken in 1977 and 1981 were used for the interpretation.

1.2.2. General Geological Features of Basin

Several geological maps published by SERNAGEOMIN (Servicio Nacional de Geologia y Mineria) are available for Pampa del Tamarugal as mentioned below.

Geological Maps
"Pisagua y Zapiga" (1:100,000) (<1)
"Mamiña" (1:50,000) (<2)
"Juan de Morales" (50,000) (<3)
"Pica, Alca, Matilla y Chacarilla" (<4)
Magnetic Map
"Arica, Pisagua-Huara" (1:250,000) (<5)

The results of the interpretation on the basin were compiled in Fig. B-III, 1.2 reviewing these existing data. Stratigraphic classification is given in the following table;

Geologic Age	Formation	Lithology	Units
Quaternary	Recent Sediments	alluvial, eolian, fan deposits	Qal, Qe, Qf.
Quaternary Tertiary	Altos de Pica Formation	continental sedimentary rocks and pyroclastic rocks, divided into 5 members: - Member 5 : dark to greenish grey and middle to fine sandstone. - Member 4 : pinkish orange-grey to white rhyolitic tuff. - Member 3 : yellowish middle to coarse sandstone. - Member 2 : pinkish orange and dark grey rhyolitic welded tuff. - Member 1 : yellowish brown conglomerate and middle to coarse sandstone.	TQau TQal
Mesozoic	Longacho Formation	fissible shale, mudstone, fine sandstone, limestone, generally grey in color.	J

1) General Geology of the Basin

Geology of Pampa del Tamarugal Basin is composed of Mesozoic and Cenozoic rocks, as shown in the table above. The interpretation resulted in the classification of six (6) geological units as shown in Fig. B-III, 1.2. Lithology of each discriminated units were discussed with published references which are mainly from Carlos Gali Oliver and Robert J. Dingman (1962). Lithological characteristics of each unit are as follows:

(1) Mesozoic Unit (J)

It is distributed on the low isolated mountains forming an anticlinal structure at the eastern side of Pampa del Tamarugal. Mesozoic rocks outcropping around

Pica are called the Longacho Formation which consists of fissible shale, mudstone, fine sandstone and limestone, generally grey in color. In many parts, the rocks of this formation are intensely silicified.

The Mesozoic Formation is intruded by andesite, dacite, diorite, granite porphyry, syenitic porphyry and gabbro.

(2) Altos de Pica Formation (Upper Tertiary to Lower Quaternary) (TQau)

The Formation is divided into three (3) continental sedimentary members, distinguished by the numbers 1, 3 and 5, and two (2) members mainly composed of pyroclastic rocks, 2 and 4. The sequence of each members of Altos de Pica Formation in the type -locality is as follows:

Member 5 :	Dark to greenish grey and middle to fine sandstone, containing ventifact, showing cross-bedding (200 m in thickness).
Member 4 :	Pinkish orange-grey to white rhyolitic tuff (23 m in thickness).
Member 3 :	Yellowish middle to coarse sandstone, containing ventifact, showing cross-bedding (173 m in thickness).
Member 2 :	Pinkish orange and dark grey rhyolitic welded tuff (17 m in thickness).
Member 1 :	Yellowish brown conglomerate and middle to coarse sandstone, showing cross-bedding (322 m in thickness).

The Member 5 is easily differentiated from other members on the LANDSAT images and aerial photographs. The Member 5, TQau on the interpretation map, shows pinkish grey or dark grey color on LANDSAT images. The welded tuff of extensive distribution between Pica and Salar del Huasco corresponds to the Member 4.

(3) Recent (Upper Quaternary) Unit (Qf, Qe, Qal)

It consists of three (3) units, which are fan deposits, eolian deposits and alluvial deposits. Among these, fan deposits have a wide extent in Pampa del Tamarugal.

2) General Geological Structure of the Basin

The results of interpretations revealed the two (2) characteristics on the structure, which are the successional anticlinal structure with N-S trend and dense fractures developed in the welded tuff of Altos de Pica Formation.

Anticlinal structures can be observed at the low isolated mountains between the area from Tarapacá in the north to Challacollo in the south, where the Mesozoic rocks are exposed in parts (see Fig. B-III, 1.2). These structures are supposed to be successional from north to south with culminations and form a trap for the groundwater.

Fractures in the welded tuff show two (2) systems in NE-SW and N-S directions, as shown in Fig. B-III, 1.3. NE-SW system fractures are extended from Collacagua to Altos de Pica and N-S systems are located in the Altos de Pica. These fractures are thought to control the groundwater system and to be a pathway to lead water to Pica.

1.2.3 Hydrogeological Characteristics of Pampa del Tamarugal

Geology of Pampa del Tamarugal is classified into three (3) units from the hydrogeological point of view;

Recent Sediments
Altos de Pica Formation
Basement Rocks

Pampa del Tamarugal is a closed structural basin and is filled by the basin fill deposits and the Altos de Pica Formation which is formed by salty crust, sand, gravel, silt, clay, etc. Basement Rocks are mainly composed of the Mesozoic Formation, therefore, they are impermeable in general. The Altos de Pica Formation is seemed to be permeable considering its lithology. Principal aquifers are occurred in this formation which widely cover the basin. Lithology of the aquifers are mainly sand and gravel. The thickness of the deposits is generally less than 100 m in the north and increases toward the south reaching 700 m in Salar de Pintados.

The aquifers are recharged groundwater mainly from the quebradas flowing into the basin from the east. Channels of the quebradas are concentrated in the following areas as shown in Fig. B-III, 1.1;

(1) Huara area
(2) Pozo Almonte area
(3) The lower reaches of the Qda. de Chacarilla

Furthermore, the Altos de Pica formation supplies the groundwater through fissures and faults of ENE-WSW direction in Pica and Matilla area as mentioned in 1.2.2.

The groundwater flows gently from north to south (from Huara to Salar de Bellavista) after entering in the basin.

Since the extension of the aquifers is so wide (about 4,000 km^2), the influence of extraction of groundwater is quite small (Ref. Chapter 3, 3.2).

Fig. B-III, 1.7 shows geological structure and a schematic geological profile of Pica and Salar del Huasco area. In Pica area, the Altos de Pica Formation is thickly deposited in the eastern side of the rise of the Basement Rocks. As the Basement Rocks are impermeable, the groundwater flowing in the Altos de Pica Formation is dammed up and occurs as the springs in Pica area. The similar hydrogeological condition is recognized along the eastern side of the basin such as Mamiña and Camiña areas.

References

<1: Cuadrangulos "Pisagua y Zapiga", Carta Geologica de Chile (Escala 1: 100,000), 1962 for Instituto de Investigaciones Geologicas Chile by Carlos Galli Olivier y Robert J. Dingman.

<2: Cuadrangulos "Mamiña", Carta Geologica de Chile (Escala 1: 50,000), 1967 for Instituto de Investigaciones Geologicas Chile by Arturo Thomas N.

<3: Cuadrangulos "Juan de Morales", Carta Geologica de Chile (Escala 1: 50,000), 1968 for Instituto de Investigaciones Geologicas Chile by Carlos Galli Olivier.

<4 Cuadrangulos Pica, Alca, Matilla y Chacarilla, Carta Geologica de Chile (Escala 1: 50,000), 1962 for Instituto de Investigaciones Geologicas Chile by Carlos Galli Olivier y Robert J. Dingman.

<5: Hojas "Arica, Pisagua-Huara", Carta Magnetica de Chile (Escala 1: 250,000), 1983 by Servicio Nacional de Geologia y Mineria,

<6: Analisis Programa de Desarrollo de Empresa de Servicios Sanitarios de Tarapaca, February 1991 for ESSAT by Bustamante y Schudeck Ingenieros Consultores Ltda.

Table B-III, 1.1 Correlation of Strata(Pampa del Tamarugal)

<Correlación de Estaatos (Pampa del Tamarugal)>

AGE			ARICA PROVINCE	CAMARACA and AZAPA	PISAGUA and ZAPIGA	MAMIÑA	JUAN de MORALES	PICA, ALCA, MATILLA, CHACARILLA	QUILLAGUA	PAMPA DEL TAMARUGAL	PAMPA DEL TAMARUGAL
Author (Year)			Salas et al. (1966)	Tobar et al. (1968)	Ignacio Silva (1977)	Thomas (1967)	Galli (1968)	Galli and Dingman (1962)	Skarmeta and Marinovic (1981)	ENAP (1987)	JICA (1994)
CENOZOIC	QUATERNARY	Holocene	Volcanics	Recent Deposits	Recent Deposits	Recent Deposits	Recent Deposits	Recent Deposits	Recent Deposits	Recent Deposits	Recent Deposits
		Pleistocene	Concordia F. Huaylas F.	El Diablo F.	Gravel, Andesitic Clastics / Altos de Pica F.	Upper / Altos de Pica F.	Imagua M. / Altos de Pica F.	TQa 5 TQa4 TQa3 / Altos de Pica F.	Soledad F.	A B / El Loa Limestone / Fill Deposit of Pampa	Q4 Q3 Q2 Q1 / Upper (TQau) / Altos de Pica F.
	TERTIARY Neogene	P.	Oxaya F.	Oxaya F.	Ignimbrite, Riolites Gravel / Altos de Pica F.	Ignimbrite, Riolite Lower / Altos de Pica F.	Tambillo M. Sagasca M. / Altos de Pica F.	TQa2 TQa1 / Altos de Pica F.	El Loa F. Ichuno F.	C D E / Altos de Pica / Fill Deposit of Pampa	Lower (TQal) / Altos de Pica F.
		M.		Azapa F.							
	TERTIARY Paleogene	O.	Azapa F. Putani F.						Sichal F. Tambillo F.		
MESO-ZOIC			Lupica F. Sausin F. Arica F.	Atajaña F. Los Tarros F. Camaraca F.	(Intrusive) Huantajaya F. Caleta Ligate F. Of. Viz F.	Cerro Empexa F. Chacarilla F.	Cerro Empexa F. Chacarilla F. Duplija F.	Cerro Empexa F. Chacarilla F. Longacho F.	Arca F. Quinchamall F.	Pintados F.	Basement

(Note) : constructed by the JICA Study Team (1994).

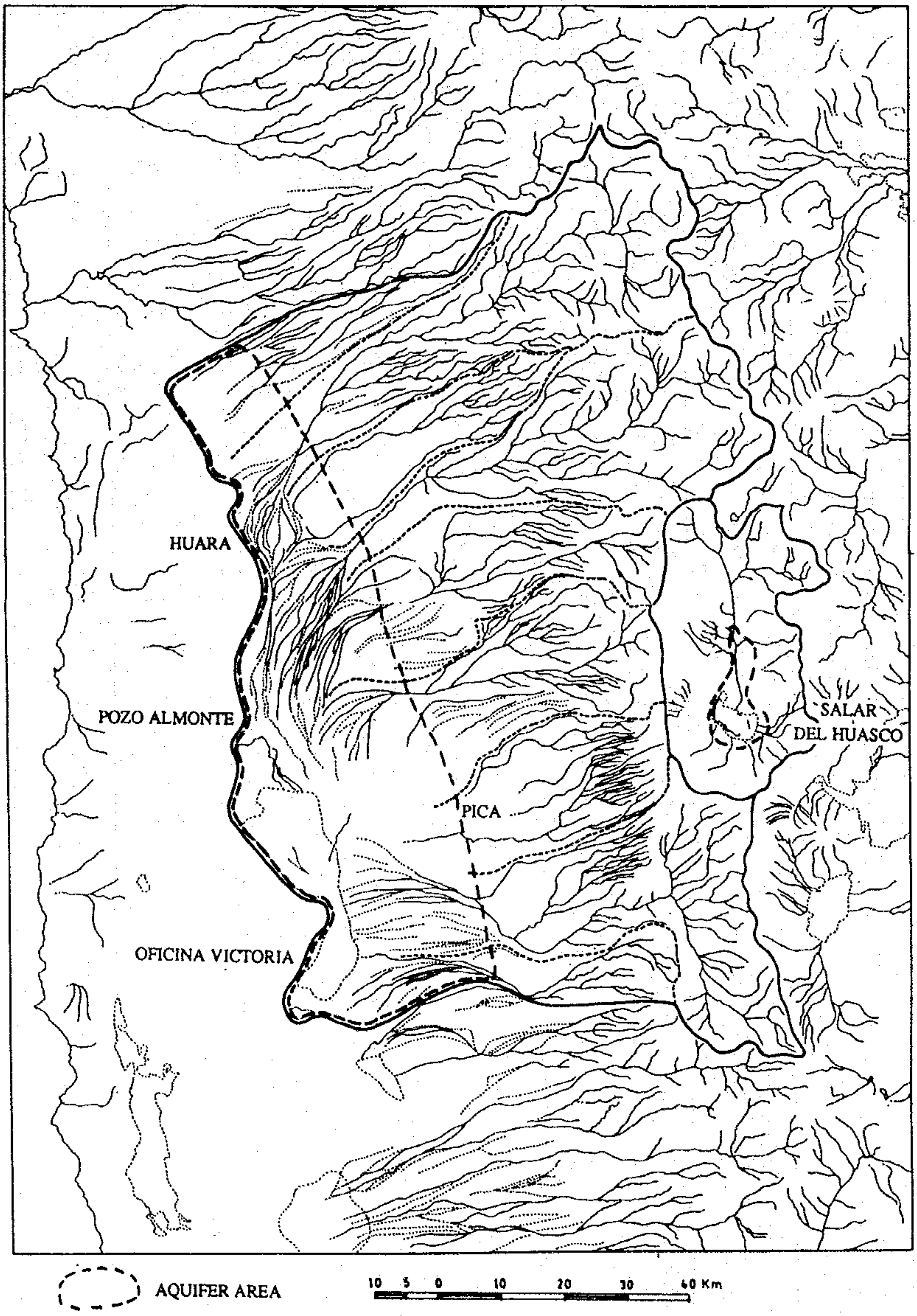

Fig. B-III, 1.1. River Network (Pampa del Tamarugal)

< *Red Hidrológica (Pampa del Tamarugal)* >

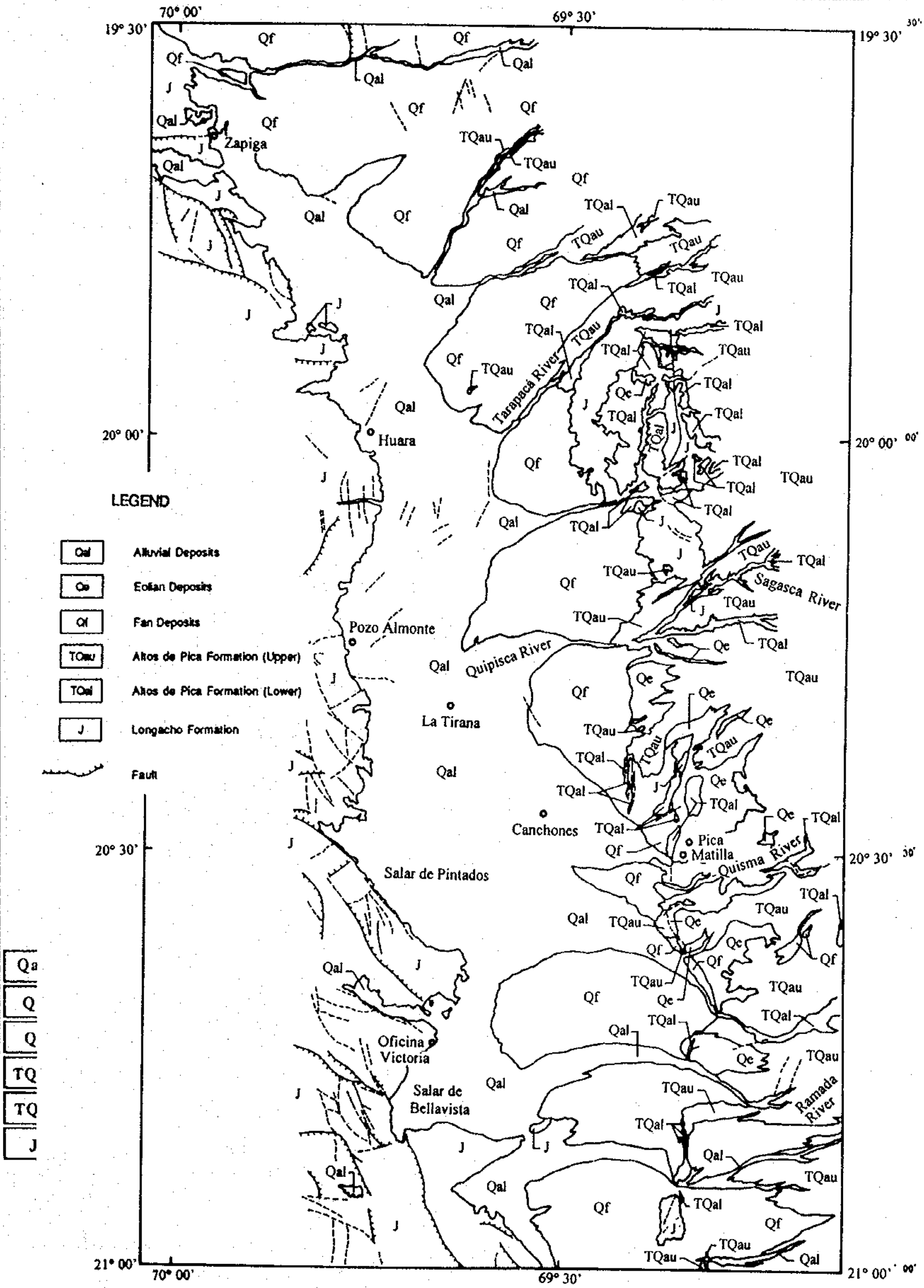

Fig. B-III. 1.2. Geological Map (Pampa del Tamarugal)

< Mapa Geológico (Pampa del Tamarugal)>

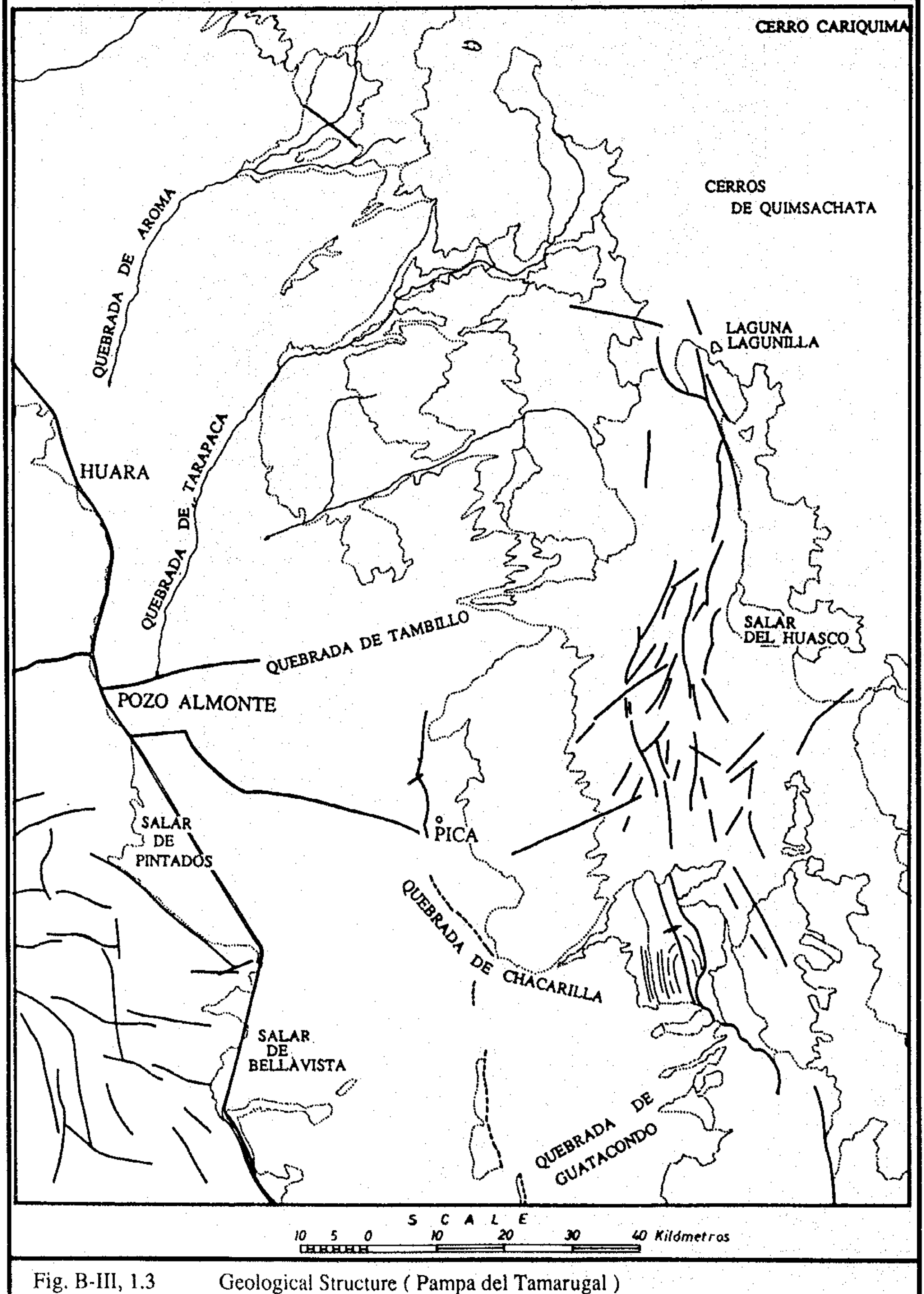

Fig. B-III, 1.3 Geological Structure (Pampa del Tamarugal)

< Estructura Geológica (Pampa del Tamarugal) >

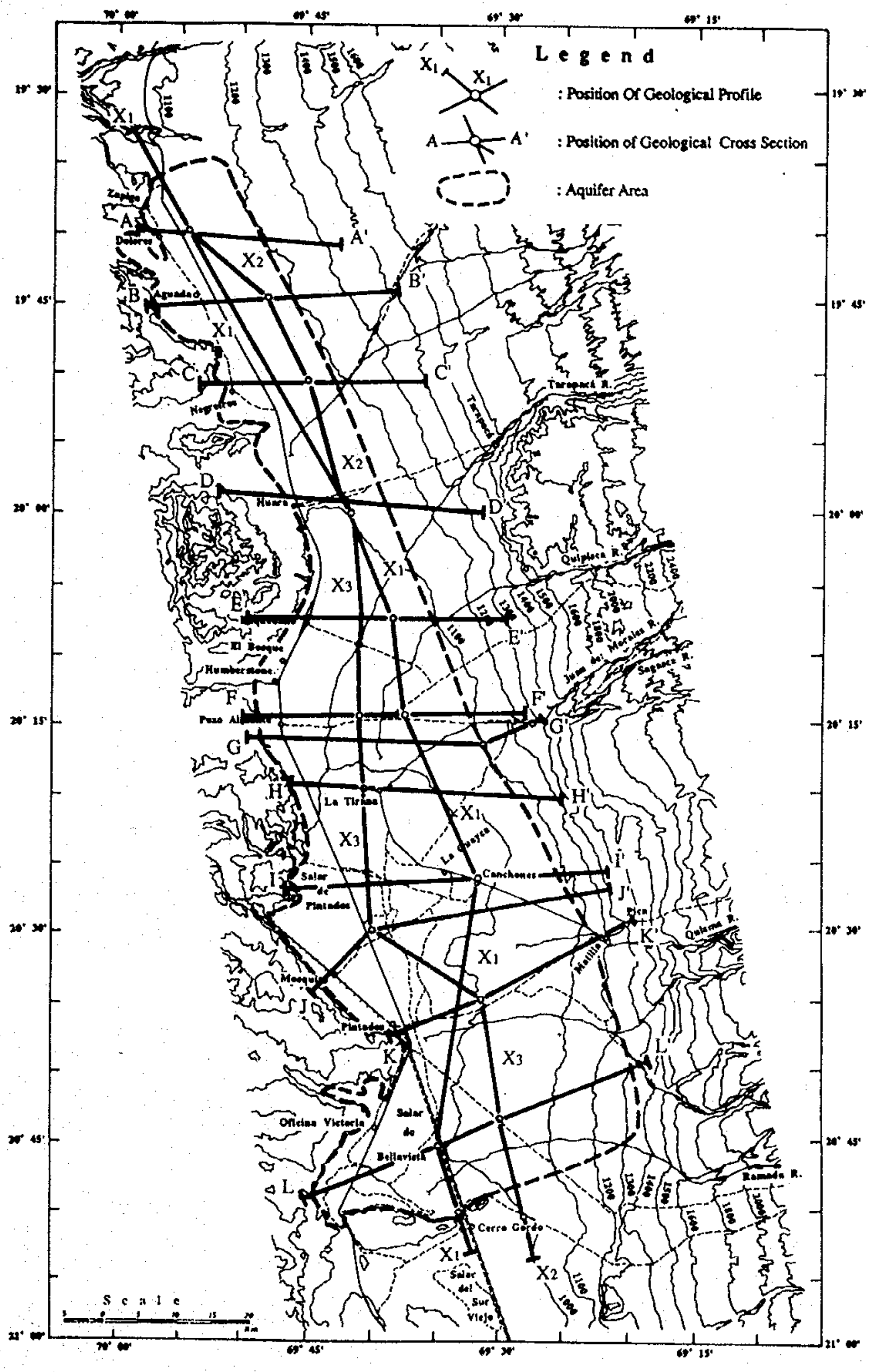

Fig. B-III, 1.4 Location of Geological Profile and Cross Section (Pampa del Tamarugal)

< *Ubicación de* Perfil Geológico y Sección Geológica Transversal (Pampa del Tamarugal) >

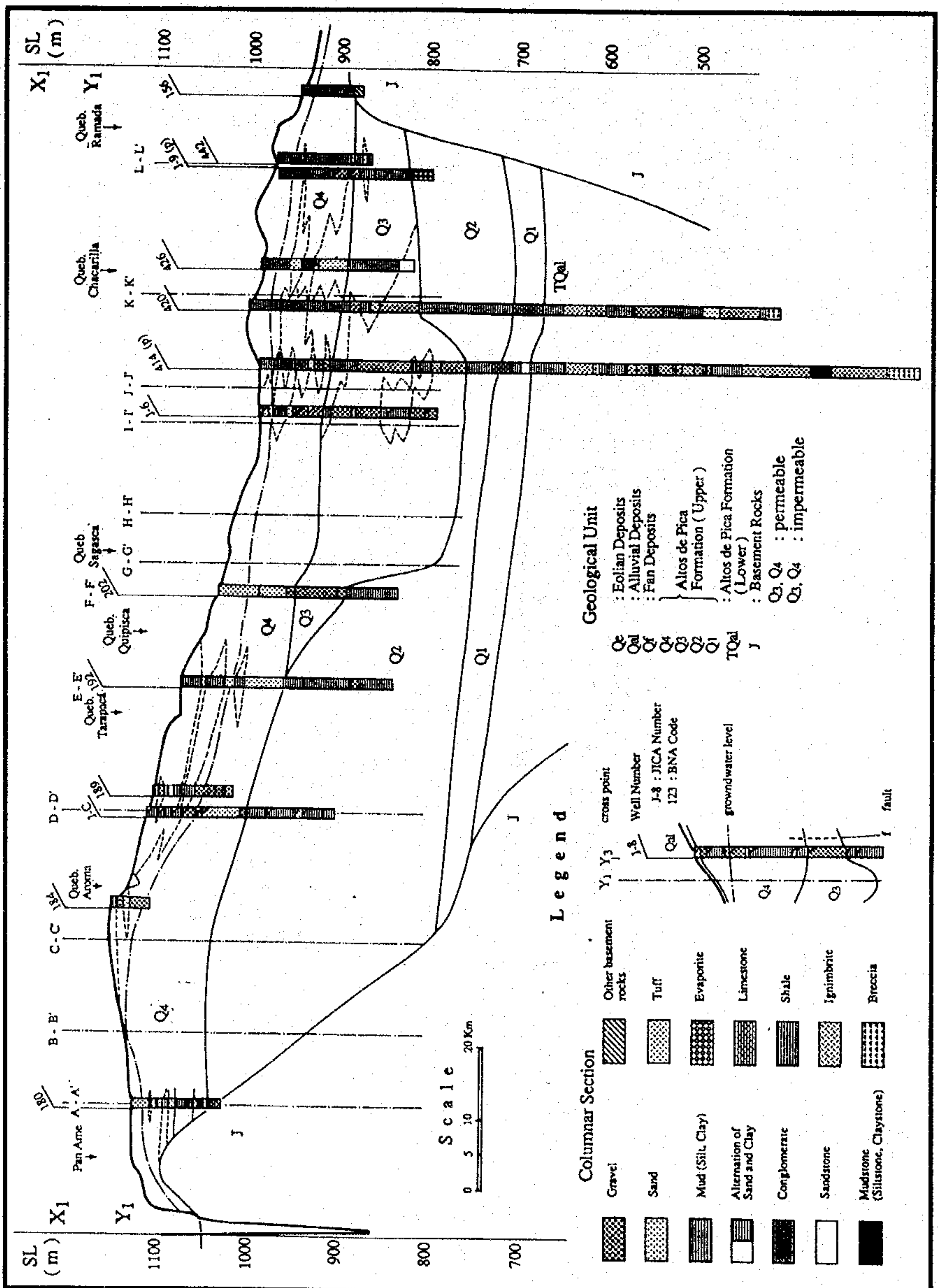

Fig. B-III, 1.5 (1) Geological Profile (Pampa del Tamarugal)

< Perfil Geológico (Pampa del Tamarugal)>

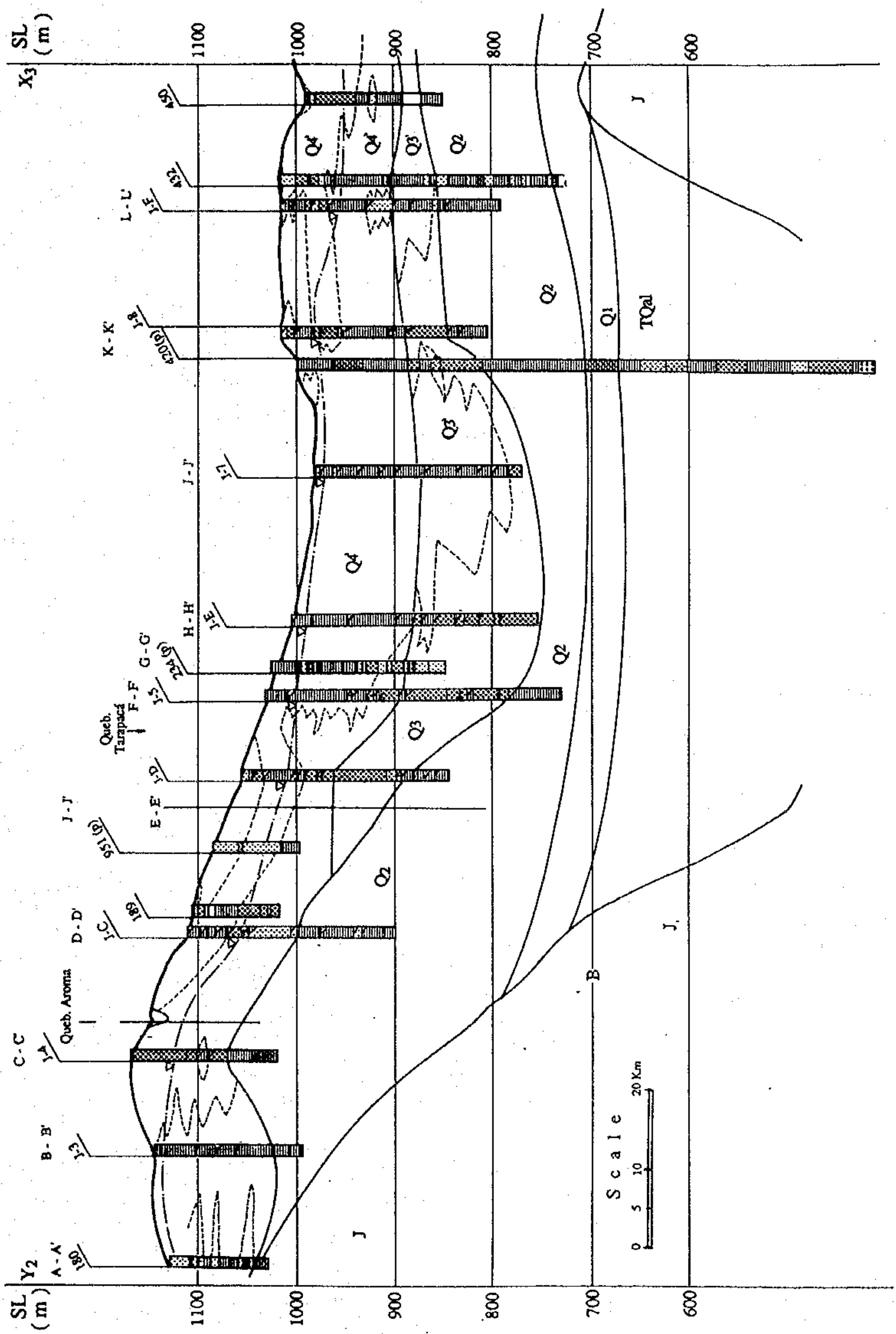

Fig. B-III, 1.5 (2) Geological Profile (Pampa del Tamarugal)

< Perfil Geológico (Pampa del Tamarugal)>

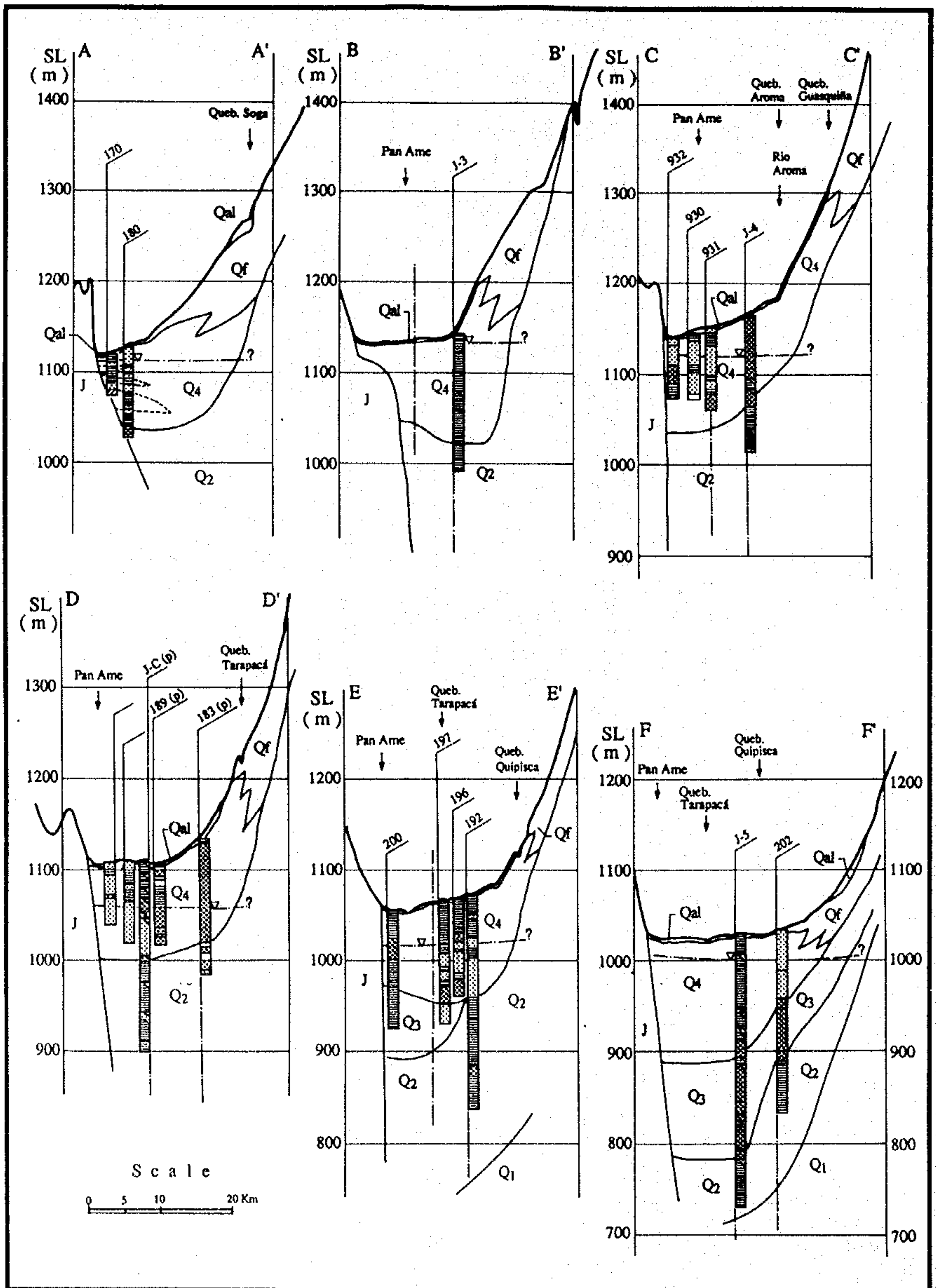

Fig. B-III, 1.6 (1) Geological Cross Section (Pampa del Tamarugal)

< Sección Geológica Transversal (Pampa del Tamarugal)>

THE STUDY ON THE DEVELOPMENT OF WATER RESOURCES IN NORTHERN CHILE | JICA

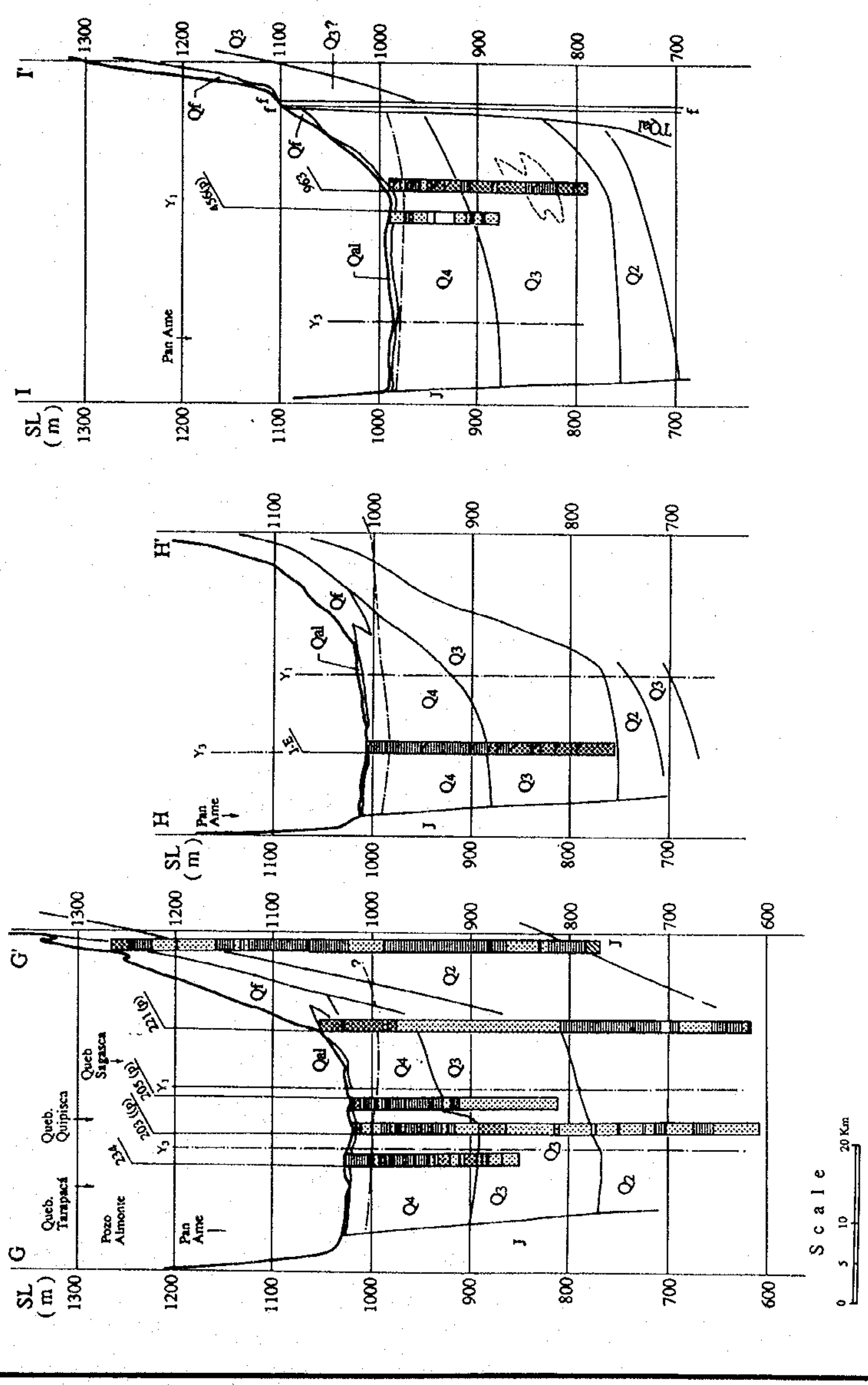

Fig. B-III, 1.6 (2) Geological Cross Section (Pampa del Tamarugal)

< Sección Geológica Transversal (Pampa del Tamarugal)>

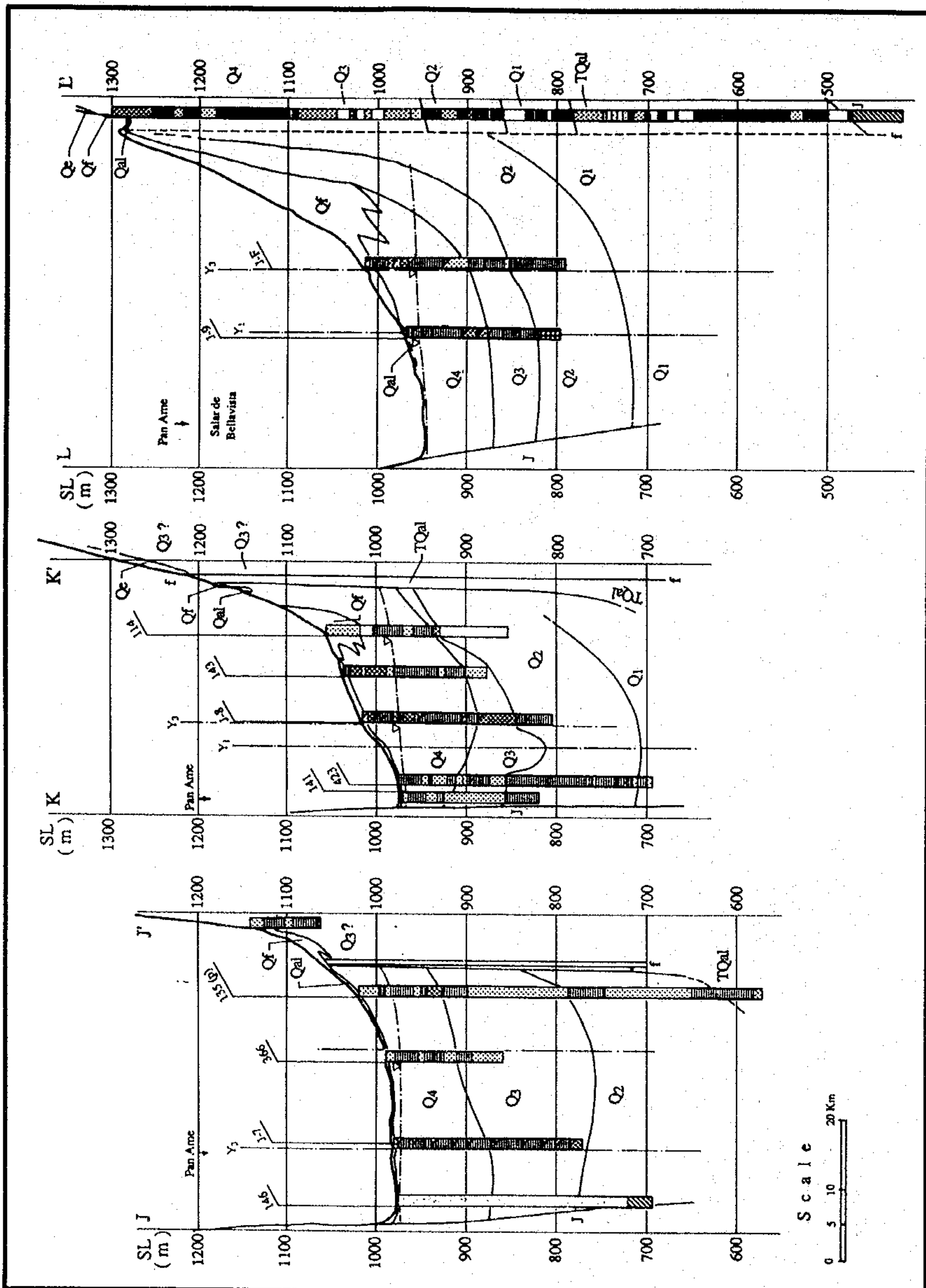

Fig. B-III, 1.6 (3) Geological Cross Section (Pampa del Tamarugal)

< Sección Geológica Transversal (Pampa del Tamarugal)>

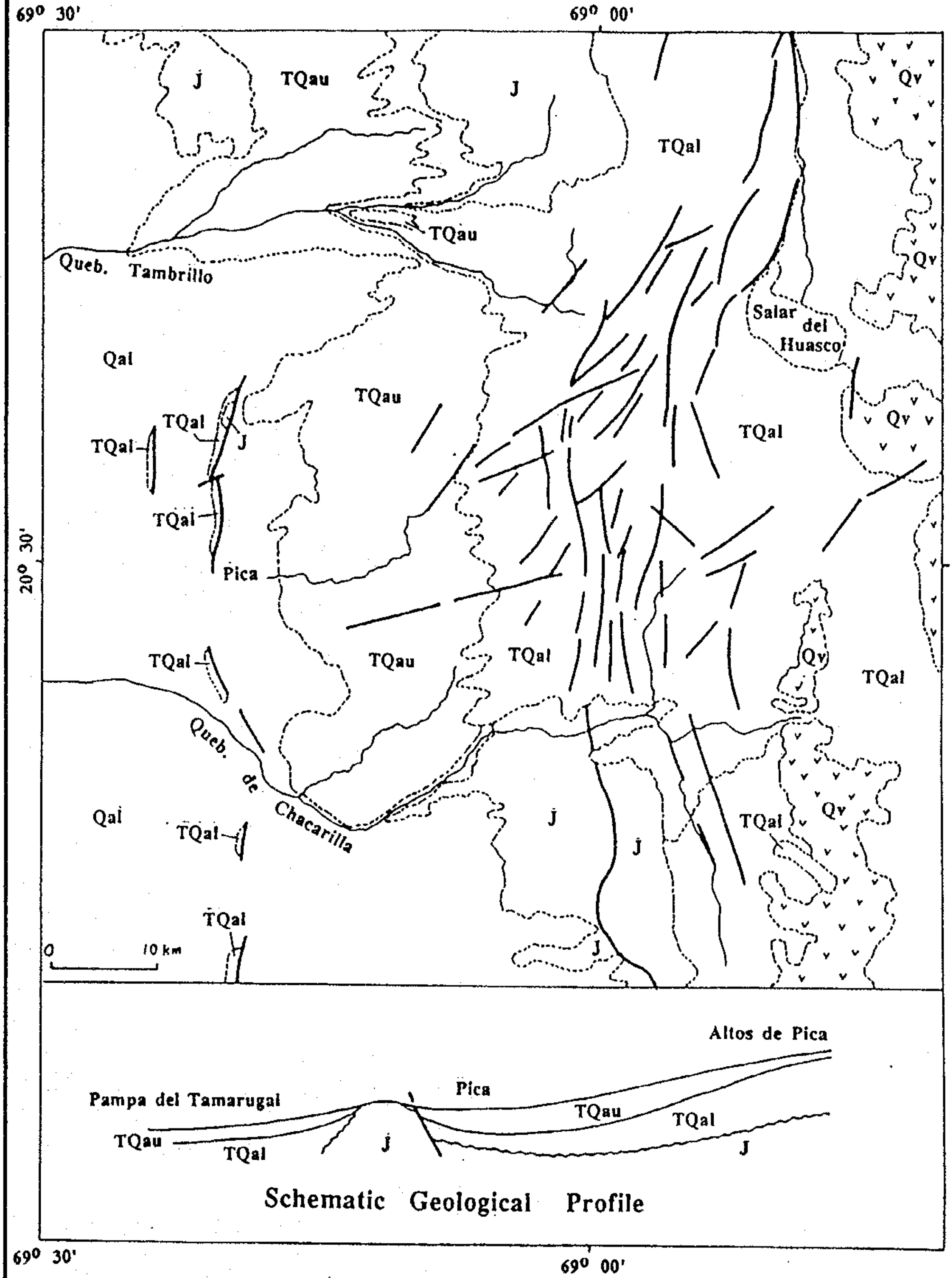

Fig. B-III, 1.7 Geological Structure (Pica and Huasco)

<Estructura Geológico (Pica y Huasco)>

Chapter II. AQUIFER OF PAMPA DEL TAMARUGAL BASIN

2.1 Inventory of Existing Wells

The inventory of existing wells was established by the JICA Study Team based on the same method mentioned in Clause 2.1 of Chapter II in B-I reviewing the following reports:

(1) Análisis Crítico de la Red de Medición de Niveles de Agua Subterránea I Región, October 1987 for DGA by Alamos y Peralta Ingenieros Consultores Ltda.

(2) Modelo de Simulación Hidrogeológica de la Pampa del Tamarugal, 1988 for DGA by Universidad de Chile.

The wells in Pampa del Tamarugal are given the numbers based on both the BNA code and the CORFO code (1975). Once the DGA code and the CORFO code (1969) were used. The CORFO code (1963) was improved to the CORFO code (1975) and the DGA code was not applied afterward.

In this report, the wells are expressed by the three (3) digits of consecutive numbers on the basis of the BNA code like "188".

The number of wells (sondajes) comes to 458 in the basin, consisting of 256 wells for research including observatory wells, five (5) wells for the industrial use, 77 wells for the potable water supply, 35 wells for the irrigation, 49 wells for the mining and 36 wells have no data. Out of 458 wells, total number of 68 wells are already abandoned. In addition to this, there are many dug wells in the basin, however, no data is available.

381 wells are already registered to BNA/CORFO(1975) codes (Table B-III, 2.1 (1)). 63 wells were drilled in Pampa del Tamarugal to apply the water right for mainly mining and irrigation use in the second half of 1980s. Those 63 wells' data are collected by DGA. Most of these wells has not yet registered to neither BNA nor CORFO (1975). Therefore, temporary numbers (BNA/CORFO codes) were given to the wells for the convenience (Table B-III, 2.1 (2)). Accordingly, a total number of 458 wells were listed in the Well Lists in Pampa del Tamarugal; 395 wells in Table B-III, 2.1 (1) and 63 wells in 2.1 (2). For those locations, see Fig. B-III, 2.1 (1) and 2.1 (2).

As for the date of well construction, 285 data are available. The number of well construction and the increase of wells are shown in Fig. B-III, 2.2. The wells have been constructed every year since 1950. Significant increase suddenly occurred during three (3) years; 1965, 1966 and 1967. Totally 175 wells were constructed in this period; most wells are for water level observation. The number of wells exceeded 200 during 1950 and 1967. A few wells were constructed in 1970s. In 1980s, number of well construction increased for the application of water right as mentioned above. Even in 1990s, well construction have been continued.

Depth of well is shown in Fig. B-III, 2.3. 235 wells are less than 100 m in depth. 56 wells are in a depth between 100 and 200 m and rest 49 wells are penetrated more than 200 m. This means that most wells are tapping groundwater from the shallower aquifers.

2.2 Existing Boring Data

2.2.1 Boring Logs

More than 400 boring logs are collected from the existing wells (both registered wells and new wells for application of water right). These logs were interpreted from the hydrogeological point of view and geostratigraphic columns are constructed which are attached to the Well Inventory (see, Data Book).

2.2.2 Pumping Test

The results of pumping test are shown in Well List (Table B-III, 2.1 (1) and 2.1 (2). Aquifer constants are estimated only for 36 wells and 40 data show only draw down and pumping rate. Specific yield (Sy) was calculated based on the 40 pumping data.

2.3 Supplementary Geological Survey

The following geological surveys were executed by the JICA Study Team to supplement the existing geological data. The survey locations are shown in Fig. B-III, 2.4.

a) Electromagnetic Survey — 100 survey points (8 lines)

b) Boring Survey

(a) Drilling

Test well drilling — 4 wells

Observation well drilling	7 wells
(b) Pumping Test	11 wells
c) Water Quality Analysis	11 wells (JICA wells)
d) C-14 Analysis	5 wells

2.3.1 Electromagnetic (TEM) Survey

1) Survey Area

Transient Electro Magnetic (TEM) survey was conducted in Pampa del Tamarugal area as shown in Fig. B-III, 2.4. Eight (8) TEM lines were set perpendicular to the main axis of the Precordillera range. A total of 100 stations were set at an interval of 2,000 m each as shown below.

Outline of TEM Survey

	Profile	Stations	Station Interval
	PT-1	14	2,000 m
	PT-2	9	2,000 m
	PT-3	28	2,000 m
	PT-4	14	2,000 m
	PT-5	8	2,000 m
	PT-6	15	2,000 m
	PT-7	4	2,000 m
	PT-8	8	2,000 m
Total		100	

2) Methodology of Survey

For the details of the methodology, see B-II, Section 2.3.1 of Chapter II.

3) Survey Results

Typical apparent resistivity curves in the area are shown in Fig. B-III, 2.5. Geoelectrical profiles are made by analyzing the apparent resistivity curve of each station. The geoelectrical profiles along the line PT-1 to PT-8 are shown in Fig. B-III, 2.6. According to the well logging (long normal) data of three (3) existing wells (Pintados No. 1, No. 2 and Dolores No. 1), the resistivity value of aquifer with no contamination is in the range of 10 to 40 Ω-m. Among these wells, Pintados No. 1 is located near station No. 5 of PT-8. Resistivity calibration was made by using the logging data of Pintados No. 1 as shown in Fig. B-III, 2.7.

The resistivity structure of the surveyed area is classified as 3 to 4 layers with stratiform structure. The geophysical characteristics of each layer are summarized as follows;

(1) The first layer (10 m to 120 m thick) shows a resistivity range of 28 to 1,400 Ω-m. The layer is distributed in the whole area. In the area, at stations No. 1 to 3 and 6 to 8 of PT-5, station No.13 to 16, 21 to 23 and 25 to 28 of PT-3, the layer shows a relatively low resistivity (28 to 100 Ω-m). This is probably due to the wet land conditions by irrigation water.

Resistivity of the layer at stations 11 to 13 of PT-1 and all stations of PT-7 is extremely high (more than 1,000 Ω-m). This is probably due to the hard and dry land conditions. In general, in the eastern part of the area, the layer shows higher resistivity than the western part. This resistivity range in the eastern part is between 200 and 1,200 Ω-m. The layer thickness gradually increases towards southeast.

The depth of the boundary between the first and second layer is almost coincident with the water level of wells in the area.

(2) The second layer (between 20 and 400 m thick) shows a resistivity range of approximately 10 to 50 Ω-m. The layer is distributed over almost all the stations of profiles. According to the resistivity logging data of the existing well of Pintados No. 1 (located near the station No. 5 on profile PT-8), this layer is considered as a expected aquifer. The layer thickness gradually increases from 100 m (PT-1) to 400 m (PT-7). However, it rapidly decrease from 200 m (PT-8) to less than 100 m (PT-4).

(3) The third layer (more than 50m thick) shows a resistivity value lower than 10 Ω-m. The layer is distributed over the whole area. The layer is presumed to have a groundwater potential of the same degree throughout the area. However, its low resistivity indicates that the layer is contaminated by salty water. The depth of the layer gradually increases to southwards.

(4) The fourth layer shows a resistivity value approximately higher than 100 Ω-m. The layer is distributed in the northern and western part of the area. According to the existing data such as the well logging of Dolores No. 1 and a gravity map of the area, the layer is considered as a geological basement composed of high density rocks. Thus, the layer is classified as the impermeable basement.

Lateral discontinuities of resistivity exist between station No. 4 and No. 5 of PT-2, station No. 4 and No. 5 of PT-6, station No. 2 and No. 3 of PT-3, and station No. 1 and No. 2 of PT-7. These discontinuities may be coincident with geological boundaries such as faults of fracture zones.

4) Interpretation with Boring Log

Geoelectric profiles, described in the above section, are analyzed comparing with the boring logs. Fig B-III, 2.3.8 to 2.3.15 show analyzed resistivity profiles. Results of interpretation for each resistivity profile are summarized as follows.

(1) Profile PT-1 (see, Fig. B-III, 2.8)

The profile is analyzed as a four (4) layered model except the area between stations No. 11 to 13. In this area, the first layer is divided into two (2) parts; the upper shows high resistivity (1,100 - 1,300 Ω-m) because of dry land, and the lower shows a resistivity range of 96 - 300 Ω-m. The second layer shows a resistivity range of 8.1 to 27 Ω-m and is considered as a aquifer. The well No. J-C is located at the station No. 4. Third layer is distributed at stations No. 5 to 14. Resistivity range shows less than 8.7 Ω-m. The boundary with the fourth layer is unclear. The summary of the interpretation are shown in the following table.

(PT-1)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 - 90 0 -40	1100 - 1300 96 -300	not confirmed sandy clay	dry surface surface deposits
2 nd	40 - 130	8.1 -27	clayey gravel at upper, clayey sand at middle, clay at lower	expected aquifer
3 nd	-	<8.7	not confirmed	contaminated aquifer
4 th	>130	>100	sandy clay	impermeable bed

(2) Profile PT-2 (see, Fig. B-III, 2.9)

A four (4) layered model is applied to this profile. The first layer shows a high resistivity range between 94 and 440 Ω-m due to dry condition. The second layer and shows a resistivity range of 7.9 to 14 Ω-m is considered as a aquifer. Lateral discontinuity of resistivity was observed between stations No. 4 and 5; Crossing this lateral discontinuity, two (2) different ranges resistivity were observed. The eastern side of the discontinuity shows a low range of less than 6.5 Ω-m and the western side indicates a high range of more than 100 Ω-m. The well No. J-D was drilled on this profile. Results of the interpretation are summarized in the following table.

(PT-2)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 -30	94 -440	mainly clayey gravel (sandy silt at top surface)	surface deposits
2 nd	30 - 160	7.9 -14	clayey gravel to clean gravel	expected aquifer
3 rd	-	<6.5	not confirmed	contaminated aquifer
4 th	>160	>100	clayey gravel	impermeable bed

(3) Profile PT-3 (see, Fig. B-III, 2.10)

The profile is analyzed as a three (3) layered model. The first layer shows a high resistivity range due to the dry surface condition and is correlated with the surface deposits. The second layer shows a resistivity range of 9.1 to 19 Ω-m and is considered to be an expected aquifer. The third layer shows a low resistivity range, therefore, it is corresponds to a contaminated aquifer.

The well No. J-E and J-6 are located at stations No. 5 and 6 respectively.

(PT-3)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 - 50	77 - 360	sandy to gravelly clay	surface deposits
2 nd	50 - 240	9.1 - 19	gravelly clay at upper, clayey gravel at lower	expected aquifer
3 rd	>240	<6.7	not confirmed	contaminated aquifer

(4) Profile PT-4 (see, Fig. B-III, 2.11)

A three (3) layered model was applied on this profile. However, the third layer is intercalated with a higher resistivity layer.

The first layer shows high resistivity range due to the dry condition and is correlated with the surface deposits. The second layer is considered as a prospective aquifer from its resistivity. The third layer is also considered as an aquifer as well as the second layer. In the eastern side of the station No. 5, the third layer contains a thick layer of higher resistivity range which is the fourth layer.

Well No. J-F is located at station No. 8.

(PT-4)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 - 80	690 -1000	gravelly clay at upper sandy clay at lower	surface deposits
2 nd	80 -150	7.3 - 16	clayey sand at upper sandy clay at lower	expected aquifer
4 th	150 -300	9.2 - 13	not confirmed	expected aquifer
3 rd	>150	<6.6	sandy clay	contaminated aquifer

(5) Profile PT-5 (see Fig. B-III, 2.12)

The profile is analyzed as a four (4) layered model. The first layer is of high resistivity range. The first layer is distributed in a restricted area between stations No. 3 and 6 which are at the central part of the profile. The second layer shows a resistivity range of 52 to 70 Ω-m and is considered as a aquifer. The third layer shows a low resistivity range, therefore, is considered to be a impermeable layer.

The well No. J-4 is located on the station No. 4.

(PT-5)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 - 30	110 -120	gravel	surface deposits
2 nd	30 - 100	52 - 70	gravel at upper part clayey gravel at lower	expected aquifer
3 rd	100 - 160	6.3 -9.7	clayey gravel at upper conglomerate at lower	contaminated aquifer
4 th	>160	>100	not confirmed	impermeable bed

(6) Profile PT-6 (see, Fig. B-III, 2.13)

The profile is analyzed as a three (3) layered model. The first layer shows a high resistivity range and is correlated with the dry surface deposits. The second layer is considered as a aquifer. However, the layer ends at the west of station No. 5. The third layer is also ends at the same place as the second layer. The layer shows a low resistivity range. The fourth layer is distributed in the western side of the profile,showing a high resistivity range, therfore, it is considered as the impermeable bed.

Well No. J-5 is located at station No. 6.

(PT-6)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 -80	690 -1,200	sandy clay	surface deposits
2 nd	80 - 210	10 - 17	clayey gravel to gravel	expected aquifer
3 rd	>210	<7.5	gravel at upper sandy clay at lower	contaminated aquifer
4 th	-	>100	not confirmed	impermeable bed

(7) Profile PT-7 (see, Fig. B-III, 2.14)

A three (3) layered model is established except the station No.1. The first layer shows a high resistivity range and corresponds to the dry surface deposits. The second layer shows a resistivity range of 7.4 to 9.5 Ω-m and is considered as a aquifer. The third aquifer is of low resistivity range and is considered to be a contaminated by the salty water. The third layer is not distributed at the station No. 1; The fourth layer appears at the station instead of the first layer. The fourth layer shows a high resistivity range. It is probably due to the distribution of the basement rocks.

Well No. J-7 is located at the survey point No.4.

(PT-7)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 -10	1,000 -1,400	sandy clay	surface deposits
2 nd	10 - 380	7.4 - 9.5	sandy clay to gravelly clay, gravel in some parts	expected aquifer
3 rd	>380	2.0 - 2.6	not confirmed	contaminated aquifer
4 th	-	1250	not confirmed	impermeable bed

(8) Profile PT-8 (see, Fig. B-III, 2.15)

In this profile, a five (5) layered model is applied. The first layer shows a high resistivity range which is corresponds to the surface deposits. The second layer is considered as a aquifer, however, it becomes a layer of low resistivity range. Therefore, the second aquifer is considered to be contaminated by the salty water in the western part of the profile. The third layer and fourth layer are considered as a aquifers as well as the second layer.

The well No. J-8 is drilled on this profile.

(PT-8)

Layer	Depth (m.bgl)	Resistivity Range(Ω-m)	Lithology	Interpretation
1 st	0 -30	920 - 950	sand and gravel at surface clay at lower	surface deposits
2 nd		25 - 47	alternation of clay and gravel	expected aquifer contaminated in the west
3 rd	30 - 320	8.9 - 9.3		expected aquifer
4 th		14 -30		expected aquifer
5 th	>320	<6.6	not confirmed	contaminated aquifer

2.3.2 Boring Test

1) Location and Depth of Each Well

Four (4) test wells (J-C, J-D, J-E and J-F) and seven (7) observation wells (J-3, J-4, J-5, J-6, J-7, J-8 and J-9) were placed along the TEM survey line (see, Fig. B-III, 2.3.1). Location, drilling depth and casing size of each well are summarized as follows.

Well No.	Location	Latitude	Longitude	Elevation (m.msl)	Casing (inch)	Depth (m.bgl)
J-C	Huara	19° 59' 05.7"	69° 42' 09.8"	1,109.711	8-5/8"	209
J-D	Baquedano	20° 09' 54.2"	69° 41' 10.4"	1,058,019	8-5/8"	210
J-E	La Tirana	20° 19' 53.2"	69° 41' 18.6"	1,009.990	8-5/8"	250
J-F	Ramada	20° 43' 53.2"	69° 30' 17.3"	1,016.128	8-5/8"	200
J-3	Aguada	19° 45' 09.1"	69° 49' 15.3"	1,135.588	5-1/2"	150
J-4	Negreiros	19° 51' 37.2"	69° 44' 51.8"	1,169.267	5-1/2"	150
J-5	Pozo Almonte	20° 15' 10.7"	69° 41' 26.1"	1,029.330	5-1/2"	300
J-6	Canchones	20° 26' 40.9"	69° 31' 15.7"	993.763	5-1/2"	200
J-7	Conaf	20° 30' 44.4"	69° 39' 56.9"	982.752	5-1/2"	210
J-8	Pintados	20° 35' 37.7"	69° 31' 08.2"	1,016.012	5-1/2"	210
J-9	Oficina Victoria	20° 45' 12.6"	69° 35' 26.3"	971.103	5-1/2"	172

2) Methodology of Well Construction

For the details of the methodology, see B-II, section 2.3.2 of Chapter II

3) Results of Boring Test

The well data for each well, lithological column, casing design, well logging and drilling rate, are shown in Fig. B-III, 2.16 to 2.19 for the test well and Fig. B-III, 2.20 to 2.26 for the observation well with scale of 1:1000.

(1) Well No. J-C (see, Fig. B-III, 2.16)

i) Lithology

The well was drilled up to 209m depth. The units, Q4 and Q2 of the Quaternary Upper Altos de Pica Formation is observed. Based on the results of geophysical logging and lithology observed, the following five (5) layers are classified.

(J-C)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 40	Shallow Aquifer	sandy to silty clay		
2 nd	40 - 100	Deep Aquifer	clayey gravel, clayey sand	Q4	Altos de Pica
3 rd	100 - 160	Impermeable Intercalation	clay, sandy clay	Q2	
4 th	160 -197	Deep Aquifer	clayey sand		
5 th	197 - 209	Impermeable Bed	clay,		

ii) Well Logging

Spontaneous Potential (SP) indicates a range of 800 to 920 mv. A relative basement line (relative 0 line) was decided as 900 mv. The resistivity indicates a high range of 10 - 100 Ω-m at surface. The reversal relation of long and short normal resistivity is appeared at the surface. On the other hand, short resistivity range of 10 to 30 Ω-m is indicated at depth below 40m.

iii) Determination of Casing Design

In order to determine the position of screen pipes, following interpretations are made by using the lithological and well logging data. For the details of casing design, see, Fig. B-III, 2.16.

a) 1 st layer (Shallow Aquifer)

The layer is composed mainly of sandy clay, which is considered as less permeable in normal case. In contrary to this, the value of SP indicates that the layer is permeable. Moreover, temperature curve shows a groundwater flow at the depth from 20 to 30m. Resistivity values show a contamination by the salty water. Therefore, the layer is classified as a shallow aquifer, however, fresh water yielding can not be expected.

b) 2 nd layer (Deep Aquifer)

All the geophysical logging data that indicate a range which can be considered as aquifer, except depth from 73 to 80m. This sequence (73 to

80m) shows a relatively high gamma ray range of 50 - 110 cps. Therefore, it is interpreted as a small scale impermeable intercalation.

The screen pipes were installed in this layer except the impermeable parts. The positions of the screen are at depths from 43.01 to 73.01m and 79.01 to 97.02m.

c) 3 rd layer (Impermeable Bed)

The layer is composed mainly of clay and sandy clay. The value of the SP exceeds relative basement line of 900 mv and gamma ray shows a rather high range of 40 to 80 cps. Blank casing pipes were installed in this layer.

d) 4 th layer (Deep Aquifer)

The layer consists mainly of clayey sand. The value of SP indicates approximately 900 mv. However, other logging data show the layer is permeable; The resistivity value is a range of 10 - 25 Ω-m, the gamma ray is less than 40 cps and temperature gently increases toward the bottom. Based on these characteristics, the layer is classified as a aquifer. Screen pipes were installed in this layer at the depth from 163.02 to 192.99m.

e) 5 th layer (Impermeable Bed)

The layer is composed of clay. Sp value and the gamma ray value also show the layer is impermeable, therefore, blank casing pipes were installed in this layer.

(2) Well No. J-D (see, Fig. B-III, 2.17)

i) Lithology

The total drilling depth is 210m. Based on the results of geophysical logging and lithological observation, following four (4) layers are classified. They are correlated with Q4, Q3 and Q2 of the Quaternary Upper Altos de Pica Formation.

(J-D)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 49	Surface Deposits	sandy silt, gravelly clay	Q4	Altos de Pica
2 nd	49 - 98	Shallow Aquifer	alternation of clayey gravel and gravelly clay		
3 rd	98 - 161	Deep Aquifer	clayey gravel, gravel	Q3	
4 th	161 - 210	Deep Aquifer	gravelly clay, clayey gravel	Q2	

ii) Well Logging

Spontaneous potential shows a range of 850 to 1000 mv. Considering the lithological, the relative basement line is estimated as 950 mv. Resistivity indicates a range of 40 to 80 Ω-m up to the depth of 30m from the surface. The resistivity of short range is 10 to 30 Ω-m from the depth of 50m to the bottom. Temperature increases from the surface to the 50m of depth and is in a range 23 to 28°C below the depth of 50m.

iii) Determination of Casing Design.

Casing design is decided as shown in Fig. B-III, 2.17, based on the following interpretation.

a) 1 st layer (Surface Deposits)

The layer consists mainly of gravelly clay except the surface which is formed of sandy silt. The layer is considered as dry because of the high value of resistivity and gamma ray.

b) 2 nd layer (Shallow Aquifer)

The ranges of all the geophysical logging indicate that the layer is aquifer, except the depth from 90 to 95m where the value of gamma ray is high.

The screen pipes were installed in this layer in two (2) parts, one is at the depth from 53.89 to 59.91m and the other is from 71.91 to 89.93m.

c) 3 rd layer (Deep Aquifer)

Geophysical characteristics of the layer are similar to the 2nd layer (Shallow Aquifer). Geological unit of the layer was classified as Q3 of the Altos de Pica Formation.

The screen pipes were installed in this layer at depths from 101.94 to 150m and from 156 to 162m.

d) 4 th layer (Deep Aquifer)

According to the lithological column, more clayey materials are observed compared with the other layers. However, the layer is classified as the lower part of the deep aquifer considering the following reasons.

- The resistivity is in a range of 7 to 20 Ω-m.
- The gamma ray shows a low range of cps value.

The screen pipes were installed at depths from 174 to 180.01m and 186.01 to 198.02m.

(3) Well No. J-E (see, Fig. B-III, 2.18)

i) Lithology

The well was drilled to a depth of 250m. On the basis of the lithology observed and well logging data, following two (2) layers are classified. They are Q4 and Q3 of the Quaternary Upper Altos de Pica Formation.

(J-E)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 70	Surface Deposits	sandy to gravelly clay	Q4	Altos de Pica
2 nd	70 - 250	Aquifer	gravelly clay at upper, clayey gravel at lower	Q4 Q3	

ii) Well Logging

The range of the resistivity is rather low (10 - 30 Ω-m) except at the surface. The relative basement line of the spontaneous potential is established as 950 mv based on the value of resistivity and lithology observed. Generally, lithology of the whole sequence is composed of gravelly clay to clayey gravel, however, ratio of gravel content gradually increases toward the bottom.

According to the interpretation of SP, permeability is higher at the bottom and lower at the surface. It is in well coincident with the lithological observation. Groundwater flow is observed on the temperature curve at the surface.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.18, based on the following interpretation.

a) 1 st layer (Surface Deposits)

The layer consists of sandy clay up to the depth of 20m from the surface, and gravelly clay in the deeper part. The SP value exceeding 950 mv indicates that the layer is impermeable. Water flow is observed on the temperature curve. However, the resistivity values of long and short normal indicate that the layer is contaminated. Considering these situation, the layer is correlated with the surface deposits with low groundwater potential. Yield of fresh water is not expected. Hence, blank casing pipes were installed.

b) 2 nd Layer (Aquifer)

The layer is composed mainly of clayey gravel throughout the whole sequence. The ratio of gravel amount is gradually increases toward the bottom. The curve of SP and resistivity is in well coincidence with this change. The resistivity range, 10 to 20 Ω-m shows that the layer is a expected aquifer.

The screen pipes were installed in this layer at eight (8) separated positions, where much gravel is confirmed. For the details of casing design, see Fig. B-III, 2.18.

(4) Well No. J-F (see, Fig. B-III, 2.19)

i) Lithology

The well was drilled up to 224m depth. Three (3) lithological units of Q4, Q3 and Q2 of the Quaternary Altos de Pica formation are confirmed. Following three (3) layers are classified by the interpretation of lithology observed and geophysical logging.

(J-F)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 47	Surface Deposits	clay, clayey gravel and clayey sand	Q4	Altos de Pica
2 nd	47 - 160	Shallow Aquifer	sandy, gravelly clay, clayey sand	Q4 Q3	
3 rd	160 - 224	Deep Aquifer	sandy clay	Q3	

ii) Well Logging

Gamma ray indicates homogeneous unchanged range of 50 - 70 cps at all sequence, however, clay layer is well identified by the particular value which exceeds 100 cps. Considering lithology and resistivity curve, a line of 900 mv is estimated as a relative basement line of spontaneous potential. Temperature curve indicates gentle and gradual increase in general. Groundwater flow is expected by the temperature curve.

iii) Determination of Casing Design

In order to determine the position of screen pipes, following interpretation was made. For the details of casing design, see, Fig. B-III, 2.19.

a) 1st layer (Surface Deposits)

The layer consists of clay, clayey gravel and clayey sand. The layer is expected to be dry because of the high resistivity value (more than 100 Ω-m). Blank casing pipes were installed in this layer.

b) 2 nd Layer (Shallow Aquifer)

Based on the SP value and the resistivity range of 10 - 30 Ω-m, the layer is considered as the most promising aquifer. Groundwater flow is confirmed by the temperature curve.

Four (4) separated positions were selected for the screen pipes as shown in Fig. B-III, 2.19.

c) 3 rd layer (Deep Aquifer)

The layer consists of sandy gravelly clay and clayey sand. Characteristics of all thelogging data are same as that of the second layer. Therefore, the layer is also considered as a aquifer.

The screen pipes were installed at three (3) different positions in this layer as shown in Fig. B-III, 2.19.

(5) Well No. J-3 (see, Fig. B-III, 2.20)

The well was drilled up to 150m depth. In the whole sequence, two (2) units, Q4 and Q2 of the Quaternary Upper Altos de Pica Formation were confirmed. Based on the results of the geophysical logging and lithology observed, following four (4) layers are classified.

(J-3)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 42	Surface Deposits	clay, sandy clay	Q4	Altos de Pica
2 nd	42 - 100	Shallow Aquifer	sandy clay	Q4	
3 rd	100 - 131	Impermeable Bed	sandy clay clay	Q4 Q2	
4 th	131 -150	Deep Aquifer	sandy clay	Q2	

ii) Well Logging

Spontaneous potential indicates a homogeneous range of 970 to 1,030 mv. A relative basement line is estimated as 1,015 mv. However, due to clay predominance material in all the layers, identification of the permeable zone by SP is difficult. The range of gamma ray is mostly within 40 to 60 cps at all layers. Groundwater flow at depths from 40 to 90m and from 120 to 145m is confirmed by temperature curve. No TEM survey was conducted in this area.

iii) Determination of Casing Design

The position of screen pipes was determined considering both the lithological and well logging data. For the details of casing design, see, Fig. B-III, 2.20.

a) 1 st layer (Surface Deposits)

The layer consists of clay at 7m from surface and sandy clay at lower part. It is estimated as impermeable by the SP range which exceeds more than 1015 mv (relative base line). A small potential of groundwater is expected by the temperature curve. Blank casing pipes were installed in this layer.

b) 2 nd layer (Shallow Aquifer)

The layer is composed of thick bed of sandy clay. Considering the lithology and well logging result, high permeability is not expected in this layer. However, the range of resistivity shows a value of 20 to 40 Ω- m similar to the aquifer in other wells. The temperature curve indicates the groundwater flow in this layer.

The layer was considered as a aquifer, and screen pipes were installed at two (2) different positions as shown in Fig. B-III, 2.20.

c) 3 rd layer (Impermeable Intercalation)

The layer consists of sandy clay at the upper part and clay at the lower part. The layer is impermeable intercalated bed, therefore, blank casing pipes were installed.

d) 4 th layer (Deep Aquifer)

The layer is situated at the upper part of Q4 unit of Altos de Pica Formation. It consists of clay and sandy clay. The value of resistivity also indicates a similar range with the 2nd layer. Therefore, the layer is classified as the deep aquifer.

The screen pipes were installed at the depth from 132.83 to 144.83m.

(6) Well No. J-4 (see, Fig. B-III, 2.21)

i) Lithology

The total drilling depth is 150m. Two (2) units of Q4 and Q2 of Quaternary Upper Altos de Pica Formation are confirmed. Based on the results of geophysical logging and lithological observation, following three (3) layers were classified.

(J-4)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 45	Surface Deposits	sand, gravel	Q4	Altos de Pica
2 nd	45 - 95	Shallow Aquifer	gravel, clayey gravel and gravelly clay		
3 rd	98 - 161	Deep Aquifer	clayey gravel, conglomerate	Q2	

ii) Well Logging

The results of all measurements is in well coincident with high permeability of the lithology. The relative basement line of the SP is estimated as 95m mv, based on the lithology and the value of gamma ray. Resistivity shows a high and unstable range at 40m from surface, short and stable range at below 45m. A small scale of groundwater flow was confirmed by the temperature curve at 10m from surface.

iii) Determination of Casing Design

The position of screen pipes was determined, based on the following interpretations. For the details of casing design, see, Fig. B-III, 2.21.

a) 1 st layer (Surface Deposits)

The layer is estimated to have high permeability by the lithological observation and SP range. However, it is expected that the layer has a less potential of groundwater since the layer is surface deposits. Water quality is critical, because of the unstable and reversal range of resistivity. Blank casing pipes were installed in this layer.

b) 2 nd layer (Shallow Aquifer)

The layer is classified as a expected aquifer by the TEM results. Resistivity shows a range of 10 to 45 Ω-m. Compared with the resistivity range of other layers, this value is within the range of the aquifer. Except middle part of the layer (75m depth) showing high gamma ray value, the layer is expected to be permeable.

Based on the above, screen pipes were installed at two (2) different positions . For the details of casing design, see, Fig. B-III, 2.21.

c) 3 rd layer (Deep Aquifer)

The same interpretation with 2 nd layer was made because of similar result of loggings.

Screen pipes were installed at depths from 97.67 to 115.72m and 138.92 to 144.94m of this layer.

(7) Well No. J-5 (see, Fig. B-III, 2.22)

i) Lithology

The well was drilled up to 300m depth. Three (3) units of Q4, Q3 and Q2 of Quaternary Upper Altos de Pica Formation were confirmed. According to lithology observed and well logging data, following three (3) layers were classified.

(J-5)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 20	Surface Deposits	silty clay, sandy clay		
2 nd	20 - 100	Shallow Aquifer	sandy clay	Q4	Altos de Pica
3 rd	100 - 300	Deep Aquifer	clayey gravel	Q3	
			sandy clay	Q2	

ii) Well Logging

Based on the lithology and resistivity, the relative basement line of the SP value is estimated as 920 mv. The range of SP is stable, because most of the layer consists of clayey materials. Resistivity shows a range of 10 to 20 Ω-m up to 100m depth and 10 to 30 Ω-m below 100m. It is also stable at all the sequences except top surface.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.22, based on the following interpretation.

a) 1 st layer (Surface Deposits)

Large amount of clay matrix is observed in the layer. The layer is estimated as impermeable deposit. It is also estimated to be dry due to a high value of the resistivity. Blank casing pipes were installed.

b) 2 nd layer (Shallow Aquifer)

The layer is expected as aquifer due to the value of the resistivity and SP. However, higher potential is expected at 3 rd layer. The screen pipes were not installed in this layer.

c) 3 rd layer (Deep Aquifer)

The layer consists of clayey gravel and sandy clay. The range of the resistivity shows a similar value with that of TEM measurement (10 -17 Ω-m), therefore the layer is expected as a aquifer.

The screen pipes were installed at six (6) different positions as shown in Fig. B-III, 2.22.

(8) Well No. J-6 (see, Fig. B-III, 2.23)

i) Lithology

The well was drilled up to 200m depth. In the whole sequence, three (3) units of Q4, Q3 and Q2 of Quaternary Upper Altos de Pica Formation are observed. Based on the results of geophysical logging and lithology observed, following three (3) major layers were classified.

(J-6)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 35	Surface Deposits	sand, sandy clay, clay	Q4	Altos de Pic
2 nd	35 - 138	Shallow Aquifer	clayey to sandy gravel, gravel	Q4 Q3	
3 rd	138 - 200	Deep Aquifer	clay, gravelly clay, clayey gravel	Q2	

ii) Well Logging

Gamma ray shows a stable range of 40 to 70 cps for whole sequence. Clay layers were clearly distinguished by a high value (more than 100 cps) of the gamma ray at depths of 20, 85 and 150m. Based on the gamma ray and lithology, a relative basement line of the SP is estimated to be 870 mv. Compared with TEM result, rather higher resistivity range was measured by logging. A flow of the groundwater was observed by the temperature curve at the depth of 35 to 100m.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.23, based on the following interpretations.

a) 1 st layer (Surface Deposits)

The layer consists of sand and sandy clay at upper 16m and clay at lower 19m. The thickness and the resistivity range of the layer is similar to the first layer classified by TEM survey. It is considered as the dry surface deposits. Blank casing pipes were installed.

b) 2 nd layer (Shallow Aquifer)

The layer was classified as an expected aquifer by the TEM results. Compared with TEM range of 10 to 17 Ω-m, the logging resistivity range of 20 to 40 Ω-m is rather high. However, high permeability can be expected by the lithological observation except clayey part at a depth from 73 to 81m. Groundwater flow at a depth from 35 to 100m was observed by the temperature curve.

The screen pipes were installed at three (3) positions as shown in Fig. B-III, 2.23.

c) 3 rd layer (Deep aquifer)

Resistivity and gamma ray value is similar to 2nd layer. The range of SP indicates permeable. The layer is classified as a deep aquifer at Q2 unit.

Two (2) positions of screen pipes were selected as shown in Fig. B-III, 2.23.

(9) Well No. J-7 (see, Fig. B-III, 2.24)

i) Lithology

Within a 210m total depth, two (2) units of Q4 and Q3 of Quaternary Upper Altos de Pica Formation were confirmed. According to the lithology observed and well logging data, following three (3) major layers were classified.

(J-7)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 35	Surface Deposits	sandy clay	Q4	Altos de Pica
2 nd	35 - 106	Shallow Aquifer	sandy to gravelly clay		
3 rd	100 - 131	Deep Aquifer	sandy to gravelly clay	Q3	

ii) Well Logging

All the layers are rich in clayey matrix. Due to this, the range of the gamma ray is almost the same for whole layer. Based on the lithology and gamma ray range, a relative basement line of SP is estimated as 970 mv. Resistivity indicates a homogeneous range of 10 to 20 Ω-m except 35m from surface. According to the TEM results, this values lie within the range of the aquifer. Therefore, the position of screen pipes was mainly determined by the SP and gamma ray values.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.24, based on the following interpretations.

a) 1 st layer (Surface Deposits)

The layer consists of mainly sandy clay except the sand which appears from surface to 4m depth. It is estimated as dry because of a high resistivity value. Blank casing pipes were installed in this layer.

b) 2 nd layer (Shallow Aquifer)

The layer is expected as a aquifer. However, it is not highly permeable. Permeable zone was determined by SP and gamma ray for the installation of screen pipes.

The screen pipes were installed at two (2) different positions of 55.79 to 61.76m and 67.79 to 79.8m depth.

c) 3 rd layer (Deep aquifer)

Same interpretation as the 2nd layer was made due to same lithology and logging measurement. However, the layer is estimated as rather more permeable than the 2 nd layer, based on the lower value of SP.

Five (5) different positions were selected for screen pipes as shown in Fig. B-III, 2.24.

(10) Well No. J-8 (see, Fig. B-III, 2.25)

i) Lithology

The well was drilled up to 210m depth. In the whole sequence, three (3) units of Q4, Q3 and Q2 of Quaternary Upper Altos de Pica Formation were observed. Based on the results of geophysical logging and lithology observed, following three (3) layers were classified.

(J-8)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 50	Surface Deposits	sand, gravel, clay	Q4	Altos de Pica
2 nd	50 - 169	Shallow Aquifer	gravel clayey, clayey gravel	Q4 Q3	
3 rd	169 - 210	Deep aquifer	gravelly clay, sandy clay	Q2	

ii) Well Logging

Spontaneous potential value indicates a range from 820 to over 1000 mv. Considering the lithology observed and the resistivity, a relative basement line is estimated as 990 mv. Resistivity value indicates a high value at 40m from the surface and a stable range of 10 to 30 Ω-m at below 50m. This range is in coincidence with the resistivity of the aquifer in the area. Intercalation of clay was identified by the gamma ray. This intercalation of clay exceeds 100 cps. A permeable layer is also identified by the gamma ray which is less than 50 cps.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.25, based on the following interpretations.

a) 1 st layer (Surface Deposits)

The layer consists of sand to gravel at 14m from the surface and gravelly clay at the lower part. However, most of the layer were estimated as dry because of high resistivity value. Blank casing pipes were installed in this layer.

b) 2 nd layer (Shallow Aquifer)

The layer is classified as a shallow aquifer based on the resistivity range of 10 to 30 Ω-m. However, high permeability can not be expected. Because, large amount clayey matrix is observed at all sequence, except fine gravel at bottom 11m. Therefore, the position of the screen pipes were selected by the gamma ray.

Eight (8) short interval positions were selected for the screen pipes as shown in Fig. B-III, 2.25.

c) 3 rd layer (Deep Aquifer)

Same interpretation was made based on the same value of the resistivity and SP. Two (2) different positions were selected for screen pipes as shown in Fig. B-III, 2.25.

(11) Well No. J-9 (see, Fig. B-III, 2.26)

i) Lithology

Three (3) units of Q4, Q3 and Q2 of Quaternary Upper Altos de Pica Formation were confirmed. The total drilling depth is 172m. Based on the results of geophysical logging and lithological observation, following three (3) major layers are classified.

(J-9)

Layer	Depth (m)	Classification	Lithology	Unit	Formation
1 st	0 - 55	Surface Deposits	sandy clay, clay	Q4	Altos de Pica
2 nd	55 - 146	Shallow Aquifer	clayey gravel gravelly clay, clay	Q4 Q3	
3 rd	146 - 172	Deep Aquifer	gypsum clay	Q2	

ii) Well Logging

At 50m from the surface, the SP curve is not coincident with lithology and gamma ray. Considering the lithology and gamma ray, a relative basement line of the SP is estimated as 1000 mv from below 50m depth. Resistivity range indicates a typical value of 10 to 20Ω-m which is a similar range with the aquifer in the area. Clay intercalation can be found by the gamma ray. This intercalation shows more than 100 cps.

iii) Determination of Casing Design

Casing design was decided as shown in Fig. B-III, 2.26, based on the following interpretations.

a) 1 st layer (Surface Deposits)

The layer consists of mainly clay to sandy clay. It is estimated as a impermeable deposits. The value of the gamma ray indicates a rather high range of 50 to 100 cps. The layer is interpreted as dry, therefore, blank casing pipes were installed.

b) 2 nd Layer (Shallow Aquifer)

The resistivity range of 10 to 20 Ω-m was observed at all the sequence. The gamma ray shows a rather lower value of 20 to 70 cps except the clay intercalation. Therefore, the layer is considered as a promising aquifer. The position of screen pipes were examined by the permeability indication of the gamma ray.

The screen pipes were installed at three (3) different positions as shown in Fig, B-III, 2.26.

c) 3 rd layer (Deep Aquifer)

The layer consists of clay with gypsum of Q2 unit. It is estimated as a impermeable layer. On the one hand, a low value of SP and gamma ray indicate that the layer is permeable. Moreover, resistivity value indicates within the range of the aquifer. Therefore, the layer is considered as a aquifer.

The screen pipes were installed as shown in Fig. B-III, 2.26.

2.3.3 Pumping Test

1) Methodology of Pumping Test

For the details of the methodology, see, B-II, section 2.3.3 of Chapter II.

2) Results of Pumping Test

(1) Aquifer Constants

Results of pumping tests are shown in Table B-III, 2.2. Aquifer constants are analyzed by the graphs shown in Fig. B-III, 2.27 to 2.37. The results of this analysis are summarized in Table B-III, 2.3. The aquifer constants for eleven (11) wells are as follows;

Well No.	Transmissibility ($m^3/d/m$)	Permeability (cm/sec)
J-C	8.29	1.23×10^{-4}
J-D	1506.17	1.81×10^{-2}
J-E	644.33	7.31×10^{-3}
J-F	86.81	9.57×10^{-4}
J-3	113.81	2.20×10^{-3}
J-4	271.08	5.22×10^{-3}
J-5	769.61	8.23×10^{-3}
J-6	21.63	3.20×10^{-4}
J-7	383.83	5.30×10^{-3}
J-8	376.27	5.18×10^{-3}
J-9	266.06	3.54×10^{-3}

A wide range of the transmissibility was obtained from eleven (11) wells; It is the highest at J-D (1506.17 $m^3/d/m$) and the lowest at J-E (633.33 $m^3/d/m$). The average of the transmissibility is calculated to be 404.35 $m^3/d/m$. The area of the high transmissibility is concentrated in the area from Baquedano to La Tirana. The wells in this area have also a high value of the specific yield. This area is considered to have the high groundwater potential. On the other hand, the area of the low transmissibility (less than 150 $m^3/d/m$) is distributed in the northern and the southern part of the area (J-C, J-F, J-3, and J-6). The lowest transmissibility is estimated at J-C (8.29 $m^3/d/m$). The wells are of the low specific yield.

The permeability coefficients of the eleven (11) wells are similar. The highest value is 1.18×10^{-2} cm/sec at J-D, and the lowest one is 1.23×10^{-4} cm/sec at J-

4. The average of permeability is calculated as 5.13×10^{-3} cm/sec. This value is in well agreement with the permeability usually expected in this lithology mainly consisting clayey gravel, gravelly clay and sandy clay.

(2) Well Capacity

The well capacity is evaluated by the amount of the critical discharge and the safe yield. The Q-Sw chart for the examination of the critical discharge and the Q-s/Q chart for the obtaining the well efficiency and the area of influence are shown in Fig. B-III, 2. 38 to 2. 48. The detailed results of the analysis for the step drawdown tests are described in Table B-III, 2.3. The well capacity for eleven (11) wells are summarized as the following table;

Well No.	Critical Discharge (l/s)	Safe Yield (l/s)
J-C	2.50	0.80
J-D	more than 25.00	10.00
J-E	more than 27.00	20.00
J-F	8.33	1.80
J-3	more than 5.00	3.75
J-4	4.00	0.30
J-5	more than 5.00	2.00
J-6	more than 4.04	5.00
J-7	more than 5.00	10.00
J-8	more than 3.34	29.00
J-9	more than 5.00	3.50

At the most of wells, the critical discharge is confirmed as larger than the maximum capacity of the submersible pump used. The highest rate, more than 27 l/s, was obtained at J-E among the test wells. The safe yield of the well is 20 l/s. Among the observation wells, high values, more than 5 l/s, were found at J-3, J-5, J-7 and J-9. According to the rate of the safe yield of the wells, high critical discharge rates are expected in all the area except J-C, J-F and J-4.

2.3.4 Carbon-14 Analysis

The Purpose of Carbon- 14 Analysis is to decide the age of groundwater for the interpretation of the groundwater recharge mechanism and for the evaluation of the groundwater potential. Ten (10) samples were taken in Pampa del Tamarugal; one (1) sample from the JICA Well (J-F) and nine (9) samples from the existing wells (see, Fig. B-III, 2.1).

Methodology of the Carbon-14 Analysis is reffered to Chapter 2 of B-II in this Report.

Results are shown in Fig. B-III, 2.49 and the following table;

Well No.	Tritium (TU)	C-14 (pmc)	Age (Y.BP)*	Average Age**
172 (Dolores)	<0.8	7.8	3,400-4,530	3,965
473 (Remolino)	<0.8	51.9	modern	modern
193 (Mapocho)	<0.8	33.6	570-1,630	1,100
- (Dupliza)	<0.8	62.7	modern-840	440
222 (Sagasca)	<0.8	67.1	modern-1,000	520
354 (Canchones)	1.1±0.6	18.7	10,780-11,840	11,310
- (Esmeralda)	<0.8	91.3	***	***
470 (Pica)	<0.8	94.1	***	***
J-F (Oficina Victoria)	<0.8	9.7	10,370-11,500	10,935
- (Cerro Gordo)	<0.8	17.8	6,320-7,450	6,885

Y.BP: years before present

* : Estimated age by the Modified Pearson Model

** : Ages are calculated considering modern as 40 years.

*** : Influenced by the irrigation water.

All the Tritium data are below or close to the detection limit, therefore, it is considered that the groundwater in the area is older than 40 years. C-14 age of the groundwater is young in the western side of Pampa, Sagasca and Dupliza, and old in the southern side, Canchones and Salar de Pintados area. Ages in Esmeralda and Pica also show modern ages, however, it does not mean the recent ages, because C-14 contents show that the groundwater of both area is influenced by the return flow of irrigation water; C-14 contents of Pica and Esmerald are 94.1 and 91.3 pmc, respectively, which are close to 100 pmc.

Considering the recharging system and the groundwater flow in Pampa, C-14 age of Dupliza seems to be too young. The wells in Dupliza are located in the lower reach of the Quipisca River. This area is covered with the surface water during floods of the Aroma, Tarapacá and Quipisca Rivers in the wet season (so called "Bolivian Winter"). This means the groundwater of Dupliza is recharged by these flood water; C-14 age is also influenced by this recharges.

2.4 Configuration of Aquifer

The Study Area, the Pampa del Tamarugal Basin is defined as follows;

(north): The divide of the basin between the Qda de Aroma and the Qda. de Tiliviche.

(south): Cerro Gordo

(east) : The western foot of the mountains.
(this border was formed by faults that pass west of Pica and Tarapaca)

(west) : The eastern edge of the Cordillera de la Costa (the coastal mountains)
(this border was formed by faults).

The Pampa del Tamarugal Basin is filled by the Tertiary to Quaternary formation (Altos de Pica Formation). The aquifers area appeared in this formation. Detailed geological and hydrogeological information are given by the 11 wells drilled by the Study Team and three (3) wells by ENAP. Results of JICA Wells are mentioned in 2.3 of this Chapter. ENAP drilled three (3) wells in the study area, "Dolores 1" in the northern part of the area and, "Pintados 1" and "Pintados 2" in the southern part of the area. These wells give information on the stratigraphy and geological structure of the basin, because ENAP wells penetrated into the Basement Rocks through the Tertiary to Quaternary formation and JICA Wells reached the base of the aquifer.

Geological profiles and cross sections of Pampa del Tamarugal are shown in Fig. B-III, 1.5 and 1.6 respectively. These are constructed based on the results of the drilling by the Study Team and the reviewing the existing profiles (<2).

The shape of the basin was controlled by the depression caused by the faults of north-south direction. The aquifers in the basin appear in the basin fill deposits which elongates in a north-south direction. Thickness of the deposits increases to the east. Although the deposits store the groundwater, the depth to the water (depth from ground surface to the water level) also increase to the east reaching more than 100m. Therefore, the eastern part of the basin is not economically suitable to develop the groundwater.

As shown in Fig. B-III, 1.5 and 1.6, aquifers occur in units Q3 and Q4 of the Altos de Pica Formation. The expected aquifer area is shown in Fig. B-III, 2.50 by the dotted lines. The Altos de Pica Formation is covered by the Recent Deposits which increase in thickness toward the east. It means that depth to the aquifer is generally high in the eastern area; The pumping head is large. Therefore, the expected aquifer area is limited within this dotted line. Width of the aquifers ranges from 13 km to 46 km, averaging 30 km.

Aquifers occur in units Q3 and Q4 of the Altos de Pica Formation (Ref. Table B-III, 1.1). The unit Q3 is composed of sand and gravel and is underlain by Q2. Q4 consists of sand and gravel with mud, and/or intercalated with mud layers. The unit

Q4 is deposited overlying the unit Q3. Thus, the distribution of Q4 is wider than that of Q3. The unit Q3 is distributed in the area from Huara to Salar de Bellavista. The unit Q4 is widespread in the aquifer area (Ref. Fig. B-III, 2.50). No impermeable layer appears between unit Q3 and Q4. Those aquifers are underlain by thick impermeable clayey beds which are the hydrogeological base of aquifers in the basin (Ref. Fig. B-III, 1.5 and 1.6).

The aquifers are occurred in some horizons, mainly in sand and gravel.

The thickness of this formation varies from place to place. It is generally thin in the northern area and thick in the southern area;

Thickness of aquifers (Fig. B-III, 2.51) is about 25 m near Dolores and increases toward the south reaching about 150 m in the center area of Pampa. The deposits are accumulated almost horizontally and sometimes interbedded with each other.

Depth to the top and the bottom of the aquifer is shown in Fig. B-III, 2.52 and 2.53 respectively. Figure of aquifers in Pampa del Tamarugal is summarized as follows;

Area	Maximum Thickness (m)	Width (km)	Top of Aquifer (mBGL)	Base of Aquifer (mBGL)
Zapiga/Dolores	80	13-17	<10	90
Negreiros	70	15	20	90
Huara	60	15-19	50	110
Humberstone	150	27	30-40	180-200
Pozo Almonte	220	26	20-30	240-260
Pintados	220	30-37	10-30	230
Bellavista	160	30-46	10-70	120-170

2.5 Hydrogeological Characteristics of Aquifer

Pampa del Tamarugal is basically a closed basin from the hydrogeological point of view, although a small river flows out from the southern end of the basin. The pampa area does not receive any precipitation throughout the year. The groundwater in Pampa is recharged from the surface water of several rivers and some fissure waters. Main rivers which flow into the pampa are Qdas. Aroma, Tarapacá, Quipisca, Juan de Morales, Quisma, Chacarilla and Ramada. Surface water of these rivers infiltrates to the underground before entering to Pampa. Pampa is sometimes covered by the flood water in so called "Bolivian Winter" season. Fissure water reaches to Pampa from the east through faults, joints and fissures developed in the volcanic rocks. One of the possible resources is the water from Salar del Huasco Basin.

The western and the southern margins of the pampa are surrounded by impermeable basement rocks. The aquifers Q3 and Q4 are underlain by the thick clay (Q2) and/or basement rocks which are \both generally impermeable. Q2 is composed mainly of clay, but sometimes contains sandy materials. Thus, Q2 also shows a certain degree of permeability. This is supposed by logging data of JICA Wells; a part of screens was also installed in Q4 in some wells (J-3, 4, C, D, 5, 6, 8, 9). The groundwater recharged into the units Q3 and Q4 are stored in these units and gently flows toward the south reaching Salar de Bellavista through Salar de Pintados.

Quantitative character of the aquifers are given by aquifer constants. Aquifer constants are available on 11 JICA Wells and 36 existing wells. Specific yield is estimated on 51 wells including JICA Wells. Data of JICA Wells are given in the following table. Details are shown in Table B-III, 2.3. Data of existing wells are in Table B-III, 2.4.

(JICA Wells)

Area	Well No.	Specific Yield (l/sec/m)	Specific Yield (m^3/day/m)	Transmissibility (m^3/day/m)	Permeability (cm/sec)
Dolores	J-3	0.73	63.1	113.81	2.20×10^{-3}
Negreilos	J-4	2.22	191.8	271.08	5.22×10^{-3}
Huara	J-C	0.09	7.8	8.29	1.23×10^{-4}
	J-D	3.47	299.8	1506.17	1.81×10^{-2}
Pozo Almonte	J-5	8.33	719.7	769.61	8.23×10^{-3}
|	J-E	6.77	584.9	644.33	7.31×10^{-3}
Canchones	J-6	0.26	22.5	21.63	3.20×10^{-4}
|	J-7	2.72	235.0	383.83	5.30×10^{-3}
Pintados	J-8	2.18	188.4	376.27	5.18×10^{-3}
Bellavista	J-9	1.92	165.9	266.06	3.54×10^{-3}
	J-F	1.65	142.6	86.81	9.57×10^{-4}
Average		2.76	238.5	404.35	5.13×10^{-3}

Specific yield (Sy) of aquifers is 2.13 l/sec/m in average, ranging from 0.03 l/sec/m (well No. 936 at Negreilos) to 10.67 l/sec/m (well No. 202 at Porvenir, east from Pozo Almonte). Sy is relatively high in Huara area and Pozo Almonte to Pintados area and low in Zapiga to Negreilos area and Bellavista area.

Transmissibility and permeability are generally high. Average of transmissibility by area is in a range from 154 m^3/day/m to 1102 m^3/day/m. Permeability of aquifers is in same order in the whole area of Pampa; its average is in a order of 10^{-2} cm/sec. This order is high as aquifers.

A contour map of static water level is constructed as shown in Fig. B-III, 3.2.1. This shows that there is a difference of water level gradient between the north of Huara and Baquedano; The gradient is less than 1/1000 in the area from Zapiga to the north of Huara and 4/1000 in the area from the north of Huara to Baquedano. It suggests that there is a low permeable zone in the area from the north of Huara and flow of groundwater from the north, such as the water from Qda. Aroma, is retarded to south.

Characteristics of aquifer constants by area are as follows;

a) Zapiga-Dolores-Negreilos area

Main aquifer of this area is the unit Q4. Productivity of Q4 is low, because Sy is between 0.03 l/sec/m and 2.20 l/sec/m, having average of 0.73 l/sec/m. Relatively high Sy appear in the wells located along the Panamerican Road; this area lies in main stream of the groundwater flow. Low Sy appear mainly in the small valleys in the western side of the area. Although permeability is relatively high (10^{-2} cm/sec. order), transmissibility is rather small (154 m^3/day/m).

Two (2) JICA Wells are drilled in the area (J-3, J-4). Both of wells show relatively low Sy and transmissibility.

b) Huara area

The unit Q4 is the main aquifer in this area. The highest average of Sy appears in this area, 3.7 l/sec/m. Transmissibility is also high, 675 m^3/day/m in average. Permeability is lower than average.

Two (2) JICA Wells are drilled in the area (J-C, J-D). J-D shows relatively high Sy (3.47 l/sec/m) and high transmissibility (1506 m^3/day/m) which is the largest in the Pampa area. In contrary to this, J-C shows low Sy and low transmissibility. Lithology of aquifer is much clayey in J-C, and extremely poor in sand and gravel beds. Therefore, lithology of aquifers in this area changes from place to place.

c) Pozo Almonte-Canchones-Pintados area

Main aquifers are Q3 and Q4 in this area. Sy is high, 3.26 l/sec/m in average which succeeds Huara area. 19 wells, out of 26 wells including JICA Wells, have Sy higher than 2 l/sec/m. Both transmissibility and permeability are of the highest value in Pampa; 1102 m^3/day/m and 4.4×10^{-2} respectively.

d) Oficina Victoria-Bellavista area

Main aquifers are Q3 and Q4. Sy is the lowest, 1.30 l/sec/m in average, compared with other area in Pampa. Transmissibility is also low, 219.5 1102 m^3/day/m, while permeability is relatively high, 1.4×10^{-2}.

Two (2) JICA Wells are drilled in the area (J-9, J-F). Both wells show higher Sy than average. However, transmissibility is lower than average.

2.6 Estimation of Groundwater Storage

Groundwater storage of Pampa del Tamarugal is shown in Table B-III, 2.5 and Fig. B-III, 2.54. These present the estimated groundwater storage in the total area of Pampa del Tamarugal shown in Fig. B-III, 2.50. Total volume of groundwater storage is estimated as follow;

$$S_{\text{Total Storage}} = \mathbf{26.9 \times 10^9\ m^3}.$$

The estimation was made based on the two (2) geological profile and 12 geological sections dividing the area into 12 zones. Each profile represent following zones;

Zone	Geological section	Major communities in the zone
1	sect. A-A' to B-B'	Dolores, Negreiros
2	sect. B-B' to C-C'	
3	sect. C-C' to D-D'	
4	sect. D-D' to E-E'	Huara
5	sect. E-E' to F-F'	Baquedano, Humberstone
6	sect. F-F' to G-G'	Pozo Almonte
7	sect. G-G' to H-H'	
8	sect. H-H' to I-I'	La Tirana, Huayca
9	sect. I-I' to J-J'	Canchones
10	sect. J-J' to K-K'	Pintados
11	sect. K-K' to L-L'	Oficina Victoria
12	sect. L-L' to southern end	Cerro Gordo

Conditions applied in the estimation are as follows;

(1) Climate condition will remain constant during the estimated period.

(2) The extent of the estimation is limited to the area shown in Fig. B-III, 2.50.

(3) Estimated volume is the groundwater stored in aquifers, Q_3 and Q_4.

(4) Estimation is made on the groundwater stored in permeable and semi-permeable beds. Although groundwater is stored in impermeable beds, it is not considered as prospective one.

(5) Effective porosity of aquifer is assumed to be 30 % as a whole, considering the materials which compose the aquifer.

References

<1: Cuadrangulos Pica, Alca, Matilla y Chacarilla, Carta Geologica de Chile (Escala 1: 50,000), 1962 for Instituto de Investigaciones Geologicas Chile by Carlos Galli Olivier y Robert J. Dingman.

<2: Analisis Programa de Desarrollo de Empresa de Servicios Sanitarios de Tarapaca, February 1991 for ESSAT by Bustamante y Schudeck Ingenieros Consultores Ltda.

<3: Informe Geologico, Pozo : Dolores 1, March 1987 by ENAP

<4: Informe Geologico, Pozo : Pintados 1, March 1987 by ENAP

<5: Informe Geologico, Pozo : Pintados 2, March 1987 by ENAP

<6: Algunos Antecedentes Tecnicos Hidrogeologicos de los Sondajes en Busca de Agua Ejectadis por en Tarapaca, November 1962 for ENAP by Jorge Alvarez R.

Table B-III, 2.1 (1) Well List (Pampa del Tamarugal)

<Lista de Sondajes (Pampa del Tamarugal)>

DGA CODE	SNA CODE	CORFO CODE(1975) LAT.	LONG.	NO.	CORFO CODE(1989) LAT.	LONG.	NO.	COMMUNITY	LOCATION NAME	NAME OF OWNER	CONSTRUCTOR	ELEVATION (mMSL)	DRILLING DEPTH (m)	SPECIFIC YIELD (m3/d/m)	DATE OF CONSTRUCTION	STATIC WATER LEVEL (93/ 10-11) (mBGL)	(mMSL)
5	017 00 161-2	1930	6950	C-1	1930	6930	A-14	HUARA	SALAR ZAPIGA	CORFO-B2	CORFO-658	1128.69	22		67/05		
6	017 00 162-0	1930	6950	C-2	1930	6930	A-15	HUARA	SALAR ZAPIGA	CORFO-B3	CORFO-658	1125.45	14		67/05		
21	017 00 164-7	1940	6940	A-1	1930	6930	A-21	HUARA	SALAR ZAPIGA	CORFO-D7	CORFO-658	1144.30	20		67/07		
23	017 00 165-5	1940	6940	A-2	1930	6930	A-22	HUARA	SALAR ZAPIGA	CORFO-D8	CORFO-658	1145.26	23		67/07	16.96	1128.:
	017 00 473-5	1940	6940	AN-3				HUARA	REMOLINO								
26	017 00 166-3	1940	6940	C-1	1930	6930	C-5	HUARA	SALAR ZAPIGA	CORFO-C8	CORFO-658	1145.70	14		67/05		
29	017 00 167-1	1940	6940	C-2	1930	6930	C-8	HUARA	SALAR ZAPIGA	CORFO-C9	CORFO-658	1132.05	24		67/07		
30	017 00 104-3	1940	6940	C-3	1930	6930	C-9	HUARA	SALAR ZAPIGA	CORFO-B9	CORFO-658	1145.57	20		67/04	14.97	1130.(
16	017 00 168-k	1940	6950	A-1	1930	6930	A-2	HUARA	PTA. AP DOLORES 1	DOS	DOS	1119.18	32	53.3			
15	017 00 169-8	1940	6950	A-2	1930	6930	A-3	HUARA	PTA. AP DOLORES 2	DOS	DOS	1120.97			63/05		
10	017 00 170-1	1940	6950	A-3	1930	6930	A-4	HUARA	PTA. AP DOLORES 3	DOS	DOS	1119.88	45	26.6			
11	017 00 171-k	1940	6950	A-4	1930	6930	A-5	HUARA	PTA. AP DOLORES 4	DOS	DOS	1120.11	49	71.2			
12	017 00 172-8	1940	6950	A-5	1930	6930	A-6	HUARA	PTA. AP DOLORES 5	DOS	DOS	1119.68	40	40.4	64/04		
13	017 00 173-6	1940	6950	A-6	1930	6930	A-7	HUARA	PTA. AP DOLORES 6	DOS	DOS	1120.90	49	79.6		6.92	1111.:
14	017 00 174-4	1940	6950	A-7	1930	6930	A-8	HUARA	PTA. AP DOLORES 7	DOS	DOS	1120.36	46	65.6			
8	017 00 175-2	1940	6950	A-8				HUARA	SALAR EL OBISPO	CORFO	CORFO-658	1121.79	16		67/05		
9	017 00 176-0	1940	6950	B-1	1930	6930	A-9	HUARA	DOLORES	ENAP B-4	ENAP	1127.00	88		67/05	9.99	1117.(
17	017 00 177-9	1940	6950	B-2	1930	6930	A17	HUARA	SALAR DE ZAPIGA	CORFO-C6	CORFO-658	1127.40	20		67/07	14.39	1113.(
18	017 00 101-9	1940	6950	B-3	1930	6930	A18	HUARA	SALAR DE ZAPIGA	CORFO-B5	CORFO-658	1127.99	12		67/05		
19	017 00 179-7	1940	6950	B-4	1930	6930	A-19	HUARA	SALAR DE ZAPIGA	CORFO-C8	CORFO-658	1145.67	17		67/05	12.60	1133.
20	017 00 179-5	1940	6950	B-5	1930	6930	A-20	HUARA	SALAR DE ZAPIGA	CORFO-B6	CORFO-658	1133.48	12		67/05		
22	017 00 100-0	1940	6950	B-6	1930	6930	A-23	HUARA	SALAR DE ZAPIGA	CORFO-C7	CORFO-658	1142.86	14		67/05		
7	017 00 180-9	1940	6950	B-7				HUARA	DOLORES E1	ENAP	ENAP	1127.00					
24	017 00 181-7	1940	6950	C-1	1930	6930	C-4	HUARA	SALAR EL OBISPO	CORFO-AA5	CORFO-658	1134.15	8		67/05		
25	017 00 102-7	1940	6950	D-1	1930	6930	C-3	HUARA	SALAR DE ZAPIGA	CORFO-B7	CORFO-658	1135.01	9		67/04		
26	017 00 103-5	1940	6950	D-2	1930	6930	C-6	HUARA	SALAR DE ZAPIGA	CORFO-B8	CORFO-659	1140.05	12		67/04		
27	017 00 182-5	1940	6950	D-3	1930	6900	C-7	HUARA	SALAR EL OBISPO	CORFO-AA6	CORFO-658	1133.69	8		67/05		
39	017 30 100-4	1950	6920	A-1	1930	6900	C-1	HUARA	PACHICA 1	CORFO	CORFO-483	1517.50	54	617.1	64/08		
40	017 30 101-2	1950	6920	A-2	1930	6900	C-2	HUARA	PACHICA 2	CORFO	CORFO-494	1537.69	36	351.0	64/11		
41	017 30 102-0	1950	6920	A-3	1930	6930	C-3	HUARA	PACHICA 3	CORFO	CORFO-509	1534.94	51	688.3	65/03		
38	017 00 183-3	1950	6930	C-1	1930	6930	D-3	HUARA	HUARA 2	CORFO	CORFO-729	1135.24	150		69/10		
34	017 00 184-1	1950	6940	A-1	1930	6930	C-2	HUARA	QBDA. AROMA 1	CORFO	CORFO-733	1150.40	43		68/04		
31	017 00 105-1	1950	6940	A-2	1930	6930	C-10	HUARA	SALAR DE ZAPIGA	CORFO-B10	CORFO-658	1150.54	24		67/05		
32	017 00 106-k	1950	6940	A-3	1930	6930	C-11	HUARA	SALAR DE ZAPIGA	CORFO-B11	CORFO-658	1150.63	29		67/05		
33	017 00 185-k	1950	6940	B-1	1930	6930	D-4	HUARA	QBDA. AROMA 2	CORFO	CORFO-737	1120.14	12		68/05		
33A	017 00 186-8	1950	6940	B-2	1930	6930	D-5	HUARA	QBDA. AROMA 3	CORFO	CORFO-740		12		68/05		
36	017 00 187-6	1950	6940	C-1	2000	6930	C-1	HUARA	HUARA 1	DOS	DOS	1106.71	25			53.56	1053.
35	017 00 188-4	1950	6940	D-1	2000	6930	D-1	HUARA	HUARA-PACHICA 2	DOS	DOS	1108.04	176				
37	017 00 189-2	1950	6940	D-2	2000	6930	D-2	HUARA	HUARA 1	CORFO	CORFO-727	1104.31	161		68/03		
49A	017 00 190-6	2000	6930	A-1				HUARA	BAQUEDANO 2	EJERCITO CHILE	CORFO-1320		175		74/09		
45	017 00 191-4	2000	6930	C-1	2000	6930	B-5	POZO ALMONTE	BAQUEDANO 4	CORFO	RIEGO	1071.00	360				
45A	017 00 192-2	2000	6930	C-2	2000	6930	B-6	POZO ALMONTE	BAQUEDANO 5	CORFO	RIEGO	1074.00	242		51/08		
42	017 00 193-0	2000	6940	B-1	2000	6930	B-1	POZO ALMONTE	MAPOCHO	RIEGO	RIEGO	1078.60	80		57/04		
48	017 00 194-9	2000	6940	D-1	2000	6930	B-2	POZO ALMONTE	BAQUEDANO 1	CORFO	RIEGO	1055.61					
49	017 00 195-7	2000	6940	D-2	2000	6930	B-3	POZO ALMONTE	BAQUEDANO 2	CORFO	RIEGO	1057.00					
46	017 00 196-5	2000	6940	D-3	2000	6930	B-4	POZO ALMONTE	BAQUEDANO 3	CORFO	RIEGO	1068.92	105		50/08		
43	017 00 197-3	2000	6940	D-4	2000	6930	B-7	POZO ALMONTE	BAQUEDANO 6	RIEGO	RIEGO	1071.06	134		51/10		
44	017 00 198-1	2000	6940	D-5	2000	6930	B-8	POZO ALMONTE	BAQUEDANO 7	RIEGO	RIEGO	1070.00	92		51/12		
47	017 00 199-k	2000	6940	D-6	2000	6930	B-9	POZO ALMONTE	BAQUEDANO 8	RIEGO	RIEGO	1065.00	81		52/08		
48A	017 00 200-7	2000	6940	D-7				POZO ALMONTE	BAQUEDANO 1	EJERCITO CHILE	CORFO-1282		130	10.0	74/04		
169	017 00 201-5	2010	6920	A-1	2000	6930	A-1	POZO ALMONTE	QBDA. J. MORALES	RIEGO	RIEGO	1275.90	462				
53	017 00 202-3	2010	6930	A-1	2000	6930	B13	POZO ALMONTE	PORVENIR	RIEGO	RIEGO	1036.52	202	921.6	63/04	35.43	1001.
45B	017 00	2010	6930	A-2				POZO ALMONTE	DUPLIZA-1	MILITARY			114	172.8	75/	52.00	
45C	017 00	2010	6930	A-3				POZO ALMONTE	DUPLIZA-2	MILITARY			90	172.8	75/	52.00	
45D	017 00	2010	6930	A-4				POZO ALMONTE	DUPLIZA-3	MILITARY			114	172.8	75/	52.00	
57	017 00 131-0	2010	6930	C-1	2000	6930	D34	POZO ALMONTE	LA TIRANA 1	CORFO	CORFO-544	1019.69	199	331.0	67/06	21.65	998.
58	017 00 203-1	2010	6930	C-2	2000	6930	D-35	POZO ALMONTE	LA TIRANA 2	CORFO	CORFO-645		412		67/04		
59	017 00 204-k	2010	6930	C-3	2000	6930	D-36	POZO ALMONTE	EL CARMELO 1	CORFO	CORFO-572	1022.79	62		66/07		
60	017 00 132-9	2010	6930	C-4	2000	6930	D-37	POZO ALMONTE	EL CARMELO 2	CORFO	CORFO-592	1022.80	183	225.6	67/07	25.09	997
61	017 00 205-8	2010	6930	C-5	2000	6930	D-38	POZO ALMONTE	EL CARMELO 3	CORFO	CORFO-628	1022.79	211		69/01		
62	017 00 206-6	2010	6930	C-6	2000	6930	D-39	POZO ALMONTE	EL CARMELO 4	CORFO	CORFO-754		176	180.0	69/04		
66	017 00 207-4	2010	6930	C-7	2000	6930	D-52	POZO ALMONTE	LA TIRANA	CORFO	CORFO-654	1008.26	30	70.2	67/10	CAPPED	
67	017 00 208-2	2010	6930	C-8	2000	6930	D-53	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1A	CORFO-654	1006.77	21		67/12		
68	017 00 209-0	2010	6930	C-9	2000	6930	D54	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1B	CORFO-654	1006.72	20		67/10		
69	017 00 210-4	2010	6930	C-10	2000	6930	D-55	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1C	CORFO-654	1006.75	20		67/04		
90	017 00 211-2	2010	6930	C-11	2000	6930	D-56	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1D	CORFO-654	1006.85	20		67/04		
91	017 00 212-0	2010	6930	C-12	2000	6930	D-57	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1E	CORFO-654	1006.94	20		67/04		
92	017 00 213-9	2010	6930	C-13	2000	6930	D-58	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1F	CORFO-654	1006.69	20		67/04		
93	017 00 214-7	2010	6930	C-14	2000	6930	D-59	POZO ALMONTE	LA TIRANA RADIOI	CORFO-1G	CORFO-654	1006.54	21		67/08		
69	017 00 215-5	2010	6930	C-15	2000	6930	D-71	POZO ALMONTE	SALAR PINTADOS	CORFO-E1	CORFO-551	1014.64	19		65/07		
70	017 00 216-3	2010	6930	C-16	2000	6930	D-72	POZO ALMONTE	SALAR PINTADOS	CORFO-F1	CORFO-551	1017.41	25		65/07		
71	017 00 217-1	2010	6930	C-17	2000	6930	D-73	POZO ALMONTE	SALAR PINTADOS	CORFO-G1	CORFO-551	1023.24	28		65/07		
94	017 00 218-k	2010	6930	C-18	2000	6930	D-78	POZO ALMONTE	SALAR PINTADOS	CORFO-F2	CORFO-551	1009.38	21		65/07		
95	017 00 219-8	2010	6930	C-19	2000	6930	D-79	POZO ALMONTE	SALAR PINTADOS	CORFO-G2	CORFO-551	1013.10	21		65/07		
85	017 00 220-1	2010	6930	C-20	2000	6930	D-77	POZO ALMONTE	SALAR PINTADOS	CORFO-E2	CORFO-551	1006.54	15		65/07		
63	017 00 221-k	2010	6930	D-1	2000	6930	D42	POZO ALMONTE	Q. J. MORALES 1	RIEGO	RIEGO	1083.56	436	569.8	65/01	75.00	988
64	017 00 222-8	2010	6930	D-2	2000	6930	D-43	POZO ALMONTE	Q. J. MORALES	MIN. SAGASCA	CORFO-775	1079.28	274	362.8	69/11	85.00	994
96	017 00 223-6	2010	6930	D-3	2000	6930	D-86	POZO ALMONTE	SALAR PINTADOS	CORFO-H2	CORFO-551	1016.52	14		65/07		
51	017 00 224-4	2010	6940	B-1	2000	6930	B-10	POZO ALMONTE	HUMBERSTONE 3	DOS	DOS-337	1036.20	51		54/10	34.85	1003
52	017 00 225-2	2010	6940	B-2	2000	6930	B-11	POZO ALMONTE	HUMBERSTONE 1	RIEGO	RIEGO	1035.92	107		56/07		
50	017 00 226-0	2010	6940	B-3	2000	6930	B12	POZO ALMONTE	HUMBERSTONE 2	RIEGO	RIEGO	1039.22	105	234.7	52/06	35.49	1003
54	017 00 227-9	2010	6940	C-1	2000	6930	C-1	POZO ALMONTE	POZO ALMONTE	DOS		1026.50					
65	017 00 107-8	2010	6940	C-2	2000	6930	C-2	POZO ALMONTE	SALARPINTADOS	CORFO-A1	CORFO-551	1020.57	28		65/08		
75	017 00 228-7	2010	6940	D-1	2000	6930	D-1	POZO ALMONTE	PTA. SARA 1	DOS	DOS-338		176		50/03		
73	017 00 106-8	2010	6940	D-2	2000	6930	D-2	POZO ALMONTE	PTA. SARA 1A	DOS	DOS-339	1018.20	161		52/12		
74	017 00 111-6	2010	6940	D-3	2000	6930	D-3	POZO ALMONTE	PTA. SARA 2	DOS	DOS-340		148				
76	017 00 229-5	2010	6940	D-4	2000	6930	D-4	POZO ALMONTE	PTA. SARA 3	DOS	DOS-341	1018.40	53	18.2	52/07		
72	017 00 129-9	2010	6940	D-5	2000	6930	D-5	POZO ALMONTE	PTA. SARA 3A	DOS	DOS-342	1019.43	54	446.3	53/11	21.42	99
77	017 00 230-9	2010	6940	D-6	2000	6930	D-6	POZO ALMONTE	PTA. SARA 4	DOS	DOS-343		102		52/11		
78	017 00 231-7	2010	6940	D-7	2000	6930	D-7	POZO ALMONTE	PTA. SARA 5	DOS	DOS-344		73		53/09		
79	017 00 232-5	2010	6940	D-8	2000	6930	D-8	POZO ALMONTE	PTA. SARA 5A	DOS	DOS-345		54	172.8	54/04		
80	017 00 233-3	2010	6940	D-9	2000	6930	D-9	POZO ALMONTE	PTA. SARA 6	DOS	DOS-348		79		53/06		
81	017 00 133-7	2010	6940	D-10	2000	6930	D-10	POZO ALMONTE	SARA TIRANA 8	DOS	DOS-349		84		54/08		
55	017 00 130-2	2010	6940	D-11	2000	6930	D-40	POZO ALMONTE	POZO ALMONTE 1	CORFO	CORFO-612	1028.03	190	143.6	67/07	26.92	99
56	017 00 234-1	2010	6940	D-12	2000	6930	D-41	POZO ALMONTE	POZO ALMONTE 2	CORFO	CORFO-632		176.1		67/03		
86	017 00 235-k	2010	6940	D-13	2000	6930	D-66	POZO ALMONTE	SALAR PINTADOS	CORFO-B1	CORFO-551	1019.52	25		65/08	21.50	99
87	017 00 236-8	2010	6940	D-14	2000	6930	D-69	POZO ALMONTE	SALAR PINTADOS	CORFO-C1	CORFO-551	1016.79	23		65/08		
88	017 00 237-6	2010	6940	D-15	2000	6930	D-70	POZO ALMONTE	SALAR PINTADOS	CORFO-D1	CORFO-551	1015.10	20		65/07		
82	017 00 109-4	2010	6940	D-16	2000	6930	D-74	POZO ALMONTE	SALAR PINTADOS	CORFO-B2	CORFO-551	1013.49	20		65/08		
83	017 00 238-4	2010	6940	D-17	2000	6930	D-75	POZO ALMONTE	SALAR PINTADOS	CORFO-C2	CORFO-551	1011.37	18		65/08		
84	017 00 239-2	2010	6940	D-18	2000	6930	D-76	POZO ALMONTE	SALAR PINTADOS	CORFO-D2	CORFO-551	1007.69	16		65/08		
81A	017 00 240-6	2010	6940	D-19	2000	6900	D-112	POZO ALMONTE	SARA TIRANA	DOS	DOS-360	1010.56	80	288.0	56/02	15.72	99
175	017 00 241-4	2020	6910	A-1	2000	6900	C-6	PICA	PAMPA BRUGGEN 1	RIEGO	RIEGO		325		57/02		
176	017 00 242-2	2020	6910	A-2	2000	6900	C-7	PICA	PAMPA BRUGGEN 1A	RIEGO	RIEGO		250		61/02		
177	017 00 243-0	2020	6910	A-3	2000	6900	C-8	PICA	PAMPA BRUGGEN 2	RIEGO	RIEGO		200		61/08		
178	017 00 244-9	2020	6910	A-4	2000	6900	C-8	PICA	PAMPA BRUGGEN 3	RIEGO	RIEGO		151		61/09		
179	017 00 246-7	2020	6910	A-5	2000	6900	C-10	PICA	PAMPA BRUGGEN 4	G. DE CHILE	RIEGO		175		61/12		

Table B-III, 2.1 (1) Well List (Pampa del Tamarugal)

<Lista de Sondajes (Pampa del Tamarugal)>

DGA CODE	BNA CODE	CORFO CODE(1975) LAT.	LONG.	NO.	CORFO CODE(1980) LAT.	LONG.	NO.	COMMUNITY	LOCATION NAME	NAME OF OWNER	CONSTRUCTOR	ELEVATION (mMSL)	DRILLING DEPTH (m)	SPECIFIC YIELD (m3/d/m)	DATE OF CONSTRUCTION	STATIC WATER LEVEL (93/ 10-11) (mBGL)	(mMSL)
111B	017 00 339-9	2020	6930	D-2	2000	6930	D-45	POZO ALMONTE	LA HUAICA	CORFO-1A	CORFO-659	989.20	11		67/12		
111C	017 00 340-2	2020	6930	D-3	2000	6930	D-46	POZO ALMONTE	LA HUAICA	CORFO-1B	CORFO-659	989.06	11		67/11		
111D	017 00 341-0	2020	6930	D-4	2000	6930	D-47	POZO ALMONTE	LA HUAICA	CORFO-1C	CORFO-659	988.99	23		67/11		
111E	017 00 342-9	2020	6930	D-5	2000	6930	D-48	POZO ALMONTE	LA HUAICA	CORFO-1D	CORFO-659	989.21	11		67/12		
111F	017 00 343-7	2020	6930	D-6	2000	6930	D-49	POZO ALMONTE	LA HUAICA	CORFO-1E	CORFO-659	989.21	11		67/12		
111G	017 00 344-5	2020	6930	D-7	2000	6930	D-50	POZO ALMONTE	LA HUAICA	CORFO-1F	CORFO-659	989.33	23		67/11		
111H	017 00 345-3	2020	6930	D-8	2000	6930	D-51	POZO ALMONTE	LA HUAICA	CORFO-1G	CORFO-659	988.81	15		67/12		
125	017 00 346-1	2020	6930	D-9	2000	6930	D-33	POZO ALMONTE	ESMER. CALERA 3	CORFO	RIEGO	996.00	226				
127	017 00 347-K	2020	6930	D-10	2000	6930	D-25	POZO ALMONTE	P. CANCHONES A	DOS 656	DOS -656	993.90	110				
128	017 00 348-8	2020	6930	D-11	2000	6930	D-26	POZO ALMONTE	P. CANCHONES B	DOS 657	DOS -657	996.21	108				
131	017 00 349-6	2020	6930	D-12	2000	6930	D-29	POZO ALMONTE	P. CANCHONES E	DOS 660	DOS - 660	995.10	54				
126	017 00 350-K	2020	6930	D-13	2000	6930	D-24	POZO ALMONTE	P. CANCHONES G	DOS	RIEGO	989.00	96				
129	017 00 351-8	2020	6930	D-14	2000	6930	D-27	POZO ALMONTE	P. CANCHONES C	DOS- 658	DOS-658	997.33	101				
132	017 00 352-6	2020	6930	D-15	2000	6930	D-30	POZO ALMONTE	P. CANCHONES F	DOS	DOS	998.00	102				
130	017 00 353-4	2020	6930	D-16	2000	6930	D-28	POZO ALMONTE	P. CANCHONES D	DOS-659	DOS-659	997.24	54				
134	017 00 354-2	2020	6930	D-17	2000	6930	D-32	POZO ALMONTE	P. CANCHONES H	DOS	DOS	994.27	100			32.74	961.53
147	017 00 355-0	2020	6930	D-18	2000	6930	D-95	POZO ALMONTE	SALAR PINTADOS	CORFO-H6	CORFO-551	994.71	10		65/07		
126A	017 00 356-9	2020	6930	D-19	2000	6930	D118	POZO ALMONTE	SALAR PINTADOS	CORFO-I6	CORFO-551	993.97	18		65/09		
158	017 00 357-7	2020	6930	D-20	2000	6930	D23	POZO ALMONTE	PTA. CUMINALLA	DOS-496	DOS-496	988.11	108	462.9			
157	017 00 358-5	2020	6930	D-21	2000	6930	D22	POZO ALMONTE	PTA. CUMINALLA	DOS-495	DOS-495	986.06	110				
156	017 00 359-3	2020	6930	D-22	2000	6930	D-21	POZO ALMONTE	PTA. CUMINALLA	DOS-494	DOS-494	986.01	100		61/11		
155	017 00 360-7	2020	6930	D-23	2000	6930	D-20	POZO ALMONTE	PTA. CUMINALLA	DOS-493	DOS-493	986.36	112		61/11		
154	017 00 361-5	2020	6930	D-24	2000	6930	D-114	POZO ALMONTE	SALAR PINTADOS	CORFO-H7	CORFO-551	982.26	6		65/07		
159	017 00 362-3	2020	6930	D-25	2000	6930	D-117	POZO ALMONTE	SALAR PINTADOS	CORFO-I7	CORFO-551	994.37	12		65/09		
167	017 00 363-1	2020	6930	D-26	2000	6930	D-115	POZO ALMONTE	SALAR PINTADOS	CORFO-H8	CORFO-551	985.24	10		65/06	10.50	974.74
168	017 00 364-K	2020	6930	D-27	2000	6930	D-116	POZO ALMONTE	SALAR PINTADOS	CORFO- I8	CORFO-551	997.41	18		65/09		
133	017 00 365-8	2020	6930	D-28	2000	6930	D-31	POZO ALMONTE	PTA. AP CANCHON	DOS	DOS		12		66/07		
126B	017 00 366-6	2020	6930	D-29				POZO ALMONTE	CANCHONES 1	CORFO	CORFO-672		183	408.2	70/04		
	017 00 454-9	2020	6930	D-30				POZO ALMONTE	CANCHONES 1	DOS			110	141.7	81/05		
	017 00 455-7	2020	6930	D-31				POZO ALMONTE	CANCHONES 2	DOS							
	017 00 456-5	2020	6930	D-32				POZO ALMONTE	CANCHONES 3	DOS			110				
	017 00 457-	2020	6930	D-33				POZO ALMONTE	CANCHONES 4	DOS							
	017 00 458-	2020	6930	D-34				POZO ALMONTE	CANCHONES 5	DOS							
	017 00 459-	2020	6930	D-35				POZO ALMONTE	CANCHONES 6	DOS			120		85/09		
	017 00 460-	2020	6930	D-36				POZO ALMONTE	CANCHONES 7	DOS			120				
97	017 00 367-4	2020	6940	A-1	2000	6930	C-3	POZO ALMONTE	SALAR PINTADOS	CORFO T-1	CORFO-551	1007.16	18		65/12		
98	017 00 147-7	2020	6940	B-1	2000	6930	D-81	POZO ALMONTE	S. PINTADOS	CPRFO P-1	CORFP-551	1004.59	15		65/09		
99	017 00 368-2	2020	6940	B-2	2000	6930	D-82	POZO ALMONTE	SALAR PINTADOS	CORFO D-3	CORFO-551	1033.93	13		65/08		
121	017 00 110-8	2020	6940	C-1	2000	6930	C-4	POZO ALMONTE	SALAR PINTADOS	CORFO T-2	CORFO-551	997.75	15		65/11		
162	017 00 112-4	2020	6940	C-2	1930	6930	A-2	POZO ALMONTE	SALAR PINTADOS	CORFO T-3	CORFO-551	990.74	13		65/11	9.28	981.46
113	017 00 136-1	2020	6940	D-1	2030	6930	D-60	POZO ALMONTE	REFRESCO RADIOI	CORFO-1	CORFO-655	994.56	32	34.6	67/10		
114	017 00 369-0	2020	6940	D-2	2030	6930	D-61	POZO ALMONTE	REFRESCO RADIOI	CORFO-1A	CORFO-655	994.97	16		67/04		
115	017 00 370-4	2020	6940	D-3	2030	6930	D-62	POZO ALMONTE	REFRESCO RADIOI	CORFO-1B	CORFO-655	994.98	12		67/10		
116	017 00 371-2	2020	6940	D-4	2030	6930	D-63	POZO ALMONTE	REFRESCO RADIOI	CORFO-1C	CORFO-655	995.01	12		67/10		
117	017 00 272-0	2020	6940	D-5	2030	6930	D-64	POZO ALMONTE	REFRESCO	CORFO-1D	CORFO-655	995.01	12		67/04		
118	017 00 373-9	2020	6940	D-6	2030	6930	D-65	POZO ALMONTE	REFRESCO	CORFO-1E	CORFO-655	995.02	13		67/04		
119	017 00 374-7	2020	6940	D-7	2030	6930	D-66	POZO ALMONTE	REFRESCO	CORFO-1F	CORFO-655	994.93	12		67/10		
120	017 00 375-5	2020	6940	D-8	2030	6930	D-67	POZO ALMONTE	REFRESCO	CORFO-1G	CORFO-655	995.06	12		67/10		
122	017 00 138-8	2020	6940	D-9	2030	6930	D-90	POZO ALMONTE	SALAR PINTADOS	CORFO-P2	CORFO-551	998.20	15		65/09		
123	017 00 139-6	2020	6940	D-10	2030	6930	D-91	POZO ALMONTE	SALAR PINTADOS	CORFO-2	CORFO-551	993.84	15		65/11		
124	017 00 376-3	2020	6940	D-11	2030	6900	D-92	POZO ALMONTE	SALAR PINTADOS	CORFO-G2	CORFO-551	991.72	12		65/10		
135	017 00 377-1	2020	6940	D-12	2030	6900	D-97	POZO ALMONTE	BOSQUE JUNOY	CORFO-W	CORFO-551	993.41	13		66/09		
133	017 00 378-K	2020	6940	D-13	2030	6900	D-102	POZO ALMONTE	BOSQUE JUNOY	CORFO-I1	CORFO-551	991.83	16		66/08		
136	017 00 379-8	2020	6940	D-14	2030	6900	D-98	POZO ALMONTE	SALAR PINTADOS	CORFO-D1	CORFO-551	989.04	15		65/12		
137	017 00 140-K	2020	6940	D-15	2030	6900	D-101	POZO ALMONTE	BOSQUE JUNOY	CORFO-8	CORFO-551		16		66/07	13.51	
150	017 00 380-1	2020	6940	D-16	2030	6900	D-100	POZO ALMONTE	SALAR PINTADOS	CORFO-P3	CORFO-551	989.29	16		65/09		
149	017 00 381-K	2020	6940	D-17	2030	6900	D-99	POZO ALMONTE	BOSQUE JUNOY	CORFO-X	CORFO-551	999.61	12		66/09	13.17	986.44
160	017 00 382-8	2020	6940	D-18	2030	6900	D-113	POZO ALMONTE	SALAR PINTADOS	CORFO-P3	CORFO-551	985.45	15		65/11		
163	017 00 383-6	2020	6940	D-19	2030	6900	D-121	POZO ALMONTE	SALAR PINTADOS	CORFO-T3	CORFO-551	987.48	8		66/07		
	017 00 137-K	2020	6940	D-20				POZO ALMONTE									
308	017 00 384-4	2030	6910	A-1	2030	6900	A-2	PICA	P.CHIANTAGUAY C	DOS	DOS	1420.00	265				
307	017 00 385-2	2030	6910	A-2	2030	6900	A-3	PICA	P.CHIANTAGUAY G	DOS	DOS	1312.00	67				
306	017 00 386-0	2030	6910	A-3	2030	6900	A-4	PICA	P.CHIANTAGUAY H	DOS	DOS	1305.00	182				
305	017 00 387-9	2030	6910	A-4	2030	6900	A-5	PICA	P.CHIANTAGUAY I	DOS	DOS	1303.00	66				
304	017 00 388-7	2030	6910	A-5	2030	6900	A-6	PICA	P.CHIANTAGUAY J	DOS	DOS	1289.00	35				
312	017 00 389-5	2030	6910	A-6	2030	6900	A15	PICA	MATILLA 2	CORFO	CORFO-676	1307.70	185	13.6	67/09		
313	017 00 390-9	2030	6910	A-7	2030	6900	A-16	PICA	MATILLA 3	CORFO	CORFO-697	1316.54	141	3.3	67/12		
317	017 00 391-7	2030	6910	A-8	2030	6900	A-14	PICA	MATILLA 1	CORFO	CORFO-547	1283.48	159		66/04		
318	017 00 392-5	2030	6910	A-9	2030	6900	A-26	PICA	PUQUIO NUNEZ A	RIEGO	RIEGO	1352.00	52				
319	017 00 393-3	2030	6910	A-10	2030	6900	A-10	PICA	PUQUIO NUNEZ 1	RIEGO	RIEGO	1526.50	376		57/02		
321	017 00 394-1	2030	6910	A-11	2030	6900	A-25	PICA	PUQUIO NUNEZ 2	CORFO	CORFO-734	1288.10	206	5.2	66/09		
322	017 00 395-K	2030	6910	C-1	2030	6900	A-24	PICA	PUQUIO NUNEZ 1	CORFO	CORFO-716	1253.70	230		68/04		
320	017 00 143-4	2030	6920	A-1	2030	6900	A-22	PICA	PINTADOS PICA 2	CORFO	CORFO-671	1039.38	159		67/07		
315	017 00 114-0	2030	6920	A-2	2030	6900	A-23	PICA	PINTADOS PICA 3	CORFO	CORFO-674	1057.89	201		67/07	71.56	986.33
301	017 00 142-6	2030	6920	B-1	2030	6900	A-17	PICA	MATILLA 4	CORFO	CORFO-711	1136.60	59				
302	017 00 117-5	2030	6920	B-2	2030	6930	A-18	PICA	MATILLA 5	CORFO	CORFO-764	1136.60	164	6.6	68/11	3.76	1132.84
309	017 00 396-8	2030	6920	B-3	2030	6930	A9	PICA	MATILLA 1A	RIEGO	RIEGO	1113.24	372		61/02		
311	017 00 397-6	2030	6920	B-4	2030	6930	A8	PICA	P.CHIANTAGUAY P	DOS		1208.00					
303	017 00 398-4	2030	6920	B-5	2030	6930	A7	PICA	P. CHIANTAGUAY O	DOS		1213.00					
310	017 00 399-2	2030	6920	B-6	2030	6930	B-13	PICA	POUIO NUNEZ 4	RIEGO	RIEGO	1165.00	112		61/12		
314	017 00 400-K	2030	6920	B-7	2030	6930	A-12	PICA	PUQUIO NUNEZ 3	RIEGO	RIEGO	1169.40			61/12		
316	017 00 401-8	2030	6920	B-8	2030	6930	A-11	PICA	PUQUIO NUNEZ 2	RIEGO	RIEGO	1120.10	187		62/01		
	017 00 469-7	2030	6920	BN-9				PICA	GRANJA MAJOSE								
	017 00 470-0	2030	6920	BN-10	2030	6930	B-26	PICA	E. ARROYO								
	017 00 471-9	2030	6920	BN-11	2030	6930	B-25	PICA	A. NAPOLI P-1								
324	017 00 402-6	2030	6920	C-1	2030	6930	A-20	PICA	CHACARILLA 1	CORFO	CORFO-659	1083.92	267		67/05	62.79	1021.13
325	017 00 403-4	2030	6920	C-2	2030	6930	A21	PICA	CHACARILLA 2	CORFO	CORFO-665	1083.49	194	37.6	68/03	62.25	1021.24
323	017 00 404-2	2030	6920	D-1	2030	6930	A-1	PICA	PUQUIO NUNEZ B	RIEGO	RIEGO	1205.00	52			20.63	1184.37
	017 00 909-	2030	6920	D-2					P.NUNEZ								
	017 00 910-	2030	6920	D-3					P.NUNEZ								
238	017 00 113-2	2030	6930	A-1	2030	6930	B-11	POZO ALMONTE	PINTADOS RADIO	CORFO-1	CORFO-656	975.84	30		67/10	6.56	969.08
239	017 00 405-0	2030	6930	A-2	2030	6930	B-12	POZO ALMONTE	PINTADOS RADIO	CORFO-1A	CORFO-656	975.91	7		67/12		
240	017 00 406-9	2030	6930	A-3	2030	6930	B-13	POZO ALMONTE	PINTADOS RADIO	CORFO-1B	CORFO-656	975.81	7		67/12		
241	017 00 407-7	2030	6930	A-4	2030	6930	B-14	POZO ALMONTE	PINTADOS RADIO	CORFO-1C	CORFO-656	975.83	18		67/12		
242	017 00 123-K	2030	6930	A-5	2030	6930	B-15	POZO ALMONTE	PINTADOS RADIO	CORFO-1D	CORFO-656	975.97	7		67/12		
243	017 00 408-5	2030	6930	A-6	2030	6930	B-16	POZO ALMONTE	PINTADOS RADIO	CORFO-1E	CORFO-656	975.94	7		67/12		
244	017 00 409-3	2030	6930	A-7	2030	6930	B-17	POZO ALMONTE	PINTADOS RADIO	CORFO-1F	CORFO-656	975.99	18		67/12		
245	017 00 410-7	2030	6930	A-8	2030	6930	B-18	POZO ALMONTE	PINTADOS RADIO	CORFO-1G	CORFO-656	975.22	7		67/12		
237	017 00 411-5	2030	6930	A-9	2030	6930	B-28	POZO ALMONTE	SALAR PINTADOS	CORFO-P5	CORFO-656	975.34	8		65/10	6.21	969.13
230	017 00 412-3	2030	6930	A-10	2030	6930	B-25	POZO ALMONTE	BOSQUE JUNOY	CORFO-13	CORFO-551	981.16	8		66/06	11.39	969.77
248	017 00 413-1	2030	6930	A-11	2030	6930	B-48	POZO ALMONTE	SALAR PINTADOS	CORFO-P1	CORFO-561	980.25	8		66/01		
232	017 00 414-K	2030	6930	B-1	2030	6930	B-10	POZO ALMONTE	SALAR PINTAD E2	ENAP	ENAP	988.80	1265				
231	017 00 415-8	2030	6930	B-2	2030	6930	B-9	POZO ALMONTE	SALAR PINTAD 2	ENAP	ENAP	988.80	132	267.8		13.61	975.19
233	017 00 416-6	2030	6930	B-3	2030	6930	B-26	POZO ALMONTE	SALAR PINTADOS	CORFO-H9	CORFO-561	980.58	13		65/06		
234	017 00 417-4	2030	6930	B-4	2030	6930	B-27	POZO ALMONTE	SALAR PINTADOS	CORFO-I9	CORFO-551	1005.16	31		65/09		
249	017 00 418-2	2030	6930	B-5	2030	6930	B-29	POZO ALMONTE	SALAR PINTADOS	CORFO-H10	CORFO-661	980.56	19		65/06		
250	017 00 419-0	2030	6930	B-6	2030	6930	B-35	POZO ALMONTE	SALAR PINTADOS	CORFO-H11	CORFO-561	991.45	21				

Table B-III, 2.1 (1) Well List (Pampa del Tamarugal)

<Lista de Sondajes (Pampa del Tamarugal)>

DGA CODE	BNA CODE	CORFO CODE(1975)			CORFO CODE(1980)			COMMUNITY	LOCATION NAME	NAME OF OWNER	CONSTRUCTOR	ELEVATION (mMSL)	DRILLING DEPTH (m)	SPECIFIC YIELD (m3/d/m)	DATE OF CONSTRUCTION	STATIC WATER LEVEL (93/ 10-11)	
		LAT.	LONG.	NO.	LAT.	LONG.	NO.									(mBGL)	(mMSL)
181	017 00 246-5	2020	6910	A-6	2000	6900	C-52	PICA	PAMPA PICA 1	U. DE CHILE					56/		
180	017 00 247-3	2020	6910	A-7	2000	6900	C-53	PICA	PAMPA PICA 2	RIEGO					56/		
215	017 00 248-1	2020	6910	C-1	2000	6900	C-54	PICA	PUQUIO LORETO D	RIEGO	RIEGO	1420.00	110		19/		
218	017 00 249-k	2020	6910	C-2	2000	6900	C55	PICA	PUQUIO MIRAF. N	RIEGO	RIEGO		131		31/		
221	017 00 250-3	2020	6910	C-3	2000	6900	C-56	PICA	PUQUIO CONCOV.S	RIEGO	RIEGO	1458.00	54				
226	017 00 251-1	2020	6910	C-4	2000	6900	C-57	PICA	PUQUIO CARMEN E	RIEGO	RIEGO	1350.00			22/		
223	017 00 252-k	2020	6910	C-5	2000	6900	C-58	PICA	CONCOVA 1 P.TT°	CORFO	CORFO-679A	1476.06	218	32.4	68/02		
222	017 00 253-8	2020	6910	C-6	2000	6900	C-60	PICA	CONCOVA 2 C.+3	CORFO	CORFO-688	1479.23	100	12.1	67/12		
216	017 00 254-6	2020	6910	C-7	2000	6900	C-60	PICA	LORETO 1	CORFO	CORFO-720		90		66/02		
217	017 00 255-4	2020	6910	C-8	2000	6900	C-61	PICA	LORETO 2	CORFO	CORFO-724	1446.75	48		68/04		
219	017 00 256-2	2020	6910	C-9	2000	6900	C-62	PICA	LORETO 3	CORFO	CORFO-736	1450.78	208		68/08	39.08	1411.70
218A	017 00 257-0	2020	6910	C-10				PICA	PAMPA MIRAFLO.1	RIEGO	RIEGO		48				
218B	017 00 258-9	2020	6910	C-11				PICA	PAMPA MIRAFLO.M	RIEGO	RIEGO		50				
218C	017 00 259-7	2020	6910	C-12				PICA	PAMPA MIRAFLO.6	RIEGO	RIEGO		50				
219A	017 00 260-0	2020	6910	C-13				PICA	PMPA.CONCOVA R	RIEGO	RIEGO		77				
219B	017 00 261-9	2020	6910	C-14				PICA	PMPA. CONCOVA T	RIEGO	RIEGO		81				
172	017 00 262-7	2020	6920	A-1	2000	6900	C-1	PICA	LA CALERA 1	RIEGO	RIEGO	1057.19	195				
170	017 00 263-5	2020	6920	A-2	2000	6900	C-5	PICA	LA CALERA 3	RIEGO	RIEGO	1300.00	283		61/08	66.13	1233.87
171	017 00 264-3	2020	6920	A-3	2000	6900	C-2	PICA	LA CALERA 2	RIEGO	RIEGO	1046.60	75		61/10	19.34	1027.26
174	017 00 265-1	2020	6920	A-4	2000	6900	C-4	PICA	ESMERALDA 6	RIEGO	RIEGO	1007.00	232	103.5	54/08	17.80	989.20
173	017 00 266-k	2020	6920	A-5	2000	6900	C65	PICA	SALAR PINTADOS	CORFO-J5	CORFO-551	1006.23	20		65/09		
212	017 00 135-3	2020	6920	C-1	2000	6900	C11	PICA	ESMERALDA 1	CORFO	RIEGO	1018.00	448		53/08		
224	017 00 267-8	2020	6920	C-2	2000	6900	C12	PICA	ESMERALDA 2	CORFO	RIEGO	1027.00	178		53/08	BURIED	
227	017 00 268-6	2020	6920	D-1	2000	6900	C-5	PICA	SAUQUECITO	RIEGO	RIEGO	1300.00	283		58/20		
220	017 00 269-4	2020	6920	D-2	2000	6900	C13	PICA	ESMERALDA 4	CORFO	RIEGO	1161.44	349		54/11		
213	017 00 270-8	2020	6920	D-3	2000	6900	C-15	PICA	ESMERALDA 7	CORFO	RIEGO	1087.00	360		55/01	42.54	1044.46
214	017 00 271-6	2020	6920	D-4	2000	6900	C-16	PICA	ESMERALDA 8	CORFO	RIEGO	1094.70	450				
225	017 00 272-4	2020	6920	D-5	2000	6900	C-17	PICA	ESMERALDA 9	CORFO	RIEGO	1117.37	312	3.1	55/06		
228	017 00 149-3	2020	6920	D-6	2000	6900	C-20	PICA	ESMERLDA 12	CORFO	RIEGO	1153.91	150		57/12		
210	017 00 273-2	2020	6920	D-7	2000	6900	C-63	PICA	QBDA. SECA 1	CORFO	CORFO-722		18		66/02		
211	017 00 274-0	2020	6920	D-8	2000	6900	C-64	PICA	QBDA. SECA 2	CORFO	CORFO-781	1332.17	183		69/03		
182	017 00 275-9	2020	6920	D-9	2000	6900	C-14	PICA	ESMERLDA 5	CORFO	RIEGO	1113.30	360		55/11		
209A	017 00 276-7	2020	6920	D-10	2000	6900	C-18	PICA	ESMERALDA 10	CORFO	RIEGO						
183	017 00 277-5	2020	6920	D-11	2000	6900	C-19	PICA	ESMERALDA 11	CORFO	RIEGO	1096.60	316		57/05	24.84	1071.76
184	017 00 278-3	2020	6920	D-12	2000	6900	C-21	PICA	ESMERALDA 13	CORFO	RIEGO	1113.30	94				
185	017 00 279-1	2020	6920	D-13	2000	6900	C-22	PICA	ESMERALDA 14	CORFO	RIEGO	1113.34	60				
209B	017 00 280-5	2020	6920	D-14	2000	6900	C-23	PICA	ESMERALDA 15	CORFO	RIEGO	1115.77	100				
186	017 00 281-3	2020	6920	D-15	2000	6900	C-24	PICA	ESMERALDA 16	CORFO	RIEGO	1126.25	120				
187	017 00 282-1	2020	6920	D-16	2000	6900	C-26	PICA	ESMERALDA 18	CORFO	RIEGO	1101.11	150				
188	017 00 283-k	2020	6920	D-17	2000	6900	C-27	PICA	ESMERALDA 19	CORFO	RIEGO	1141.00	130				
189	017 00 284-8	2020	6920	D-18	2000	6900	C-28	PICA	ESMERALDA 20	CORFO	RIEGO	1104.57	150				
190	017 00 285-6	2020	6920	D-19	2000	6900	C-29	PICA	ESMERALDA 21	CORFO	RIEGO	1143.45	150				
191	017 00 286-4	2020	6920	D-20	2000	6900	C-30	PICA	ESMERALDA 22	CORFO	RIEGO	1109.90	150		62/04		
192	017 00 287-2	2020	6920	D-21	2000	6900	C-31	PICA	ESMERALDA 23	CORFO	RIEGO	1132.40	101				
193	017 00 288-0	2020	6920	D-22	2000	6900	C-32	PICA	ESMERALDA 24	CORFO	RIEGO	1130.32	83				
194	017 00 289-9	2020	6920	D-23	2000	6900	C-33	PICA	ESMERALDA 25	CORFO	RIEGO	1123.48	84		62/05		
195	017 00 290-2	2020	6920	D-24	2000	6900	C-34	PICA	ESMERALDA 25A	CORFO		1123.66	61		62/10		
196	017 00 291-0	2020	6920	D-25	2000	6900	C-35	PICA	ESMERALDA 26	CORFO	RIEGO	1110.70	128		62/05		
209D	017 00 292-9	2020	6920	D-26	2000	6900	C-36	PICA	ESMERALDA 27	CORFO	RIEGO		78		62/07		
197	017 00 293-7	2020	6920	D-27	2000	6900	C-37	PICA	ESMERALDA 28	CORFO	RIEGO	1130.92	83		62/07	40.30	1090.62
198	017 00 294-5	2020	6920	D-28	2000	6900	C-38	PICA	ESMERALDA 29	CORFO	RIEGO	1112.03	102		62/06		
199	017 00 295-3	2020	6920	D-29	2000	6900	C-39	PICA	ESMERALDA 30	CORFO	RIEGO	1118.99	70		62/07		
200	017 00 296-1	2020	6920	D-30	2000	6900	C-40	PICA	ESMERALDA 31	CORFO	RIEGO	1111.77	85		62/07	49.50	1062.27
201	017 00 297-k	2020	6920	D-31	2000	6900	C-41	PICA	ESMERALDA 32	CORFO	RIEGO	1115.48	92		62/08		
202	017 00 298-8	2020	6920	D-32	2000	6900	C-42	PICA	ESMERALDA 33	CORFO	RIEGO	1113.45	80		62/08		
203	017 00 299-6	2020	6920	D-33	2000	6900	C-43	PICA	ESMERALDA 34	CORFO	RIEGO	1118.72	85		62/09	45.75	1072.97
204	017 00 300-3	2020	6920	D-34	2000	6900	C-44	PICA	ESMERALDA 35	CORFO	RIEGO	1121.31	83		62/10		
205	017 00 301-1	2020	6920	D-35	2000	6900	C-45	PICA	ESMERALDA 36	CORFO	RIEGO	1120.60	82		62/10		
206	017 00 302-k	2020	6920	D-36	2000	6900	C-46	PICA	ESMERALDA 37	CORFO	RIEGO	1119.98	62		62/09		
207	017 00 303-8	2020	6920	D-37	2000	6900	C-47	PICA	ESMERALDA 38	CORFO	RIEGO	1119.24	82		62/10		
208	017 00 304-6	2020	6920	D-38	2000	6900	C-48	PICA	ESMERALDA 39	CORFO	RIEGO	1122.57	52		62/11		
209	017 00 305-4	2020	6920	D-39	2000	6900	C-49	PICA	ESMERALDA 40	CORFO	RIEGO	1124.97	55		62/11		
209E	017 00 306-2	2020	6920	D-40	2000	6900	C-50	PICA	ESMERALDA 41	CORFO	RIEGO	1122.44	52		62/11		
209F	017 00 307-0	2020	6920	D-41	2000	6900	C-51	PICA	ESMERALDA 42	CORFO	RIEGO	1120.72	50		62/11		
209C	017 00 308-9	2020	6920	D-42	2000	6930	C-25	PICA	ESMERALDA 17	CORFO	RIEGO	1120.16	100		66/07		
110	017 00 309-7	2020	6930	A-1	2000	6930	D-108	PICA	BOSQUE JUNOY 16	CORFO	CORFO-551		12		66/07		
77A	017 00 310-0	2020	6930	A-2	2000	6930	D-11	POZO ALMONTE	LA TIRANA 8A	DOS-347	DOS-347	1008.00	61				
77B	017 00 311-9	2020	6930	A-3	2000	6930	D-12	POZO ALMONTE	LA TIRANA 104A	DOS-439	DOS-439	1007.24	42		58/11		
100	017 00 312-7	2020	6930	A-4	2000	6930	D-83	POZO ALMONTE	SALAR PINTADOS	CORFO-E3	CORFO-551	1000.78	13		65/07	13.06	987.72
101	017 00 313-5	2020	6930	A-5	2000	6930	D-84	POZO ALMONTE	SALAR PINTADOS	CORFO-F3	CORFO-551	1001.59	12		65/07		
102	017 00 314-3	2020	6930	A-6	2000	6930	D-85	POZO ALMONTE	SALAR PINTADOS	CORFO-G3	CORFO-551	1002.49	15		65/07		
108	017 00 315-1	2020	6930	A-7	2000	6930	D-106	POZO ALMONTE	BOSQUE JUNOY 4	CORFO	CORFO-551	1001.18	12		66/07		
107	017 00 316-k	2020	6930	A-8	2000	6930	D-107	POZO ALMONTE	BOSQUE JUNOY 15	CORFO	CORFO-551		12		66/07	9.59	
	017 00 463-8	2020	6930	A-9				POZO ALMONTE									
	017 00 148-5	2020	6930	A-10				POZO ALMONTE									
	017 00 464-6	2020	6930	A-11				POZO ALMONTE									
	017 00 465-4	2020	6930	A-12				POZO ALMONTE									
	017 00 466-2	2020	6930	A-13				POZO ALMONTE	LA TIRANA	DOS			100	135.4	89/04		
	017 00 901-	2020	6930	A-14													
103	017 00 317-8	2020	6930	B-1	2000	6930	D-86	POZO ALMONTE	SALAR PINTADOS	CORFO-H3	CORFO-551	1007.01	14		65/07		
104	017 00 318-6	2020	6930	B-2	2000	6930	D-87	POZO ALMONTE	SALAR PINTADOS	CORFO-I3	CORFO-551		11		65/09		
105	017 00 319-4	2020	6930	B-3	2000	6930	D-88	POZO ALMONTE	SALAR PINTADOS	CORFO-H4	CORFO-551	996.96	10		65/07		
106	017 00 320-8	2020	6930	B-4	2000	6930	D-89	POZO ALMONTE	SALAR PINTADOS	CORFO-14	CORFO-551	996.23	11		65/09		
111	017 00 134-5	2020	6930	B-5	2000	6930	D-94	POZO ALMONTE	SALAR PINTADOS	CORFO-H5	CORFO-551	988.03	8		65/07		
112	017 00 321-6	2020	6930	B-6	2000	6930	D-96	POZO ALMONTE	SALAR PINTADOS	CORFO-15	CORFO-551	991.14	13		65/09		
	017 00 461-1	2020	6930	B-7				POZO ALMONTE									
	017 00 462-K	2020	6930	B-8				POZO ALMONTE									
139	017 00 322-4	2020	6930	C-1	2000	6930	D-13	POZO ALMONTE	PTA. AP HISPANIA	DOS-246	SONDA		100			8.54	
140	017 00 323-2	2020	6930	C-2	2000	6930	D-14	POZO ALMONTE	PTA. AP HISPANIA	DOS-247	SONDA	989.69	106		59/12	9.43	980.26
141	017 00 324-0	2020	6930	C-3	2000	6930	D-15	POZO ALMONTE	PTA. AP HISPANIA	DOS-248	SONDA	990.49	103		60/02		
142	017 00 325-9	2020	6930	C-4	2000	6930	D-16	POZO ALMONTE	PTA. AP HISPANIA	DOS-249	SONDA	990.14	101		60/03		
143	017 00 326-7	2020	6930	C-5	2000	6930	D-17	POZO ALMONTE	PTA. AP HISPANIA	DOS-250	SONDA	989.07	100		59/11		
144	017 00 150-2	2020	6930	C-6	2000	6930	D-18	POZO ALMONTE	PTA. AP HISPANIA	DOS-280	SONDA	988.70	106				
145	017 00 327-5	2020	6930	C-7	2000	6930	D-19	POZO ALMONTE	PTA. AP HISPANIA	DOS-281	SONDA	990.06					
146	017 00 328-3	2020	6930	C-8	2000	6930	D-93	POZO ALMONTE	SALAR PINTADOS	CORFO-Q1	CORFO-551	995.42	9		65/10		
151	017 00 329-1	2020	6930	C-9	2000	6930	D-103	POZO ALMONTE	BOSQUE JUNOY 12	CORFO	CORFO-551	988.80	13		66/08		
148	017 00 330-5	2020	6930	C-10	2000	6930	D-104	POZO ALMONTE	BOSQUE JUNOY 6	CORFO	CORFO-551		12		66/07		
166	017 00 331-3	2020	6930	C-11	2000	6930	D109	POZO ALMONTE	BOSQUE JUNOY 14	CORFO	CORFO-551	991.00	9		66/08		
165	017 00 332-1	2020	6930	C-12	2000	6930	D-110	POZO ALMONTE	BOSQUE JUNOY 1	CORFO	CORFO-551		10		66/08		
164	017 00 333-K	2020	6930	C-13	2000	6930	D-111	POZO ALMONTE	BOSQUE JUNOY 10	CORFO	CORFO-551	983.67	13		66/08		
161	017 00 334-8	2020	6930	C-14	2000	6930	D112	POZO ALMONTE	BOSQUE JUNOY 9	CORFO	CORFO-551	986.76	15		66/07		
153	017 00 335-6	2020	6930	C-15	2000	6930	D-119	POZO ALMONTE	BOSQUE JUNOY 7	CORFO	CORFO-551		13		65/12		
152	017 00 336-4	2020	6930	C-16	2000	6930	D-120	POZO ALMONTE	SALAR PINTADOS	CORFO	CORFO-551	986.74	13		66/08		
109	017 00 337-2	2020	6930	C-17	2000	6930	D-105	POZO ALMONTE	BOSQUE JUNOY 2	CORFO	CORFO-551		18				
	017 00 902-	2020	6930	C-18					LA HUAICA								
	017 00 903-	2020	6930	C-20													
111A	017 00 338-0	2020	6930	D-1	2000	6930	D-44	POZO ALMONTE	LA HUAICA	CORFO-1	CORFO-659	988.98	30		67/11		

Table B-III, 2.1 (1) Well List (Pampa del Tamarugal)

<Lista de Sondajes (Pampa del Tamarugal)>

DGA CODE	BNA CODE	CORFO CODE(1978)			CORFO CODE(1990)			COMMUNITY	LOCATION NAME	NAME OF OWNER	CONSTRUCTOR	ELEVATION	DRILLING DEPTH	SPECIFIC YIELD	DATE OF CONSTRUCTION	STATIC WATER LEVEL (93/ 10-11)	
		LAT.	LONG.	NO.	LAT.	LONG.	NO.					(mASL)	(m)	(m3/d/m)		(mBGL)	(mASL)
252	017 00 420-4	2030	6930	B-7	2030	6930	B-6	POZO ALMONTE	SALAR PINTA. E1	ENAP	ENAP	1001.70	2475			24.04	977.66
251	017 00 421-2	2030	6930	B-8	2030	6930	B-7	POZO ALMONTE	SALAR PINTADOS 1	ENAP	ENAP	1001.70	120	237.6			
254	017 00 118-3	2030	6930	C-1	2030	6930	B-33	POZO ALMONTE	SALAR PINTADOS	CORFO-S1	CORFO-661	975.43	12		85/11	5.34	970.09
255	017 00 422-0	2030	6930	C-2	2030	6930	B-34	POZO ALMONTE	SALAR PINTADOS	CORFO-P7	CORFO-661	978.03	12		85/10		
256	017 00 141-8	2030	6930	C-3	2030	6930	B-19	POZO ALMONTE	SALAR PINTADOS 2	CORFO	CORFO-661	978.29	158		87/08	8.79	969.50
257	017 00 144-2	2030	6930	C-4	2030	6930	B-22	POZO ALMONTE	SALAR PINTADOS 3	CORFO	CORFO-688		84		87/08	8.87	
258	017 00 423-9	2030	6930	C-5	2030	6900	B-21	POZO ALMONTE	SALAR PINTADOS 4	CORFO	CORFO-688		285	118.8	88/08		
265	017 00 151-5	2030	6930	C-6	2030	6900	B-37	POZO ALMONTE	SALAR PINTADOS	CORFO-P8	CORFO-661	979.73	15		85/11		
249	017 00 120-5	2030	6930	C-7	2030	6900	B-30	POZO ALMONTE	SALAR PINTADOS	CORFO-P8	CORFO-661	975.86	7		85/10		
259	017 00 119-1	2030	6930	D-1	2030	6930	B-36	POZO ALMONTE	SALAR PINTADOS	CORFO-H12	CORFO-661	990.05	21		85/12		
253	017 00 121-3	2030	6930	D-2	2030	6930	B-22	POZO ALMONTE	PINTADOS PICA 1	CORFO	CORFO-688	1009.26	110		87/08		
261	017 00 424-7	2030	6930	D-3	2030	6930	B-4	POZO ALMONTE	ESTACION PINTA.3	CO.AG.JEHOVA	RIEGO	987.99	315		68/04		
262	017 00 425-5	2030	6930	D-4	2030	6930	B-6	POZO ALMONTE	ESTACION PINTA.5	CO.AG.JEHOVA	RIEGO	987.99	328				
260	017 00 426-3	2030	6930	D-5	2030	6930	B-5	POZO ALMONTE	ESTACION PINTA.4	CO.AG.JEHOVA	RIEGO	987.43	395			11.97	975.46
263	017 00 150-7	2030	6930	D-6	2030	6930	B-2	POZO ALMONTE	ESTACION PINTA.1	CO.AG.JEHOVA	RIEGO	987.61	172			18.22	969.39
264	017 00 427-1	2030	6930	D-7	2030	6930	B-3	POZO ALMONTE	ESTACION PINTA.2	CO.AG.JEHOVA	RIEGO	983.46					
266	017 00 428-K	2030	6930	D-8	2030	6930	B-40	POZO ALMONTE	SALAR B. VISTA	CORFO-SB3	CORFO-621	984.28	24		68/04		
	017 00 116-7	2030	6930	D-9				POZO ALMONTE									
229	017 00 429-B	2030	6940	B-1	2030	6930	B-24	POZO ALMONTE	SALAR PINTADOS	CORFO-P4	CORFO-661	983.48	10		85/10		
235	017 00 430-1	2030	6940	B-2	2030	6930	B-31	POZO ALMONTE	SALAR PINTADOS	CORFO-S3	CORFO-661	983.07	8		85/11	6.35	976.72
247	017 00 145-0	2030	6940	B-3	2030	6930	B-32	POZO ALMONTE	SALAR PINTADOS	CORFO-S2	CORFO-661	977.04	9		85/11		
238	017 00 146-9	2030	6940	B-4	2030	6930	B-1	POZO ALMONTE	MOSQUITOS 1		RIEGO	978.71	285		57/05	4.20	974.51
326	017 00 122-1	2040	6910	A-1	2030	6930	A-19	PICA	CHACARILLA 1	RIEGO			338			86.00	
327	017 00 431-k	2040	6920	C-1	2030	6930	C-1	POZO ALMONTE	RAMADA 1	CORFO	CORFO-704	1019.28	202		68/07		
328	017 00 432-8	2040	6920	C-2	2030	6930	C-2	POZO ALMONTE	RAMADA 2	CORFO	CORFO-731	1019.55	290	130.1	68/07		
267	017 00 125-8	2040	6930	A-1	2030	6930	B-38	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB1	CORFO-621	970.71	15		68/03	11.15	959.56
268	017 00 433-6	2040	6930	A-2	2030	6930	B-41	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB4	CORFO-621	985.50	10		68/03		
269	017 00 126-4	2040	6930	A-3	2030	6930	B39	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB2	CORFO-621	974.13	18		68/03		
271	017 00 434-4	2040	6930	A-4	2030	6930	B-42	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB5	CORFO-621	970.38	18		68/04	11.56	958.82
273	017 00 435-2	2040	6930	A-5	2030	6930	B-45	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB8	CORFO-621	960.83	10		68/03		
275	017 00 436-0	2040	6930	A-6	2030	6930	B-46	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB9	CORFO-621	968.06	15		68/04	11.30	956.76
276	017 00 157-4	2040	6930	A-7	2030	6930	B-47	POZO ALMONTE	SALAR BELAVISTA	CORFO-SB10	CORFO-621	974.35	20		68/04	16.39	957.96
274	017 00 437-9	2040	6930	A-8	2030	6900	B-23	POZO ALMONTE	OF. VICTORIA 4	SOQUIMICH	RIEGO	954.56	85				
270	017 00 438-7	2040	6930	B-1	2030	6930	B43	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB6	CORFO-621	965.09	25		68/06		
280	017 00 128-0	2040	6930	C-1	2030	6930	D-7	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB12	CORFO-621	958.88	12		68/04	8.73	950.15
283	017 00 152-3	2040	6930	C-2	2030	6930	D-10	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB15	CORFO-621	949.40	8		68/04	2.96	946.44
285	017 00 439-5	2040	6930	C-3	2030	6930	D-11	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB18	CORFO-621	953.50	10		68/04		
287	017 00 440-9	2040	6930	C-4	2030	6930	D-14	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB19	CORFO-621	947.50	7		68/06	3.10	944.40
288	017 00 441-7	2040	6930	C-5	2030	6930	D-15	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB20	CORFO-621	947.15	7		68/08		
278	017 00 442-5	2040	6930	D-1	2030	6930	D-2	POZO ALMONTE	OF. VICTORIA 2	SOQUIMICH	RIEGO	973.05	108		55/02	15.87	957.18
277	017 00 443-3	2040	6930	D-2	2030	6930	D-3	POZO ALMONTE	OF. VICTORIA 3	SOQUIMICH	RIEGO	972.04	335		69/09		
281	017 00 444-1	2040	6930	D-3	2030	6930	D-6	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB13	CORFO-621	974.30	23		68/04	18.82	955.48
282	017 00 445- X	2040	6930	D-4	2030	6930	D-1	POZO ALMONTE	OF. VICTORIA Q	SOQUIMICH	RIEGO-	973.09	156		54/08		
286	017 00 127-2	2040	6930	D-5	2030	6930	D-12	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB17	CORFO-621	972.54	24		68/04	19.85	952.69
289	017 00 446-8	2040	6930	D-6	2030	6930	D-16	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB21	CORFO-621	966.91	12		68/05		
272	017 00 447-6	2040	6940	B-1	2030	6930	B-44	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB7	CORFO-621	962.60	12		68/03	5.80	956.80
279	017 00 448-4	2040	6940	D-1	2030	6930	D-8	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB11	CORFO-621	953.09	15		68/03		
284	017 00 449-2	2040	6940	D-2	2030	6930	D-9	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB14	CORFO-621	946.28	9		68/03		
329	017 00 450-6	2050	6920	A-1	2030	6900	C-3	POZO ALMONTE	CERRO GORDO 1	CORFO	CORFO-703	992.70	140		67/11		
	017 00 467-0	2050	6920	C-1				POZO ALMONTE									
	017 00 472-7	2050	6920	D-2				POZO ALMONTE									
296	017 00 153-1	2050	6930	A-1	2030	6930	D-20	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV3	CORFO-621	923.82	16		66/10		
298	017 00 451-4	2050	6930	A-2	2030	6930	D-22	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV8	CORFO-621	923.30	18		66/10		
291	017 00 452-2	2050	6930	B-1	2030	6930	D-17	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB22	CORFO-621	948.28	10		68/08		
293	017 00 156-6	2050	6930	B-2	2030	6930	D-4	POZO ALMONTE	CHALLACOLLO 1	CORFO	CORFO-675	945.35	88		67/07		
292	017 00 453-0	2050	6930	B-3	2030	6930	D-5	POZO ALMONTE	CHALLACOLLO 2	CORFO	CORFO-677	945.80	21			36.85	908.95
294	017 00 155-8	2050	6930	B-4	2030	6930	D-18	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB23	CORFO-621	945.73	31		68/08	27.17	918.56
295	017 00 154-K	2050	6930	B-5	2030	6930	D-19	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV2	CORFO-621	930.87	22		66/10		
297	017 00 159-0	2050	6930	B-6	2030	6930	D-21	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV5	CORFO-621	931.40	24		66/10		
299	017 00 160-4	2050	6930	D-1	2030	6930	D-23	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV7	CORFO-621	923.21	19		66/10		
300	017 00 163-9	2050	6930	D-2	2030	6930	D-24	POZO ALMONTE	SALAR SUR VIEJO	CORFO-SV11	CORFO-621	927.11	24		66/10		
	017 00 917-6	2050	6930	D-3													
290	017 00 124-8	2050	6940	B-1	2030	6930	D-13	POZO ALMONTE	SALAR BELLAVISTA	CORFO-SB16	CORFO-621	947.56	7		68/08	3.18	944.38
								ZAPIGA		DGA-JICA	JICA J-3	1143.90	180	62.79	93/11	9.17	1134.73
								ZAPIGA	CAMINA	DGA-JICA	JICA J-4	1168.04	150	169.40	93/12	46.18	1121.86
								ZAPIGA	HUARA	DGA-JICA	JICA J-C	1110.86	209	8.20	93/11	52.03	1058.83
								POZO ALMONTE	BAQUEDANO	DGA-JICA	JICA J-D	1056.69	210	300.00	93/12	46.05	1010.64
								POZO ALMONTE	POZO ALMONTE	DGA-JICA	JICA J-5	1030.80	300	720.00	93/12	29.08	1001.72
								POZO ALMONTE	LA TIRANA	DGA-JICA	JICA J-E	1006.03	250	584.60	93/12	13.73	992.30
								POZO ALMONTE	CANCHONES	DGA-JICA	JICA J-6	991.90	200	22.30	93/12	14.04	977.86
								POZO ALMONTE	CONAF	DGA-JICA	JICA J-7	981.64	210	234.60	93/12	7.94	973.70
								POZO ALMONTE	PINTADOS	DGA-JICA	JICA J-8	1016.12	210	168.61	93/12	37.99	978.13
								POZO ALMONTE	OFICINA VICTORIA	DGA-JICA	JICA J-F	1016.16	224	142.20	93/01	57.00	959.16
								POZO ALMONTE	OFICINA VICTORIA	DGA-JICA	JICA J-9	969.80	172	168.10	93/01	13.97	955.83

NOTE

(PUNPING TEST)
D/W: DYNAMIC WATER LECEL
S/W: STATIC WATER LEVEL

Table B-III, 2.1 (2) Well List (Pampa del Tamarugal)

<Lista de Sondajes (Pampa del Tamarugal)>

BNA CODE		MAP	CORFO CODE(1975)			UTM		COMMUNITY	LOCATION NAME	NAME OF OWNER	CONSTRUCTOR	ELEVATION (mASL)	DRILLING DEPTH (m)	WELL DEPTH (m)	SPECIFIC YIELD (m2/d)	DATE OF CONSTRUCTION	STAIC WATER LEVEL	
			LAT.	LONG.	NO.	North (m)	East (m)										(mBGL)	(mMSL)
017 00	919	ZP-1	1940	6950	B-6	7.819.853	405.341	HUARA	STA. CATALINA	LUIS PAPIC	--		7.20	7.20	414.7		4.72	
017 00	920	ZP-2	1940	6950	D-4	7.815.343	407.751	HUARA	AGUADA	LUIS PAPIC	--		15.00	15.00	267.9		12.35	
017 00	928	ZP-3	1950	6950	B-1	7.805.763	411.189	HUARA	NEGREROS	SAL. RENACER	CRUZAT		30.25	30.25	154.7	07.89	12.43	
017 00	926	ZP-4	1940	6950	D-10	7.807.004	411.249	HUARA	NEGREROS	SAL. RENACER	CRUZAT		18.50	18.50		07.89	11.10	
017 00	925	ZP-5	1940	6950	D-9	7.807.322	412.083	HUARA	NEGREROS	SAL. RENACER	CRUZAT		26.70	26.70	104.9	07.89	13.73	
017 00	923	ZP-6	1940	6950	D-7	7.808.191	410.724	HUARA	NEGREROS	SAL. RENACER	CRUZAT		20.20	20.20	60.3	07.89	11.24	
017 00	922	ZP-7	1940	6950	D-6	7.808.840	411.377	HUARA	NEGREROS	SAL. RENACER	CRUZAT		45.00	45.00	76.5	06.89	12.98	
017 00	924	ZP-8	1940	6950	D-8	7.807.767	410.395	HUARA	NEGREROS	SAL. RENACER	CRUZAT		12.90	12.90			12.63	
017 00	921	ZP-9	1940	6950	D-5	7.809.917	410.789	HUARA	NEGREROS	SAL. RENACER	CRUZAT		25.40	25.40	95.3	06.89	10.45	
017 00	934	ZP-10	1950	6950	B-4	7.804.136	411.169	HUARA	NEGREROS	MERCK QCA.	SAACOL		24.00	24.00	7.3	02.88	13.19	
017 00	936	ZP-11	1950	6950	B-6	7.803.875	411.520	HUARA	NEGREROS	MERCK QCA.	SAACOL		44.00	44.00	2.4	03.88	14.77	
017 00	935	ZP-12	1950	6950	B-5	7.804.000	412.001	HUARA	NEGREROS	MERCK QCA.	SAACOL		32.00	32.00	5.5	02.88	15.60	
017 00	932	ZP-13	1950	6950	B-3	7.804.613	411.223	HUARA	NEGREROS	MERCK QCA.	SAACOL		66.00	35.00	94.1	12.87	13.50	
017 00	938	ZP-14	1950	6950	B-8	7.803.243	411.275	HUARA	NEGREROS	MERCK QCA.	SAACOL		40.00	40.00	7.4	12.87	14.20	
017 00	939	ZP-15	1950	6950	B-7	7.803.374	411.526	HUARA	NEGREROS	MERCK QCA.	SAACOL		20.40			12.87	17.60	
017 00	941	ZP-16	1950	6950	B-11	7.802.270	409.971	HUARA	NEGREROS	MERCK QCA.	SAACOL		40.00	40.00	21.0	02.88	14.52	
017 00	929	ZP-17	1950	6950	B-2	7.804.584	410.455	HUARA	OF. MERCEDES	MERCK QCA.	SAACOL		22.20		16.4	11.89	14.35	
017 00	937	ZP-18	1950	6950	B-9	7.803.184	410.275	HUARA	NEGREROS	MERCK QCA.	SAACOL		17.00		43.2	11.89	15.00	
017 00	940	ZP-19	1950	6950	B-10	7.802.864	410.126	HUARA	NEGREROS	MERCK QCA.	SAACOL		19.00		933.1	11.89	14.75	
017 00	943	ZP-20	1950	6950	B-13	7.801.776	409.888	HUARA	OF. AGUA SANTA	MERCK QCA.	SAACOL		17.80		95.4	11.89	15.92	
017 00	942	ZP-21	1950	6950	B-12	7.802.217	411.482	HUARA	OF. PROGRESO	MERCK QCA.	SAACOL		17.75		259.2	11.89	15.44	
017 00	947	ZP-22	1950	6940	D-5	7.789.897	421.676	HUARA	STA. ROSA HUARA	MERCK QCA.	SAACOL	1106.25	68.00	68.00	10.3	12.87	48.70	1057.55
017 00	948	ZP-23	1950	6940	D-4	7.789.856	423.320	HUARA	STA. ROSA HUARA	MERCK QCA.	SAACOL	1106.37	93.00	90.00	187.5	04.89	50.97	1055.40
017 00	946	ZP-24	1950	6940	D-3	7.790.940	422.661	HUARA	STA. ROSA HUARA	MERCK QCA.	SAACOL	1110.74	90.00	90.00	352.9	05.89	51.44	1059.30
017 00		ZP-25	1940	6950	A-8	7.824.465	398.974	HUARA	OF. LOS POZOS	INV. JUNIN	CORFO							
017 00		ZP-26	1950	6940	A-9	7.801.445	412.049	HUARA										
017 00	930	ZP-27	1950	6940	A-5	7.804.585	413.382	HUARA	JOSEFINA	MERCK QCA.	SAACOL	1146.28	73.00	68.00	52.1	07.88	18.19	1128.09
017 00	931	ZP-28	1950	6940	A-4	7.804.797	415.920	HUARA	JOSEFINA	MERCK QCA.	SAACOL	1151.35	90.00	70.00	121.2	09.88	25.23	1126.12
017 00	944	ZP-29	1950	6940	A-7	7.800.973	416.060	HUARA	BARCELONA	MERCK QCA.	SAACOL	1146.21	27.00	27.00	28.8		22.00	1124.21
017 00	927	ZP-30	1940	6940	D-1	7.808.558	426.151	HUARA	CURANA	LUIS PAPIC	CRUZAT		45.00	45.00	13.3	07.89	7.50	
017 00	933	ZP-31	1950	6940	A-6	7.804.581	418.317	HUARA	NEGREROS	MERCK QCA.	SAACOL		62.50	61.50	190.5	08.89	25.38	
017 00	955	PA-1				7.758.701	419.112	P. ALMONTE	CARMEN BAJO	W. GONZALEZ	--		28.80	28.80	385.0	05.90	24.99	
017 00	954	PA-2				7.758.732	418.926	P. ALMONTE	CARMEN BAJO	PETROMIN.	--		29.30	29.30	514.9	05.90	25.63	
017 00	950	PA-3				7.787.146	423.456	P. ALMONTE	HORNILLOS	S. RENACER	CRUZAT		84.00	84.00	91.5	05.89	50.00	
017 00	949	PA-4				7.787.242	424.929	P. ALMONTE	HORNILLOS	S. RENACER	CRUZAT		87.00	87.00	347.6	05.89	53.75	
017 00	951	PA-5				7.780.049	425.690	P. ALMONTE	MAPOCHO	M. MAPOCHO	SAACOL		79.00	79.00	250.8	05.91	55.00	
017 00	960	PA-6				7.741.050	442.800	P. ALMONTE	LA GUAYCA	TITO BARRERA	I. CARVAJAL		60.00	60.00	153.5	08.88	11.80	
017 00	963	PA-10				7.739.918	446.226	P. ALMONTE	CANCHONES	SENDOS	SENDOS		54.00	54.00	122.8		18.90	
017 00	962	PA-11				7.740.763	446.244	P. ALMONTE	CANCHONES	SENDOS	SAACOL		110.00	110.00	360.2	05.81	20.35	
017 00	961	PA-12				7.741.082	446.082	P. ALMONTE	CANCHONES	SENDOS	SAACOL		110.00	110.00	496.3	05.81	19.00	
017 00	959	PA-13				7.741.360	446.312	P. ALMONTE	CANCHONES	SENDOS	SAACOL		110.00	110.00	339.9	05.81	17.35	
017 00	953	PA-15				7.765.700	417.250	P. ALMONTE	EL BOSQUE	RIEGO	RIEGO	1050.00	67.00			11.86	27.00	1023.00
017 00	952	PA-16				7.768.500	419.200	P. ALMONTE	EL BOSQUE	RIEGO	RIEGO	1050.00	100.50			10.86		
017 00	968	GT-8				7.716.100	466.900	P. ALMONTE	CHACARILLA	CORFO	CORFO	1300.00	882.00	882.00		02.80	130.00	1170.00
017 00		MM-1				7.708.425	478.260											
017 00	982	VC-1				7.702.276	437.721	P. ALMONTE	SALAR BELLAVISTA	SOQUIMICH	CAPTAGUA		23.80	23.80	46.8	05.88	12.47	
017 00	975	VC-3				7.706.670	431.740	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--						3.30	
017 00	976	VC-4				7.706.641	431.862	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--		109.30	109.30	57.5	10.87	3.75	
017 00	980	VC-5				7.703.192	437.030	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--		17.05	17.05	218.1	10.87	10.33	
017 00	983	VC-6				7.702.321	440.093	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--		20.70	20.70	105.4	05.88	15.11	
017 00	978	VC-7				7.705.620	439.700	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--		24.00	24.00	227.4	08.87	16.30	
017 00	972	VC-8				7.711.636	425.158	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--	959.30	6.50	6.50	51.1	04.88	4.54	954.76
017 00	973	VC-9				7.711.375	426.925	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--	959.22	20.00	20.00	255.4	04.88	4.54	954.68
017 00	977	VC-10				7.706.547	431.728	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--	973.87	6.40	6.40	79.5	05.88	1.64	972.23
017 00	984	VC-12																
017 00	974	VC-14				7.711.363	436.022	P. ALMONTE	OF. VICTORIA	SOQUIMICH	--		34.50	34.50	83.4	05.88	13.80	
017 00	981	VC-15				7.702.448	427.250	P. ALMONTE	OF. VICTORIA	JULIAN NINA	--		8.00	8.00		07.88	2.00	
017 00	986	VC-16				7.698.050	443.960	P. ALMONTE	OF. GRANJA	URRUTICOEC.	CRUZAT		25.30	25.30	282.5	10.91	22.62	
017 00	987	VC-17	107			7.696.890	443.925	P. ALMONTE	OF. GRANJA	URRUTICOEC.	CRUZAT		26.00	26.00	27.8	10.91	19.25	
017 00	985	VC-18				7.699.080	444.500	P. ALMONTE	OF. GRANJA	URRUTICOEC.	CRUZAT		24.45	24.45	162.0	10.91	23.30	
017 00	988	VC-19				7.689.900	439.100	P. ALMONTE	OF. LA GRANJA	URRUTICOEC.	CRUZAT		37.70	37.70	79.2	10.91	17.23	
017 00	989	VC-20				7.688.843	435.598	P. ALMONTE	OF. LA GRANJA	URRUTICOEC.	CRUZAT		28.30	28.30	9.1	10.91	18.65	
017 00	990	VC-21				7.687.799	434.339	P. ALMONTE	CAMPAM. IRIS	URRUTICOEC.	CRUZAT		27.40	27.40	9.4	10.91	13.48	

Note: BNA Code and CORFO Code mentioned in this list are all temporary ones.

(STAIC WATER LEVEL)
mBGL: m BELOW THE GROUND LEVEL
mMSL: m ABOVE THE SEA LEVEL

Table B-III, 2.2 Result of Pumping Test (Pampa del Tamarugal)
< Resultado de Prueba de Bombeo (Pampa del Tamarugal) >

Well No.	Pumping Data (by Constant Test)				
	Static Water Level (m)	Pumping Rate (l/s)	Dynamic Water Level (m)	Drawdown (m)	Specific Yield (l/s/m)
J-C	52.03	2.25	75.75	23.72	0.09
J-D	46.05	22.5	52.53	6.48	3.47
J-E	13.73	27.00	17.72	3.99	6.77
J-F	57.00	20.00	69.15	12.15	1.65
J-3	9.17	5.00	16.05	6.88	0.73
J-4	46.22	4.40	48.20	1.98	2.22
J-5	29.08	5.00	29.68	0.60	8.33
J-6	14.04	4.04	29.70	15.66	0.26
J-7	7.94	5.00	9.78	1.84	2.72
J-8	37.99	3.34	39.52	1.53	2.18
J-9	13.97	5.00	16.57	2.60	1.92

Table B-III, 2.3 Aquifer Constans (JICA Wells)
<Coeficientes de Aculferos (Pozos JICA)>

Well No.	Aquifer Constant		Test Method				Average
			Theis		Jacob		
			Constant	Recovery	Constant	Recovery	
J-C	Transmissibility	(m3/s/m)	5.47E-05	1.22E-04	9.00E-05	1.17E-04	9.59E-05
	Storage Coefficient		1.46E-01		8.25E-03		7.71E-02
	Permeability	(cm/sec)	7.02E-05	1.56E-04	1.15E-04	1.50E-04	1.23E-04
J-D	Transmissibility	(m3/s/m)	6.49E-03	2.85E-02	7.64E-03	2.71E-02	1.74E-02
	Storage Coefficient		6.49E-06		7.86E-08		3.28E-06
	Permeability	(cm/sec)	6.75E-03	2.97E-02	7.95E-03	2.82E-02	1.82E-02
J-E	Transmissibility	(m3/s/m)	1.26E-02	3.67E-03	9.77E-03	3.79E-03	7.46E-03
	Storage Coefficient		8.40E-03		1.43E-04		4.27E-03
	Permeability	(cm/sec)	1.23E-02	3.60E-03	9.57E-03	3.71E-03	7.30E-03
J-F	Transmissibility	(m3/s/m)	4.99E-04	3.10E-04	2.93E-03	2.80E-04	1.00E-03
	Storage Coefficient		4.99E-07		2.63E-44		2.50E-07
	Permeability	(cm/sec)	4.75E-04	2.95E-04	2.79E-03	2.67E-04	9.57E-04
J-3	Transmissibility	(m3/s/m)	1.13E-03	1.65E-03	8.79E-04	1.61E-03	1.32E-03
	Storage Coefficient		3.16E-04		5.01E-03		2.66E-03
	Permeability	(cm/sec)	1.89E-03	2.76E-03	1.47E-03	2.69E-03	2.20E-03
J-4	Transmissibility	(m3/s/m)	3.32E-03	3.90E-03	1.44E-03	3.89E-03	3.14E-03
	Storage Coefficient		7.96E-06		3.12E-02		1.56E-02
	Permeability	(cm/sec)	5.53E-03	6.49E-03	2.40E-03	6.47E-03	5.22E-03
J-5	Transmissibility	(m3/s/m)	1.17E-02	3.92E-03	1.61E-02	3.91E-03	8.91E-03
	Storage Coefficient		1.88E-05		9.78E-09		9.40E-06
	Permeability	(cm/sec)	1.08E-02	3.62E-03	1.49E-02	3.61E-03	8.23E-03
J-6	Transmissibility	(m3/s/m)	3.44E-04	2.10E-04	2.45E-04	2.02E-04	2.50E-04
	Storage Coefficient		1.38E-04		6.44E-03		3.29E-03
	Permeability	(cm/sec)	4.40E-04	2.69E-04	3.14E-04	2.59E-04	3.21E-04
J-7	Transmissibility	(m3/s/m)	4.10E-03	3.28E-03	7.17E-03	3.22E-03	4.44E-03
	Storage Coefficient		1.07E-04		2.24E-10		5.35E-05
	Permeability	(cm/sec)	4.89E-03	3.91E-03	8.56E-03	3.84E-03	5.30E-03
J-8	Transmissibility	(m3/s/m)	2.66E-03	5.43E-03	3.99E-03	5.34E-03	4.36E-03
	Storage Coefficient		2.13E-03		7.98E-06		1.07E-03
	Permeability	(cm/sec)	3.17E-03	6.46E-03	4.75E-03	6.35E-03	5.18E-03
J-9	Transmissibility	(m3/s/m)	4.21E-03	2.91E-03	2.53E-03	2.66E-03	3.08E-03
	Storage Coefficient		2.36E-03		1.76E-03		2.06E-03
	Permeability	(cm/sec)	4.84E-03	3.34E-03	2.91E-03	3.06E-03	3.54E-03

Table B-III, 2.4 Aquifer Constants of Existing Wells
<Coeficientos de Acuíferos de Pozos Existentes>

(Zapiga-Dolores-Negreilos Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks
100-4	7.0	7.14	96	8.89E-03	3.32	J
102-0	15.0	10.00	1031	1.17E-01	1.11	J
101-5	2.5	2.50				J
170	4.0	0.31				J
172	5.0	0.47				J
168	9.0	0.62				J
171	7.0	0.82				J
173	7.0	0.92				J
174	7.5	0.99				J
101-2	6.5	4.06				J
928	6.0	1.79	520	4.15E-02		C
925		1.21	164	1.89E-02		C
923	3.0	0.70	398	5.12E-02		C
922	3.0	0.89	135	1.30E-02		C
921	3.0	1.10	258	2.99E-02		C
936	0.5	0.03	1	2.85E-05	2.42	J
935	0.5	0.06	9	8.16E-04	4.94E-02	J
938	1.0	0.09	3	1.59E-04	1.92	J
941	1.0	0.24	53	3.06E-03	9.99E-10	J
930	8.0	0.60	110	4.55E-03	2.84E-04	J
927		0.15	23	1.75E-03		C
933	5.5	2.20	173	9.02E-03		J
Average		1.68	212	0.0214	1.26	

(Huara Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks
190-6			1440			C
946	2.2	4.1	39	1.56E-04	5.26E-07	J
949		4.0	935	3.37E-02	6.00E-04	C
951	18.0	2.9	284	2.35E-02		J
Average		3.7	675	0.0191	0.0003	

(Pica-Matilla Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks
117-5	6.0	0.08				J
252-k	7.5	0.38				J
253-6	1.1	0.14				J
265-1	42.0	1.89				J
272-4	2.0	0.04				J
389-5	8.0	0.16	6	8.43E-05	2.81E-01	J
390-9	1.0	0.04	312	1.39E-02	4307	J
391 or 392			155			C
394-1	1.5	0.06				J
401-8			49			C
403-4	5.0	0.43				J
Average		0.36	130	6.99E-03	2.15E+03	0

(Pozo Almonte-Canchones-Pintados Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks Rate (l/
129-9	36.0	5.14				J
130-2		1.66	47		4.29E-02	C
131-0	60.0	3.82				J
132-9	30.0	2.61				J
136-1	3.8	0.40	9	8.51E-04	4.14E-01	J
200-7	6.0	0.12				J
202-3	64.0	10.67				J
206-6	25.0	2.08				J
207-4	3.5	0.81	1094	1.06E-01	2.62E-03	J
221-k	40.0	6.78				J
222-8	70.0	4.43	450			C
226-0	47.0	2.72				J
229-5	4.0	0.21				J
232-5	24.0	2.00				J
234-1			4280			C
240-6	20.0	3.33				J
357-7	120.0	5.36				J
366-6	120.0	4.72				J
415-8	9.3	3.10				J
421-2	5.5	2.75				J
423-9	70.0	1.37	920			C
955		4.46	915	2.52E-02	5.00E-04	C
Average		3.26	1102	0.044	0.115	Average

(Oficina Victoria-Bellavista Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks
432-b	25.0	1.51				432-b
445-k	26.0		420	1.39E-02	3.30E-01	J
985		3.04	220		3.00E-03	C
986		0.32	81		5.00E-02	C
987		0.32	157		1.00E-01	C
Average		1.30	219.5	0.014	0.121	Average

(TOTAL PAMPA AREA: except Pica-Matilla Area)

BNA NO.	Discharge Rate (l/s)	Specific Yield (l/sec/m)	Transmissibility (m3/d/m)	Permeability (cm/sec)	Storativity	Remarks
Average		2.43	492	0.024	0.574	

(Note)
C: Existing Data.
J: Estimated by the Study Team on the basis of existing test data.