

**CHAPTER 7 ENVIRONMENTAL (WATER QUALITY)
INVESTIGATION**

CHAPTER 7 ENVIRONMENTAL (WATER QUALITY) INVESTIGATION

A water quality investigation at 45 monitoring points was executed during the second and third field investigations. A total of three monitoring investigations were conducted, including in June, September and November 2000. The location of the monitoring points is shown in Figure 7.1.

7.1 Groundwater Quality Monitoring

The water quality monitoring investigation is summarized, as follows:

- The existing groundwater monitoring network for the Sohar mine area consists of 15 bore holes with casings and 31 hands dug wells used by the local residents for irrigation.
- OMCO and MMEW have been conducting periodic sampling and analysis of all 46 monitoring wells for 10 to 15 years.
- OMCO classified their existing monitoring network into 3 groups, including well around the tailings dam, wells in Wadi Suq, and wells in the area around mines. Sampling activities are conducted once a week for the tailings dam wells, once in two weeks for the wells along Wadi Suq, and once a month for areas around mines. OMCO analyzes all the samples they collect in their own laboratory.

7.2 Collection of Existing Monitoring Data for Groundwater

Groundwater data was collected from monitoring points along Wadi Suq and the surrounding area. The data are contained mainly in two documents, one entitled "Groundwater Pollution and Remediation in Wadi Suq" prepared by MWR in 1996, and OMCO's own environmental monitoring reports that they prepare monthly.

Fluctuations in groundwater level, pH, TDS and Na at monitoring points for duration from March 1995 to December 1999 according to OMCO's monthly data are presented in Figure 7.2. These data are summarized, as follows:

- Groundwater levels have decreased gradually by as much as 1 to 2 m in the period of four years.
- Since groundwater levels have decreased both upstream and downstream of trench 2, it is presumed that the volume of groundwater has decreased over all.
- pH values are almost neutral with fluctuation in range of 6.5 to 7.5.
- At MW-12 downstream of Trench -2, pH values shifted to the alkaline side of pH 8 to 9.
- TDS had almost no fluctuation during this 4-year period.
- Na concentrations generally exhibited a tendency to increase during this 4-year monitoring period.

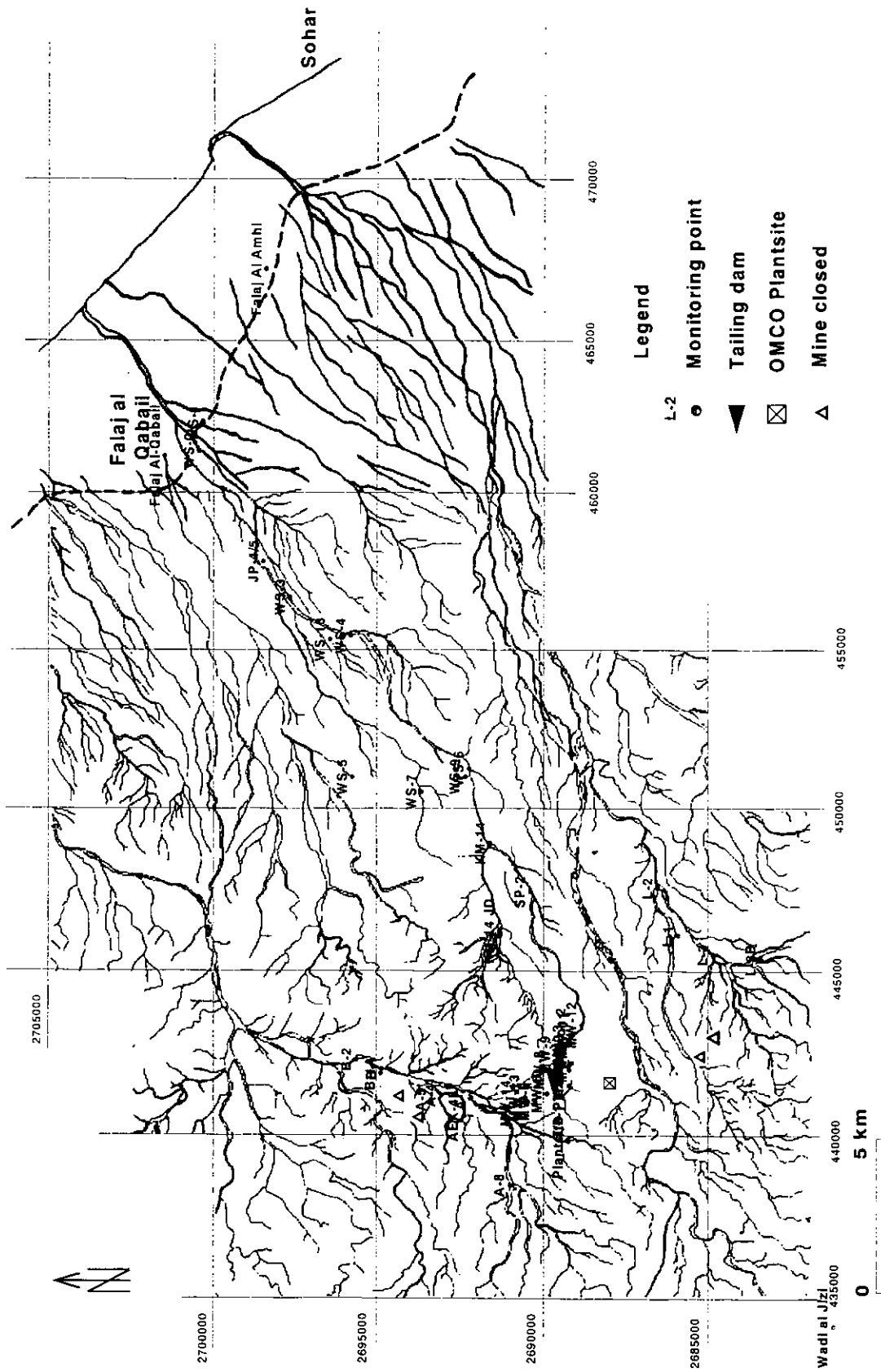
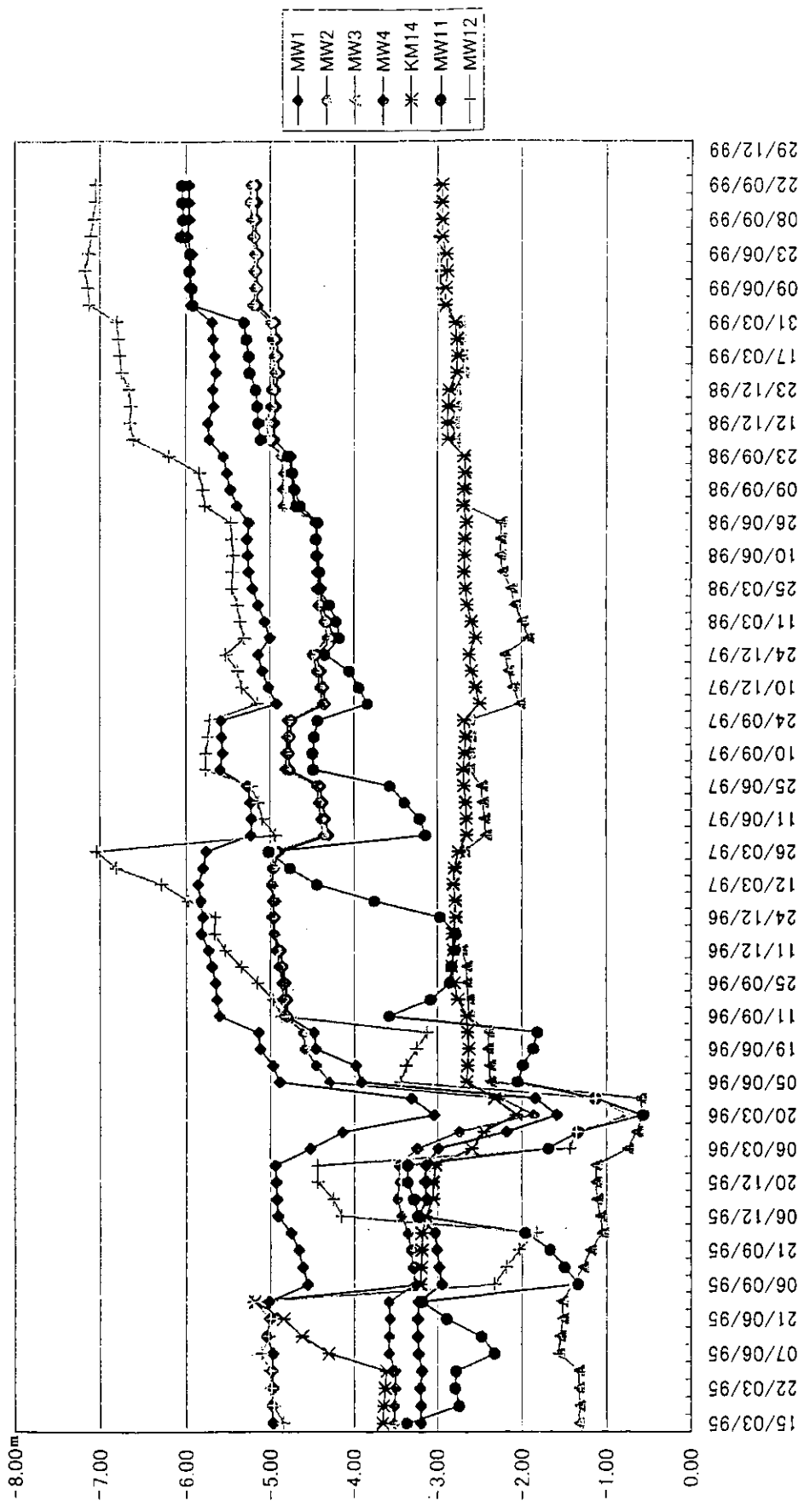


Figure 7.1 Existing Monitoring Stations



TAILING SYSTEM MONITORING
WATER LEVEL m

Figure 7.2 Existing Monitoring Results

7.3 Water Quality Monitoring Investigation

7.3.1 Water Sampling and Water Quality Measurement

As water quality monitoring points for this Study, 45 points were selected from the existing wells, surface water, mine water in open pits, and falaj water. The water quality investigation work conducted during the JICA Study is summarized, as follows:

- Water samples were collected from the wells using a Teflon bailer.
- Samples from a few of the hand-dug wells had to be collected from discharge pipe of the well pumping system because such wells were inaccessible.
- In the case of some drilled wells, a small stainless steel bailer had to be used because deterioration and corrosion had constricted the casings.
- The results of the analytical testing of the water samples are presented in Table 7.1 (1)~(3).
- Groundwater sampled from downstream of the tailing dam indicated rather high electric conductivities (EC) of 5.41 to 3.51 S/m, which corresponds waters that are typically considered brackish.
- All groundwater samples indicated neutral pH, ranging 6.5 to 7.5.
- Samples collected downstream of the tailings dam exhibited a strong odor, color and turbidity.

It is presumed that the odor and turbidity is caused by the flotation reagents used in concentrator that are now being biodegraded in the groundwater.

7.3.2 Result of Water Analysis

Each of the water quality samples was analyzed for the following 12 parameters: pH, EC, water temperature, Hg, Cd, Cr, As, Pb, Cu, Zn, SO₄ and Cl. Analytical results and the geographic distribution of concentrations are presented in Table 7.2 (1) to (4) and Figure 7.3 (1) to (6), respectively (refer to Appendix-7).

- pH ranges from 5.8 to 8.4. The pH of groundwater in the tailing dam and Lasail West mine water presented weakly acidic in range of pH 5.8 to 6.0.
- Electric Conductivity presented a high value of 8.15 S/m at the tailings impoundment and decreased with distance downstream along Wadi Suq.
- Water temperature ranged in 30 to 34 °C. Values in the tailings impoundment and surrounding areas were high.
- Hg presented somewhat higher values at the tailings impoundment and in the mine water samples.
- Cd presented higher values at the tailings impoundment and mine water of Aarja.
- As presented high value at the tailing impoundment and its high concentration zone elongated toward the northwest.

Table 7.1 Investigation Results of Existing Water Wells (1) June 13 to June 15, 2000

Sample No.	Collection Date	Sample type	Depth (m)	Turbidity	Color	Sediment	Odor	pH	ORP (mV)	E.C. (S/m)	Temp. (C)	Coordinates	
												Northing	Easting
MW-1	13-Jun-00	Groundwater	5.09	Slight	Gray	None	Strong organic	6.46	-157	5.41	33.1	2689228	442079
MW-2	13-Jun-00	Groundwater	5.00	Slight	Gray	None	Strong organic	6.76	-192	5.71	33.0	2689221	442156
MW-3	13-Jun-00	Groundwater	2.85	Slight	Gray	None	Strong organic	6.95	-112	5.18	34.2	2689256	442825
MW-4	13-Jun-00	Groundwater	6.01	Slight	Gray	None	None	6.09	80	5.98	33.6	2689131	442218
MW-5	13-Jun-00	Groundwater	12.88	Moderate	Gray	Silty	None	7.09	117	0.73	32.7	2689880	441277
MW-6	13-Jun-00	Groundwater	15.51	Slight	Gray	None	None	6.60	-48	0.55	32.6	2690245	441038
MW-7	13-Jun-00	Groundwater	13.06	None	Clear	None	None	7.75	49	0.11	33.2	2690471	441037
MW-8	13-Jun-00	Groundwater	11.16	Moderate	Brown	Silty	Slight iron	6.21	-83	2.11	33.4	2689815	442013
MW-9	13-Jun-00	Groundwater	8.64	Moderate	Gray	Silty	Slight iron	6.91	-103	1.24	34.5	2689630	442483
MW-11	13-Jun-00	Groundwater	4.48	Slight	Brown	Silty	Slight organic	6.99	-173	4.05	33.7	2689102	443084
MW-12	13-Jun-00	Groundwater	7.64	Slight	Brown	Silty	Slight organic	6.72	-68	3.51	35.2	2688835	443397
MW-13	13-Jun-00	Groundwater	12.45	High	Gray	Silty	Slight iron	6.14	-109	1.59	33.2	2690556	441157
MW-14	13-Jun-00	Groundwater	11.11	High	Gray	Silty	Slight iron	7.16	128	0.79	35.4	2690819	440990
Plant-1	13-Jun-00	Groundwater	14.21	None	Clear	None	None	7.58	147	0.15	32.5	2689237	439816
Trench-1	13-Jun-00	Surface water	NA	None	Clear	None	Slight organic	6.90	22	5.72	31.8	2689213	441991
Trench-2	13-Jun-00	Groundwater	NA	None	Clear	None	None	6.36	24	5.30	37.7	2689161	443000
A-4	13-Jun-00	Groundwater	5.55	None	Clear	None	None	7.56	51	0.20	31.5	2693078	441231
A-5	13-Jun-00	Groundwater	6.34	High	Brown	Moderate	None	7.10	141	0.75	30.0	2693382	441095
A-7	13-Jun-00	Groundwater	10.33	High	Brown	Silty	Strong fishy	7.20	71	0.39	33.3	2692183	441138
B-1	13-Jun-00	Groundwater	4.73	Slight	Clear	Slight	None	7.12	145	0.35	30.9	2694890	442050
B-1A	13-Jun-00	Groundwater	5.52	None	Clear	Slight	None	7.10	127	0.33	31.7	2694930	441900
B-2	13-Jun-00	Groundwater	4.81	None	Clear	None	None	7.16	143	0.36	32.0	2695656	442330
KM-14	14-Jun-00	Groundwater	3.80	None	Clear	None	None	6.77	152	1.71	30.0	2691600	449025
KM-14JD	14-Jun-00	Groundwater	NA	None	Clear	None	None	7.79	103	0.21	29.3	2691317	446303
Fajal Qabail	14-Jun-00	Surface Water	NA	None	Clear	None	None	8.37	20	0.11	32.9	2701554	460991
JP-4/3	14-Jun-00	Groundwater	11.00	None	Clear	Silty	None	7.28	159	0.89	33.2	2698543	457739
WS-1	14-Jun-00	Groundwater	NA	None	Clear	None	None	8.14	34	0.06	33.3	2700390	462065
WS-2	14-Jun-00	Groundwater	NA	None	Clear	None	None	7.67	65	0.39	33.2	2700513	461142
WS-3	14-Jun-00	Groundwater	NA	None	Clear	None	None	6.99	88	0.74	33.9	2697708	456648
WS-4	14-Jun-00	Groundwater	3.18	None	Clear	None	None	7.09	136	0.88	32.1	2695835	455448
WS-5	14-Jun-00	Groundwater	7.67	None	Clear	None	None	8.03	78	0.26	31.7	2695787	451081
WS-6	14-Jun-00	Groundwater	14.48	None	Clear	None	None	7.80	90	0.13	30.7	2692253	451336
WS-7	14-Jun-00	Groundwater	12.86	None	Clear	None	None	7.33	112	0.45	32.2	2693681	450618
WS-9	14-Jun-00	Groundwater	16.30	None	Clear	None	None	6.55	148	1.52	31.8	2692363	451091
WS-13	14-Jun-00	Groundwater	5.01	None	Clear	Iron flakes	None	8.03	75	0.40	32.2	2696478	455332
SP-2	14-Jun-00	Groundwater	2.39	Slight	Brown	Silty	None	6.60	117	1.78	33.3	2690387	447516
A-8	14-Jun-00	Groundwater	8.20	None	Clear	Silty	None	7.40	81	0.27	31.3	2691011	438483
AEX-48	14-Jun-00	Groundwater	11.05	None	Clear	Silty	None	7.83	31	0.18	32.5	2692403	440591
Wadi al Jizi	14-Jun-00	Surface water	NA	None	Clear	None	None	8.11	77	0.14	30.1	2681162	434152
L-1	15-Jun-00	Groundwater	NA	None	Clear	None	None	7.80	113	0.14	30.2	2685904	446163
L-2	15-Jun-00	Groundwater	6.51	None	Clear	Silty	None	7.51	112	0.12	31.4	2686534	447637
L-3	15-Jun-00	Groundwater	6.09	None	Clear	None	None	7.71	108	0.09	30.9	2684838	445576
L-3B	15-Jun-00	Groundwater	NA	None	Clear	None	None	7.64	106	0.08	30.5	2683363	445419
Fajal al Ambi	15-Jun-00	Surface water	NA	None	Clear	None	None	8.13	104	0.07	31.7	2698461	466759
T/D Piezo DH-2	15-Jun-00	Groundwater	19.67	Opaque	Rust red	Silty	Slight iron	5.80	44	7.66	31.0	2689227	441521

Table 7.1 Investigation Results of Existing Water Wells (2)

September 12 to September 14, 2000

Sample No.	Collection Date	Sample type	Depth (m)	Turbidity	Color	Sediment	Odor	pH	ORP (mV)	E.C. (S/m)	Temp. (C)	Coordinates	
												Northing	Easting
MW-1	12-Sep-00	Groundwater	5.10	Slight	Gray	None	Strong organic	7.07	-148	5.44	34.6	2689228	442079
MW-2	12-Sep-00	Groundwater	5.01	Moderate	Gray	None	Strong organic	7.06	-189	5.74	33.8	2689221	442156
MW-3	12-Sep-00	Groundwater	2.00	Slight	Gray	None	Moderate organic	7.22	-119	5.20	36.1	2689256	442825
MW-4	12-Sep-00	Groundwater	6.02	None	None	None	None	6.63	180	5.94	33.6	2689131	442218
MW-5	12-Sep-00	Groundwater	13.01	Slight	Clear	Silty	Musty	7.43	1	0.70	32.7	2689880	441277
MW-6	12-Sep-00	Groundwater	15.64	None	Clear	None	None	6.75	66	0.56	33.5	2690245	441038
MW-7	12-Sep-00	Groundwater	13.36	None	Clear	None	None	7.68	62	0.10	33.6	2690471	441037
MW-8	12-Sep-00	Groundwater	11.23	Moderate	Brt/Gray	Silty	Slight iron	6.81	-60	2.02	34.3	2689815	442013
MW-9	12-Sep-00	Groundwater	8.63	Moderate	Gray	Silty	Slight iron	6.80	-116	1.18	33.6	2689630	442483
MW-11	12-Sep-00	Groundwater	4.61	Slight	Brown	Silty	Slight organic	6.88	-186	4.13	35.5	2689102	443084
MW-12	12-Sep-00	Groundwater	6.77	Slight	Brown	Silty	Slight organic	6.63	-98	1.94	34.3	2688835	443397
MW-13	12-Sep-00	Groundwater	12.67	High	Gray	Silty	Slight iron	6.34	94	1.51	33.4	2690556	441157
MW-14	12-Sep-00	Groundwater	11.19	High	Gray	Silty	Slight iron	7.42	70	0.73	32.8	2690819	440990
Plantistic-1	12-Sep-00	Groundwater	14.50	None	Clear	None	None	7.56	185	0.15	32.4	2689237	439816
Trench-1	12-Sep-00	Surface water	NA	None	Clear	None	Slight organic	7.15	1	5.61	34.0	2689213	441991
Trench-2	12-Sep-00	Groundwater	NA	None	Clear	None	Slight organic	6.34	22	5.32	36.1	2689161	443000
A-4	13-Sep-00	Groundwater	5.60	None	Clear	None	None	7.58	78	0.19	32.4	2693078	441231
A-5	13-Sep-00	Groundwater	7.19	High	Brown	Moderate	None	7.36	-20	0.77	31.9	2693382	441095
A-7	13-Sep-00	Groundwater	10.48	None	Clear	Silty	Slight fishy	7.34	93	0.38	33.7	2692183	441138
B-1	12-Sep-00	Groundwater	5.40	Slight	Clear	Slight	Strong S-	7.32	-172	0.36	35.4	2694890	442050
B-2	12-Sep-00	Groundwater	6.07	None	Clear	Slight	Slight	7.69	60	0.33	31.7	2694930	441900
B-1A	12-Sep-00	Groundwater	4.81	None	Clear	None	None	7.41	45	0.35	33.4	2695656	442330
KM-14	13-Sep-00	Groundwater	4.20	None	Clear	None	None	7.28	114	1.70	32.0	2691600	449025
KM-14JD	13-Sep-00	Groundwater	13.43	None	Clear	None	None	7.99	94	0.20	32.9	2691317	446303
Falaj al Qabail	13-Sep-00	Surface water	NA	Slight	Cloudy	None	Slight	8.27	-10	0.11	33.5	2701554	460991
JP-4/3	13-Sep-00	Groundwater	11.15	Slight	Cloudy	Silty	Strong fishy	7.40	-208	0.87	34.2	2698543	457739
WS-1	13-Sep-00	Groundwater	NA	None	Clear	None	None	8.21	25	0.07	33.6	2700390	462065
WS-2	13-Sep-00	Groundwater	NA	No sample taken								2700513	461142
WS-3	13-Sep-00	Groundwater	7.13	Slight	Cloudy	None	None	7.29	74	0.82	33.6	2697708	456648
WS-4	13-Sep-00	Groundwater	3.43	None	Clear	None	None	7.34	109	0.94	33.7	2695835	455448
WS-5	13-Sep-00	Groundwater	5.69	None	Clear	None	None	7.69	89	0.26	32.8	2695787	451081
WS-6	13-Sep-00	Groundwater	12.95	None	Clear	None	None	7.74	96	0.13	31.1	2692253	451336
WS-7	13-Sep-00	Groundwater	12.18	None	Clear	None	None	7.50	105	0.43	32.9	2693681	450618
WS-9	14-Sep-00	Groundwater	16.72	None	Clear	None	None	6.85	157	1.56	33.4	2692363	451091
WS-13	13-Sep-00	Groundwater	5.05	Moderate	Tan	Iron flakes	Musty	8.58	-9	0.40	34.8	2696478	455332
SP-2	14-Sep-00	Groundwater	2.77	None	None	Silty	Slight	6.65	167	1.78	33.9	2690387	447516
A-8	13-Sep-00	Groundwater	8.57	None	Clear	None	None	7.48	92	0.27	29.5	2691011	438483
AEX-48	13-Sep-00	Groundwater	NA	No sample taken								2692403	440591
Wadi al Jizi	14-Sep-00	Surface water	NA	None	Clear	None	None	8.12	100	0.10	30.7	2681162	434152
L-1	13-Sep-00	Groundwater	13.98	None	Clear	None	None	7.55	95	0.15	31.2	2685904	446163
L-2	13-Sep-00	Groundwater	6.91	None	Clear	Silty	None	7.63	102	0.12	32.0	2686534	447637
L-3	13-Sep-00	Groundwater	6.48	None	Clear	None	None	7.46	87	0.09	32.5	2684838	445576
L-3B	13-Sep-00	Groundwater	11.23	None	Clear	None	None	7.52	88	0.08	31.3	2683363	445419
Falaj al Amhi	13-Sep-00	Surface water	NA	None	Clear	None	None	8.33	20	0.06	32.1	2698461	466759
T/D Piezo DH-2	13-Sep-00	Groundwater	19.73	Opaque	Rust red	Silty	Slight iron	NA	NA	NA	NA	2689227	441521

Table 7.1 Investigation Results of Existing Water Wells (3) November 19 to November 22, 2000

Sample No.	Collection Date	Sample type	Depth (m)		Turbidity	Color	Sediment	Odor	pH	ORP (mV)	E.C. (S/m)	Temp. (°C)	Coordinates	
			Surface	Bottom									Northing	Easting
MW-1	19-Nov-00	Groundwater	5.20	5.08	Slight	Gray	None	7.01	-32	5.51	32.5	2689228	442079	
MW-2	19-Nov-00	Groundwater	5.08	5.08	Moderate	Gray	None	6.93	-191	5.79	32.4	2689221	442156	
MW-3	19-Nov-00	Groundwater	2.89	2.89	Slight	Gray	None	7.29	-150	5.17	33.4	2689256	442825	
MW-4	19-Nov-00	Groundwater	6.06	6.06	None	None	None	6.61	121	5.89	32.0	2689131	442218	
MW-5	19-Nov-00	Groundwater	13.19	13.19	Slight	Clear	Silty	7.29	-43	0.73	30.4	2689880	441277	
MW-6	19-Nov-00	Groundwater	15.70	15.70	None	Clear	None	6.80	-94	0.55	30.7	2690245	441038	
MW-7	19-Nov-00	Groundwater	13.68	13.68	None	Clear	None	7.64	61	0.11	32.3	2690471	441037	
MW-8	19-Nov-00	Groundwater	11.30	11.30	Moderate	Bm/Gray	Silty	6.55	-96	2.13	31.5	2689815	442013	
MW-9	19-Nov-00	Groundwater	8.70	8.70	Moderate	Gray	Silty	6.76	-112	1.16	30.6	2689630	442483	
MW-11	19-Nov-00	Groundwater	4.94	4.94	Slight	Brown	Silty	6.82	-211	4.36	32.2	2689102	443084	
MW-12	19-Nov-00	Groundwater	7.82	7.82	Slight	Brown	Silty	6.90	-127	4.09	32.3	2688835	443397	
MW-13	19-Nov-00	Groundwater	12.89	12.89	High	Gray	Silty	6.43	82	1.54	31.7	2690556	441157	
MW-14	19-Nov-00	Groundwater	11.24	11.24	High	Gray	Silty	7.55	6	0.72	31.4	2690819	440990	
Plantlet-1	19-Nov-00	Groundwater	14.71	14.71	None	Clear	None	7.66	91	0.16	30.1	2689237	439816	
Trench-1	19-Nov-00	Surface water	NA	NA	None	Clear	None	7.18	19	5.47	26.6	2689213	441991	
Trench-2	19-Nov-00	Groundwater	NA	NA	None	Clear	None	6.82	-16	5.38	36.2	2689161	443000	
A-4	21-Nov-00	Groundwater	5.73	5.73	None	Clear	None	7.48	80	0.19	31.2	2693078	441231	
A-5	21-Nov-00	Groundwater	7.72	7.72	None	Clear	None	7.12	94	0.78	29.8	2693382	441095	
A-7	21-Nov-00	Groundwater	9.28	9.28	None	Clear	None	7.28	83	0.40	30.3	2692183	441138	
B-1	21-Nov-00	Groundwater	5.72	5.72	Slight	Brown	Slight	7.19	46	0.83	28.6	2694890	442030	
B-1A	21-Nov-00	Groundwater	5.46	5.46	None	Clear	None	7.99	57	0.34	28.0	2694930	441900	
B-2	21-Nov-00	Groundwater	4.57	4.57	None	Clear	None	7.67	80	0.35	31.1	2695656	442330	
KM-14	20-Nov-00	Groundwater	4.20	4.20	None	Clear	None	7.22	148	1.72	29.4	2691600	449025	
KM-14JD	20-Nov-00	Groundwater	NA	NA	None	Clear	None	7.93	103	0.21	27.1	2691317	446303	
Falaj al Qabail	20-Nov-00	Surface water	NA	NA	Slight	Cloudy	None	8.24	74	0.12	30.6	2701554	460991	
JP-4/3	20-Nov-00	Groundwater	NA	NA	No sample taken							2698543	457739	
WS-1	20-Nov-00	Groundwater	NA	NA	None	Clear	None	8.27	74	0.06	30.7	2700390	462065	
WS-2	20-Nov-00	Groundwater	NA	NA	None	Clear	None	7.78	103	0.38	27.6	2700513	461142	
WS-3	20-Nov-00	Groundwater	7.24	7.24	None	Clear	None	7.29	103	0.82	32.0	2697708	456648	
WS-4	20-Nov-00	Groundwater	3.80	3.80	None	Clear	None	7.45	125	0.95	31.1	2695835	455448	
WS-5	20-Nov-00	Groundwater	5.21	5.21	None	Clear	None	7.78	101	0.26	29.8	2695787	451081	
WS-6	20-Nov-00	Groundwater	13.10	13.10	None	Clear	None	7.83	106	0.12	27.5	2692253	451336	
WS-7	20-Nov-00	Groundwater	13.03	13.03	None	Clear	None	7.51	119	0.45	29.9	2693681	450618	
WS-9	20-Nov-00	Groundwater	16.95	16.95	None	Clear	None	7.16	126	1.61	32.8	2692363	451091	
WS-13	20-Nov-00	Groundwater	5.16	5.16	Moderate	Tan	Iron flakes	8.62	56	0.41	31.2	2696478	455332	
SP-2	20-Nov-00	Groundwater	2.98	2.98	Slight	Clear	None	7.29	129	1.81	30.2	2690387	447516	
A-8	21-Nov-00	Groundwater	7.72	7.72	None	Clear	Slight	7.71	39	0.28	28.8	2691011	438483	
ABX-48	21-Nov-00	Groundwater	NA	NA	No sample taken							2692403	440591	
Wadi al Jizi	19-Nov-00	Surface water	NA	NA	None	Clear	None	8.90	50	0.10	29.8	2681162	434132	
L-1	20-Nov-00	Groundwater	10.23	10.23	None	Clear	None	7.61	113	0.15	29.1	2685904	446163	
L-2	20-Nov-00	Groundwater	11.44	11.44	None	Clear	Silty	8.09	82	0.16	29.8	2686534	447637	
L-3	20-Nov-00	Groundwater	7.08	7.08	None	Clear	Slight	7.54	109	0.99	30.9	2684838	445576	
L-3B	20-Nov-00	Groundwater	12.08	12.08	Slight	White	Slight	7.64	108	0.08	29.3	2683363	445419	
Falaj al Amhi	22-Nov-00	Surface water	NA	NA	None	Clear	None	7.63	88	0.06	27.9	2698461	466759	
T/D Piezo DH-2	19-Nov-00	Groundwater	19.80	19.80	Opaque	Rust red	Silty	6.19	59	7.45	29.00	2689227	441521	

Table 7.2 Analysis Results of Water Monitoring Investigation (1)

Sample No.	Sample Type	Temp.	pH	ORP	E.C.	Hg	Cd	As	Pb	Cu	Zn	SO ₄	Cl
		(C.)		mV	S/m	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-1	Groundwater	33.1	6.46	-157	5.410	0.0012	0.028	0.005	0.30	0.56	< 0.01	1230	21500
MW-2	Groundwater	33.0	6.76	-192	5.710	0.0027	0.028	0.008	0.23	0.42	< 0.01	1476	22800
MW-3	Groundwater	34.2	6.95	-112	5.180	0.0005	0.028	0.004	0.24	0.37	< 0.01	999	20500
MW-4	Groundwater	33.6	6.09	80	5.980	0.0024	0.037	0.008	0.24	0.31	< 0.01	1519	24000
MW-5	Groundwater	32.7	7.09	117	0.725	0.0007	<0.001	0.004	0.09	1.27	1.70	446	2190
MW-6	Groundwater	32.6	6.60	-48	0.549	0.0007	<0.001	0.004	0.05	1.16	28.40	265	1650
MW-7	Groundwater	33.2	7.75	49	0.105	0.0023	<0.001	0.005	0.23	0.15	0.31	122	108
MW-8	Groundwater	33.4	6.21	-83	2.110	0.0013	<0.001	0.007	0.22	1.97	52.25	1034	7250
MW-9	Groundwater	34.5	6.91	-103	1.238	0.0021	<0.001	0.006	0.23	1.30	10.75	819	3860
MW-11	Groundwater	33.7	6.99	-173	4.050	0.0022	0.037	0.009	0.45	0.95	8.50	1143	15600
MW-12	Groundwater	35.2	6.72	-68	3.510	0.0013	<0.001	0.006	0.48	2.35	47.25	1072	14300
MW-13	Groundwater	33.2	6.14	-109	1.588	0.0014	<0.001	0.006	0.24	0.51	37.75	860	5040
MW-14	Groundwater	35.4	7.16	128	0.785	0.0022	<0.001	0.010	0.11	3.09	43.50	618	2560
Plantsite-1	Groundwater	32.5	7.58	147	0.151	0.0002	<0.001	0.007	< 0.01	0.12	< 0.01	234	208
Trench-1	Surface water	31.8	6.90	22	5.720	0.0046	0.028	0.011	0.48	0.19	< 0.01	1404	22600
Trench-2	Groundwater	37.7	6.36	24	5.300	0.0010	0.028	0.005	0.49	0.17	< 0.01	1337	20700
A-4	Groundwater	31.5	7.56	51	0.195	0.0011	<0.001	0.007	< 0.01	0.10	< 0.01	249	344
A-5	Groundwater	30.0	7.10	141	0.751	0.0002	<0.001	0.004	< 0.01	0.23	< 0.01	1635	1570
A-7	Groundwater	33.3	7.20	71	0.394	0.0008	<0.001	0.004	< 0.01	1.76	1.09	291	1012
B-1	Groundwater	30.9	7.12	145	0.353	0.0001	<0.001	0.004	< 0.01	0.11	< 0.01	231	908
B-1A	Groundwater	31.7	7.10	127	0.333	0.0002	<0.001	0.005	< 0.01	0.04	< 0.01	270	800
B-2	Groundwater	32.0	7.16	143	0.359	0.0010	<0.001	0.006	< 0.01	0.06	< 0.01	230	896
KM-14	Groundwater	30.0	6.77	152	1.714	0.0011	<0.001	0.008	0.02	0.07	< 0.01	572	5830
KM-14JD	Groundwater	29.3	7.79	103	0.205	0.0011	<0.001	0.004	< 0.01	0.01	< 0.01	394	304
Falaj al Qabail	Surface water	32.9	8.37	20	0.105	0.0009	<0.001	0.003	0.01	<0.01	< 0.01	140	154
JP-4/3	Groundwater	33.2	7.28	159	0.891	0.0008	<0.001	0.007	0.03	0.03	< 0.01	1467	1820
WS-1	Groundwater	33.3	8.14	34	0.059	0.0002	<0.001	0.002	< 0.01	<0.01	< 0.01	52	90
WS-2	Groundwater	33.2	7.67	65	0.393	0.0006	<0.001	0.003	0.01	<0.01	< 0.01	626	840
WS-3	Groundwater	33.9	6.99	88	0.738	0.0018	<0.001	0.004	0.02	0.04	< 0.01	421	2080
WS-4	Groundwater	32.1	7.09	136	0.878	0.0028	<0.001	0.004	0.09	0.03	< 0.01	281	2900
WS-5	Groundwater	31.7	8.03	78	0.255	0.0004	<0.001	0.003	0.02	0.01	< 0.01	591	284
WS-6	Groundwater	30.7	7.80	90	0.133	0.0010	<0.001	0.003	< 0.01	<0.01	< 0.01	121	144
WS-7	Groundwater	32.2	7.33	112	0.447	0.0046	<0.001	0.005	< 0.01	0.01	< 0.01	589	988
WS-9	Groundwater	31.8	6.55	148	1.523	0.0017	<0.001	0.008	0.21	0.05	< 0.01	515	5076
WS-13	Groundwater	32.2	8.03	75	0.396	0.0031	<0.001	0.006	0.01	<0.01	< 0.01	565	680
SP-2	Groundwater	33.3	6.60	117	1.779	0.0001	<0.001	0.007	0.24	0.05	< 0.01	649	6144
A-8	Groundwater	31.3	7.40	81	0.266	0.0017	<0.001	0.003	< 0.01	0.01	< 0.01	495	372
AEX-48	Groundwater	32.5	7.83	31	0.175	0.0010	<0.001	0.003	< 0.01	0.11	< 0.01	299	180
Wadi al Jizi	Surface water	30.1	8.11	77	0.135	0.0020	<0.001	0.002	< 0.01	0.01	< 0.01	74	128
L-1	Groundwater	30.2	7.80	113	0.137	0.0010	<0.001	0.003	< 0.01	0.01	< 0.01	354	120
L-2	Groundwater	31.4	7.51	112	0.117	0.0010	<0.001	0.003	< 0.01	<0.01	< 0.01	232	108
L-3	Groundwater	30.9	7.71	108	0.087	0.0003	<0.001	0.002	< 0.01	<0.01	< 0.01	135	60
L-3B	Groundwater	30.5	7.64	106	0.080	0.0026	<0.001	0.002	< 0.01	<0.01	< 0.01	100	68
Falaj al Amhi	Surface water	31.7	8.13	104	0.065	0.0017	<0.001	0.003	< 0.01	<0.01	< 0.01	72	80
T/D Piezo DH-2	Groundwater	31.0	5.80	44	7.660	0.0047	<0.001	0.012	0.59	1.21	0.30	1434	31600
Minimum		29.3	5.80	-192	0.059	0.0001	<0.001	0.002	< 0.01	< 0.01	< 0.01	52	60
Maximum		37.7	8.37	159	7.660	0.0047	0.037	0.012	0.59	3.09	52.25	1635	31600
Average		32.4	7.21	52	1.527	0.0015	0.006	0.005	0.12	0.42	5.16	615	5565

Red color : Exceeding Omani standard of discharge