WADI ARAB WASTEWATER TREATMENT PLANT

General Information

AIM

The aim of the WWTP is to protect the environment, especially to avoid the penetration of ground water wells. In addition, its aim is to protect people (the population) against contamination with bacteria.
The treated water, in line with international and national standards, can be used for irrigation purposes.

CLIENT

Water Authority of Jordan (WAJ)

CONSULTANTS

DAR (Germany)
Rhein Ruhr (Germany)
Sigma Consulting Engineers (Jordan)

CONTRACTORS

Preussag Wassertechnik (Germany)
United Enterprises (Jordan)
TECO (Jordan)
and several local subcontractors

FINANCING

Kreditanstalt für Wiederaufbau (KFW)
80% - Loan of the German Government
Water Authority Jordan (WAJ)
20% - Own Founds

Contractual Information

Project:	Wastewater Collection and Treatment Systems in the Greater Irbid Area
Contract:	Wadi Arab Treatment Plant
Contract no.:	174/95 Central

Contract Value (Original):	J.D 18,657,763.000

Client:	Ministry of Water and Irrigation Water Authority P. O. Box 2412 Amman - Jordan
Co-financement:	Kreditanstalt für Wiederaufbau, Frankfurt - Germany
% Financed:	80%

Engineer:	Joint Venture of DAR, RRI (Germany) in association with Sigma Consulting Engineers (Jordan) P. O. Box 20076 Amman 11118 Jordan
Contractor:	Joint Venture United Enterprises Co. - Preussag Noell Wassertechnik GmbH P. O. Box 830287 Amman 11183 Jordan

Date of Agreement:	11.9.1996
Contract Period:	812 days
Commencement Date:	11.9.1996
Completion Date:	3.12.1998
Mobilization Period:	30 days
Completion of Mobilization Period:	10.12.1996

Process and Design Criteria

The sewage treatment plant is designed for the target year 2010 with a possibility for extension until year 2020.

The basic data are as follows:

		2010	2020
Population (rounded)		202,000	311,000
Daily flow Qd	m³/d	20,800	35,100
Peak Factor	---	1.8	1.7
Hourly flow	m³/h	1,560	2,490
Max. inflow Qm	m³/d	2,950	2,950
BOD-load unsettled	kg/BOD/d	12,120	18,660
Suspended solids	kg SS/d	12,120	18,660

The effluent standards to be achieved are:

BOD =< 30 mg/l

COD =< 100 mg/l

NH3 =< 2.5 mg/l

SS =< 30 mg/l

Description of Units

Unit	Type	Operation	Capacity	Main Dimensions
Storm Water Overflow	Side weir	Diversion of storm water before entering WWTP		Ground area: 8.60m x 3.70m Depth: 3.08m
Flow Meter 1	Open Venturi Flume	Metering and recording the flow of the treatment plant	Maximum flow Qm=2.95 m³/h	Ground area: 13.20m x 1.60m Depth: 2.43m
Screen	Coarse Screen: Vertically bar racks Fine Screen: Automatically operated fine screen with conveyor belt and screening press	Removal of large floating and suspended matter	Average flow for 2nd construction phase: Qd=35,100 m³/d Max. flow: Qm=2,950 m³/h	Ground area: 13.20m x 1.60m Depth: 2.43m
Grit Chamber	Aerated grit chamber with parallel grease trap	Removal of grit and grease	Ave. flow in the 2nd construction phase: 35,100 m³/h Max. inflow: Qm=2,950 m³/h	Ground area including bypass channel: 44.20m x 8.25m Depth: 10.45m
Blower House	Single storey building	Air supply for grit chamber		7.90m x 4.90m Height: 3.20m
Distribution Chamber 1	Circular chamber with weir of equal length	Equal distribution of flow to each of the aeration tanks No.1 - 4	Maximum flow in 1st and 2nd construction phase: Qm=2.950 m³/h	Ground area: 34.0m² Diameter: 5.40m Max. Depth: 5.45m
Distribution Chamber 2	Circular chamber with weir of equal length	Equal distribution of flow to each of the aeration tanks No.5 & 6, 1st construction stage and to tanks No.5 to 9, second stage	Maximum flow in 1st construction phase: Qm=985 m³/h In the 2nd phase: Qm=1,640 m³/h	Ground area: 24.0m² Diameter: 4.25m Max. Depth: 5.53m
Aeration Tanks	Actived sludge tanks for completely mixed process Aeration by surface aerators	Convert organic matter into flocculent, settleable solids	Ave. flow for 1st construction phase: Qd=20,800 m³/d Peak flow: Qh=1,560 m³/h Max. flow: Qm=2,950 m³/h	Six tanks Ground area of each tank: 19.00m x 74.50m with 6.80m depth
Sedimentation Tanks	Circular tanks with radial flow	Removal of activated sludge and scum	Ave. flow for 1st construction phase: Qd=20,800 m³/d Peak flow: Qh=1,560 m³/h Max. flow: Qm=2,950 m³/h	Six tanks Diameter: 23.10m Surface area: 419m² Max. depth in sed. area: 6.60m Max. depth in central hopper: 9.00m
Chlorine Contact Basin	Serpentine type	Disinfection of final effluent by chlorine	Ave. daily flow in the 2nd construction phase: Qd=35,100 m³/h Max. flow: Qm=2,290 m³/h	Surface area (total): 16.85m x 50.70m Depth: 4.70m
Chlorination Building	Chlorine vacuum feeder for aqueous solution	Disinfection of effluent	30.0 kg Cl₂/h for 2nd construction phase	Surface area: 150m² Height: 4.00m
Flow Meter 2	Open Venturi Flume	Metering and recording the effluent of the treatment plant to the bypass pipeline of Wadi Arab Dam	Max. flow: Qm=2,950 m³/h	Ground area: 17.20m x 1.60m Depth: 3.42m

continued

Description of Units *(continued)*

Unit	Type	Operation	Capacity	Main Dimensions
Septage Discharge Station	Closed storage tank	Receive septage by tankers from project area	114 m^3/h	Total surface area: 13.20m x 9.40m Height: 5.30m
Return Sludge Pumping Station	Centrifugal pumps	Provide activated sludge return to aeration tanks	Return sludge quantity: 110 m^3/h per each pump	Six pumping stations Surface area of each: 2.30m x 5.40m Depth: 6.10m
Surplus Sludge Pumping Station	Centrifugal pumps	Pump excess sludge to sludge holding tank 2 & 3	Excess sludge quantity: 80 to 160 m^3/h per each pump	Surface area: 3.00m x 5.20m Depth: 5.40m
Sludge Holding Tank No.1	Circular	Thickening of sludge	505 m^3/h for 1st construction phase, 5,005 kg SS/d	Diameter: 13.00m Depth: 7.80m Max. depth is central hopper: 9.55m
Sludge Holding Tanks No.2 and No.3	Circular	Thickening and storage of sludge	505 m^3/h for 1st construction phase, 5,005 kg SS/d	Diameter: 11.20m Depth: 10.25m
Sludge Drying Beds	Conventional drying beds with underdrains	Dewatering of sludge	Ave. quantity: 253 m^3/h	Ground area: 11,300m^2 Length of each bed: 25.00-30.00m Width of each bed: 6.00m
Operation Building and Workshop	Two storey building	Facilities for administration, central control of the whole plant, performance of all required sewage analysis, kitoher, clothing facilities, toilets, storing, stand-by equipment and spare parts		Surface area: 1500m^2
Guard Houses	Single storey building	Entrance control / guard house		Ground area: 15.0m^2
Roads and Footpaths	Asphalt mix, gravel and cement tiles	Connections between the individual units for maintenance and installation of equipment		34,000m^2 asphalted area 4000m^2 foot paths
Box Culverts	Rectangular, reinforced concrete structure	Continuation of roads, wasi crossings		Opening width: 26m^2 for main wadi 2.26m^2 for side
Sewage Lines	Gravity pipework and syphons	Process connection lines between the individual units of the WWTP	Ave. flow including 2nd stage: Q_d=35,100 m^3/d Max. flow: Q_m=2,950 m^3/h	
Supernatant and Internal Sewage	Gravity pipes	Transport of supernatant and internal sewage	Internal sewage: 12 m^3/d Supernatant including 2nd construction phase: 1,555m^3/d	
Wash-down and Irrigation System	Pressure unit with distribution network	Supplying treated effluent water for washing and irrigation to all necessary points	For 2nd construction phase: 100m^3/d	
Drinking Water	Distribution network	Supplying of drinking water to all consumers in the treatment plant and chlorination building	Ave.flow in 2nd construction phase: 12m^3/d	

Wadi Arab Wastewater Treatment Plant - Plan Detail

1 AERATION TANK

5 CHLORINE BASIN

2 SEDIMENTATION TANK

6 GRIT CHAMBER

3 OPERATION BUILDING

7 SCREEN

4 MAIN SUBSTATION

8 SLUDGE DRYING BEDS