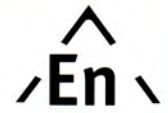
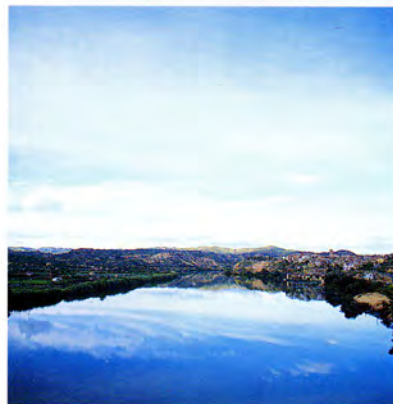




Consorci
d'Aigües
de Tarragona



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Tarragona Water Consortium

Constitution of Tarragona Water Consortium

On 2nd April 1985, the Tarragona Water Consortium was set up as a concern with its own legal personality, on a non profit basis, formed by the Generalitat of Catalonia, town and city councils and industries from the province of Tarragona and representatives of the two Irrigators' Associations of the Ebro Delta.

The Consortium started to supply water to the town and city councils and industries in the consortium on 3rd August 1989.

The Consortium at its beginnings consisted of 21 municipalities and 18 industries and by the year 2000 the consortium was made up of 44 town and city councils and 30 industries.

Governing bodies

According to the articles of association published in the Official Gazette of the Generalitat of Catalonia No. 593, dated 27-IX-85:

The consortium shall be governed by the following bodies: **(Art.5.)**

- a) The General Assembly
- b) The Board of Directors
- c) The President

The General Assembly

The General Assembly consist of: **(Art. 6.)**

NINE representatives of the Generalitat of Catalonia, TWO of whom are proposed by the Irrigators' Associations of the left and right banks of the river Ebro

ONE member for each of the consortium's municipalities and ONE member for each of the industries.

The Board of Directors

The Board of Directors consists of: **(Art. 7.)**

TWO representatives of the Generalitat.

TWO representatives of the municipalities, ONE being the mayor of the municipality with the greatest water consumption, and the other chosen by the other town and city councils.

TWO representatives of the industries chosen by these.

TWO representatives of the Irrigator's Associations.

The President

The President: **(Art. 8.)**

The President of the Consortium will be appointed by the Generalitat of Catalonia from the members of the Assembly.

The Vice-presidency shall be held by the Mayor of the Municipality with the greatest water consumption.





Consortium members in 2.000

On June 31st 2001 the Consortium was set up by the Generalitat of Catalonia and the town and city councils and industries listed below. The Assembly consists of 9 representatives of the Generalitat of Catalonia, amongst whom there is one for each irrigators' association, from the two banks of the Ebro Delta; 46 from town and city councils and 30 from the industries.

Town and City Councils

- Alcanar
- L'Albiol
- Almoster
- Altafulla
- L'Ametlla de Mar
- L'Ampolla
- Amposta
- L'Arboç del Penedès
- Blancafort
- Calafell
- Cambrils
- Castellvell del Camp
- El Catllar
- Constantí
- Creixell
- Cunit
- Els Garidells
- Deltebre-Camarles-L'Aldea
- Mancomunitat Intermunicipal (Deltatres)*
- Maspujols
- Montblanc
- Mont-roig del Camp
- El Morell
- Els Pallaresos
- Perafort
- El Perelló
- La Pobla de Mafumet
- Reus
- Riudoms
- Roda de Barà
- Salou
- Sant Carles de la Ràpita
- Sant Jaume d'Enveja
- Sarral
- La Selva del Camp
- Solivella
- Tarragona
- Torredembarra
- Vallmoll
- Valls
- Vandellòs i l'Hospitalet de l'Infant
- El Vendrell
- Vilallonga del Camp
- Vila-seca
- Vinyols i els Arcs

Industries

- ACESA
- AISCONDEL, SA
- ARAGONESAS INDUSTRIAS Y ENERGÍA
- ASFALTOS ESPAÑOLES, SA
- CENTRAL NUCLEAR VANDELLÒS II, AIE.
- BASF ESPAÑOLA, SA
- BAYER HISPANIA INDUSTRIAL, SA
- MESSER CARBUROS, SA
- COBEGA, SA
- CARBUROS METÁLICOS
- CARDONA HERMANOS, SA
- CARGILL ESPAÑA, SA
- CLARIANT ESPECIALIDADES QUÍMICAS, SL
- COMPLEJO INDUSTRIAL TAQSA, AIE
- DOW CHEMICAL IBÉRICA, SA
- ENDESA
- ERKIMIA, SA
- HERCKELBOUT DAWSON IBÉRICA, SA
- HIFRENSA
- LA SEDA DE BARCELONA-IQA División Química
- INPASA
- BIC IBERIA, SA
- POLÍGON INDUSTRIAL DE CONSTANTÍ
- PERAFORT INVERSIONS, SA
- PRODUCTOS ASFÁLTICOS, SA
- PROMOCIONES TURÍSTICAS DEL MEDITERRÁNEO Y Cía. CB
- REPSOL BUTANO, SA
- REPSOL PETRÓLEO, SA
- REPSOL QUÍMICA, SA
- VERTEDEROS Y RECICLADOS TORREDEMBARRA, SA
- SCA HYGIENE PAPER ESPAÑA, S.L.





1. Background to the Tarragona Water Consortium

Background

In the late seventies there was a marked water shortage in the counties of Tarragona. The growing tourist trade, along with industrial and agricultural development had resulted in soaring water consumption, exhausting the underground resources and salinising the wells.

Only 50 million cubic metres were available, yet 90 million were needed to meet water requirements. In view of this precarious situation the Generalitat of Catalonia asked the Central Spanish Government about the possibility of obtaining water from the river Ebro to meet the needs of the province.

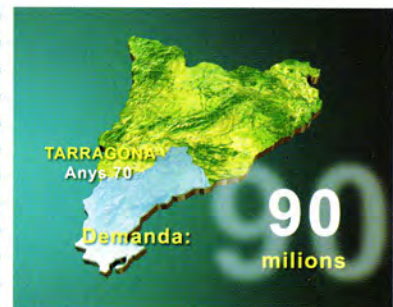


Law 18/81

On 1st July 1981, Law 18/1981 was passed concerning steps to be taken with regard to the water situation in Tarragona.

Section one.

One. The Ministry of Public Works and Development, through the Ebro Hydrographic Confederation, will draw up and execute the Plan for adapting and improving the water infrastructure of the Ebro Delta, to allow greater efficiency in water distribution and its agricultural use, recovering the amounts at present lost in that area.







1. Background to the Tarragona Water Consortium

Two. *A flow equivalent to what is recovered may be used for the urban and industrial supply of municipalities in the province of Tarragona, with the maximum limit of four cubic metres per second, subject to the administrative concession, the granting of which will not commit any volumes of water from the Ebro in addition to that currently allowed for irrigated land in the Delta, for which purposes any necessary readjustments of present concessions shall be made.*



Section two.

One. The concession referred to in the previous section shall be applied for and, where applicable, obtained by town and city councils and industries constituting a Concern with its own legal personality, whose Articles of Association, insofar as these define a concessionary of public waters, will have to be approved by the Ministry of Public Works and Development, not affecting any approvals which may previously have been applicable due to the nature and purposes of the concern, by other bodies of local or state public administration and in particular by the Generalitat of Catalonia autonomous community authority.

Two. The waters conceded shall have to be used exclusively for the purposes defined in this law.

Three. Usage of the waters thus conceded will have to be made, where applicable, with no economic contribution whatsoever from the General State Budget.







1. Background to the Tarragona Water Consortium

Delta Plan

Point One of this law has led to the creation of what is known as the "Delta Plan", infrastructure work designed to waterproof the canals and irrigation channels by lining them with concrete.

Considering that the irrigation canal on the right bank of the river between Xerta and Amposta was built in 1859 and the one on the left bank in 1900, they were in a precarious state at the time the law was passed, with significant water leakage due to filtration, as well as through the land slip and breakages suffered by the channels during flooding.

In late 2000 the total length of channels lined with concrete was 197 Km., with 109 sluice gates and 79 siphons built to allow drainage under the channels, 639 bridges for access to estates replaced, and 100 km. of paths totally or partially surfaced.

This work meant an investment of 23,427 million pesetas by the end of 2000.







2. Water Collection

The water is collected at Camp-redó, a district of Tortosa, for the irrigation channels on the left and right banks of the river.

After passing through rough filtering screens, the water from the right-hand canal is transferred to the left bank by means of two siphons 200 metres long, installed on the river bed and consisting of two pipes 1.200 and 1.600 mm. in diameter.



On the left bank the CAT has facilities including the EB-0 pumping station and a 4.000 cubic metre (4 million litre) suction tank, where the flows collected from the right and left banks are incorporated after passing through the rough filtering screens and the fine mesh filtration drums, in which all particles carried by the water in suspension with a diameter over 1 mm. are retained. The water is then pumped through a 1.60 m. diameter concrete pipe with a steel sleeve to the l'Ampolla waterworks.

The pumping station is fitted with 6 motor pump sets capable of driving the session's 4 cubic metres by second, 3 with a power of 1500 Kw. and 3 with a power of 630 Kw.

5 kms. from the EB-0 pumping station and at the highest point of the route a surge shaft, 41 m. high and 7 m. in diameter, was built to protect the facilities from the so-called "water hammer" affect.



AMPOSTA

Pol. Industrial
de l'Aldea

DELTATRES

CAT

L'AMPOLLA

EL PERELLÓ

L'AMETLLA

HOSPITALET

ST. CARLES
de la RÀPITA

ST. JAUME
d'ENVEJA

POBLENOU

EUCALIPTUS



CAT
Distribution
Network





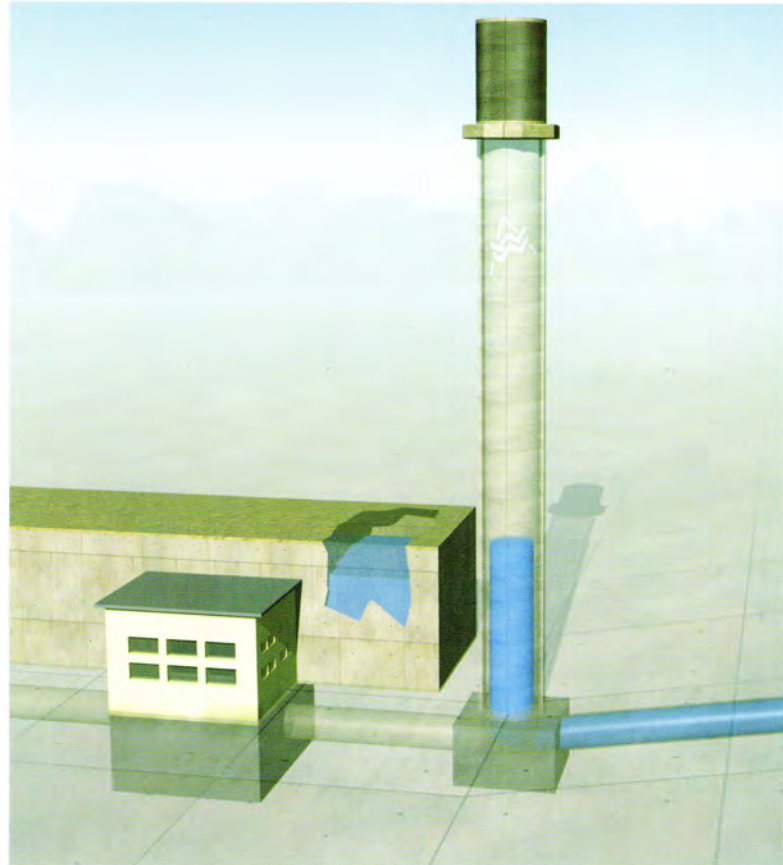


2. The Water Collection

Water Hammer

The water is taken at sea level, lower than the consortium's town and city councils and industries where the water is supplied, this means that when pumping stops there is a water backflow of such force that it would destroy the pumping station installations. The surge shaft is a hollow tower open at the top where the water loses its energy in an up and down movement until it is retained at a determined height.

In its piping network the CAT disposes of the 41 metre shaft in Camp-redó, two of 85 metres each one at the l'Ampolla plant, one the EB-2 station at Hospitalet and another, 30 metres high, in Reus.







3. Treatment Plant

The waterworks in l'Ampolla have a water treatment capacity of 4 cubic metres per second (4.000 litres per second).

This facility was built in two totally symmetrical sections, each with a treatment capacity of 2 cubic metres per second.

Treatment process

The process consists of decanting the particles carried in suspension by the water, correcting the pH and post-chlorination, which guarantees its transport.



Description of the Plant

The water from the EB-0 station (Camp-redó) is sent to tanks with a capacity for 150,000 cubic metres (150 million litres). This is the "untreated water tank" which is designed to regulate the potabilization treatment.

In this tank potassium permanganate is added in order to oxidise the organic material.

From this tank the water is delivered, by gravity to the:



Entry chamber

Here the water is divided so as to pass through the plant's two sections. In this chamber the chlorine dioxide and alumina sulphate are added. The water recovered from washing the sand filters and from the sludge concentrators also ends up here.

Mixing chamber

From the Entry chamber the water is delivered (still by gravity) to the Mixing Chamber, a compartment with mechanical agitation where the polyelectrolyte is added, this being an additive which allows the particles carried in the water in suspension to flocculate.





1. Raw water tank
2. Entry chamber
3. Reactive salts
4. Mixing chamber
5. Flocculation chamber
6. Decantation chamber
7. Sludge concentrators
8. Sand filters
9. Orging pools
10. Recovered water tank
11. Treated water tank
12. Pump room
13. Equilibration stack

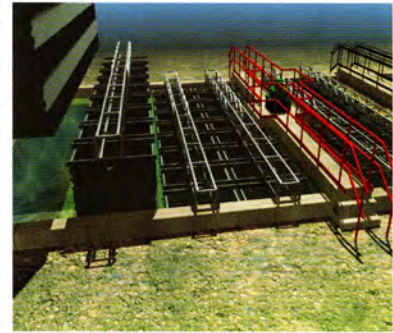


3. Treatment Plant

Flocculators

In this compartment sludge extracted from the process itself is added to the water which is then agitated by rotating turbines, in order to facilitate the reaction with the polyelectrolyte and alumina sulphate, making the particles group together in flocs, (particles that are visible to the naked eye).

Active carbon is also added.



Decantation tanks

In this section the water passes through numerous batteries of "slats", strategically placed plastic sheets, and as the "flocs" hit these they drop to the bottom and are deposited in the form of sludge. After being freed of its flocs the water, now totally transparent, is released through conduits.

The sludge deposited on the bottom will be collected by a rotating scraper at a central outlet and will then be pumped to the Sludge Concentrators.



Sand filter

The water finally passes through chambers whose bottom are covered with a one- metre layer of sand. Here the particles that did not flocculate are trapped between the grains of sand.

These filters are cleaned daily with compressed air, water and air backflow, replacing any sand which is lost in the washing process.

The emerging water is now potable and ready for consumption.



Treated water tank

The water from the sand filters is sent to the treated water tank with a capacity for 38,000 cubic metres, from where the water is then given post-chlorination treatment, in order to avoid subsequent contamination, and is distributed to the municipalities and industries in the consortium, from pumping room EB-1, in which 6 pumps are installed, 2 with two 1,100 and 500 Kw. alternating motors, 2 with two 468 and 200 Kw motors and 2 with one 1,100 Kw motor.

Distribution from the plant takes place through a pipe 1.60 m. in diameter.



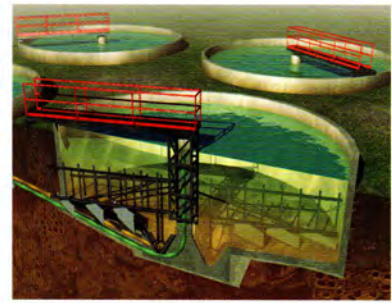




3. Treatment Plant

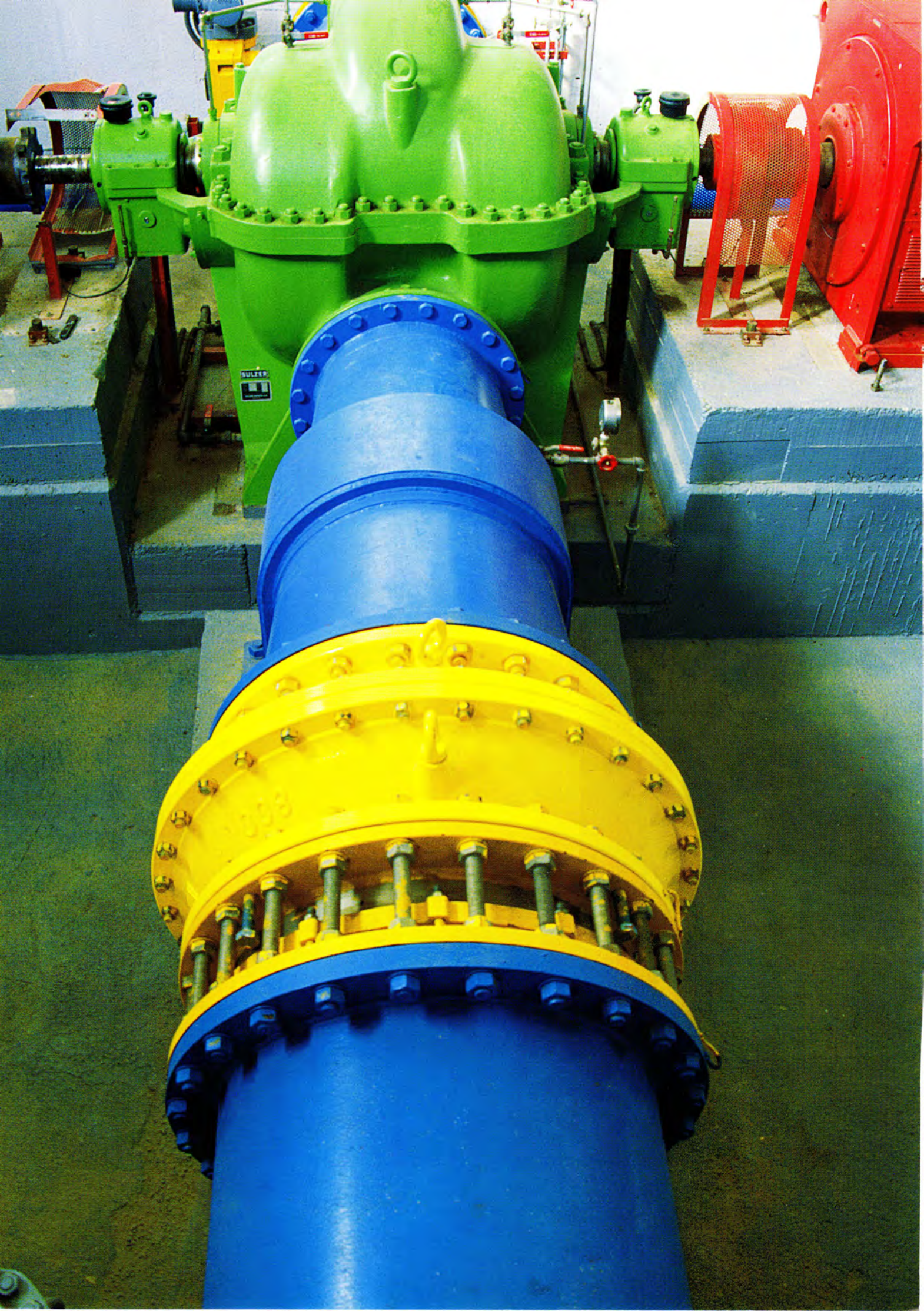
The route taken by the sludges

The sludges collected in the settling chamber are pumped to the sludge concentrators and from there one part will be sent to be processed in the flocculation chamber and the rest to drying floors, where they will dry by evaporation, for later use in agriculture.



Laboratory

The water supplied by the Consortium is analysed daily and continuously, both the untreated water and the potabilized water. At the Plant laboratory the basic physical chemical process analyses are made as well as the tests to determine the proper dosages of all the additives used during treatment.





4. Network and distribution

Network and pumping stations

At the end of 2000 the consortium had 320 km. of pipes installed, 85 Km (Camp-redó-Tarragona) with a diameter of 1.60 m. and the rest with diameters from 80 to 1,300 mm. This network extends from Alcanar in the south of the province, to Cunit on the coast and up to Santa Coloma de Queralt, in the north.

In the water distribution network the Consortium has 18 pumping stations and 11 regulation tanks installed to transport the water to the members of the consortium.

Control

From the control room the water is distributed to over 105 diferents geographics points, starting and stopping the pumps, flows circulating, tank levels, motor temperature, deviation of flows, detection of breakdowns in the network, alarm systems, etc., are coordinated and directed, all through its own telecommunications system. Using the information received, the computers at the control room give the relevant instructions, depending on the work to be done, through pre-established programs, these orders are transmitted by the same data transmission system. The basic telecommunications system runs through its own telephone cable, and in the event of a breakdown a communications system by radio comes into operation.







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