

/ -

\*\*

\*

\*

\*\*

" "

(1994 Postma Appelo).

-1

-2

. 2011 / 2 / 13

. 2011 / 5 / 10

:

—

(1) .<sup>2</sup> (1020)

2 (1650)

(17)

(0.4)

(1977 Hassan )

—

(Plistocene)

(Pliocene)

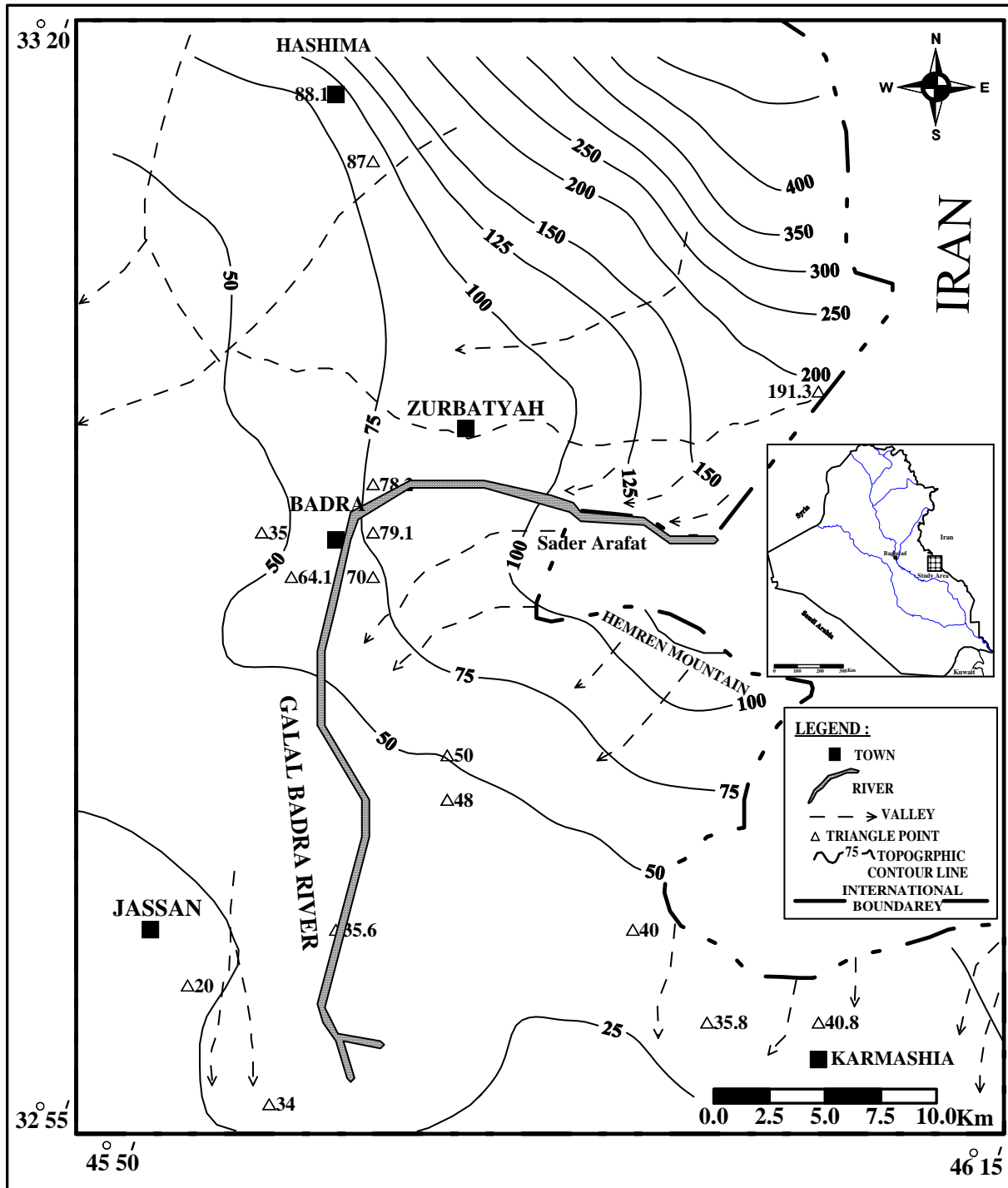
(1977 Hassan)

:

(2) . (1995 Eaton)

(1)

—



. 1

. ( )

.1

HCO3		SO4		Cl		K		Na		Mg		Ca		TDS			
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
212	200	995	930	286	255	4	3.5	243	228	63	60	365	304	2435	2025		1
184	184	1167	1022	408	376	4.6	4.2	339	336	70	62	410	338	2830	2465		2
234	292	1338	1456	590	622	5.65	5.5	446	484	86	88	483	512	3480	3630		3
95	148	1169	1405	606	393	3.9	4.2	339	359	77.8	70	411	426	2890	2910		4
173	215	1134	2233	625	905	5.1	15	304	699	81.6	169	456	688	2915	5325		5
216	284	1246	1506	709	650	5.1	5.5	483	499	73	85	435	510	3515	2720	1/	6
231	209	1340	1617	686	1141	5.7	5.5	499	833	71	113	466	476	3680	4365	2/	7
267	284	1002	1238	1041	873	4.5	4.8	639	667	66	65	395	387	3420	3475		8
110	236	1572	2591	80	634	7.3	14.3	105	598	20.2	313	602	560	2350	5690		9
167	160	1796	2123	208	190	17.1	18.5	199	203	149	168	549	606	3250	3825		10
98	94	1475	1868	329	224	8.2	10	207	227	36.5	35.5	608	637	2975	3160		11
299	322	1637	1825	512	1273	6.1	7.8	455	854	71	175	487	646	3550	5970		12
127	121	1539	1681	1083	1106	6.2	6.1	639	695	98	96	544	540	4410	4250		13
142	157	1012	1036	1250	1292	5.65	5.5	750	833	62	70	376	372	3960	3770		14
221	161	799	1143	1008	874	4.5	4.8	639	639	57.2	57	323	347	3050	3110		15
89	88	1652	1939	593	380	7	6.8	339	359	51.8	46.1	610	618	3425	3490	2/	16
115	82	2026	3040	1460	1708	12.9	17.8	1035	1334	146	182	644	864	5880	7760	1/	17
105	140	905	1186	490	652	4	4	470	563	53	63	502	600	2560	3200		18
146	131	1465	1480	1936	1970	8.1	8.1	1001	973	115	134	776	744	6345	6080		19

Dilution and )

. (1979 Cherry Freeze)

(Mixing

. (2000 Boyd)

(5)

. (2)

: (1998 Faures)

$$V . R . = \left[ \frac{\text{Max.} - \text{Min.}}{\text{Min.}} \right] * 100 \quad \text{-----}(1-4)$$

Variation Ratio

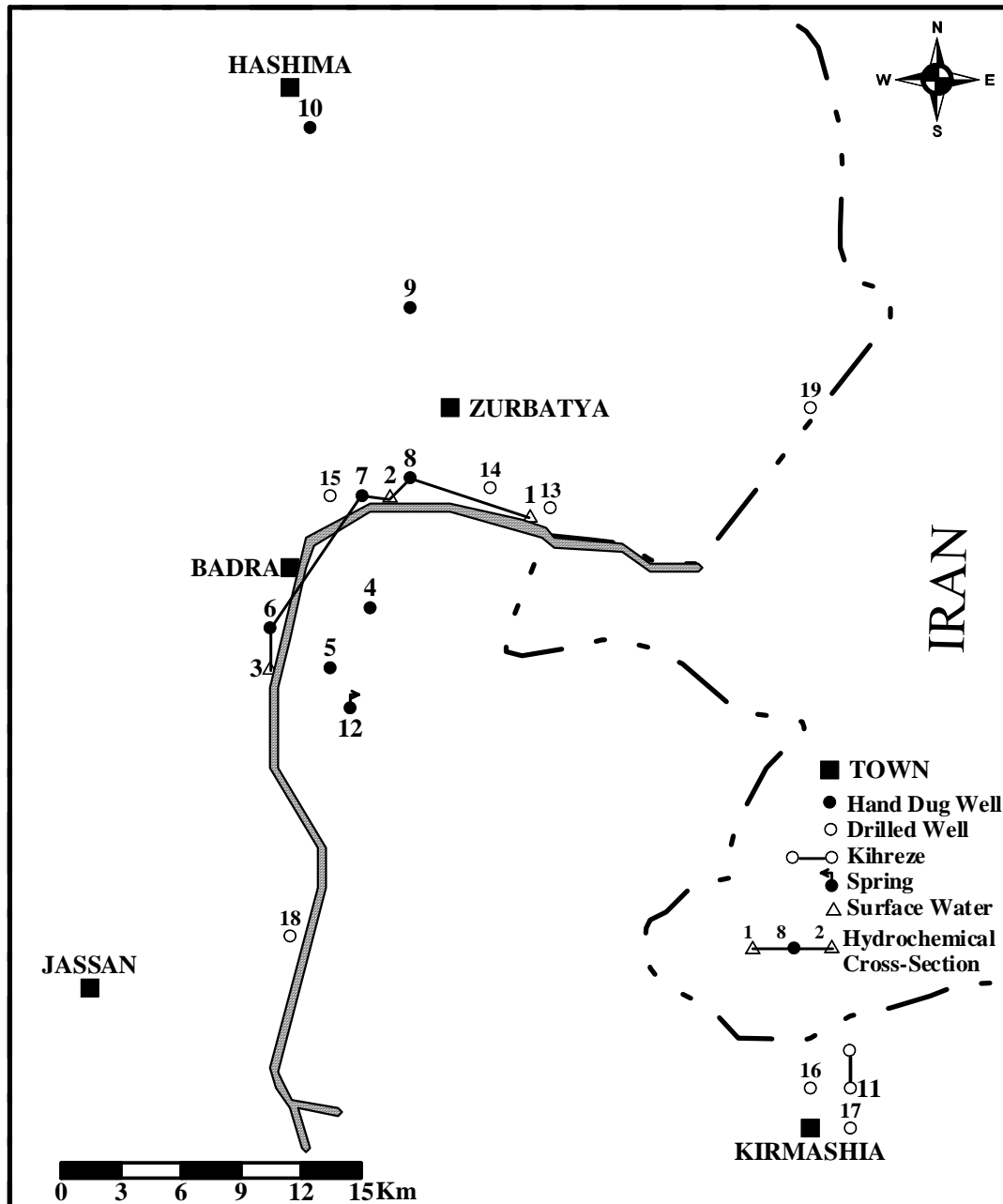
: V.R.:

: Max.

: Min.

. 2

V.R.	TDS			
-16.8	2435	2025		1
-12.89	2830	2465		2
4.31	3480	3630		3



. 2

(3) .  
(4) ( )

. 3

V.R.	TDS				
0.69	2910	2890	4		1
82.67	5325	2915	5		2
5.83	3720	3515	6	(1)	3
18.61	4365	3680	7	(2)	4
1.61	3475	3420	8		5
142.1	5690	2350	9		6
17.69	3825	3250	10		7
6.21	3160	2975	11		8
68.16	5970	3550	12		9

. 4

V.R.	TDS				
-3.62	4410	4250			1
-4.79	3960	3770			2
1.96	3050	3110			3
1.89	5880	7760	1 /		4
31.97	3425	3490	2 /		5
25	2560	3200			6
-4.17	6345	6080			7

. (5)

. (1991 Power)

50 )

. (1989

Strebl ; 1991 Fried)

(

(2)

-



. 5

NO <sub>3</sub> (PPM)		TDS (PPM)			
18	16.4	2435	2025		1
14.12	9.4	2830	2465		2
8.48	6.9	3480	3630		3
4.7	17.8	2890	2910		4
16.9	1.64	2910	5325		5
8.82	6.48	3515	2720	1/	6
9.27	3.9	3680	4365	2/	7
9.4	6.97	3420	3475		8
3.62	49	2350	5690		9
82.6	117	3250	3825		10
19.9	21.2	2975	3160		11
13.6	1.7	3550	5970		12
2.57	2.46	4410	4250		13
2.87	2.25	3960	3770		14
7	3.3	3050	3110		15
18.9	15.9	5880	7760	1/	16
8.6	2.57	3425	3490	2/	17
6.5	6	2560	3200		18
10.3	9.73	6345	6080		19

:

-1

-2

-3

. 2002 .

. (100) .

- Appelo, C.A.J. and D. Postma. 1999 . *Geochemistry, Ground water and Pollution*,
- Boyd ,C.E. 2000. *Water quality An introduction* , Kluwer Academic Publishers . USA. 330 p.
- Eaton , A.D., L.S. Clesceri, and A.E. Greenbury. 1995. *Standard methods for the Examination of water and waste water* , American Public Health Association , American Water Works Association and Water Environment Association, Washington D.C. , USA.
- Faures , G.1998. *Principles and Application of Geochemistry* . second edition . Prentice Hall Inc. , USA , 600 p.
- Freeze,R.A.; and J.A. Cherry. 1979. *Ground Water* . Prentice-Hall Inc. England Cliff , N.J. 604 P.
- Fried ,J.J.1991. Nitrate and their control in the EEC aquatic environment,I., Kulzelka ,Ecological Science.309Springer,Berlin, pp3-11 .
- Hassan , H.A., A.Z. Eloubaiby, C.P.Griolet , M.S.Ayob , A.L. Abbas , N. Jamal, and P.B. Smoor. 1977. Galal Badra project area part I:Geological and Hydrological Investigations.Bull. No. 106 . Scientific Research Foundation . Ministry of Higher Education and ScientificResearch . Baghdad . Iraq . 35 P.
- Power , J.F. ( Ed.) 1991 . *The Role of legumes in conservation Tillage system soil conservation* . Society of American , Ankeny ,IA.
- Strebel, O., W.H.M. Duynisveld, and J. Bottcher . 1989. Nitrate Pollution of ground water in western Europe. *Agriculture Ecosystem and Environment* 2 ; PP 189 –214.

## **HYDROCHEMICAL POLLUTION OF GROUNDWATER IN BADRA- JASSAN BASIN / EASTERN OF IRAQ.**

**Issar M. Al-Shamaa\***

**Batool Mohammad Ali\*\***

**\* Dept. of Geology - College of Science- Univ. of Baghdad.**

**\*\* General Commission for Groundwater - Ministry of Water Resources.**

### **ABSTRACT**

Variation in quality of Surface and Groundwater is changing depends on water position in Hydrological basin. The Topographical and Geological conditions lead an important role in determining the quality of this water to be used for various purposes and the determination of its possible contamination. Badra - Jassan basin is located in Wasit province at the far East of Iraq. According to the Surface and Groundwater hydrochemical study in this basin depending on salinity concentrations as well as the major elements analyzed for nineteen water samples collected from several sites of the basin within the periods of water surplus and water deficit, the salinity and nitrate pollution was identified. The pollution in the two above mentioned parameters was accrued in surface and groundwater unconfined aquifer, while only salinity pollution was determined in the confined aquifer of the Quaternary deposits and Muqdadiyah Formation.