CHAPTER VIII HYDROGEOLOGY

8.1 Inventory and Water Quality Survey of Existing Water Sources

8.1.1 Inventory Survey

1) Establishment of Inventory

Since the study has commenced on March 1996, all the data related to water point in South Sinai including cased well, dug well and spring have been collected. The basic data was obtained from WRRI's database namely BADGE and the list of wells made by local branch office of WRRI. To supplement more information to these basic data and existing list, the JICA Study Team carried out inventory surveys.

The survey items cover the measurement of coordinates, elevation, water quality and static water level. Other data, such as well specification, hydrogeological data, were gotten by an investigation of other document such as a drilling report and other study report.

As a result, the inventory that covers a total of 454 water points consist of 157 cased wells, 256 dug wells and 41 springs in 16 different areas was established. Since the BADGE covers only 214 water points in seven different areas or wadis, it is declared that a total of 240 water points were newly supplemented by this inventory survey. Moreover, a total of 10 different areas or wadis, namely Wadi Gharandal, Wadi Zaghara, Wadi Saal, Wadi Dahab, Wadi Kid, Wadi El Garf, Wadi Babaa, Wadi Zalaga, Taba and Wadi El Arish were newly surveyed by JICA Study Team. Most of water points as dug wells and springs were discovered at these newly surveyed wadis.

The contents of the data for 214 water points covered by BADGE, were also supplemented by the review of collected drilling report or other study report. Many of none recorded data in BADGE, such as pumping test data and well specification were identified by the review. These data are mostly cased wells in El Qaa Plain and Pre-Quaternary deep wells.

Based on this survey, the well inventory for water points in South Sinai was established. The inventory was presented in Table 8.1.1-1 (1) to (17) in this report. The below table shows an outline of the inventory established.

Table No.of	Location	Number of Water Source			Number of Data
		Cased Well	Dug Well	Spring	
(1)	El Qaa Plain (1/2), (2/2)	67*	29	5	100
(2)	Wadi Feiran and El Tarfa	0	40	0	40
(3)	St. Catherine	4	18	1	23
(4)	Wadi El Garf and Wadi Baba	0	18	0	18
(5)	Wadi Gharandal	0	12	3	15
(6)	Ras Sudr	0	35	0	35
(7)	Wadi Sudr	0	0	9	9
(8)	Taba	3	0	2	5
(9)	Wadi Watir	9	18	4	31
(10)	Nuweiba Coastal Plain	5	25	0	30
(11)	Wadi Zalaga	0	8	2	9
(12)	Wadi Zaghara / Wadi Nasb	0	8	0	8
(13)	Wadi Saal / Bir Saal	0	24	0	24
(14)	Wadi Dahab	8	0	5	8
(15)	Wadi Kid	1	2	1	3
(16)	Wadi El Arish	0	2	0	2
(17)	Pre-Quaternary (1/2), (2/2)	60	17	9	86
	Total number of Data	157	256	41	446

*: The number of well in El Qaa Plain includes 19 piezometers.

Note: Among Quaternary wells following wells are doubly listed in the Inventory of Pre-Quaternary; One (1) cased well and one (1) spring in El Qaa Plain, and springs in Wadi Zalaga and Wadi Sudr.

2) Contents of Well Inventory

(1) Well Identification and Location

There are two (2) identifications of water point: WRRI Code No. and Well Name. The WRRI Code No. is the code number given by the BADGE database. Numbering method is based on the Map Code No. of the topographic map. On the other hand, the Well Name is the name commonly known or used in the local.

The most of locations of water points were measured by GPS, during a series of inventory survey. The elevation was measured by altimeter in field, if the existing data raised a doubt.

(2) Well Specification

There are description of "Drilling Depth", "Cased Depth", "Screen Position" and "Aquifer". The most of data were obtained by BADGE database and drilling report. The Drilling Depth and Cased Depth entered by meter below ground level. A column of "Screen Position" expresses a position of screen pipe by meter below ground level, and total thickness of screen length by meter was indicated in a parenthesis.

The alphabetical symbol in a column of "Aquifer" express following geological terms;

Q	: Quaternary
UC	: Upper Cretaceous
LC	: Lower Cretaceous
Pre-C	: Precambrian
S+G	: Sand and Gravel
SS	: Sandstone
LS	: Limestone
Gnt	: Granite

(3) Water Quality Data

There are two (2) major description of "JICA Measurement" and "WRRI Periodical Measurement" in this section. The measurement carried out by JICA Study Team, that is TDS value (mg/l) and indication of chemical analysis result are described in JICA's column. The information of previous periodical measurement carried by the WRRI are described in WRRI's column as a period and interval. These information was obtained from CHRONO database established by WRRI.

(4) Hydrogeological Data

Five (5) items of "Static Water Level" (S.W.L), "Dynamic Water Level" (D.W.L), "Discharge Rate", "Specific Yield" and "Transmissivity" is described in this section. These data were obtained by mainly BADGE database and well list of WRRI local office. JICA Study Team measured static water level of dug wells.

(5) Remarks

Information about owner, usage and present condition of wells is described in a last section of "Remarks".

8.1.2 Water Quality Survey and Analysis

1) Existing Data

(1) Availability of Existing Water Quality Data

The chemical analysis data of the groundwater quality have been collected. The data source is mainly CRONO database system of WRRI and partly WRRI's local offices. A total of 188 chemical analysis data was obtained as listed below table.

Table No.of	Location	Number of Water Source			Number of Data
		Cased Well	Dug Well	Spring	
(1)	El Qaa Plain (1/2), (2/2)	38	*56	0	94
(2)	Wadi Feiran and El Tarfa	0	14	0	14
(3)	St. Catherine	0	8	0	8
(4)	Wadi El Garf and Wadi Baba	0	0	0	0
(5)	Wadi Gharandal	0	0	0	0
(6)	Ras Sudr	0	27	6	33
(7)	Wadi Sudr	0	0	0	0
(8)	Taba	0	0	11	11
(9)	Wadi Watir	0	23	0	28
(10)	Nuweiba Coastal Plain	5	0	0	0
(11)	Wadi Zalaga	0	0	0	0
(12)	Wadi Zaghara / Wadi Nasb	0	0	0	0
(13)	Wadi Saal / Bir Saal	0	0	0	0
(14)	Wadi Dahab	0	0	0	0
(15)	Wadi Kid	0	0	0	0
(16)	Wadi El Arish	0	0	0	0
(17)	Pre-Quaternary (1/2), (2/2)	0	0	0	0
	Total number of Data	43	128	17	188

Remark:*out of WRRI's database

As shown as above table, the data are available on major 6 areas of El Qaa Plain, Wadi Feiran & El Tarfa, St. Catherine, Wadi Watir, Nuweiba Coastal Plain and Ras Sudr. No data are available on the other 11 areas. The collected data are presented in Data Book.

Water quality data of El Qaa Plain was obtained from 94 wells. Among them, the data of 38 cased wells is identified by the well inventory. The remainder 56 wells are dug well, and these are out of list of WRRI database. The other data availability are 14 data of dug wells in Wadi Feiran & El Tarfa, 8 data of dug wells in St Catherine, 6 data of springs in Wadi Watir, 28 data (consisting 5 cased wells and 23 dug wells) in Nuweiba Coastal Plain, and 33 data (consisting 27 dug wells and 6 springs) in Ras Sudr. All of these data are listed in WRRI database.

In order to facilitate comparison and grouping of the groundwater type, all the data obtained were plotted on the Piper diagram and Stiff diagram. These diagrams were compiled in Data Book too.

(2) History of Water Quality Measurement

The following table shows the measurement year of the collected data. As shown as the table, the periodical chemical analysis data of the groundwater are recorded only the El Qaa Plain area. In other areas, available data are concentrate in the year of

1994 and 1995.

Area	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
El Qaa Plain	○	○	○	○	○	○	◎	◎	◎	-
Wadi Feiran and El Tarfa	-	-	-	-	-	-	◎	◎	-	-
St Catherine	-	-	-	-	-	-	◎	◎	-	-
Wadi Watir	-	-	-	-	-	-	◎	◎	-	-
Nuweiba Coastal Plain	-	-	-	-	-	-	◎	◎	◎	-
Ras Sudr	-	-	-	-	-	-		◎	-	-

Remarks (as of October, 1996) :

○ data compiled in WRRI's database, ◎ processed by JICA Study Team from the raw data

However, even in El Qaa Plain area, periodical data are not available for all the wells. Well inventory (refer, section 8.1.1) indicates availability of the data. As shown as well inventory of El Qaa Plain, the available data of most of wells is concentrate on the year of 1989. In this period, periodical measurements are recorded through the year with almost one-month interval. Before and after 1989, however, a few data are only recorded.

2) Water Quality Survey

(1) Sampling for Laboratory Test

Apart from previous water quality data measured and recorded by WRRI, JICA Study Team carried out water quality survey through the year of 1997. Purpose of the survey is to supplement and to fill the gap of time and area of the data related to groundwater quality. Therefore, sampling location was distributed on entire area of South Sinai.

A total of 44 water points including 7 newly drilled JICA test wells were selected for location of sampling. The water points selected are consisting of deep cased wells, dug wells, springs and seepage water in the wadi. In these location, seasonable sampling on winter (February 1997) and summer (August 1997) were carried out. The below table shows number of samples collected in each season.

Sampling Season	Number of Samples Measured for	
	Concentration of Major Ions	Drinking Water Standard
Winter (Feb 1997)	39	21
Summer (Aug 1997)	41	24
Total Number of Sample	80	45

The selected locations and number of samples of the winter survey and summer survey are summarized in Table 8.1.2-1 and 8.1.2-2 respectively.

(2) Chemical and Biological Analysis

Water samples taken from the selected water points were analyzed on the following items adopting Drinking Water Standard in Egypt. The results are shown in Table 8.1.2-1 for samples in February and Table 8.1.2-2 for samples in August.

A Concentration of Anion and Cation (mg/l)
Anion (4 items): HCO_3^-, CO_3^{2-}, Cl^-, SO_4^{2-}
Cation (4 items): Ca^{2+}, Mg^{2+}, Na^+, K^+

B Drinking Water Standards Parameter

(i) Physical Properties
Color (Platinum-Cobalt Units)
Turbidity (NTU)
Total Dissolved Solids (TDS: mg/l)

(ii) Chemical Properties
Nitrite (NO_2)
Iron (Fe)
Manganese (Mn)
Total Hardness ($CaCO_3$)
pH

(iii) Bacterial Test
Total Coliform (group/100ml)
Bacteria (N/ml)

All the data obtained were plotted on the Piper diagram, Schoeller graph and Stiff diagram. These diagrams were compiled in Data Book, as an appendix of this Report.

(3) Field Measurement

Field measurement for water quality was also conducted simultaneously with inventory survey. The measurements were carried out in February and September of 1997. The areas surveyed are consisting of 12 major Wadis and 3 areas in South Sinai. These are 15 water points of Wadi Gharandal, 1 water point of Wadi El Humur, 11 water points of Wadi El Garf, 2 water points of Malha Area, 7 water points of Wadi Babaa, 3 water points of Wadi Watir, 8 water points of Wadi Zalaga, 6 water points of Taba Area, 2 water points of Wadi Sheira, 4 water points of Wadi El Hathy, 6 water points of St. Catherine Area, 1 water point of Wadi Saal, 6 water points of Wadi Nasb and 3 water points of Wadi Kid. The surveyed item are TDS (ppm), pH and Temperature.

The result of measurements are shown in Table 8.1.2-3 for February and Table 8.1.2-4 for September .

8.1.3 Existing Database

1) Outline of Groundwater Databases in WRRI

At present, WRRI has used two types of database software (BADGE and CHRONO) developed by BRGM for management of groundwater data. The BADGE manages time independent data. It stores lithological and technical data relating to wells and springs, and is available to deal with statistics, mapping and listing. The CHRONO manages time series of chemical data and water levels, and makes their lists and graphs.

Also, WRRI has a borehole and well data processing software (ACTIF) developed by BRGM. However, several subroutines of the ACTIF have not been supplied, it has not worked well.

2) BADGE

(1) Operation of BADGE

The BADGE allows interactive operation and it has four main screens: SELECTION OF DATABASE, PROCESSES, PRINTING and UTILITY. In the PROCESSES screen, various types of processing are available as follows: creation of new records, modification of old records, selection of records, and sorting. The PRINTING displays well information in the form of tables on screen, on printer, or in DOS files. The UTILITY contains back up and importation of data.

(2) Record Format

The database files are in dBASE III format (*.DBF files). The well database file consists of well records. A well record is related to all lithological and technical data of the well, and made up of several fields. A field refers to an elementary piece of information of a well: for example, the name of well or the date of completion. The field which has name expressed in 6 letters, can be either one of five different types: character, numeric, date (expressed in dd/mm/yy), logical (expressed in Y or N) and code.

The code fields expressed in 2 digits, correspond to items of information for which a list of keywords has been defined in a lexicon.

(3) Number of Wells

The number of well data in the BADGE system is shown in the following table.

Area	Number of wells	Status	Area	Number of wells	Status
El Qaa & Abu Durba	BH 48	○	Gharandal	-	×
	DW 2	○			
St. Catherine & W. Feiran	BH 1	○	Dahab	-	×
	DW 54	○			
Wadi Watir	BH 3	○	Pre-Quaternary	-	×
	DW 45	○			
Sudr	-	×			

BH: Borehole, DW: Dug Well

Status; ○: obtained already, ×: not available

(4) Input of New Data

The well inventory for South Sinai has been compiled based on filed survey and collected data. Also, water level and water quality of selected wells was measured during this study. These new data was input to the BADGE.

3) CHRONO

(1) Operation of CHRONO

The CHRONO is able to carry out interactive operations on time dependent database. The time dependent database consists of daily, monthly, sequential and multiple ones. Water levels are stored in a sequential database and chemical analysis results are put in a multiple database.

The management program of database is available to create, delete or modify records and to check values using graphs and tables.

(2) Record Format

The CHRONO databases are written in the dBASE IV format.

(3) Number of Data

The number of groundwater level and chemical analysis data in the CHRONO is shown in following tables.

Number of Groundwater Level Data

Area	1989	1990	1991	1992	1993	1994	1995	1996
El Qaa / Abu Durba	○	○	○	×	×	×	×	×
Cath. & W. Feiran								
Wadi Watir								
Sudr								
Gharandal								
Dahab								
Pre-Quaternary								

○: obtained already, ×: not available

Number of Chemical Analysis Data

Area	1989	1990	1991	1992	1993	1994	1995	1996
El Qaa / Abu Durba	○	○	○	○	○	◎	◎	◎
Cath. & W. Feiran	○	○	○	○	○	○	◎	-
Wadi Watir	-	-	○	○	○	◎	◎	◎
Sudr	-	-	-	-	-	-	◎	-
Gharandal	-	-	-	-	-	-	◎	◎
Dahab	-	-	-	-	-	-	-	-
Pre-Quaternary	-	-	-	-	-	-	-	-

○: obtained already, ◎: processed by JICA from raw data

(4) Input of New Data

Water level and water quality of selected wells were measured during this study. These new data was input to the CHRONO.

Table 8.1.1-1 (1) Well Inventory (El Qaa Plain 1/2)

No	Well Identification and Location: Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
1	37DA401	QAA 3	283345	332940	98	200.0	145.0	98-140 (42)	Q (S+G)	3220		11/88-12/89	1M,6M	69.76	82.50	90	1.96	1433		irrigation	not in use
2	37DE401	RIWR 8	283623	332631	105.87	200.0	175.0	156-170 (20)	Q (S+G)	4230	(Feb/Aug 97)			90.74					WRRI	Pz	in use
3	37DA402	RIWR 6	283354	332942	102.5	300.0	196.0	175-191 (15)	Q (S+G)			3/89-11/89	1M,3M	75.36					WRRI	Pz	in use
4	37EA401	QAA 16	283306	333035	101	200.0	110.0	76-100(30)	Q (S+G)			10/88-12/89	1M	66.23	68.05	40	6.11	1175	Tamir	irrigation	not in use
5	37EA409	QAA 6	282843	333101	78	200.0	155.0	90-150(50)	Q (S+G)	2170		3/89-6/89	1M	45.85	55.42	67.1	1.95	462	private	irrigation	not in use
6	37EA402	QAA 5	283107	333106	99	120.0	115.0	80-110 (30)	Q (S+G)	1610		10/88-12/89	1M	43.13	69.85	50	0.52	227	Tamir	irrigation	not in use
7	37EE401	QAA 10	282817	333343	64	160.0	160.0	65-95(30)	Q (S+G)	1680	(Feb/Aug 97)	10/88-6/95	1M,7M,66M	39.43	60.65	25	0.33	138		irrigation	abandoned
8	37EA404	QAA 9	282947	333224	75	200.0	120.0	85-115(30)	Q (S+G)	1470		10/88-6/94	1M,5M,9M	45.43	52.35	75	3.01	1028	private	irrigation	not in use
9	37EA405	QAA 2	282838	333343	76.13	200.0	110.0	75-105 (30)	Q (S+G)	1225		3/89-6/89	1M	48.22	64.00	100	4.81	2150	Tamir	irrigation	not in use
10	37EA406	QAA 17	282902	333607	95	200.0	80.0	55-80 (25)	Q (S+G)			10/88-12/89	1M	68.50	71.95	20	1.61	106		irrigation	abandoned
11	37EA403	QAA 5(1)	283108	333139	71.5	200.0	115.0	86-116(30)	Q (S+G)					42.32					Tamir	Pz	in use
12	37EA406	QAA 2(1)	282839	333348	80	110.0	110.0	75-105 (30)	Q (S+G)										Tamir	Pz	not in use
13	37EA407	QAA 2(2)	282839	333349	82.5	200.0	110.0	75-105 (30)	Q (S+G)					58.24	65.19	115	4.58	2150	Tamir	Pz	in use
14	37EE402	Safsaf 1	282926	333533	132			66-89(23)												oil exp.	
15	37EB401	RIWR 7	283136	333501	126.29	405.0	145.0	125-140 (15)	Q (S+G)					102.12					WRRI	Pz	in use
16	43AA401	QAA 16	282741	333401	78	250.0	100.0	65-95(30)	Q (S+G)			10/88-5/91	1M,2M,9M	52.50	55.51	55	5.68	762	private	irrigation	not in use
17	43AB403	QAA 8	282663	333436	64.2	250.0	100.0	65-95(30)	Q (S+G)	1085	(Feb/Aug 97)	10/88-3/96	1M,3M,6M,11M	47.40					private	irrigation	not in use
18	43AB404	QAA 4	282442	333436	55.32	120.0	105.0	75-100(25)	Q (S+G)	2100		7/96-10/96	4M,6M,16M	38.77	50.60	45	1.06	196	private	irrigation	abandoned
19	43AB401	QAA 25	282736	333441	80	200.0	95.0	66-89(25)	Q (S+G)			12/89-6/95	2M,9M,7M						private	irrigation	not in use
20	43AB407	QAA 7	282233	333550	56	250.0	120.0	75-115(40)	Q (S+G)	1330		1/89-6/95	1M,6M	34.17	40.33	101.5	4.55	1226	Tamir	irrigation	not in use
21	43AB402	QAA 25(1)	282729	333441	78.9	200.0	89.0	66-89(25)	Q (S+G)					55.22					Tamir	Pz	in use
22	42AB401	RIWR 6(1)	282429	333749	98.17	500.0	357.0	310-332,342-354 (34)	Q (S+G)					79.35	152.85	20.3	0.08	9		Pz	abandoned
23	42AB403	RIWR 6(2)	282429	333745	98.975	359.0	359.0	308-358(50)	Q (S+G)											irrigation	productive
24	48BB406	QAA 12	281759	333740	74.27	200.0	95.0	66-89(30)	Q (S+G)	508	(Feb/Aug 97)	10/88-3/96	1M,3M,6M	15.85	41.75	50	0.33	81	Tamir	domestic	in use
25	48BB403	QAA 24	282039	333825	45	200.0	75.0	56-70(20)	Q (S+G)			10/88-12/89	1M,2M,4M						Tamir	domestic	not in use
26	48BB404	QAA 15	281957	333646	44.17	300.0	95.0	56-80(40)	Q (S+G)	420	(Feb/Aug 97)	10/88-3/96	1M,4M,7M,13M	21.80	26.00	60	3.97	718	Tamir	domestic	in use
27	48BB405	T 2 (army)	281801	333855	44		102.0	26-100(74)	Q (S+G)			10/88-3/96	1M,3M,8M,12M					744	Army	domestic(SES**)	in use
28	48BB407	QAA 23	281907	333910	50	157.0	95.0	50-80(40)	Q (S+G)	448	(Feb/Aug 97)	10/88-3/96	1M,3M,6M,11M						Tamir	domestic	in use
29	48BB409	QAA 20	281848	334005	65.22	153.0	92.0	65-87(22)	Q (S+G)			10/88-3/96	1M,3M,8M,12M	44.02	53.19	50	1.52	279	Tamir	domestic	in use
30	48BB408	QAA 21	281917	334029	77	200.0	115.0	75-110(35)	Q (S+G)	490	(Feb/Aug 97)	1/89-3/96	1M,4M,8M,11M						Tamir	domestic	in use
31	48BC401	QAA 22	281830	334053	80	200.0	115.0	75-110(35)	Q (S+G)			1/89-9/90	1M,5M,8M						Manic	domestic	in use
32	48BB401	QAA 13	282119	333634	42.1	110.0	100.0	65-95(30)	Q (S+G)			1/89-5/91	1M,5M	23.80	34.20	75	1.93	451	Tamir	irrigation	not in use
33	48BB402	QAA 1	282125	333751	47.24	250.0	120.0	65-85,105-115(30)	Q (S+G)	910		10/88-3/89	5M	27.96	32.00	100	6.88	2145	Tamir	irrigation	not in use
34	48BB414	QAA 14	282110	333950	69.85	110.0	105.0	75-105(30)	Q (S+G)			10/88-3/96	1M,3M,9M,35M						Tamir	irrigation	in use
35	48BB413	RIWR 5	282117	333935	62.68	274.0	256.0	226-236 (10)	Q (S+G)			2/89-11/89	2M,3M	46.00					WRRI	Pz	not in use
36	48BB415	QAA 21(1)	281920	334031	76.65	200.0	115.0	75-110(35)	Q (S+G)										Tamir	Pz	not in use
37	48BB416	QAA 29	282012	333953	60				Q (S+G)	425	(Feb/Aug 97)	1/93-3/96	12M,26M						Manic	domestic	in use
38	48BC402	QAA 28	282024	334057	86				Q (S+G)			1/93-3/96	5M,9M,12						Manic	domestic	in use
39	48CB406	T 1 (army)	281609	333919	55.97		126.0	38-123(85)	Q (S+G)			10/88-3/96	1M,8M,12M,37M					580	Army	domestic(SES**)	in use
40	48CB405	Abu Kalam	281409	333815	19.48				Q (S+G)	2124	(Feb/Aug 97)	5/90-3/96	1M,4M,7M,35M						Kalam	irrigation	in use
41	48CB403	Osman	281434	333841	31.24			15-26(9)	Q (S+G)			1/89-6/95	1M,4M,9M,35M						Osman	irrigation	in use
42	48CC406		281629	334056	78															oil exp.	
43	48CB401	RIWR 1	281536	333616	5.11	49.0	40.0	15-39 (15)	Q (S+G)			1/89-5/89	1M	4.31					WRRI	Pz	in use
44	48CB402	RIWR 2	281552	333650	19.74	54.0	51.0	28-51 (23)	Q (S+G)					11.95					WRRI	Pz	in use
45	48CB407	T 1/1 (amy)	281615	333951	57.23				Q (S+G)			10/88-9/94	1M,7M,9M,36M	39.48					Army	Pz	in use
46	48CB408	T 1/2 (amy)	281615	333951	57.23	43.0			Q (S+G)			10/88-9/94	1M,3M,9M,36M	41.39					Army	Pz	in use
47	48CC402	QAA 26	281502	333956	58.92	170.0	93.0	55-75(20)	Q (S+G)			2/89-3/96	1M,6M,9M,10M						Tamir	domestic	in use
48	48CC407	D 4	281616	334107	86.24															domestic	abandoned
49	48CC408	Oil Test																		oil exp.	
50	48CC403	T 7 (amy)	281450	334010	58.84				Q (S+G)					44.57					Army	Pz	in use
51	48CC404	RIWR 1A	281639	334115	88.36	300.0	281.0	260-270 (10)	Q (S+G)			1/89-11/89	1M	72.45	81.36			52.3	WRRI	Pz	in use
52	48CC405	RIWR 1B	281639	334115	88.34	123.0	120.0	105-115	Q (S+G)			3/89-11/89	1M	70.30					WRRI	Pz	in use
53	48CC409	RIWR 3	281424	334306	133	200.0	195.0	130-190(60)	Q (S+G)					dry						not confirmed	
54	48CC406	RIWR 1C	281640	334115	89	290.0	290.0	260-290(30)	Q (S+G)					73.96	108.90	26.4	0.21		WRRI	Pz	in use
55	48CB409	El Tor 1*	281047	333547	1.2	1011.0						11/89-12/89	1M							oil exp.	
56	47AE405	RIWR 4(1)	282080	334304	140	186.0	186.0	150-175(25)	Q(S)					dry						dry	
57	47AE409	El Qaa 1	282222	333729	58	350.0	335.0	134-209, 265-325(137)	Q (S+G)	2150				39.61	50.25	39.6	1.07	162	WRRI	domestic	
58	47AB410	El Qaa 2	282342	333734	84	350.0	296.0	140-180, 205-230, 250-275(90)	Q (S+G)	1024				63.06	80.68	52	0.82	116	WRRI	domestic	
59	47AB411	El Qaa 3	282324	333802	82	150.0	150.0	71-95, 105-117, 126-138(48)	Q (S+G)	1760				60.65	67.57	60.8	7.38	2283	WRRI	domestic	
60	47AB412	El Qaa 4	282255	333824	78	148.0	146.0	81-93, 113-133(50)	Q (S)					56.59	63.17	72	4.37	1622	WRRI	domestic	
61	47AB413	El Qaa 5	282231	333850	73	162.0	160.0	82-102, 133-147(41)	Q (S+G)					51.50	53.33	60.9	9.23	2639	WRRI	domestic	
62	48AB417	No.6/96 El Qaa	281835	333616	32	133.0	132.5	52-113 (50)	Q (S+G)	1052	(Drilling Report)			21.27	29.47	48.6	1.65	242	WRRI		capped
63	48BB418	No.7/97 El Qaa	281912	333615	40	160.0	159.2	76-149 (62)	Q (S+G)	1934	(Drilling Report)			27.07	29.98	60.45	5.98	342	WRRI		capped
64	48ED401	Petrobel 3	280244	334947	60	200.0	176.0	98-116(18), 119-137(18), 151-175(24)	Q(S+G)	4928	(1997/6/6)			90.20		6			PETROBEL	industry	in use
65	48ED402	Petrobel 2	280240	334963	60	200.0	197.5	175-179(4)	Q(S+G)	4928	(1997/6/6)			75.00		6			PETROBEL	industry	in use
66	48ED403	JICA 7	280929	335218	285	251.0	251.0	196-236(40)	Q(S+G)	493	17/Aug/98			148.99	234.00	6	0.03	0.688	JICA/WRRI	not well	in use

Note: Well with (*) is also listed in the Inventory for Pre-Quaternary Wells

** SES : Sharm El Sheikh

Table 8.1.1-1 (1) Well Inventory (El Qaa Plain 2/2)

Sr. No.	Well Identification and Location: Identification: WRRI Code No.	Well Name	Location: Coordinates: Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	El Qaa Plain Dug Wells																				
2	48AB-013	Salem Soliman	281725	333627	18	9.0	-	-	Q					6.00					private	irr./ dom.	in use
3	48AB-014	Zekri	281739	333658	25	19.0	-	-	Q					11.70					private	irr./ dom.	in use
4	48AB-015	Salem Aoda	281734	333638	17	6.0	-	-	Q					5.30					private	irr./ dom.	in use
5	48AB-016	West Wadi	281707	333631	15	6.0	-	-	Q					3.70					private	irr./ dom.	in use
6	48AB-017	East Wadi	281710	333645	15	2.0	-	-	Q					1.90					private	irr./ dom.	in use
7	48BB-019	Wind mill	281656	333646	16	8.5	-	-	Q					8.00					private	irr./ dom.	in use
8		Mansour Aoda	281657	333654	17	10.0	-	-	Q					7.80					private	irr./ dom.	in use
9		Solimman Mohammed	281701	333652	19	10.0	-	-	Q					10.00					private	irr./ dom.	in use
11	48AB-018	El Tamir	281628	333631	10	6.0	-	-	Q					5.30					private	irr./ dom.	in use
12		Soliman Abu Ledeed	281730	333629	17	11.0	-	-	Q					9.10					private	irr./ dom.	in use
13	48AB-019	Hag Sobah	281728	333632	17	11.0	-	-	Q	1250	(Feb/Aug 97)			8.10					private	irr./ dom.	in use
14	48AB-020	Hussen Mutter	281659	333631	15	8.0	-	-	Q					6.20					private	irr./ dom.	in use
15		Salem Abu Ledeed	281656	333629	15	13.0	-	-	Q					10.00					private	irr./ dom.	in use
16	48AB-021	Salama Mussa	281642	333631	13	10.0	-	-	Q					6.90					private	irr./ dom.	in use
17	48AB-022	Soliman Farag	281628	333626	10	7.0	-	-	Q					4.40					private	irr./ dom.	in use
18	48AB-023	Farag Aoda	281655	333712	25	15.0	-	-	Q					12.40					private	irr./ dom.	in use
19	48AB-024	Yossif Sabah	281714	333712	30	20.0	-	-	Q					18.40					private	irr./ dom.	in use
20		Hameed Aoda	281315	333753	10	5.0	-	-	Q					4.50					private	irr./ dom.	in use
21	48CB-008	Hag Menefy	281320	333750	9	4.0	-	-	Q					3.50					private	irr./ dom.	in use
22	48CB-009	Hassasa	281330	333741	5	5.0	-	-	Q					4.00					private	irr./ dom.	in use
23	48CB-010	Foad Salem 1	281211	333806	9	6.0	-	-	Q					3.80					private	irr./ dom.	in use
24	48CB-011	Salem Aoda	281227	333828	18	15.0	-	-	Q					12.50					private	irr./ dom.	in use
25		Foad Salem 2	281215	333806	9	8.0	-	-	Q					6.90					private	irr./ dom.	in use
26	48CB-012	M. Abu Salem 1	281204	333803	8	7.0	-	-	Q	3280	(Feb/Aug 97)			4.00					private	irr./ dom.	in use
27		M. Abu Salem 2	281202	333801	7	4.0	-	-	Q					2.40					private	irr./ dom.	in use
28	48CB-013	Hemdan Salem	281154	333822	9	4.0	-	-	Q					3.00					private	irr./ dom.	in use
29	48CB-014	Ahmed Badry	281155	333743	31	4.0	-	-	Q					1.80					private	irr./ dom.	in use
30	48CB-015	Abdel Atti S	281132	333757	7	5.0	-	-	Q					4.00					private	irr./ dom.	in use
31		Hameed Aoda	281208	333837	16	4.0	-	-	Q										private	irr./ dom.	in use
	El Qaa Plain Springs																				
1		Hamam Musa*	281603	333549	14	-	-	-	Q	9378	(Feb/Aug 97)								government	bathing	in use
2	47EC-001	W. Hibran	283025	334105	350	-	-	-	Q	900	(Feb/Aug 97)								-	domestic	in use
3	48AC-002	W. Mir	282647	334223	300	-	-	-	Q	685	(Feb/Aug 97)								-	domestic	in use
4	48CE-002	W. Thiman	281216	335645	600	-	-	-	Q	834	(Feb/Aug 97)								-	domestic	in use
5	48CE-001	W. Isra	281438	335254	485	-	-	-	Q	765	(Feb/Aug 97)								-	domestic	in use

Note: Well with (*) is also listed in the Inventory for Pre-Quaternary Wells

Table 8.1.1-1 (2) Well Inventory (Wadi Feiran and El Tarfa)

Sr. No.	Well Identification: WRRI Code No.	Well Identification: Well Name	Location: Coordinates Lat.	Location: Coordinates Long.	Location: Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Well Specification: Cased Depth (mBGL)	Well Specification: Screen Position (m) (thickness)	Well Specification: Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Water Quality Data: JICA Study Team Chemical Analysis	Water Quality Data: Periodical Measurement by WRRI since/to	Water Quality Data: Periodical Measurement by WRRI interval	Hydrogeological Data: S.W.L (mBGL)	Hydrogeological Data: D.W.L (mBGL)	Hydrogeological Data: Discharge Rate (m^3/h)	Hydrogeological Data: Specific Capacity (l/s/m)	Hydrogeological Data: Trans-missivity (m^2/day)	Remarks: Owner	Remarks: Use for	Remarks: Present Condition
	W. Feiran																				
1-8	missing number																				
9	47CE-001	Red Ayd	284140	335651					Q					welded					private		not in use
12	47CE-002	M. Atayq	284129	335639			-	-	Q	443				welded					private		not in use
26	47CC-001	Mohamed Mansour	284251	333946		25.0	-	-	Q (S+G)	576 (15/9/96)		1/94,1/95	12M	20.20		4			private	irrigation	in use
27	47CB-002	Mohamed Salem 1	284241	333921		22.0	-	-	Q (S+G)	796 (Feb/97)	(Feb/Aug 97)			21.00		4			private	irrigation	in use
28	47CB-003	Mohamed Salem 2	284241	333923		20.0	-	-	Q (S+G)	640 (15/9/96)		1/94,1/95	12M	17.35		4			private	irrigation	in use
29	47CB-017	Feiran (Muni)	284242	333921					Q										private		
30	47CB-004	Aoda M. Hassan	284240	333920		20.0	-	-	Q (S+G)	512 (15/9/96)				17.50		4			private	irrigation	in use
31	47CB-007	Hassan Gebaly 1	284207	333911		10.0	-	-	Q (S+G)	512 (15/9/96)		1/94,1/95	12M	8.83		4			private	irrigation	in use
32	47CB-006	Emrazeq 1	284232	333908		12.0	-	-	Q (S+G)	512 (15/9/96)				10.77		3			private	irrigation	in use
33	47CB-008	Hassan Gebaly 2	284210	333855		12.0	-	-	Q (S+G)	640 (15/9/96)		1/95	one data	10.93		3			private	irrigation	in use
34	47CB-018	Emrazeq 2	284207	333916					Q										private		
35	47CB-005	Hassan Dief				20.0	-	-	Q (S+G)	520 (15/9/96)				13.70		6.00			private	irrigation	in use
36	47CB-019	Hassan Hamady	284216	333849					Q										private		
37	47DE-011	Aleian (Spring)	284209	333858		-	-	-	Q (S+G)	257 (15/9/96)				-	-					domestic	in use
38	47CB-009	Aoda Hassan	284219	333841		15.0	-	-	Q (S+G)	660 (15/9/96)				13.20		3			private	irrigation	in use
39	47CB-010	Fiteeh Hassan 1	284236	333838		27.0	-	-	Q (S+G)	576 (15/9/96)				26.00		3			private	irrigation	in use
40	47CB-011	Fiteeh 2	284234	333838		13.0	-	-	Q (S+G)	704 (15/9/96)		1/95	one data	11.70		3			private	irrigation	in use
41	47CB-013	El Briga	284242	333838		14.0	-	-	Q (S+G)	576 (15/9/96)				12.64					private	irrigation	in use
42	47CB-020	El Sheikh Saal	284243	333823					Q										private		
43	47CB-012	Mobark Emam	284248	333824		12.0	-	-	Q (S+G)	640 (15/9/96)		1/95	one data	11.02		3			private	irrigation	in use
44	47CB-014	El Rahebar	284231	333718		25.0	-	-	Q (S+G)	517 (15/9/96)				23.08		4			private	irrigation	in use
45	47CB-015	Mosalam Saleh	284245	333709		15.5	-	-	Q (S+G)	540 (15/9/96)				14.33		15			private	irrigation	in use
46	47CB-021	Ramadan Salem	284256	333707					Q										private		
47	47CB-017	El Hesswa	284257	333655		15.0	-	-	Q (S+G)	580 (15/9/96)		1/95	one data	13.90		4			private	irr./dom.	in use
48	47CB-022	Refai	284244	333715		17.0	-	-	Q (S+G)	694 (Feb/97)	(Feb/Aug 97)			14.95		6.25			private	irr./dom.	in use
	El Tarfa																				
10	47CE-002	Eid Saleh Eid	284136	335648		15.0	-	-	Q (S+G)	384 (15/9/96)		1/94,1/95	12M	15.00		6			private	irrigation	in use
11	47CE-003	Mohamed Sbael	284132	335644		16.0	-	-	Q (S+G)	448 (15/9/96)				14.00		6			private	irrigation	in use
13	47CE-006	Hossen Mohana	284135	335627		16.0	-	-	Q (S+G)	512 (15/9/96)				13.32		6			private	irrigation	in use
14	47CE-007	Abd El Rahman	284139	335628		16.0	-	-	Q (S+G)	448 (15/9/96)				13.00		6			private	irrigation	in use
15	47CE-005	Gomaa Khamis	284134	335629		16.0	-	-	Q (S+G)	448 (15/9/96)	(Feb/Aug 97)	1/94,1/95	12M	14.20		6			private	irrigation	in use
16	47CE-008	Embabi Awad	284141	335623		16.0	-	-	Q (S+G)	640 (15/9/96)				13.90		2			private	irrigation	in use
17	47CE-009	Yassen Matter	284148	335618		18.0	-	-	Q (S+G)	640 (15/9/96)				18.00		4			private	irrigation	in use
18	47CE-010	Hassan Awad Mohane	284150	335602		19.0	-	-	Q (S+G)	640 (15/9/96)		1/94,1/95	12M	10.87		7			private	irrigation	in use
19	47CE-011	Mobarak Saleh 1	284149	335659		18.0	-	-	Q (S+G)	550 (15/9/96)				14.30					private	irrigation	in use
20	47CE-012	Eid Hemed	284147	335657		18.0	-	-	Q (S+G)	576 (15/9/96)				14.50		4			private	irrigation	in use
21	47CE-013	Farha Slama	284147	335649		18.0	-	-	Q (S+G)	576 (15/9/96)		1/94,1/95	12M	14.12		3			private	irrigation	in use
22	47CE-014	Raffe Salama	284142	335641		18.0	-	-	Q (S+G)	640 (15/9/96)		1/94,1/95	12M	14.00		4			private	irrigation	in use
23	47CE-015	Mobarak Saleh 2	284137	335633		18.0	-	-	Q (S+G)	704 (15/9/96)		1/94,1/95	12M	14.14					private	irrigation	in use
24	47CE-016	Abd El RAhman 2	284150	335623		18.0	-	-	Q (S+G)	707 (15/9/96)				14.17					private	irrigation	in use
25	47CD-001	Sahab	284256	334628		42.5	-	-	Q (S+G)	704 (15/9/96)		1/94,1/95	12M	41.91		4			private	irrigation	in use

Table 8.1.1-1 (3) Well Inventory (St. Catherine)

Sr. No.	Identification and Location: Well Identification: WRRI Code No.	Identification and Location: Well Identification: Well Name	Identification and Location: Location: Coordinates: Lat.	Identification and Location: Location: Coordinates: Long.	Identification and Location: Location: Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Well Specification: Cased Depth (mBGL)	Well Specification: Screen Position (m) (thickness)	Well Specification: Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Water Quality Data: JICA Study Team: Chemical Analysis	Water Quality Data: Periodical Measurement by WRRI: since/to	Water Quality Data: Periodical Measurement by WRRI: interval	Hydrogeological Data: S.W.L (mBGL)	Hydrogeological Data: D.W.L (mBGL)	Hydrogeological Data: Discharge Rate (m^3/h)	Hydrogeological Data: Specific Capacity (l/s/m)	Hydrogeological Data: Trans-missivity (m^2/day)	Remarks: Owner	Remarks: Use for	Remarks: Present Condition
	St. Catherine Cased Well																				
1	57DA-002	St. Catherine Well	283627	335937		100			Q (S+G)					48.80					WRRI	test well	in use
2		St. Catherine/ Pz 1							Q										WRRI	monitoring	in use
3		St. Catherine/ Pz 2							Q										WRRI	monitoring	in use
4		St. Catherine/ Pz 3				130	128.35	59-124(65)	Q (S+G)										WRRI	monitoring	in use
	St. Catherine Dug Well																				
5	57DA-001	Zaituna Well	283541	335933		49	-	-	Q	337 (Sep/97)				43.22		($40m^3/d$)					
6	47DE-002	Harouna Well	283407	335756		31	-	-	Q	575 (Feb/97)	(Feb/Aug 97)			29.70		($300m^3/d$)					
7	57CA-004	Sowira 1	283305	335800		10	-	-	Q (S+G)	676 (Feb/97)	(Feb/Aug 97)			2.40		1			private	irrigation	in use
8	57CA-003	Sowira 2	283402	335902			-	-	Q			1/94, 1/95	12M	welded					private	irrigation	in use
9	57CA-001	El Watia	284128	335855	1250	35.25	-	-	Q (S+G)	418 (9Mar97)		1/94, 1/95	12M	30.63		10			government	domestic	in use
10	47DE-001	Ramadan Gabaly	284001	335809		13	-	-	Q (S+G)	576 (15/9/96)		1/94, 1/95	12M	12.00		6			private	irrigation	in use
11	missing number																				
12	47DE-003	Mohamed Farag 1	283332	335731		9	-	-	Q (S+G)	704 (15/9/96)				3.65		6			private	irrigation	in use
13	47DE-004	Khedr A. Salem	283332	335718		16	-	-	Q (S+G)	384 (15/9/96)				14.40		4			private	irrigation	in use
14	47DE-005	Saleh M. Farag	283319	335718		12	-	-	Q (S+G)	384 (15/9/96)		1/94, 1/95	12M	9.70		4			private	irrigation	in use
15	47DE-006	Saady Farag	283343	335735		12	-	-	Q (S+G)	256 (15/9/96)				9.00		4			private	irrigation	in use
16	47DE-007	Mohamed Farag 2	283350	335655		12	-	-	Q (S+G)	256 (15/9/96)		1/94, 1/95	12M	7.65		4			private	irrigation	in use
17	47DE-008	Esmail Ebrahem	283556	335602		10	-	-	Q (S+G)	640 (15/9/96)		1/94, 1/95	12M	4.37		4			private	irrigation	in use
18	47DE-009	Mohamed Mansoor 1	283512	335514		10	-	-	Q (S+G)	448 (15/9/96)				4.15		4			private	irrigation	in use
19	47DE-010	Mohamed Mansoor 2	283508	335512		10	-	-	Q (S+G)	220 (15/9/96)		1/94, 1/95	12M	4.65		4			private	irrigation	in use
20	47EE-001	Ahamed Mansour	283128	335541		16	-	-	Q (S+G)	256 (15/9/96)		1/94, 1/95	12M	12.50		4			private	irrigation	in use
21	57CA-002	El Halwagy	284009	335927																	
22	missing number																				
23	47DE-012	El Rabba (Spring)	283315	335644	1600		-	-		160 (9Mar.97)	(Feb/Aug 97)										in use
24	57CA-004	Bir El Suweir	283847	340002	1330	12.23	-	-		643 (9Mar.97)				2.49							in use
25	57CA-005	Farag Sabaa Farm	284305	340335	1290	17	-	-		423 (9Mar.97)				15.10							in use
26	missing number																				

Table 8.1.1-1 (4) Well Inventory (Wadi El Garf and Wadi Babaa)

Sr. No.	Identification and Location: Well Identification WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trams -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	Wadi El Garf Dug Well																				
1	36DE-001	W. El Garf L	290416	332323	420		-	-	Q	3116				12.30					private	domestic	in use
2	36DE-002	W. El Garf M	290401	332230	400	16.0	-	-	Q	2604				11.08					private	domestic	in use
3	36DE-003	W. El Garf N	290357	332302	405	15.4	-	-	Q	2080				14.79					private	domestic	in use
4	36DE-004	W. El Garf O	290354	332358	430	14.1	-	-	Q					12.66					private	domestic	in use
5	36DE-005	W. El Garf P	290358	332425	440	13.0	-	-	Q	2668				10.68					private	domestic	in use
6	36DE-006	W. El Garf Q	290400	332504	450	11.0	-	-	Q	2105				7.52					private	domestic	in use
7	36DE-007	W. El Garf R	290415	332553	480	9.3	-	-	Q	2252				8.64					private	domestic	in use
8	36DE-008	W. El Garf S	290423	332559	490	10.0	-	-	Q					9.02					private	domestic	in use
9	36DE-009	W. El Garf T	290433	332618	500	10.8	-	-	Q	1766				10.40					private	domestic	in use
10	36DE-010	W. El Garf U	290520	332704	520	20.1	-	-	Q	906				18.85					private	domestic	in use
11	36CE-001	W. El Garf V	290708	332423	540	15.0	-	-	Q	787				14.90					private	domestic	in use
	Wadi Babaa Dug Well																				
1	36DE-001	W. Babaa 1	290322	332143	370	11.3	-	-	Q	1804				11.26					private	domestic	in use
2	36DE-002	W. Babaa 2	290312	332137	365	12.2	-	-	Q	1702				11.41					private	domestic	in use
3	36DE-003	W. Babaa 3	290303	332131	360	6.6	-	-	Q	1587				5.91					private	domestic	in use
4	36DD-001	W. Babaa 4	290257	332125	350	8.7	-	-	Q	1644				8.56					private	domestic	in use
5	36DD-002	W. Babaa 5	290301	332125	350	10.2	-	-	Q	1548				9.62					private	domestic	in use
6	36DD-003	W. Babaa 6	290151	332110	340	7.1	-	-	Q					5.88					private	domestic	in use
7	36DD-004	W. Babaa 7	290149	332112			-	-	Q	1824				7.02					private	domestic	in use

Table 8.1.1-1 (5) Well Inventory (Wadi Gharandal)

Sr. No.	Identification and Location: Well Identification WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trams -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	W.Gharandal Dug Well																				
1	36QA-001	W. Gharandal A	291923	330001	125	11.6	-	-	Q											domestic	in use
2	36QA-002	W. Gharandal B	291944	330020	125	(A dry hole to collect and take water)															not in use
3	36QA-003	W. Gharandal C	291948	330025	130	13.6	-	-	Q	1208(Feb/97)				13.00						domestic	in use
4	36QB-001	W. Gharandal D	292057	330651	235	23.4	-	-	Q											domestic	in use
5	36QB-002	W. Gharandal E	292036	330833	280	25.5	-	-	Q	613(Feb/97)				24.65						domestic	in use
6	36QC-001	W. Gharandal F	291949	331027	320	22.7	-	-	Q	2624(Feb/97)				19.22						domestic	in use
7	36QC-002	W. Gharandal G	291952	331026	320	20.3	-	-	Q	1038(Feb/97)				18.45						domestic	in use
8	36QC-003	W. Gharandal H	292000	331130	340	24.9	-	-	Q	529(Feb/97)				23.85						domestic	in use
9	36QD-004	W. Gharandal I	292018	331539	420	32.6	-	-	Q	445(Feb/97)				31.49						domestic	in use
10	36QD-005	W. Gharandal J	292108	331918	500	19.2	-	-	Q					17.74						domestic	in use
11	36QD-006	W. Gharandal K	292135	331940	520	15.6	-	-	Q	1337(Feb/97)				15.17						domestic	in use
	W.Gharandal Spring																				
12	36AD-007	W.Gharandal 1	292219	332100	540		-	-		2944(Feb/97)										domestic	in use
13	35ED-001	W.Gharandal 2	292250	332132	570		-	-		1708(Feb/97)										domestic	in use
14	35ED-002	W.Gharandal 3	292252	332252	570		-	-		1014(Feb/97)										domestic	in use
15		Ain Higiya	292149	332347	670		-	-		834(Feb/97)				1.12						domestic	in use

Table 8.1.1-1 (6) Well Inventory (Ras Sudr Coastal Plain)

Sr. No	Identification and Location: Well Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	Ras Sudr Dug Well																				
1	25CC-001	Ebrahem Qreny	293638	324246	9.43	10.3	-	-	Q (S)	1340 (15/09/96)				8.30		60			private	irrigation	in use
2	25CC-002	Soliman Qreny	293700	324246	9.9	9.3	-	-	Q(S)	960 (15/09/96)				8.03		60			private	irrigation	in use
3	25CC-003	El Queany 3	293707	324243	10.2	9.5	-	-	Q(S)	700 (15/09/96)		2/95	one data	6.85		45			private	irrigation	in use
4	25BC-001	Ebahem El Derebe	293710	324248	10.7	11.5	-	-	Q(S)	830 (15/09/96)				8.92		50			private	irrigation	in use
5	25BC-025	Awoda Darebg	293658	324253		12.0	-	-	Q(S)	1020		2/95	one data	9.55		50			private	irrigation	
6	25CE-001	Atia Abou Ashba	293709	324258		6.0	-	-	Q(S)	960		2/95	one data	5.15		45			private	irrigation	
7	25BC-002	Niams Zayed	293717	324303	12.5	13.5	-	-	Q(S)	768 (15/09/96)		2/95	one data	12.03		50			private	irrigation	in use
8	25BC-003	Hamad Rashed	293721	324317	12.6		-	-	Q(S)										private	irrigation	abondoned
9	25BC-004	Alian Zedan	293716	324321	13.8	14.0	-	-	Q(S)	640 (15/09/96)		2/95	one data	12.22		60			private	irrigation	in use
10	25BC-005	Owdah S Zaied	293725	324250	11.2	11.0	-	-	Q(S)	700 (15/09/96)				9.87		45			private	irrigation	in use
11	25BC-006	Desert Institute	293725	324253			-	-	Q(S)	830 (15/09/96)		2/95	one data			25			private	irrigation	in use
12	25BC-007	Nowelam M Zayed	293730	324256	12.8	13.5	-	-	Q(S)	700 (15/09/96)		2/95	one data	11.75		30			private	irrigation	in use
13	25BC-008	Nowelam Salama Nowelam	293737	324308	15.2	16.0	-	-	Q(S)	960 (15/09/96)		2/95	one data	13.84		50			private	irrigation	in use
14	25BC-009	Abdel Karem Khamas	293801	324256	13.1	14.0	-	-	Q(S)	4360 (Feb/97)	Feb/Aug 97	2/95	one data	11.75		50			private	irrigation	in use
15	25BC-010	Khaleifa Werdany	293758	324244		11.5	-	-	Q(S)	960 (15/09/96)		2/95	one data	8.17		45			private	irrigation	in use
16	25BC-011	Dabek Khames	293807	324312		13.0	-	-	Q(S)	830 (15/09/96)		2/95	one data	9.79					private	irrigation	in use
17	25BC-012	Soliman Hamed	293907	324252		12.0	-	-	Q(S)	830 (15/09/96)		2/95	one data	10.61		40			private	irrigation	in use
18	25BC-013	F Msaid Ali	293953	324230	7.8	7.5	-	-	Q(S)	830 (15/09/96)		2/95	one data	6.50		45			private	irrigation	in use
19	25BC-014	Msaid Ali	293947	324226	7.4	7.5	-	-	Q(S)	830 (15/09/96)		2/95	one data			40			private	irrigation	in use
20	25BC-015	Mohamed Salama	293838	324312	7.5		-	-	Q(S)							40			private	irrigation	in use
21	25BC-016	Owdah Qreny	293845	324305	8.8	9.5	-	-	Q(S)	895 (15/09/96)		2/95,12/95	10M	7.45		40			private	irrigation	in use
22	25BC-017	Aed Khames Mefkrag	293817	324223	8.9	11.0	-	-	Q(S)	860 (15/09/96)		2/95,12/95	10M	7.65		40			private	irrigation	in use
23	25BC-018	Salman Zedan	293819	324229	3.3	10.0	-	-	Q(S)	895 (15/09/96)		2/95,12/95	10M	5.85		40			private	irrigation	in use
24	25BC-026	Gamel Salem	293808	324213			-	-	Q(S)							70			private	irrigation	
25	25BC-019	Salem alg Salem	293800	324220	8.1	11.0	-	-	Q(S)	1210 (15/09/96)		2/95,12/95	10M	7.17		70			private	irrigation	in use
26	25BC-020	Nafea alg Salem	293809	324225	8.6		-	-	Q(S)										private	irrigation	in use
27	25CC-004	Naf Rowe Dy	293742	324232		11.0	-	-	Q(S)			2/95,12/95	10M	7.90		70			private	irrigation	in use
28	25BC-021	Aed Slem Saba	293726	324218	9	11.0	-	-	Q(S)	895 (15/09/96)		2/95	one data	7.43		70			private	irrigation	in use
29	25BC-022	Salman Mesalam Zayed	293717	324202	6.8	6.0	-	-	Q(S)	830 (15/09/96)		2/95,12/95	10M	4.69		70			private	irrigation	in use
30	25BC-023	Moner Abou Bakr	293713	324223	8	6.0	-	-	Q(S)	895 (15/09/96)		2/95,12/95	10M	3.20		70			private	irrigation	in use
31	25CC-005	Ahmad Mostafa Geaemy	293653	324209		5.5	-	-	Q(S)	1020		2/95,12/95	10M	5.08		60			private	irrigation	
32	25BC-024	Hag Talat			4.8	4.0	-	-	Q(S)			2/95,12/95	10M						private	irrigation	in use
33	25CC-006	Mohamed Abou Reza	293644	324229		7.8	-	-	Q(S)	1080		2/95,12/95	10M	6.82		60			private	irrigation	
34	25BC-025	Salah Dein Selem	293648	324229	3.8	3.1	-	-	Q(S)	1280 (15/09/96)		2/95,12/95	10M	6.37		70			private	irrigation	in use
35	25CC-007	Ahamad Mostafa Awad	293554	324043		5.3	-	-	Q(S)	1150		2/95,12/95	10M	2.39		50			private	irrigation	
36	missing number																				

Table 8.1.1-1 (7) Well Inventory (Wadi Sudr)

Sr. No	Identification and Location: Well Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	W. Sudr Spring																				
37	35AB-001	Ain Desa*	294601	330255		2.5	-	-	(LS)	1150 (15/09/96)		2/95,12/95	10M	0.55		112				domestic	in use
38	35AB-002	Spring	294620	330256		1.6	-	-	(LS)	1150 (15/09/96)		2/95,12/95	10M	4.27						domestic	in use
39	35AB-003	Ain Kesha*	294614	330252		0.5	-	-	(LS)	890 (15/09/96)		2/95,12/95	10M	0.86						domestic	in use
40	35AB-004	Ain Abou Reyem	294735	330326			-	-	(LS)	5650	Feb/Aug 97	2/95,12/95	10M							domestic	in use
41	35AB-005		294732	330325			-	-	(LS)	1280 (15/09/96)										domestic	in use
42	34EB-001	Ain Sudr*	294852	330639		0.5	-	-	(LS)	704 (15/09/96)				0.39		35				domestic	in use
43	35AB-006	Thanlah Nareya	294759	330817		0.6	-	-	(LS)	448 (15/09/96)		2/95	one data	1.98						domestic	in use
44	35AC-001		294631	331012		1.9	-	-	(LS)	704 (15/09/96)				2.89						domestic	in use
45	35BB-001	Umm Garf	294220	325620		0.5	-	-	(LS)	448 (15/09/96)		2/95	one data	1.88						domestic	in use

Note: Wells with (*) are also listed in the Inventory for Pre-Quaternary Wells

Table 8.1.1-1 (8) Well Inventory (Taba)

Sr. No	Well Identification and Location: Identification: WRRI Code No	Well Identification and Location: Identification: Well Name	Location: Coordinates: Lat	Location: Coordinates: Long	Location: Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Well Specification: Cased Depth (mBGL)	Well Specification: Screen Position (m) (thickness)	Well Specification: Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Water Quality Data: JICA Study Team: Chemical Analysis	Water Quality Data: Periodical Measurement by WRRI: since/to	Water Quality Data: Periodical Measurement by WRRI: interval	Hydrogeological Data: S.W.L (mBGL)	Hydrogeological Data: D.W.L (mBGL)	Hydrogeological Data: Discharge Rate (m^3/h)	Hydrogeological Data: Specific Capacity (l/s/m)	Hydrogeological Data: Trans-missivity (m^2/day)	Remarks: Owner	Remarks: Use for	Remarks: Present Condition
1	65DD-001	spring 1	293121	345246	110				granite	2131									military	-	not in use
2	65DC-001	spring 2	293131	345251	120				granite	3040									military	-	not in use
3	65DD-003	Taba 1	293107	345322	60	46.0	17.0	17-12.2(5.2)	Q	dry				dry					military	-	capped
4	65DD-004	Taba 2	293004	345345	90				Q	>12800				24.50					military	-	capped
5		Cased Well 1	292430	344823		60.0			Q	12346				32.43					private	-	not in use

Table 8.1.1-1 (9) Well Inventory (Wadi Watir)

Sr. No	Well Identification and Location: Identification: WRRI Code No.	Well Identification and Location: Identification: Well Name	Location: Coordinates: Lat	Location: Coordinates: Long.	Location: Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Well Specification: Cased Depth (mBGL)	Well Specification: Screen Position (m) (thickness)	Well Specification: Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Water Quality Data: JICA Study Team: Chemical Analysis	Water Quality Data: Periodical Measurement by WRRI: since/to	Water Quality Data: Periodical Measurement by WRRI: interval	Hydrogeological Data: S.W.L (mBGL)	Hydrogeological Data: D.W.L (mBGL)	Hydrogeological Data: Discharge Rate (m^3/h)	Hydrogeological Data: Specific Capacity (l/s/m)	Hydrogeological Data: Trans-missivity (m^2/day)	Remarks: Owner	Remarks: Use for	Remarks: Present Condition
	W. Watir Cased Well																				
1		W.Watir 1				50.0			Q	dry				dry	-	-	-	-	WRRI		abandoned
2		W.Watir 2				24.0			Q	dry				dry	-	-	-	-	WRRI		abandoned
3		WRRI 1 (W.Watir 3)	291229	342914		92.0	85.0	50-76 (20)	Q(G)	1102				43.89	56.08	2.7	0.06	4.94	WRRI	domestic	in use
4		WRRI 3 (W.Watir 4)	291224	342914		100.0	65.0	35-52 (17)	Q (S)	1969				12.75	20.75	3.2	0.11	5.4	WRRI	domestic	in use
5		W.Watir 5				31.5			Q	dry				dry	-	-	-	-	WRRI		abandoned
6		WRRI 2 (W.Watir 6)	291211	342902		82.0	75.0		Q	1969				14.30		132			WRRI	domestic	in use
7		W.Watir 7				82.0	79.0	45-70 (25)	Q (S)	1100				14.35	35.31	5.5	0.07	6.24	WRRI	domestic	in use
8	missing number																				
9		W.Watir 9				24.0	-	-	Q	dry				dry	-	-	-	-	WRRI		abandoned
10		W.Watir 10				21.0	-	-	(Q)	dry				dry	-	-	-	-	WRRI		abandoned
	W. Watir Spring																				
1	66DA-001	Furtaga 1	290302	343314	220	5.8	-	-		1368 (Feb/97)	(Feb/Aug 97)			3.03	5.00	1800	10.58		munic	domestic	in use
2	66DA-002	Furtaga 2	290302	343317	220	5.8	-	-		1088 (12/05/94) 32°C	(by WRRI)			4.73	5.00	1800	77.16		munic	domestic	in use
3	66DA-003	Furtaga 3	290906	343320	220	5.8	-	-		1088 (12/05/94) 32°C	(by WRRI)			2.57	5.00	1800	8.57		munic	domestic	in use
4	66DA-004	Furtaga 4	290251	343315	210	8.3	-	-		1207 (4/03/97)				3.90							
	Sheikh Attia Area Dug Well						-	-													
1	66BA-001					16.0	-	-	Q					14.30		8			private	irrigation	in use
2	66BA-002	Mosalam Hemdan				13.7	-	-	Q	700 (12/05/94) 32°C	(by WRRI)	5/94-3/95	3M,7M	10.60		10			private	irr./dom.	in use
3	66BA-003	Abd Allah Abu Hemad	291317	342933	600	13.7	-	-	Q	724 (8 Mar 97)		8/94	one data	13.09	12.50	50	-0.98		private	irrigation	in use
4	66BA-004	Salem Abu Anazo	291315	342927		13.8	-	-	Q	700 (12/05/94) 32°C	(by WRRI)	5/94-3/95	10M	10.98	12.00	50	0.57		private	irrigation	in use
5	66BA-005	Medan Salem	291316	342913		11.3	-	-	Q	832				10.66	11.00	50	1.70		private	irrigation	in use
6	66BA-006	M Attawy	291318	342926		12.5	-	-	Q	640 (12/05/94) 32°C	(by WRRI)	5/94,8/94	3M	10.58	11.00	50	1.38		private	irrigation	in use
7	66BA-007	Municipal				12.2	-	-	Q	768				11.17	12.00	-			munic	irrigation	in use
8	66BA-008	Soliman Abu Allaw				11.2	-	-	Q	1200 (12/05/94) 32°C	(by WRRI)	8/94-3/96	7M	10.80		10			private	irr./dom.	in use
9	66BA-009	Saleem Attawy	291312	342928		12.2	-	-	Q	768 (12/05/94) 32°C	(by WRRI)	5/94-3/95	3M,7M	11.73	12.00	50	2.14		private	irr./dom.	in use
10	66BA-010	Nassar Aed Mefargy	291318	342928		9.5	-	-	Q	1150 (12/05/94) 32°C	(by WRRI)	8/94	one data	7.56	9.00	50	0.40		private	irrigation	in use
11	66BA-011	Zedan Eed	291312	342926		10.7	-	-	Q	896 (12/05/94) 32°C	(by WRRI)	5/94-3/96	3M,6M,13M	9.75	10.00	50	2.31		private	irrigation	in use
12	66BA-012	Zedan Rashed	291312	342921		9.8	-	-	Q	1280		3/95	one data	7.32	9.00	50	0.34		private		
13	66BA-013	Hassan Saleem	291302	342926		10.3	-	-	Q	1280		8/94	one data	8.44	9.80	80	0.68		private		
14	66BA-014	Saleem Abu Makawi	291303	342924		11.0	-	-	Q	1150 (12/05/94) 32°C	(by WRRI)	5/94-3/95	3M,7M	8.43	10.00	50	0.37		private	irrigation	in use
15	66CA-001	Soliman Abu Anizan	291306	342917		9.9	-	-	Q	1200				7.93	9.00	30	0.32		private	irrigation	in use
16	66CE-001	Saleh Suleem	291256	342902	580	11.6	-	-	Q	1802 (Feb/97)	(Feb/Aug 97)			9.72	10.50	80	1.19		private	irrigation	in use
17	66CA-002	El Hessi	292237	343323	770	4.7	-	-	Q	952 (8 Mar 97)				4.30	4.50	10	0.58		private	domestic	in use
18	66DA-004	(near Furtaga)	290229	343311	270	7.8	-	-		1316 (Sep/97)				7.21					private	irrigation	in use

Table 8.1.1-1 (10) Well Inventory (Nuweiba Coastal Plain)

Sr. No	Identification and Location: Well Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
1	66DB-001	M.El Sakhen	290057	344024	12	7.0	-	-	Q	2430 (10/05/94) 27°C	(by WRRI)	5/94-3/95	3M,7M	6.68	7.00	50	1.81		private	irrigation	in use
2	66DE-002	El Mezena (6)	290048	343959	17	15.0	-	-	Q	1716		8/94-3/96	7M,12M	14.40	14.48	-			private	irrigation	in use
3	66DB-003	Eed Awda	290033	344009	16	12.5	-	-	Q	1600 (10/05/94) 31°C	(by WRRI)	5/94-3/96	3M,7M,12M	12.85	12.90	20	4.63		private	irrigation	in use
4	66DB-004	M.Hemyed	290057	344000	16	11.8	-	-	Q	1660 (10/05/94) 26°C	(by WRRI)	5/94-3/96	3M,7M,12M	11.47	11.80	20	0.70		private	irrigation	in use
5	66DB-005	Ebrahem Hemyed	290054	344006	16	10.4	-	-	Q	2092(Feb/97)	(Feb/Aug/97)	5/94-3/96	3M,7M	10.00	10.75	20	0.31		private	irrigation	in use
6	66DB-006	El Mezena(1)	290047	344014	16	11.8	-	-	Q	1860 (10/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	9.90	11.00	80	0.84		private	irr./dom.	in use
7	66DB-007	Frage Subuh	290040	344003	16	10.0	-	-	Q	2800 (10/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	10.22	10.30	20	2.89		private	irrigation	in use
8	66DB-008	Hassan Awda	290033	344009	16	10.4	-	-	Q	2240 (10/05/94) 31°C	(by WRRI)	5/94-3/96	3M,19M	9.64	10.00	20	0.64		private	irrigation	in use
9	66DB-009	El Mezena(2)	290029	344017	16	10.8	-	-	Q	3000 (10/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	9.99	10.30	80	2.99		Munic.	irr./dom.	in use
10	66DB-010	El Mezena(3)	290015	344018	16	11.5	-	-	Q	2360 (10/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	10.31	10.80	80	1.89		Munic.	irr./dom.	in use
11	66DB-011	Faragallah Hemdan	290039	344016	10	9.2	-	-	Q	2360 (10/05/94) 36°C	(by WRRI)	5/94-3/96	3M,7M,12M	8.55	9.00	20	0.51		private	irrigation	in use
12	66DB-012	Soliman Khodear	290045	344018	10	8.2	-	-	Q	2430 (10/05/94) 30°C	(by WRRI)	5/94-3/96	3M,19M	7.70					private	irrigation	in use
13	66DB-013	Salem Gomah	290051	344019	12	9.0	-	-	Q	3000 (12/05/94) 30°C	(by WRRI)	5/94-3/96	3M,7M,12M	8.90	9.14	20	0.96		private	irrigation	in use
14	66DB-014	Sallam Soliman	290054	344021	13	9.0	-	-	Q	2040 (12/05/94) 30°C	(by WRRI)	5/94-3/96	3M,19M	8.30	9.00	20	0.33		private	irrigation	in use
15	66EB-001	El Mezena(5)	285821	343940	10	13.0	-	-	Q	3070 (12/05/94) 32°C	(by WRRI)	5/94-3/96	10M,12M	11.95	12.15	80	4.63		Munic.	irr./dom.	in use
16	66EB-002	Saf Elbahrewy	285807	343933	10	12.0	-	-	Q	7800 (12/05/94) 32°C	(by WRRI)	5/94	one data	11.00					private	irrigation	in use
17	66EB-003	El Mezena(4)	285830	343943	11	12.6	-	-	Q	4090 (12/05/94) 32°C	(by WRRI)	5/94,2/95	10M	11.84	12.20	80	2.57		private	irrigation	in use
18	66EB-010	Hemdan Hassan	285839	343918	10	11.7	-	-	Q	2300 (12/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	10.64	11.00	20	0.64		private	irrigation	in use
19	66EB-011	Awda Hawashy	285833	343926	10	11.0	-	-	Q	2800 (12/05/94) 32°C	(by WRRI)			7.40	9.87	10	0.05		private	irrigation	in use
20	66EB-007	El Gamea	285821	343907	10	5.3	-	-	Q	5767		5/94-2/95	3M,7M	5.18	5.30	5	0.48		private	irrigation	in use
21	66EB-008	Abd Allah Hemad	285824	343857	6	10.3	-	-	Q	3460 (Feb/97)	(Feb/Aug/97)	5/94-3/96	3M,7M,12M	10.24	10.40	20	1.45		private	irrigation	in use
22	66EB-012	Atawy Soliman	285816	343906	4	3.5	-	-	Q	7700 (12/05/94) 32°C	(by WRRI)	5/94-3/96	3M,7M,12M	2.74	2.80	-			private	irrigation	in use
23	57CC-001	Salama	285848	343906	4	3.1	-	-	Q	6605		5/94	one data	2.50		1			private		in use
24	66EB-004	Gomaa Awied	285815	343859	5	7.9	-	-	Q	3300 (12/05/94) 32°C	(by WRRI)	5/94	one data	7.30					private	irrigation	in use
25	66EB-006	El-Arishi	285816	343855	4	4.5	-	-	Q	6700 (12/05/94) 32°C	(by WRRI)			3.90	3.95	-			private	irrigation	in use
	Nuweiba Cased Well																				
26	66DB-015	REGWA 1	290041	343837	32	60.0	53.0	38-53 (15)	Q (S+G)	2810 (10/05/94) 30°C	(by WRRI)	5/94,8/94	3M	33.38					Taamir	domestic	in use
27	66DB-016	REGWA 2	290033	343838	32	61.0	54.0	40-54 (14)	Q (S+G)	1790 (10/05/94) 29°C	(by WRRI)	5/94,8/94	3M	40.15					Taamir	irrigation	in use
28	66DB-017	REGWA 5	290039	343845	30	55.0	50.0	35-50 (15)	Q (S+G)	4992 (10/05/94) 28°C	(by WRRI)	5/94,8/94	3M	33.70					Taamir	irrigation	in use
29	66EB-005	REGWA 6	290019	343849	30	52.0	47.0	32-47 (15)	Q (S+G)	1200 (12/05/94) 28°C	(by WRRI)	5/94,8/95	3M	28.50					Taamir	irrigation	in use
30	66DB-018	REGWA 8	290045	343844	32	58.0	53.0	40-53 (13)	Q (S+G)	3900 (10/05/94) 28°C	(by WRRI)	5/94,8/94	3M	36.76					Taamir	irrigation	in use
	WRRI-01 Data Nuweiba (W Wasit-1)		290025	343836		80.0	77.0	53-70 (17)	Q (WB)	3000				22.36	35.94	17.21	0.35	839	WRRI	domestic	in use

Table 8.1.1-1 (11) Well Inventory (Wadi Zalaga)

Sr. No	Identification and Location: Well Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
1	66CA-001	1	290816	342921	430	10.2	-	-	Q	1286				9.01					private	irr./dom.	in use
2		Ain Umm Ahmed(Aneeri)	290333	342441	645	5.8	-	-	Q	1796(Feb/97)	(Feb/Aug 97)			5.16							
3	56DE-003	2	290313	342429	650	4.9	-	-	Q	2061				2.77					private	irr./dom.	in use
4	56DE-004	3	290306	342420	650	6.2	-	-	Q	1734				3.67					private	irr./dom.	in use
5	56DE-005	4	290259	342417	655	4.3	-	-	Q	1818				2.82					private	irr./dom.	in use
6	56DE-006	5	290226	342407	680	7.8	-	-	Q	1568				6.64					private	irr./dom.	in use
7	56DE-007	6	290049	342305	695	10.8	-	-	Q	1875				10.20							
8		Ain U Ahmed(spring)*	290304	342446	620	(about 360 m^3/day)			granite	2234						363					
9		Ain Khudra	285346	342515	650	6.5	-	-		1241 (9Mar 97)				6.20							in use
10		Ain Khudra(spring)	285346	342515	650	(about 10 m^3/day)															

Table 8.1.1-1 (12) Well Inventory (Wadi Zaghara)

Sr. No.	Identification and Location: Well Identification WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	W.Zaghara Dug Well																				
1	57DC-001	W. Zaghara	283805	341553	750	12.4	12.4		Q	880(Feb/97)	(Feb/Aug 97)			11.00					private	domestic	in use
2	57DC-002	W. Zaghara 2	283959	341815	700	4.9	-	-	Q	900 (Sep/97)				4.90					private	domestic	in use
	W. Nasb Dug Well																				
1		Nasb 1	283204	341430	940	2.2	-	-	Q	627(10Mar.97)				2.00					private	irr./dom.	in use
2		Nasb 2	283204	341430	940	2.2	-	-	Q					2.00					private	irr./dom.	in use
3	57EC001	Nasb 3	283158	341346	955	2.7	-	-	Q					2.50					private	irr./dom.	in use
4	57EC002	Nasb 4	283154	341346	955	2.2	-	-	Q					2.00					private	irr./dom.	in use
5	57EC003	Nasb 5	283203	341344	960	4.5	-	-	Q	609(10Mar.97)				4.00					private	irr./dom.	in use
6	57EC004	Nasb 6	283150	341303	1000	11.8	-	-	Q	609(10Mar.97)				11.67					private	irr./dom.	in use

Table 8.1.1-1 (13) Well Inventory (Wadi Saal)

Sr. No.	Identification and Location: Well Identification WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Measurement TDS (mg/l)	pH / Temp.	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans-missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	W. Saal Dug Well																				
1	57BC-001	Abdala	284530	341439	820	8.9	-	-	Q	3782 (Jun.97)	8.15 / 21.5			7.32					private	domestic	not in use
2	57BC-002	Salem	284519	341452	820	9.9	-	-	Q	363 (Jun.97)	7.23 / 25.0			9.24					private	domestic	in use
3	57BC-003	Israelie	284523	341451	820	11.5	-	-	Q	157 (Jun.97)	7.07 / 25.9			5.04					private	domestic	in use
4	57BC-004	Swelmh	284512	341451	820	9.7	-	-	Q	986 (Jun.97)	7.96 / 25.4			9.06					private	domestic	in use
5	57BC-005	Salama	284522	341508	810	9.1	-	-	Q	138 (Jun.97)	7.64 / 25.3			6.29					private	domestic	in use
6	57BC-006	Nasr Meseid	284517	341504	810	12.3	-	-	Q	1434 (Jun.97)	7.82 / 26.3			10.12					private	domestic	in use
7	57BC-007	Aoda	284524	341529	800	9.2	-	-	Q	1251 (Jun.97)	7.98 / 26.2			4.81					private	domestic	in use
8	57BC-008	Fraga Musa	284523	341540	800	12.7	-	-	Q	1036 (Jun.97)	7.71 / 25.8			5.14					private	domestic	in use
9	57BC-009	Frig Aoda	284530	341528	800	5.4	-	-	Q	1427 (Jun.97)	7.81 / 26.4			4.67					private	domestic	in use
10	57BC-010	Frig Musa	284526	341521	810	12.5	-	-	Q	1223 (Jun.97)	8.04 / 28.3			8.50					private	domestic	in use
11			284522	341702	810	10.7			Q					8.58					private	domestic	in use
	Bir Safra Dug Well																				
1	57BD-001	Safra 1	284525	342042	680	7.9	-	-	Q	1894 (Jun.97)	7.47 / 23.7			4.00					private	domestic	in use
2	57BD-002	Safra 2	284539	342008	690	7.6	-	-	Q	1127 (Jun.97)	7.69 / 26.0			7.40					private	domestic	in use
3	57BD-003	Safra 3	284535	342004	690	10.8	-	-	Q	1792 (Jun.97)	7.95 / 28.6			8.87					private	domestic	in use
4	57BD-004	Safra 4	284552	342003	690	8.9	-	-	Q	1702 (Jun.97)	7.74 / 27.0			8.10					private	domestic	in use
5	57BD-005	Safra 5	284549	342002	690	9.9	-	-	Q	1408 (Jun.97)	7.83 / 27.0			8.45					private	domestic	in use
6	57BD-006	Safra 6	284549	341958	695	8.9	-	-	Q	1260 (Jun.97)	7.92 / 26.1			8.16					private	domestic	in use
7	57BD-007	Safra 7	284553	341954	700	9.5	-	-	Q	1350 (Jun.97)	7.41 / 26.1			8.70					private	domestic	in use
8	57BD-008	Safra 8	284546	341821	740	6.0	-	-	Pre-C	dry											
9	57BD-009	Safra 9	284521	341734	760	7.0	-	-	Pre-C	dry											
10	57BD-010	Safra 10	284553	341706	770	8.1	-	-	Q	1446 (Jun.97)	7.64 / 26.2			5.59					private	domestic	in use
11	57BD-011	Safra 11	284555	341715	770		-	-	Q	1702 (Jun.97)	7.74 / 27.0			2.60					private	domestic	in use
12	57BD-012	Safra 12	284554	341702	770	under drilling (as of June 97)													private	-	-
13	57BD-013	Safra 13	284555	341705		4.0	-	-	Q					3.50					private	domestic	in use

Table 8.1.1-1 (14) Well Inventory (Wadi Dahab)

Sr. No.	Identification and Location: Well Identification: WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trams -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
1		W. Dahab 2				50.0			Q	2500				30.00		144			Taamir		
2		W. Dahab 4				55.0			Q	2500				32.00		240			Taamir		
3		W. Dahab 5				55.0			Q	2500				32.00		240			Taamir		
4		W. Dahab 6				60.0			Q	3000				35.00		384			Taamir		
5		W. Dahab 7				60.0			Q	2500				33.00		240			Taamir		
6		W. Dahab 8				65.0			Q	3000				35.00		600			Taamir		
7		W. Dahab 9				60.0			Q	3000				34.00		720			Taamir		
8		W. Dahab 10				70.0			Q	3000				28.00		480			Taamir		
	*Well Nos. are not confirmed (Temporary No. by the JICA Study Team).																				
1	57EE-001	Dahab (WP 36)	283023	342900																	
2	57EE-002	Dahab (WP 37)	283022	342904																	
3	57EE-003	Dahab (WP 38)	283021	342907																	
4	67EA-001	Dahab (WP 39)	283004	342939																	
5	57EE-004	Dahab (WP 40)	283450	342808																	
	* : These coordinates shall be correlated with wells Wadi Dahab 2 to 10.																				

Table 8.1.1-1 (15) Well Inventory (Wadi Kid)

Sr. No.	Identification and Location: Well Identification: WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trams -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
1	58DE-001	W. Kid 1	281001	342124	90		-	-	Q					50.29 (Feb.97)					Taamir		
2	58AG-001	D.W.1	282124	341001	750	7.9	-	-	Q	337(Mar.97)				7.16					private	irr./dom.	in use
3	58AC-002	D.W.2	282119	341005	740	4.5	-	-	Q					3.60					private	irr./dom.	
	Wadi Kid Spring																				
1		Kid Spring	282109	341016	650																

Table 8.1.1-1 (16) Well Inventory (Wadi El Arish)

Sr. No.	Well Identification and Location: Identification: WRRI Code No.	Well Name	Location: Coordinates Lat.	Long.	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trams -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	W. El Arish Dug Well																				
1		W. El Mishaies	292730	341440	700	6.5	-	-	Q(wadi)	3250(03/10/97)				4.97					private	irr./dom.	in use
2		farm(near J 3)	293102	333239	570	12.0	-	-	Q(wadi)	3150(05/05/97)				11.15					private	irr./dom.	in use

Table 8.1.1-1 (17) Well Inventory (Pre-Quaternary 1/2)

Sr. No	Identification and Location: Well Identification: WRRI Code No	Well Name	Location: Coordinates: Lat	Long	Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Cased Depth (mBGL)	Screen Position (m) (thickness)	Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Chemical Analysis	Periodical Measurement by WRRI: since/to	interval	Hydrogeological Data: S.W.L (mBGL)	D.W.L (mBGL)	Discharge Rate (m^3/h)	Specific Capacity (l/s/m)	Trans -missivity (m^2/day)	Remarks: Owner	Use for	Present Condition
	Pre- Quaternary Cased Well																				
1		Taba 2				46.0	17.0		Pre-C	-									WRRI		
2		Wadi Watir				330.0			Q, LC							264					
3	65DA-001	Sheira 1	292904	343538	820	804.0	804.0	720-804(84)	LC(SS)	1562 (Feb/97)	(Feb/Aug 97)			353.00		22			WRRI	monitoring	in use
4	65DA-002	Sheira 2	292820	343500	825	325.0	325.0	175-325(150)	UC(LS)	1100				85.00		5			WRRI	monitoring	in use
5	65CA-001	Sheira 1(K83)	292923	343458	835	830.0	828.0	697-815 (93.15)	LC	1200	D. Report			349.45	353.32	29.5	2.12	539.9	MPWWR		
6	65CA-002	Sheira 2 (K82)	292933	343458	810	735.0			LC	1080				347.00		1200			MPWWR		
7	65CA-003	El Hathi 1 (K72.5)	292337	343359	740	355.0		104-346 (126)	LC	1269					(no pumping test due to too samll capacity)				MPWWR		
8	65CA-004	El Hathi 2 (K70.5)	292234	343317	720	408.0			LC	1050				93.00		72			MPWWR		
9	56BE-001	Sheira No.3 (K52)	291413	343002	562	920.0	917.0	768-904 (105.4)	LC	1080	D. Report			141.10	147.58	50	2.14	156.8	MPWWR		
10	56HE-002	Sheira No 4 (K53)	291446	342954	579	860.0	858.9	709-846 (111.6)	LC	1068	D. Report			149.30	159.75	46.1	1.23	168.7	MPWWR		
11	missing number																		WRRI		
12	missing number																		WRRI		
13	missing number																		WRRI		
14	37BE-001	Feiran 1	284712	332552	280	776.0	500.0	244-450(128)	LC(SS)	784	D. Report			37.74	54.20	50.41	0.85	113.5	WRRI	monitoring	not in use
15	37BE-002	Feiran 2	284645	332435	280	676.5	628.8	390-622 (120)	LC(SS)	840	D. Report			57.30	63.18	60.4	2.85	312	WRRI	monitoring	not in use
16	37BE-003	Feiran 3	284745	332655	325	366.0	322.9	115-317 (114)	LC(SS)	850				39.39	49.70	74.9	2.02	281.16	WRRI	monitoring	not in use
17	37BE-004	Feiran 4	284740	332552	270	600.0	560.0	379-541 (137)	LC	1152				66.87	74.51	56.6	2.06	414.72	WRRI		
18	37BE-005	Feiran 5	284718	332424	280	552.0	472.0	253-458 (112)	LC	972				37.39	48.85	66	1.60	293.76	WRRI		
19	37BE-006	Feiran 6	284725	332604	285	512.0	217.4	124-198 (50)	*LC	832				40.05	46.75	72	2.99	50.11	WRRI		
20	37BE-007	Feiran 7	284745	332655															WRRI		
21	37BE-008	Feiran 8	284529	332257	205	300.0	-		UC	dry				dry		dry			WRRI		
22	36CC-001	Wadi Gharandal 1	292003	330932	270	550.0	515.0	418-502 (73.63)	LC	1822	D. Report			78.20	87.76	50	1.45	194	WRRI		not in use
23	36AC-002	Wadi Gharandal 2	291956	331047	290	230.0	228.5	109-225 (60.46)	UC	8048	D. Report			20.66	77.34	5	0.02	1.3	WRRI	monitoring	in use
24	36AC-001	Wadi Gharandal 3	292003	331131	300	930.0	777.0	656-770 (113.24)	P(SS)	5060	D. Report			96.90	105.53	50	1.61	157	WRRI	monitoring	in use
25	24EC-001	Ayun Musa 1	285304	323858	4	1661.0	152.0	116-122 (6)	LC(SS)	2599 (Feb/97)	(Feb/Aug 97)			11.00		20	1.9m3/h/m		oil exp	irrigation	not in use
26	24CE-002	Ayun Musa 2	285309	324020	26	1770.0	268.0	122-268(146)	LC(SS)	3860 (18/02/92) 38.9°C	by WRRI			14.00		70	3.2m3/h/m		oil exp	irrigation	not in use
27	44FD-001	Nakhl 1	295129	334636	435	1020.0	1020.0	827-964(80.94)	LC(SS)	1690	D. Report			254.47	258.87	41.9	1.73	460			
28	44DC-001	Nakhl 2*	295549	334252	420	1095.0	1095.0	920-1082(124.33)	LC(SS)	1630	D. Report			226.23	237.45	40.9	3.37	665.3			
29	44EE-001	Nakhl 3*	295005	335242	477																
30	44DD-001	Nakhl 4*	295626	334623	380	1170.0	1159.6	1005-1148(142.8)	LC(SS)	1536	D. Report			200.58	201.41	40.9	3.18	561.35	MPWWR	irrigation	in use
31	44DD-002	Nakhl 5*	295720	334006	380	1194.0	1192.7	1049-1180(130.6)	LC(SS)	1614	D. Report			198.47	202.53	35.68	2.44	1164.5			
32	44DD-003	Nakhl 6*	295356	334502	410	1200.0	1197.0	1016-1184(127)		1634	D. Report			219.63	226.14	54.3	2.32	596.2	MPWWR	irrigation	in use
33	44EC-001	Nakhl 7*	295225	334220	425	1160.0	1157.0	958-1144(141.94)	LC(SS)	1732	D. Report			227.50	232.72	44.77	2.38	468.2	MPWWR	irrigation	in use
34	55BD-001	Nakhl 8 (Themed 2)*	294054	341814	600	747.0	745.2	559-733(111.6)	LC(SS)	1728	D. Report			376.84	387.06	40.45	1.10	592.2	MPWWR	irrigation	in use
35	55BD-002	El Themed 1	294032	341831	615	805.0	789.4	607-772(142.5)	LC(SS)	1768	D. Report			382.35	383.17	18.9	6.40	1016.6			
36	34CD-001	Sudr El Hitan	295922	331634	443	1040.0	996.0	858-990 (114.25)	LC(SS)	1656 (Jan/91)	D. Report			270.00	300.00	20	0.19				
37		Sudr El Hitan 1	295925	331636	440	268.0															
38		Sudr El Hitan 2				277.0															
39		El Malha 1				212.0				-											
40		El Malha 2				213.0	179.0	115-164(49.6)	UC(LS)	1906	D. Report			14.50	113.29	3.86	0.01	0.226			
41	45BB-001	JICA 1	294231	333908	520	1254.0	1100.0	907-1081(162)	LC(SS)	1206				312.77	317.87	29.6	2.15	950.4	JICA/WRRI	test/obser	in use
42	55CA-001	JICA 2	293435	340143	657	1260.0	1257.4	1101-1245(118.18)	LC(SS)	1182	JICA	-	-	423.96	443.37	22.95	0.33	109.21	JICA/WRRI	test/obser	in use
43	45CA-001	JICA 3	293353	333215	544	1004.0	968.6	801-950 (149)	LC(SS)	470	JICA	-	-	284.35	290.38	35.55	1.64	470.3	JICA/WRRI	test/obser	in use
44	55EA-001	JICA 4	292621	340256	775	1130.0	1087.0	863-1068(136)	LC(SS)	1047	JICA	-	-	501.00	501.18	10.56	2.48	19.9	JICA/WRRI	test/obser	in use
45	56AB-001	JICA 5	292018	342241	740	557.0	512.0	362-512(98)	LC(SS)	Dry	NA	-	-	-	-	-	-	-	JICA/WRRI	test/obser	in use
46	46AB-001	JICA 6	291940	333648	710	900.0	787.0	610-768(126)	LC(SS)	1520	JICA	-	-	438.53	439.26	9.62	3.66	114.79	JICA/WRRI	test/obser	in use

Note; Wells with (*) are also listed in the Inventories for North Sinai Newly Wells.

Table 8.1.1-1 (17) Well Inventory (Pre-Quaternary 2/2)

Sr. No	Identification and Location: Well Identification: WRRI Well Code No.	Identification and Location: Well Identification: Well Name	Location: Coordinates: Lat.	Location: Coordinates: Long.	Location: Elev. (mASL)	Well Specification: Drilling Depth (mBGL)	Well Specification: Cased Depth (mBGL)	Well Specification: Screen Position (m) (thickness)	Well Specification: Aquifer (facies)	Water Quality Data: JICA Study Team: TDS (mg/l)	Water Quality Data: JICA Study Team: Chemical Analysis	Water Quality Data: Periodical Measurement by WRRI: since/to	Water Quality Data: Periodical Measurement by WRRI: interval	Hydrogeological Data: S.W.L (mBGL)	Hydrogeological Data: D.W.L (mBGL	Hydrogeological Data: Discharg Rate (m^3/h)	Hydrogeological Data: Specific Capacity (l/s/m)	Hydrogeological Data: Trans -missivity (m^2/day)	Remarks: Owner	Remarks: Use for	Remarks: Present Condition
	Oil Exloratory Well (source:SDS)																				
49	44DC-001	Nakhel No.1*	295545	334241	430	1696.0															
50	44ED-001	Dareg No.1	295126	334626	446	836.0															
51	44DB-001	Abu Hamth No.1	295757	333847	423	2174.0															
52	24DE-001	El Hamra No.1	295818	325402	322	1460.0															
53	24EC-003	Misalla No.1	294940	324015	36	585.0															
54	48DB-001	El Tor No.1***	281047	333748	12	1011.0															
55	25AD-001	Abu Qiteifa 1	294528	324837	126	654.0															
56	25CD-001	Sudr No.2	293437	324547	30	2142.0															
57	25DD-001	Matarma No.1	293035	324727	35	1857.0															
58	25DE-001	Asl No.24	292736	325024	90.5	1995.0															
59	25EE-001	Nebwn No.4	292246	325124	82	1956.0															
60	26BE-001	Lagia No.2	291334	325344	2	2555.0															
61	37AC-001	Rudeis No.1	285330	331051	5	2380.0															
62	37AB-001	Sidri No.1	285200	331045	15																
63	47CC-002	Feiran 1	284345	331300	10	2031.0															
64	24EC-004	Ayun Musa Well No.14	295130	324230	60	630.0															
65	24EC-005	Wadi Baba Well	29000?	331330		1900.0															
	Pre-Quaternary Dug Well (W.Qideira & Maiha area)																				
1	56AD-001	Bir Qideira	291716	342037	785	3.2	-	-	UC(LS)	2253 (10/6/97)									private	irr./dom.	in use
2	45EA-001	Abd Allah Seleman 1	292438	332908	635		-	-	UC(LS)	1648 (Feb 1997)	(Feb/Aug 97)			9.60					private	irr./dom.	in use
3	45EA-002	Abd Allah Seleman 2	292434	332912	640	10.4	-	-	UC(LS)	1572 (Feb 1997)	(Feb/Aug 97)			9.95					private	irr./dom.	in use
4	45EA-003	Salama Abu Aid	292324	333128	620	9.9	-	-	UC(LS)	1485 (12/6/97)				9.50					private	irr./dom.	in use
5	45EA-004	Aid Salah	292319	333132	620		-	-	UC(LS)										private	irr./dom.	in use
6	45EA-005	Kedel Saad 1	292325	333139	625	11.4	-	-	UC(LS)	1059 (12/6/97)				9.45					private	irr./dom.	in use
7	45EA-006	Gamaan	292300	333145	625		-	-	UC(LS)										private	irr./dom.	in use
8	45EA-007	Lefy Amhamed	292306	333212	630	14.0	-	-	UC(LS)	1498 (12/6/97)				13.80					private	irr./dom.	in use
9	45EA-008	Salama Aid 1	292312	333210	630		-	-	UC(LS)										private	irr./dom.	in use
10	45EA-009	Salama Aid 2	292315	333217	630		-	-	UC(LS)										private	irr./dom.	in use
11	45EA-010	Kedel Saad 2	292330	333000	625		-	-	UC(LS)										private	irr./dom.	in use
12	45EA-011	Salah Aid (farm)	292337	333154	630		-	-	UC(LS)										government	irr./dom.	not in use
13	45EA-012	Shaieh Slaiman	292352	333131	620		-	-	UC(LS)										private	irr./dom.	in use
14	45EA-013	Hosein Sniman (1)	292451	332906	620	10.4	-	-	UC(LS)	1734 (Oct/1997)				8.67					private	irr./dom.	in use
15	45EA-014	Hosein Sniman (2)	292459	332911	620	9.7	-	-	UC(LS)	4505 (Oct/1997)				7.66					private	irr./dom.	in use
16	45EA-015	Bir El Maiha	292515	332909	620	7.1	-	-	UC(LS)	1581 (Oct/1997)				6.26					private	irr./dom.	in use
17	45EA-016	Salha Hamad	292245	333213	640	14.8	-	-	Q (wadi)	9274 (Oct/1997)				14.60					private	irr./dom.	in use
	Pre-Quaternary Spring																				
1	24EC-011	Ayun Musa	295150	323851	10	-	-	-	UC(SS)	2559 (Feb/97)	(Feb/Aug 97)								government	domestic	in use
2	35DA-001	Hammam Faraoun	291149	325719	0	-	-	-	UC(LS)	12930 (Feb/97)	(Feb/Aug 98)								public	bathing	in use
3	56DA-001	Ain Umm Ahmed**	290304	342446	620				PC(Gnt)	5123 (Feb/97)	(Feb/Aug 99)								public	domestic	in use
4		Hamam Musa***	281603	333549		-	-	-	UC(LS)	937ft	(Feb/Aug 97)								government	bathing	in use
5	34EB-001	Ain Sudr****	294852	330639		0.5	-	-	UC(LS)	704 (15/09/96)				0.39		35				domestic	in use
6	35AB-003	Ain Resha****	294614	330252		0.5	-	-	UC(LS)	890 (15/09/96)		2/95,12/95	10M	0.86						domestic	in use
7	35AB-001	Ain Desa****	294601	330255		2.3	-	-	UC(LS)	1150 (15/09/96)		2/95,12/95	10M	0.55		112				domestic	in use
8		Ain Erga	292026	332813					UC(LS)	1894(Jun/97)											
9		Ain Abu Miteguna	291439	333030					UC(LS)												

Note: Wells with (*), (**), (***) and (****) are also listed in the Inventories for North Sinai Newly Drilled Wells, Wadi Zalaga Wells, El Qaa Plain Wells and Wadi Sudr Wells respectively.

Table 8.1.2-1 Water Quality in Winter (February 1997)

No.	Sr. No.	Cord No.	Well Name (Spring)	Sample Ions	Sample DWS	Concentration of Anion and Cation (me/l) Cation Mg^{++}	Ca^{++}	Na^{+}	K^{+}	Anion SO_4^{--}	CO_3^{--}	HCO_3^{-}	Cl^{-}	Drinking Water Standard Physical Properti Turbidity (NTU)	TDS (ppm)	Chemical Properties NO_2 (ppm)	Fe (ppm)	Mn (ppm)	T.H (ppm)	pH	Bacterial Test (cfu) T. Coliform	Bacteria	Date of Sampling
El Qaa Plain Cased Wells																							
1	2	37DE-001	PZ-8	1	1	86.40	176.00	805.00	12.48	145.00	0.01	24.00	961.40	60.00	4230	0	24.40		800	8.80	30	0	15-Feb-97
2	7	-	QAA10	1	1	37.44	97.60	326.37	12.48	50.00	0.01	164.00	384.50	97.00	1680	0.002	1.87		400	7.85	0	0	15-Feb-97
3	17	48AB-003	QAA8	1	1	38.88	95.20	172.50	6.63	280.00	0.01	30.00	105.80	70.00	1085	0.002	2.83		400	7.56	0	0	15-Feb-97
4	24	48BB-006	QAA12	1	1	20.16	66.40	128.80	0.66	84.00	0.01	90.00	96.10	3.50	588	0	0.08		250	7.90	0	0	15-Feb-97
5	25	48BB-004	QAA15	1	-	14.88	71.20	60.95	2.46	57.00	0.01	96.00	43.30	1.00	420	0	0.01		240	7.92	-	-	15-Feb-97
6	28	48BB-007	QAA23	1	1	15.84	47.20	80.50	2.18	57.00	0.01	94.00	48.10	2.40	448	0	0.03		184	7.95	5	0	15-Feb-97
7	30	48BB-008	QAA21	1	1	42.24	113.60	115.00	4.29	58.00	0.01	98.00	67.30	3.60	490	0	0.05		460	7.40	0	0	15-Feb-97
8	37	48-BB016	QAA29	1	1	24.96	78.40	57.50	2.18	56.00	0.01	90.00	48.10	1.60	425	0	0.01		300	7.91	0	0	15-Feb-97
9	40	48CB-005	Abu Kalam	1	-	67.20	120.00	543.95	4.29	150.00	0.01	74.00	629.70	1.60	2124	0	0.17		580	7.70	-	-	15-Feb-97
10		DW (Tur Sout	M Abu Salem	1	-	72.00	224.00	652.74	9.83	290.00	0.01	80.00	624.90	0.60	3280	0.004	0.02		860	7.94	-	-	
11		DW (W. Villag	El Hag Sobahe	1	-	53.88	119.20	184.00	3.32	500.00	0.01	98.00	120.20	3.70	1250	0	0.05		520	7.37	-	-	
El Qaa Plain Springs																							
1			Hamam Musa	1	-	72.00	880.00	1035.0	44.46	1500.0	0.01	114.00	1971.00	33.00	9378	0.11	0.07		5000	6.94	-	-	15-Feb-97
2			W. Hibran	1	1	38.40	104.00	109.48	7.02	60.00	0.01	174.00	144.20	1.10	900	0	0.04		420	7.80	0	0	16-Feb-97
3			W. Mear	1	-	67.20	48.00	25.99	2.18	310.00	0.01	140.00	43.30	33.00	685	0.005	ND		400	7.36	-	-	16-Feb-97
4			W. Thman	1	-	76.00	96.00	86.25	2.77	320.00	0.01	180.00	100.90	31.00	834	0.005	0.04		560	7.37	-	-	17-Feb-97
5			W. Esra	1	-	72.00	80.00	58.65	5.59	340.00	0.01	170.00	60.10	35.00	765	0	ND		500	7.37	-	-	17-Feb-97
W. Feiran																							
1	27	47CB-002	M. Salem 1	1	1	144.00	160.00	32.20	2.18	300.00	0.01	100.00	67.30	32.00	796	0.01	0.01		1000	7.33	100	40	19-Feb-97
2	48		Refaay	1	-	72.00	80.00	36.80	2.18	340.00	0.01	164.00	48.10	33.00	694	0.005	0.01		500	7.40	-	-	19-Feb-97
El Tarfa																							
1	15	47CB-005	Gomaa Khamis	1	1	67.20	48.00	24.84	1.09	320.00	0.01	130.00	31.20	32.00	590	0	0.02		400	7.44	300	200	19-Feb-97
St. Catherine																							
1	6		Haroun Well	1	1	110.40	120.00	9.20	1.09	200.00	0.01	154.00	33.60	30.00	575	0	0.05		960	7.55	15	0	19-Feb-97
2	7	57CA-004	Sovam 1	1	-	67.20	128.00	41.40	1.37	280.00	0.01	164.00	67.30	46.00	676	0.01	0.08		600	7.44	-	-	19-Feb-97
3			El Rabba Spring	1	-	24.00	32.00	6.90	0.55	300.00	0.01	88.00	7.20	32.00	194	0	0.01		180	7.67	-	-	
W. Watir																							
1	1	66DA-001	Furtaga-1	1	1	57.60	80.00	46.00	9.36	700.00	0.01	180.00	76.90	33.00	1368	0.005	0.79		440	7.40	25	25	19-Feb-97
2	16		Saleh Seleem	1	1	86.40	96.00	46.00	5.85	800.00	0.01	154.00	96.10	58.00	1802	0.01	0.04		600	7.42	200	100	19-Feb-97
W. Zalaga																							
			Ainez Well	1	-	96.00	160.00	96.14	5.07	1500.0	0.01	114.00	149.00	28.00	1796	0.01	ND		1000	7.58	-	-	
Nuweiba Coastal Plain																							
1	5	66DB-005	E. Hemyed	1	-	216.00	280.00	74.75	9.36	1600.0	0.01	116.00	384.50	28.00	2092	0.005	0.02		1600	7.33	-	-	19-Feb-97
2	21	66EB-008	A. A. Hemad	1	-	216.00	400.00	480.70	21.45	1400.0	0.01	134.00	865.30	38.00	3460	0	0.01		1900	7.22	-	-	19-Feb-97
W. Zaghara																							
1	1		Dug Well	1	-	120.00	200.00	75.90	1.64	310.00	0.01	116.00	84.10	37.00	880	0.48	0.04		700	8.10	-	-	19-Feb-97
W. Dahab																							
			Reservoir Tank	1	-	192.00	560.00	195.50	8.58	380.00	0.01	56.00	793.20	28.00	3972	0	0.01		2200	7.55	-	-	20-Feb-97
W. Sheira																							
1	3	65DA-001	Sheira-1	1	1	168.00	320.00	75.60	9.36	560.00	0.01	172.00	170.60	46.00	1562	0.1	0.37		1500	7.22	20	15	20-Feb-97
Rus Sudr																							
1	14	25BC-009	A. K. Khamis	1	1	288.00	320.00	273.70	10.06	2100.0	0.01	116.00	985.40	30.00	4360	0.005	0.01		2000	7.71	350	100	20-Feb-97
2	40	35AB-004	Ain Abou Kagem	1	1	408.00	600.00	1035.0	10.06	1700.0	0.01	166.00	1778.00	32.00	5650	0	0.06		1500	7.68	4	2	20-Feb-97
El Malha																							
1			Abd Allah Seleman Well (1)	1	1	216.00	200.00	71.99	3.32	600.00	0.01	240.00	192.30	28.00	1648	0.005	ND		1400	7.60	0	0	20-Feb-97
2			Abd Allah Seleman Well (2)	1	1	168.00	200.00	138.00	2.77	610.00	0.01	220.00	182.70	27.00	1572	0.005	ND		1200	6.37	0	0	20-Feb-97
Other Springs																							
1			Aynn Musa Spring	1	1	124.80	192.00	218.50	27.30	1000.0	0.01	136.00	721.10	55.00	2599	0.01	1.70		1000	7.51	10	0	20-Feb-97
2			Hammam Faraoun Hot Spring	1	-	768.00	1120.0	1849.4	78.00	2700.0	0.01	140.00	4903.00	31.00	1293	0.02	0.08		6000	7.20	-	-	20-Feb-97
3			Ain Om Ahmed Spring	1	-	240.00	640.00	228.44	20.28	2500.0	0.01	244.00	793.20	31.00	5123	0	ND		2600	7.53	-	-	20-Feb-97
JICA Wells																							
1			JICA No.2	1	1	46.65	128.00	190.00	19.50	375.00	0.01	92.00	296.00	clear	1182					7.99	0	0	15-Aug-97
2			JICA No.3	1	1	28.20	41.60	60.00	7.80	190.00	0.01	88.00	72.00	clear	470					7.73	0	0	25-May-97
		Aquifer Test	JICA No.3 (U.C.)	1	-	87.40	136.00	2225.0	38.00	3200.0	0.01	316.00	1240.00		6738					7.33	-	-	5-Mar-97
Total of Samples				40	21																		

Table 8.1.2-2 Water Quality in Summer (August 1997)

Well Identification						Concentration of Anion and Cation (mg/l)								Drinking Water Standard								Date of Sampling
						Cation				Anion				Physical Properties		Chemical Properties					Bacterial Test (cfu)		
No.	Sr. No.	Cord No.	Well Name (Spring)	Sample Ions	Sample DWS	Mg^{2+}	Ca^{2+}	Na^{+}	K^{+}	SO_4^{2-}	CO_3^{2-}	HCO_3^{-}	Cl^{-}	Turbidity (NTU)	TDS (ppm)	NO2 (ppm)	Fe (ppm)	Mn (ppm)	T.H (ppm)	pH	T. Colifor	Bacteria	
El Qaa Plain Cased Wells																						
1	2	37DE-001	PZ-8	1	1	33.00	294.00	1252.0	13.00	542.00	0.01	270.00	2005.0	3.00	4435	0	0.009	0.026	1719	7.40	<3	<3	5-Aug-97
2	7	-	QAA10	1	1	20.00	137.00	575.00	14.00	299.00	0.01	257.00	833.00	8.00	2147	0	0.021	0.019	609	7.40	<3	<3	5-Aug-97
3	17	48AB-003	QAA8	1	1	12.00	215.00	252.00	4.00	308.00	0.01	256.00	433.00	2.00	1485	0	0.014	0.02	1329	7.40	<3	<3	5-Aug-97
4	24	48BB-006	QAA12	1	1	4.00	77.00	123.00	3.00	57.00	0.01	220.00	169.00	5.00	653	0	0.035	0.017	296	7.60	90000	70	5-Aug-97
5	26	48BB-004	QAA15	1	-	5.00	64.00	69.00	3.00	45.00	0.01	179.00	102.00		467					7.60			5-Aug-97
6	28	48BB-007	QAA23	1	1	5.00	48.00	92.00	3.00	61.00	0.01	173.00	99.00	10.00	483	0	0.041	0.035	680	7.60	4000	<3	5-Aug-97
7	30	48BB-008	QAA21	1	1	6.00	65.00	115.00	3.00	62.00	0.01	214.00	144.00	6.00	611	0	0.019	0.047	682	7.60	4000	70	5-Aug-97
8	37	48-BB016	QAA29	1	1	5.00	61.00	69.00	3.00	47.00	0.01	164.00	103.00	2.00	452	0	0.022	0.036	502	7.60	15000	70	5-Aug-97
9	40	48CB-005	Abu Kalam	1	-	40.00	490.00	805.00	4.00	784.00	0.01	249.00	1510.0		3899					7.30			5-Aug-97
10		DW (Tur Sout	M Abu Salem	1	-	45.00	196.00	537.00	8.00	406.00	0.01	235.00	881.00		2320					7.40			5-Aug-97
11		DW (W. Villag	El Hag Sobahe	1	-	31.00	242.00	237.00	4.00	567.00	0.01	207.00	351.00		1643					7.50			5-Aug-97
El Qaa Plain Springs																						
1			Hamam Musa	1	-	365.00	617.00	1501.0	53.00	1296.0	0.01	307.00	3401.0		7572					7.10			5-Aug-97
2			W. Hibran	1	1	15.00	221.00	202.00	11.00	392.00	0.01	264.00	315.00	4.00	1424	0	0.017	0.038	745	7.50	9000	30	5-Aug-97
3			W. Mear	1	-	12.00	91.00	51.00	4.00	131.00	0.01	150.00	94.00		533					7.60			5-Aug-97
4			W. Thman	dry	dry																		5-Aug-97
5			W. Esia	1	-	15.00	93.00	131.00	7.00	212.00	0.01	179.00	157.00		796					7.70			5-Aug-97
W. Feiran																						
1	27	47CB-002	M. Salem 1	1	1	28.00	105.00	55.00	4.00	172.00	0.01	170.00	132.00	4.00	666	0	0.009	0.011	386	7.70	<3	<3	5-Aug-97
2	43		Refaay	1	-	9.00	90.00	69.00	3.00	128.00	0.01	154.00	110.00		564								5-Aug-97
El Talfa																						
1	15	47CE-005	Gomaa Khamis	1	1	16.00	101.00	37.00	2.00	183.00	0.01	136.00	70.00	2.00	547	0	0.017	0.015	170	7.70	23000	70	5-Aug-97
St. Catherine																						
1	6		Haroun Well	1	1	19.00	135.00	28.00	1.00	235.00	0.01	140.00	83.00	2.00	646	0	0.004	0.017	447	7.60	<3	<3	5-Aug-97
2	7	57CA-004	Sovara 1	1	-	17.00	96.00	69.00	1.00	101.00	0.01	214.00	129.00		628					7.60			5-Aug-97
3			El Rabba Spring	1	-	10.00	25.00	8.00	0.40	24.00	0.01	93.00	16.00		176					7.80			5-Aug-97
W. Watir																						
1	1	66DA-001	Furtaga-1	1	1	95.00	152.00	115.00	12.00	600.00	0.01	214.00	170.00	163.00	1361	0	0.013	0.018	163	7.40	9000	50	5-Aug-97
2	16		Salch Seleem	1	1	84.00	155.00	123.00	8.00	538.00	0.01	222.00	189.00	3.00	1325	0	0.044	0.026	527	7.40	4000	50	5-Aug-97
W. Zalaga																						
			Ainez Well	1	-	132.00	215.00	246.00	11.00	822.00	0.01	241.00	415.00		2087					7.40			5-Aug-97
Nuweiba Coastal Plain																						
1	5	66DB-005	E. Hemied	1	-	169.00	141.00	242.00	12.00	512.00	0.01	278.00	592.00		1950					7.40			5-Aug-97
2	21	66DB-008	A. A. Hemied	1	-	173.00	221.00	690.00	25.00	960.00	0.01	230.00	1148.0		3461					7.40			5-Aug-97
W. Zaghare																						
1	1		Dug Well	1	-	37.00	58.00	131.00	2.00	163.00	0.01	220.00	169.00		783					7.60			5-Aug-97
W. Dahab																						
1			Reserover Tank	1	-	55.00	463.00	558.00	11.00	380.00	0.00	278.00	1413.0		3170					7.30			5-Aug-97
W. Sheira																						
1	3	65DA-001	Sheira-1	1	1	91.00	158.00	155.00	11.00	321.00	0.01	311.00	381.00	3.00	1432	0	0.009	0.022	209	7.40	<3	<3	5-Aug-97
Rus Sudr																						
1	14	25BC-009	A. K. Khamis	1	1	194.00	388.00	863.00	12.00	1497.0	0.01	228.00	1365.0	6.00	4565	0	0.025	0.047	163	7.20	<3	<3	5-Aug-97
2	40	35AB-004	Ain Abou Ragem	1	1	516.00	522.00	1466.0	16.00	1366.0	0.01	306.00	2595.0	6.00	6419	0	0.023	0.039	218	7.20	90000	110	5-Aug-97
El Malha																						
1			Abd Allah Seleman Well (1)	1	1	40.00	269.00	391.00	4.00	465.00	0.01	185.00	752.00	1.00	1700	0.12	0.023	0.035	459	8.00	<3	<3	10-Sep-97
2			Abd Allah Seleman Well (2)	1	1	66.00	270.00	345.00	6.00	427.00	0.01	195.00	782.00	1.00	1657	0.08	0.039	0.061	522	8.00	<3	<3	10-Sep-97
Other Springs																						
1	Aynn Musa Spring			1	1	65.00	214.00	897.00	33.00	1460.0	0.01	312.00	724.00	9.00	3724	0	0.042	0.057	286	7.30	4000	70	5-Aug-97
2	Hammam Faraoun Hot Spring			1	-	313.00	1188.0	3565.0	144.00	1416.0	0.01	311.00	7437.0		14451					7.10			5-Aug-97
3	Ain Om Ahmed Spring			1	-	173.00	221.00	237.00	10.00	963.00	0.01	224.00	436.00		2268					7.30			5-Aug-97
JICA Wells																						
1			JICA No.1	1	1	63.00	130.00	138.00	13.00	500.00	0.01	207.00	152.00		1206	0	0.13	0	603	7.10	0	0	13-Feb-98
	Aquifer Test		JICA No.1 (U.C.)	1	-										2000								9-Sep-97
2			JICA No.4	1	1	34.00	106.00	123.00	12.00	306.00	0.01	283.00	160.00		1047	0	0.27	0	492	8.00	0	0	21-Feb-98
3			JICA No.5	-	-					dry													-
4			JICA No.6	1	1	69.00	147.00	253.00	8.00	361.00	0.01	194.00	483.00		1520	0	0.14	0	662	7.70	0	0	13-Feb-98
	Aquifer Test		JICA No.6 (U.C.)	1	-	93.30	96.00	650.00	8.80	525.00	0.01	216.00	1000.0		2952								12-Nov-97
5			JICA No.7	1	1	13.00	28.00	93.00	2.00	71.00	0.01	244.00	40.00		493					7.90			16-Aug-98
Total of Samples				42	23																		

Table 8.1.2-3 Water Level and Quality of Wells in Main Wadis (Feb./ 97)

Area (Wadi)	Well No	Coordinates Lat	Long	Elev. (m. asl)	Well Depth (m. btoc)	W.L (m btoc)	TOC (m agl)	S.W.L (m bgl)	EC µ S/cm	Temp (°C)	TDS (ppm)	Remarks	Date of Measurement
W. Garandal													
	A	291923	330001	125	11.63	dry	0.4						27-Feb
	B	291944	330020	125	(A dry hole to collect and take water)								27-Feb
	C	291948	330025	130	13.60	13.40	0.40	13.00	1888	23.6	1208		27-Feb
	D	292057	330651	235	23.40	dry	0.40						27-Feb
	E	292036	330833	280	25.45	25.25	0.60	24.65	959	24.4	614		27-Feb
	F	291949	331027	320	22.73	20.62	1.40	19.22	4100	19	2624		27-Feb
	G	291952	331026	320	20.25	19.10	0.65	18.45	1623	21.7	1039		27-Feb
	H	292000	331130	340	24.85	24.65	0.80	23.85	827	24.8	529		27-Feb
	I	292018	331539	420	32.59	32.49	1.00	31.49	696	23.1	445		27-Feb
	J	292108	331918	500	19.19	18.29	0.55	17.74					27-Feb
	K	292135	331940	520	15.57	15.37	0.20	15.17	2090	20.9	1338		27-Feb
	spring	292219	332100	540					4600	22.2	2944	seepage?	27-Feb
	spring	292250	332132	570					2670	16.7	1709	seepage?	27-Feb
	spring (surface flow)	292252	332252	570					1585	14.6	1014		27-Feb
W. El Humur		290527	330613	55	(surface flow ; about 2 liters/sec)				6830	24.6	4371		28 Feb
W. El Garf													
	L	290416	332323	420		12.30		12.30	4870	13.6	3117	Sandstone?	1-Mar
	M	290401	332230	400	16.00	11.68	0.60	11.08	4070	23.7	2605		1-Mar
	N	290357	332302	405	15.37	15.24	0.45	14.79	3250	19.6	2080		1-Mar
	O	290354	332358	430	14.07	13.26	0.60	12.66					1-Mar
	P	290358	332425	440	13.00	11.08	0.40	10.68	4170	17.4	2669		1-Mar
	Q	290400	332504	430	11.04	7.85	0.33	7.52	3290	21.9	2106		1-Mar
	R	290415	332553	480	9.28	8.64	0.00	8.64	3520	20.8	2253		1-Mar
	S	290423	332559	490	9.97	9.17	0.15	9.02					1-Mar
	T	290433	332618	500	10.83	10.60	0.20	10.40	2760	22.6	1766		1-Mar
	U	290520	332704	520	20.05	19.20	0.35	18.85	1417	20	907		1-Mar
	V	290708	332423	540	15.00	14.93	0.03	14.90	1231	(21.2)	788		1-Mar
W. Garandal													
(Ein Higya)	Dug Well	292149	332347	670		1.62	0.50	1.12	1303	16.5	834		3-Mar
Malha													
	D.W.1	292438	332908	635		9.69	0.00	9.69	2550	15.3	1632	Limestone	3-Mar
	D.W.2	292434	332912	640	10.35	9.95	0.00	9.95	2670	(21.7)	1709	Limestone	3-Mar
W. Babaa													
	1	290322	332143	370	11.31	11.26	0.00	11.26	2820	22	1805		4-Mar
	2	290312	332137	365	12.15	11.61	0.20	11.41	2660	20.2	1702		4-Mar
	3	290303	332131	360	6.64	6.16	0.25	5.91	2480	25.3	1587		4-Mar
	4	290257	332125	350	8.66	8.56	0.00	8.56	2570	24.1	1645		4-Mar
	5	290301	332125	350	10.15	9.85	0.23	9.62	2420	20.8	1549		4-Mar
	6	290151	332110	340	7.10	6.18	0.30	5.88					4-Mar
	7	290149	332112			7.22	0.20	7.02	2950	(16.5)	1824		4-Mar
W. Watir													
Ein Fortaga	D.W.4	290251	343315	210	8.27	5.00	1.10	3.90	1886	22.8	1207	Basement	7-Mar
	D.W.2	290301	343318	210					1909	22.3	1222		7-Mar
	Surface flow								1880	19	1203		7-Mar
W. Zalaqa													
	1	290816	342921	430	10.15	9.01	0.00	9.01	2010	(12.8)	1286		7-Mar
Ein Umm Ahmed (Aneze1)		290333	342441	645	5.84	5.22	0.06	5.16	3460	(15.8)	2214		7-Mar
Ein Umm Ahmed	spring	290304	342446	620	(about 4.2 liters/sec)				3490	21.9	2234	Granite	7-Mar
	2	290313	342429	650	4.86	2.77	0.00	2.77	3220	20.6	2061		7-Mar
	3	290306	342420	650	6.17	4.04	0.37	3.67	2710	(14.4)	1734		7-Mar
	4	290259	342417	655	4.27	3.22	0.40	2.82	2840	(19.8)	1818		7-Mar
(Aneze 2)	5	290226	342407	680	7.76	6.64	0.00	6.64	2450	(15.2)	1568		7-Mar
	6	290049	342305	695	10.82	10.20	0.00	10.20	2930	(17.3)	1875		7-Mar
Taba													
Tube well drilling site		(about 20km south of Taba)			60.00	32.83	0.40	32.43	19290	26.8	12346		8-Mar
	spring	293121	345246	110					3330	18.2	2131	Granite	8-Mar
	surface flow	293131	345253	120					3550	21.3	2272		8-Mar
	spring	293131	345251	120					4750	18.9	3040	Granite	8-Mar
	1	293107	345322			(capped)							8-Mar
	2	293004	345345	65		1.25.67	1.17	24.50	>19999	27.2	>12800		8-Mar
W. Sheira													
Shera 2	'96	292820	343500	825	325.00				2750	(12.0)	1760		8-Mar
Shera 1	85(K83)	292923	343458	935	830.00				2200	(36.3)	1408		8-Mar
W. El Hathy	D.W.	292248	343332	770	6.35	4.55	0.25	4.30	1487	(14.7)	952		8-Mar
Sheiha Tie (Abu Hamed)		291323	342937	600	14.17	13.54	0.35	13.19	1132	25.2	724		8-Mar
(Saleh Suleem)		291258	342900	580	10.54	9.72	0.00	9.72	2020	(14.3)	1293		8-Mar
Ein Khudra		285346	342515	650	6.51	6.20	0.00	6.20	1939	20.9	1241	Sandstone	9-Mar
St. Catherina													
Bir El Suweir		293847	340002	1330	12.23	2.79	0.30	2.49	1004	18.3	643		9-Mar
El Wattia		284121	335856	1250	35.25	31.95	1.32	30.63	653	20	418		9-Mar
Zaitone (Zaituna)		283541	335933	1425	50.00	39.17	0.64	38.53					9-Mar
Haron (Harouna)		283402	335758	1510	31.00	27.58	0.20	27.38	807	(21.2)	516		9-Mar
Rabba spring		283315	335644	1600					250	13	160		9-Mar
Farag Sabaa Farm		284305	340325	1290	17.00	15.10	0.00	15.10	661	(22.8)	423	Granite	9-Mar
W. Saal													
W. Saal village		284519	341453	845	9.50	8.05	0.00	8.05	1168	(14.0)	748		9-Mar
W. Nasb													
	1				2.2	2	0	2	979	22.1	627		10-Mar
	2				2.2	2	0	2					10-Mar
	3	283158	341346	955	2.7	2.5	0	2.5					10-Mar
	4	283154	341345	955	2.2	2	0	2					10-Mar
	5	283203	341344	960	4.5	4	0	4	951	(22.1)	609		10-Mar
	6	283150	341303	1000	11.8	10.17	-1.5	11.67	951	23.3	609		10-Mar
W. Kid													
	D.W.1	282124	341001	750	7.90	7.16	0.00	7.16	526	25.6	337		10-Mar
	D.W.2	282119	341005	740	4.45	4.00	0.40	3.60					10-Mar
Reservoir for Water Seller		281655	341718						772	17.8	494		10-Mar

Table 8.1.2-4 Water Level and Quality of Wells in Main Wadis (Sep./97)

Area (Wadi)	Well No.	Coordinates Lat.	Coordinates Long.	Elev. (m. asl)	Well Depth (m. btoc)	W.L. (m btoc)	TOC (m agl)	S.W.L. (m bgl)	EC (μ S/cm)	Temp. (°C)	TDS (ppm)	Remarks	Date of Measurement
W. Garandal													
	A	291923	330001	125	11.63	Dry	0.4		-				21-Sep-93
	B	291944	330020	125	(dry hole to collect flood water)				-				21-Sep-93
	C	291948	330025	130	13.60	13.450	0.40	13.05	-				21-Sep-93
	D	292057	330651	235	23.40	Dry	0.40		-				21-Sep-93
	E	292036	330833	280	25.45	26.210	0.60	25.61	852		545		21-Sep-93
	F	291949	331027	320	22.73	20.350	1.40	18.95	1992		1275		21-Sep-93
	G	291952	331026	320	20.25	20.600	0.65	19.95	1130		723		21-Sep-93
	H	292000	331130	340	24.85	24.580	0.80	23.78	588		376		21-Sep-93
	I	292018	331539	420	32.59	32.500	1.00	31.50	625		400		21-Sep-93
	J	292108	331918	500	19.19	Dry	0.55		-				21-Sep-93
	K	292135	331940	520	15.57	15.360	0.20	15.16	690		442		21-Sep-93
	spring	292219	332100	540		Dry			-			seepage?	21-Sep-93
	spring	292250	332132	570		Dry			-			seepage?	21-Sep-93
spring (surface flow)		292252	332252	570		Dry			-				21-Sep-93
W. El Humur		290527	330613	55	(surface flow ; about 2 liters/sec)								
W. El Gurf													
	L	290416	332323	420		13.200			4650	21.9	2976	Sandstone?	21-Sep-93
	M	290401	332230	400	16.00	16.655	0.60	16.06	1000	26.1	640		21-Sep-93
	N	290357	332302	405	15.37	15.700	0.45	15.25	-	-			21-Sep-93
	O	290354	332358	430	14.07	13.550	0.60	12.95	-	-			21-Sep-93
	P	290358	332425	440	13.00	11.520	0.40	11.12	-	-			21-Sep-93
	Q	290400	332504	430	11.04	9.550	0.33	9.22	3360	25.6	2150		21-Sep-93
	R	290415	332553	480	9.28	8.730	0.00	8.73	3350	24.9	2144		21-Sep-93
	S	290423	332559	490	9.97	9.210	0.15	9.06	-	-			21-Sep-93
	T	290433	332618	500	10.83	10.635	0.20	10.44	2930	25	1875		21-Sep-93
	U	290520	332704	520	20.05	19.885	0.35	19.54	1548	26	991		21-Sep-93
	V	290708	332423	540	15.00	15.515	0.03	15.49	-	-			21-Sep-93
W.Garandal													
(Ein Higiya) Dug Well		292149	332347	670			0.50						
Malha													
	D.W.1	292438	332908	635			0.00					Limestone	
	D.W.2	292434	332912	640	10.35		0.00					Limestone	
W. Babaa													
	1	290322	332143	370	11.31	11.43	0.00	11.43	2760	26.6	1766		21-Sep-93
	2	290312	332137	365	12.15	11.87	0.20	11.67	-	-			21-Sep-93
	3	290303	332131	360	6.64	-	0.25		-	-			21-Sep-93
	4	290257	332125	350	8.66	8.37	0.00	8.37	-	-			21-Sep-93
	5	290301	332125	350	10.15	9.94	0.23	9.71	2540	27.0	1626		21-Sep-93
	6	290151	332110	340	7.10	-	0.30		-	-			21-Sep-93
	7	290149	332112			7.38	0.20	7.18	-	-			21-Sep-93
W.Watir													
Ein Fortaga	D.W.4	290251	343315	210	8.27	5.54	1.10	4.44				Basement	25-Sep-93
	D.W.2	290301	343318	210	5.82	2.28	0.77	1.51					25-Sep-93
Surface flow								0.00					25-Sep-93
W Zalaqa													
	1	290816	342921	430	10.15	5.84	0.00	5.84	-				24-Sep-93
Ein Umm Ahmed (Aneze1)		290333	342441	645	5.84	-	0.06		-				24-Sep-93
Ein Umm Ahmed	spring	290304	342446	620		(1.8 l/sec)						Granite	24-Sep-93
	2	290313	342429	650	4.86	3.44	0.00	3.44	-				24-Sep-93
	3	290306	342420	650	6.17	5.55	0.37	5.18	2770		1773		24-Sep-93
	4	290259	342417	655	4.27	3.68	0.40	3.28	-				24-Sep-93
(Aneze 2)	5	290226	342407	680	7.76	6.85	0.00	6.85	-				24-Sep-93
	6	290049	342305	695	10.82	10.80	0.00	10.80	-				24-Sep-93
Taba								0.00					
Tube well drilling site		(about 20km south of Taba)			60.00	Capped	0.40		-				26-Sep-93
	spring	293121	345246	110					27100		17344	Granite	26-Sep-93
surface flow		293131	345253	120		Dry							26-Sep-93
	spring	293131	345251	120		Dry						Granite	26-Sep-93
	1	293107	345322		(capped)	Dry							26-Sep-93
	2	293004	345345	65		Dry	1.17						26-Sep-93
W. Sheira													
Shera 2 '96		292820	343500	825	325.00	-			-	-		pumping	26-Sep-93
Shera 1 86(K83		292923	343458	835	830.00	-			-	-		pumping	26-Sep-93
W. El Hathy	D.W.	292248	343332	770	6.35	4.67	0.25	4.42					25-Sep-93
Sheiba Tie (Abu Hamed)		291323	342937	600	14.17	11.98	0.35	11.63					25-Sep-93
(Saleh Suleem)		291258	342900	580	10.54	10.35	0.00	10.35					25-Sep-93
Ein Khudra		285346	342515	650	6.51	2.15	0.00	2.15				Sandstone	
St. Catherina								0.00					
Bir El Suweir		293847	340002	1330	12.23	3.83	0.30	3.53	-				24-Sep-93
El Wattia		284121	335856	1250	35.25	33.21	1.32	31.89	571		365		24-Sep-93
Zaitone (Zaituna)		283541	335933	1425	50.00	44.38	0.64	43.74	527		337		24-Sep-93
Haroo (Harouna)		283402	335758	1510	31.00	28.48	0.20	28.28	684		438		24-Sep-93
Rabba spring		283315	335644	1600				0.00	250		160		24-Sep-93
Farag Sabaa Farm		284305	340325	1290	17.00	14.06	0.00	14.06	1490		954	Granite	24-Sep-93
W. Saaf								0.00			0		
W. Saal village		284519	341453	845	9.50	9.27	0.00	9.27	883		565		24-Sep-93
W. Nasb								0.00					
	1				2.2	1.64	0	2	-				23-Sep-93
	2				2.2	-	0		-			buried	23-Sep-93
	3	283158	341346	955	2.7	-	0		-			buried	23-Sep-93
	4	283154	341346	955	2.2	3.52	0	4	795		509		23-Sep-93
	5	283203	341344	960	4.5	4.78	0	5	845		541		23-Sep-93
	6	283150	341303	1000	11.8	9.89	-1.5	11.39	790		506		23-Sep-93
W. Kid													
	D.W.1	282124	341001	750	7.90	2.57	0.00	2.57					23-Sep-93
	D.W.2	282119	341005	740	4.45	2.38	0.40	1.98					23-Sep-93
Reservoir for Water Seller		281655	341718										23-Sep-93

Elev ; measured with a altimeter

TDS,converted from EC

Table 8.1.3-1 Example of BADGE Output List

IDENTIFICATION AND LOCATION	ID Number : 37DE-001

Site Location : RIWR 8
Physiographic area : EL QAA/ABU DURB — Aquifer : ALLUVIUM
Stratigraphy : QUATERNARY — Data Source : RIWR WELL

Site type : BOREHOLE — Contractor : DASCO
Site object : MONITORING — Completion date : / /
Use of site : POTENTIOMETRY — East Coordinate : 167300 m
Site status : IN USE — North Coordinate : 905300 m
Owner : RIWR — Elevation : 105.9 m AMSL

HYDROGEOLOGICAL CONTEXT

Geomorphological context : PLAIN
Directions of fracturation : . main : ° secondary : °

AQUIFERS CROSSED	AQUIFER n° 1	AQUIFER n° 2	AQUIFER n° 3
Name of aquifer	ALLUVIUM		
Depth of • top			
(m BGL) • bottom			
Lithological nature	GRAVEL + SAND		
Porosity type	POROUS		
Hydrodynamical type	UNCONFINED		

DEPTH borehole : 302.00 m BGL — SCREEN . from : 150.00 m BGL
casing : 170.00 m BGL . to : 170.00 m BGL
length : 20.00 m

PUMP . from : m BGL
POSITION . to : m BGL
diameter : 12 mm

TECHNICAL AND HYDRAULIC CHARACTERISTICS

Sampling Date : / /		Ca :	ppm	Cl :	ppm
Electr. cond. :	µS/cm	Na :	ppm	NO3 :	ppm
T.D.S. :	ppm	Mg :	ppm	HCO3 :	ppm
Temperature :	°C	K :	ppm	SO4 :	ppm

Pump capacity : m3/h — Pump type :
Operating rate : m3/h — Year : 19

Reference Elevation : 105.87 m AMSL — Description :
Standing Water level : 80.74 m BGL — Date : / /
Pumping .max yield : m3/h — drawdown : m
test .duration : hrs — Date : / /

Specific yield : 10 m3/h/m = 10 m2/s
Transmissivity : 10- m2/s — Method of interpretation :
Storage coefficient : 10-

Lithological log :
Well loggings :
Water level time series :
Hydrochemical time series :

Computerized form . date of input: 12/09/95
. last release : 02/07/90

Table 8.1.3-2 Badge DBF File Format (1/2)

	Name	Parameter	Type	Unit	LEX
A	NOCALS	Identification number	character		
B	SITLOC	Name of well	character		
C	PHYSIO	Physiographical area code	coded		58
D	STRATI	Stratigraphy code	coded		60
E	AQUIFE	Aquifer code	coded		61
F	DATSOU	Data source code	coded		59
G	SITTYP	Site type code	coded		36
H	SITOBJ	Site object code	coded		37
I	USESIT	Use of site	coded		38
J	SITSTA	Site status	coded		39
K	OWNERN	Name of owner	character		
L	CONTRA	Name of contractor	character		
M	DATCOM	Date of completion	date		
N	X___	East coordinate	numeric	m	
L	Y___	North coordinate	numeric	m	
O	Z___	Elevation (AMSL)	numeric	m AMSL	
Q	DATINP	Date of input	date		
R	DATREL	Date of release	date		
S	GEOMOR	Geomorphologic code	coded		42
T	FRMAIN	Direction of main fracturation	numeric	degree	
U	FRSECD	Direction of secon. fracturation	numeric	degree	
V	NAMAQ1	Name of aquifer no.1	coded		49
W	NAMAQ2	Name of aquifer no.2	coded		49
X	NAMAQ3	Name of aquifer no.3	coded		49
Y	DTOAQ1	Depth to top of aquifer no.1	numeric	m BGL	
Z	DTOAQ2	Depth to top of aquifer no.2	numeric	m BGL	
AA	DTOAQ3	Depth to top of aquifer no.3	numeric	m BGL	
AB	DBOAQ1	Depth to bottom of aquifer no.1	numeric	m BGL	
AC	DBOAQ2	Depth to bottom of aquifer no.2	numeric	m BGL	
AD	DBOAQ3	Depth to bottom of aquifer no.3	numeric	m BGL	
AE	LITAQ1	Lithology of aquifer no.1	coded		43/44
AF	LITAQ2	Lithology of aquifer no.2	coded		43/44
AG	LITAQ3	Lithology of aquifer no.3	coded		43/44
AH	PORAQ1	Porosity of aquifer no.1	coded		40
AI	PORAQ2	Porosity of aquifer no.2	coded		40
AJ	PORAQ3	Porosity of aquifer no.3	coded		40
AK	HYDAQ1	Hydrodynamic type of aquifer 1	coded		41
AL	HYDAQ2	Hydrodynamic type of aquifer 2	coded		41
AM	HYDAQ3	Hydrodynamic type of aquifer 3	coded		41
AN	DEPBOT	Depth of well bottom	numeric	m BGL	
AO	DEPEQU	Depth of equipment	numeric	m BGL	
AP	DTOSCR	Depth of top of screen	numeric	m BGL	
AQ	DBOSCR	Depth of bottom of screen	numeric	m BGL	
AR	LENSCR	Length of screen	numeric	m	
AS	DTOPCH	Depth of top of pumping chamber	numeric	m BGL	

Table 8.1.3-2 Badge DBF File Format (2/2)

	Name	Parameter	Type	Unit	LEX
AT	DBOPCH	Depth of bot. of pumping chamber	numeric	m BGL	
AU	DIAPCH	Diameter of pumping chamber	numeric	mm	
AV	DATSAM	Date of sampling	date		
AX	ELCOND	Electrical conductivity	numeric	μ S / cm	
AY	TEMPER	Temperature	numeric	degree C	
AZ	CALCIU	Ca++ concentration	numeric	mg / l	
BA	SODIUM	Na+ concentration	numeric	mg / l	
BB	MAGNES	Mg++ concentration	numeric	mg / l	
BC	POTASS	K+ concentration	numeric	mg / l	
BD	CHLORI	Cl- concentration	numeric	mg / l	
BE	NITRAT	NO3- concentration	numeric	mg / l	
BF	BICARB	HCO3- concentration	numeric	mg / l	
BG	SULFAT	SO4—concentration	numeric	mg / l	
BH	PUMCAP	Capacity of pump	numeric	l / s	
BI	PUPTYP	Type of pump	coded		62
BJ	PRODUC	Production yield	numeric	m3 / year	
BK	PRYEAR	Production year	numeric	year	
BL	REFELE	Reference level	numeric	m AMSL	
BM	REFDES	Reference position	character		
BN	DEPSWL	Depth of standing water level	numeric	m BRL	
BO	DATSWL	Date of standing water level	date		
BP	PTYILD	Yield of pumping test	numeric	l / s	
BQ	PTDRDN	Drawdown of pumping test	numeric	m	
BR	PTDURA	Duration of pumping test	numeric	hrs	
BS	PTDATE	Date of pumping test	data		
BT	SPYILD	Specific yield	numeric	m2 / h	
BU	TRANSM	Transmissivity	numeric	m2 / s	
BV	STORAG	Storativity	numeric		
BW	INTERP	Method of interpretation	character		
BX	LITLOG	Lithological log	logical		
BY	WELLOG	Well log	logical	Y/N	
BZ	WATLVL	Water level time dependent series	logical	Y/N	
CA	CHEMIC	Hydrochemical time dependent series	logical	Y/N	

AMSL : above mean sea level
BGL : below ground level
BRL : below reference level

Table 8.1.3-3 Code Table

58 Physiographic Area Code

01	El Arish	13	Sidri	25	El Temed
02	Sh.Zuwaid - Rafaa	14		26	El Naqb
03	Romana - Birclabd	15		27	South Sh.Zuwaid
04	El Gorah	16	Gharandal	28	East El Temed
05	Upp. Wadi Arish	17		29	Gebel El Khrim
06	El Qaa / Abu Durb	18	Sudr	30	Arif El Naqa
07	El Gerafi	19		31	El Barth
08	Wadi El Azarik	20		32	El Maquddabah
09		21	El Maghara	33	El Matalh
10	El Kuntilla	22	Wadi Watir	00	Unknown
11		23	Gebel El Halal		
12	Feiran	24	El Qusima		

60 Stratigraphy Code

01	Quaternary	09	Maestrichtian	17	Upper Paleozoic
02	Pleistocene	10	Campanian	18	Lower Paleozoic
03	Pliocene	11	Turonian	19	Pre-Cambrian
04	Miocene	12	Cenomanian	20	Upper Cretaceous
05	Oligocene	13	Lower Cretaceous	21	Middle Cretaceous
06	Upper Eocene	14	Upper Jurassic	22	Quat. & Tertiary
07	Lower Eocene	15	Lower Jurassic	23	Quat. & Miocene
08	Paleocene	16	Triassic		

61 Aquifer Code

01	Stab. Dune / Beach	08	Fractured Basement	15	Eocene
02	Alluvium	09	Basalt	16	Miocene
03	Kurkar	10	Fissured Basement	17	Upper Jurassic
04	Upper Clastic Aquifer	11	Lower Cretaceous	18	Lower Jurassic
05	Middle Clastic Aquifer	12	Middle Cretaceous	19	Old Beach
06	Lower Clastic Aquifer	13	Upper Cretaceous		
07	Weathered Basement	14	Alluvium & Kurkar		

Table 8.1.3-4 Example of CHRONO Output List

DETAILED CHEMICAL ANALYSES ON THE STATION :'S1E8-065 ()

Date	Ca++	Mg++	Na+	K+	HCO3-	CO3--	Cl-	SO4--	NO3-	pH	E.C	T.D.S.
01/02/89	232.00**	206.00**	741.00	13.00	200.00	0.01	245.00	187.00		8.12	1.34	1824.00**
01/04/89	48.00	38.00	211.99	7.00	163.00	10.00	295.00*	174.99		8.20	1.50	948.00*
01/01/90	102.00*	63.00*	828.00	11.00	268.00	0.01	1290.00**	403.00**		7.20	4.52	2890.00**
01/04/90	51.00	123.99*	1149.00	11.00	293.99	0.01	1595.00**	680.00**		8.00	5.97	3842.00**
01/07/90	44.00	175.00**	1039.00	13.00	146.00	0.01	1223.00**	1212.00**		7.50	5.13	3874.00**
01/10/90	68.00	180.00**	1012.00	10.00	32.00	0.01	1412.99**	1062.90**		7.25	6.16	3800.00**
01/01/92	63.00	193.00**	885.00	5.00	112.00	0.01	1195.00**	1060.00**		7.20	5.52	3512.00**
01/08/93	34.00	35.00	414.00	5.00	38.00		405.00*	-		8.00	2.23	931.00*

* Exceeds highest desirable level ** Exceeds maximum permissible level

Date	Ca++	Mg++	Na+	K+	HCO3-	CO3--	Cl-	SO4--	NO3-	Balance(%)
01/02/89	11.58	16.94	32.22	0.33	3.28	0.00	6.90	3.89		-62.54
01/04/89	2.40	3.13	9.22	0.18	2.67	0.33	8.31	3.64		0.12
01/01/90	5.09	5.18	36.00	0.28	4.39	0.00	33.80	8.39		0.04
01/04/90	2.54	10.20	49.96	0.28	3.84	0.00	44.93	14.15		-0.04
01/07/90	2.20	14.39	45.17	0.33	2.39	0.00	34.45	25.23		-0.01
01/10/90	3.39	14.80	44.00	0.26	0.52	0.00	39.80	22.13		0.00
01/01/92	3.14	15.87	38.48	0.13	1.84	0.00	33.66	22.07		-0.05
01/08/93	1.70	2.88	18.00	0.13	0.62		11.41			-30.72

Date	Alkalinity	Total Hardness		Non Carb.Hardn.	Salinity Class.
01/02/89	166.68	1427	Very Hard	1260	Brackish
01/04/89	152.50	276	Very Hard	124	fresh
01/01/90	223.35	514	Very Hard	291	Brackish
01/04/90	195.01	638	Very Hard	443	Brackish
01/07/90	121.68	830	Very Hard	708	Brackish
01/10/90	26.68	910	Very Hard	884	Brackish
01/01/92	93.35	952	Very Hard	858	Brackish
01/08/93		229	Very Hard		fresh

Date	Agriculture	SAR	RSC	Irrigation Suitability	Corrosion Stability Index	
01/02/89	C1S1	8.5	-25.2	Suitable	5.2	Encrusting
01/04/89	C1S1	5.5	-2.5	Suitable	6.5	Neutral
01/01/90	C1S1	15.9	-5.9	Suitable	6.6	Neutral
01/04/90	C1S2	19.8	-8.9	Suitable	6.6	Neutral
01/07/90	C1S2	15.7	-14.2	Suitable	7.6	Slightly corrosive
01/10/90	C1S1	14.5	-17.7	Suitable	8.8	Corrosive
01/01/92	C1S1	12.5	-17.2	Suitable	7.8	Slightly corrosive
01/08/93	C1S1	11.9				

Printed: 15/01/95

8.2 Quaternary Aquifers

The Quaternary aquifers in South Sinai are distributed in the El Qaa Plain, coastal plains and major wadis; Major wadis are W. Feiran and W. Gharandal in the western side of the area, and W. Watir, W. Zaghara, W. Dahab and W. Kid in the eastern area. Fig. 8.2-1 shows the location of main Quaternary Basins.

Many studies and development of groundwater have been conducted in this area by WRRI and other agencies in Egypt.

Hydrogeological characteristics of each basin are mentioned below.

8.2.1 El Qaa Plain

1) General Features of the Basin

The El Qaa Plain is the most representative Quaternary sedimentary basin in South Sinai. The plain is located in the southwestern part of the area, in the range of latitude 27 degrees 45 minutes north and latitude 28 degrees 45 minutes north, covering 1,930 km^2. The plain is bounded in the northeast by the uplifted Precambrian Rocks, in the northwest by Gebel Quabiliyat and in the southwest by Suez Bay. Main wadis flowing into the basin are W. Gibah, W. Hibran, W. Mir, W. Isla, W. Thiman and so forth. A total catchment area of the El Qaa Plain is approximately 3,900 km^2.

A number of test wells, productive wells and piezometric boreholes have been drilled in the plain. In addition, many dug wells have been constructed in the area around El Tur. The details of these boreholes are described in the following section.

The El Qaa Plain is ranked as the high priority area in South Sinai for development. The groundwater in the Quaternary aquifers are considerably exploited to meet the water demand of domestic water use in El Tur and Sharm El Sheikh cities, and irrigation use in the plain.

However, most of wells are now not in use or abandoned except WRRI's wells and TAAMIR's wells because of the inadequate management of well facilities.

2) Well Inventory

Well inventories in the El Qaa Plain were established as shown in Table 8.1.1-1(1) & (2), which include 67 cased wells, 29 dug wells and 5 springs. Locations of wells are shown in Fig. 8.2.1-1 & 2. Coordinates of these wells were surveyed with GPS by the JICA

Study Team.

Shallow dug wells are located around El Tur, that is, Wadi Village and El Gebaal. The aquifer developed by the dug wells is named the first aquifer in the El Qaa Plain.

The drilled and cased depth of most boreholes ranged from about 100 meters to about 200 meters, except oil exploratory boreholes. The average drilled depth was 143 meters. Fig. 8.2.1-3 shows the range of screen installed in the wells. Most of screens are installed up to the depth of -100 m ASL, concentrating to the depth between 0 m to -50 m. The layer is considered the main aquifer called the second aquifer in the area.

Fig. 8.2.1-3 also shows that the screen pipes of some boreholes were installed in the deeper layer than the second aquifer. The layer is the third aquifer in the area.

Wells are almost concentrated in the central to the northern parts of the plain, while a few wells are located in the southern part of the plain.

The water use is shown in the following table and Fig. 8.2.1-4.

Use	Condition	Number of Well
Domestic	in use	8+(1; stand by)
	not in use	6(new)+(1; sand in filter)
	abandoned	1
Domestic for Sharm El Sheikh	in use	2
Irrigation	in use	5
	not in use	14
Piezometer	in use	14
	not in use	4
Dry		2
Industry	in use	2
Oil exploration		4
Test well		3
Total		67

3) Supplementary Geological Survey

(1) Electro-magnetic (TEM) survey

The details of the whole geophysical survey conducted by the JICA Study Team are

described in Chapter VI. The TEM survey conducted on the El Qaa Plain revealed some matters about geological structure in the plain.

Three layers were recognized in the northern El Qaa Plain (Fig. 8.2.1-5). The first layer with very high electric resistivity of more than 50 ohm-m likely consists of loose sand and gravel containing no water. The second layer with resistivity values from 10-20 ohm-m that is situated at the depth between +20m and -60m ASL is regarded as the main aquifer in the area. The third layer shows low resistivity values of 10 ohm-m or less. It is known that the layer consists of sand with clay and silt that contains slightly saline water.

Remarkable discontinuous resistivity structure as shown in Fig. 8.2.1-6 indicates that an inferred fault exists and divides the El Qaa Plain into two parts, north and south. The inferred fault is located on the extension of the valley of Wadi Isla. Probably bedrock occurs in a comparative shallow depth in the southern area from the inferred fault.

It is considered that no aquifer occurs in the mountain foot area in the southern part. However, a lower resistivity zone where is from B074 to B088 (see Fig.8.2.1-5(2)) at the depth of 100-160 meters may contain water as an aquifer. The zone seems to extend along Line C and it is confirmed by the survey result by WRRI too.

The low resistivity layer with less than five ohm-m contains high saline water. The layer, which underlies the layer with resistivity values ranging from 20 to 50 ohm-m, intrudes to the inland from the coastal side in the south of El Tur.

(2) Test borehole drilling

In the southern part of the El Qaa Plain, one test borehole was drilled to inspect the relatively low resistivity zone around W. Thiman as mentioned above.

4) Configuration of Aquifer

(1) General

The existence of many faults is inferred under the El Qaa Plain, but the detailed setting of that and the subterranean situation of the area have not been cleared yet. In the northwest of the El Qaa Plain the Quaternary Deposits overlies the sedimentary rocks of Cretaceous and Tertiary that expose on the northern mountainous area. In the other area, the Precambrian Basement rocks underlie the Quaternary deposit. These Pre-Quaternary rocks can be considered the impermeable bedrock in the area. A few aquifers occur in the Quaternary Deposits overlying the bedrock.

The Quaternary Deposits are mainly composed of silt and clay with gravel. They are called as the Tur Group. The thickness is in a range between 50 m and 1000 m or more; it is thick in the central part of the plain and decreases toward the eastern mountain foot. The TEM survey by JICA Study Team revealed that the deposits are thick in the northern part of the El Qaa Plain and thin in the southern part that is expected the basement occurs at the shallow depth. The boundary between the north and south part is the inferred fault along the extension of the valley of Wadi Isla.

The deposits in the northern part can be divided into three (3) layers. The upper layer consists of coarse gravel with sand and it's 100 meters in maximum thickness. The layer shows high electric resistivity value of more than 100 ohm-meters that implies the layer contains no water. The middle layer consists of coarse to medium sand and gravel with interbeded clay and it's about 100 meters in thickness. The second aquifer that is the main aquifer occurs in this layer as already described in the preceding sections. The electric resistivity value of the layer is ranging 10 to 50 ohm-meters. The lower layer consists of sand and gravel with silt and clay. The third aquifer occurs in the layer. The maximum thickness of the layer is actually unknown because no drilled borehole except oil exploration ones reached the bottom of the layer. It is probable that the thickness is relatively thin around Gebel Safariat that is a remnant of the area

Table 8.2.1-2 is the summarized hydrogeological description of formations in the El Qaa Plain.

In addition to the second and third aquifer described above, the first aquifer is distributed around El Tur, which is exploited by dug wells for irrigation in the area. Some of these dug wells are used to extract water for domestic use in Sharm El Sheikh. As described the preceding section, most of the boreholes in the El Qaa Plain were drilled to the second aquifer that is the main aquifer in the area. The aquifer has been developed mainly for irrigation and domestic supply for El Tur in the northern part of the El Qaa Plain. The third aquifer occurs in the low electric resistivity layer. There are some observation boreholes and a few production wells reaching to the aquifer. The base of the aquifer has not been confirmed by any borehole.

The geophysical prospecting disclosed that a layer with very high electric resistivity occurs generally at the shallow depth in the southern part of the El Qaa Plain, which is expected to be the basement. It is considered that there is no aquifer in the layer except a limited zone showing relatively low resistivity. During the project term, one test well was drilled to penetrate the limited zone. The result of the drilling work is described in Chapter VII.

Concerning the first aquifer, the water table contour map indicates a possibility that the limited aquifer may be a part of the second aquifer. The details will be described in the section of water levels.

(2) Main Aquifer in the El Qaa Plain

As described in the section of well inventory, most of screens are installed up to the depth of -100 m ASL, concentrating to the depth between 0 m to -50 m. Fig. 8.2.1-5(2)-(1/2) indicates that the zone installed most screens correspond to the second layer with resistivity values from 10 to 20 ohm-m. It is concluded that the layer with the intermediate electric resistivity value is the main aquifer in the El Qaa Plain. This layer underlies widely at the depth between +20m to -60m ASL in the north of the El Qaa Plain from the southeast of El Tur. The maximum thickness is about 80 meters or more. The layer in the central area is thinner, about 10 to 20 m. The mean thickness of the layer is estimated at 50 m.

This layer corresponds to the layer that is conventionally called the second aquifer in the El Qaa Plain. Therefore, the second aquifer can be named the main aquifer in the area.

The base of the second aquifer was estimated based on the collected data and considering the points described above. Fig. 8.2.1 -5 show the profiles by the result of the TEM survey and the estimated line of the bottom of the aquifer. Fig. 8.2.1-7 shows the geological profile based on the geological column of existing boreholes. These figures indicate that there are two areas with the deeper bottom than other areas.

In addition to the data as described above, the depth of the screen location for production, wells were used to prepare Fig. 8.2.1-8, which is the isobath map of the main aquifer in the El Qaa Plain. The figure indicates that there are actually two groundwater sub-basins in the area. One is in the area northwest of Gebel Safariat and another is in the lower area of Wadi Mir and Wadi Shadk, which is northeast of El Tur. The deepest area is more than 100 meters below seawater level and is located in the almost central part of the El Qaa Plain.

The isopach map of the aquifer, Fig. 8.2.1-9, was also drawn on the basis of the isobath map and the water table map prepared by the Study Team. The lines are naturally almost similar to the basement lines. There are also two thickest parts in the area, namely the area northwest of Gebel Safariat and the lower area of Wadi Shadk. These areas have a thickness of more than 80 meters.

The isopach line of 0 meter shows the whole extent of the aquifer. The assumed area

that is bounded by a presumed line extended to the area without borehole data is estimated at 678 km^2. The extent of the aquifer is considered to be limited to an inferred fault on the extension of Wadi Isla at the south. The table below shows the results of the similar estimation for the areas of a thickness of more than 20 meters, 40 meters, 60 meters, and 80 meters. The figures will be used to estimate the volume of the aquifer.

Thickness	0	20	40	60	80	(meter)
Area	678	576	476	342	131	(km^2)

(3) Aquifer in the southern El Qaa Plain

In the southern El Qaa Plain, the result of the geophysical survey shows that the high resistivity area spread in the mountain foot on the eastern El Qaa Plain and the lower resistivity area spread in the coastal area. This indicates that the existence of an extensive aquifer may be not expected in the southeastern part of the El Qaa Plain and, an aquifer with high saline water may occur in the coastal area. Recently private company's (PETROBEL) wells constructed in the south coastal area yielded groundwater with TDS of 4,928 mg/l.

Although the general situation is as described above, a zone with relatively low resistivity was found by the JICA geophysical survey in the southeastern side. The zone is located in the downstream area of Wadi Thiman running from the back in which lots of dykes are observed. It may be expected that an aquifer occur in this low resistivity zone. The test borehole, J-7, was drilled to penetrate this zone. It was drilled in the Quaternary deposits up to the depth of 250m, however, it did not reach the basement rocks. Lithology is sand and gravel. Screen was installed in the section between 196m and 236m. Static water level was confirmed at 148.99mBGL.

5) Groundwater Level

(1) Water level fluctuation

Groundwater level fluctuates depending on natural and artificial conditions. The natural conditions are seasonal and daily variation such as precipitation, evaporation, level of surface water, and atmospheric pressure. The artificial conditions are pumping rate of intake wells, construction work and others. Fluctuation of groundwater level in an aquifer represents the change of hydrogeological condition in the aquifer. Therefore, continuous measurement of groundwater levels is indispensable for groundwater development and management.

The groundwater levels in the Quaternary aquifer had been measured in several studies. Since 1989, the measurement of groundwater level has been periodically carried out by WRRI and the results have been stored in the database CHRONO. The JICA Study Team conducted water level measurement of selected wells three times during the project term, May 1996, February and September 1997. All the results are shown in Table 8.2.1-1. The data of elevation of some boreholes were revised as mentioned in the table.

According to the screen positions recorded in the well inventory, Table 8.1.1-(1), there are 15 boreholes to observe water level of the second aquifer. Four (4) of them have data for less than one and half year, 11 other boreholes have data from 1989 to 1996 or 1997. Three (3) of the 11 boreholes are two operating wells and the observation borehole for an operating well. The rest, eight (8) boreholes, are five (5) piezometric boreholes and three (3) observation boreholes for not operating wells at the present. The water level fluctuations of these eight (8) boreholes are shown in Fig. 8.2.1-10. The recorded rainfall at El Tur and St. Catherine are also shown in this figure as bar charts.

Generally, seasonal fluctuation is not clear, though some parts of the fluctuation seem to respond to rainfall. The increase of water levels was observed in the beginning of 1989. From the end of 1994 to the beginning of 1996 water levels of some boreholes seem to show a similar tendency of variation. A distinctive rising was observed in some boreholes from March to May 1997, but it is not clear what affected this increment.

Concerning the long-term tendency, the boreholes located in the north of the main aquifer show no decrease of water levels from 1989 to 1997. The other wells located in the southern part of the aquifer seem to show 6cm/year decreasing of water levels in average as shown in the below table. However, it is not clear yet if the phenomenon is a prolonged tendency. The area has been developed to extract water for domestic supply.

Change of Average Water Level in Meters (from 1989 to 1997)

Well No. (Code & Name)	1989	1990	1991	1992	1994	1995	1996	1997
43; 48CB-001	1.93	1.81	2.09	1.88	1.93	1.93	1.75	
RIWR1		-0.12	0.28	-0.21	0.05	0.00	-0.18	
44; 48CB-002	8.65	8.70	8.54	8.44	8.47	8.51	8.36	8.20
RIWR2		0.05	-0.16	-0.10	0.03	0.04	-0.15	-0.16
50; 48CC-003	15.05	14.51	14.41	14.38	14.34	14.32	14.36	14.27
T-7		-0.54	-0.10	-0.03	-0.04	-0.02	0.04	-0.09
52; 48CC-005	19.03	19.01	18.97	18.84	18.66	18.66	19.41	18.46
RIWR1B		-0.02	-0.04	-0.13	-0.18	0.00	0.75	-0.95

Upper column: Average water level in the year
Bottom column: Differences from the previous year

On the other hand, it is also confirmed based on the position of screen pipes that there are four (4) boreholes to observe water level of the third aquifer. In addition, it is possible that another borehole, No.45 (T-1/1), which was constructed beside No.44 (T-1/2), was drilled to the third aquifer. The recorded water levels of the five (5) boreholes are shown in Fig. 8.2.1-11 with the recorded rainfall at the El Qaa Plain and St.Catherine. The fluctuation tendency common to all boreholes has not been observed, except a similar movement of two boreholes, No.45 (T-1/1) and No.51 (RIWR1A), for a short term of the latter of 1995. It is unknown what caused this fluctuation.

The long-term tendency for the third aquifer is indistinct from 1989 to 1997.

In Wadi Village and El Gebaal located around El Tur, water levels of dug wells had been measured monthly from May 1995 to February 1996 by the El Tur office of WRRI. The results are shown in Fig. 8.2.1-12 & 13. According to the figures, a general tendency during the period can be considered almost stable though some recorded levels changed sharply by pumping probably. During the field survey conducted the Study Team, however, it was reported that the water levels of dug wells in Wadi Village had been falling down for recent years. It is possible that new dug wells have been constructed recently. Prolonged and continuous observation of water levels may be necessary to manage groundwater in the area properly.

(2) Water table contour of the main aquifer

As mentioned in the preceding section, the JICA Study Team conducted water level measurement of selected wells three times, May 1996, February and September 1997. Fig. 8.2.1-14 (1), (2), & (3) show the water table contour obtained by the result. The

figures indicate the water level is a little down in the central area in winter.

The flow lines, Fig. 8.2.1-1, were drawn on the basis of the contour map of water level. These flow lines indicate that there are two main flows in the area. One is the flow into the Gulf of Suez through the groundwater sub-basin, which is located to the northwest of Gebel Safariat, from the north mountainous area. The other one is the flow through the another groundwater sub-basin located in the down stream of Wadi Mir and Wadi Sidaq flowing out of the eastern mountainous area. It suggests that there is a difference in the recharge area to these sub-basins shown in the isobath map. Namely, the north sub-basin is mainly recharged by groundwater through the sedimentary rocks on the north of the El Qaa Plain and the south sub-basin is recharged through the Precambrian basement rocks on the east.

Another water table contour map, Fig. 8.2.1-16, shows the water table contour of dug wells in Wadi Village and El Gebaal. The contour lines are obtained after the well locations were revised with GPS survey. The figure indicates that the lines can be considered to overlap with the contour lines of the second aquifer. The first aquifer that has been founded in the very limited area and exploited by dug wells is most probably a part of the second aquifer.

(3) Rainfall and Water Level Fluctuation

It is natural that the water level fluctuation of an aquifer responds to rainfall in the catchment area where a certain volume of the rainfall recharges the aquifer. However, the response is generally the seeming one, which means that the rainfall itself has not reached the aquifer directly at the time when the increase of water level is observed. Besides, the increase of water level shows time lag behind rainfall due to the hydrogeological condition in the area.

A variety of factors can cause water level change as already described. Therefore, not all the water level change can be considered to correspond and coincide with the change of water storage. Nevertheless, an attempt to reveal the correlation between rainfall and water level change has significance as one of steps to estimate the volume of recharge. The following calculation was done as a trial of it.

In an unconfined aquifer, the change in groundwater storage, dQ, is given by

$$dQ = A \cdot dh \cdot Sy$$

where A is the area over which a change in water level is observed, h is the change in water level, Sy is the specific yield or effective porosity of the aquifer material.

From September 1994 to May 1996, the water levels of several piezometric boreholes penetrated the main aquifer had been observed every three (3) month. The result is summarized in Table 11.1.1-1 (Refer, Fig. 8.2.1-10). The average change of water level is below;

The average change of water level in meters

Sep. 94	Dec. 94	Mar. 95	Jun. 95	Sep. 95	Dec. 95	Mar. 96	May.96
	+0.22	-0.05	+0.08	+0.06	-0.08	-0.05	+0.96

(The figures are different from the previous record)

The area of the second aquifer is 678 km^2 (See 8.2.1-4)-(2)). The main aquifer consists of sand and gravel with silt and clay, therefore the effective porosity may be estimated at 0.15.

Then the increase of groundwater storage is calculated as below;

22.4 x 10^6 m^3 when the water level increase is 0.22 meters (Dec.1994)

8.14 x 10^6 m^3 when the water level increase is 0.08 meters (Jun.1995)

6.10 x 10^6 m^3 when the water level increase is 0.06 meters (Sep.1995)

97.6 x 10^6 m^3 when the water level increase is 0.96 meters (May.1996)

The total of the figures from December 1994 to September 1995 is 36.6 x 10^6 m^3. This may be presumed the accumulated increasing volume of groundwater storage during the term.

On the other hand, during 1994 and 1995 the recorded precipitation at St.Catherine was as follows;

The rainfall at St. Catherine in mm (1994-1995)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1994	12.7	0.0	5.9	0.0	0.0					16.9	12.5	0.1
1995	0.2	2.9	5.8	3.5	0.0					0.0	0.0	9.2

The catchment area of Wadi El Agwag which covers the north half of the El Qaa Plain is 1934 km^2. Then, the total precipitation in the catchment area from the latter half of 1994 to the first half of 1995 is calculated as follows;

32.68 x 10^6 m^3 when the recorded rainfall was 16.9 mm (Oct.1994)

24.18 x 10^6 m^3 when the recorded rainfall was 12.5 mm (Nov.1994)

0.19×10^5 m^3	when the recorded rainfall was 0.1 mm (Dec.1994)
0.39×10^6 m^3	when the recorded rainfall was 0.2 mm (Jan.1995)
5.61×10^5 m^3	when the recorded rainfall was 2.9 mm (Feb.1995)
11.21×10^6 m^3	when the recorded rainfall was 5.8 mm (Mar.1995)
6.77×10^6 m^3	when the recorded rainfall was 3.5 mm (Apr.1995)

The total of the above figures is 81×10^6 m^3.

During the latter half of 1994 and the first half of 1995, the accumulated increasing volume of groundwater storage, 36.6×10^6 m^3, was 45 % of the volume of the accumulated rainfall.

However, the calculation is a very rough and simplified one for the particular period. The value obtained in May 1996 is considered too high comparing with the other values.

An analysis of the prolonged observation result is necessary to clarify the correlation of the recharge and the discharge in the aquifer.

6) Groundwater Quality

(1) Groundwater Quality of the Main Aquifer in the El Qaa Plain

The groundwater quality maps of the main aquifer in the El Qaa Plain was provided by the recent TDS (Total Dissolved Solid) value of the obtained 38 wells. These maps are shown in Fig. 8.2.1-17 for winter (February) and Fig. 8.2.1-18 for summer (August). The data used for the provided maps consist of existing data and result of laboratory test by JICA (1997). These wells are cased, and a range of depth is approximately 100 m to 200 m. The contour line of TDS value is shown in the map. Based on the water quality map, a feature and distribution of TDS value in the plain are described as follows;

TDS Distribution

The TDS in the main aquifer in the area shows a gradual increase to northwest and west direction, and drastic increase towards the coastal line (southwest) of El Tur. The major 2 contour lines of 1000 mg/l and 1500 mg/l on winter season and 1500 mg/l and 2000 mg/l on summer season are respectively along the plain distribution of northwest to southeast line. In the central of plain where is 10km north of El Tur City, the

groundwater maintain the lowest TDS value of the plain.

In the northern area of the plain, where the area lied between G. Qabiliyat and G. Mutga, there are wells showing high TDS value of over 3000mg/l. These wells are No.2 (37DE-001), No.3 (37DA002) and No.5 (37EA-009). The characteristic of groundwater quality in the northern area of plain, including above mentioned 3 wells, is represented a high value of Cl^- ion which exceeded a value of Egyptian drinking water standard (600 mg/l) at all wells, and Ca^{2+} ion as well at a part of wells. It is possible that the source of these ions are the sedimentary rocks in the northern mountains. On the other hand, there is an area where low TDS value of less than 500 mg/l are distributed. The area is located around the lower part of Wadi Geba, where the well No.9 (37EA-005) exists.

In north to northeast area of El Tur, or the central area of the plain, most of wells are concentrated. In the coastal area of El Tur, the distribution of extremely high TDS value of more than 5,000 mg/l is observed along the coastal line. The TDS value of 2 wells located in coastal area are 10,273 mg/l at well No. 43 (48CB-001) and 8,823 mg/l at well No. 55 (El Tur-1). In these wells, 3 ions of Cl^-, Ca^{2+} and SO_4^{2-} are exceeded the value of Egyptian drinking water standard. On the other hand, the interior of the city area shows low TDS value of less than 500 mg/l , and there are no exceeding ions from the Egyptian drinking water standard.

Consideration of Groundwater Recharge

The distribution of major TDS contour lines (1000/1500 mg/l on winter and 1500/2000 mg/l on summer) is suggestive of the recharge from the eastern mountains of the Precambrian basement, as well as the directing of groundwater flow towards the coastal line of southwest. Especially the areas distributed low TDS value are due to the high recharge rate from the wadis facing these areas. Such areas are represented by following locations;

The western area of Gebel Safariat.

Low TDS value of less than 500 mg/l (Well No. 9; 37EA-005) and less than 1000mg/l (Well No. 10; 37EA-008 and No. 21; 48AB-002) is distributed. The area is located at the lower part of Wadi Geba and Wadi Warka flowing out of the mountains of the Precambrian Basement . It is expected that groundwater flows into this area through the fractures in the Basement.

The lower area of Wadi Mir and Wadi Shadk.

There is the lowest TDS zone of less than 500 mg/l value. The area seems to be the thick aquifer area in the isopach map. A contour line of 500 mg/l TDS value is clearly opened directing northeastward, Wadi Mir and Wadi Shadk. The groundwater flow to the area, therefore, is considered from these Wadis.

Seasonable Variations

A variation of contour line in winter (Fig. 8.2.1-17) and summer (Fig.8.2.1-18) proves that there is higher recharge rate from the wadis in winter season. Because the low TDS zones are extensive in winter season, and limited in summer season. This phenomenon is specially distinguished in the western area of Gebel Safariat and the lower area of Wadi Mir and Wadi Shadk.

JICA Study Team carried out water quality survey on February and August of 1997. The samples for laboratory analysis were taken from 16 water points, including 9 cased wells, 2 dug wells and 5 springs (including seepage water in wadis) in the El Qaa Plain. Fig. 8.2.1-19 shows a variation of TDS values in the El Qaa Plain, using the data obtained by the laboratory test. The graph indicates that the TDS values of most water points are low at February and high at August. An exception of Hamam Musa is because of hot spring.

Sea Water Intrusion

The groundwater maps (Fig. 8.2.1-17 and Fig. 8.2.1-18) indicate high salinity zone in the southeastern area of El Tur City, along coastal line. The TDS value in the area is between 3,000 - 7,000 mg/l in winter season and 3,000 - 10,000 mg/l in summer season. The wells located in this zone are No. 40 (48CB-005; Abu Kalam), No. 41 (48CB-001; RIWR1) and No. 55 (El Tur-1). These wells are characterized by the high value of 3 ions of Cl^-, Ca^{2+} and SO_4^{2-} which exceeded the value of Egyptian drinking water standard. Such high salinity may be attributed to the sea water intrusion

The historical variation of TDS value in the area is shown in Fig. 8.2.1-20. The available data are concentrate in the year of 1989. According to this graph, at the most of wells located in the interior of the city area, the TDS value increase only at August of 1994. The other period is relatively stable as a range of 500 to 700 mg/l. The wells (No. 40; 48CB-005 and No. 41; 48CB-003) located in coastal area of the city, however, TDS values increase since early 1990, and never become stable. It is suspected, therefore, that sea water intrusion has been started from early 1990, in the coastal area of the city.

(2) Groundwater Quality of Springs in the El Qaa Plain

The groundwater quality maps of the springs in the El Qaa Plain was provided by the recent TDS (Total Dissolved Solid) value of the obtained 5 springs. A map is shown in Fig.8.2.1-21. The data used for a provided map is result of laboratory test by JICA (1997). The water quality of the springs of the wadis, including Wadi Hibran, Wadi Mir, Wadi Thiman and Wadi Isra shows low salinity of less than 1,000 mg/l. These TDS values are low in February and lather high in August.

(3) Water Quality of Dug Wells in Wadi Village and El Gebaal

The measurement was conducted on May 1989 or August 1994 by WRRI for most of wells. Two dug wells of Hag Sobah (No.8) and Abu Salem-1 (No. 18) were measured by JICA Study Team.

The TDS values of dug wells in Wadi Village ranged widely from 376 to 9470 mg/liter. The JICA Study Team confirmed the well with the highest value had not been used because of pollution probably caused artificially. It is considered that some wells showing high value of Cl^- and SO_4^{2-} are most likely polluted by artificial factors in Wadi Village.

The TDS values of dug wells in El Gebaan were generally higher than in Wadi Village. Probably the dug wells of in the coastal area are affected by a sea water intrusion.

Fig. 8.1.2-22 is drawn based on the data excluding the probable polluted wells in Wadi Village. A similar trend with the second aquifer is shown in the coastal area of the El Tur. The TDS value is extremely high along coastal line, and relatively low in the interior area of the city. Most of major ions are exceeded the value of Egyptian Drinking Water Standard. Considering these water qualities, it is concluded that the groundwater in the coastal area is not suitable for potable water supply.

7) Hydrogeological Characteristics of Aquifer

As described in the section of Configuration of Aquifer, two important points have emerged about the main aquifer in the area. 1; The second aquifer can be considered to consist of two sub-basins , one is the area located in the northwest of Gebel Safariat and another is the area spreading down Wadi Mir and Wadi Shadk. 2; The first aquifer is most probably a part of the second aquifer.

The second and third aquifer is exploited by pumping up from cased wells. Pumping tests had been carried out to obtain aquifer constants such as transmissivity in some cased wells

in the past. The Study Team collected and reanalyzed the data and revised the some results. The collected data were summarized in Data Book. Table 8.2.1-3 summarized the hydrogeological data obtained from the wells.

Recorded yield from wells in the northern part of the second aquifer ranged from 20 to 115 m^3/hour. Specific capacity is ranging from 0.33 to 6.11 liters/sec/meter. Transmissivity is ranging from 106 to 2150 m^2/day. Hydraulic conductivity is ranging from 4.6 to 71.6 meters/day. Concerning the southern part of the second aquifer, yield from wells ranged from 48.6 to 101.5 m^3/hour. Specific capacity is ranging from 0.53 to 9.23 liters/sec/meter. Transmissivity is ranging from 81 to 2639 m^2/day. Hydraulic conductivity is ranging from 2.7 to 71.5 meters/day. The average figures of each hydrogeological factor of the northern part are little smaller than the southern part. The averages are shown in the below table.

Yield from wells drilled up to the third aquifer ranged from 20.3 to 52 m^3/hour. Specific capacity is ranging from 0.08 to 1.07 liters/sec/meter. Transmissivity is ranging from 9 to 52.3 m^2/day. Hydraulic conductivity is ranging from 0.28 to 5.23 meters/day. The averages are also shown in the below table. The figures are an order of magnitude smaller than the figures of the second aquifer.

Average Hydrogeological Factors

	Yield	Specific Capacity	Trans missivity	Hydraulic Conductivity
	(m^3/h)	(liters/s/m)	(m^2/day)	(m/day)
Northern part of the second aquifer	56.7	2.64	768	23.9
Southern part of the second aquifer	67.2	4.36	989	25.5
The third aquifer	34.6	0.54	85	2.0

The distribution of Transmissivity and Hydraulic conductivity of the second aquifer is summarized in Fig. 8.2.1-23 and Fig. 8.2.1-24 respectively.

The zone with highest value is nearly located in the deepest and thickest area of the south sub-basin. Recently WRRI constructed production wells for domestic water use in this area.

Fig. 8.2.1-25 was provided to evaluate the groundwater resources in the area. The figure was drawn by combining the lines of depth to water, Fig. 8.2.1-26, and the water quality distribution, Fig. 8.2.1-18. The evaluation of the groundwater resources is described in Chapter XI.

8) Groundwater Extraction

At the present there are 14 production wells pumping from the second aquifer in the El Qaa Plain. Seven (7) wells are used for domestic water supply in El Tur and two (2) wells for domestic use of Sharm El Sheikh. Five (5) other wells are used for irrigation. In addition to the 14 wells, 29 dug wells are confirmed to be used for private farms. Some of dug wells are used to supply domestic water for Sharm El Sheikh.

Unfortunately, these production wells have no flow meters and no records of the withdrawal at the present. Therefore, the withdrawal can be only estimated roughly. The withdrawal from the second aquifer has been estimated in several studies. The values of pumpage, however, are slightly different each other. The amount of pumpage in 1981 was estimated to be 2,800 m^3/day (domestic water supply : 700 m^3/day; export to Sharm El Sheikh : 2,000 m^3/day; irrigation: 100 m^3/day). The average withdrawal in 1984 was estimated at 8,250 m^3/day (domestic water supply: 1,500 m^3/day (3 wells) ; export to Sharm El Sheikh: 1,700 m^3/day (3 wells) ; irrigation: 5,050 m^3/day (11 wells)). The development of groundwater extraction during the period 1972 - 1992 is summarized in the table below. The extraction had rapidly increased in 1980's and reached at its peak in 1987. After 1987, amount of pumpage had gradually decreased and the average pumpage rate in 1992 was 8820 m^3/day.

Groundwater Extraction in The El Qaa Plain (1972 – 1992)

Year	Number of wells		Average groundwater extraction (m^3/day)		
	Irrigation	Domestic	Irrigation	Domestic	Total
1971	2	3	500	1700	2200
1984	14	6	5350	3200	8550
1987	14	9	6540	6500	13040
1990	14	9	2310	7960	10270
1992	10	8	830	7790	8820

The JICA Study Team conducted a survey about water use in the area. The details of the survey will be described in Chapter X. According to the result the volume of extracted groundwater are estimated as below. Pumpage from dug wells are estimated at about 2,000 m^3/day.

Discharge rate in The El Qaa Plain (1997)

Domestic	Domestic for Sharm El Sheikh	Irrigation	Dug wells	Total (m3/day)
6000	1000	451	2000	9415