Outreach
Laboratory
North Aspen
Broken Arrow, OK 74012
(918) 251-2515
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Project No.:	20011079
Client:	Kaiser Aluminum 7311 East 41st Street Tulsa, OK 74145
Date Submitted:	12/5/01
Date Reported:	1/14/02

CASE NARRATIVE

Twelve samples were received for analysis for Ra-226, Ra-228, Iso Thorium, Metals, and general chemistry parameters. The samples were received in good condition. The Calcium, Magnesium, and Sodium MS/MSD diluted out, due to a sample matrix effect. The Potassium MSD was also low due to the dilution required because of the matrix. The sample results were not effected. All other QC is in control limits.

If you have questions, please feel free to call at 918-251-2515.

Quality Assurance Officer

Laboratory Director

Outreach Laboratory
North Aspen
Broken Arrow, OK 74012
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20011079-01**						
Client ID:	**MWD-7 UNFILTERED**						
Date Sampled:	**12/5/2001 9:02:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	1.05 +/- 0.189	pCi/l	0.201	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0.855 +/- 0.048	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.015 +/- 0.064	pCi/l	0.108	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0 +/- 0.072	pCi/l	0.186	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.065	pCi/l	0.128	12/6/2001	12/8/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	256	mg/l	4.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	102	mg/l	2		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	855	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	12/10/2001 10:30:00 AM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	6.80	SI			12/5/2001 4:43:00 AM	RT
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	7.8	mg/l	1		12/28/2001 2:55:00 PM	RT
Temperature	EPA 170.1	20.8	degrees C			12/5/2001 4:43:00 PM	RT
	Metals Analyses						

BDL = Below Detection Limit

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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Barium	EPA 6010B	1.24	mg/l	0.294	12/11/2001	12/28/2001	JM
Calcium	EPA 6010B	51.6	mg/l	1.18	12/11/2001	12/17/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/17/2001	JM
Magnesium	EPA 6010B	14.5	mg/l	0.189	12/11/2001	12/17/2001	JM
Potassium	EPA 6010B	140	mg/l	7.20	12/11/2001	12/28/2001	JM
Sodium	EPA 6010B	22.0	mg/l	2.27	12/11/2001	12/28/2001	JM

Lab ID: 20011079-02
Client ID: MWD-7 FILTERED
Date Sampled: 12/5/2001 9:02:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.469 +/- 0.127	pCi/l	0.130	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.090	pCi/l	0.938	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.024 +/- 0.052	pCi/l	0.084	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0 +/- 0.080	pCi/l	0.187	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.057	pCi/l	0.101	12/6/2001	12/8/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	230	mg/l	4.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	91.7	mg/l	2		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	809	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	12/10/2001 10:30:00 AM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	6.84	SI			12/5/2001 4:46:00 AM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	9.9	mg/l	1		12/28/2001 2:55:00 PM	RT
Temperature	EPA 170.1	20.6	degrees C			12/5/2001 4:46:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	0.675	mg/l	0.294	12/11/2001	12/28/2001	JM
Calcium	EPA 6010B	67.8	mg/l	1.18	12/11/2001	12/17/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/17/2001	JM
Magnesium	EPA 6010B	10.6	mg/l	0.189	12/11/2001	12/17/2001	JM
Potassium	EPA 6010B	75.2	mg/l	7.20	12/11/2001	12/28/2001	JM
Sodium	EPA 6010B	20.8	mg/l	2.27	12/11/2001	12/28/2001	JM

Lab ID: **20011079-03**
Client ID: **ST-3 UNFILTERED**
Date Sampled: **12/5/2001 10:10:00 AM**
Matrix: **Water**

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	2.01 +/- 0.235	pCi/l	0.163	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	4.05 +/- 0.065	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.076	pCi/l	0.157	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.006 +/- 0.117	pCi/l	0.237	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.094	pCi/l	0.172	12/6/2001	12/8/2001	E/D'
		Inorganics Analyses					
Alkalinity	EPA 310.1	141	mg/l	1.8		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	2040	mg/l	25		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	6080	uMHO/cm	2		12/5/2001 4:41:00 PM	RT

BDL = Below Detection Limit

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	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/10/2001 10:30:00 AM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.33	SI			12/5/2001 4:48:00 AM	RT
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	1.8	mg/l	1		12/28/2001 2:55:00 PM	RT
Temperature	EPA 170.1	20.7	degrees C			12/5/2001 4:48:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	5.17	mg/l	0.294	12/11/2001	12/28/2001	JM
Calcium	EPA 6010B	190	mg/l	1.18	12/11/2001	12/17/2001	JM
Iron	EPA 6010B	1.07	mg/l	0.105	12/11/2001	12/17/2001	JM
Magnesium	EPA 6010B	64.8	mg/l	0.189	12/11/2001	12/17/2001	JM
Potassium	EPA 6010B	10.2	mg/l	7.20	12/11/2001	12/28/2001	JM
Sodium	EPA 6010B	1030	mg/l	25	12/11/2001	1/14/2002	RE

Lab ID: 20011079-04
Client ID: ST-3 FILTERED
Date Sampled: 12/5/2001 10:10:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	2.40 +/- 0.415	pCi/l	0.366	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	1.23 +/- 0.049	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.092 +/- 0.089	pCi/l	0.129	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.257 +/- 0.125	pCi/l	0.203	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0.173 +/- 0.114	pCi/l	0.158	12/6/2001	12/8/2001	E/D
Inorganics Analyses							

BDL = Below Detection Limit

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	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Alkalinity	EPA 310.1	140	mg/l	2.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	2020	mg/l	25		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	6080	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/10/2001 12:40:00 PM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.35	SI			12/5/2001 4:50:00 PM	RT
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	2.7	mg/l	1		12/28/2001 2:55:00 PM	RT
Temperature	EPA 170.1	20.2	degrees C			12/5/2001 4:50:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	5.33	mg/l	0.294	12/11/2001	12/28/2001	JM
Calcium	EPA 6010B	188	mg/l	1.18	12/11/2001	12/17/2001	JM
Iron	EPA 6010B	0.996	mg/l	0.105	12/11/2001	12/17/2001	JM
Magnesium	EPA 6010B	65.1	mg/l	0.189	12/11/2001	12/17/2001	JM
Potassium	EPA 6010B	10.5	mg/l	7.20	12/11/2001	12/28/2001	JM
Sodium	EPA 6010B	1000	mg/l	25	12/11/2001	1/14/2002	RE

Lab ID: 20011079-05
Client ID: MW-9 UNFILTERED
Date Sampled: 12/5/2001 10:57:00 AM
Matrix: Water

Radiochemical Analyses

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra-226	SM 7500 Ra (M)	0.162 +/- 0.128	pCi/l	0.192	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	1.68 +/- 0.054	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.081	pCi/l	0.156	12/6/2001	12/9/2001	E/D
Th-230	LANL ER 200 M	0.053 +/- 0.107	pCi/l	0.213	12/6/2001	12/9/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.096	pCi/l	0.176	12/6/2001	12/9/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	218	mg/l	2.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	86.8	mg/l	1		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	705	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	12/10/2001 12:40:00 PM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	6.95	SI			12/5/2001 4:52:00 AM	RT
Silica Dioxide	EPA 370.1	1.9	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	34.0	mg/l	2		12/28/2001 2:55:00 PM	RT
Temperature	EPA 170.1	20.6	degrees C			12/5/2001 4:52:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/28/2001	JM
Calcium	EPA 6010B	85.7	mg/l	1.18	12/11/2001	12/17/2001	JM
Iron	EPA 6010B	0.235	mg/l	0.105	12/11/2001	12/17/2001	JM
Magnesium	EPA 6010B	25.3	mg/l	0.189	12/11/2001	12/17/2001	JM
Potassium	EPA 6010B	8.37	mg/l	7.20	12/11/2001	12/28/2001	JM

BDL = Below Detection Limit

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	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sodium	EPA 6010B	20.3	mg/l	2.27	12/11/2001	12/28/2001	JM

Lab ID: 20011079-06
Client ID: MW-9 FILTERED
Date Sampled: 12/5/2001 10:57:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.013 +/- 0.107	pCi/l	0.183	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	0.864 +/- 0.048	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.041 +/- 0.065	pCi/l	0.102	12/6/2001	12/9/2001	E/D
Th-230	LANL ER 200 M	0.207 +/- 0.112	pCi/l	0.191	12/6/2001	12/9/2001	E/D
Th-228	LANL ER 200 M	0.016 +/- 0.104	pCi/l	0.177	12/6/2001	12/9/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	218	mg/l	2.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	87.3	mg/l	1		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	704	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.2	mg/l	0.2	12/10/2001 12:40:00 PM	12/26/2001 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	6.94	SI			12/5/2001 4:54:00 AM	RT
Silica Dioxide	EPA 370.1	1.9	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	30.9	mg/l	2		12/28/2001 2:55:00 PM	RT

BDL = Below Detection Limit

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	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	20.7	degrees C			12/5/2001 4:54:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.252	mg/l	0.070	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	91.7	mg/l	1.18	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	BDL	mg/l	0.055	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	30.1	mg/l	0.099	12/11/2001	1/11/2002	RE
Potassium	EPA 6010B	32.5	mg/l	1.72	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	23.6	mg/l	2.27	12/11/2001	1/14/2002	RE

Lab ID: **20011079-07**
Client ID: **MWD-11 UNFILTERED**
Date Sampled: **12/5/2001 1:28:00 PM**
Matrix: **Water**

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	1.86 +/- 0.307	pCi/l	0.311	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	1.21 +/- 0.051	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.081	pCi/l	0.166	12/6/2001	12/9/2001	E/D
Th-230	LANL ER 200 M	0.017 +/- 0.108	pCi/l	0.218	12/6/2001	12/9/2001	E/D
Th-228	LANL ER 200 M	0.142 +/- 0.101	pCi/l	0.144	12/6/2001	12/9/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	251	mg/l	2.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	590	mg/l	10		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	2260	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	2.2	mg/l	0.3	12/10/2001 2:40:00 PM	12/26/2001 4:42:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT

BDL = Below Detection Limit

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pH	EPA 150.1/9040A	7.38	SI			12/5/2001 4:57:00 AM	RT
Silica Dioxide	EPA 370.1	1.1	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	18.4	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	20.8	degrees C			12/5/2001 4:57:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.819	mg/l	0.140	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	58.7	mg/l	1.18	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.167	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	189	mg/l	0.369	12/11/2001	1/13/2002	RE
Potassium	EPA 6010B	142	mg/l	3.43	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	59.8	mg/l	5.4	12/11/2001	1/11/2002	RE

Lab ID: 20011079-08
Client ID: MWD-11 FILTERED
Date Sampled: 12/5/2001 1:28:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.809 +/- 0.192	pCi/l	0.234	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	0.087 +/- 0.045	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.060	pCi/l	0.113	12/6/2001	12/9/2001	E/D
Th-230	LANL ER 200 M	0.059 +/- 0.110	pCi/l	0.215	12/6/2001	12/9/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.069	pCi/l	0.148	12/6/2001	12/9/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	249	mg/l	2.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	590	mg/l	10		12/27/2001 9:00:00 AM	RT

BDL = Below Detection Limit

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Conductivity	EPA 120.1	2260	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	2.1	mg/l	0.3	12/10/2001 2:40:00 PM	12/26/2001 4:42:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.46	SI			12/5/2001 4:59:00 AM	RT
Silica Dioxide	EPA 370.1	1.1	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	19.7	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	20.7	degrees C			12/5/2001 4:59:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.798	mg/l	0.140	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	56.8	mg/l	1.18	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.137	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	174	mg/l	0.369	12/11/2001	1/13/2002	RE
Potassium	EPA 6010B	130	mg/l	3.43	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	45.4	mg/l	5.4	12/11/2001	1/11/2002	RE

Lab ID: 20011079-09
Client ID: MWD-6 UNFILTERED
Date Sampled: 12/5/2001 3:10:00 PM
Matrix: Water

	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.428 +/- 0.172	pCi/l	0.231	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	0.314 +/- 0.046	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.004 +/- 0.063	pCi/l	0.110	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.165 +/- 0.142	pCi/l	0.250	12/6/2001	12/8/2001	E/D

BDL = Below Detection Limit

Outreach Laboratory
North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	11 of 17

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-228	LANL ER 200 M	0.066 +/- 0.069	pCi/l	0.096	12/6/2001	12/8/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	95	mg/l	1.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	673	mg/l	10		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	2330	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	1.8	mg/l	0.2	12/11/2001 8:30:00 AM	12/26/2001 4:42:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.36	SI			12/5/2001 5:09:00 PM	RT
Silica Dioxide	EPA 370.1	1.0	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	11.5	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	21.7	degrees C			12/5/2001 5:09:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	3.34	mg/l	0.070	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	76.2	mg/l	1.18	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.163	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	110	mg/l	0.189	12/11/2001	1/11/2002	RE
Potassium	EPA 6010B	216	mg/l	1.72	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	52.1	mg/l	2.27	12/11/2001	1/11/2002	RE

BDL = Below Detection Limit

Outreach
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	12 of 17

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20011079-10**						
Client ID:	**MWD-6 FILTERED**						
Date Sampled:	**12/5/2001 3:10:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.547 +/- 0.153	pCi/l	0.196	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	0.654 +/- 0.048	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.027 +/- 0.070	pCi/l	0.114	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.284 +/- 0.130	pCi/l	0.210	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.074	pCi/l	0.133	12/6/2001	12/8/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	97	mg/l	1.0		12/17/2001 6:40:00 AM	RT
Chloride	EPA 325.3	678	mg/l	10		12/27/2001 9:00:00 AM	RT
Conductivity	EPA 120.1	2330	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	1.2	mg/l	0.2	12/11/2001 11:20:00 AM	12/26/2001 4:42:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.38	SI			12/5/2001 5:11:00 PM	RT
Silica Dioxide	EPA 370.1	1.1	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	12.6	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	21.1	degrees C			12/5/2001 5:11:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	3.34	mg/l	0.070	12/11/2001	1/11/2002	RE

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	13 of 17

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	74.5	mg/l	1.18	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.087	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	118	mg/l	0.189	12/11/2001	1/11/2002	RE
Potassium	EPA 6010B	229	mg/l	1.72	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	58.4	mg/l	2.27	12/11/2001	1/11/2002	RE

Lab ID: 20011079-11
Client ID: DUP UNFILTERED
Date Sampled: 12/5/2001
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	5.30 +/- 0.499	pCi/l	0.299	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	1.34 +/- 0.051	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.175	pCi/l	0.406	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.165 +/- 0.128	pCi/l	0.227	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0.008 +/- 0.082	pCi/l	0.142	12/6/2001	12/8/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	139	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	2010	mg/l	25		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	6090	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/11/2001 11:20:00 AM	12/26/2001 4:42:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.38	SI			12/5/2001 5:13:00 PM	RT
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sulfate	EPA 375.4	3.5	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	20.5	degrees C			12/5/2001 5:13:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	4.82	mg/l	0.070	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	194	mg/l	5.66	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.243	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	69.4	mg/l	0.909	12/11/2001	1/11/2002	RE
Potassium	EPA 6010B	68.0	mg/l	1.72	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	879	mg/l	21.6	12/11/2001	1/11/2002	RE

Lab ID: **20011079-12**
Client ID: **DUP FILTERED**
Date Sampled: **12/5/2001**
Matrix: **Water**

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	2.70 +/- 0.280	pCi/l	0.187	12/12/2001	12/12/2001	E/D
Ra-228	EPA 904/9320	6.20 +/- 0.066	pCi/l	0.469	12/11/2001	12/14/2001	SD
Th-232	LANL ER 200 M	0.022 +/- 0.074	pCi/l	0.123	12/6/2001	12/8/2001	E/D
Th-230	LANL ER 200 M	0.184 +/- 0.112	pCi/l	0.196	12/6/2001	12/8/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.071	pCi/l	0.132	12/6/2001	12/8/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	140	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	2010	mg/l	25		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	6120	uMHO/cm	2		12/5/2001 4:41:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/11/2001 11:20:00 AM	12/26/2001 4:42:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	15 of 17

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/6/2001 11:20:00 AM	12/6/2001 1:15:00 PM	RT
pH	EPA 150.1/9040A	7.36	SI			12/5/2001 5:15:00 PM	RT
Silica Dioxide	EPA 370.1	1.9	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	3.2	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	20.8	degrees C			12/5/2001 5:15:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	4.91	mg/l	0.070	12/11/2001	1/11/2002	RE
Calcium	EPA 6010B	179	mg/l	5.66	12/11/2001	1/11/2002	RE
Iron	EPA 6010B	0.403	mg/l	0.005	12/11/2001	1/11/2002	RE
Magnesium	EPA 6010B	67.1	mg/l	0.909	12/11/2001	1/11/2002	RE
Potassium	EPA 6010B	71.8	mg/l	1.72	12/11/2001	1/11/2002	RE
Sodium	EPA 6010B	1020	mg/l	25	12/11/2001	1/14/2002	RE

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	16 of 17

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	104.0			0.6	104.0	105.0	0.5	12/17/2001
Alkalinity	BDL	102.0			1.0	104.0	104.0	0.2	12/14/2001
Barium	BDL	96.6				98.2	98.9	0.7	12/28/2001
Barium	BDL	97.0				99.0	98.6	0.4	1/11/2002
Calcium	BDL	103.0				DO	DO	1.5	1/11/2002
Calcium	BDL	96.9				101.0	104.0	3.2	12/17/2001
Chloride	BDL	101.0			1.2	100.0	101.0	0.5	12/27/2001
Chloride	BDL	101.0			0.5	92.9	93.9	0.5	12/27/2001
Conductivity	BDL	101.0			0.0				12/5/2001
Fluoride	BDL	92.5			3.6	99.5	95.2	2.8	12/26/2001
Iron	BDL	93.3				103.0	102.0	0.5	12/17/2001
Iron	BDL	99.9				81.7	82.1	0.4	1/11/2002
Magnesium	BDL	90.0				107.0	115.0	1.4	12/17/2001
Magnesium	BDL	93.5				DO	DO	1.8	1/11/2002
Nitrate (N)	BDL	102.0			NC	109.0	113.0	3.1	12/6/2001
pH		100.0			0.1				12/5/2001
Potassium	BDL	93.7				101.0	99.6	0.9	12/28/2001
Potassium	BDL	94.4				77.0	64.0	5.6	1/11/2002
Ra-226	0+/-0.1	85.1			23.5	109.0			12/12/2001
Ra-226	0+/-0.1	94.2	92.6	1.8	11.4	72.8	97.9	28.0	12/11/2001
Ra-228	0.8+/-0.0	96.0			NC	88.9			12/14/2001
Silica Dioxide	BDL	101.0			0.0	99.0	98.6	0.2	12/29/2001
Sodium	0.233	104.0				DO	DO	3.3	1/14/2002
Sodium	BDL	104.0				107.0	105.0	3.1	12/28/2001
Sulfate	BDL	101.0			4.1	94.9	102.0	4.1	12/28/2001
Th-228	0+/-0	119.0	117.0	1.7	NC	128.0	126.0	1.0	12/8/2001
Th-230	0+/-0				NC				12/8/2001
Th-232	0+/-0	109.0	115.0	4.8	NC	117.0	118.0	1.2	12/8/2001

QA Approval:

BDL = Below Detection Limit

Outreach
Laboratory
North Aspen
ken Arrow, OK 74012
918) 251-2515
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011079
Date Reported:	1/14/2002
Date Received:	12/5/01
Page Number:	17 of 17

Lab Approval:

BDL = Below Detection Limit

OUTREACH LABORATORY

311 North Aspen
Broken Arrow, OK 74012
Phone: (918) 251-2515
Fax: (918) 251-0008

CHAIN OF CUSTODY

Results To:
Company A&M Engineering
Name Irfan Turner
Address
City State Zip
Phone 665-6575 Fax #

Bill To:
Company
Name
Address
City State Zip

ANALYSIS REQUESTED

PO #
PROJECT # 1556-020
PROJECT NAME Kaiser QTR.
REQUESTED TURNAROUND TIME (ADDITIONAL CHARGES MAY APPLY)
SAMPLER Jon Kuda
Signature

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	# CONTAINERS	CONTAINER SIZE & TYPE (PLASTIC OR GLASS)	PRESERVATIVE # (1. HNO_3 pH<2; 2. Ice <4°C; 3. HCl pH<2; 4. H2S04 pH<2; 5. NaOH pH>11)									REMARKS (I.E. FILTERED, UNFILTERED, GRAB, COMPOSITE)
unFiltered	MWD-7	12/5/01	09:02	H_2O	2	P			See Attached							
Filtered	MWD-7	12/5/01	09:02	H_2O	2	P										
unFiltered	ST-3	12/5/01	10:10	H_2O	2	P										
Filtered	ST-3	12/5/01	10:10	H_2O	2	P										
unFiltered	MW-9	12/5/01	10:57	H_2O	2	P										
Filtered	MW-9	12/5/01	10:57	H_2O	2	P										
unFiltered	MWD-11	12/5/01	13:28	H_2O	2	P										
Filtered	MWD-11	12/5/01	13:28	H_2O	2	P										
unFiltered	MWD-6	12/5/01	15:10	H_2O	2	P										
Filtered	MWD-6	12/5/01	15:10	H_2O	2	P										
Duplicate	unFiltered Dup.	12/5/01		H_2O	2	P										
Duplicate	Filtered Dup.	12/5/01		H_2O	2	P										

RELINQUISHED BY: Jon Kuda DATE 12/5/01 TIME 355 RECEIVED BY [signature] DATE 12/5/01 TIME 355

RELINQUISHED BY: DATE TIME RECEIVED BY: DATE TIME

My signature on this chain of custody form indicates that I am authorized by the above company to release samples for analysis. The company agrees to pay the entire balance upon receipt of sample data and it is understood and agreed that any balance carried over thirty (30) days is subject to a 1.5% per month (18% per annum) late charge. In the event of default, the company becomes legally liable for any reasonable attorney and/or collection fees and all related costs necessary to remit the entire balance to Outreach Technologies, Inc. (Outreach Laboratory).

SAMPLE RETURN/DISPOSAL: All non-hazardous aqueous samples shall be disposed of 30 days after issue of final report. All others will be returned at client's expense.

FOR LABORATORY USE ONLY: 20011080

Sample Condition Upon Receipt good

Custody Seals Intact Y N

Cooler Temperature NA

Outreach
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1 North Aspen
Broken Arrow, OK 74012
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Project No.: 20011083
Client: Kaiser Aluminum
7311 East 41st Street
Tulsa, OK 74145
Date Submitted: 12/6/01
Date Reported: 1/10/02

CASE NARRATIVE

Ten samples were received for analysis for Ra-226, Ra-228, Iso Thorium, Metals, and general chemistry parameters. The samples were received in good condition. The Magnesium, and Potassium MS/MSD's diluted out, due to a sample matrix effect. The sample results were not effected. All other QC is in control limits.

If you have questions, please feel free to call at 918-251-2515.

Quality Assurance Officer

Laboratory Director

Outreach
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11 North Aspen
Broken Arrow, OK 74012
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FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
Page Number:	1 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20011083-01**						
Client ID:	**MWD-5 UNFILTERED**						
Date Sampled:	**12/6/2001**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	EPA	1.94 +/- 0.242	pCi/l	0.227	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.051	pCi/l	0.469	12/14/2001	12/20/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.088	pCi/l	0.170	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.685 +/- 0.182	pCi/l	0.247	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.100	pCi/l	0.191	12/10/2001	12/12/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	107	mg/l	1.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	268	mg/l	2		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1190	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	12/11/2001 3:10:00 PM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.66	SI			12/6/2001 4:48:00 PM	RT
Silica Dioxide	EPA 370.1	1.0	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	2.8	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	15.3	degrees C			12/6/2001 4:48:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	4.33	mg/l	0.294	12/11/2001	12/27/2001	JM

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
Page Number:	2 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	43.8	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	23.2	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	149	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	26.1	mg/l	2.27	12/11/2001	12/27/2001	JM

Lab ID: 20011083-02
Client ID: MWD-5 FILTERED
Date Sampled: 12/6/2001
Matrix: Water

Radiochemical Analyses							
Ra-226	EPA	3.22 +/- 0.279	pCi/l	0.172	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0.192 +/- 0.051	pCi/l	0.469	12/14/2001	12/20/2001	SD
Th-232	LANL ER 200 M	0.119 +/- 0.091	pCi/l	0.122	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.231 +/- 0.135	pCi/l	0.236	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0.004 +/- 0.124	pCi/l	0.213	12/10/2001	12/12/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	149	mg/l	1.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	268	mg/l	2		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1180	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	12/11/2001 3:10:00 PM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.71	SI			12/6/2001 4:50:00 PM	RT
Silica Dioxide	EPA 370.1	1.0	mg/l	0.5		12/29/2001 2:30:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sulfate	EPA 375.4	2.9	mg/l	1		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	13.6	degrees C			12/6/2001 4:50:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	4.12	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	43.3	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	0.275	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	21.3	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	145	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	25.0	mg/l	2.27	12/11/2001	12/27/2001	JM

Lab ID: 20011083-03
Client ID: MWD-4 UNFILTERED
Date Sampled: 12/6/2001
Matrix: Water

		Radiochemical Analyses					
Ra-226	EPA	0.296 +/- 0.119	pCi/l	0.161	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0.710 +/- 0.053	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.096	pCi/l	0.176	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.289 +/- 0.145	pCi/l	0.246	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0.059 +/- 0.095	pCi/l	0.153	12/10/2001	12/12/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	297	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	240	mg/l	3		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1400	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/11/2001 3:10:00 PM	12/26/2001 5:30:00 PM	RT

BDL = Below Detection Limit

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(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	6.84	SI			12/6/2001 4:51:00 PM	RT
Silica Dioxide	EPA 370.1	2.2	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	73.4	mg/l	4		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	14.9	degrees C			12/6/2001 4:51:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	140	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	1.80	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	62.5	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	27.9	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	42.3	mg/l	2.27	12/11/2001	12/27/2001	JM

Lab ID: 20011083-04
Client ID: MWD-4 FILTERED
Date Sampled: 12/6/2001
Matrix: Water

		Radiochemical Analyses					
Ra-226	EPA	0.461 +/- 0.244	pCi/l	0.333	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.053	pCi/l	0.469	12/14/2001	12/20/2001	SD
Th-232	LANL ER 200 M	0.031 +/- 0.072	pCi/l	0.117	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.148 +/- 0.129	pCi/l	0.241	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.075	pCi/l	0.154	12/10/2001	12/12/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	301	mg/l	2.0		12/14/2001 1:15:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	241	mg/l	3		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1410	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	12/11/2001 5:20:00 PM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	6.84	SI			12/6/2001 4:53:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	65.2	mg/l	4		12/28/2001 3:45:00 PM	RT
Temperature	EPA 170.1	17.3	degrees C			12/6/2001 4:53:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	142	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	63.4	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	30.3	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	44.3	mg/l	2.27	12/11/2001	12/27/2001	JM

Lab ID: 20011083-05
Client ID: FULTON CREEK UNFILTERED
Date Sampled: 12/6/2001
Matrix: Water

		Radiochemical Analyses					
Ra-226	EPA	0.635 +/- 0.187	pCi/l	0.226	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.049	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.067	pCi/l	0.127	12/10/2001	12/12/2001	E/D

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	0.028 +/- 0.124	pCi/l	0.253	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.081	pCi/l	0.158	12/10/2001	12/12/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	194	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	98.5	mg/l	1		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	844	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	12/11/2001 5:20:00 PM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.65	SI			12/6/2001 4:54:00 PM	RT
Silica Dioxide	EPA 370.1	0.6	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	37.8	mg/l	2		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	15.6	degrees C			12/6/2001 4:54:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	85.0	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	24.4	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	20.7	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	42.9	mg/l	2.27	12/11/2001	12/27/2001	JM
Copper	EPA 6010B	0.046	mg/l	0.027	12/11/2001	1/13/2002	RE
Zinc	EPA 6010B	0.027	mg/l	0.006	12/11/2001	1/13/2002	RE

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Client:	Kaiser Aluminum
Client Project:	QTRLY-
Lab Number:	20011083
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20011083-06**						
Client ID:	**FULTON CREEK FILTERED**						
Date Sampled:	**12/6/2001**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	EPA	0.349 +/- 0.144	pCi/l	0.175	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.050	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.066	pCi/l	0.124	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.706 +/- 0.180	pCi/l	0.242	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.075	pCi/l	0.144	12/10/2001	12/12/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	194	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	97.5	mg/l	1		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	843	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	12/11/2001 5:20:00 PM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.72	SI			12/6/2001 4:57:00 PM	RT
Silica Dioxide	EPA 370.1	0.6	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	41.5	mg/l	2		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	16.6	degrees C			12/6/2001 4:57:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	79.9	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	23.0	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	19.7	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	41.5	mg/l	2.27	12/11/2001	12/27/2001	JM
Copper	EPA 6010B	0.044	mg/l	0.027	12/11/2001	1/13/2002	RE
Zinc	EPA 6010B	0.030	mg/l	0.006	12/11/2001	1/3/2002	RE

Lab ID: 20011083-07
Client ID: MWD-8 UNFILTERED
Date Sampled: 12/6/2001
Matrix: Water

Radiochemical Analyses							
Ra-226	EPA	1.90 +/- 0.265	pCi/l	0.248	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	1.72 +/- 0.060	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0.015 +/- 0.077	pCi/l	0.130	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.132 +/- 0.130	pCi/l	0.246	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0.059 +/- 0.090	pCi/l	0.140	12/10/2001	12/12/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	162	mg/l	1.3		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	564	mg/l	10		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	2180	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	1.3	mg/l	0.2	12/12/2001 8:10:00 AM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.37	SI			12/6/2001 4:58:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Silica Dioxide	EPA 370.1	1.2	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	5.3	mg/l	1		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	19.3	degrees C			12/6/2001 4:58:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	18.1	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	63.4	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	2.41	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	121	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	182	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	25.9	mg/l	2.27	12/11/2001	12/27/2001	JM

Lab ID: **20011083-08**
Client ID: **MWD-8 FILTERED**
Date Sampled: **12/6/2001**
Matrix: **Water**

		Radiochemical Analyses					
Ra-226	EPA	0.987 +/- 0.170	pCi/l	0.161		12/11/2001	E/D
Ra-228	EPA 904/9320	3.86 +/- 0.068	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.093	pCi/l	0.171	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.063 +/- 0.132	pCi/l	0.267	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.098	pCi/l	0.184	12/10/2001	12/12/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	169	mg/l	1.3		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	544	mg/l	10		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	2190	uMHO/cm	2		12/6/2001 4:00:00 PM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY-
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	1.3	mg/l	0.2	12/12/2001 8:10:00 AM	12/26/2001 5:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.48	SI			12/6/2001 5:00:00 PM	RT
Silica Dioxide	EPA 370.1	1.2	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	4.8	mg/l	1		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	16.5	degrees C			12/6/2001 5:00:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	19.4	mg/l	0.294	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	64.7	mg/l	1.18	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	2.48	mg/l	0.105	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	117	mg/l	0.189	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	179	mg/l	1.72	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	25.3	mg/l	2.48	12/19/2001	12/21/2001	JM

Lab ID: 20011083-09
Client ID: RETENTION POND UNFILTER
Date Sampled: 12/6/2001
Matrix: Water

	Radiochemical Analyses						
Ra-226	EPA	3.00 +/- 0.605	pCi/l	0.677	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	0.747 +/- 0.055	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0.232 +/- 0.094	pCi/l	0.104	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.458 +/- 0.136	pCi/l	0.202	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0.217 +/- 0.101	pCi/l	0.125	12/10/2001	12/12/2001	E/D
	Inorganics Analyses						

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
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Analytical Report

	Method	Result	Units	DL	P. Date	Analysis Date	Analyst
Alkalinity	EPA 310.1	297	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	156	mg/l	2		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1100	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	3.4	mg/l	0.3	12/12/2001 8:10:00 AM	12/26/2001 10:00:00 AM	RT
Nitrate (N)	EPA 352.1	0.8	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	9.23	SI			12/6/2001 5:10:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	63.1	mg/l	4		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	17.1	degrees C			12/6/2001 5:10:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM
Calcium	EPA 6010B	10.1	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	127	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	38.5	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	15.4	mg/l	2.27	12/11/2001	12/27/2001	JM
Copper	EPA 6010B	BDL	mg/l	0.027	12/11/2001	1/13/2002	RE
Zinc	EPA 6010B	0.025	mg/l	0.006	12/11/2001	1/13/2002	RE

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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	20011083-10						
Client ID:	RETENTION POND FILTERED						
Date Sampled:	12/6/2001						
Matrix:	Water						
	Radiochemical Analyses						
Ra-226	EPA	1.29 +/- 0.205	pCi/l	0.188	12/10/2001	12/11/2001	E/D
Ra-228	EPA 904/9320	1.27 +/- 0.057	pCi/l	0.469	12/14/2001	12/21/2001	SD
Th-232	LANL ER 200 M	0 +/- 0.063	pCi/l	0.111	12/10/2001	12/12/2001	E/D
Th-230	LANL ER 200 M	0.506 +/- 0.170	pCi/l	0.244	12/10/2001	12/12/2001	E/D
Th-228	LANL ER 200 M	0.046 +/- 0.079	pCi/l	0.120	12/10/2001	12/12/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	295	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	158	mg/l	2		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1100	uMHO/cm	2		12/6/2001 4:00:00 PM	RT
Fluoride	EPA 340.2	3.2	mg/l	0.3	12/12/2001 10:25:00 AM	12/26/2001 10:00:00 AM	RT
Nitrate (N)	EPA 352.1	0.8	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	9.29	SI			12/6/2001 5:12:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	60.6	mg/l	4		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	17.2	degrees C			12/6/2001 5:12:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	BDL	mg/l	0.294	12/11/2001	12/27/2001	JM

BDL = Below Detection Limit

Outreach Laboratory
North Aspen
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918) 251-2515
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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
Page Number:	13 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	10.1	mg/l	1.18	12/11/2001	12/11/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.105	12/11/2001	12/11/2001	JM
Magnesium	EPA 6010B	130	mg/l	0.189	12/11/2001	12/11/2001	JM
Potassium	EPA 6010B	39.4	mg/l	7.20	12/11/2001	12/27/2001	JM
Sodium	EPA 6010B	15.4	mg/l	2.27	12/11/2001	12/27/2001	JM
Copper	EPA 6010B	0.033	mg/l	0.027	12/11/2001	1/13/2002	RE
Zinc	EPA 6010B	0.020	mg/l	0.006	12/11/2001	1/13/2002	RE

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QTRLY-
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
Page Number:	14 of 15

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	102.0			1.0	104.0	104.0	0.2	12/14/2001
Barium	BDL	86.5				115.0	115.0	0.1	12/21/2001
Barium	BDL	103.0				97.5	100.0	0.8	12/27/2001
Calcium	BDL	90.5				114.5	105.0	8.6	12/21/2001
Calcium	BDL	96.5				98.3	95.9	2.5	12/11/2001
Chloride	BDL	101.0			0.5	92.9	93.9	0.5	12/27/2001
Conductivity	BDL	104.0			0.0				12/6/2001
Copper	BDL	99.8				108.0	106.0	1.4	12/21/2001
Fluoride	BDL	92.5			3.6	99.5	95.2	2.8	12/26/2001
Fluoride	BDL	98.7			4.4	103.0	89.4	7.6	12/26/2001
Iron	BDL	93.4				92.9	89.6	3.0	12/11/2001
Iron	BDL	87.4				96.6	88.7	8.5	12/21/2001
Magnesium	BDL	90.2				DO	DO	2.6	12/11/2001
Magnesium	BDL	85.8				114.0	103.0	9.5	12/21/2001
Nitrate (N)	BDL	107.0			10.8	108.0	97.6	6.7	12/19/2001
pH		100.0			0.1				12/6/2001
Potassium	BDL	86.0				DO	DO	1.5	1/10/2002
Potassium	BDL	102.0				111.0	111.0	0.1	12/27/2001
Ra-226	0+/-0.1	94.2	92.6	1.8	11.4	72.8	97.9	28.0	12/11/2001
Ra-228	0+/-0	95.1	92.8	2.4	NC	95.6	95.6	0.0	12/21/2001
Silica Dioxide	BDL	99.1			0.0	99.8	96.8	2.0	12/29/2001
Sodium	BDL	101.0				95.8	96.4	0.6	12/27/2002
Sulfate	BDL	102.0			4.5	101.0	96.2	2.6	12/28/2001
Th-228	0+/-0	113.0	130.0	13.7	NC	121.0	112.0	7.1	12/13/2001
Th-230	0+/-0.1				NC				12/13/2001
Th-232	0+/-0	103.0	123.0	18.3	NC	122.0	105.0	15.3	12/13/2001
Zinc	BDL	102.0				92.3	92.6	0.6	12/11/2001

QA Approval:

BDL = Below Detection Limit

Outreach
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Client:	Kaiser Aluminum
Client Project:	QTRLY
Lab Number:	20011083
Date Reported:	1/14/2002
Date Received:	12/6/01
Page Number:	15 of 15

Lab Approval:

BDL = Below Detection Limit

OUTREACH LABORATORY

311 North Aspen
Broken Arrow, OK 74012
Phone: (918) 251-2515
Fax: (918) 251-0008

CHAIN OF CUSTODY

Results To:
Company: A & M Engineering
Name: Irfan Taner
Address:
City: State: Zip:
Phone: 665-6273 Fax #:

Bill To:
Company:
Name:
Address:
City: State: Zip:

ANALYSIS REQUESTED

PO #:
PROJECT #: 1556-020
PROJECT NAME: Kaiser QTR
REQUESTED TURNAROUND TIME (ADDITIONAL CHARGES MAY APPLY):
SAMPLER: Jon Kuhn (Signature)

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	# CONTAINERS	CONTAINER SIZE & TYPE (PLASTIC OR GLASS)	PRESERVATIVE # (1. HNO_3 pH<2; 2. Ice <4°C; 3. HCl pH<2; 4. H2S04 pH<2; 5. NaOH pH>11)									REMARKS (I.E. FILTERED, UNFILTERED, GRAB, COMPOSITE)
unFilt	MWD-5	12/6/01	10:03	H_2O	2	P										
Filtered	MWD-5	12/6/01	10:03	H_2O	2	P										
Unfiltered	MWD-4	12/6/01	12:20	H_2O	2	P										
Filtered	MWD-4	12/6/01	12:20	H_2O	2	P										
Unfiltered	Fulton Creek	12/6/01	15:05	H_2O	2	P										
Filtered	Fulton Creek	12/6/01	15:05	H_2O	2	P										
UnFiltered	MWD 8	12/6/01	14:29	H_2O	2	P										
Filtered	MWD-8	12/6/01	14:29	H_2O	2	P										
UnFiltered	Retention Pond	12/6/01	15:30	H_2O	2	P										
Filtered	Retention Pond	12/6/01	15:30	H_2O	2	P										

SEE ATTACHED

RELINQUISHED BY: Jon Kuhn DATE 12/6/01 TIME 16:26 RECEIVED BY: DATE TIME

RELINQUISHED BY: DATE TIME RECEIVED BY: DATE 12/6/01 TIME 16:31

My signature on this chain of custody form indicates that I am authorized by the above company to release samples for analysis. The company agrees to pay the entire balance upon receipt of sample data and it is understood and agreed that any balance carried over thirty (30) days is subject to a 1.5% per month (18% per annum) late charge. In the event of default, the company becomes legally liable for any reasonable attorney and/or collection fees and all related costs necessary to remit the entire balance to Outreach Technologies, Inc. (Outreach Laboratory).

SAMPLE RETURN/DISPOSAL: All non-hazardous aqueous samples shall be disposed of 30 days after issue of final report. All others will be returned at client's expense.

FOR LABORATORY USE ONLY:

Sample Condition Upon Receipt
Custody Seals Intact Y N
Cooler Temperature

Outreach Laboratory
North Aspen
oken Arrow, OK 74012
918) 251-2515
AX (918) 251-0008

Project No.: 20011092
Client: Kaiser Aluminum
7311 East 41st Street
Tulsa, OK 74145
Date Submitted: 12/7/01
Date Reported: 1/14/02

CASE NARRATIVE

Seven samples were received for analysis for Ra-226, Ra-228, Iso Thorium, Metals, and general chemistry parameters. The samples were received in good condition. The Potassium MS/MSD diluted out, due to a sample matrix effect. The sample results were not effected. All other QC is in control limits.

If you have questions, please feel free to call at 918-251-2515.

Quality Assurance Officer

Laboratory Director

Outreach Laboratory
North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	1 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20011092-01**						
Client ID:	**P-5 UNFILTERED**						
Date Sampled:	**12/7/2001 8:20:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.070 +/- 0.139	pCi/l	0.230	12/27/2001	12/27/2001	E/D
Ra-228	EPA 904/9320	0.157 +/- 0.046	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0.034 +/- 0.092	pCi/l	0.154	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0 +/- 0.105	pCi/l	0.256	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0.008 +/- 0.094	pCi/l	0.162	12/26/2001	12/27/2001	E/D
	Inorganics Analyses						
Alkalinity	EPA 310.1	227	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	397	mg/l	5		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1890	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	0.5	mg/l	0.2	12/13/2001 10:00:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.16	SI			12/7/2001 2:19:00 PM	EH
Silica Dioxide	EPA 370.1	1.7	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	7.5	mg/l	1		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	15.3	degrees C			12/7/2001 2:19:00 PM	EH
	Metals Analyses						
Barium	EPA 6010B	3.95	mg/l	0.154	12/19/2001	12/21/2001	JM

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	2 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	51.8	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	0.243	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	26.8	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	263	mg/l	1.72	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	33.3	mg/l	1.30	12/19/2001	12/21/2001	JM
Copper	EPA 6010B	0.051	mg/l	0.027	12/19/2001	1/13/2002	RE
Zinc	EPA 6010B	0.030	mg/l	0.006	12/19/2001	1/13/2002	RE

Lab ID: 20011092-02
Client ID: P-5 FILTERED
Date Sampled: 12/7/2001 8:20:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.099 +/- 0.119	pCi/l	0.191	12/27/2001	12/27/2001	E/D
Ra-228	EPA 904/9320	1.79 +/- 0.053	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0 +/- 0.053	pCi/l	0.106	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0 +/- 0.099	pCi/l	0.245	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0.008 +/- 0.077	pCi/l	0.134	12/26/2001	12/27/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	233	mg/l	2.0		12/14/2001 1:50:00 PM	RT
Chloride	EPA 325.3	387	mg/l	5		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1880	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	0.6	mg/l	0.2	12/13/2001 10:00:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.22	SI			12/7/2001 2:23:00 PM	EH

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	3 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Silica Dioxide	EPA 370.1	1.7	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	7.9	mg/l	1		12/28/2001 4:25:00 PM	RT
Temperature	EPA 170.1	15.4	degrees C			12/7/2001 2:23:00 PM	EH
Metals Analyses							
Barium	EPA 6010B	4.19	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	57.0	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	0.071	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	29.7	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	235	mg/l	1.72	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	38.2	mg/l	1.30	12/19/2001	12/21/2001	JM
Copper	EPA 6010B	0.037	mg/l	0.027	12/19/2001	1/13/2002	RE
Zinc	EPA 6010B	0.028	mg/l	0.006	12/19/2001	1/13/2002	RE

Lab ID: **20011092-03**
Client ID: **MWD-10 UNFILTERED**
Date Sampled: **12/7/2001 9:25:00 AM**
Matrix: **Water**

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.202 +/- 0.092	pCi/l	0.116	12/27/2001	12/27/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.041	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0 +/- 0.076	pCi/l	0.138	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0.039 +/- 0.122	pCi/l	0.271	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.075	pCi/l	0.138	12/26/2001	12/27/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	253	mg/l	2.0		12/14/2001 1:15:00 PM	RT
Chloride	EPA 325.3	239	mg/l	3		12/27/2001 11:05:00 AM	RT

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	4 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Conductivity	EPA 120.1	1300	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	0.9	mg/l	0.3	12/13/2001 10:00:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.01	SI			12/7/2001 2:25:00 PM	EH
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	13.7	mg/l	1		12/28/2001 5:10:00 PM	RT
Temperature	EPA 170.1	17.3	degrees C			12/7/2001 2:25:00 PM	EH
Metals Analyses							
Barium	EPA 6010B	1.14	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	95.4	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	0.176	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	62.4	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	63.0	mg/l	0.343	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	26.2	mg/l	1.30	12/19/2001	12/21/2001	JM

Lab ID: 20011092-04
Client ID: MWD-10 FILTERED
Date Sampled: 12/7/2001 9:25:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0 +/- 0.140	pCi/l	0.261	12/27/2001	12/27/2001	E/D
Ra-228	EPA 904/9320	0.673 +/- 0.048	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0 +/- 0.090	pCi/l	0.160	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0.229 +/- 0.145	pCi/l	0.278	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.107	pCi/l	0.199	12/26/2001	12/27/2001	E/D

BDL = Below Detection Limit

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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
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Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Inorganics Analyses					
Alkalinity	EPA 310.1	257	mg/l	2.0		12/17/2001 2:50:00 PM	RT
Chloride	EPA 325.3	237	mg/l	3		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1290	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	0.9	mg/l	0.3	12/14/2001 11:20:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	7.05	SI			12/7/2001 2:27:00 PM	EH
Silica Dioxide	EPA 370.1	1.8	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	14.3	mg/l	1		12/28/2001 5:10:00 PM	RT
Temperature	EPA 170.1	17.5	degrees C			12/7/2001 2:27:00 PM	EH
		Metals Analyses					
Barium	EPA 6010B	1.09	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	85.7	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	0.056	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	55.1	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	60.3	mg/l	0.343	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	24.7	mg/l	1.30	12/19/2001	12/21/2001	JM

Lab ID: **20011092-05**
Client ID: **P-3 FILTERED**
Date Sampled: **12/7/2001 10:45:00 AM**
Matrix: **Water**

BDL = Below Detection Limit

Outreach Laboratory
North Aspen
Ken Arrow, OK 74012
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	6 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0.097 +/- 0.112	pCi/l	0.177	12/27/2001	12/27/2001	E/D
Ra-228	EPA 904/9320	0 +/- 0.045	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0.074 +/- 0.067	pCi/l	0.096	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0.032 +/- 0.107	pCi/l	0.242	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.060	pCi/l	0.114	12/26/2001	12/27/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	197	mg/l	2.0		12/17/2001 2:50:00 PM	RT
Chloride	EPA 325.3	424	mg/l	5		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	1780	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	0.4	mg/l	0.2	12/14/2001 11:20:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	6.95	SI			12/7/2001 2:29:00 PM	EH
Silica Dioxide	EPA 370.1	1.7	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	41.9	mg/l	3		12/28/2001 5:10:00 PM	RT
Temperature	EPA 170.1	19.4	degrees C			12/7/2001 2:29:00 PM	EH
		Metals Analyses					
Barium	EPA 6010B	0.279	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	238	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	54.5	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	13.5	mg/l	0.343	12/19/2001	1/10/2002	RE

BDL = Below Detection Limit

Outreach Laboratory
North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	7 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sodium	EPA 6010B	58.9	mg/l	1.30	12/19/2001	12/21/2001	JM
Copper	EPA 6010B	BDL	mg/l	0.297	12/19/2001	12/21/2001	JM
Zinc	EPA 6010B	BDL	mg/l	0.066	12/19/2001	12/21/2001	JM

Lab ID: 20011092-06
Client ID: EQUIP BLANK UNFILTERED
Date Sampled: 12/7/2001 10:40:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0 +/- 0.093	pCi/l	0.177	12/27/2001	12/28/2001	E/D
Ra-228	EPA 904/9320	0.579 +/- 0.047	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0 +/- 0.075	pCi/l	0.142	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0 +/- 0.111	pCi/l	0.287	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0 +/- 0.080	pCi/l	0.156	12/26/2001	12/27/2001	E/D
Inorganics Analyses							
Alkalinity	EPA 310.1	BDL	mg/l	1.0		12/17/2001 2:50:00 PM	RT
Chloride	EPA 325.3	5.4	mg/l	1		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	359	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	BDL	mg/l	0.2	12/14/2001 11:20:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT
pH	EPA 150.1/9040A	5.30	SI			12/7/2001 2:32:00 PM	EH
Silica Dioxide	EPA 370.1	BDL	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	2.8	mg/l	1		12/28/2001 5:10:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
1 North Aspen
ken Arrow, OK 74012
18) 251-2515
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY-
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	8 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	17.6	degrees C			12/7/2001 2:32:00 PM	EH
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	BDL	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	BDL	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	BDL	mg/l	0.343	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	BDL	mg/l	1.30	12/19/2001	12/21/2001	JM

Lab ID: 20011092-07
Client ID: EQUIP BLANK FILTERED
Date Sampled: 12/7/2001 10:40:00 AM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0 +/- 0.069	pCi/l	0.135	12/27/2001	12/28/2001	E/D
Ra-228	EPA 904/9320	0.336 +/- 0.054	pCi/l	0.469	12/26/2001	12/28/2001	S/D
Th-232	LANL ER 200 M	0.051 +/- 0.064	pCi/l	0.097	12/26/2001	12/27/2001	E/D
Th-230	LANL ER 200 M	0.011 +/- 0.114	pCi/l	0.259	12/26/2001	12/27/2001	E/D
Th-228	LANL ER 200 M	0.063 +/- 0.082	pCi/l	0.127	12/26/2001	12/27/2001	E/D
		Inorganics Analyses					
Alkalinity	EPA 310.1	BDL	mg/l	1.0		12/17/2001 2:50:00 PM	RT
Chloride	EPA 325.3	5.4	mg/l	1		12/27/2001 11:05:00 AM	RT
Conductivity	EPA 120.1	284	uMHO/cm	2		12/7/2001 3:00:00 PM	EH
Fluoride	EPA 340.2	BDL	mg/l	0.2	12/14/2001 11:20:00 AM	12/26/2001 11:02:00 AM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	12/19/2001 9:00:00 AM	12/19/2001 1:40:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
' North Aspen
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(18) 251-2515
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	9 of 10

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
pH	EPA 150.1/9040A	5.01	SI			12/7/2001 2:34:00 PM	EH
Silica Dioxide	EPA 370.1	BDL	mg/l	0.5		12/29/2001 2:30:00 PM	RT
Sulfate	EPA 375.4	1.7	mg/l	1		12/28/2001 5:10:00 PM	RT
Temperature	EPA 170.1	17.2	degrees C			12/7/2001 2:34:00 PM	EH
Metals Analyses							
Barium	EPA 6010B	BDL	mg/l	0.154	12/19/2001	12/21/2001	JM
Calcium	EPA 6010B	BDL	mg/l	0.616	12/19/2001	12/21/2001	JM
Iron	EPA 6010B	BDL	mg/l	0.055	12/19/2001	12/21/2001	JM
Magnesium	EPA 6010B	BDL	mg/l	0.099	12/19/2001	12/21/2001	JM
Potassium	EPA 6010B	BDL	mg/l	0.343	12/19/2001	1/10/2002	RE
Sodium	EPA 6010B	BDL	mg/l	1.30	12/19/2001	12/21/2001	JM

BDL = Below Detection Limit

Outreach Laboratory
North Aspen
Broken Arrow, OK 74012
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Client:	Kaiser Aluminum
Client Project:	QUARTERLY
Lab Number:	20011092
Date Reported:	1/14/2002
Date Received:	12/7/01
Page Number:	10 of 10

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	103.0			0.5	104.0	105.0	0.5	12/17/2001
Alkalinity	BDL	102.0			1.0	104.0	104.0	0.2	12/14/2001
Barium	BDL	86.5				115.0	115.0	0.1	12/21/2001
Calcium	BDL	90.5				115.0	105.0	8.6	12/21/2001
Chloride	BDL	101.0			0.5	92.9	93.9	0.5	12/27/2001
Conductivity	BDL	99.0			0.0				12/7/2001
Copper	BDL	94.3				94.4	74.9	23.1	12/21/2001
Fluoride	BDL	98.7			4.4	103.0	89.4	7.6	12/26/2001
Iron	BDL	87.4				96.6	88.7	8.5	12/21/2001
Magnesium	BDL	85.8				114.0	103.0	9.5	12/21/2001
Nitrate (N)	BDL	107.0			10.8	108.0	97.6	6.7	12/19/2001
pH		99.8			0.0				12/7/2001
Potassium	BDL	86.0				DO	DO	1.5	1/10/2002
Ra-226	0+/-0	113.0			NC	81.4			12/27/2001
Ra-228	0.2+/-0	98.5	89.8	9.2	NC	92.1	78.4	16.0	12/28/2001
Silica Dioxide	BDL	99.1			0.0	99.8	96.8	2.0	12/29/2001
Sodium	BDL	101.0				95.8	96.4	0.6	12/27/2002
Sulfate	BDL	102.0			4.5	101.0	96.2	2.6	12/28/2001
Th-228	0+/-0	106.0			NC	101.0			12/27/2001
Th-230	0+/-0.1				NC				12/27/2001
Th-232	0+/-0	107.0			NC	106.0			12/27/2001
Zinc	BDL	89.4				90.1	84.7	6.3	12/21/2001

QA Approval:

Lab Approval:

BDL = Below Detection Limit

OUTREACH LABORATORY

311 North Aspen
Broken Arrow, OK 74012
Phone: (918) 251-2515
Fax: (918) 251-0008

CHAIN OF CUSTODY

Results To:
Company: A&M Engineering
Name: Brian Tamero
Address:
City: State: Zip:
Phone: 1665-6575 Fax #:

Bill To:
Company:
Name:
Address:
City: State: Zip:

ANALYSIS REQUESTED

PO #:
PROJECT #: 15556-020
PROJECT NAME: Kaiser PTR.
REQUESTED TURNAROUND TIME (ADDITIONAL CHARGES MAY APPLY):
SAMPLER: [signature] Signature

CONTAINER SIZE & TYPE: PLASTIC OR GLASS

PRESERVATIVE #:
1. HNO_3 pH<2
2. Ice <4°C
3. HCl pH<2
4. H2S04 pH<2
5. NaOH pH>11

	LAB SAMPLE ID	CLIENT SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	# CONTAINERS	CONTAINER SIZE & TYPE	PRESERVATIVE #									REMARKS (I.E. FILTERED, UNFILTERED, GRAB, COMPOSITE)
	unFilter	P-5	12/7/01	08:20	H_2O	2	P										
X	Filtered	P-5	12/7/01	08:20	H_2O	2	P			Ice							
	Unfiltered	MW10-10	12/7/01	09:25	H_2O	2	P										
X	Filtered	MW10-10	12/7/01	09:25	H_2O	2	P										
	Filtered	P-3	12/7/01	10:45	H_2O	2	P										
	unFiltered	Equipment Blk	12/7/01	10:40	H_2O	2	P										
	Filtered	Equipment Blk	12/7/01	10:40	H_2O	2	P										

RELINQUISHED BY: [signature] DATE 12/7/01 TIME 11:23 RECEIVED BY: [signature] DATE 12/7/01 TIME 1120

RELINQUISHED BY: DATE TIME RECEIVED BY: DATE TIME

My signature on this chain of custody form indicates that I am authorized by the above company to release samples for analysis. The company agrees to pay the entire balance upon receipt of sample data and it is understood and agreed that any balance carried over thirty (30) days is subject to a 1.5% per month (18% per annum) late charge. In the event of default, the company becomes legally liable for any reasonable attorney and/or collection fees and all related costs necessary to remit the entire balance to Outreach Technologies, Inc. (Outreach Laboratory).

SAMPLE RETURN/DISPOSAL: All non-hazardous aqueous samples shall be disposed of 30 days after issue of final report. All others will be returned at client's expense.

FOR LABORATORY USE ONLY: 2001(F)92

Sample Condition Upon Receipt: Good

Custody Seals Intact: Y N

Cooler Temperature:

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly

PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jor

TECHNICIAN NAME: Scott

WEATHER: Overcast

AMBIENT AIR TEMP (°C):

LAST PRECIP.

DATE: 12/3/01

Location (WELL NO.)	Fresh 12/3/01 water pond	12/4/01 Retention pond	Fulton 12/4/01 Creek	
Condition of Well				
Water Depth (WD) (ft)				
Total Well Depth (TWD)(ft)				
Depth of Pump Intake (ft)				
Volume to purge (gal)				
Initial Purging Rate (gal/min)				
Time Required to Purge Initial 2 ½ Well Volumes				
Time Initial Purging Begins				
Time Initial Purging Complete				
Final Purging Rate				
Time Required to Purge Final ½ Well Volume				
Time Final Purging Begins				
Time Final Purging Ends				
Notes:				

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	Fresh Water pond 12/3/01		Flotation pond 12/4/01		Fulton Creek 12/4/01		
Temp (°C) of Purge Well	13.9	14.3	20.1	19.6	17.9	18.1	
	14.6	15.0					
pH During Purging Instrument ID: 313	7.53	7.57	9.28	9.33	7.70	7.81	
	7.58	7.50					
Conductivity During Purging µS/cm	500	600	600	600	400	400	
	600	600					
Dissolved Oxygen (mg/l) During Purging	9.04	10.03	8.10	8.50	9.93	9.75	
	10.25	10.32					
Turbidity of Sampled Water	6.8	5.8	10.8	10.8	3.7	4.1	
	5.8	5.8					
Sampling Method	Pump		pump		Pump		
Time Sampling Begins	14:49		12:15		15:15		
Time Sampling Completed	14:59		12:30		15:25		
Color of Sampled Water	clear		clear		clear		
Odor of Sampled Water	None observed		None observed		None observed		
Results of Measurement of pH of Buffer Solutions			Resampled &		Resampled &		
Results of Measurement of Conductivity Standards			Split with		Split with		
Results of Measurements of Dissolved Oxygen in Air			NRC		NRC		

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly PROJECT NUMBER: 1556-028

SUPERVISOR NAME: Jon Kuhn TECHNICIAN NAME: Scott McReynolds

WEATHER: Overcast AMBIENT AIR TEMP (°C): 60 °F

LAST PRECIP. DATE: 12-3-01

Location (WELL NO.)	MWD #2	ST-2	P-3	P-2
Condition of Well	Good	Good	Good	Good
Water Depth (WD) (ft)	9.23	51.8	9.18	10.4
Total Well Depth (TWD)(ft)	18.68	53.63	16.09	31.4
Depth of Pump Intake (ft)	12.5'		14.1	20
Volume to purge (gal)	7.67		6.3	13.26
Initial Purging Rate (gal/min)	~~200~~ 1000ml		600ml	600ml.
Time Required to Purge Initial 2 ½ Well Volumes	~~11:50~~ 35min.		See Notes	85gal. / 1421
Time Initial Purging Begins	11:15		12:40	13:40
Time Initial Purging Complete	11:50		See Notes	~~1440~~
Final Purging Rate	500m			500ml
Time Required to Purge Final ½ Well Volume				~~14:21~~ 19 min
Time Final Purging Begins	11:50		Pumped Dry	14:21
Time Final Purging Ends	12:05			1440
Notes:		Dry	DRY @ 3.5 gal	

3.4 gal well volume

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	MWD#2		ST-2	P-3		P-2	
Temp (°C) of Purge Well	19.2	19.0	18.9	14.7	17.5	17.9	17.7
	18.6	18.9		17.4	17.4	16.8	18.1
pH During Purging Instrument ID: 313	6.95	7.06	7.04	6.77	6.91	6.84	6.92
	7.07	7.08		6.93	6.92	7.00	6.88
Conductivity During Purging µS/cm	800	800		1600	1800	800	800
	800	800		1700	1700	800	700
Dissolved Oxygen (mg/l) During Purging	4.02	4.04	3.37	8.59	10.62	2.27	3.34
	2.31	3.11		9.42	9.44	5.38	5.75
Turbidity of Sampled Water	2.3	2.4	6.36	11.1	6.5	24.4	28.6
	19.1	1.6		8.4	7.7	25.2	24.5
Sampling Method	pump			Pump		Pump	
Time Sampling Begins	12:05			NA		1440	
Time Sampling Completed	12:38			Next day.		15:03	
Color of Sampled Water	none ~~N/A~~ observed			Clear		None observed	None observed
Odor of Sampled Water	~~N/A~~ none observed			none		"	
Results of Measurement of pH of Buffer Solutions							
Results of Measurement of Conductivity Standards							
Results of Measurements of Dissolved Oxygen in Air	8.91						

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon TECHNICIAN NAME: Scott

WEATHER: Overcast AMBIENT AIR TEMP (°C): 55°F

LAST PRECIP. DATE: 12/4/01

Location (WELL NO.)	P-1	P-10	No CAP P-8	P-7
Condition of Well	Good	Good	Good	Good
Water Depth (WD) (ft)	8.28'	11.2	10.85	14.35
Total Well Depth (TWD)(ft)	23.32'	23.75	25.9	25.9
Depth of Pump Intake (ft)	~17'	~18'	~20'	~19'
Volume to purge (gal)	10.35 gal.	9.12	10.3	8.6
Initial Purging Rate (gal/min)	600ml/min.	600ml/min	900ml/min.	500ml/min.
Time Required to Purge Initial 2 ½ Well Volumes	8.6gal / 08:17	7.6gal.	8.6 gal / 1149	~~8.6~~ 7.2gal. / 1342
Time Initial Purging Begins	0745	1020	1136	1242
Time Initial Purging Complete	~~0745~~ 0817	11:00	1149	1342
Final Purging Rate	500 ml	500 ml	900ml/min.	500ml/min.
Time Required to Purge Final ½ Well Volume	13 min.	10 min	6 min.	10 min
Time Final Purging Begins	817	11:00	1149	1342
Time Final Purging Ends	830	1110	1155	1332
Notes:	1 well volume 2.45	1 well volume 2.04 1355 start Second Sampling 1400 Finished	1 well volume 2.4 control misfiltered	1 well volume 1.88

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	P-1		P-10		P-8		P-7	
Temp (°C) of Purge Well	18.7	18.3	20.1	19.9	19.2	19.1	22.0	20.2
	18.4	18.2	20.1	22.6	18.8	19.2	20.0	19.9
pH During Purging Instrument ID: 313	6.75	6.76	6.97	7.0	7.0	7.0	6.92	6.90
	6.87	6.87	7.18	6.43	7.03	7.03	6.86	6.85
Conductivity During Purging µS/cm	600	600	400	400	600	600	400	400
	600	600	400	8/a	600	600	400	400
Dissolved Oxygen (mg/l) During Purging	2.64	8.99	1.44	3.36	1.20	1.01	1.65	2.06
	5.99	5.40	4.36	7.82	1.59	4.02	3.15	3.70
Turbidity of Sampled Water	39.7	10.8	4.3	33.4	18.1	14.5	338 1000 Range	237 1000R
	20.0	48.4	420 Range 1000	5.6	15.0	16.3	181 1000R	182 1000R
Sampling Method	pump		~~HRD~~ pump		pump		pump	
Time Sampling Begins	8:30		1110		11:55		1332	
Time Sampling Completed	9:55		1125 unfiltered		1210		1345	
Color of Sampled Water	None observed		None observed		hazzy		murky	
Odor of Sampled Water	None observed		None observed		light Sulfur oder		None observed	
Results of Measurement of pH of Buffer Solutions								
Results of Measurement of Conductivity Standards								
Results of Measurements of Dissolved Oxygen in Air								

Ran out of water after sampling unfiltered

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon TECHNICIAN NAME: Scott

WEATHER: Overcast AMBIENT AIR TEMP (°C):

LAST PRECIP. DATE: 12/5/01

Location (WELL NO.)	ST-3	MWD-7	MW9	~~MWD-7~~ ST-3 (Dup.)
Condition of Well	Good	Good	Good	
Water Depth (WD) (ft)	10.0'	11.3'	11.55	
Total Well Depth (TWD)(ft)	50.9	23.88'	23.0	
Depth of Pump Intake (ft)	38'	15'	15'	
Volume to purge (gal)	23.0 gal.	9.15 gal.	8.59 gal.	
Initial Purging Rate (gal/min)	700 ml	600 ml.	600	
Time Required to Purge Initial 2 ½ Well Volumes	19.1 gal	7.6 / 35 min	7.1	
Time Initial Purging Begins	08:15	08:17	0953	
Time Initial Purging Complete	0948	852	1043	
Final Purging Rate	500 ml	500 ml	500	
Time Required to Purge Final ½ Well Volume	22 min.	10 min.	14 min	
Time Final Purging Begins	0948	0852	1043	
Time Final Purging Ends	1010	0902	1057	
Notes:	1 well volume 6.6	1 well volume 2.0	1.86 well volume	

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

ST-3

Location (WELL NO.)	ST-3		MWD-7		MW-9		~~MW-7~~ (Dup)	
Temp (°C) of Purge Well	18.7	18.7	19.3	19.2	19.6	19.6	~~7.39~~ 18.6	18.5
	18.7	18.6	19.1	19.1	19.5	19.5	18.6	18.6
pH During Purging Instrument ID: 313	7.23	7.34	6.62	6.82	7.13	7.12	7.39	7.42
	7.37	7.43	6.93	6.90	7.11	7.15	7.44	7.44
Conductivity During Purging µS/cm	4400	4900	400	600	600	600	4800	4800
	5000	4800	600	600	600	600	4800	4800
Dissolved Oxygen (mg/l) During Purging	5.37	1.45	2.17	7.13	2.48	1.91	2.07	6.03
	1.56	6.67	4.52	7.68	1.43	2.53	8.82	5.01
Turbidity of Sampled Water	1.1	1.5	1.5	1.2	6.7	5.8	2.0	1.6
	1.1		1.0	.6	4.4	4.2	1.0	1.2
Sampling Method	Pump ST-3		pump		pump		pump	
Time Sampling Begins	1010		0902		1057		1010	
Time Sampling Completed	1035		09:25		11:20		1035	
Color of Sampled Water	None observed		None observed		None observed		SAME	
Odor of Sampled Water	Slight sulfur odor		None observed		None observed		SAME	
Results of Measurement of pH of Buffer Solutions								
Results of Measurement of Conductivity Standards								
Results of Measurements of Dissolved Oxygen in Air								

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon TECHNICIAN NAME: Scott

WEATHER: Overcast AMBIENT AIR TEMP (°C): 60°F

LAST PRECIP. DATE: 12/5/01

Location (WELL NO.)	MWS-11	MWD-11	MWS-6	MWD-6
Condition of Well	Good	Good	Good	Good
Water Depth (WD) (ft)	13.8	15.55	15.2	15.11
Total Well Depth (TWD)(ft)	13.8	28.37	18.7	33.56
Depth of Pump Intake (ft)		22'	Pumped Dry	~30'
Volume to purge (gal)		9.26		12
Initial Purging Rate (gal/min)		600ml	1000ml	500ml
Time Required to Purge Initial 2 ½ Well Volumes		7.71 Gal.		10 gal. 1456
Time Initial Purging Begins		1243	13:53	1358
Time Initial Purging Complete		1315		1456
Final Purging Rate		500ml	No Recovery	500ml
Time Required to Purge Final ½ Well Volume		13 min.		14 min.
Time Final Purging Begins		1315		1456
Time Final Purging Ends		13:28		1510
Notes:	DRY	2 gallons 1 well volume	Purged Dry. Bailer	3.0 gallons 1 well volume

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	MWS-11	MWD-11		MWS-6		MWD-6	
Temp (°C) of Purge Well	Dry Well	20.2	19.9	~~21.3~~	~~20.5~~	21.3	20.5
		19.7	19.7			20.5	21.1
pH During Purging Instrument ID: 313		7.48	7.56	7.91	~~7.84~~	7.91	7.84
		7.55	7.56			7.74	7.77
Conductivity During Purging µS/cm		1400	1600	1800	~~1800~~	1800	1800
		1600	1600			1800	1800
Dissolved Oxygen (mg/l) During Purging		6.78	8.27	~~2.64~~	~~4.11~~	2.64	4.11
		6.85	3.40			7.82	1.33
Turbidity of Sampled Water		2.8	1.6	~~7.1~~	~~7.7~~	7.1	7.7
		1.6	2.6			5.4	6.5
Sampling Method		pump				pump	
Time Sampling Begins		1328		~~1510~~		1510	
Time Sampling Completed		13:45				1525	
Color of Sampled Water		Clear				clear	
Odor of Sampled Water		None				none	
Results of Measurement of pH of Buffer Solutions							
Results of Measurement of Conductivity Standards							
Results of Measurements of Dissolved Oxygen in Air							

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon TECHNICIAN NAME: SCOTT

WEATHER: Cloudy AMBIENT AIR TEMP (°C): 50 °F

LAST PRECIP. DATE: 12/6/01

Location (WELL NO.)	MWS-5	MWD-5	MWD-4	MWD-8
Condition of Well	Good	Good	Good	Good
Water Depth (WD) (ft)	Dry	10.3	10.75	7.55
Total Well Depth (TWD)(ft)	7.5.	25.4	24.00	22.05
Depth of Pump Intake (ft)	Dry.	18.5'	18'	
Volume to purge (gal)		10.38	9.47	10.0
Initial Purging Rate (gal/min)		800 ml.	500ml	600ml
Time Required to Purge Initial 2 ½ Well Volumes		8.6 0952	7.8	8.4
Time Initial Purging Begins		09:13	1120	1340
Time Initial Purging Complete		0915 2	1210	1422
Final Purging Rate		500ml	500ml	500ml
Time Required to Purge Final ½ Well Volume		11 min	10 min	7 min
Time Final Purging Begins		0952	1210	1422
Time Final Purging Ends		10·03	1220	1429
Notes:	Dry.	one well 2.4	one well 2.15	2.36

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	MWS-5	MWD-5		MWD-4		MWD-8	
Temp (°C) of Purge Well	DRY	17.9	16.8	18.1	18.9	19.6	19.6
		17.5	17.5	19.0	19.3	19.5	19.6
pH During Purging Instrument ID: 313		7.81	7.88	7.00	7.04	7.68	7.69
		7.98	7.99	7.00	6.97	7.62	7.70
Conductivity During Purging µS/cm		1200	1000	900	1000	1400	1500
		1000	1000	1000	1000	1600	1800
Dissolved Oxygen (mg/l) During Purging		1.15	4.61	2.80	8.53	8.68	8.78
		1.65	1.23	9.34	9.04	8.78	8.50
Turbidity of Sampled Water		1.2	1.5	18.0	14.8	1.1	.9
		.9	1.0	20.5	21.8	.7	1.1
Sampling Method		Pump		pump		pump	
Time Sampling Begins		10:03		1220		1429	
Time Sampling Completed		10:22		~~1220~~ 1230		1448	
Color of Sampled Water		Clear		Mostly clear		cloudy Murky	
Odor of Sampled Water		Slight Sulfur		None observed		Sulfur odor	
Results of Measurement of pH of Buffer Solutions							
Results of Measurement of Conductivity Standards							
Results of Measurements of Dissolved Oxygen in Air							

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly

PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon

TECHNICIAN NAME: Scott

WEATHER: Sunny

AMBIENT AIR TEMP (°C):

LAST PRECIP.

DATE: 12/6/01

Location (WELL NO.)	Fulton Creek #2	Retention pond #2		
Condition of Well	Resample	Resample		
Water Depth (WD) (ft)				
Total Well Depth (TWD)(ft)				
Depth of Pump Intake (ft)				
Volume to purge (gal)				
Initial Purging Rate (gal/min)				
Time Required to Purge Initial 2 ½ Well Volumes				
Time Initial Purging Begins				
Time Initial Purging Complete				
Final Purging Rate				
Time Required to Purge Final ½ Well Volume				
Time Final Purging Begins				
Time Final Purging Ends				
Notes:				

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	Fulton creek #2	Retention pond #2		
Temp (°C) of Purge Well	15.7	15.9		
pH During Purging Instrument ID: 313	8.08	9.65		
Conductivity During Purging µS/cm	800	930		
Dissolved Oxygen (mg/l) During Purging	10.00	10.09		
Turbidity of Sampled Water	2.3	3.92		
Sampling Method	pump	pump		
Time Sampling Begins	1505	1530		
Time Sampling Completed	1511 ~~1500~~	1534		
Color of Sampled Water	clear	clear		
Odor of Sampled Water	None observed	None observed		
Results of Measurement of pH of Buffer Solutions				
Results of Measurement of Conductivity Standards				
Results of Measurements of Dissolved Oxygen in Air				

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 1 OF 2

PROJECT NAME: Kaiser Aluminum Quarterly

PROJECT NUMBER: 1556-020

SUPERVISOR NAME: Jon & David

TECHNICIAN NAME: Scott

WEATHER: Sunny

AMBIENT AIR TEMP (°C):

LAST PRECIP.

DATE: 12/7/01

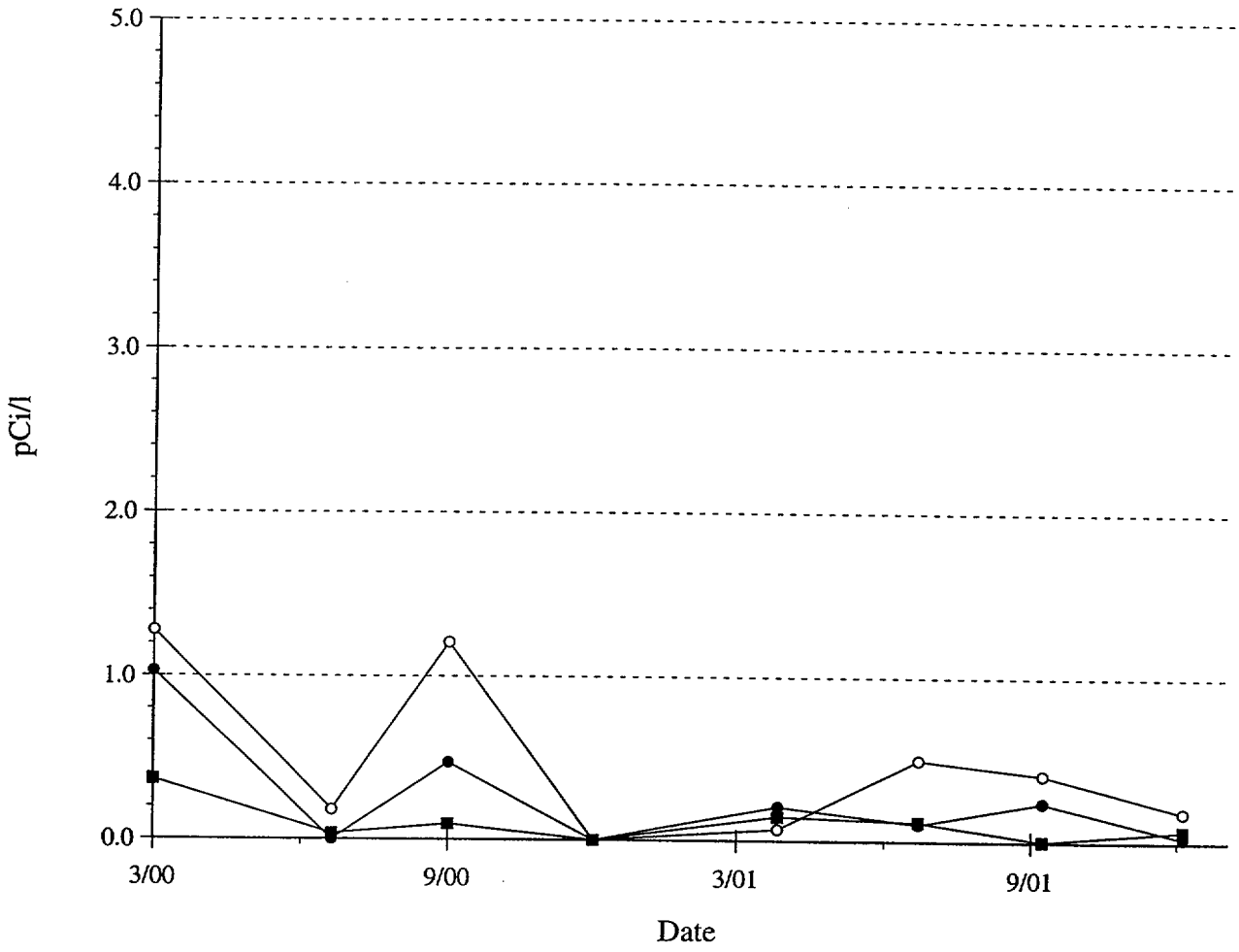
Location (WELL NO.)	B-5	MWD-10		
Condition of Well	Good	Good		
Water Depth (WD) (ft)	12.0'	14.59		
Total Well Depth (TWD)(ft)	23.0'	23.5		
Depth of Pump Intake (ft)	18.5'	16'		
Volume to purge (gal)	8.3	8.8		
Initial Purging Rate (gal/min)	500ml	500ml		
Time Required to Purge Initial 2 ½ Well Volumes	6.98	7.35		
Time Initial Purging Begins	0731	906		
Time Initial Purging Complete	811	945		
Final Purging Rate	500ml	500ml		
Time Required to Purge Final ½ Well Volume	9min	7min		
Time Final Purging Begins	811	945		
Time Final Purging Ends	820	952		
Notes:	1.79/1 volume	1.94		

FIELD QUALITY SAMPLING AND ANALYSIS DATA SHEET
SHEET 2 OF 2

Location (WELL NO.)	P-5		MWD-10					
Temp (°C) of Purge Well	14.7	16.5	16.8	17.3				
	17.1	16.3	18.2	18.6				
pH During Purging Instrument ID: 313	7.50	7.44	7.26	7.26				
	7.44	7.44	7.18	7.17				
Conductivity During Purging µS/cm	1600	1600	1100	1000				
	1600	1600	1000	1000				
Dissolved Oxygen (mg/l) During Purging	1.03	1.23	~~13.26~~ 3.01	1.45				
	10.93	10.75	1.27	10.25				
Turbidity of Sampled Water	6.8	3.6	~~[illegible]~~ 12.3	~~[illegible]~~ 6.8				
	5.4	4.5	6.0	5.7				
Sampling Method	pump		pump					
Time Sampling Begins	820		952					
Time Sampling Completed	840		1005					
Color of Sampled Water	clear		clear					
Odor of Sampled Water	None observed		None observed					
Results of Measurement of pH of Buffer Solutions								
Results of Measurement of Conductivity Standards								
Results of Measurements of Dissolved Oxygen in Air								

Appendix C

Radionuclide Time Trend Analyses



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-1A

Thorium Isotopic Data Versus Time
P-1 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	DHO 5/02
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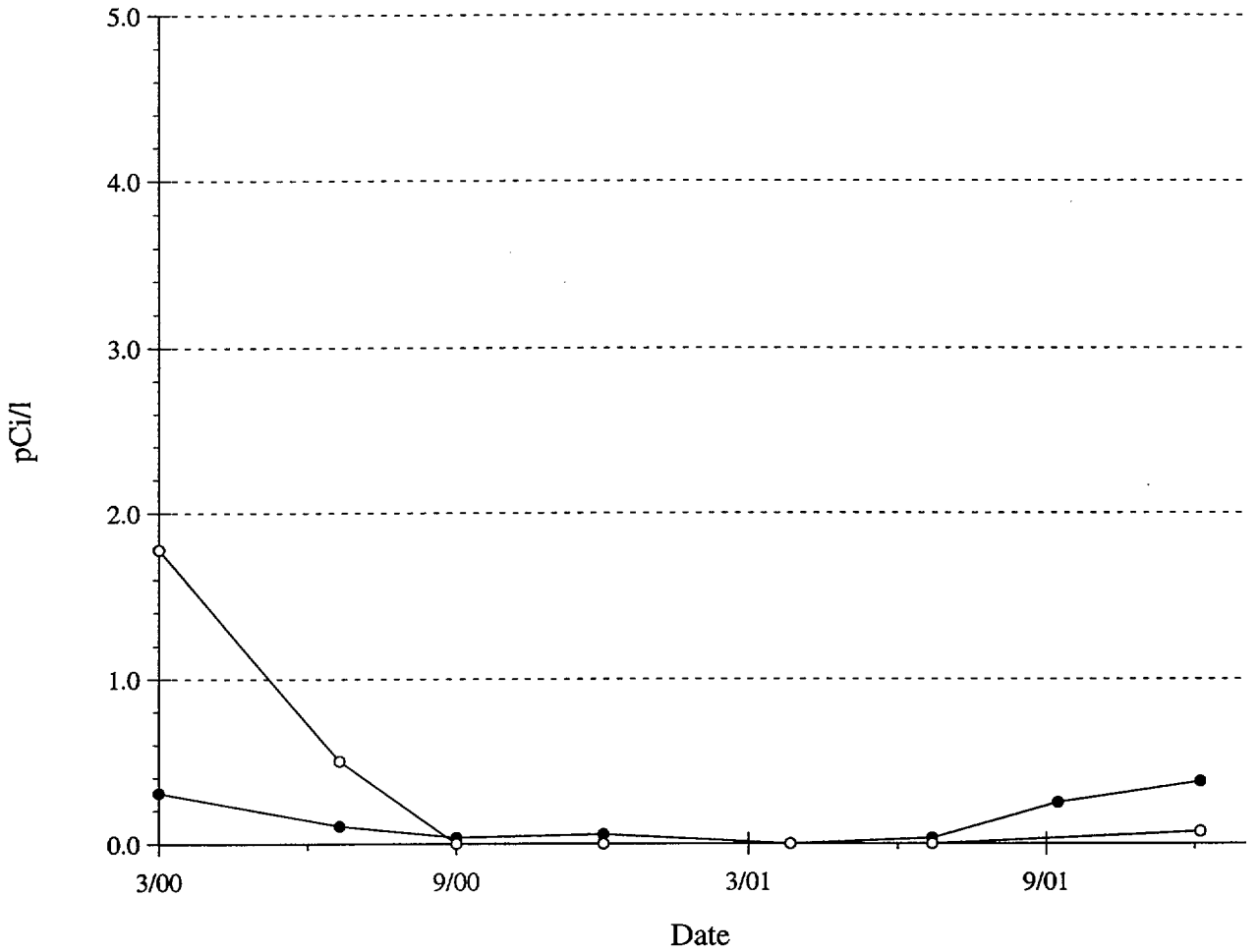

Legend

- ● Radium-226
- ○ Radium-228

Figure C-1B

Radium Isotopic Data Versus Time
P-1 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RFD 5/02
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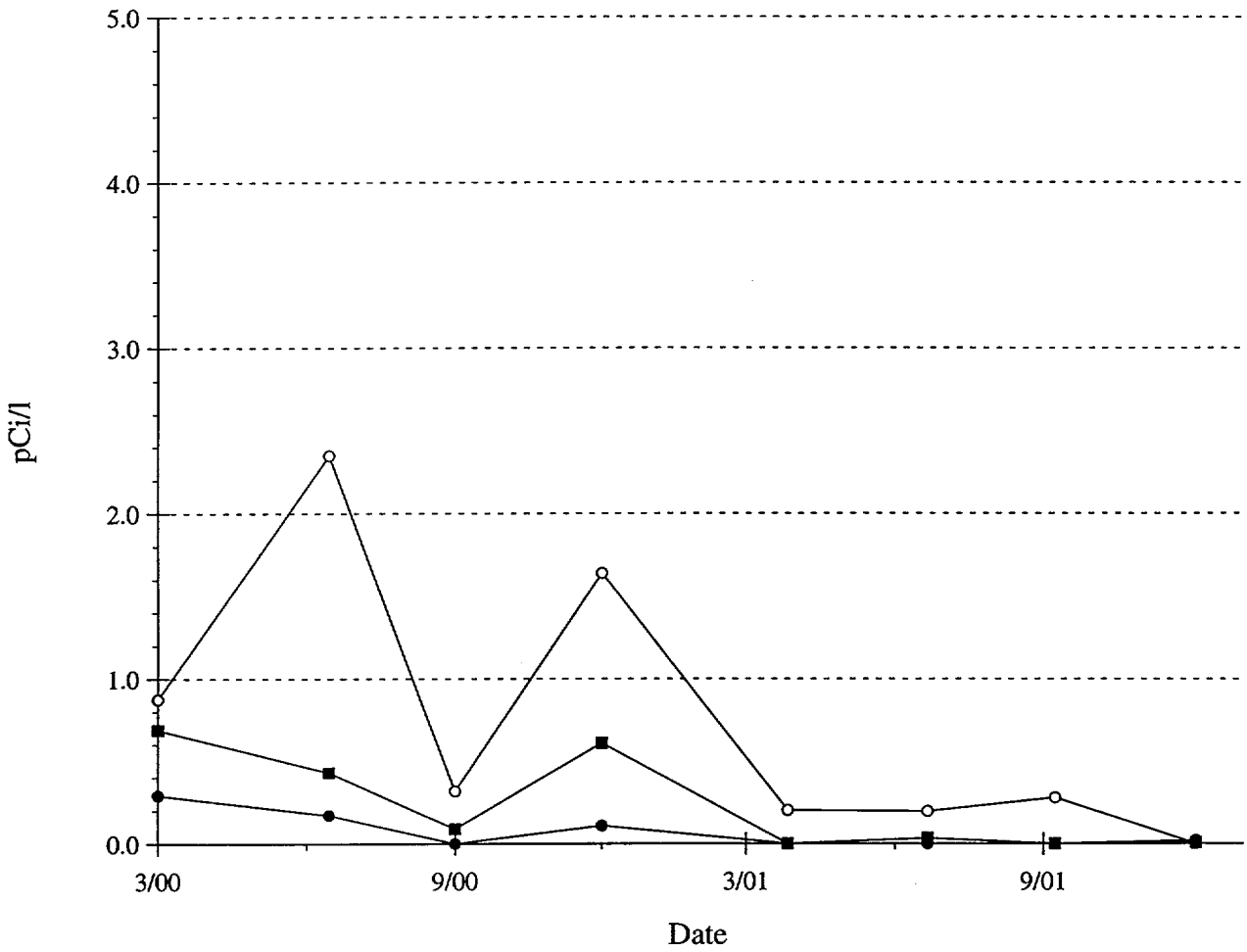

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-2A

Thorium Isotopic Data Versus Time
P-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RHD 5/02	
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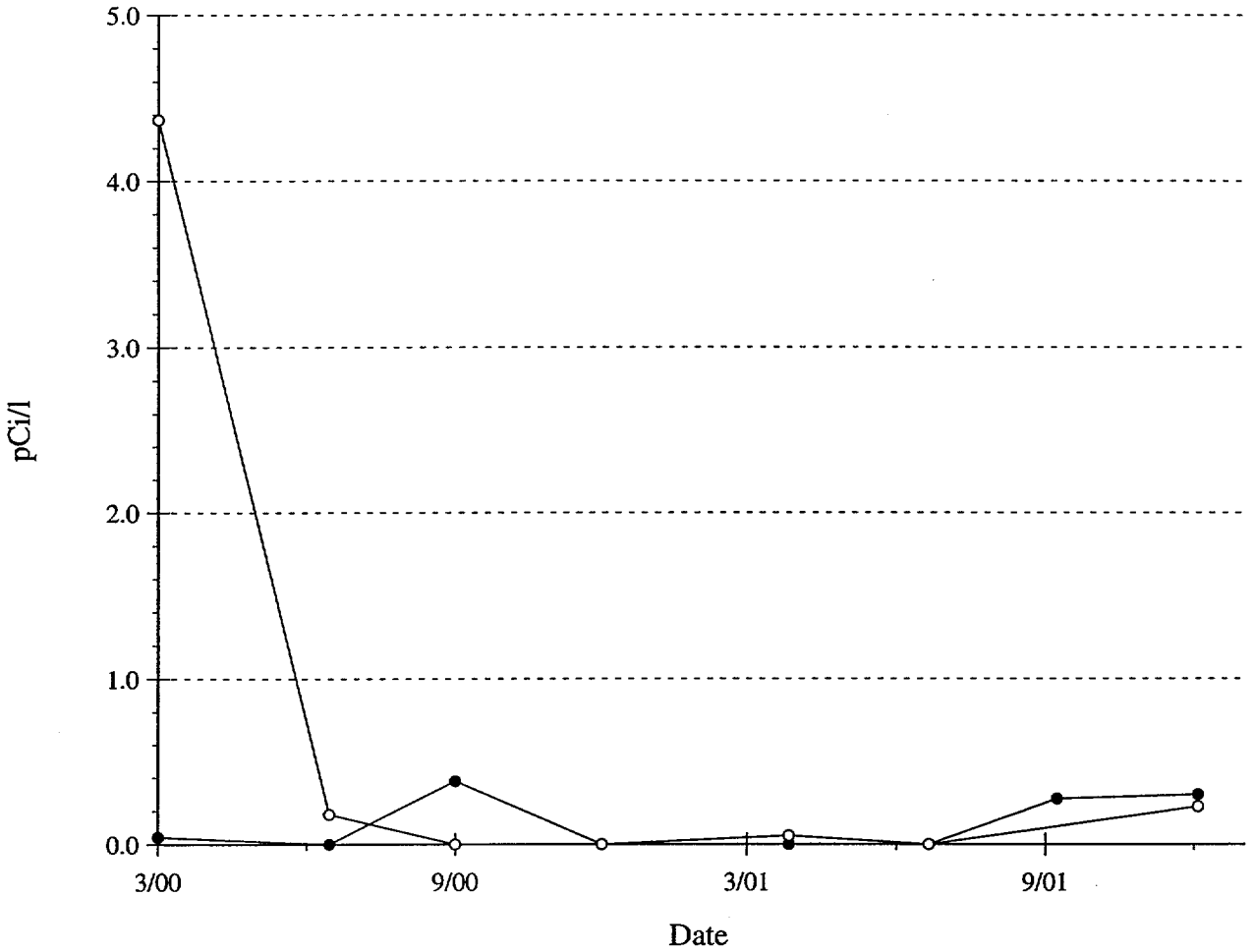
Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-2B

Radium Isotopic Data Versus Time
P-2 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

APPROVED	RJ2 3/02
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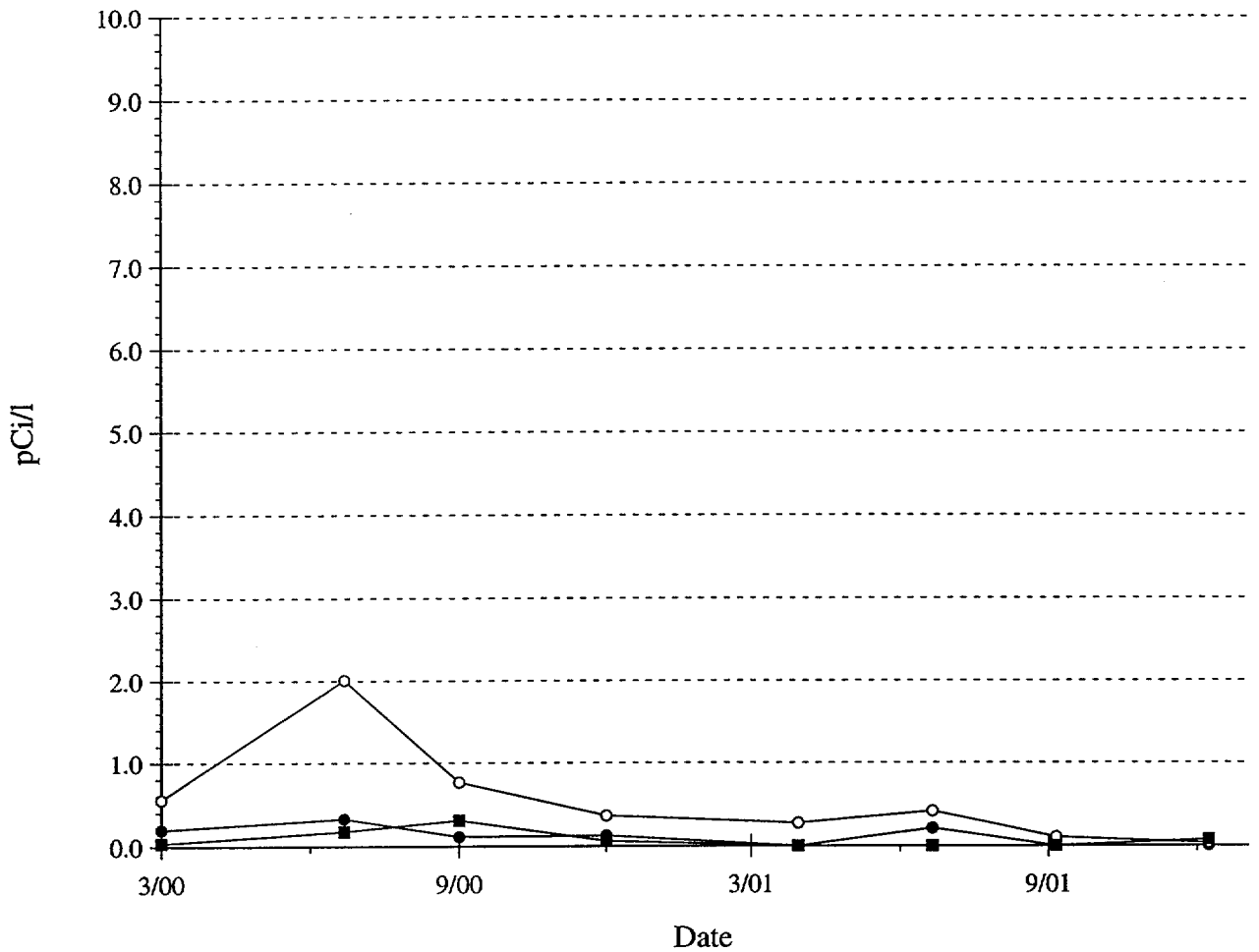

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-3A

Thorium Isotopic Data Versus Time
P-3 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	KRO 5/02
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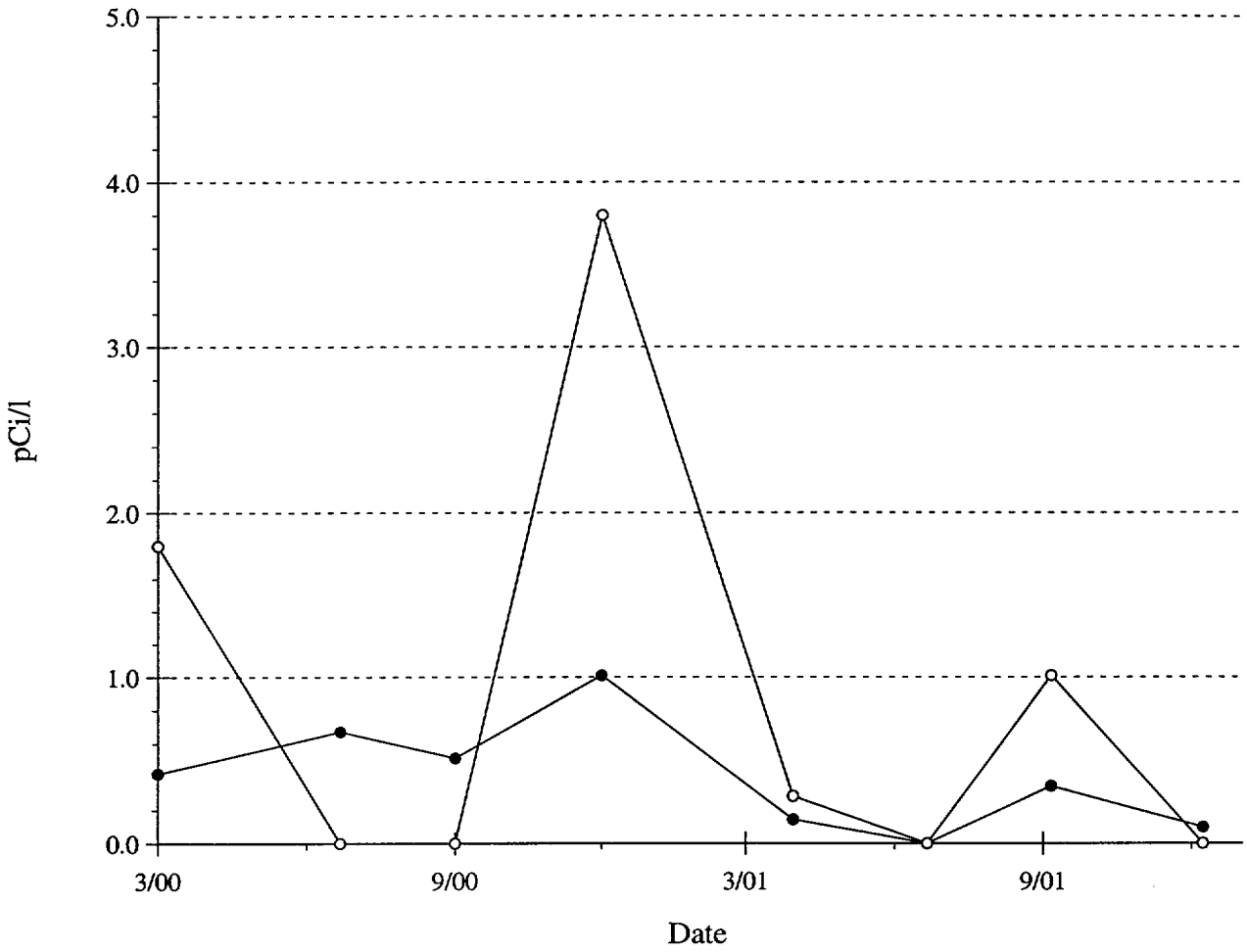
Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-3B

Radium Isotopic Data Versus Time
P-3 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

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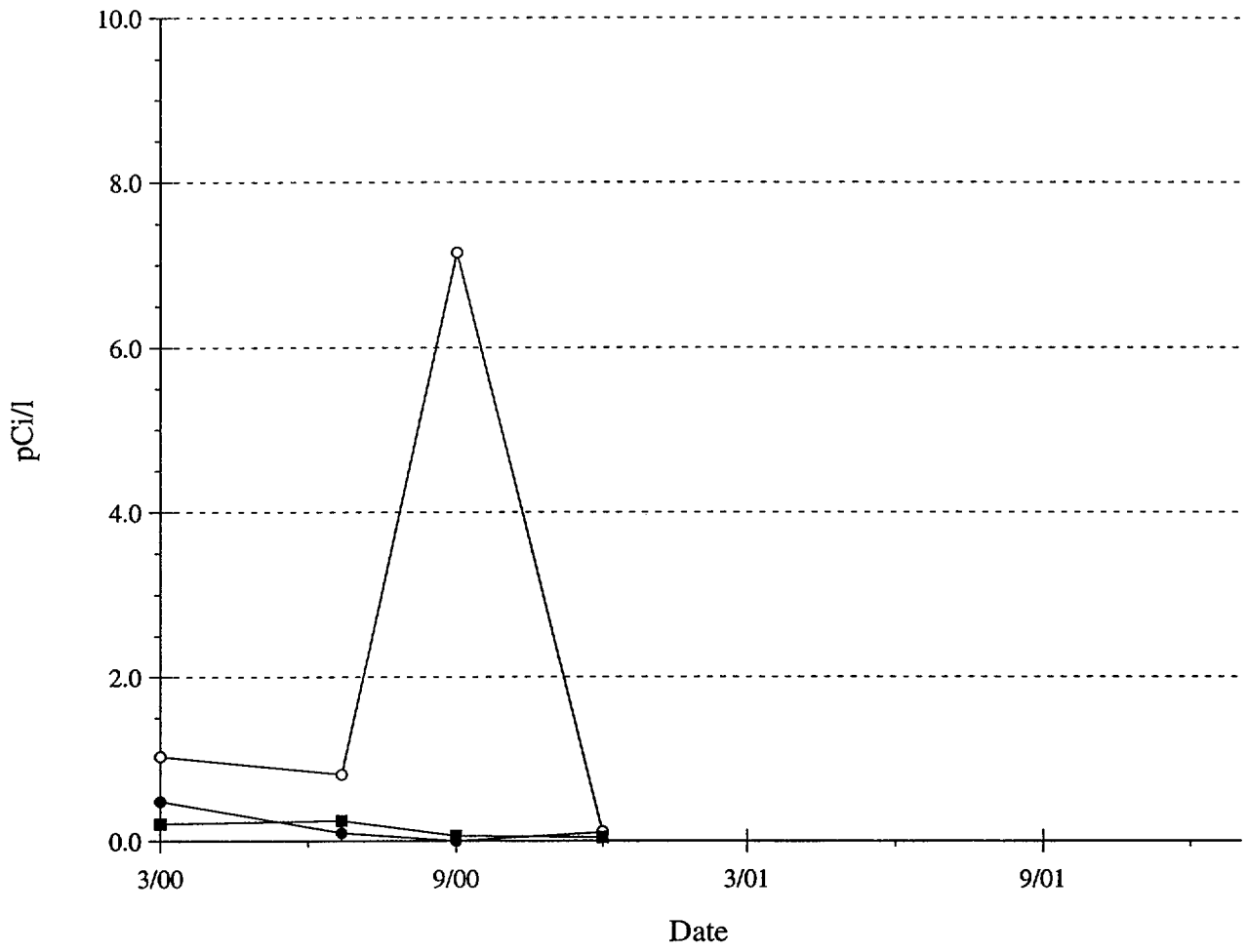

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Note: Well abandoned in March 2001 to accommodate ALRP stockpiling activities.

Figure C-4A

Thorium Isotopic Data Versus Time
P-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RPD 5/02
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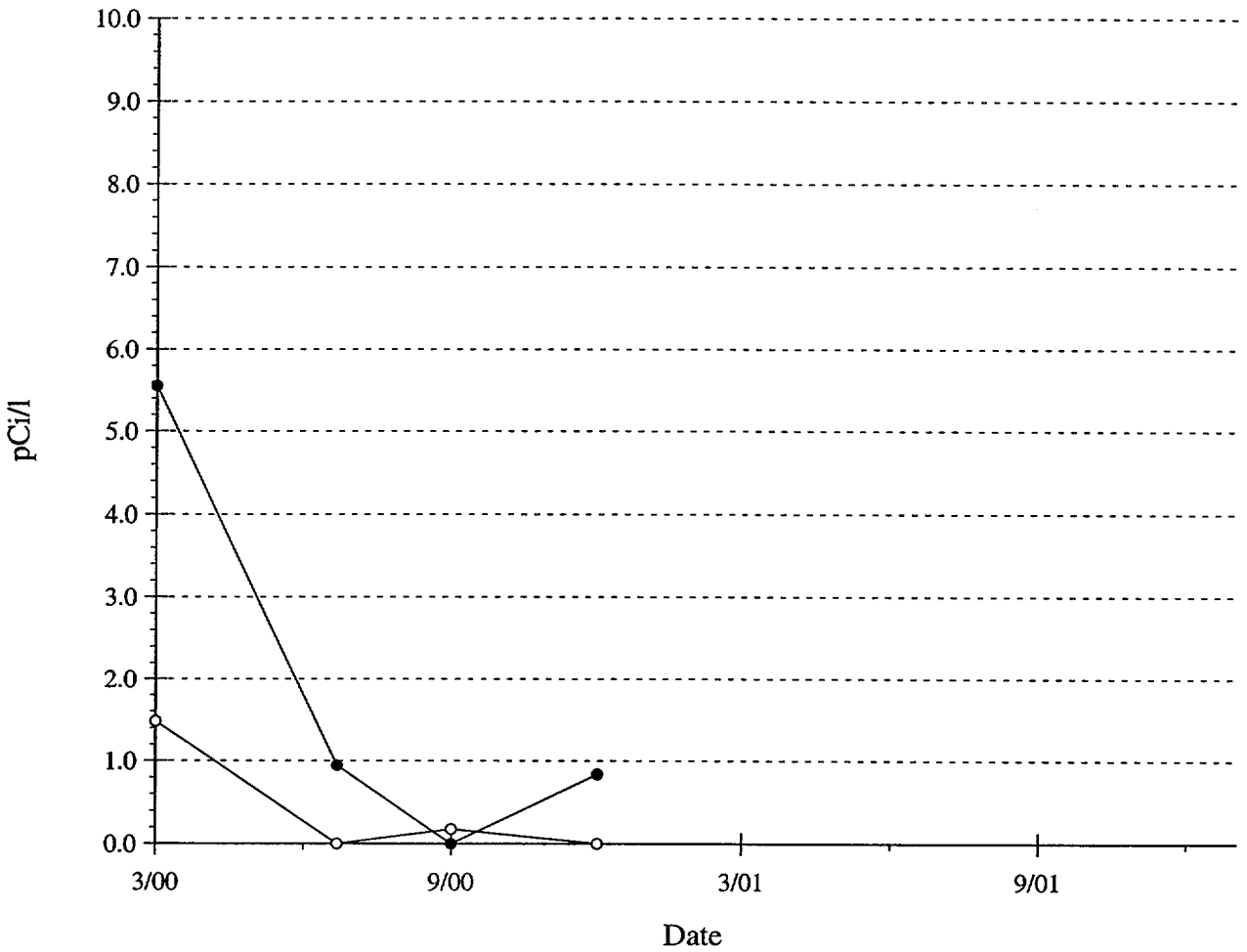
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Note: Well abandoned in March 2001 to accommodate ALRP stockpiling activities.

Figure C-4B

Radium Isotopic Data Versus Time
P-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

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Baton Rouge, Louisiana

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DRAWN	ZZZ 05/15/2002
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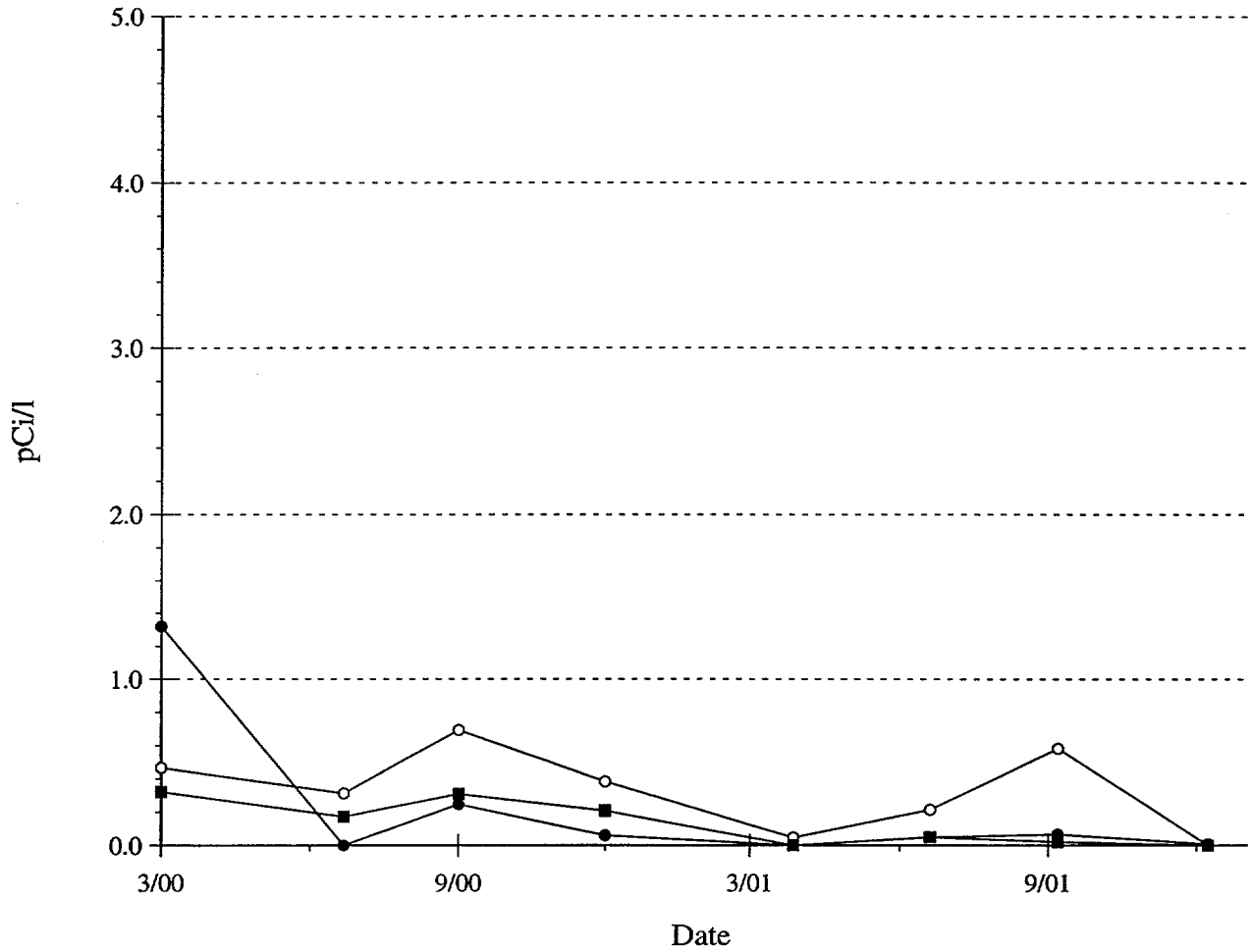
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-5A

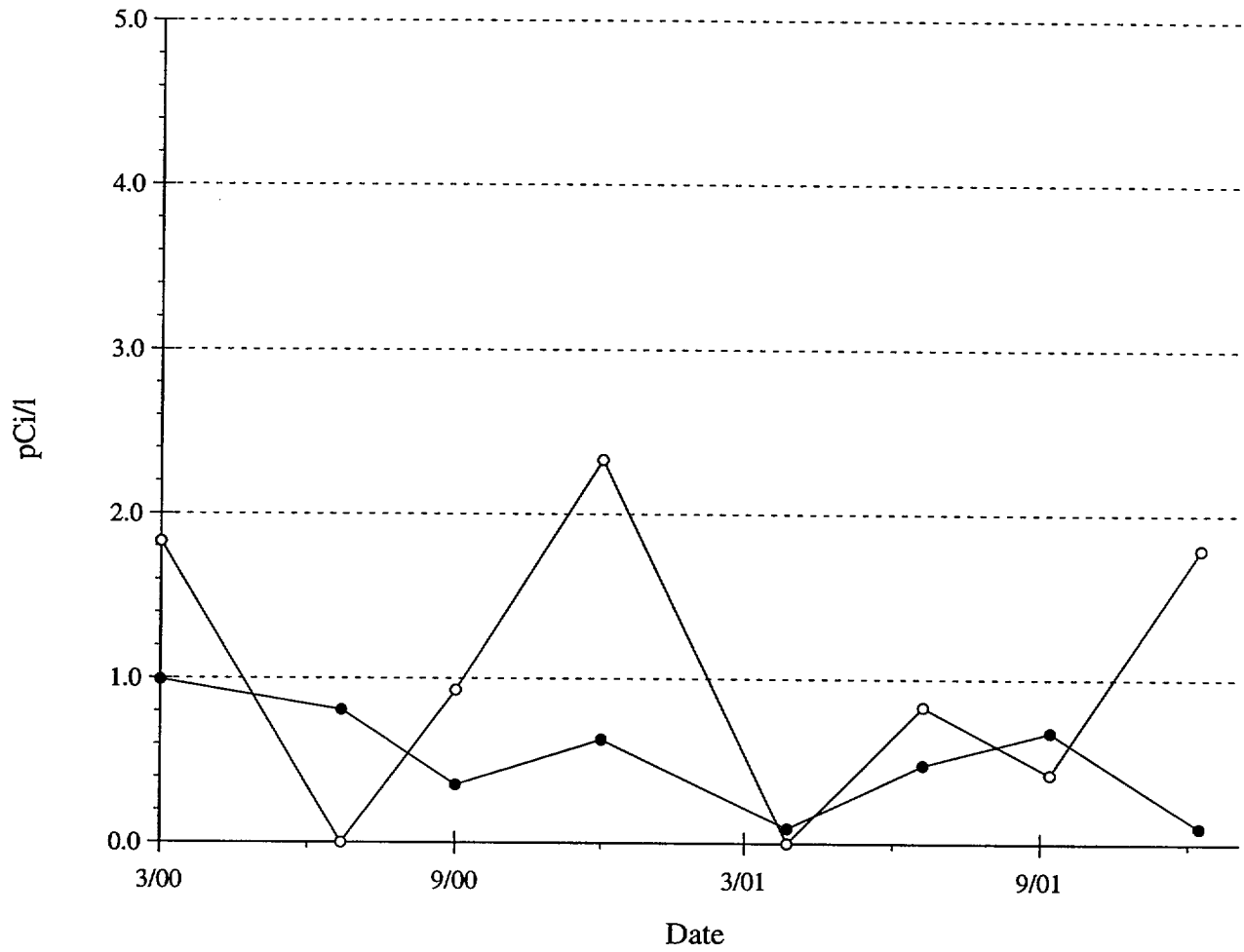
Thorium Isotopic Data Versus Time
P-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	5/02
CHECKED	—
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-5B

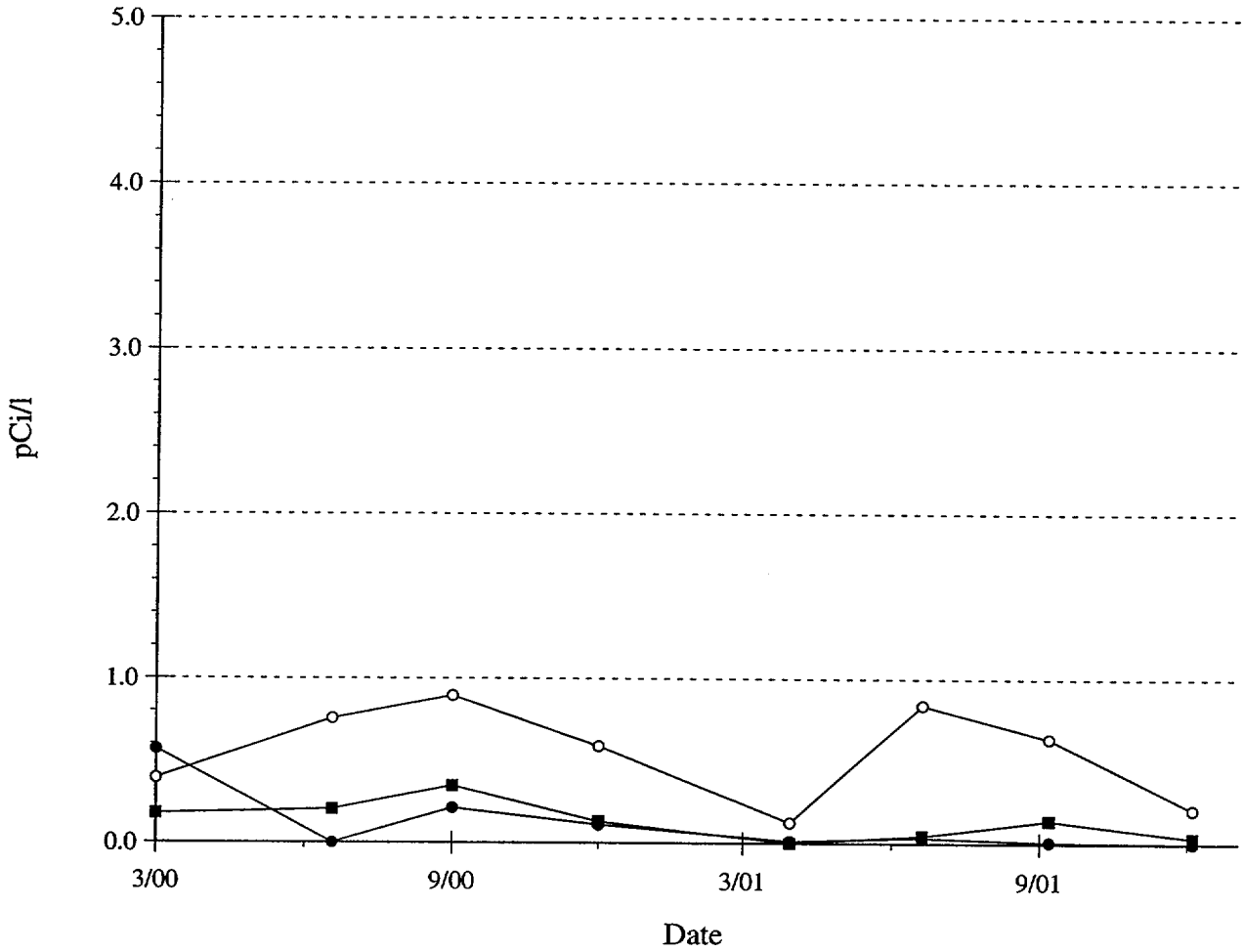
Radium Isotopic Data Versus Time
P-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RAD Sid	
CHECKED –	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-6A

Thorium Isotopic Data Versus Time
P-7 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RHO 5/02	
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DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

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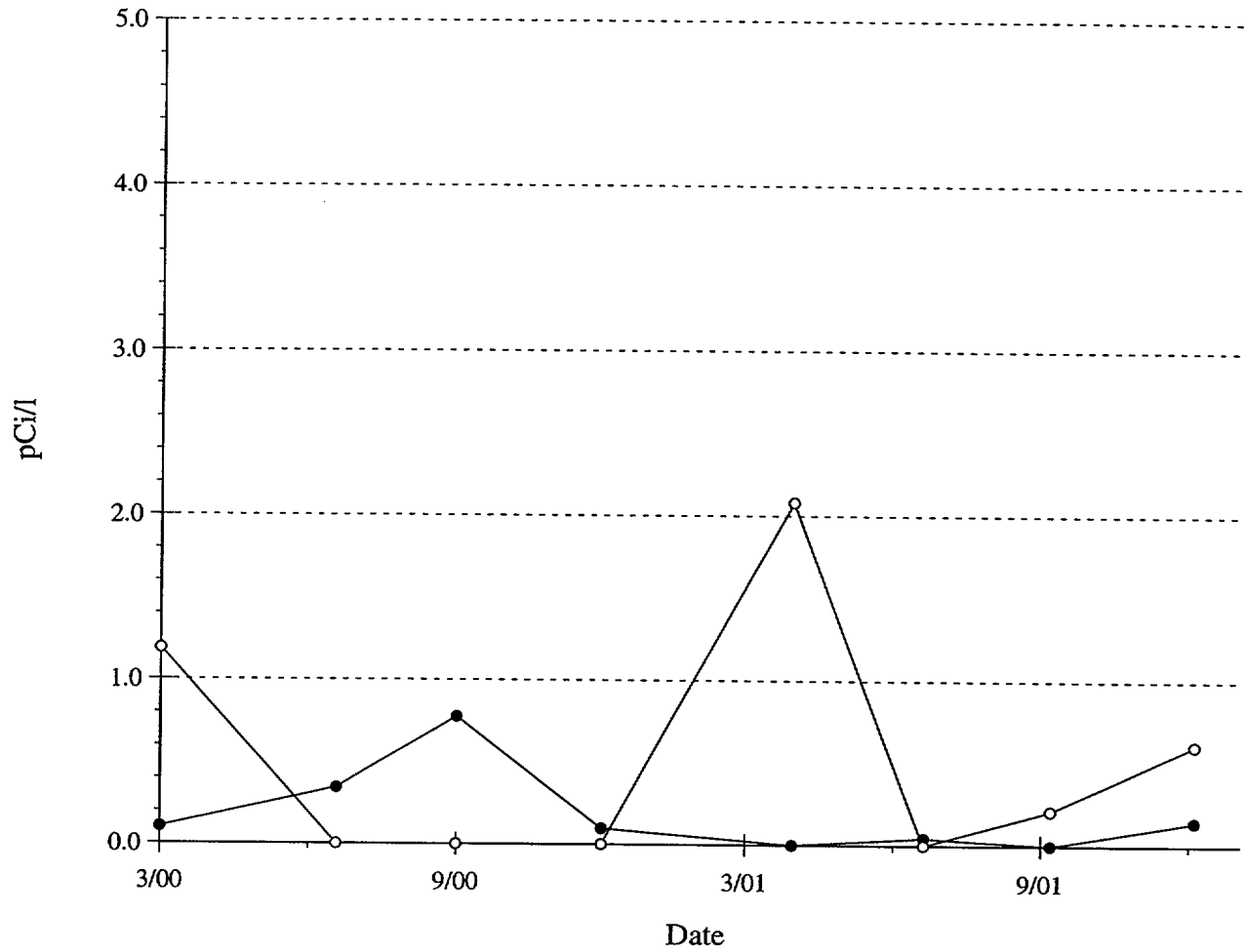

Legend

- ● Radium-226
- ○ Radium-228

Figure C-6B

Radium Isotopic Data Versus Time
P-7 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

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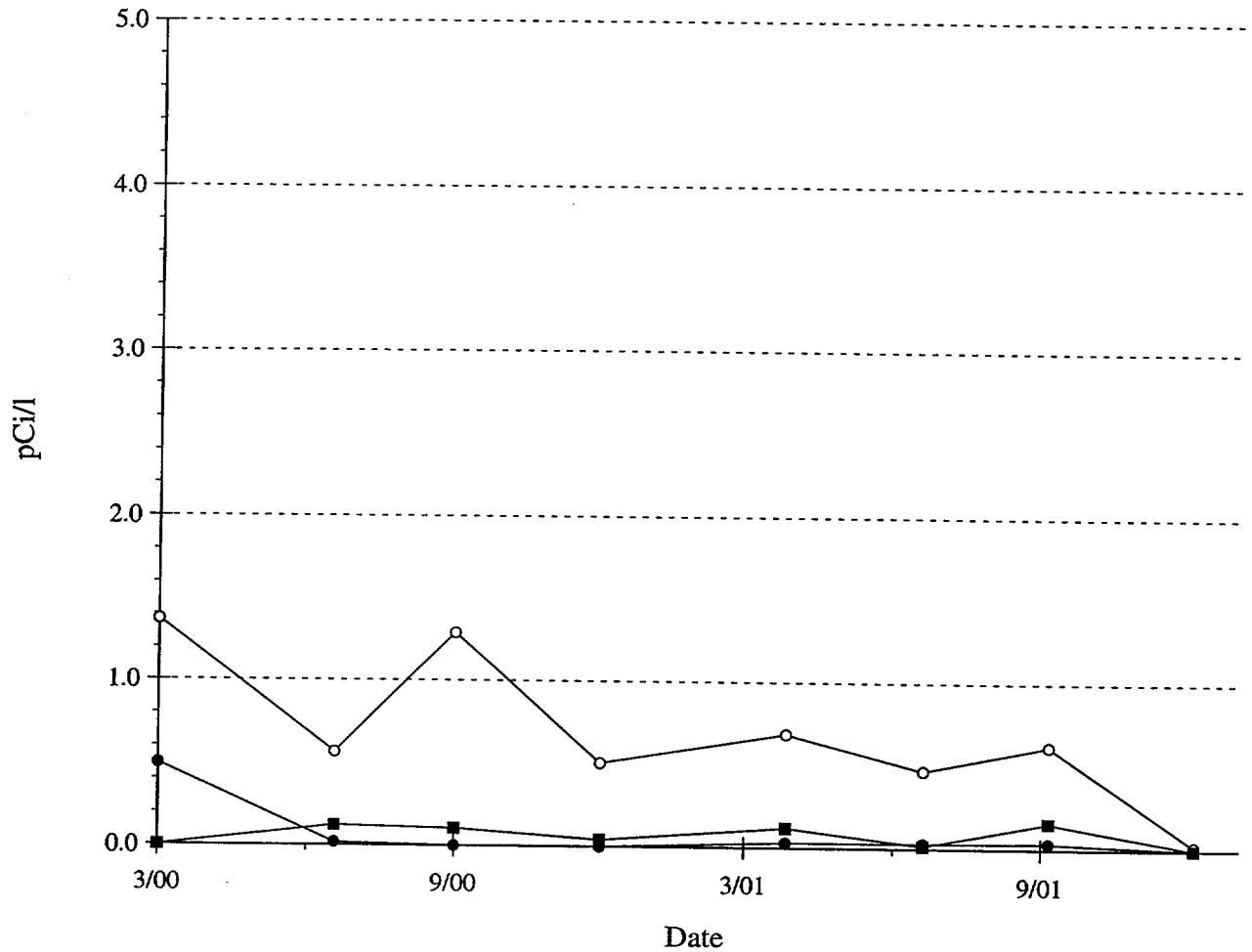

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-7A

Thorium Isotopic Data Versus Time
P-8 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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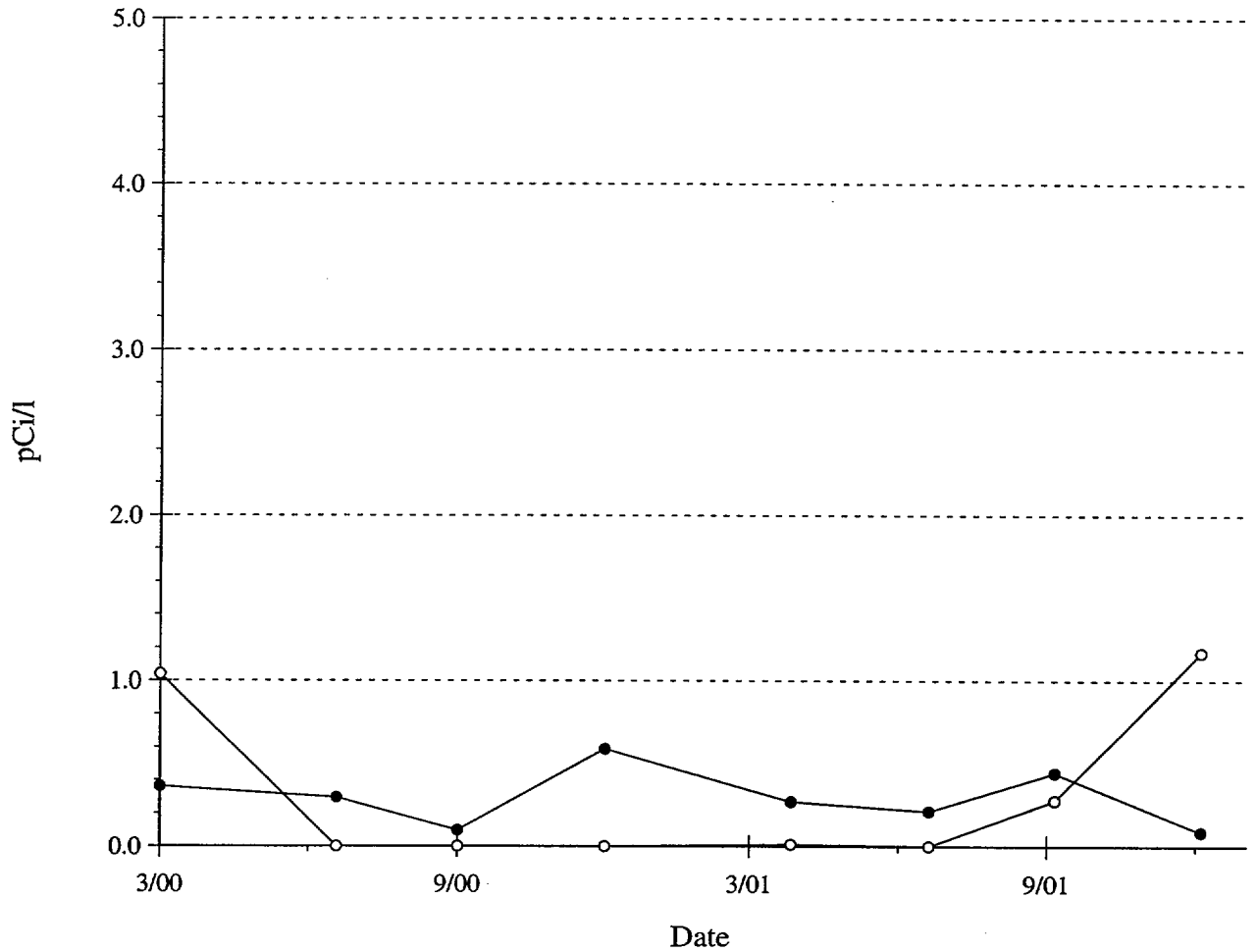
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-7B

Radium Isotopic Data Versus Time
P-8 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RAD 5/02
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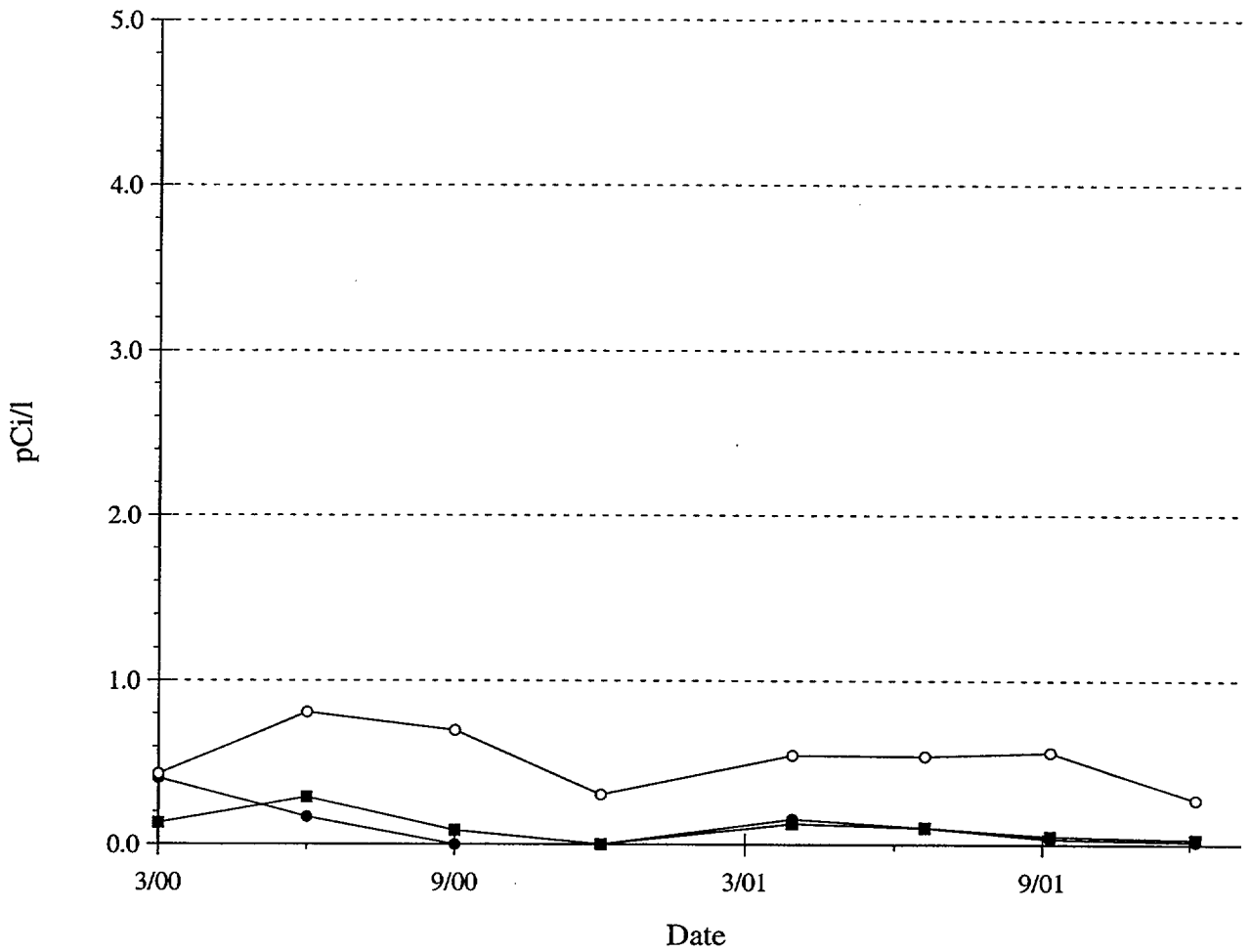
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-8A

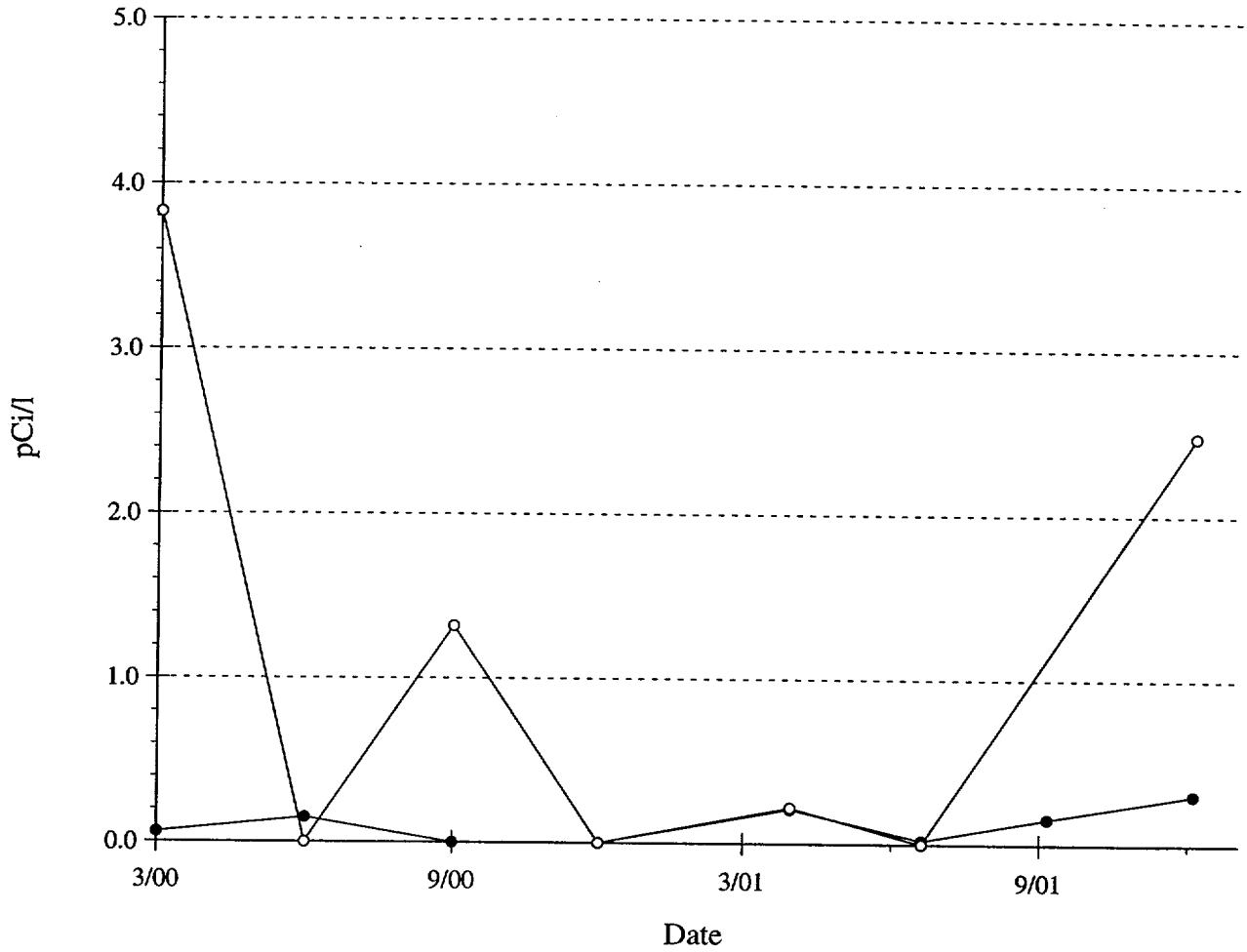
Thorium Isotopic Data Versus Time
P-10 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RHD 5/02
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-8B

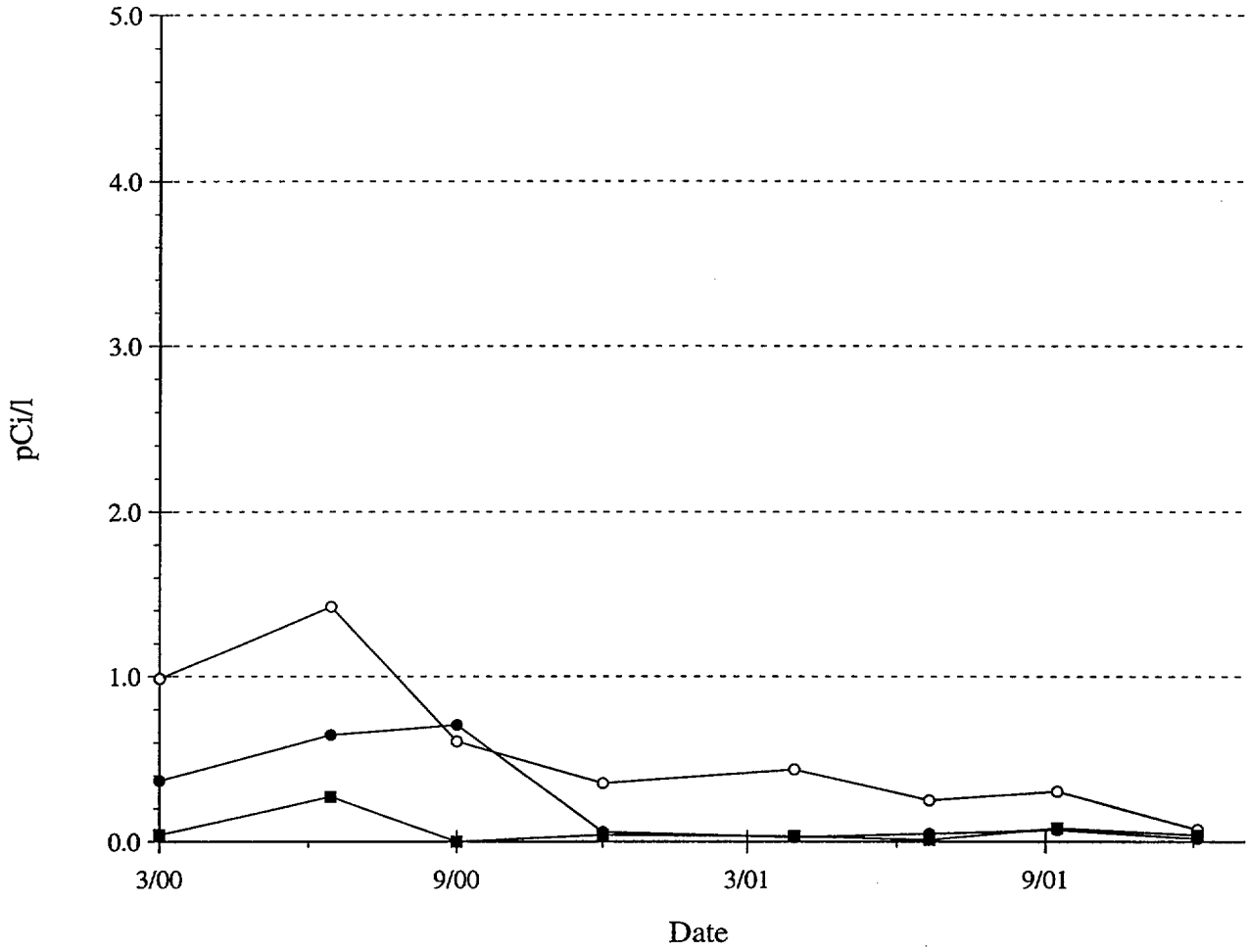
Radium Isotopic Data Versus Time
P-10 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RAD 5/12
CHECKED	-
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-9A

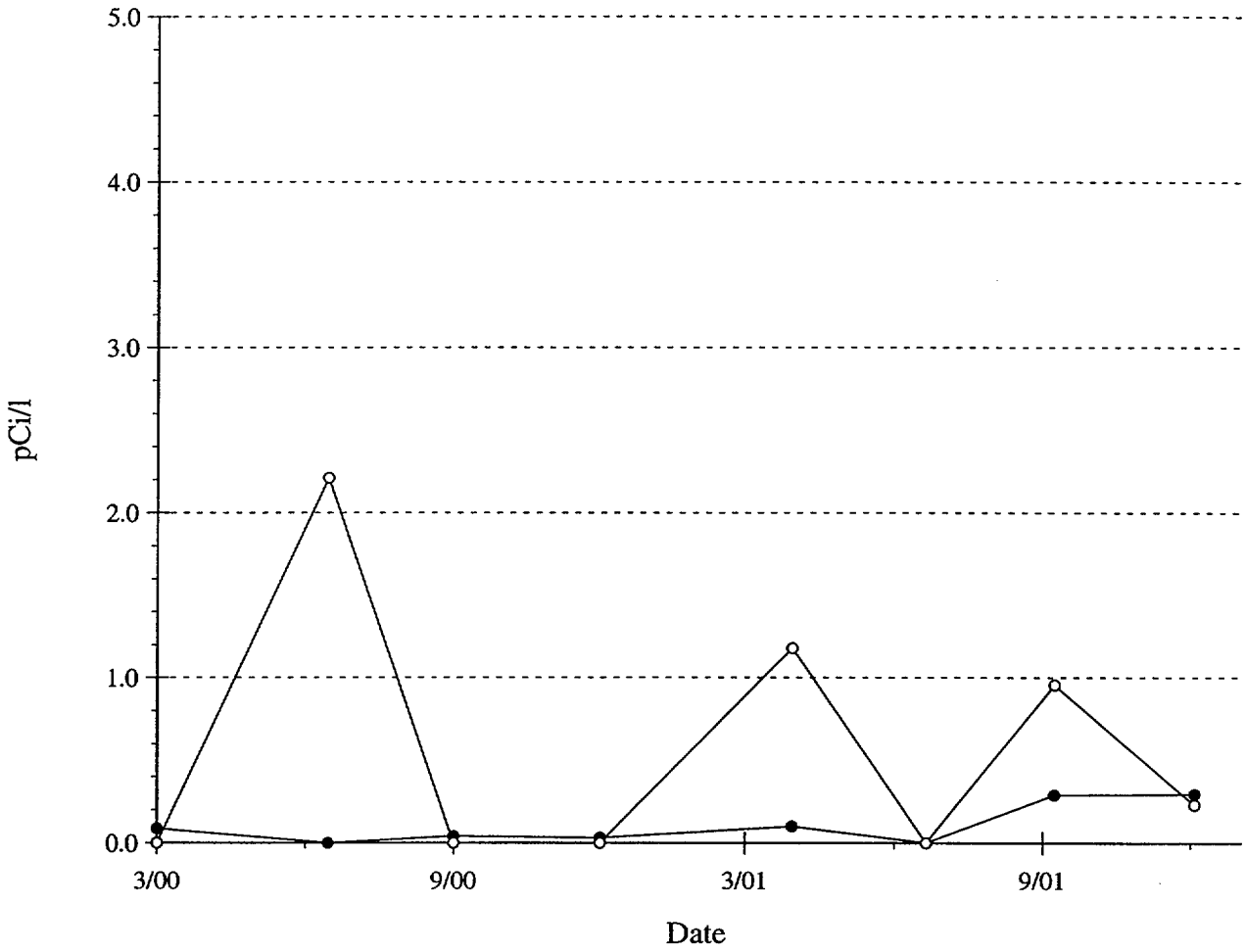
Thorium Isotopic Data Versus Time
MWD-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RPO 3/02	
CHECKED –	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-9B

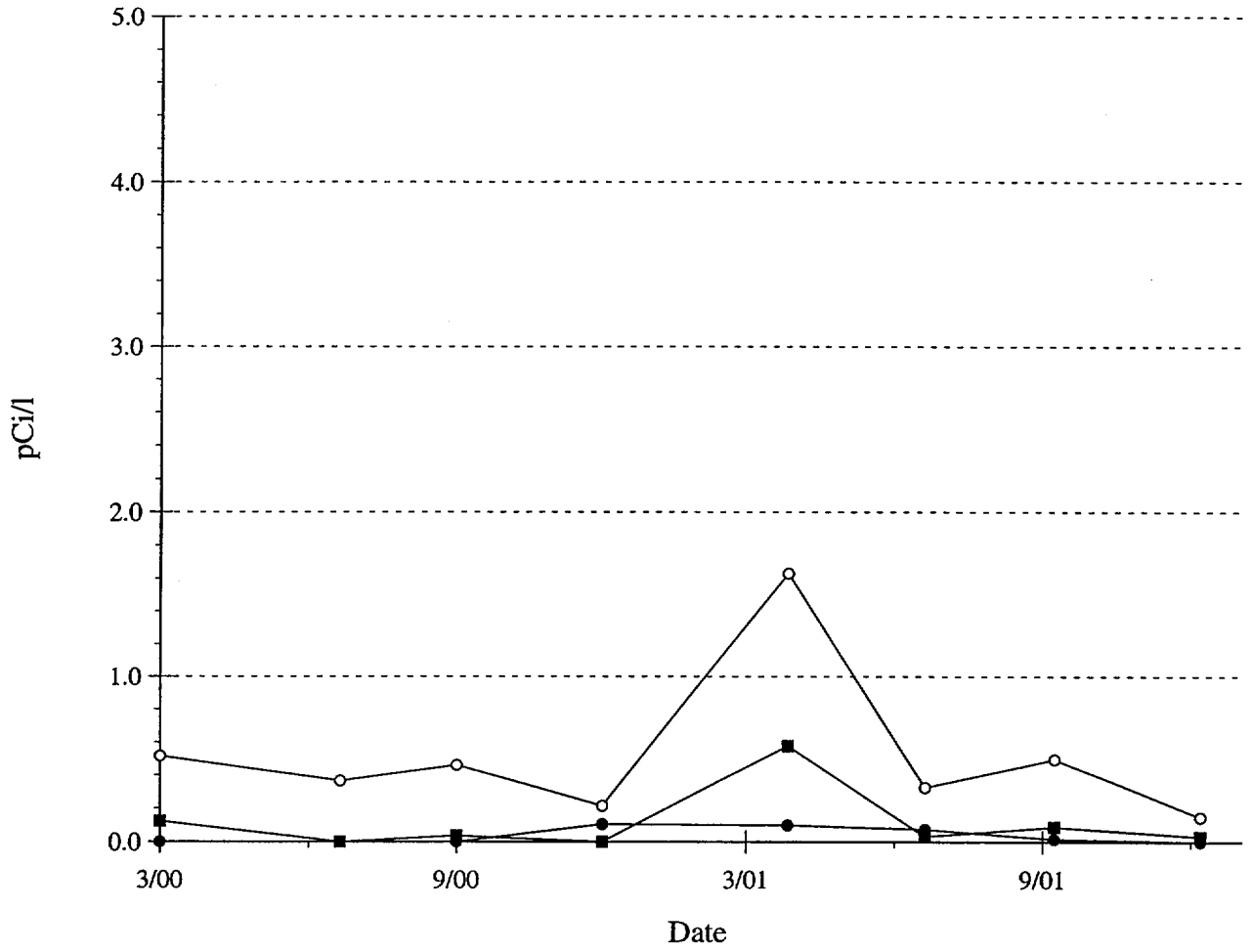
Radium Isotopic Data Versus Time
MWD-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RFO 5/02	
CHECKED –	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-10A

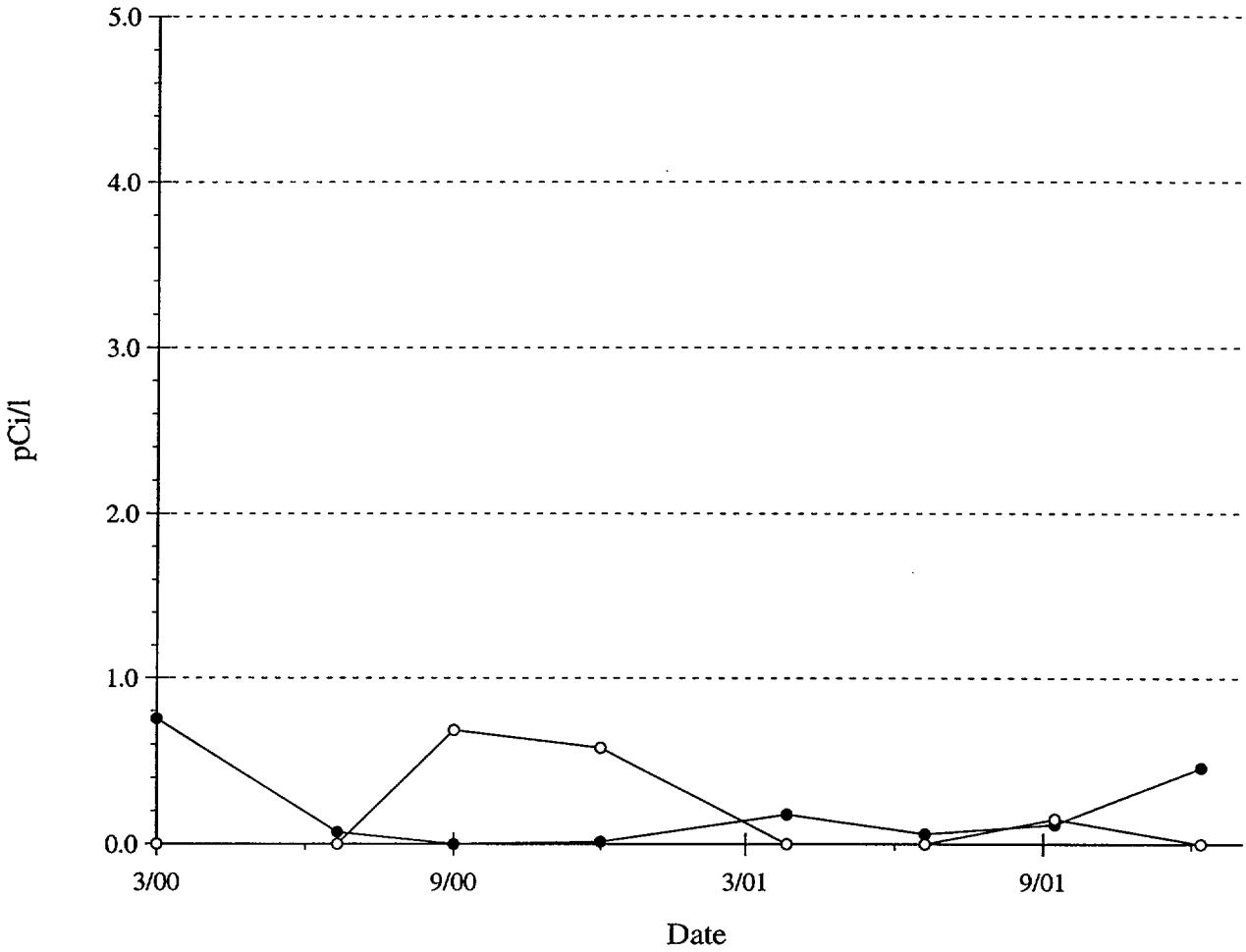
Thorium Isotopic Data Versus Time
MWD-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	KFO 5/02
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-10B

Radium Isotopic Data Versus Time
MWD-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RFO 5/02	
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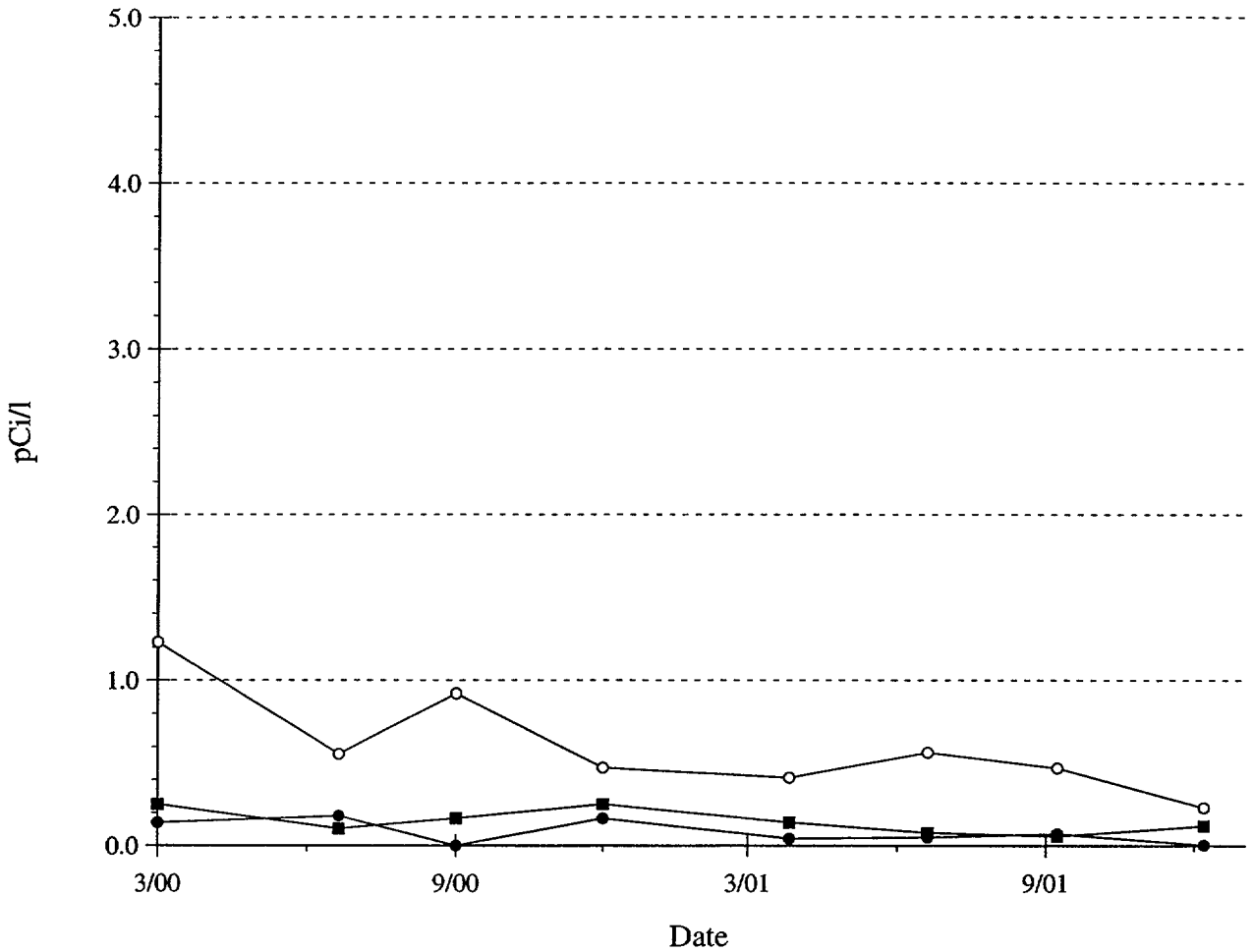
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-11A

Thorium Isotopic Data Versus Time
MWD-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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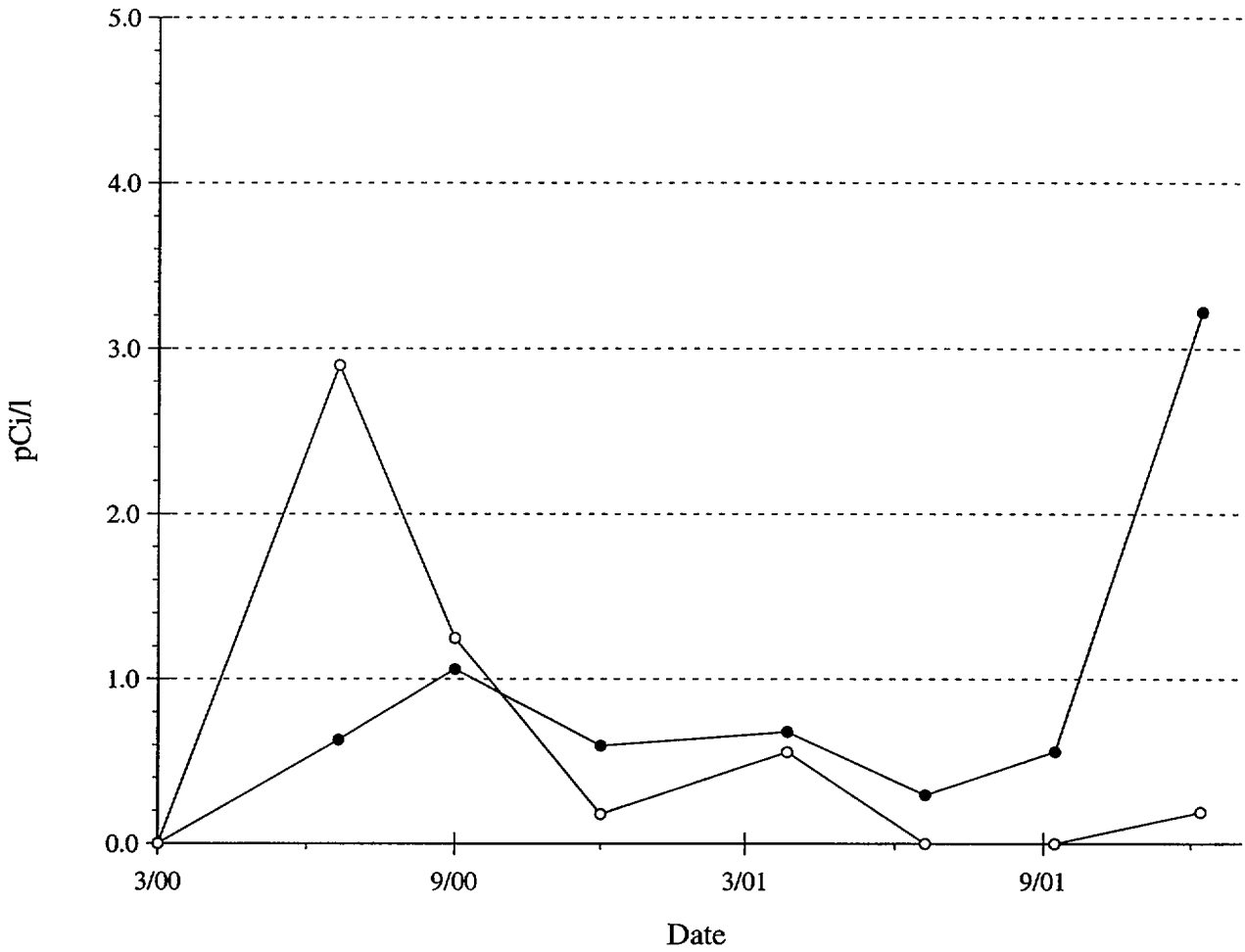

Legend

- ● Radium-226
- ○ Radium-228

Figure C-11B

Radium Isotopic Data Versus Time
MWD-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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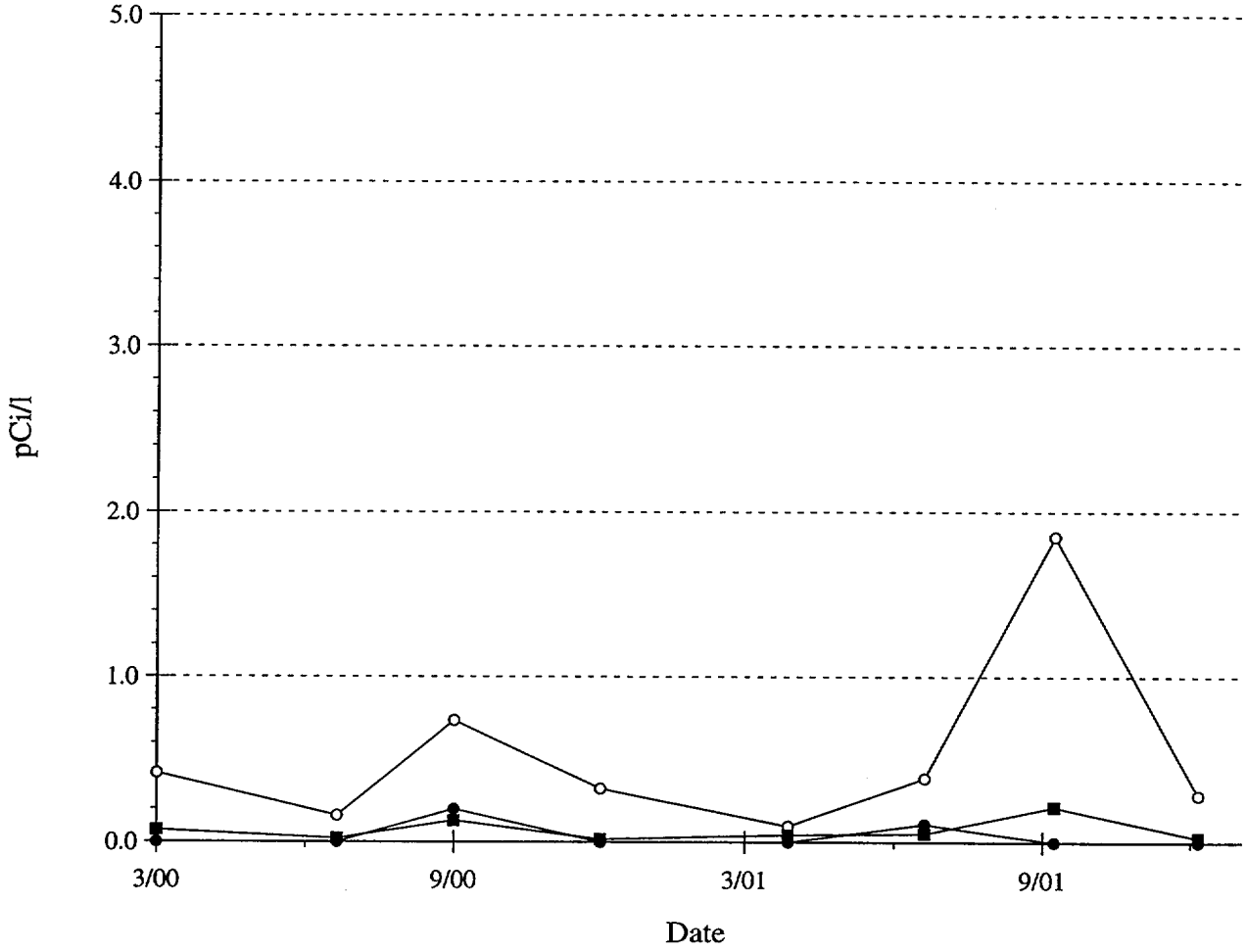
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-12A

Thorium Isotopic Data Versus Time
MWD-6 (Filtered)
Tulsa, Oklahoma

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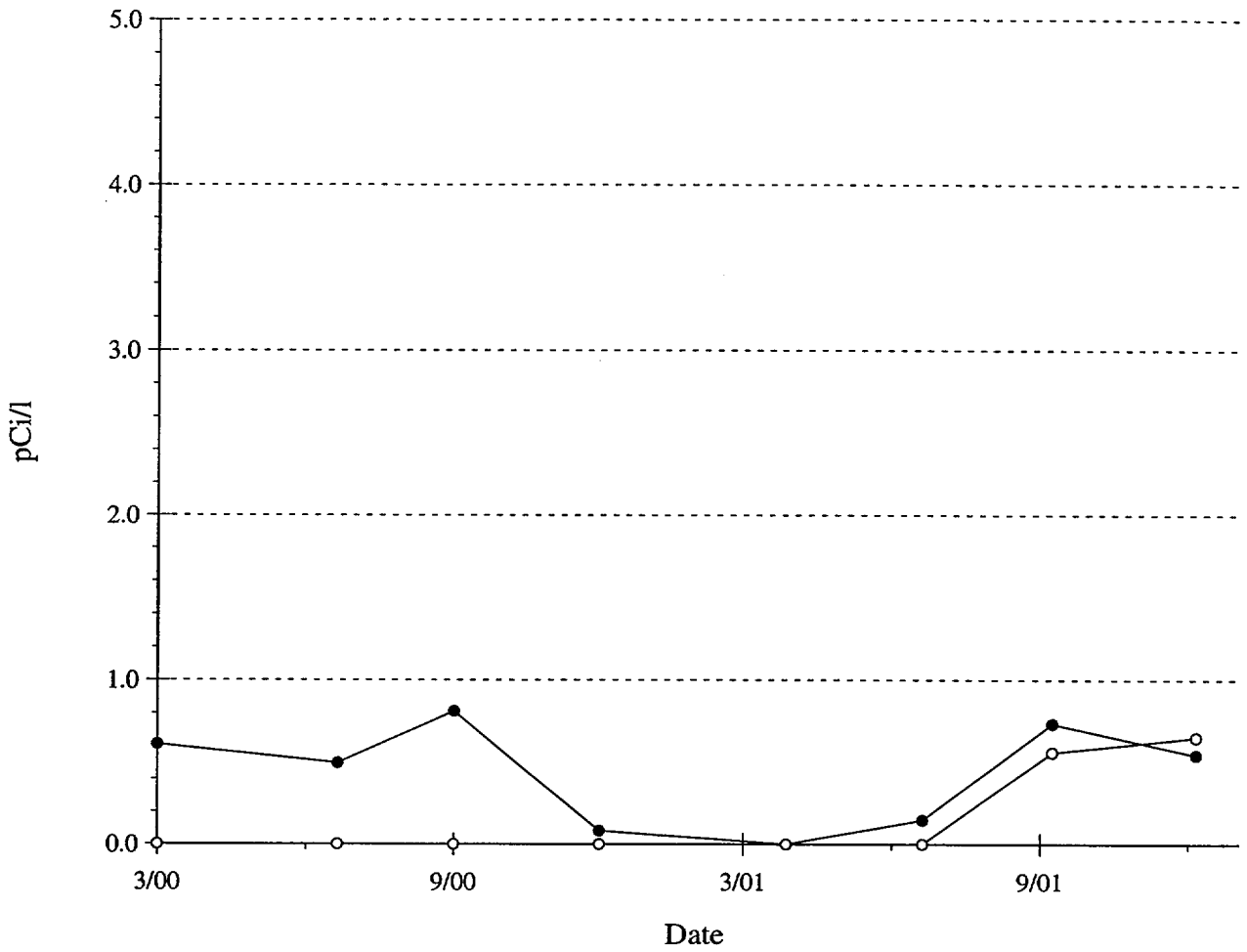
Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-12B

Radium Isotopic Data Versus Time
MWD-6 (Filtered)
Tulsa, Oklahoma

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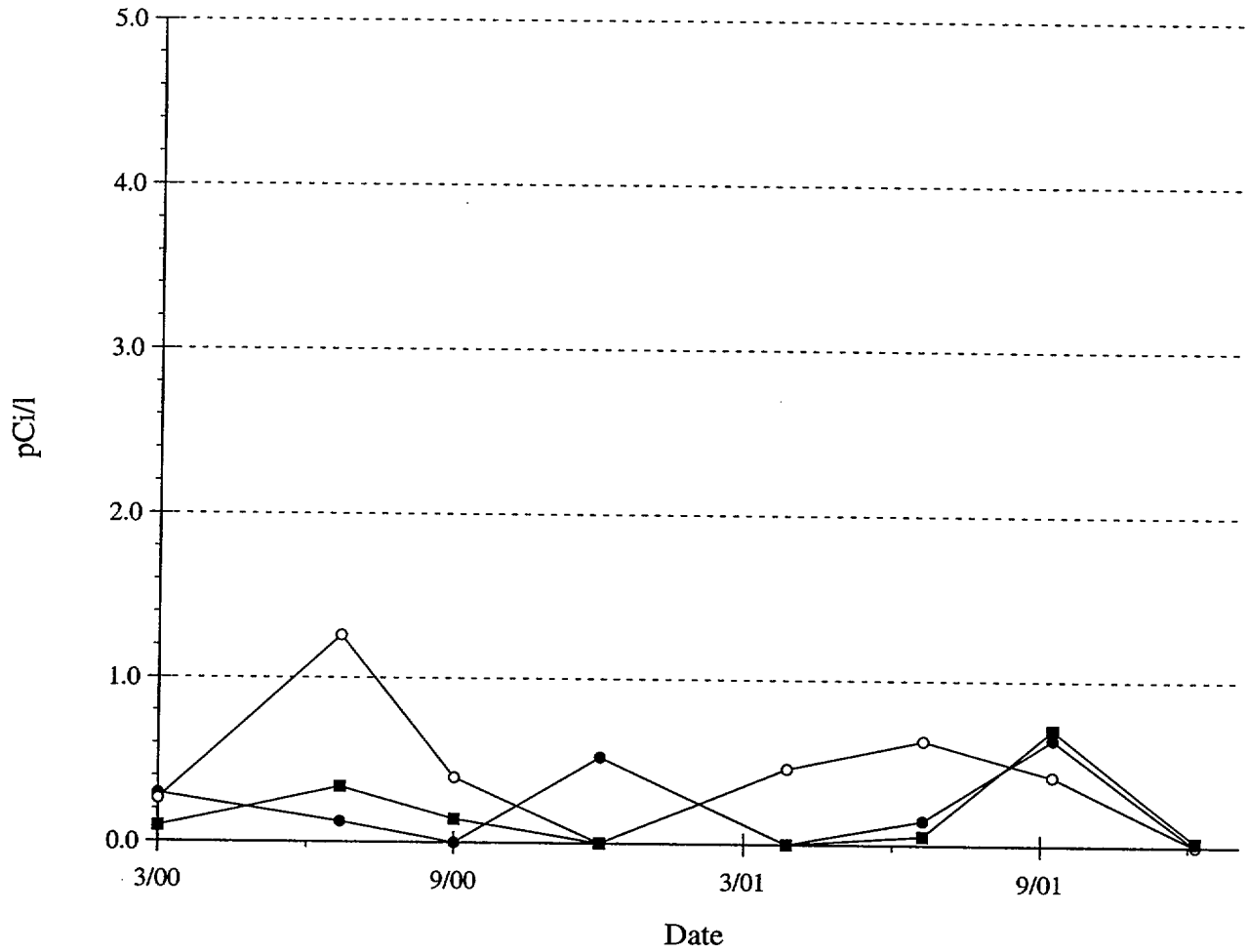
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-13A

Thorium Isotopic Data Versus Time
MWD-7 (Filtered)
Tulsa, Oklahoma

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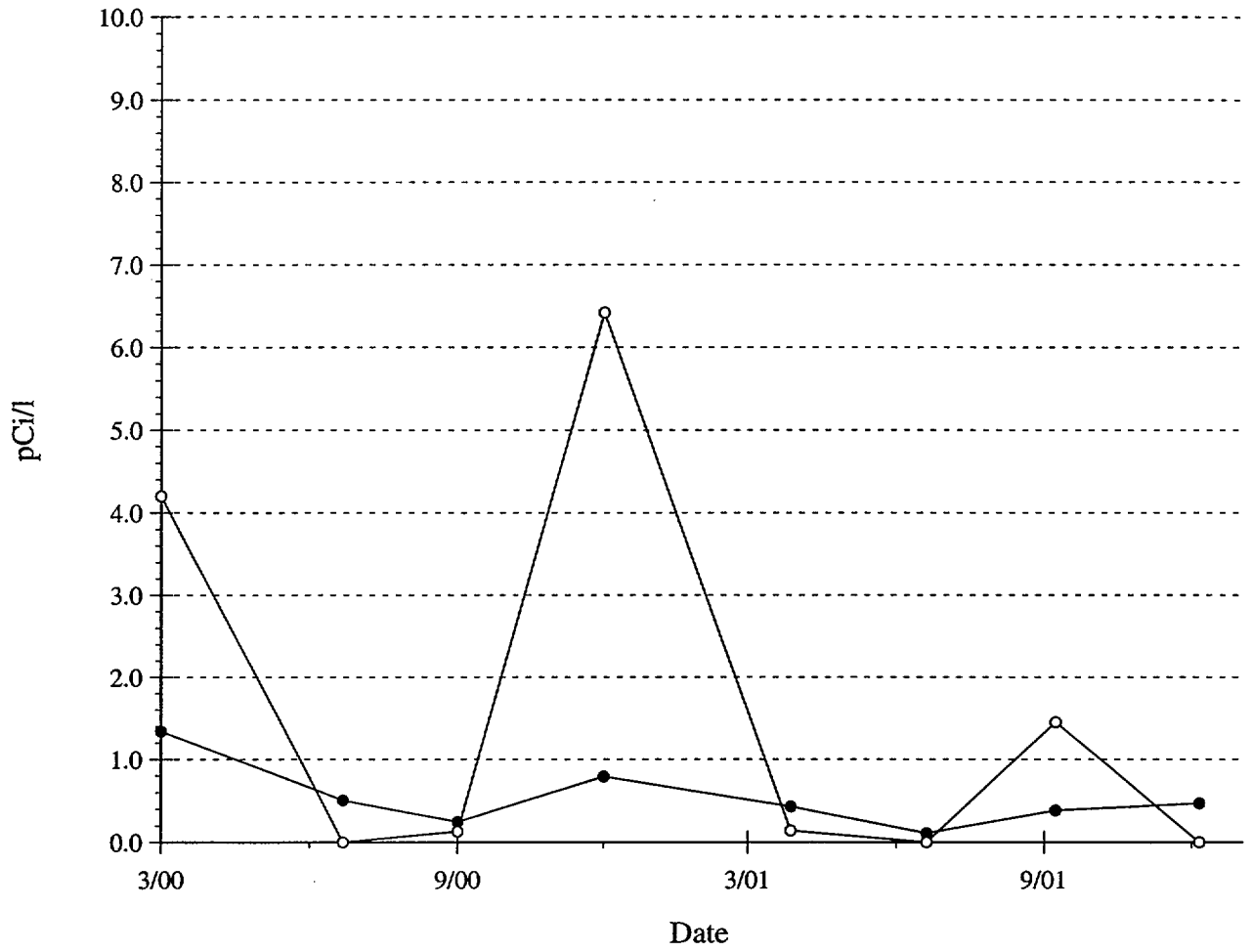

Legend

- ● Radium-226
- ○ Radium-228

Figure C-13B

Radium Isotopic Data Versus Time
MWD-7 (Filtered)
Tulsa, Oklahoma

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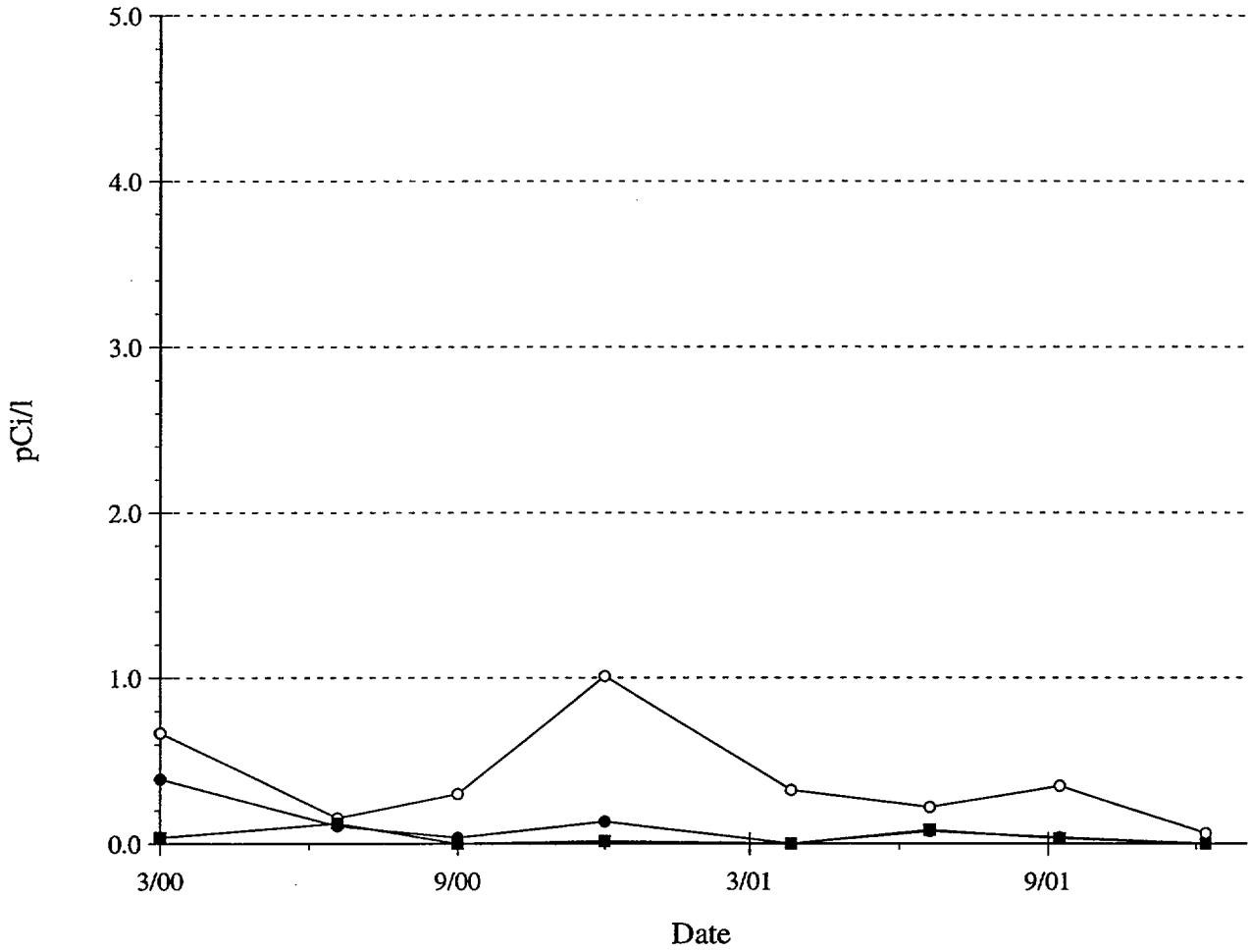

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-14A

Thorium Isotopic Data Versus Time
MWD-8 (Filtered)
Tulsa, Oklahoma

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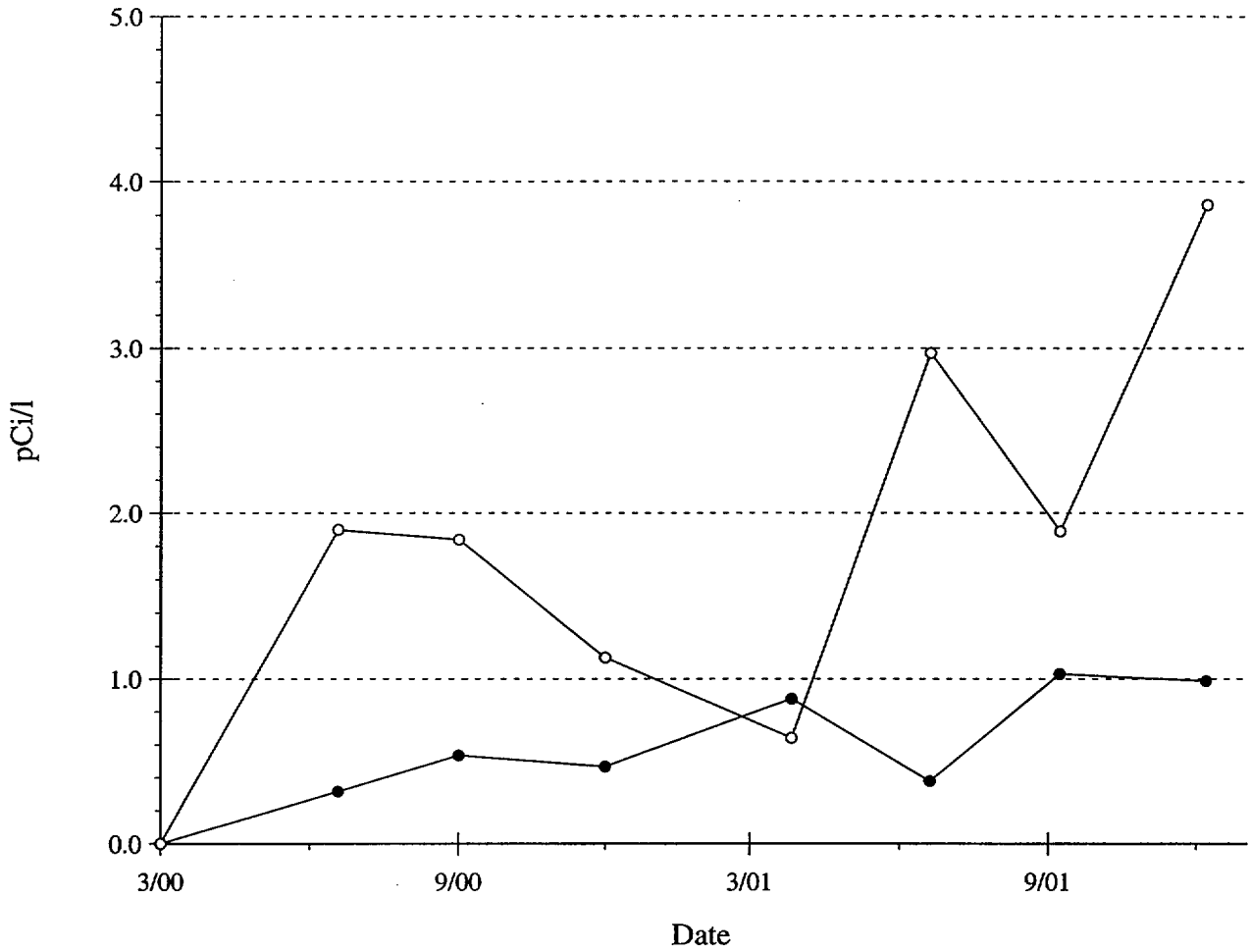

Legend

- ● Radium-226
- ○ Radium-228

Figure C-14B

Radium Isotopic Data Versus Time
MWD-8 (Filtered)
Tulsa, Oklahoma

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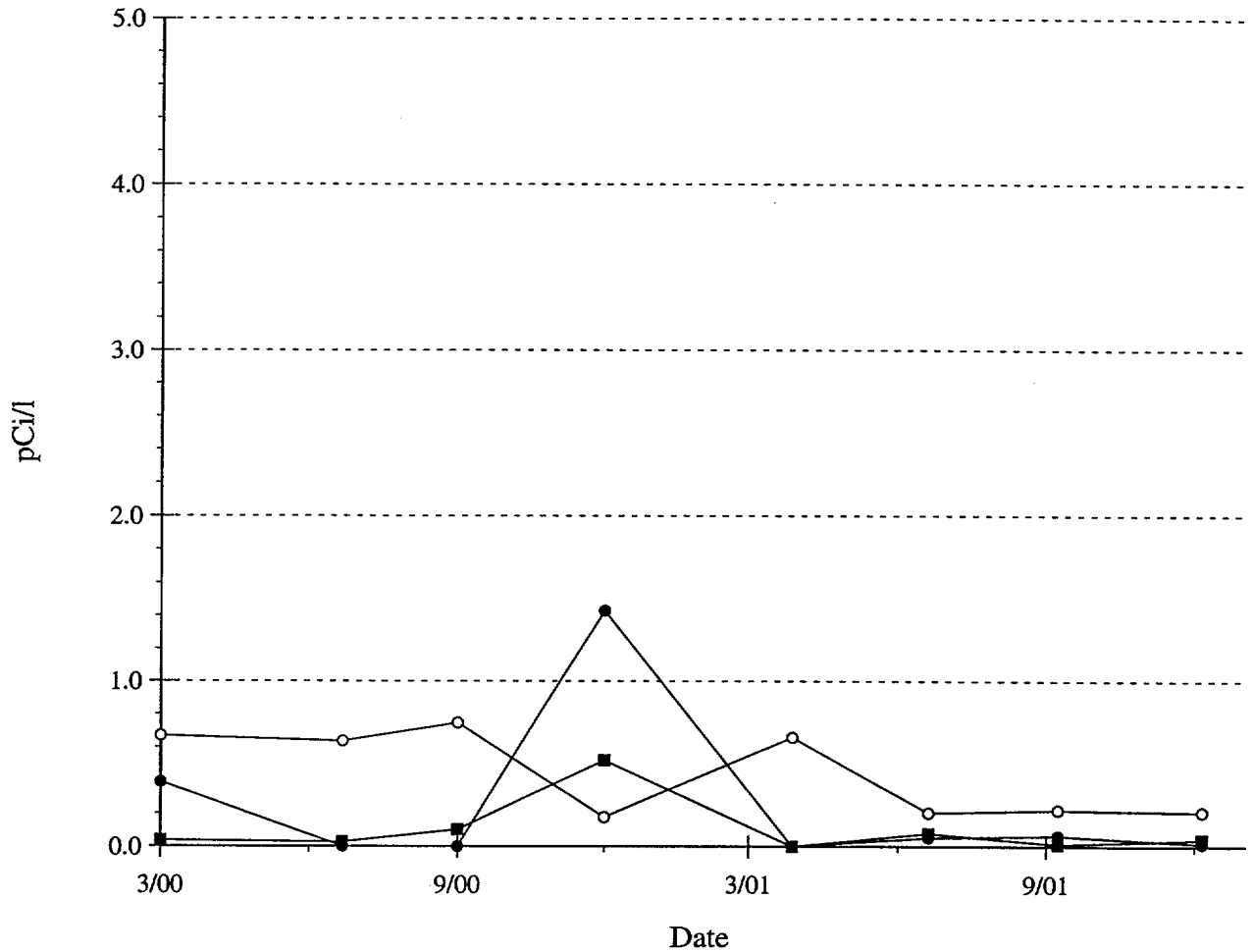
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-15A

Thorium Isotopic Data Versus Time
MWD-9 (Filtered)
Tulsa, Oklahoma

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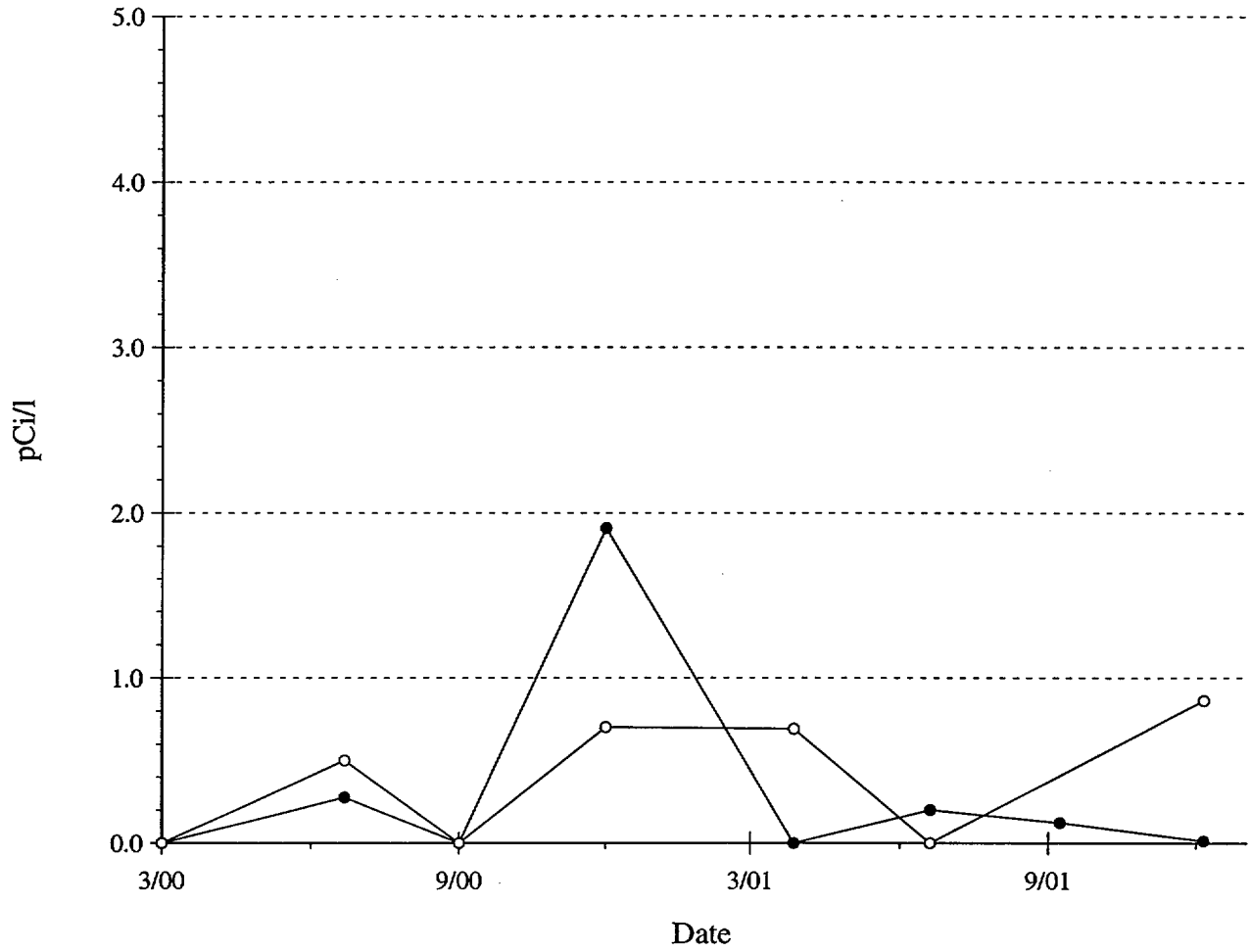

Legend

- ● Radium-226
- ○ Radium-228

Figure C-15B

Radium Isotopic Data Versus Time
MWD-9 (Filtered)
Tulsa, Oklahoma

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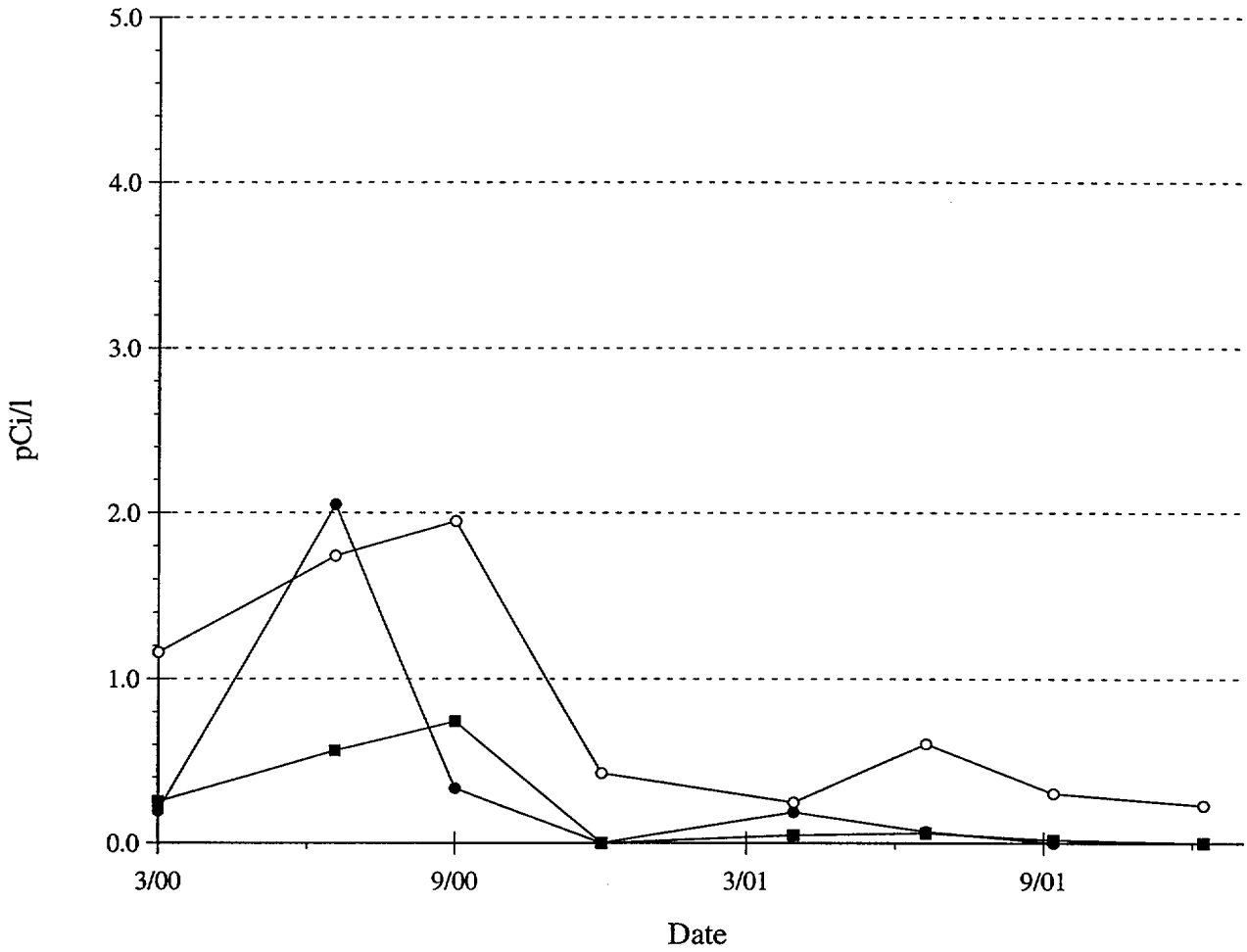
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-16A

Thorium Isotopic Data Versus Time
MWD-10 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
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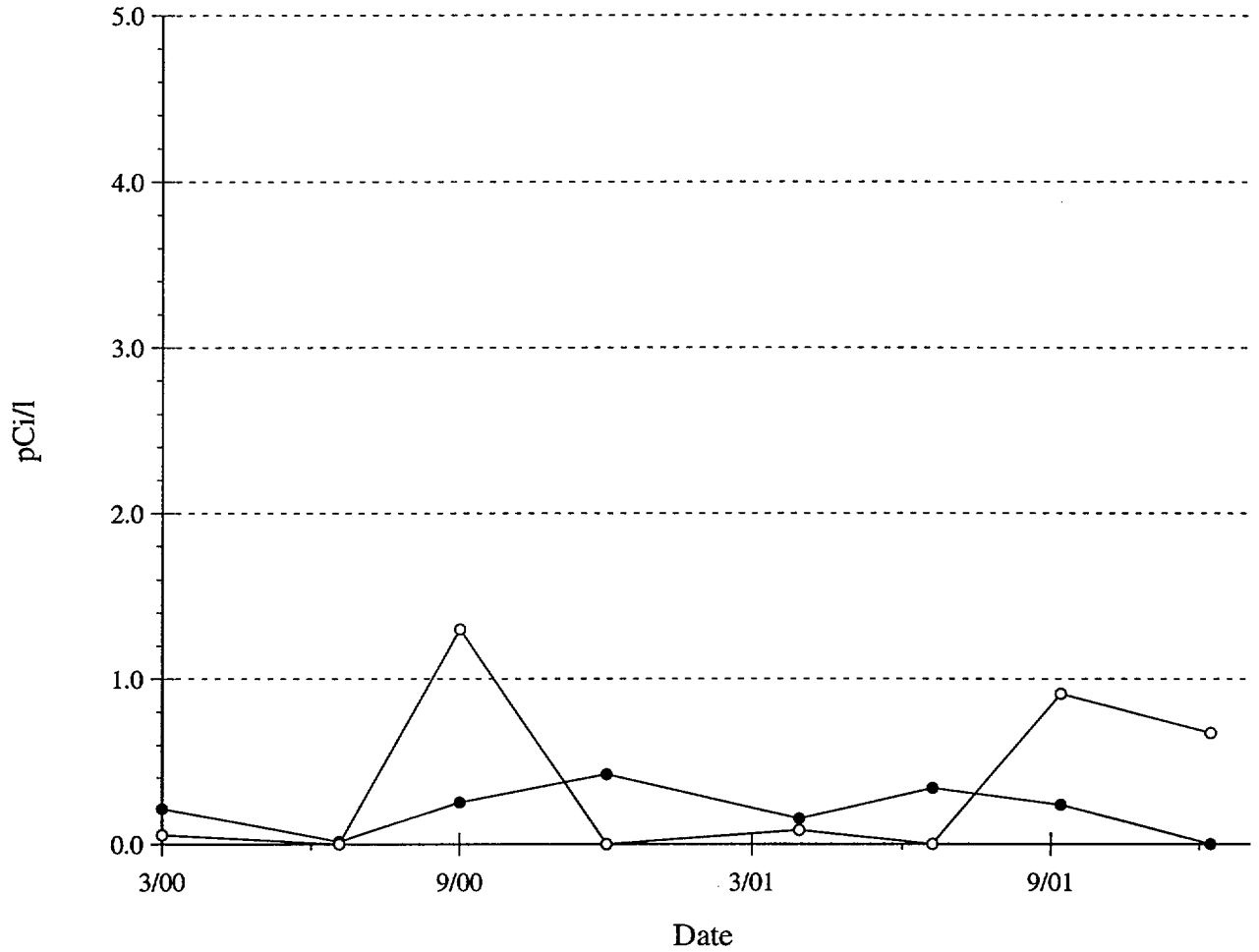

Legend

- ● Radium-226
- ○ Radium-228

Figure C-16B

Radium Isotopic Data Versus Time
MWD-10 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

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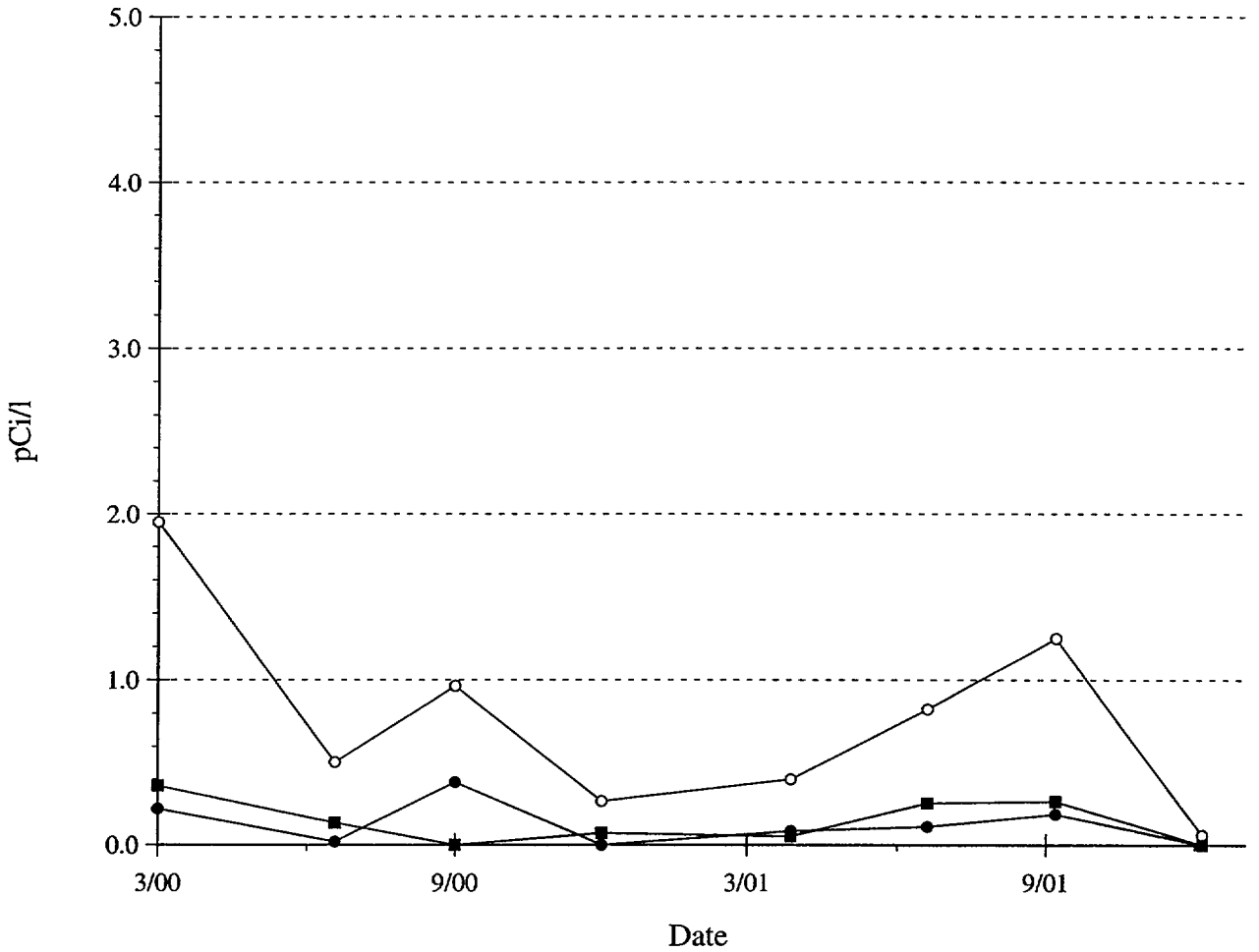

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-17A

Thorium Isotopic Data Versus Time
MWD-11 (Filtered)
Tulsa, Oklahoma

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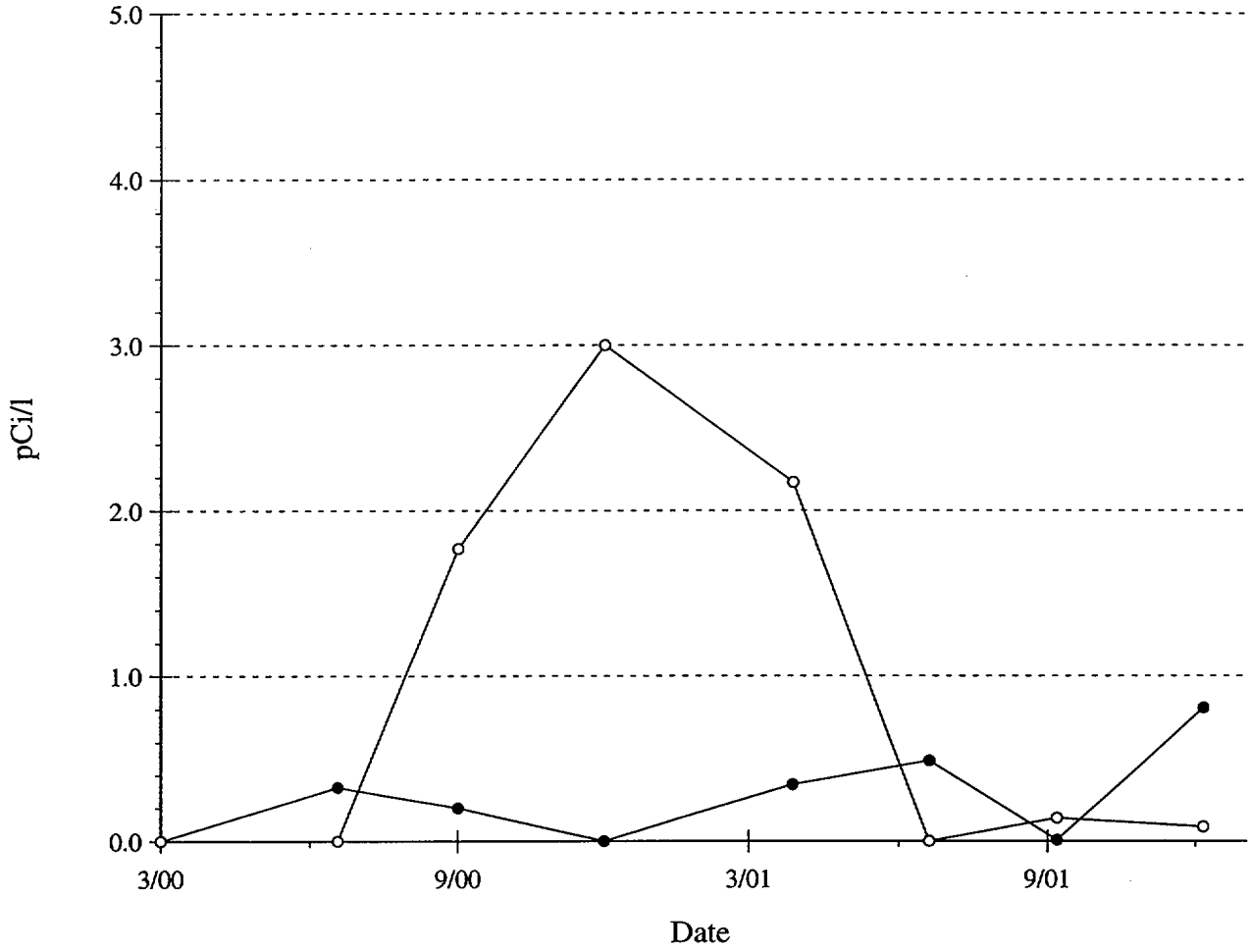

Legend

- ● Radium-226
- ○ Radium-228

Figure C-17B

Radium Isotopic Data Versus Time
MWD-11 (Filtered)
Tulsa, Oklahoma

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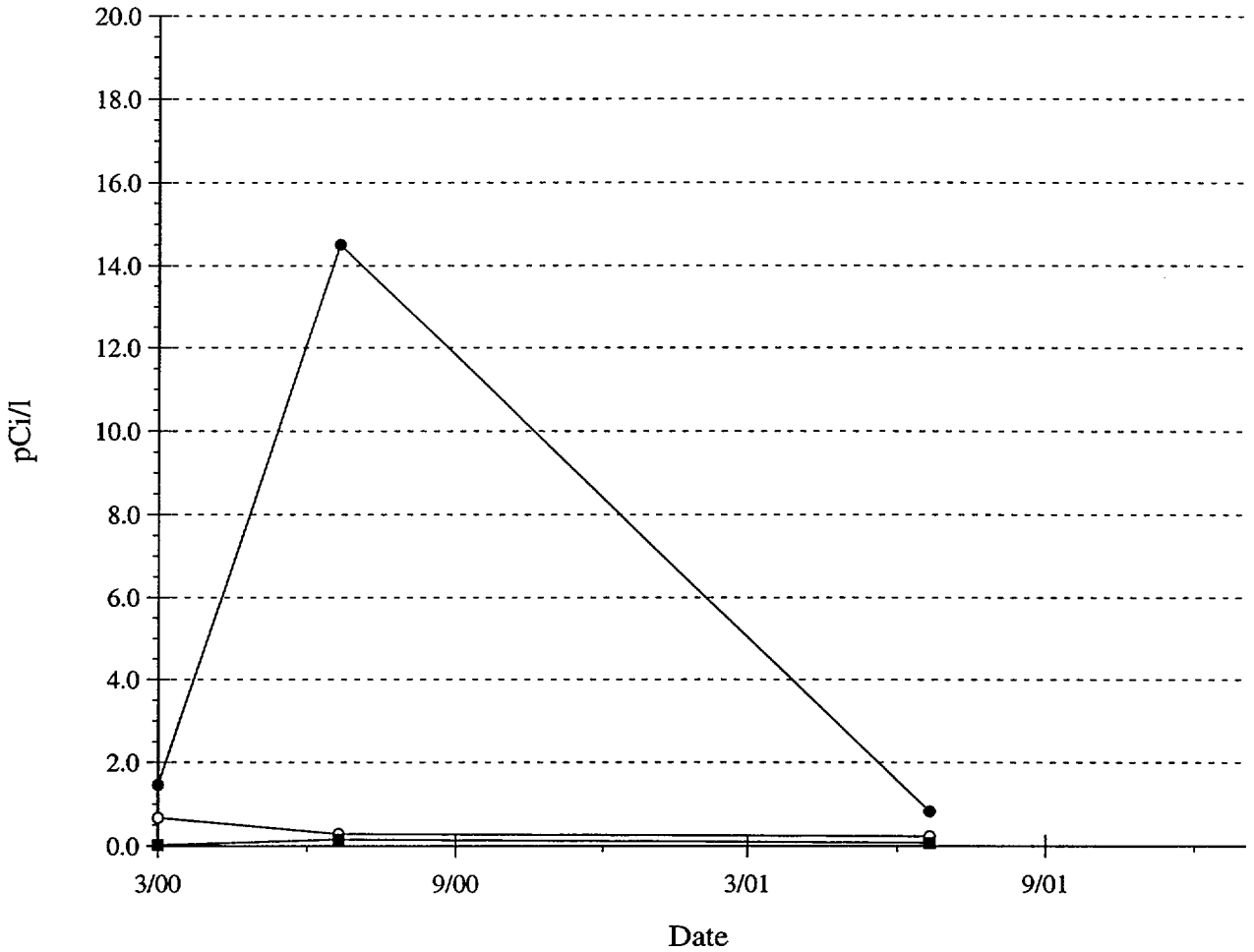

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-18A

Thorium Isotopic Data Versus Time
MWS-4 (Filtered)
Tulsa, Oklahoma

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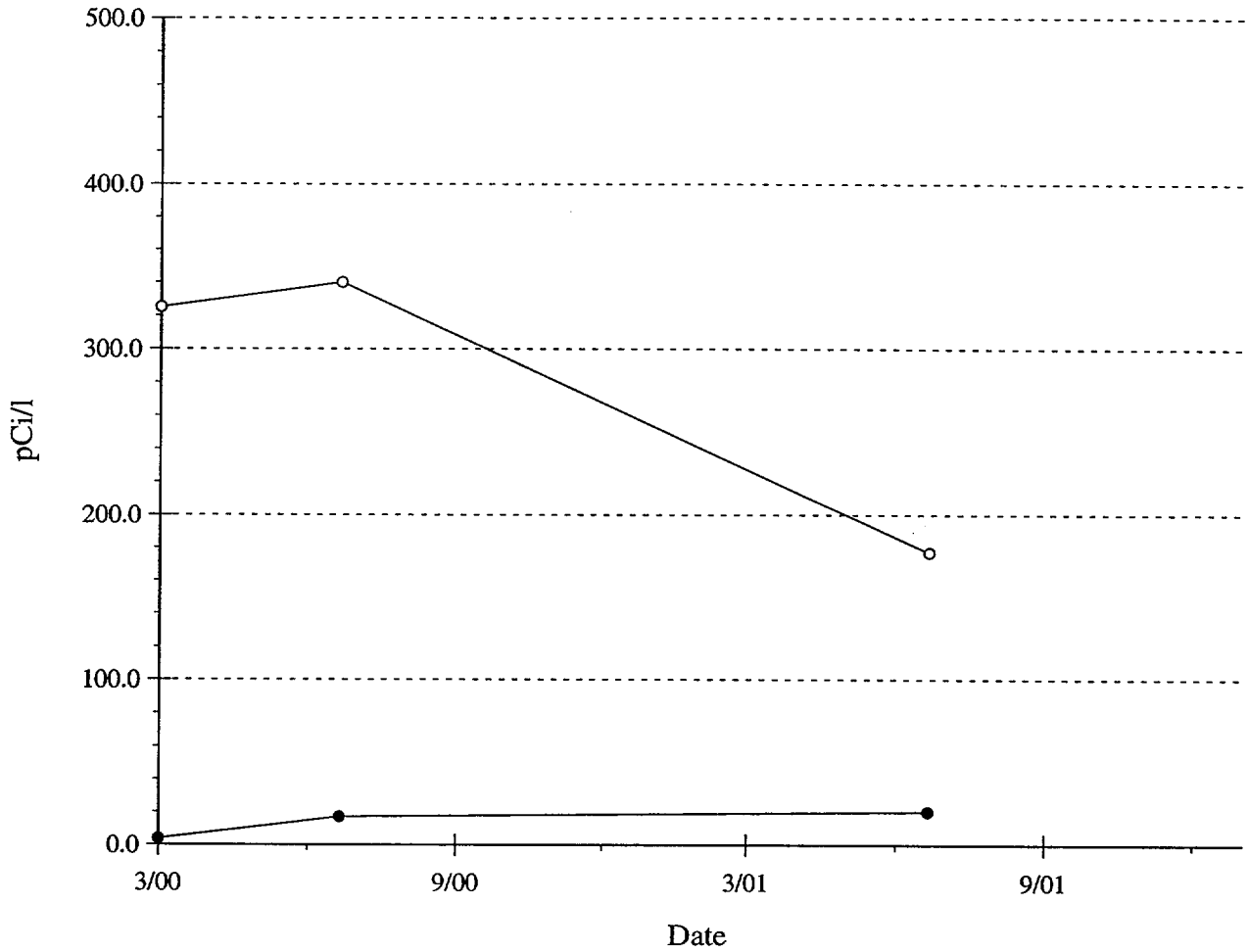
Earth Sciences Consultants, Inc.



Legend

- ● Radium-226
- ○ Radium-228

Figure C-18B

Radium Isotopic Data Versus Time
MWS-4 (Filtered)
Tulsa, Oklahoma

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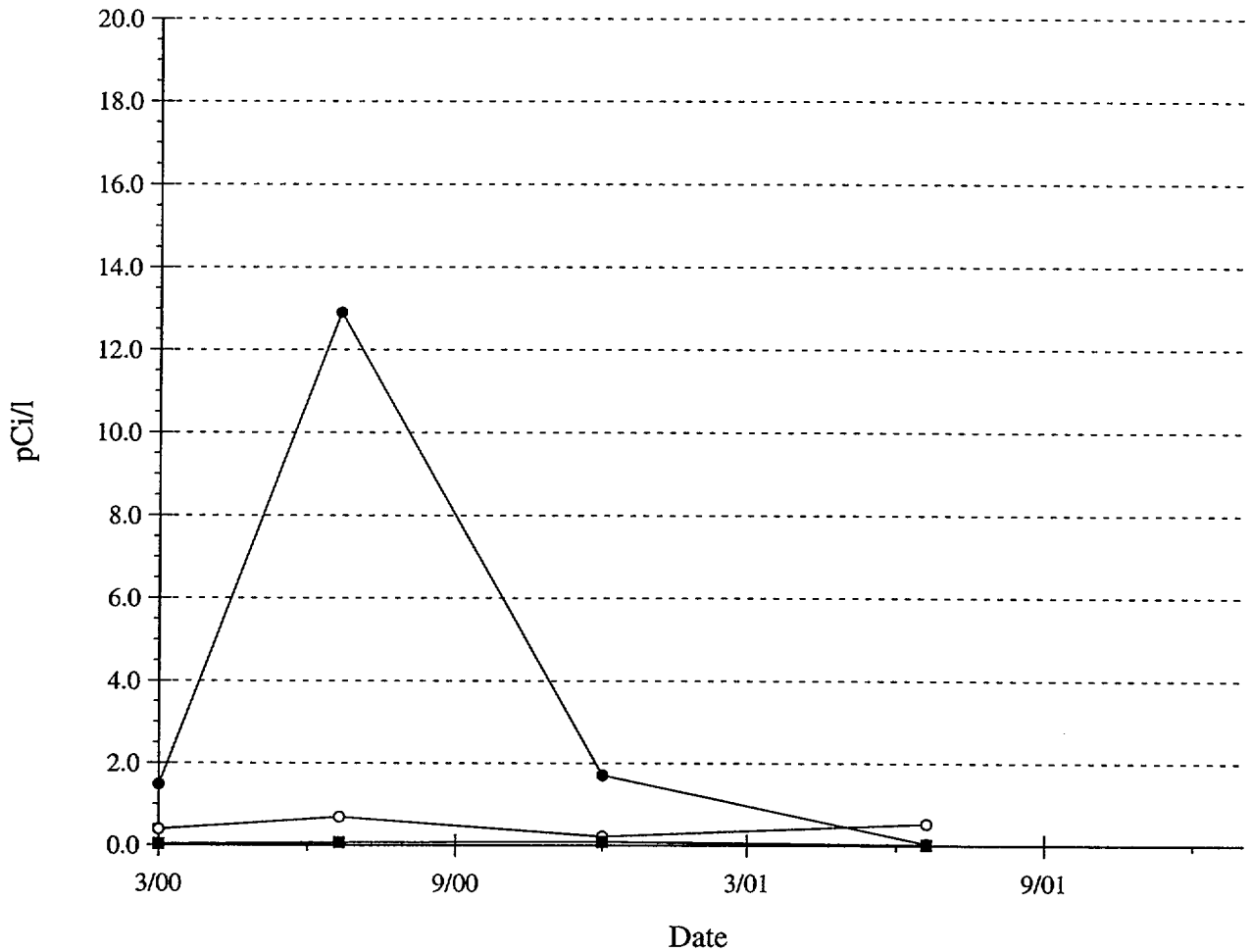

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-19A

Thorium Isotopic Data Versus Time
MWS-5 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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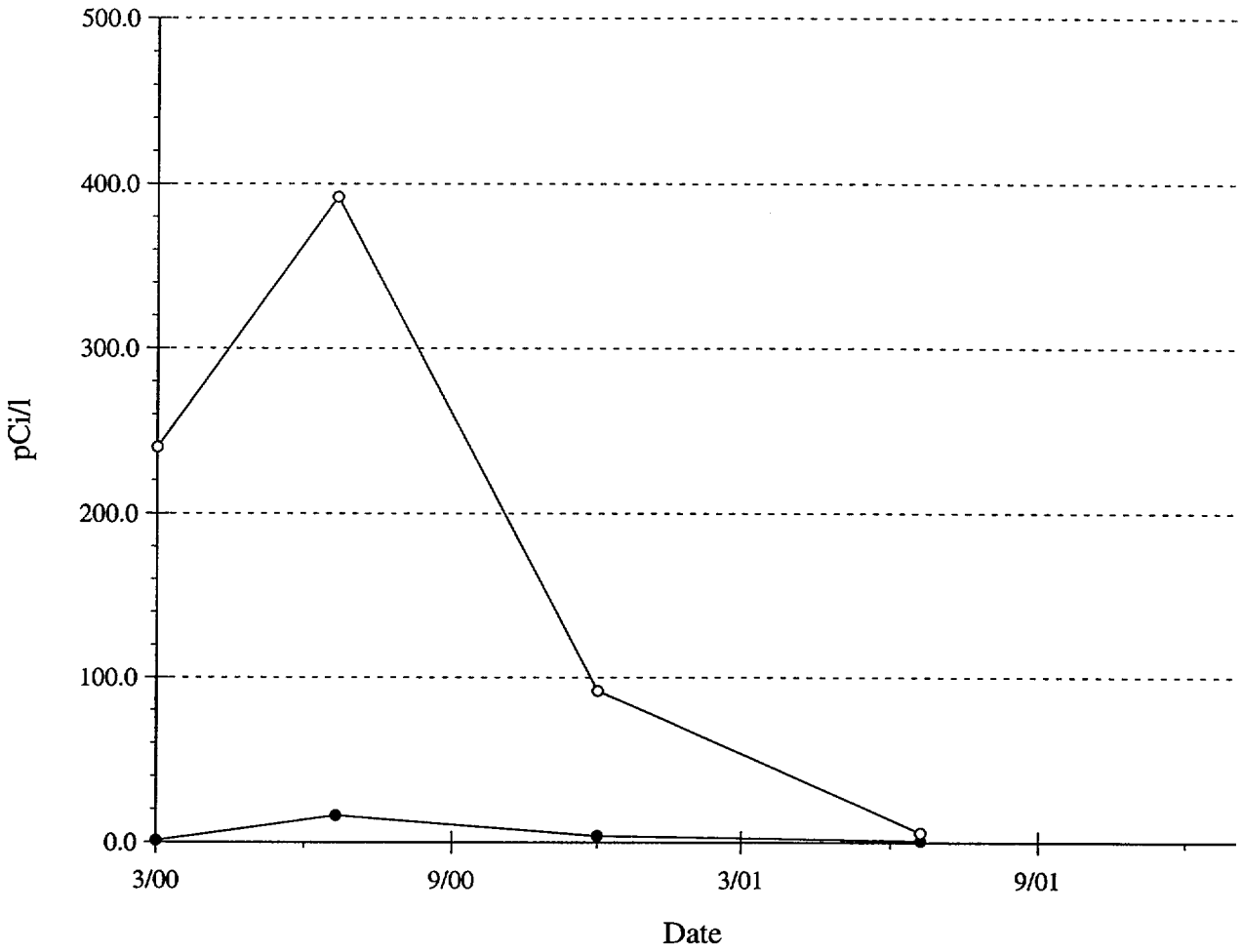

Legend

- ● Radium-226
- ○ Radium-228

Figure C-19B

Radium Isotopic Data Versus Time
MWS-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
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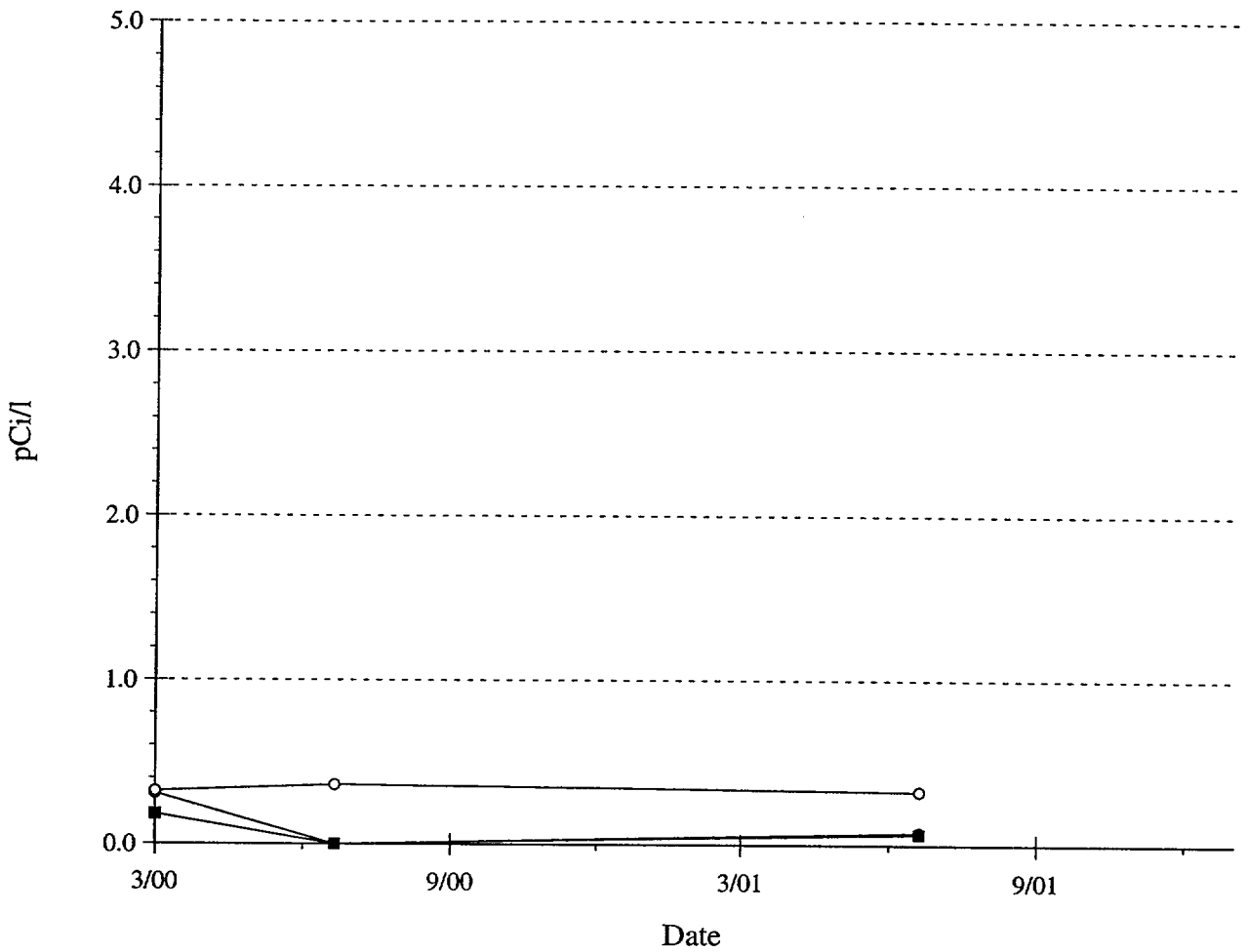
Earth Sciences Consultants, Inc.



Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-20A

Thorium Isotopic Data Versus Time
MWS-6 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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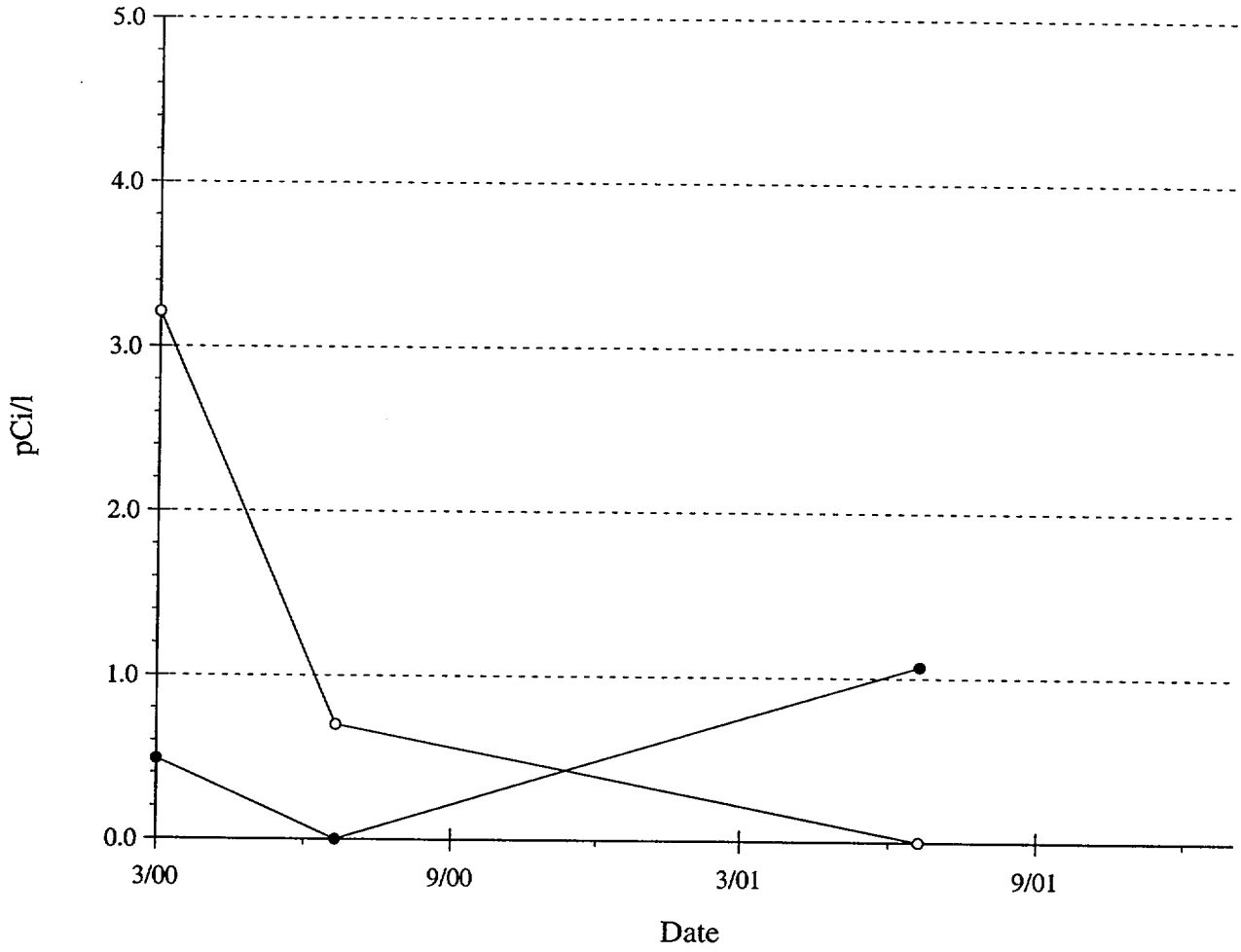

Legend

- ● Radium-226
- ○ Radium-228

Figure C-20B

Radium Isotopic Data Versus Time
MWS-6 (Filtered)
Tulsa, Oklahoma

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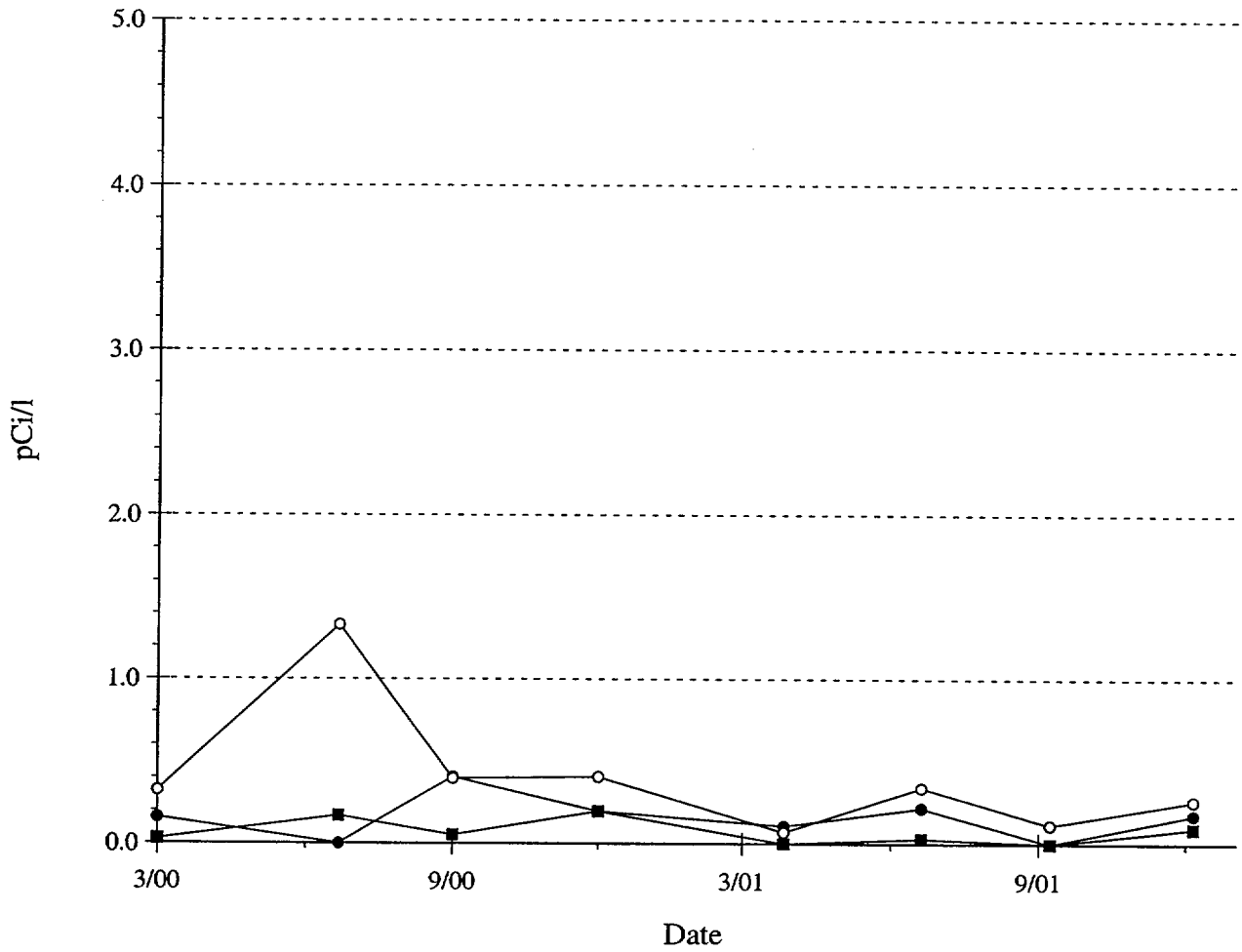

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-21A

Thorium Isotopic Data Versus Time
ST-3 (Filtered)
Tulsa, Oklahoma

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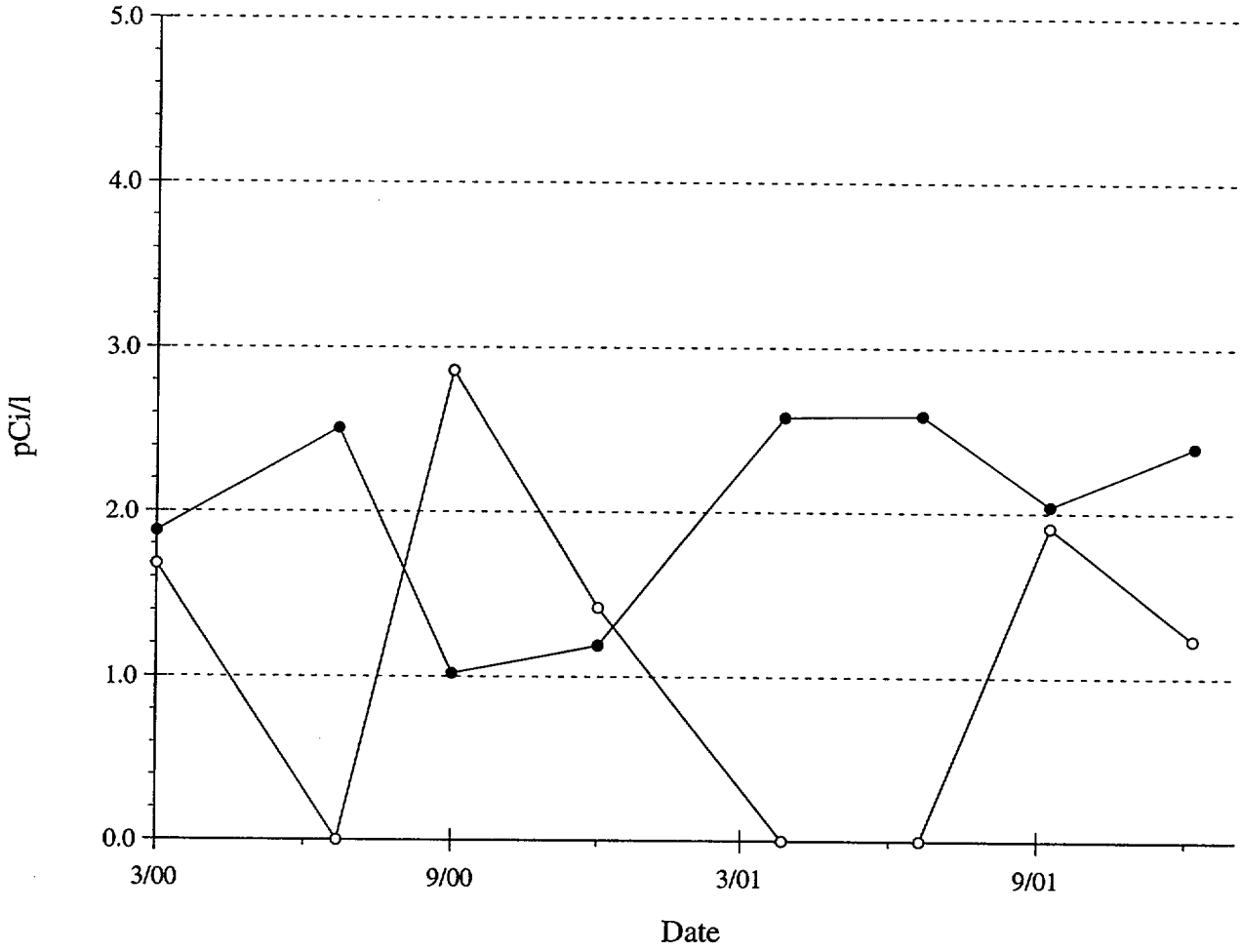

Legend

- ● Radium-226
- ○ Radium-228

Figure C-21B

Radium Isotopic Data Versus Time
ST-3 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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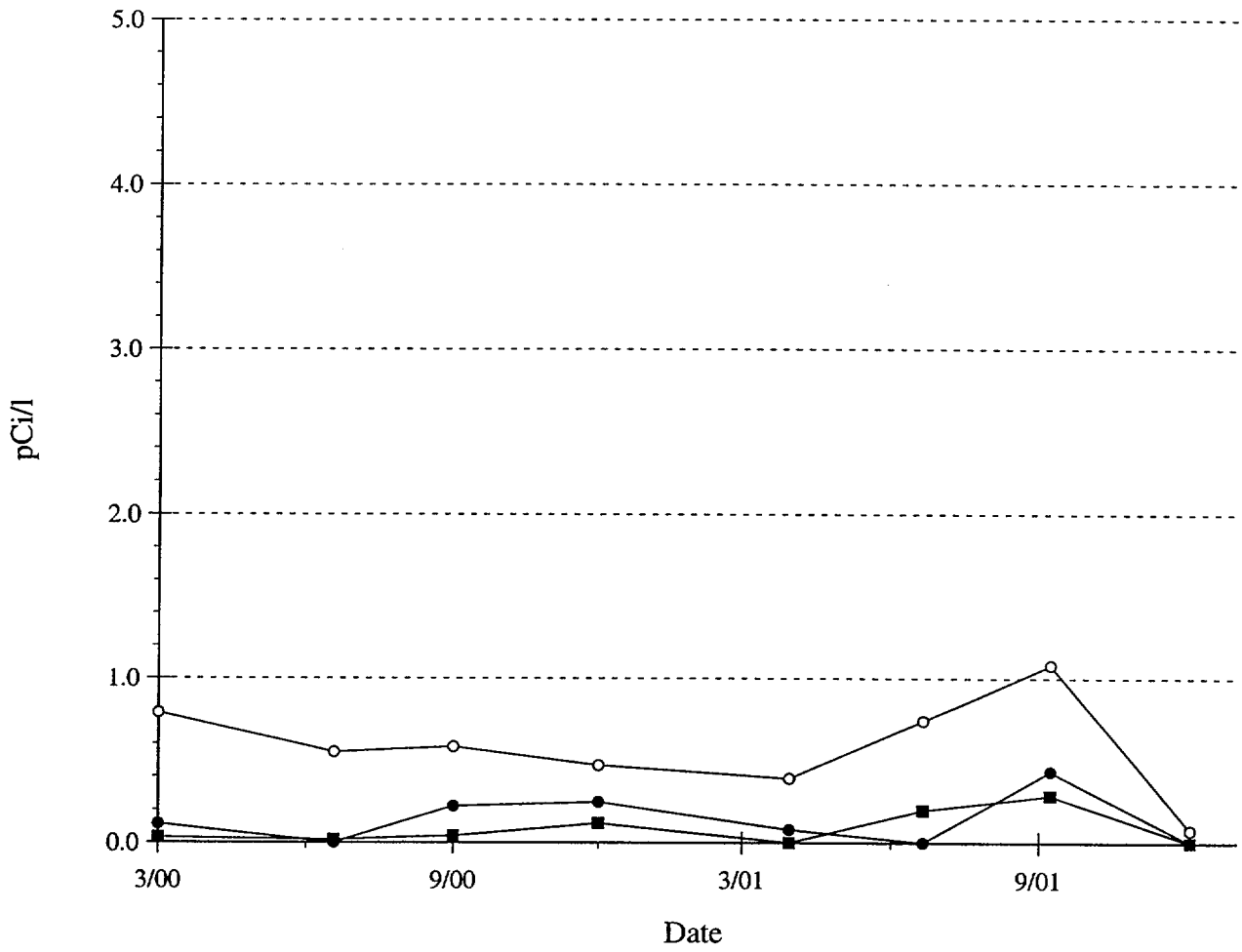

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-22A

Thorium Isotopic Data Versus Time
Fresh Water Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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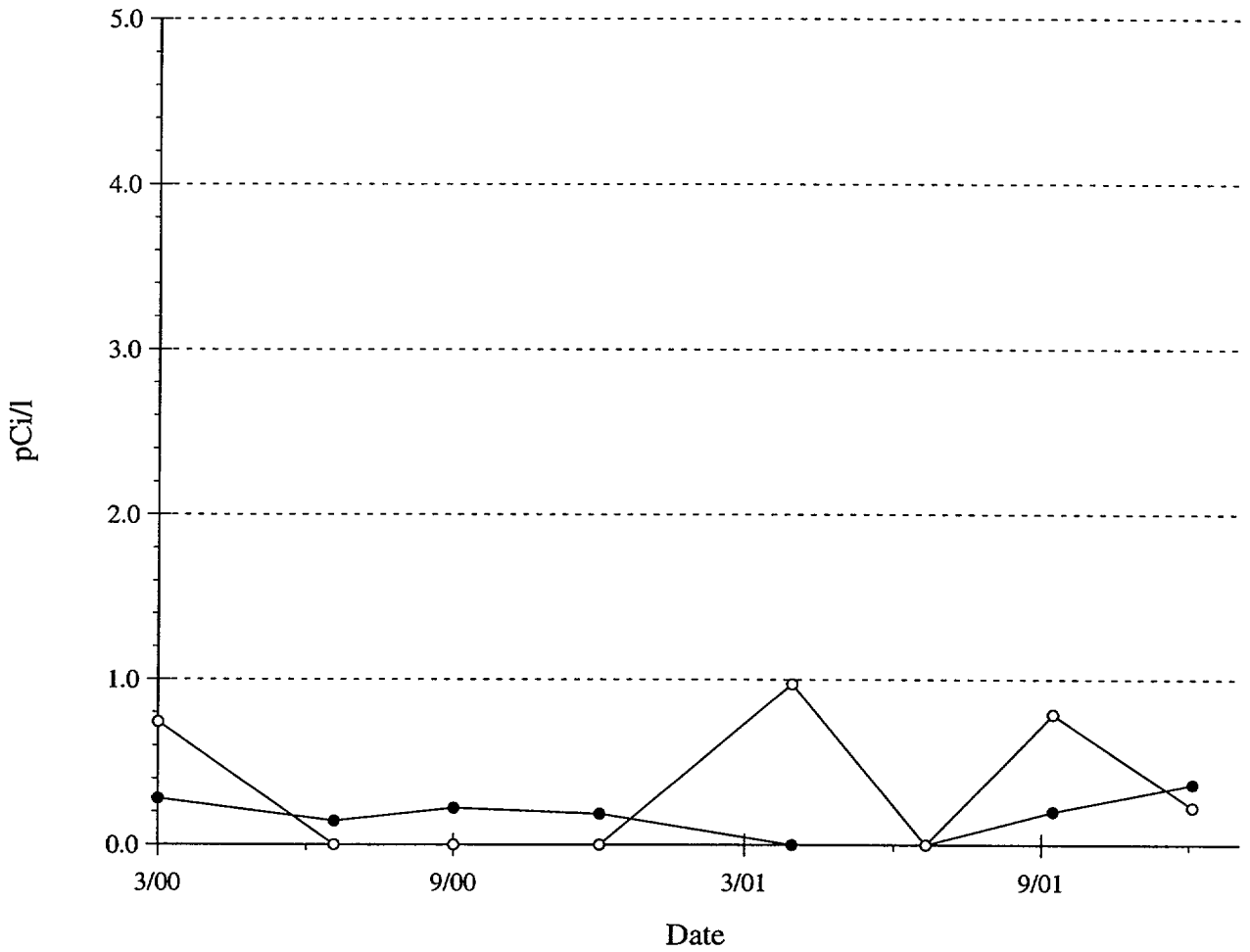

Legend

- ● Radium-226
- ○ Radium-228

Figure C-22B

Radium Isotopic Data Versus Time
Fresh Water Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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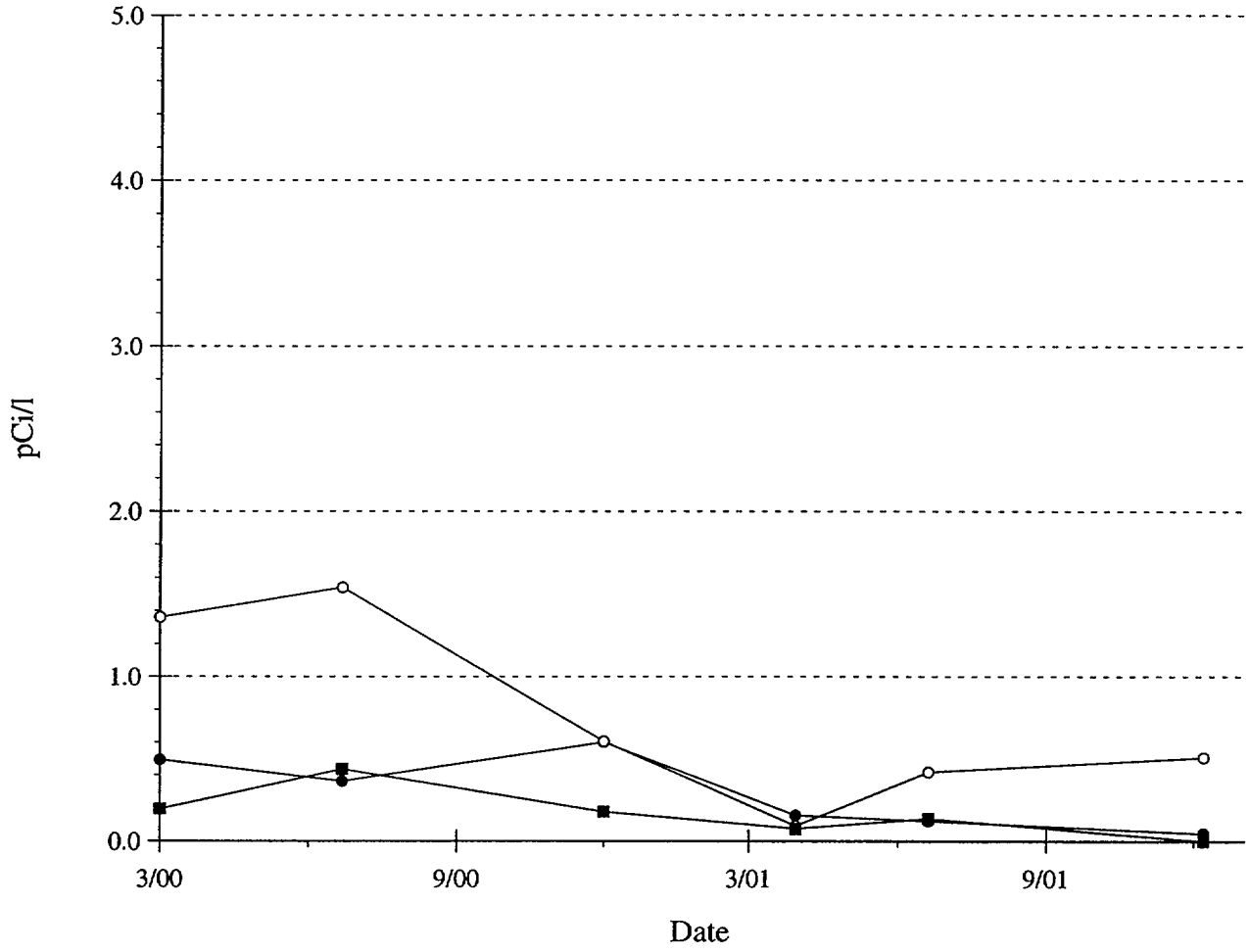

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-23A

Thorium Isotopic Data Versus Time
Retention Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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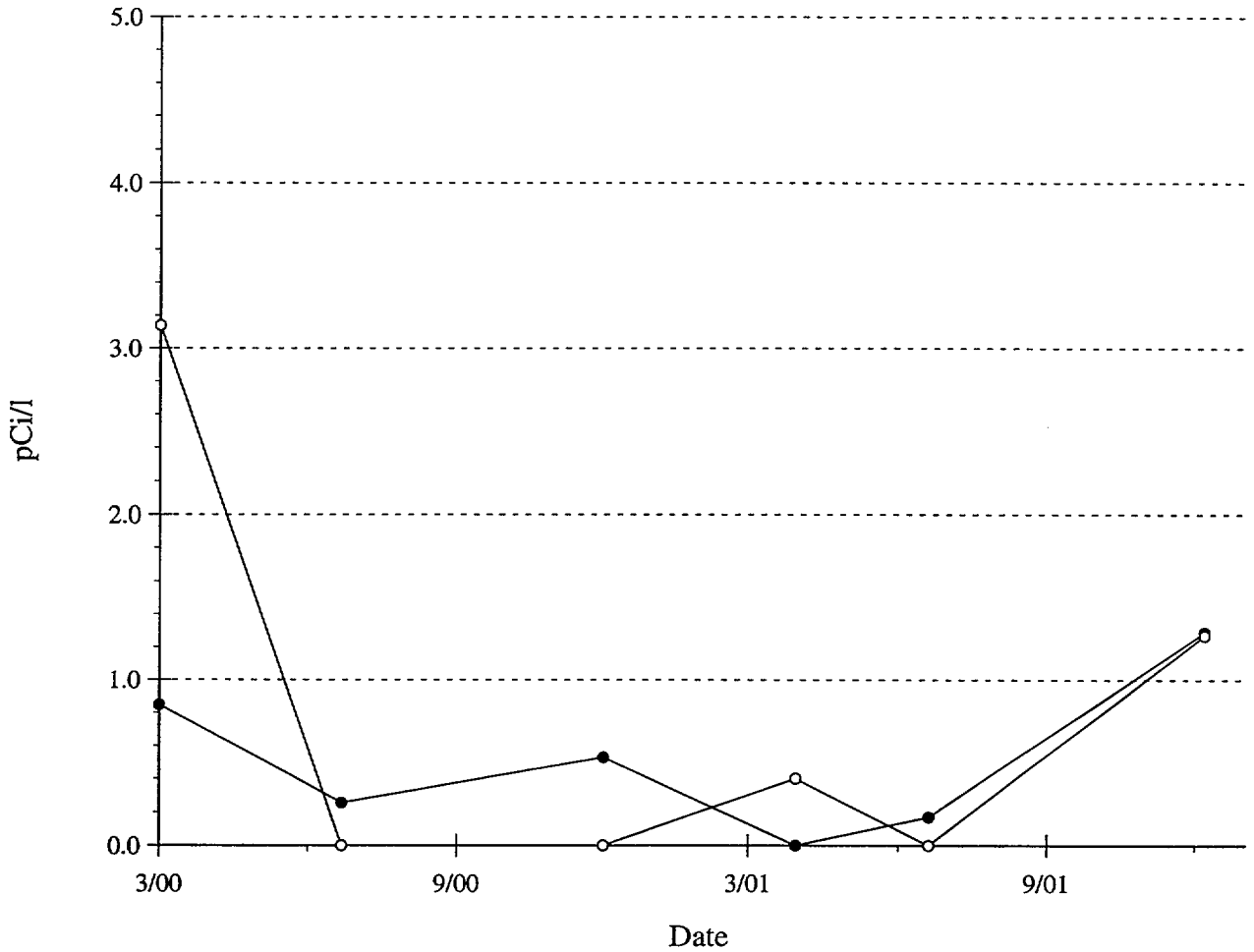

Legend

- ● Radium-226
- ○ Radium-228

Figure C-23B

Radium Isotopic Data Versus Time
Retention Pond (Filtered)
Tulsa, Oklahoma

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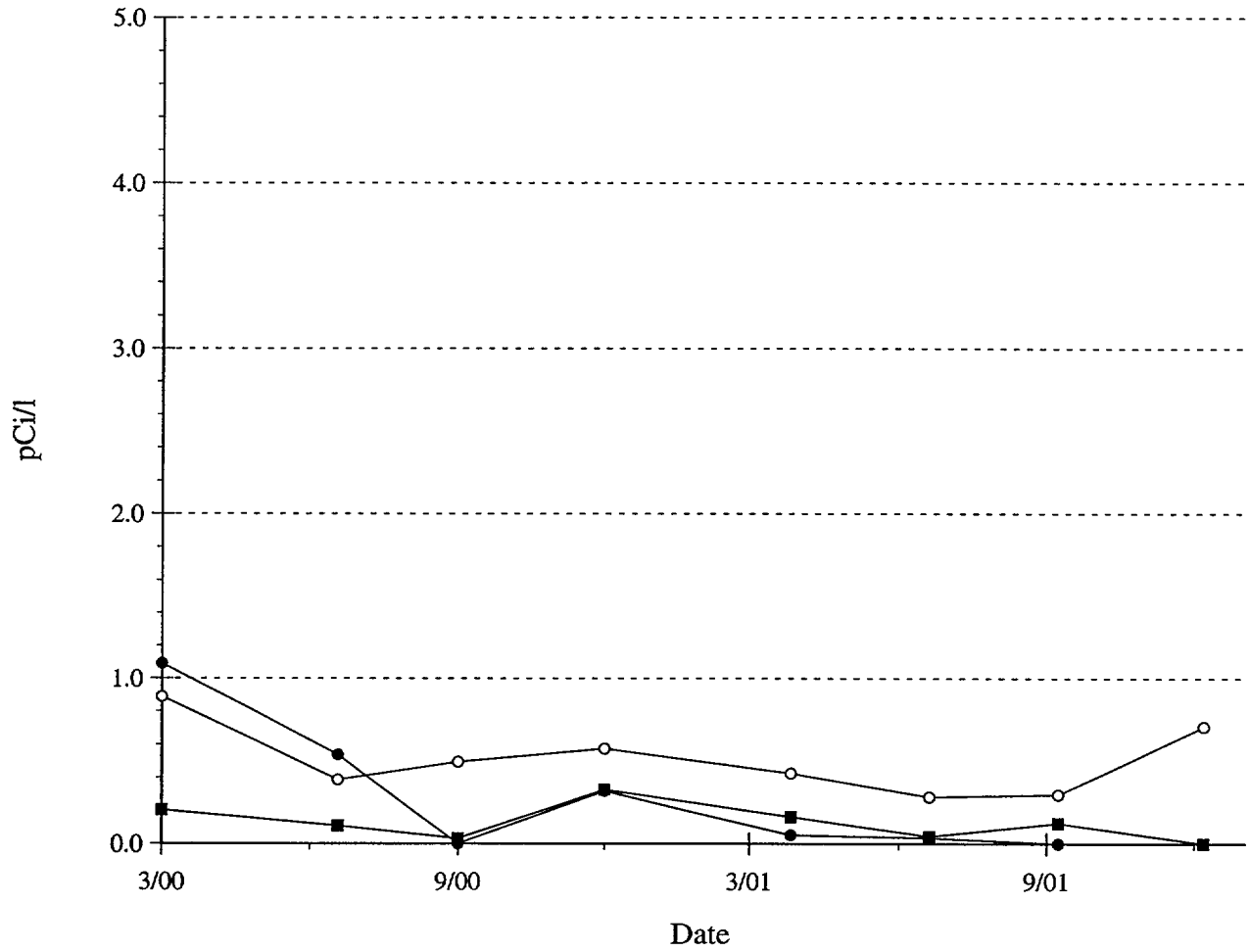

Legend

- ● Thorium-228
- ○ Thorium-230
- ■ Thorium-232

Figure C-24A

Thorium Isotopic Data Versus Time
Fulton Creek (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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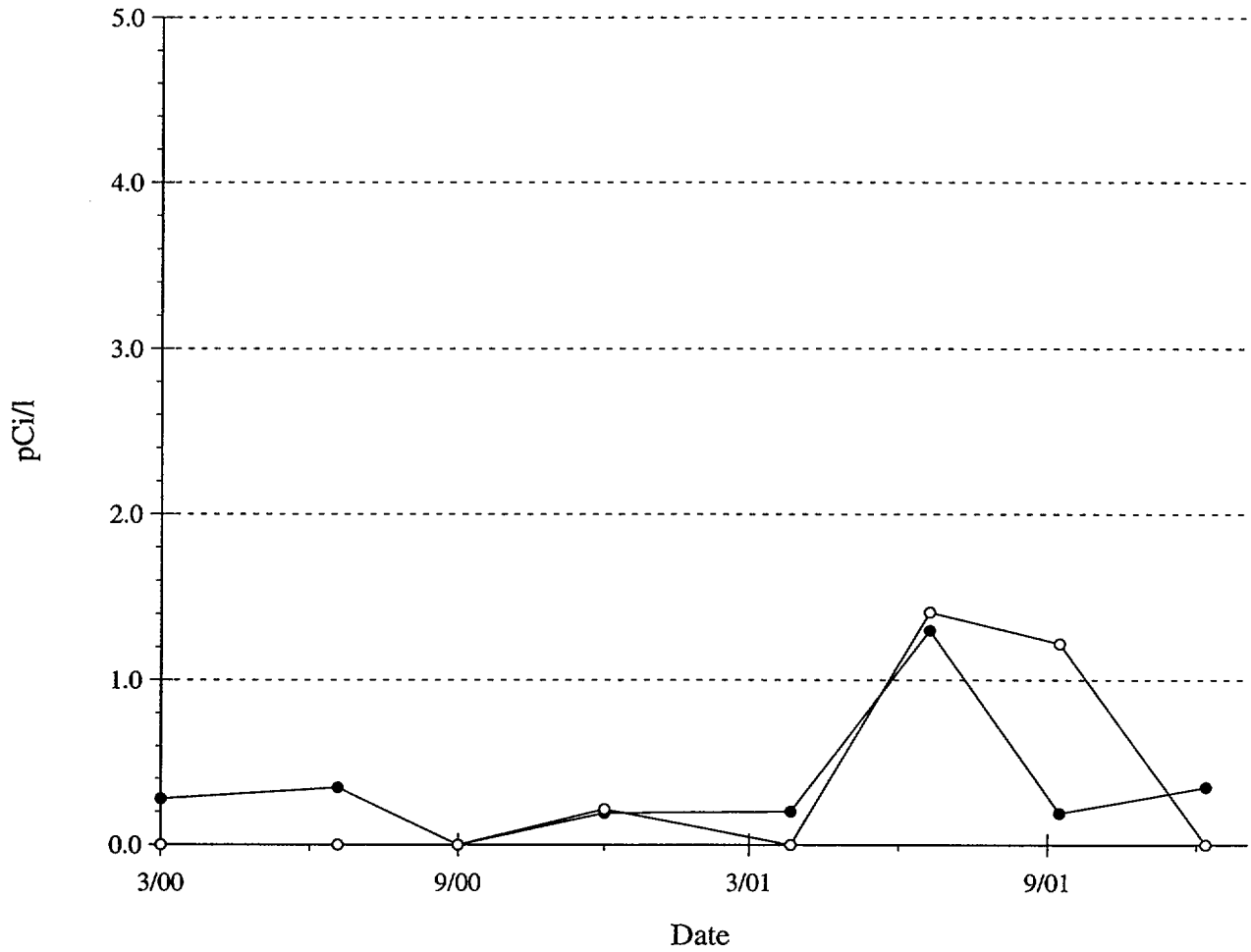

Legend

- ● Radium-226
- ○ Radium-228

Figure C-24B

Radium Isotopic Data Versus Time
Fulton Creek (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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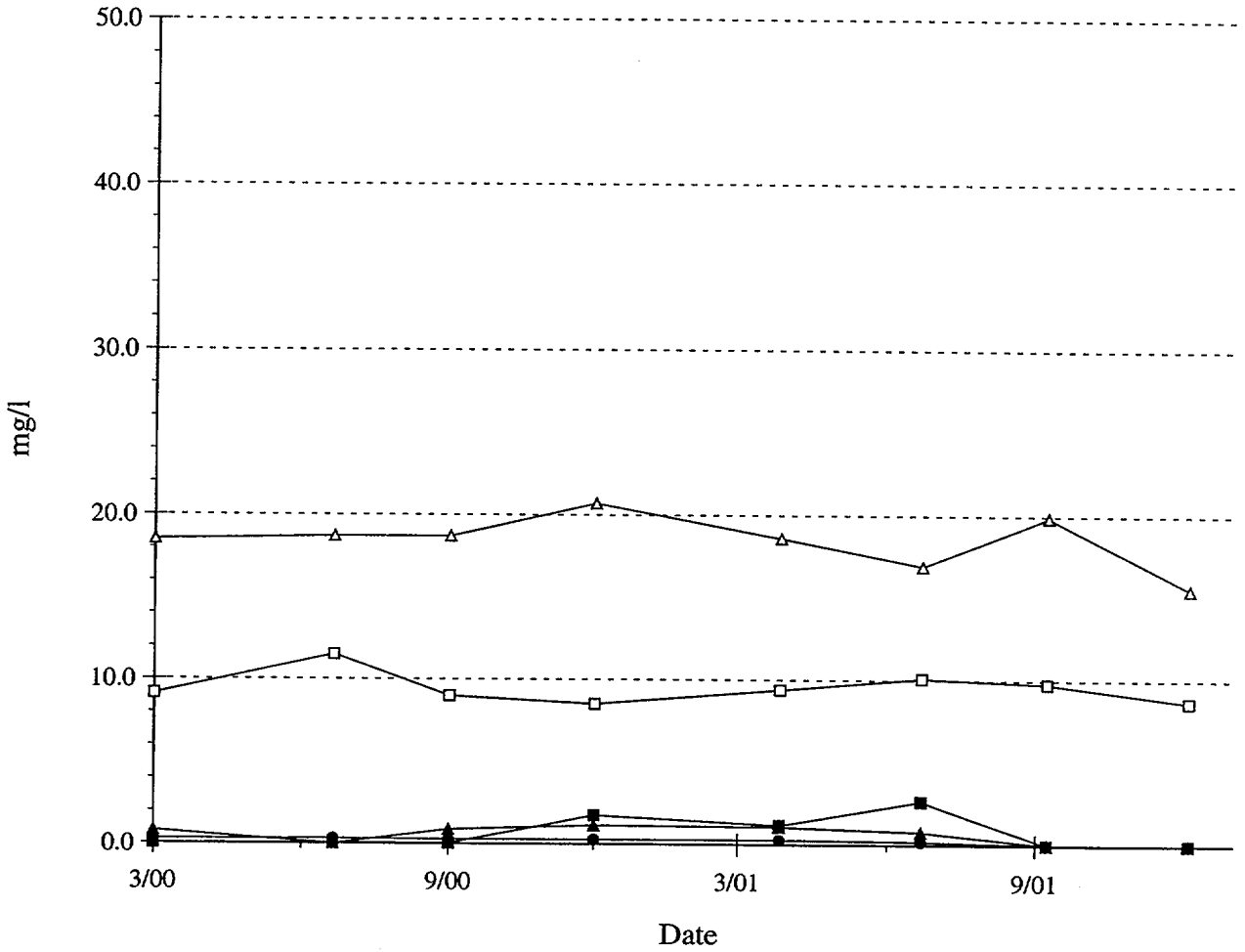
Appendix D

Inorganic Parameters Time Trend Analyses



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-1A

Metals Data Versus Time
P-1 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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DRAWING NUMBER	

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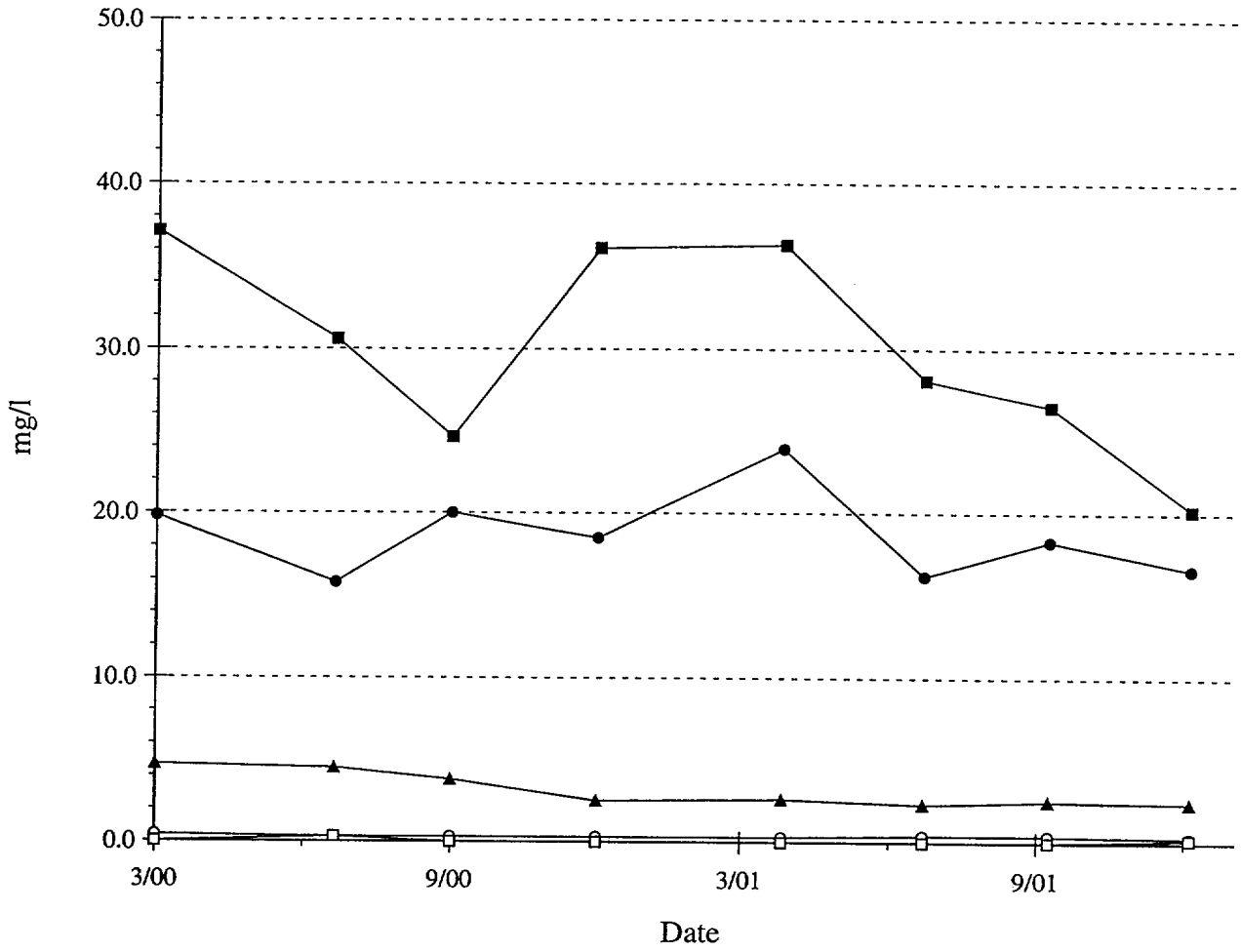

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-1B

Inorganic Data Versus Time
P-1 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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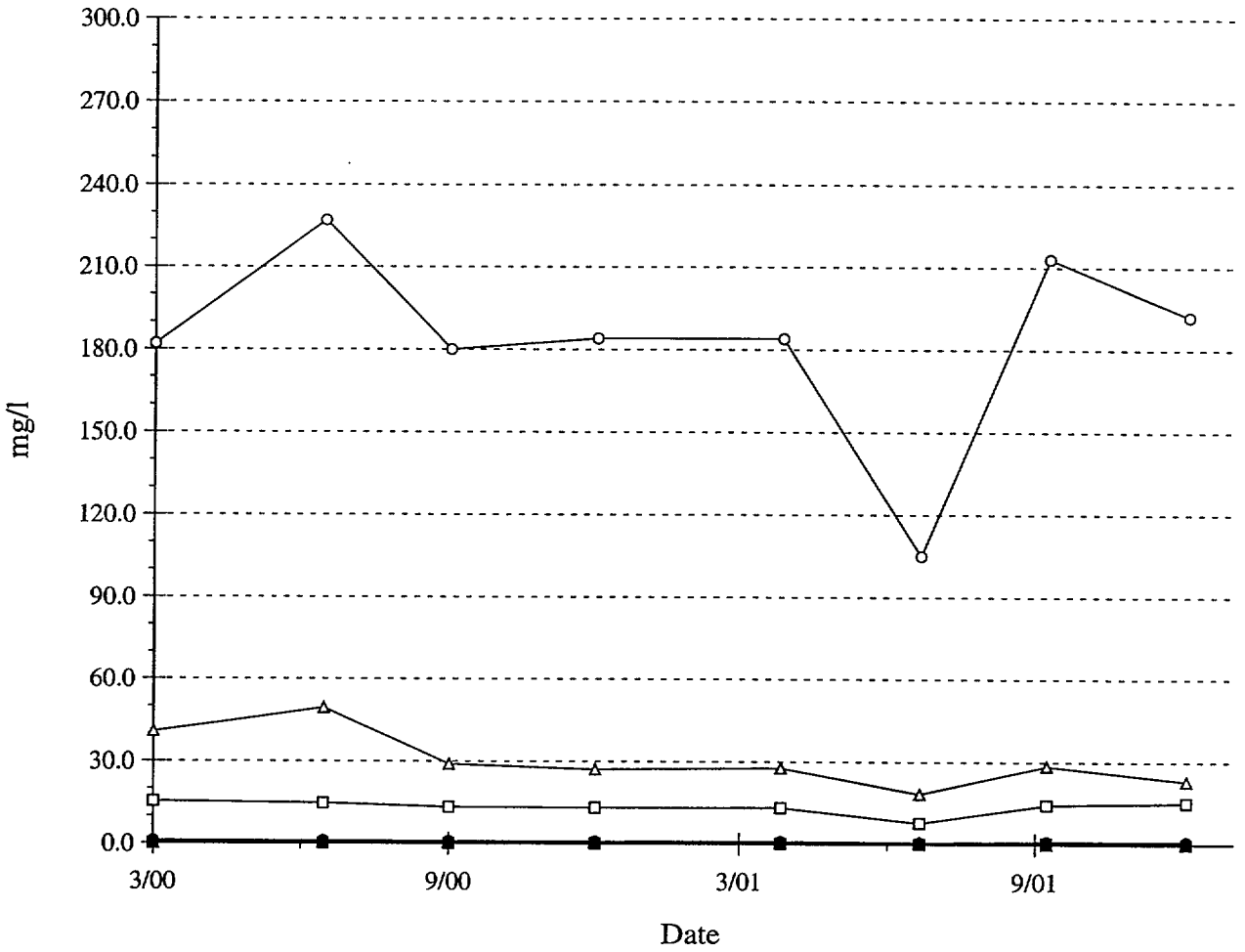

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-2A

Metals Data Versus Time
P-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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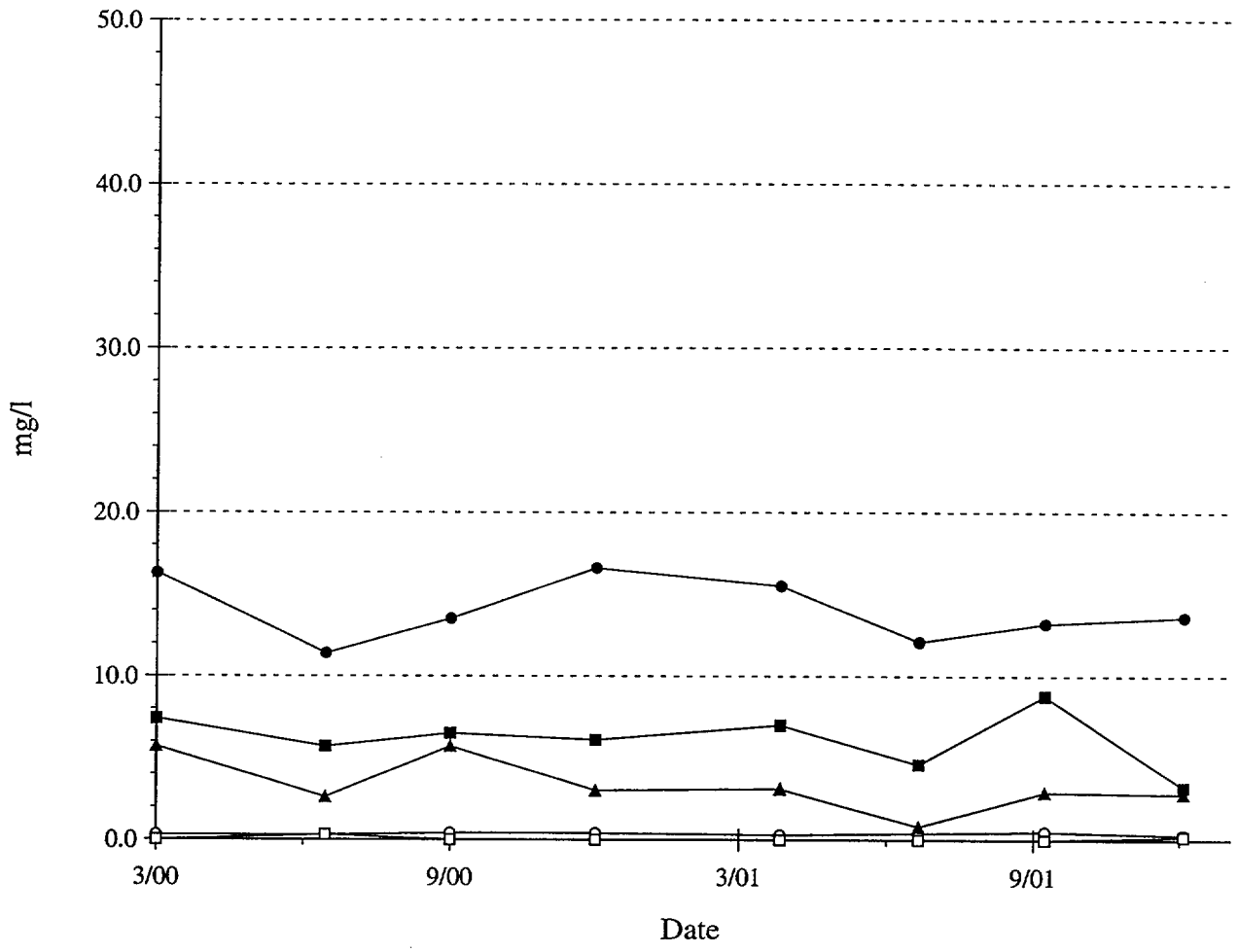
Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-2B

Inorganic Data Versus Time
P-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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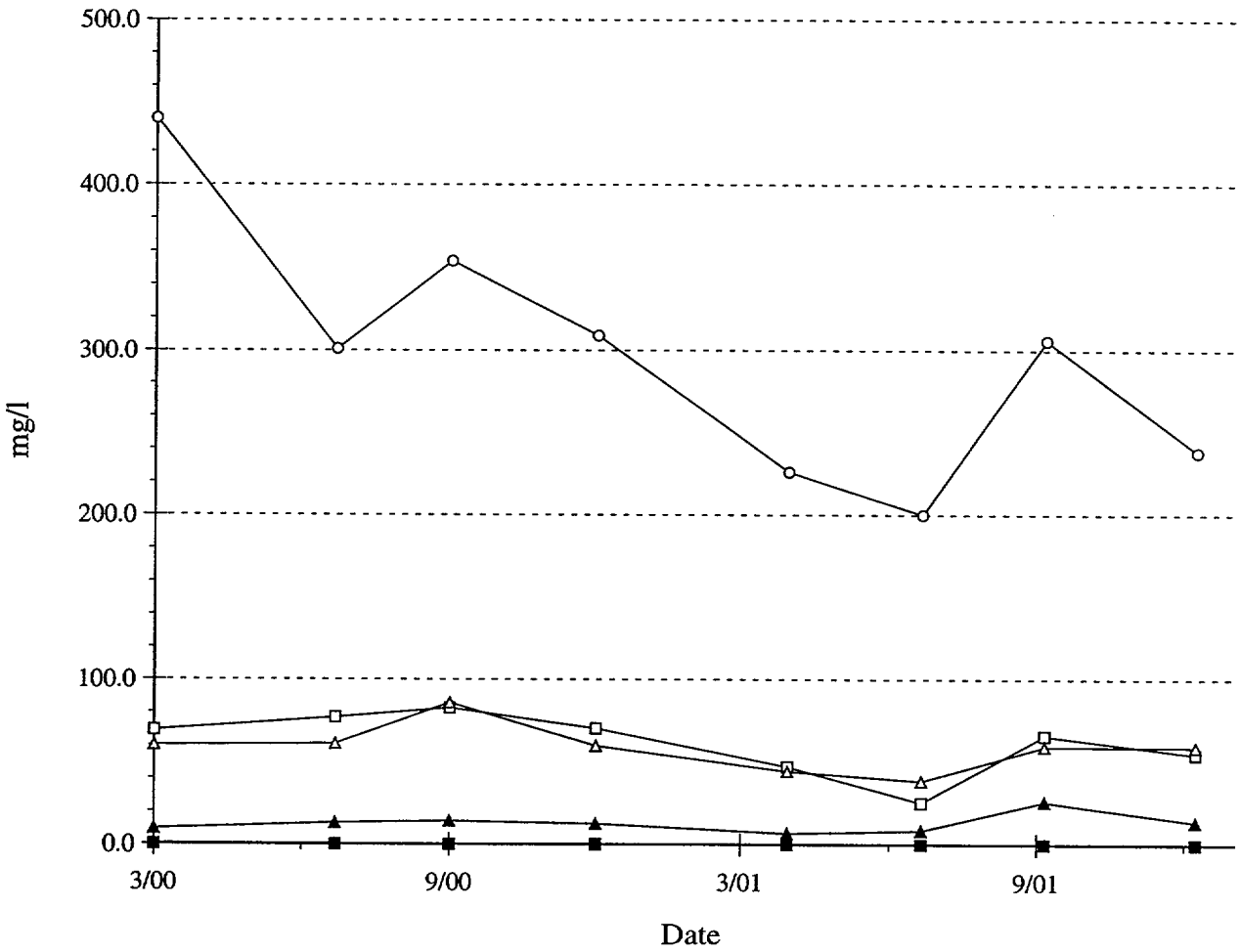

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-3A

Metals Data Versus Time
P-3 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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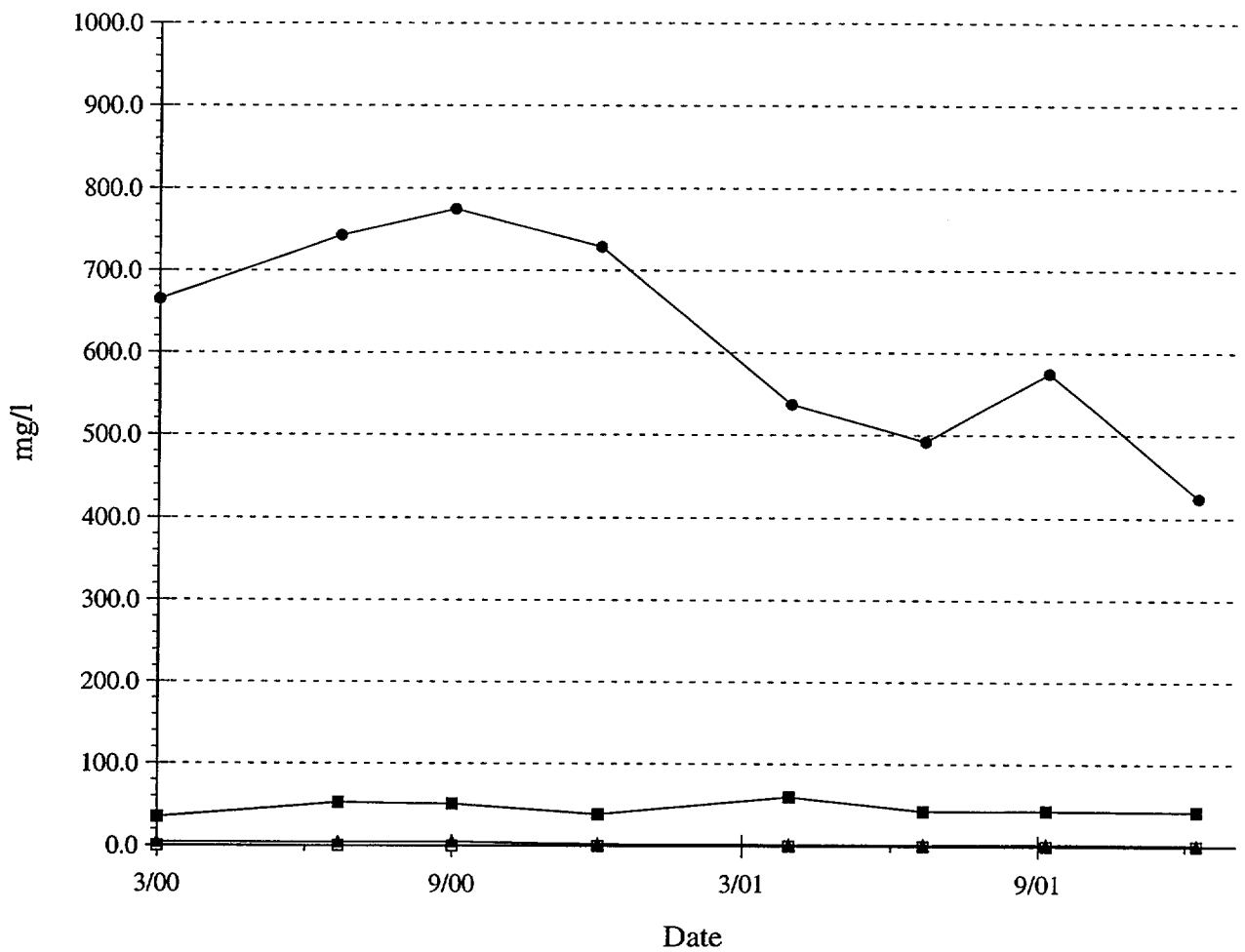

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-3B

Inorganic Data Versus Time
P-3 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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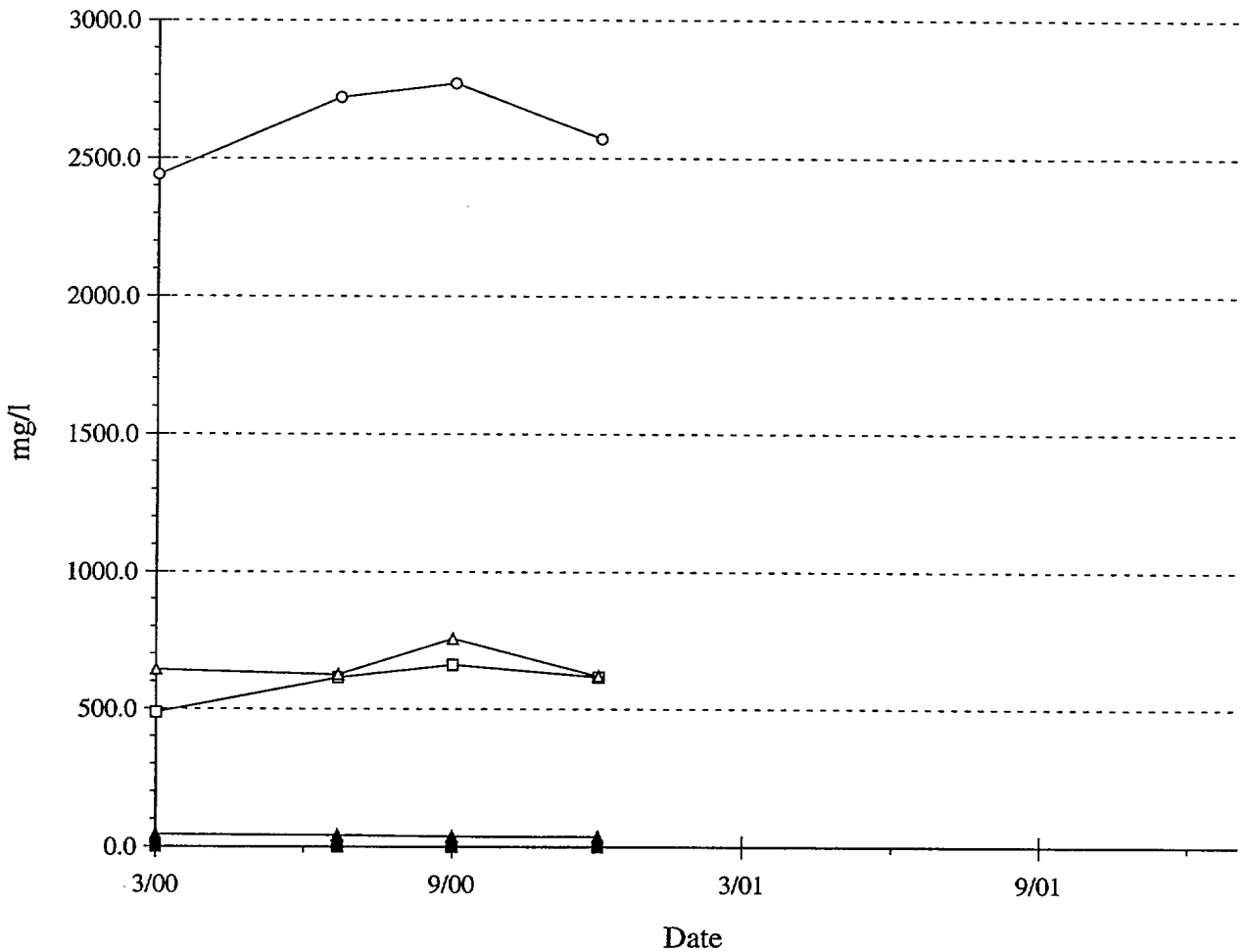
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Note: Well abandoned in March 2001 to accommodate ALRP stockpiling activities.

Figure D-4A

Metals Data Versus Time
P-4 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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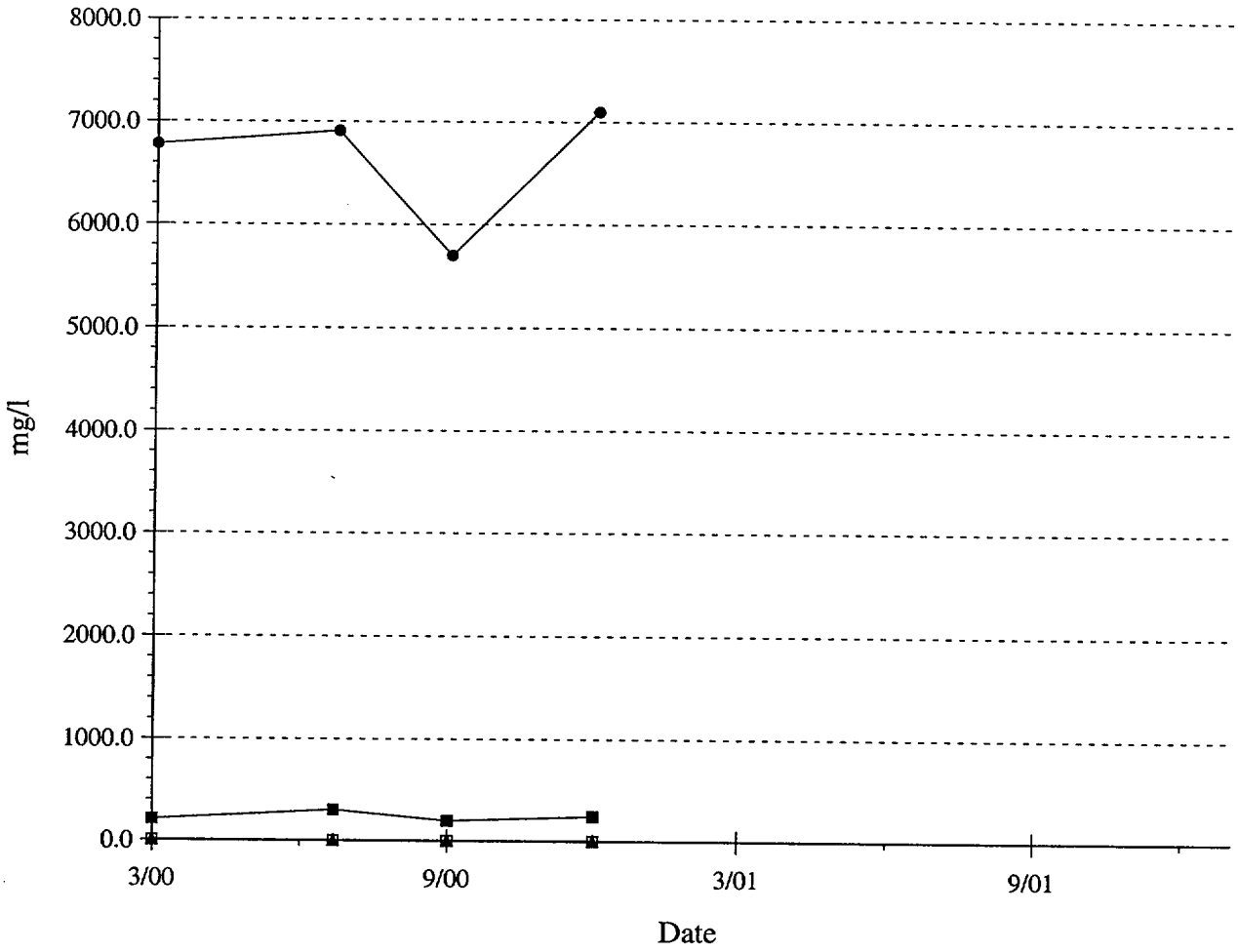

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Note: Well abandoned in March 2001 to accommodate ALRP stockpiling activities.

Figure D-4B

Inorganic Data Versus Time
P-4 (Filtered)
Tulsa, Oklahoma

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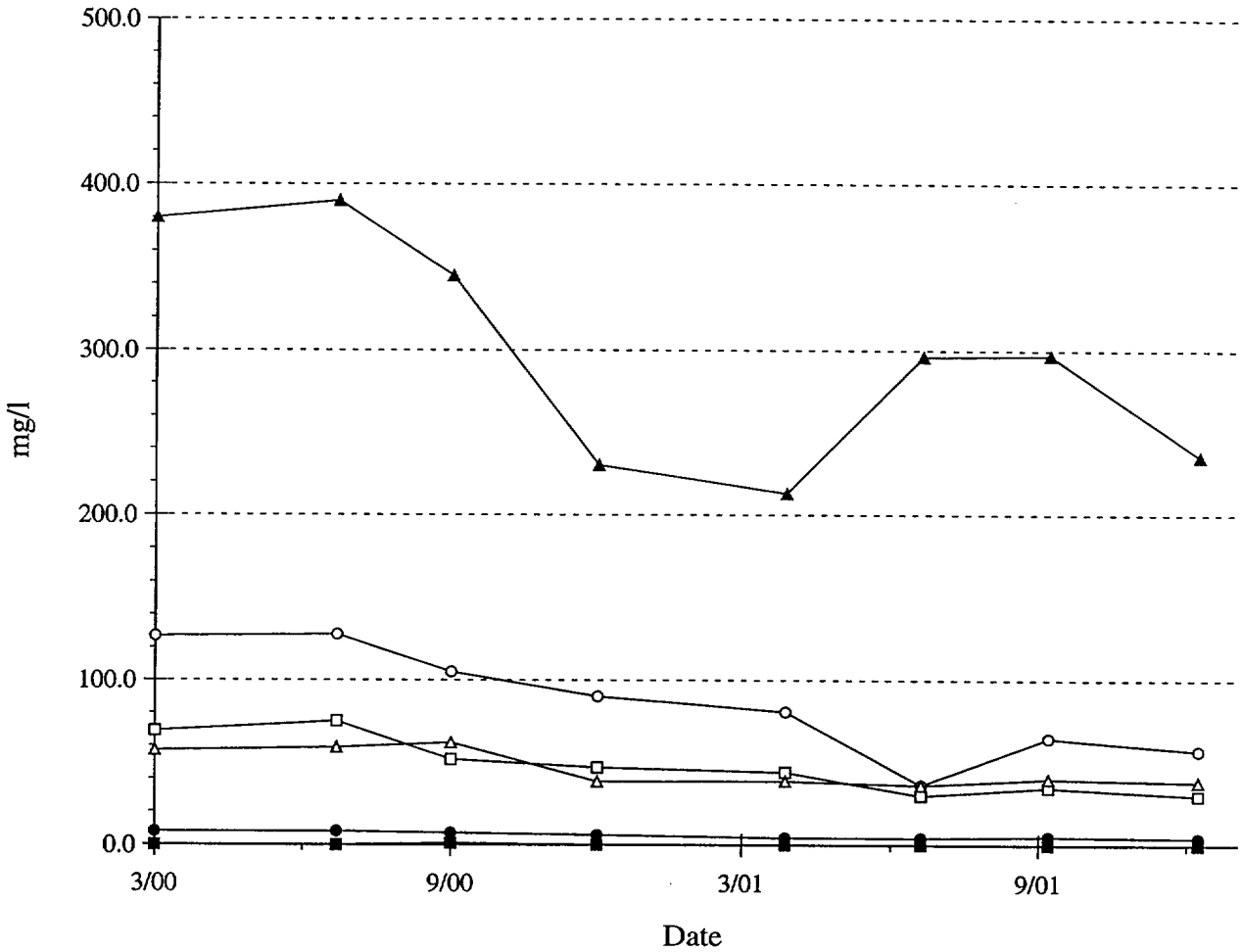

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-5A

Metals Data Versus Time
P-5 (Filtered)
Tulsa, Oklahoma

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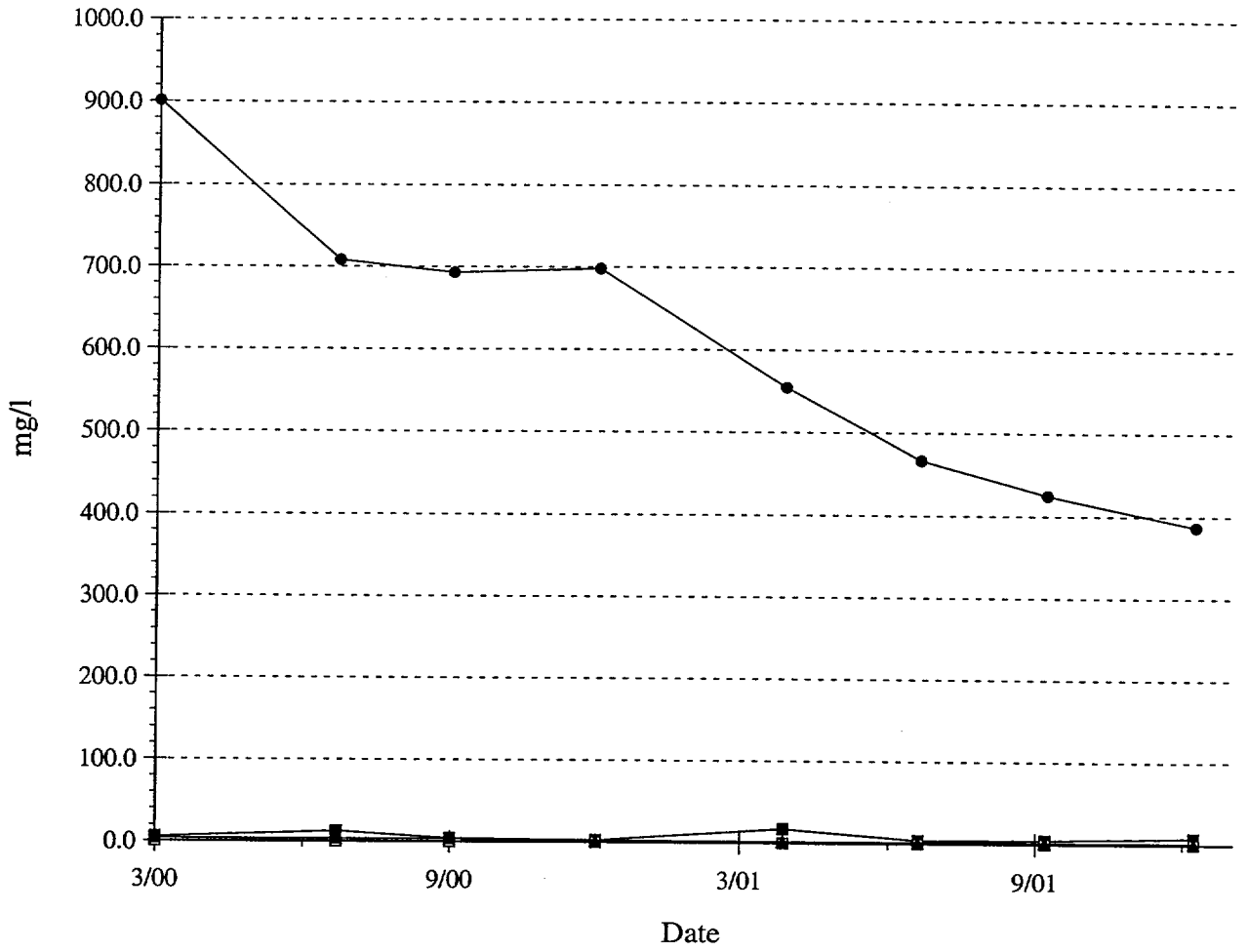

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-5B

Inorganic Data Versus Time
P-5 (Filtered)
Tulsa, Oklahoma

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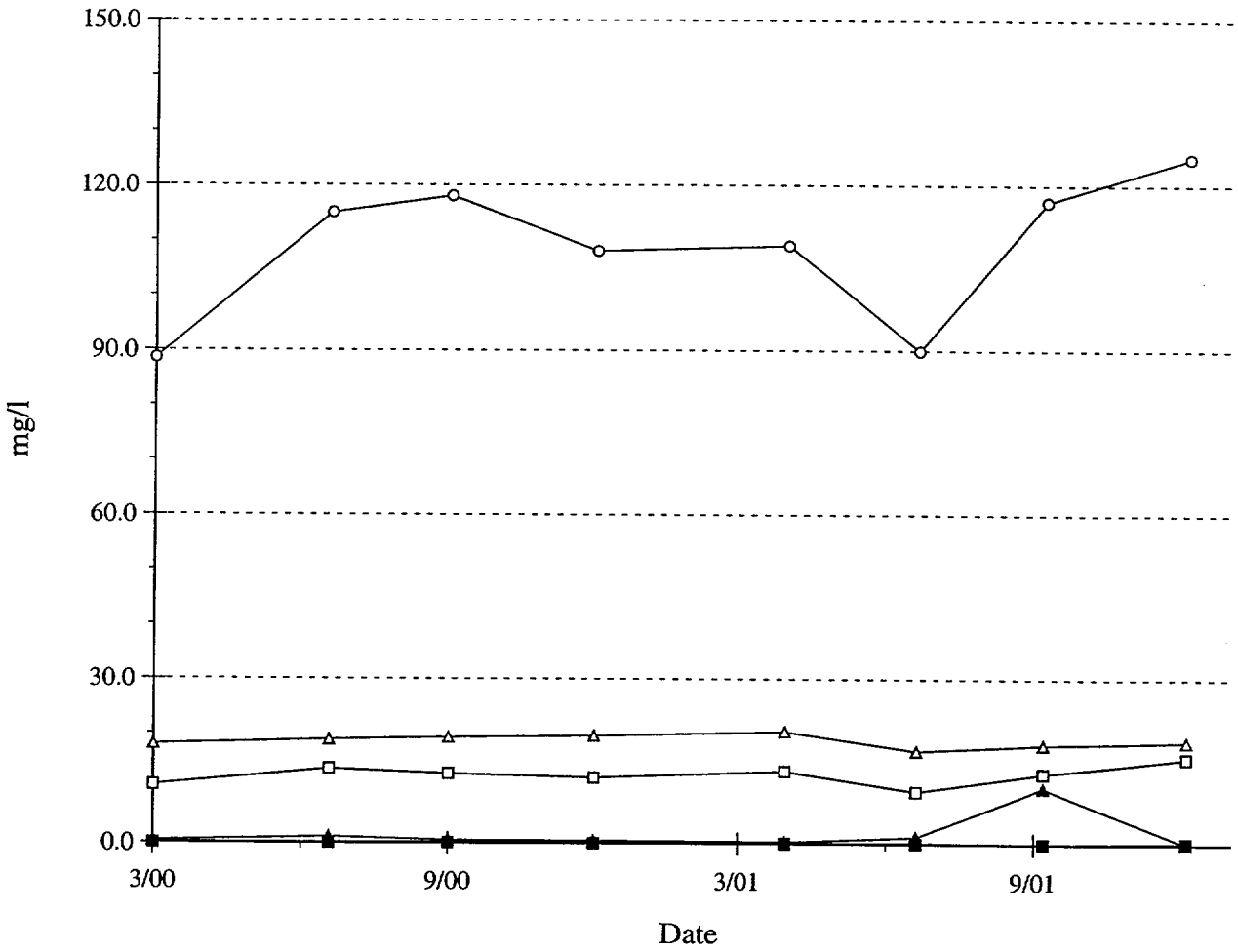

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-6A

Metals Data Versus Time
P-7 (Filtered)
Tulsa, Oklahoma

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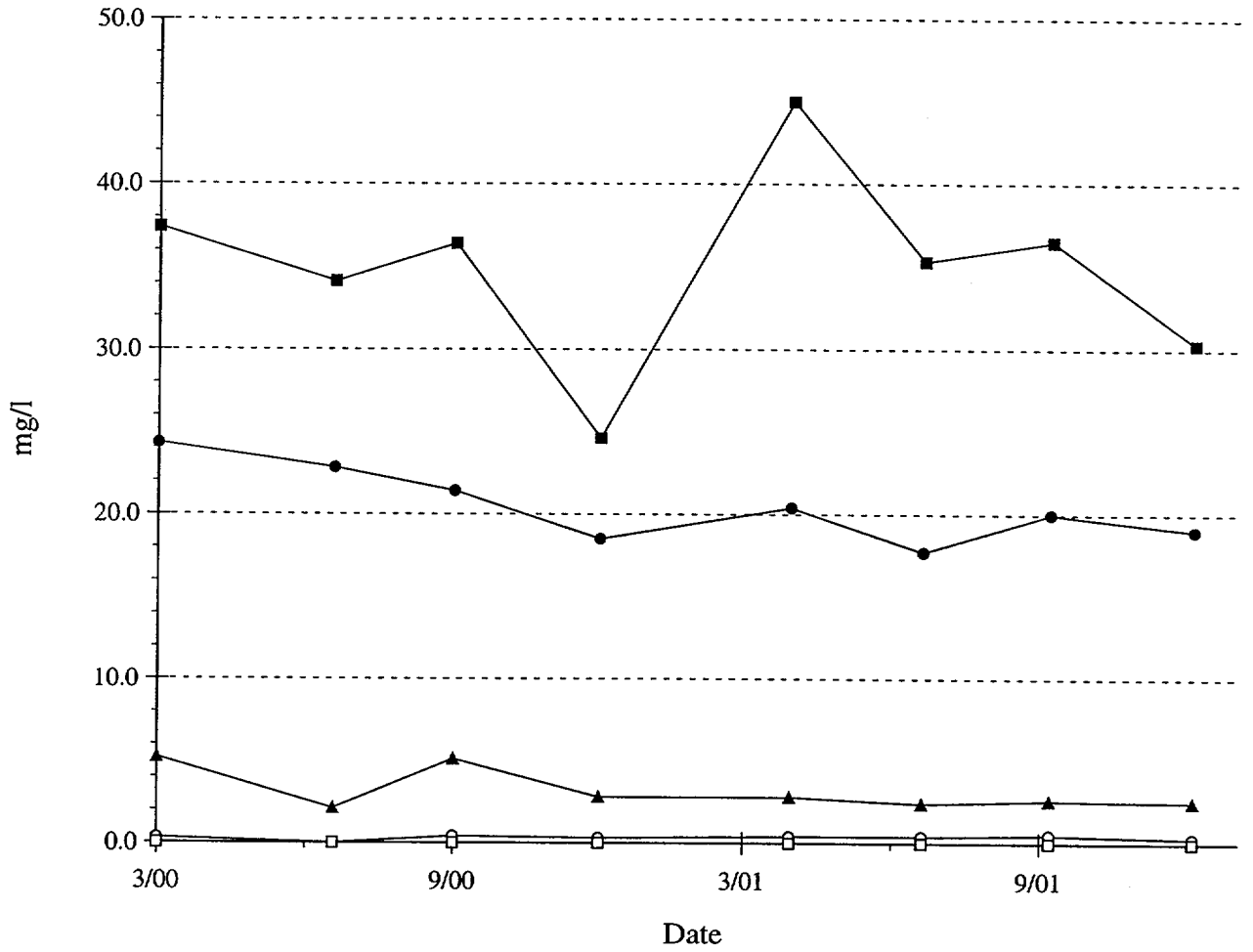

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-6B

Inorganic Data Versus Time
P-7 (Filtered)
Tulsa, Oklahoma

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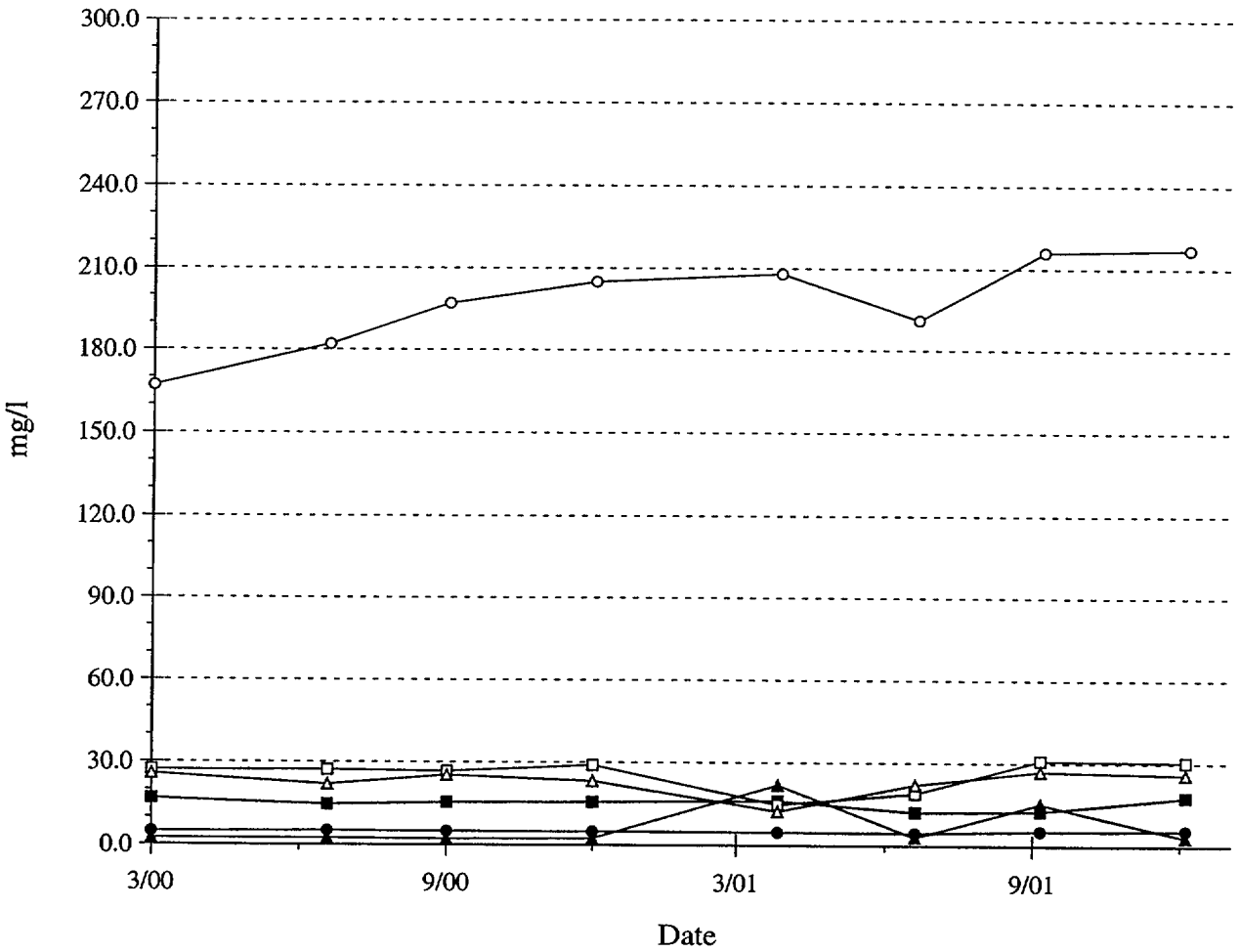

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-7A

Metals Data Versus Time
P-8 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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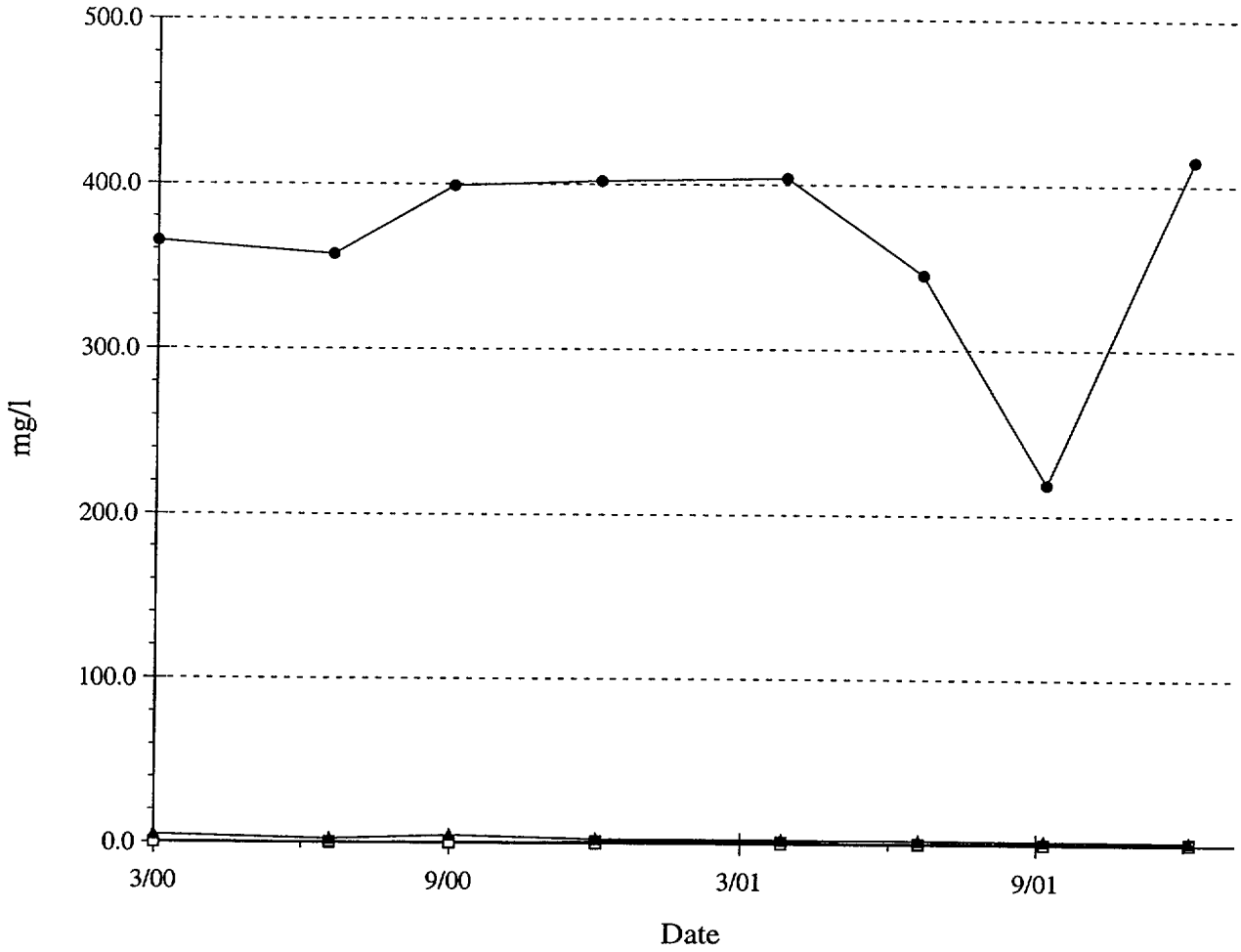

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-7B

Inorganic Data Versus Time
P-8 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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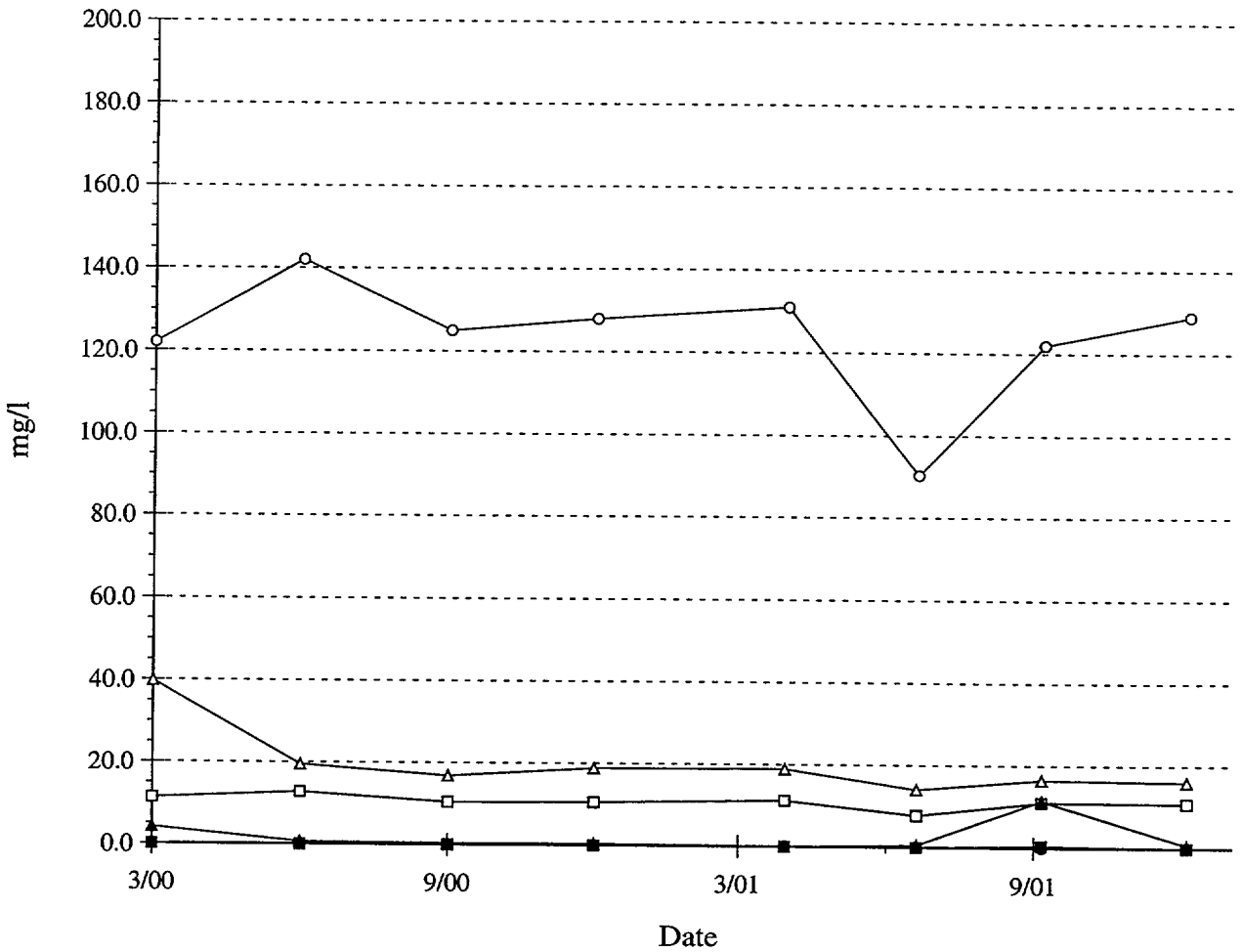

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-8A

Metals Data Versus Time
P-10 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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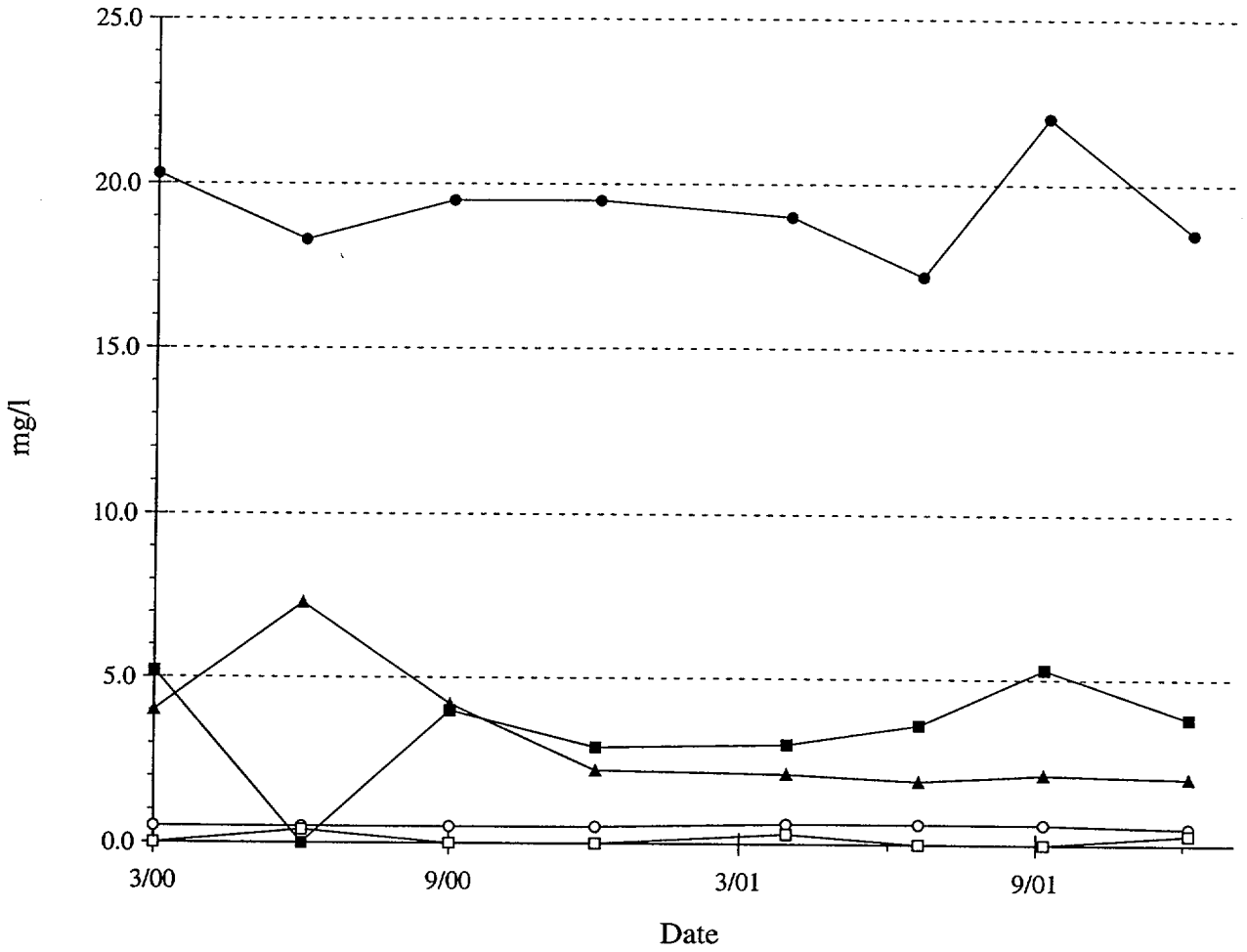

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-8B

Inorganic Data Versus Time
P-10 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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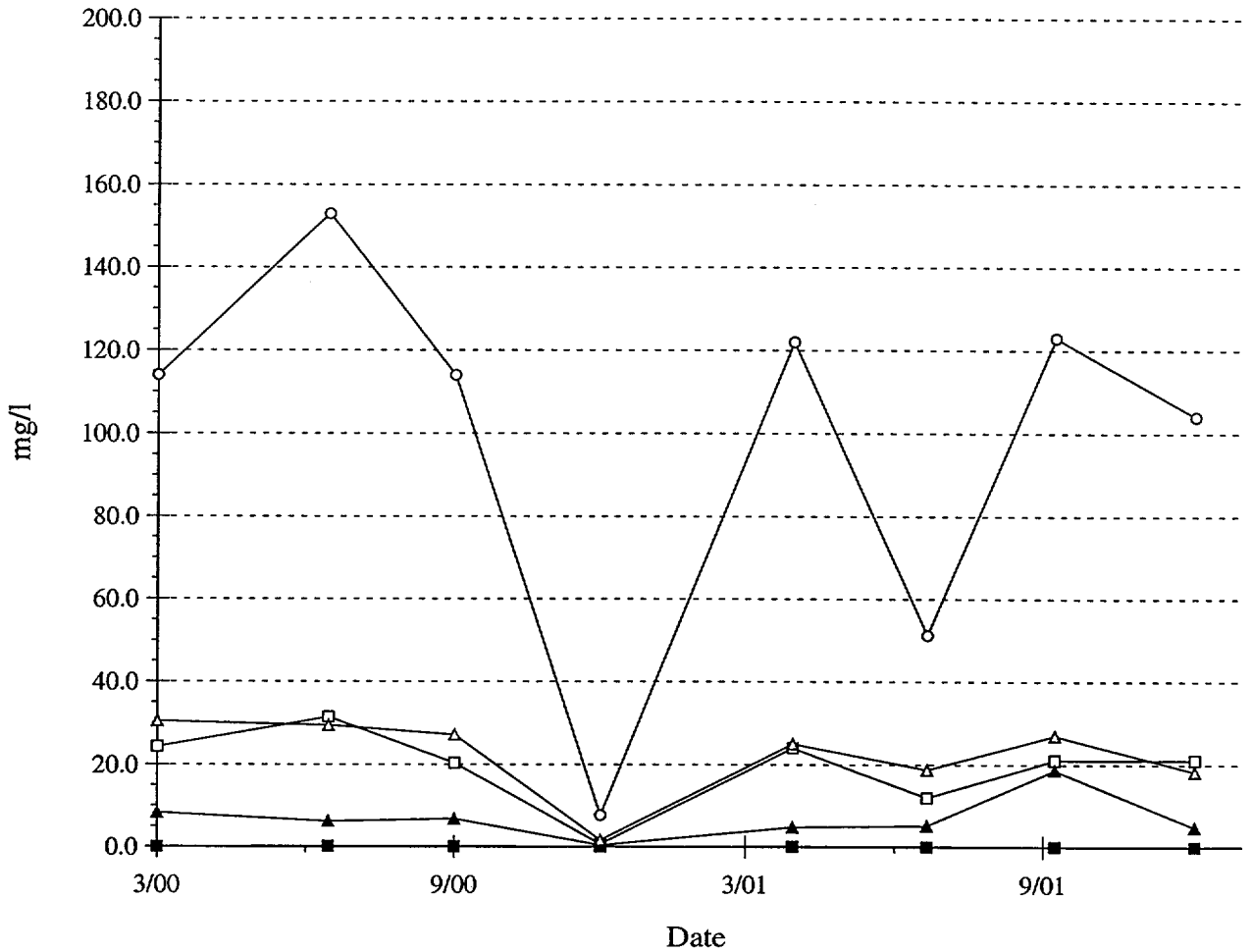

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-9A

Metals Data Versus Time
MWD-2 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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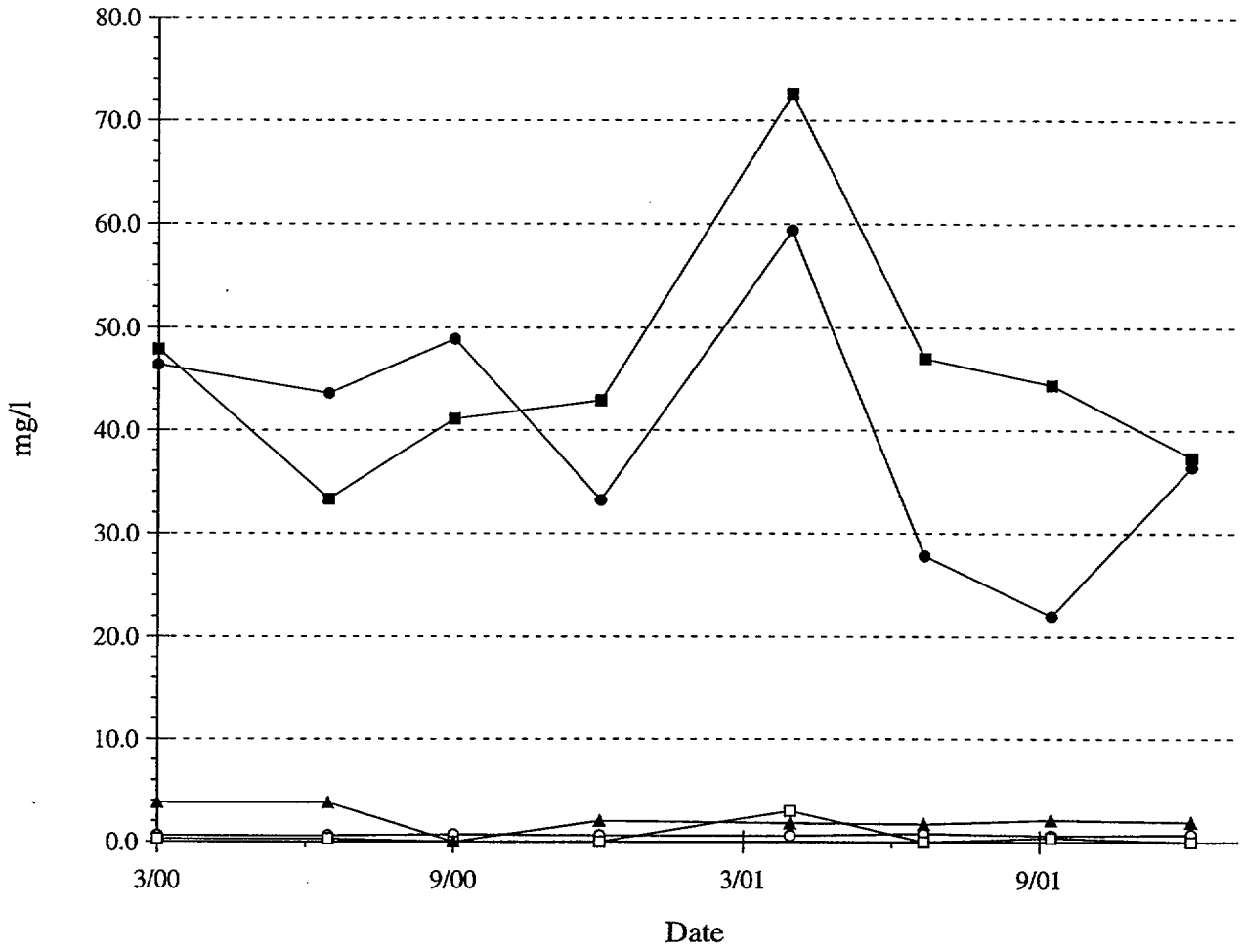

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-9B

Inorganic Data Versus Time
MWD-2 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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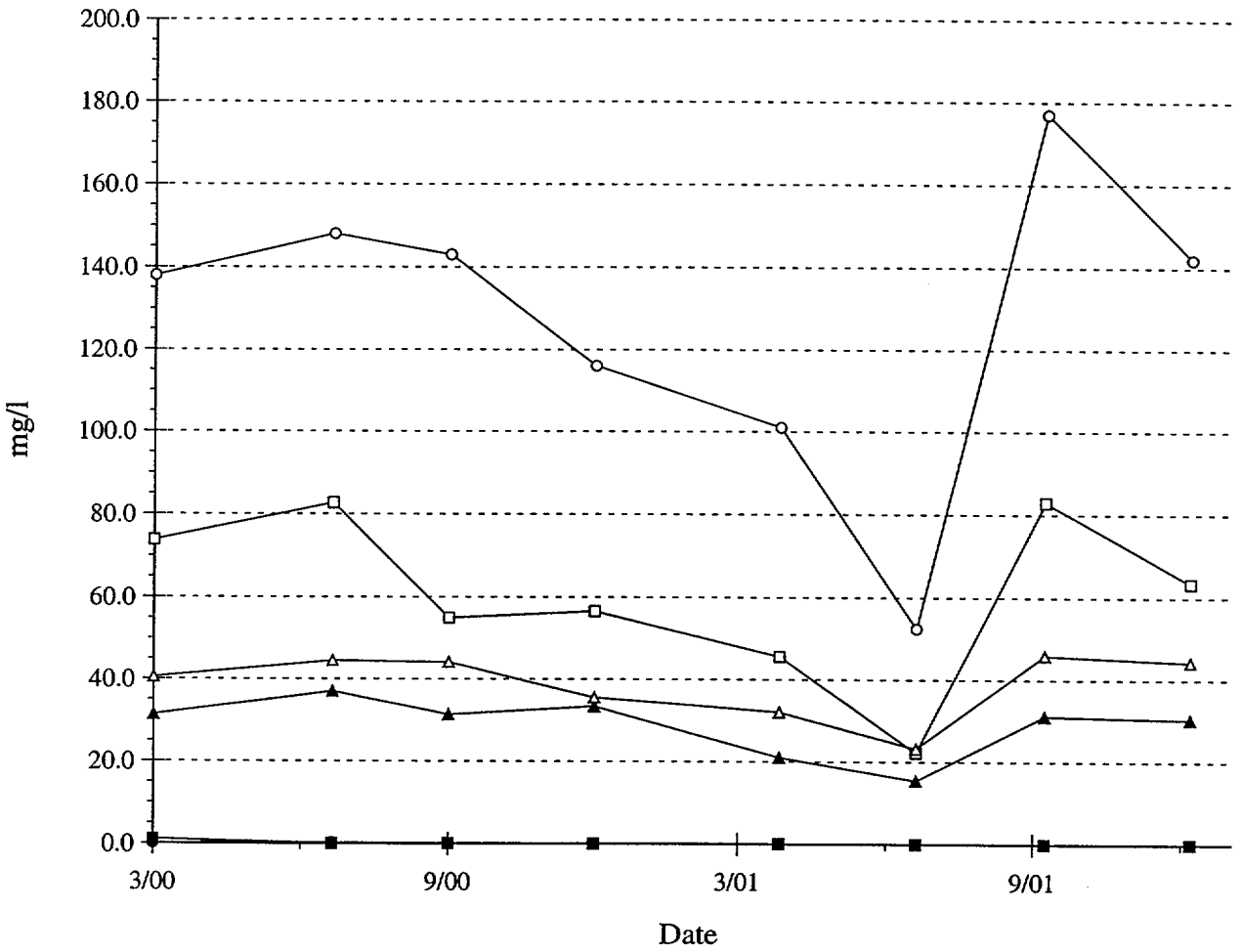

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-10A

Metals Data Versus Time
MWD-4 (Filtered)
Tulsa, Oklahoma

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Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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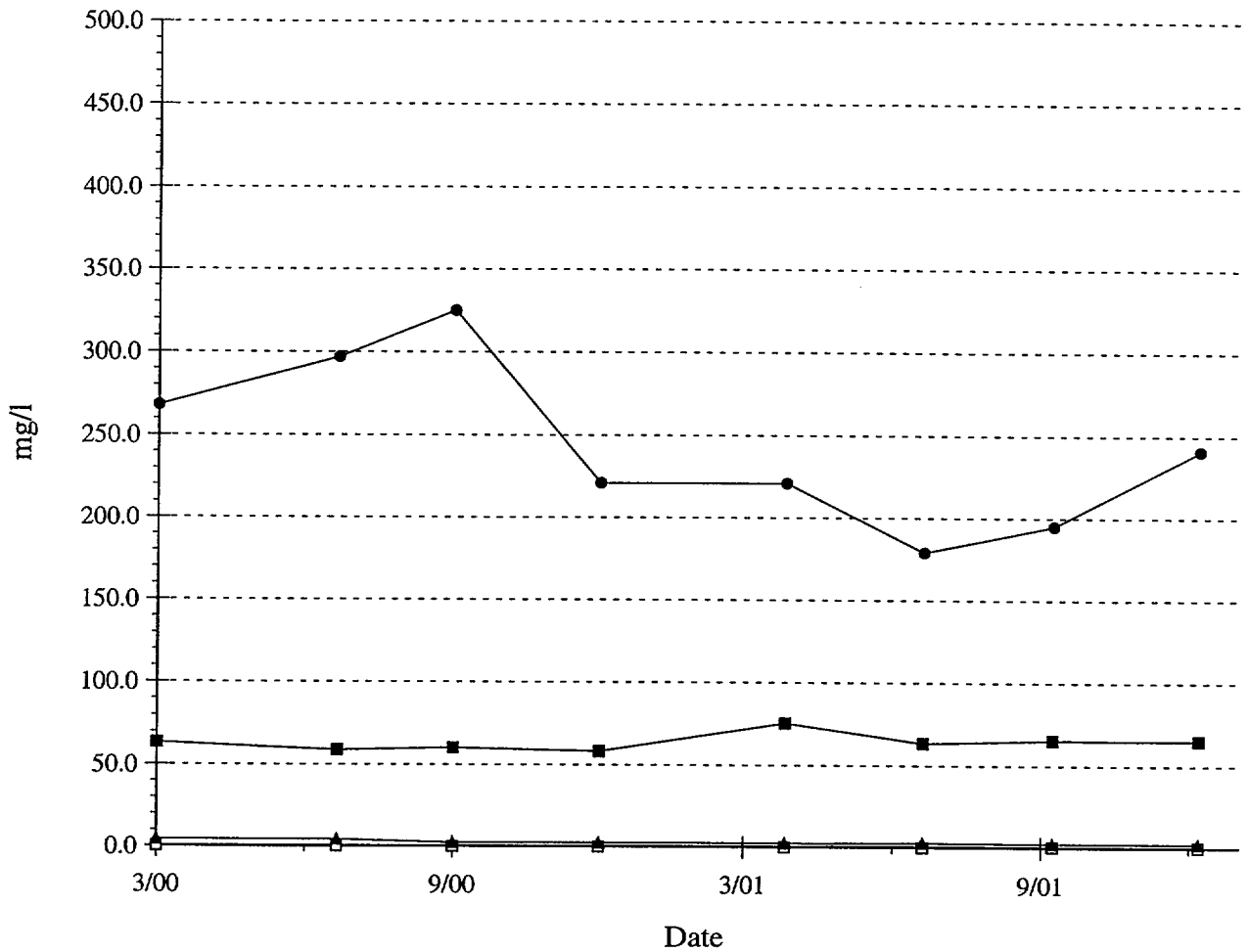

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-10B

Inorganic Data Versus Time
MWD-4 (Filtered)
Tulsa, Oklahoma

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Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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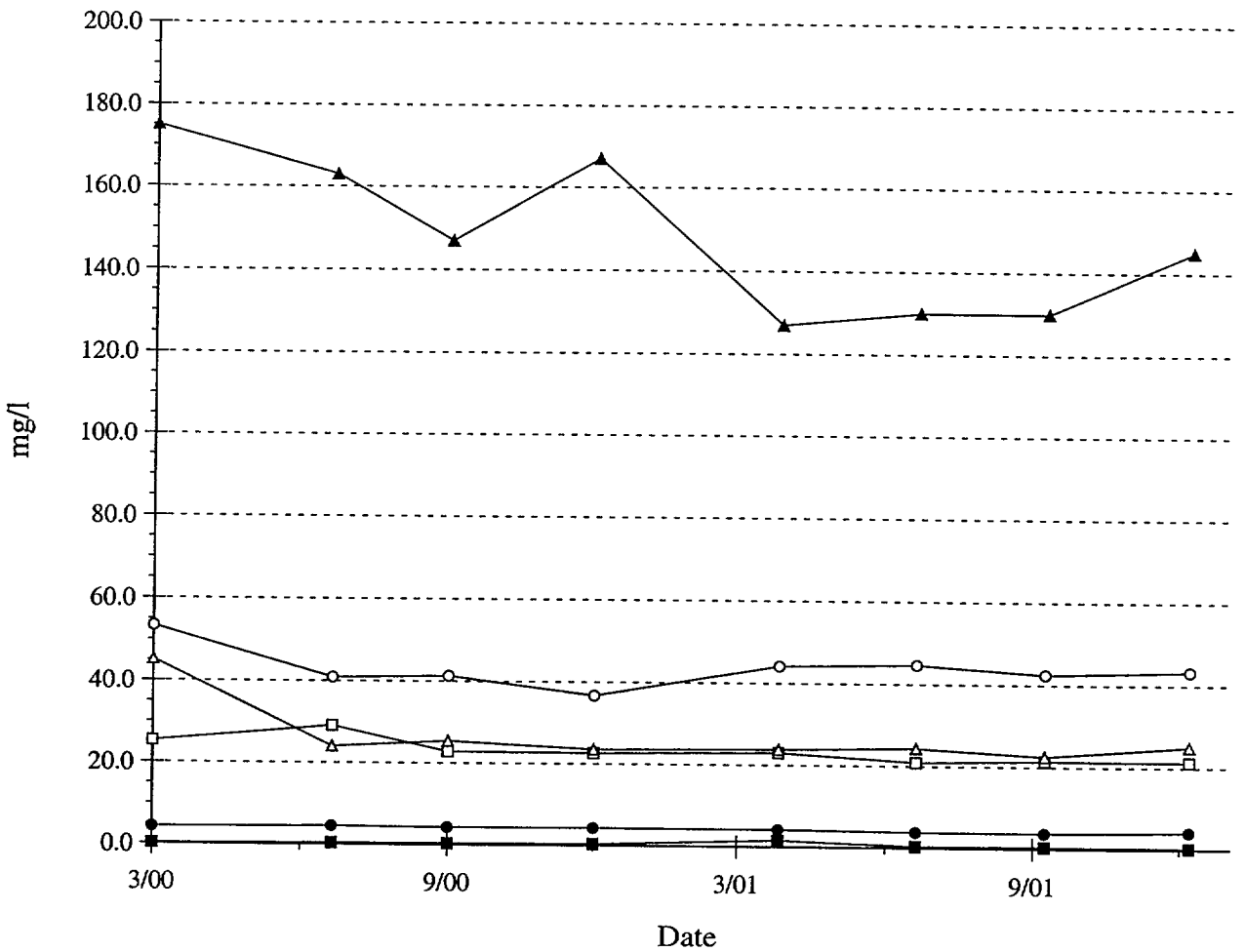

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-11A

Metals Data Versus Time
MWD-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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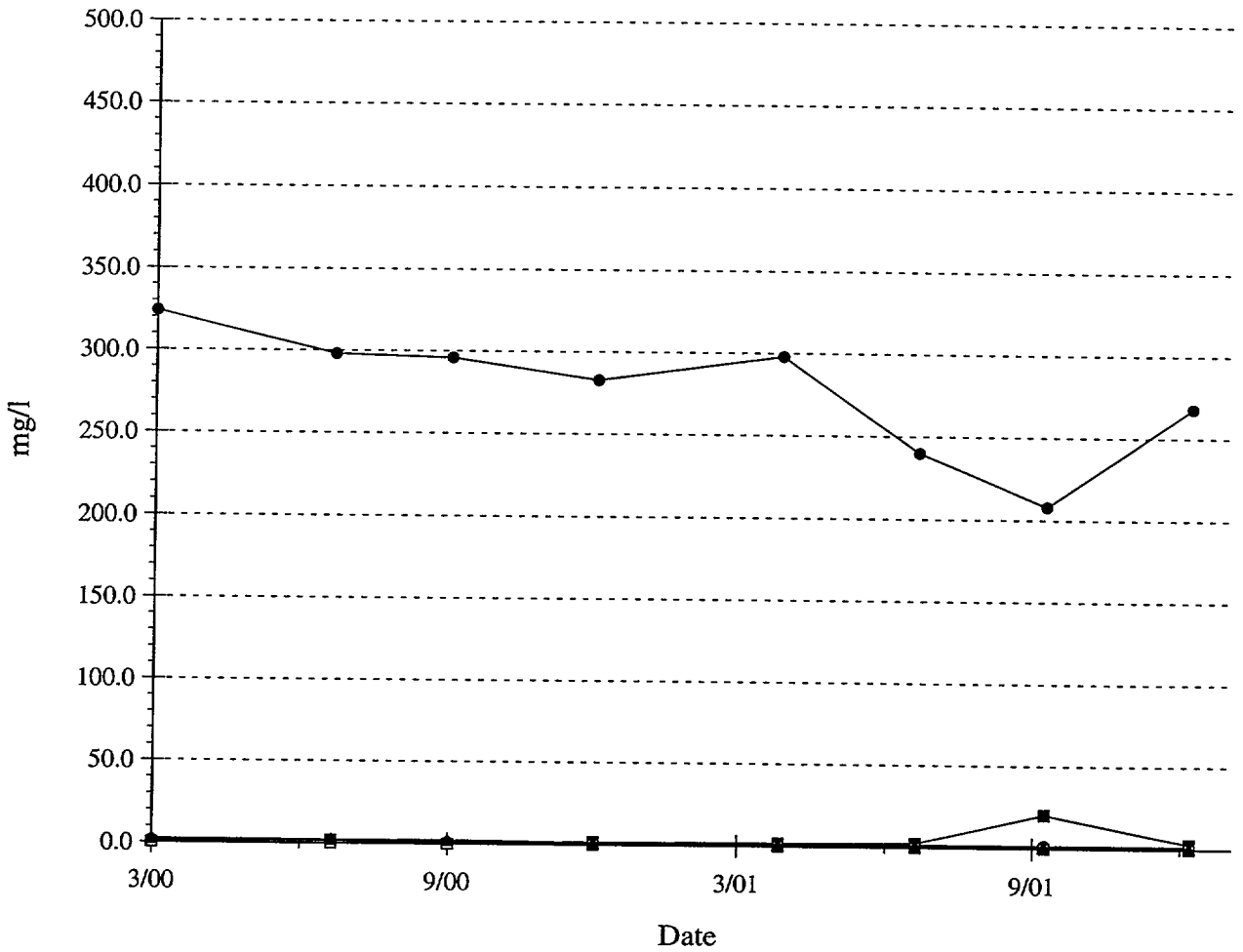

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-11B

Inorganic Data Versus Time
MWD-5 (Filtered)
Tulsa, Oklahoma

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Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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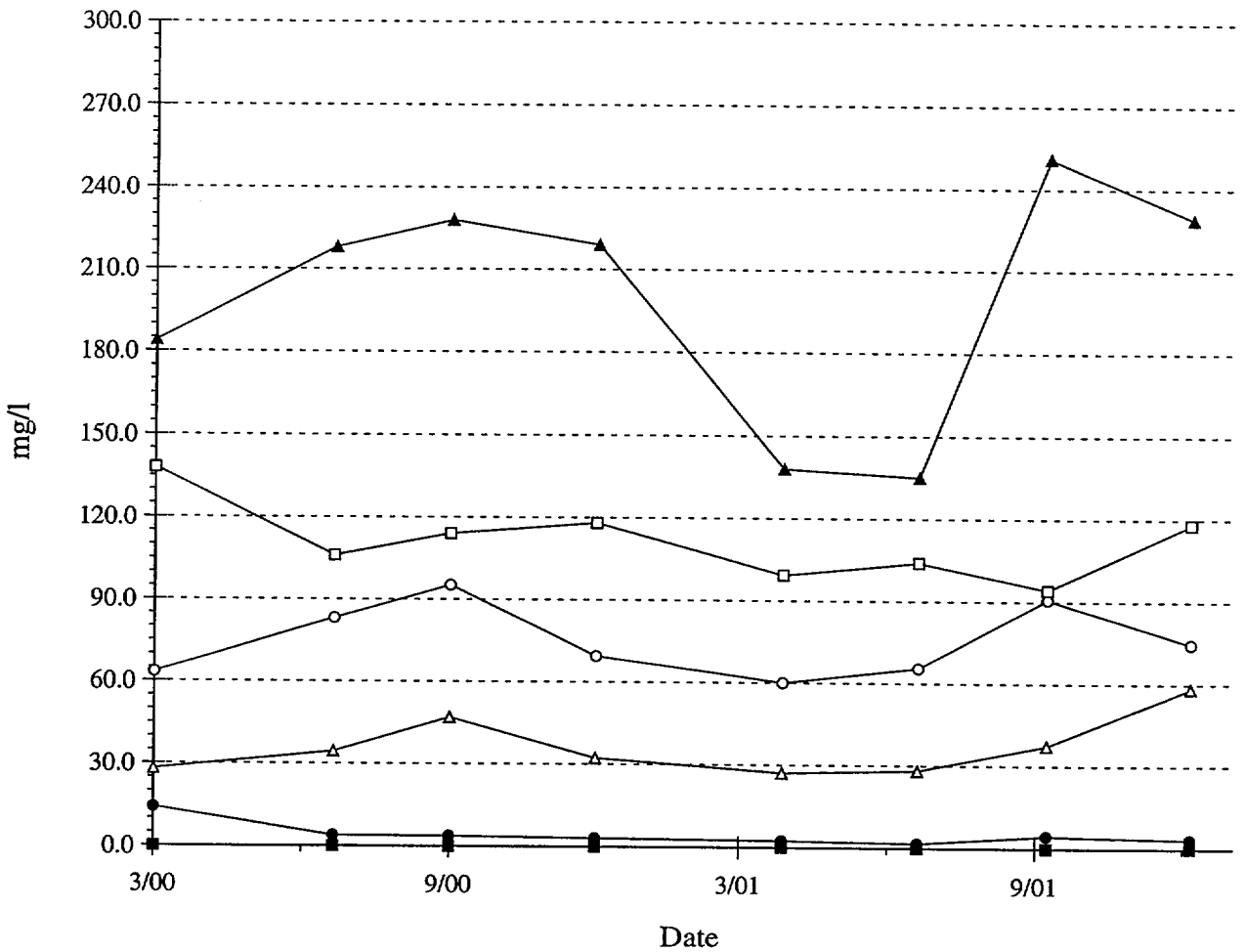

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-12A

Metals Data Versus Time
MWD-6 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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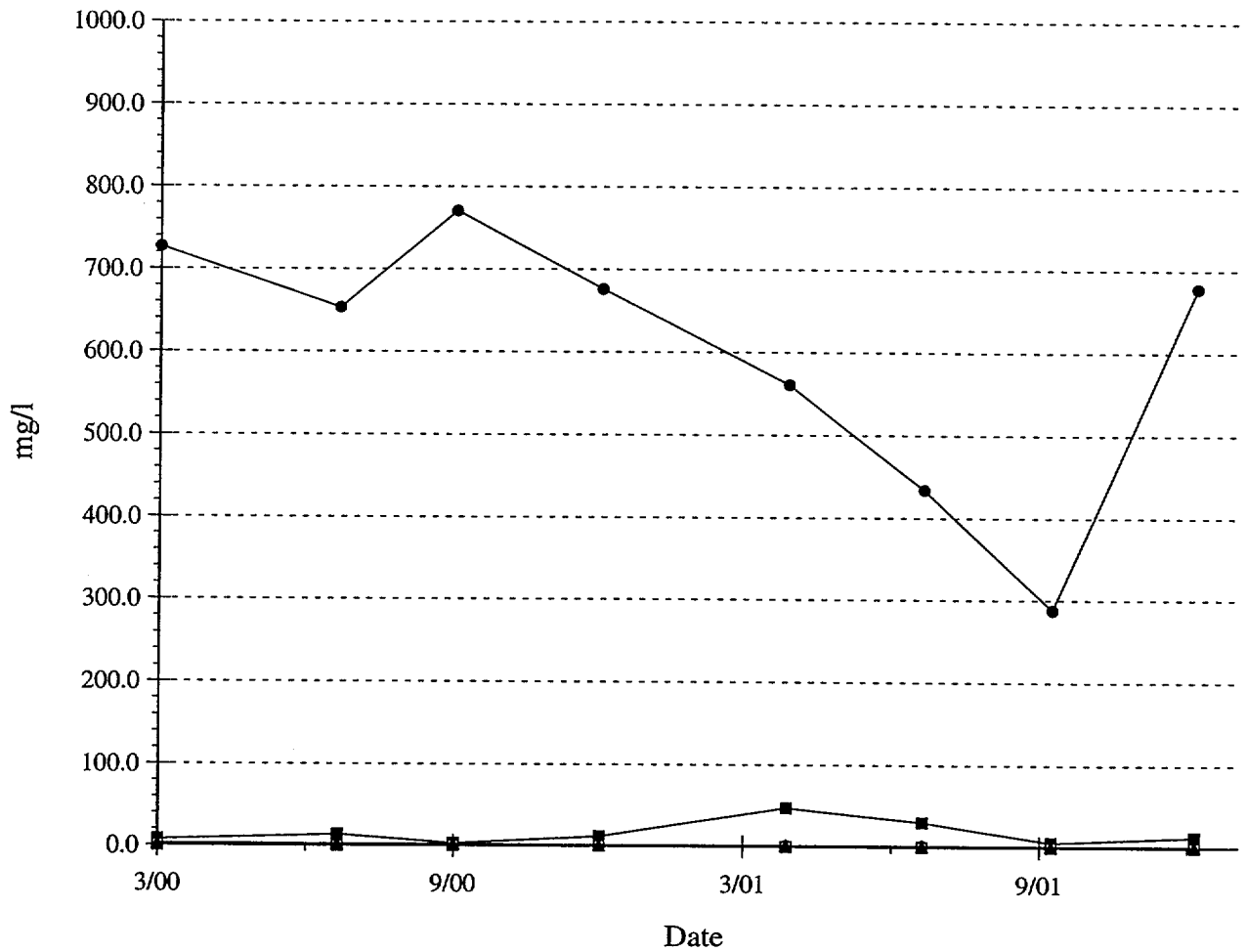
Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-12B

Inorganic Data Versus Time
MWD-6 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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DRAWN	ZZZ 05/15/2002
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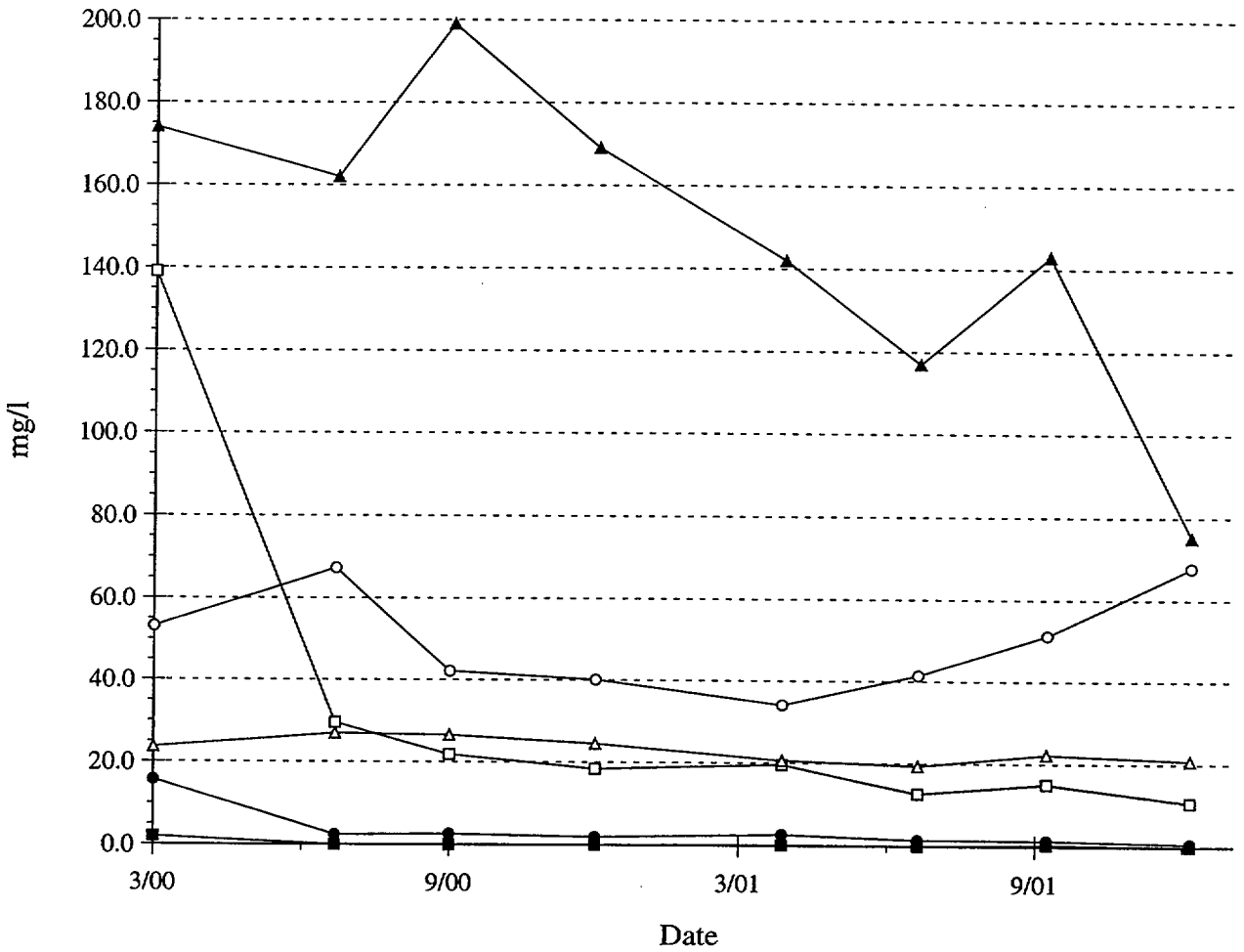

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-13A

Metals Data Versus Time
MWD-7 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RPD 5/02	
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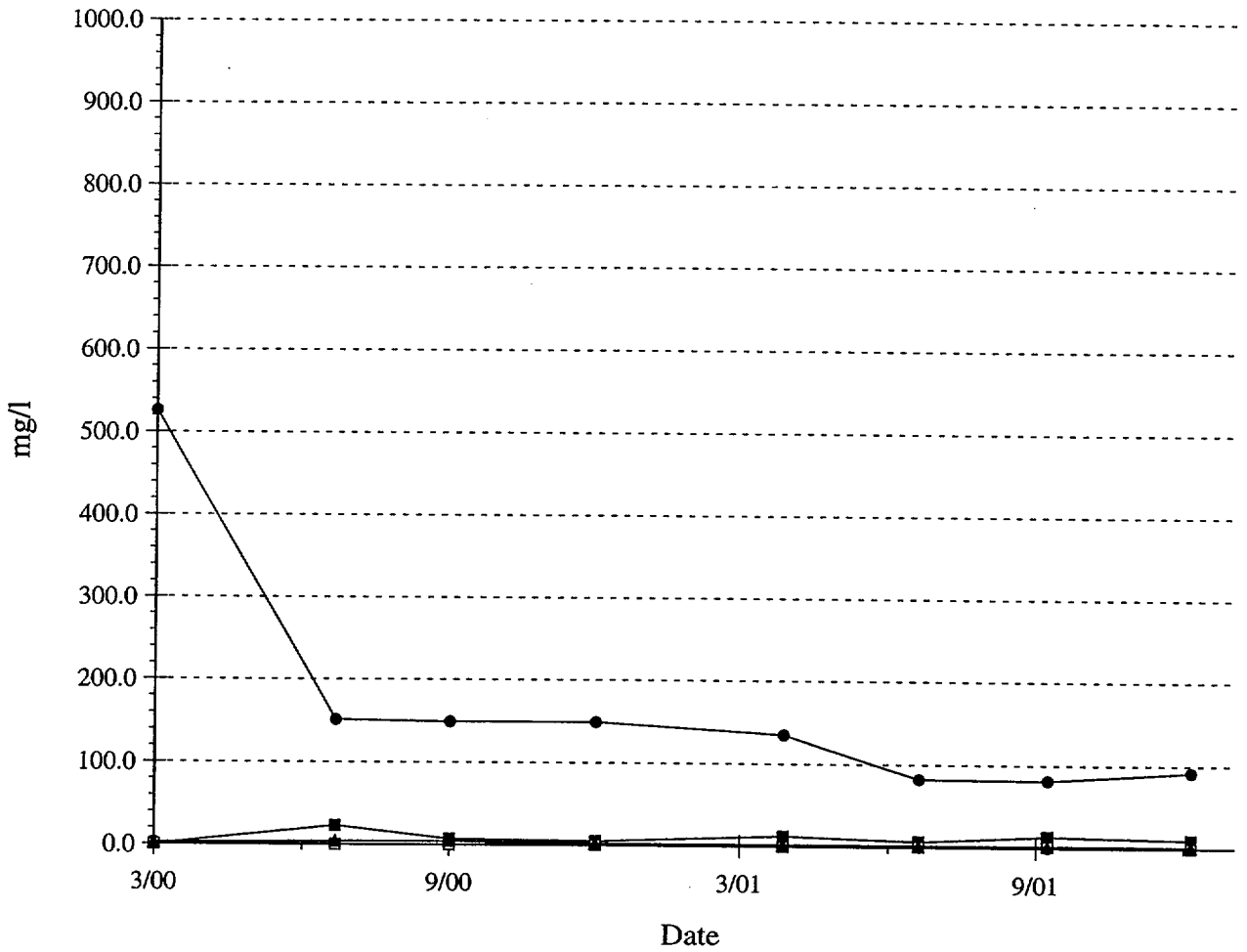
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-13B

Inorganic Data Versus Time
MWD-7 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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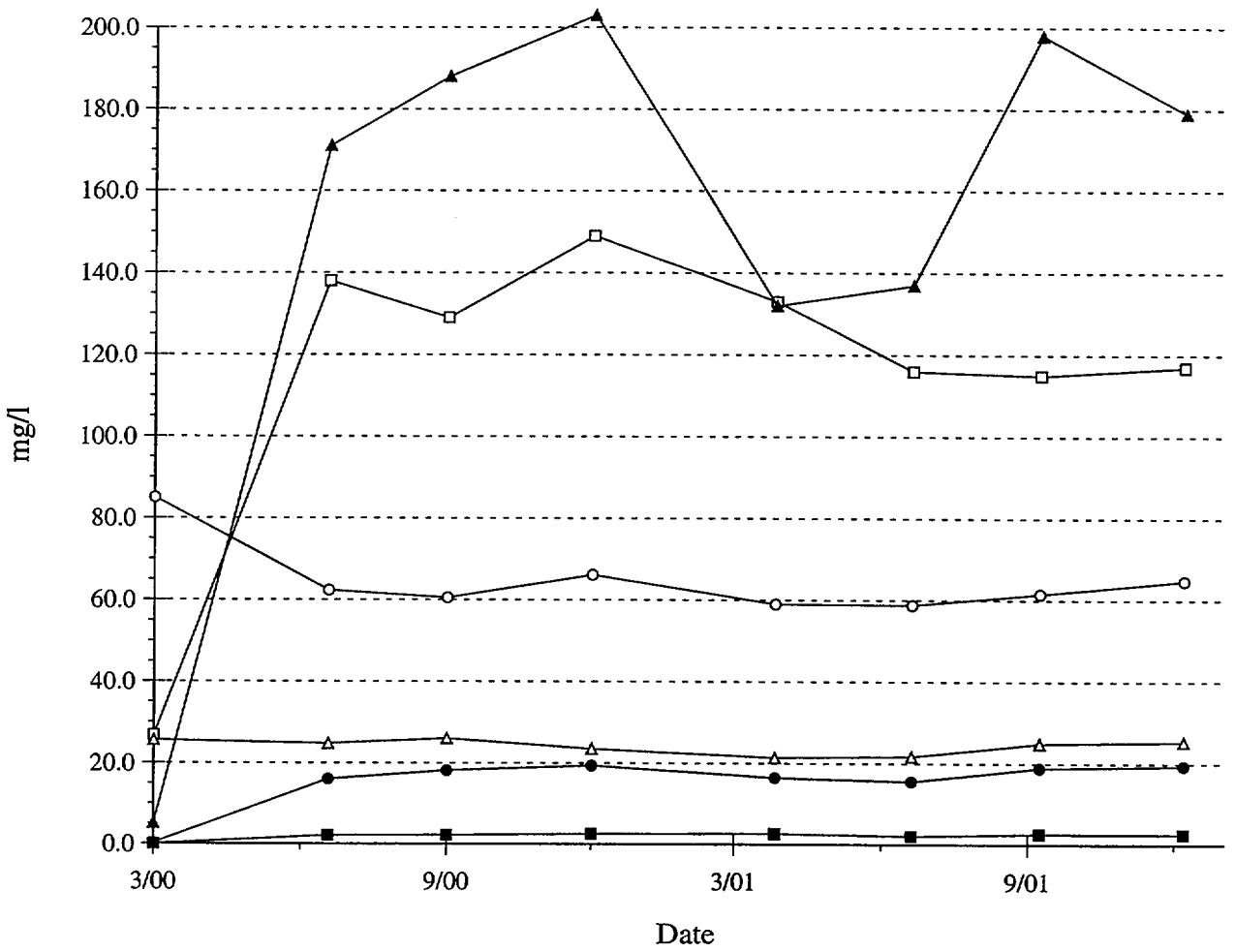
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-14A

Metals Data Versus Time
MWD-8 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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DRAWN	ZZZ 05/15/2002
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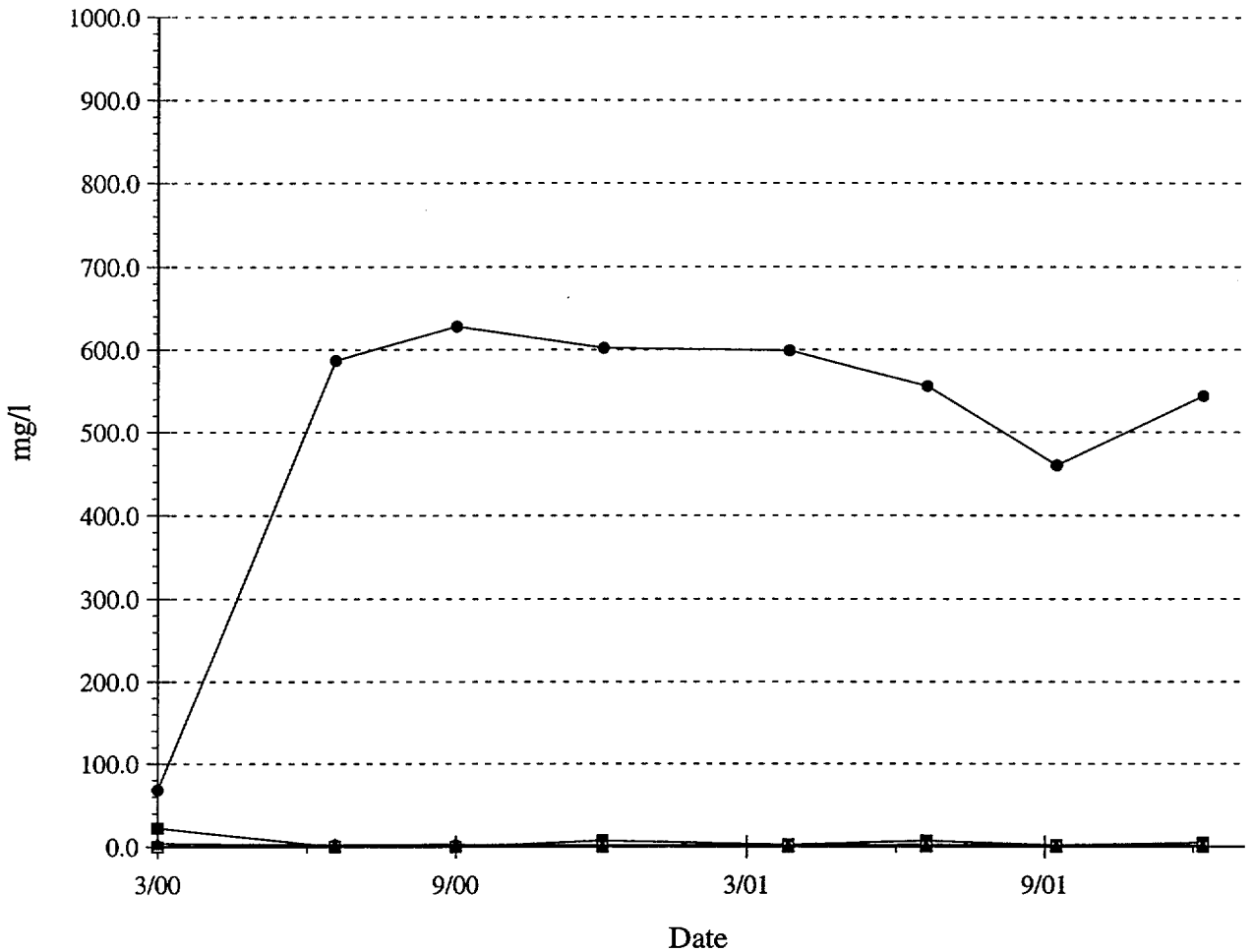

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-14B

Inorganic Data Versus Time
MWD-8 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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DRAWING NUMBER	

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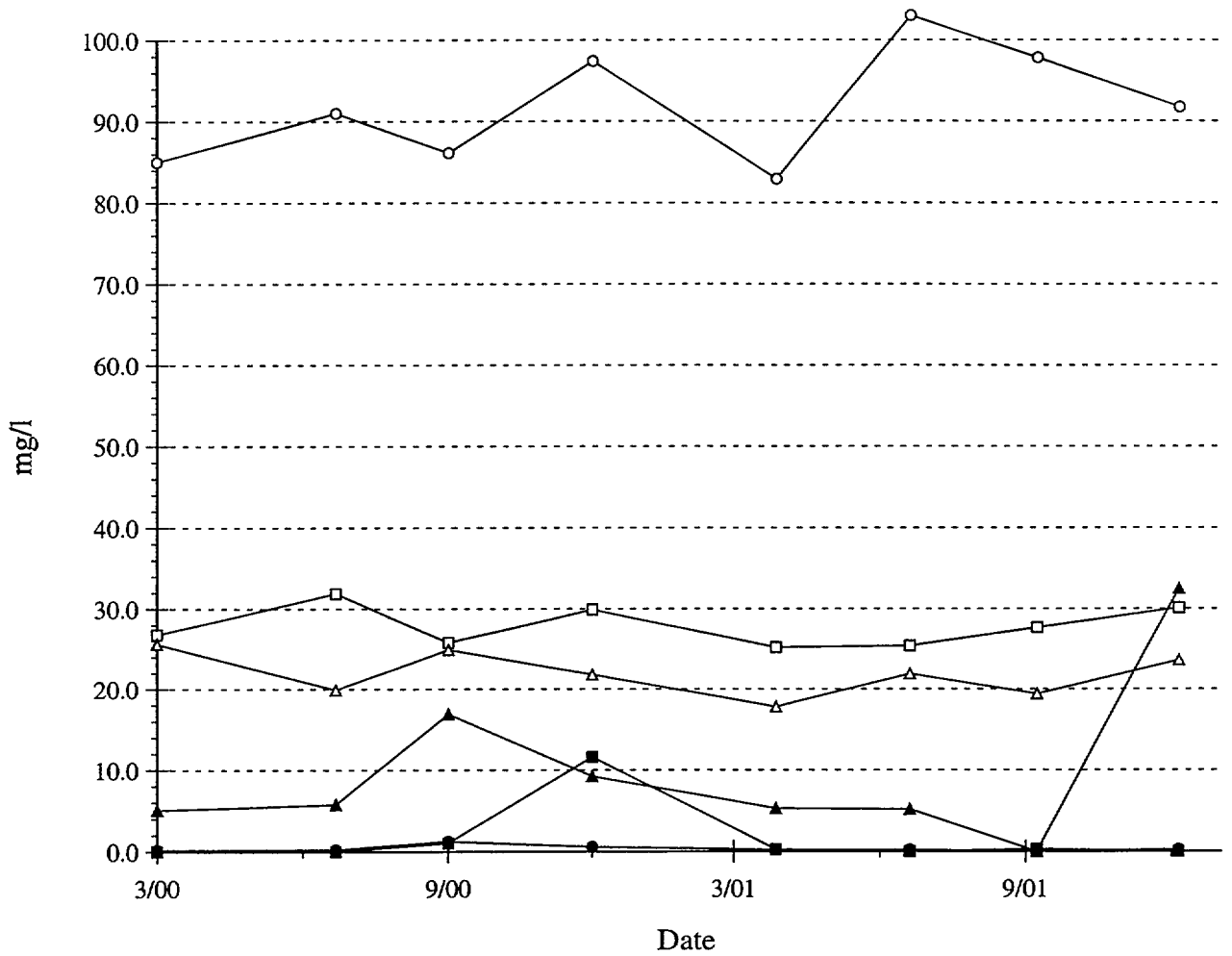

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-15A

Metals Data Versus Time
MWD-9 (Filtered)
Tulsa, Oklahoma

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Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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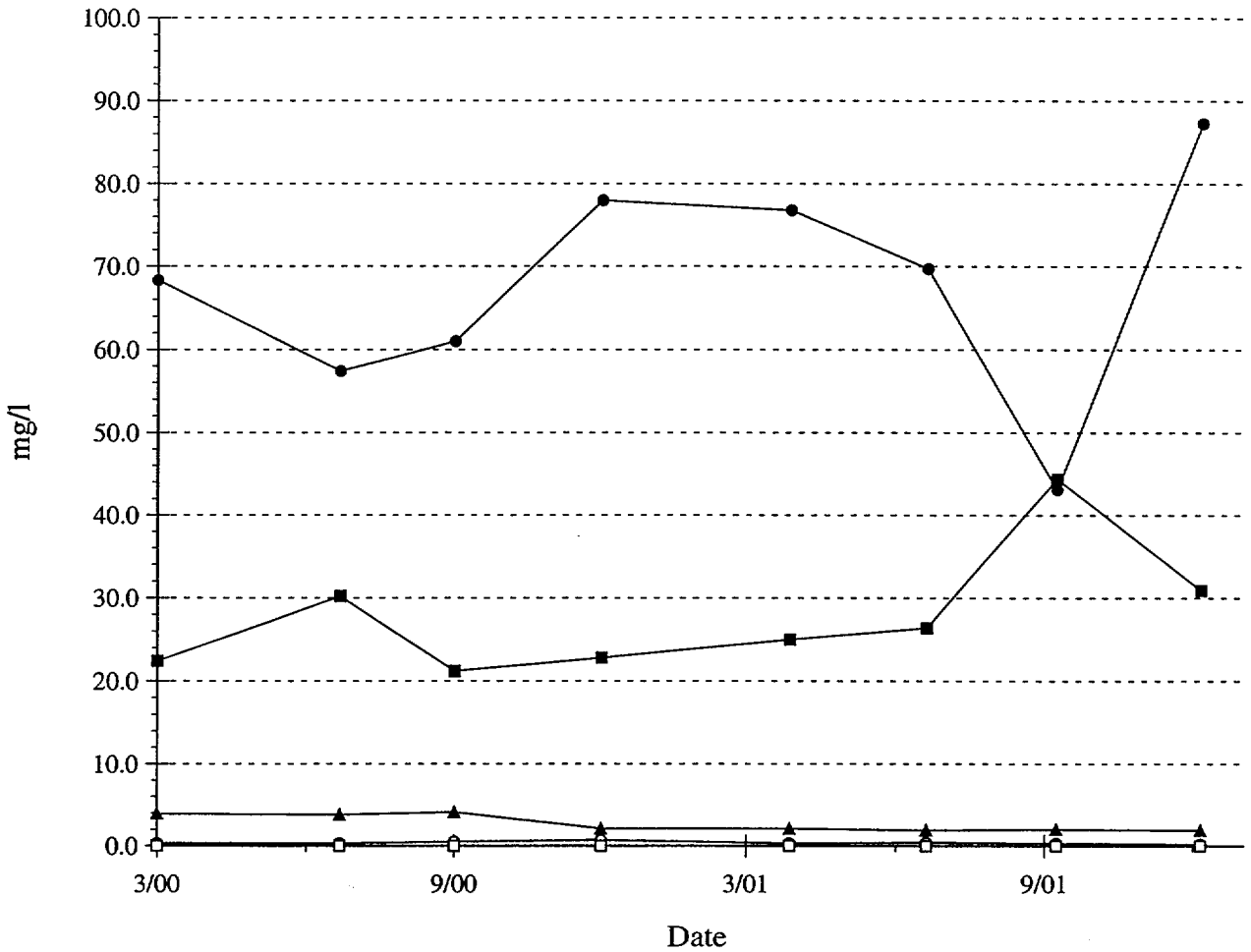

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-15B

Inorganic Data Versus Time
MWD-9 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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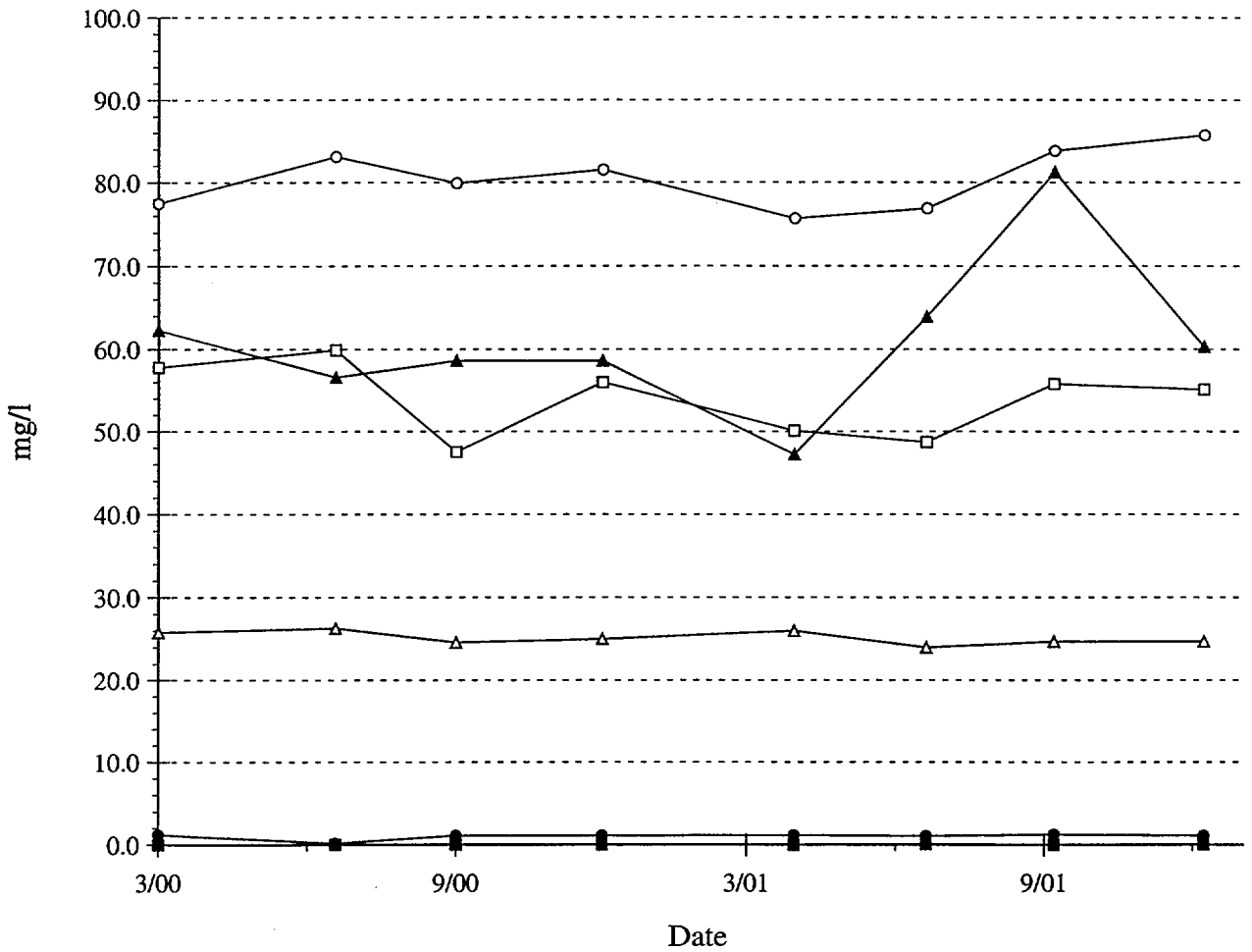
Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-16A

Metals Data Versus Time
MWD-10 (Filtered)
Tulsa, Oklahoma

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Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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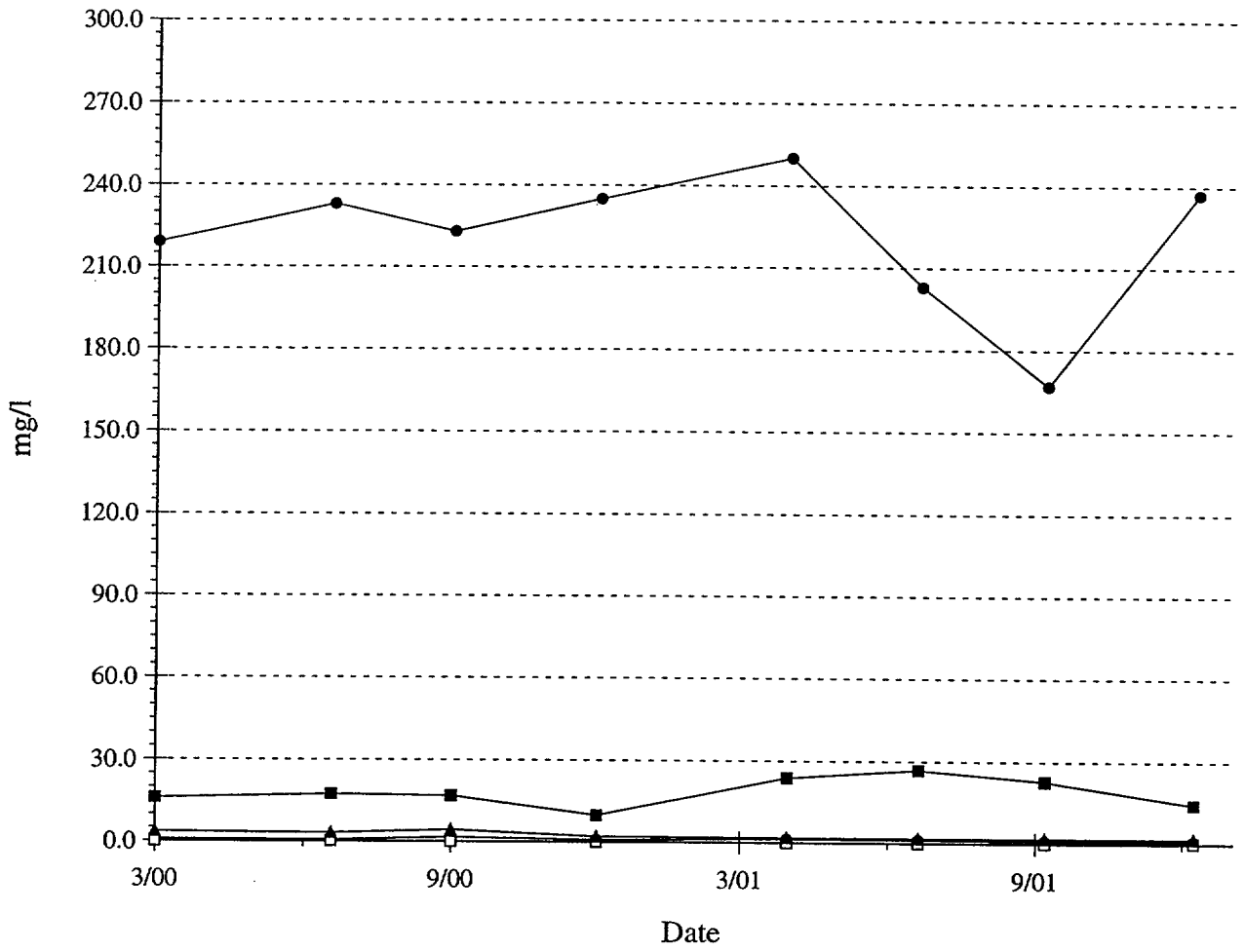

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-16B

Inorganic Data Versus Time
MWD-10 (Filtered)
Tulsa, Oklahoma

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Baton Rouge, Louisiana

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DRAWING NUMBER	

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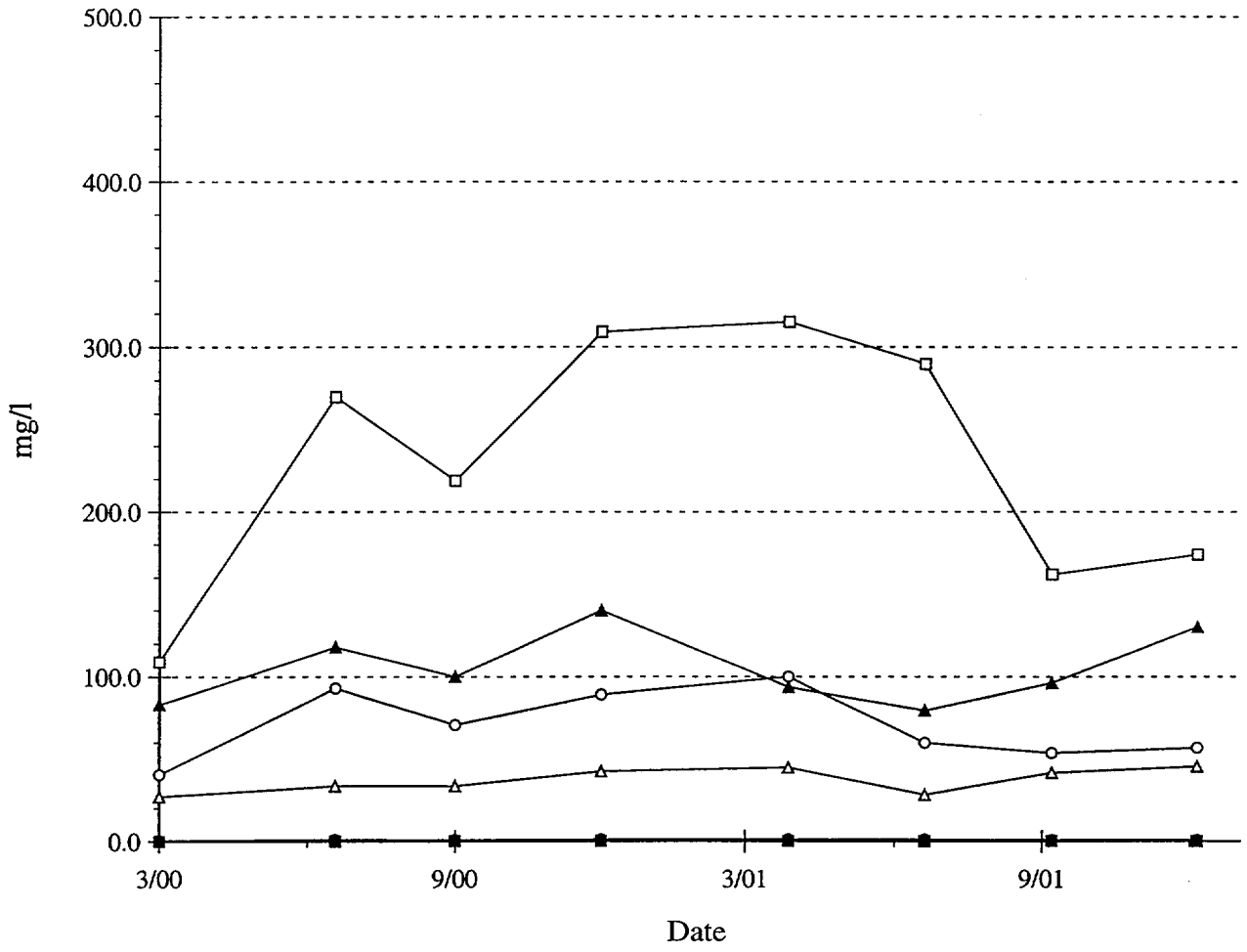

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-17A

Metals Data Versus Time
MWD-11 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RAD 5/02
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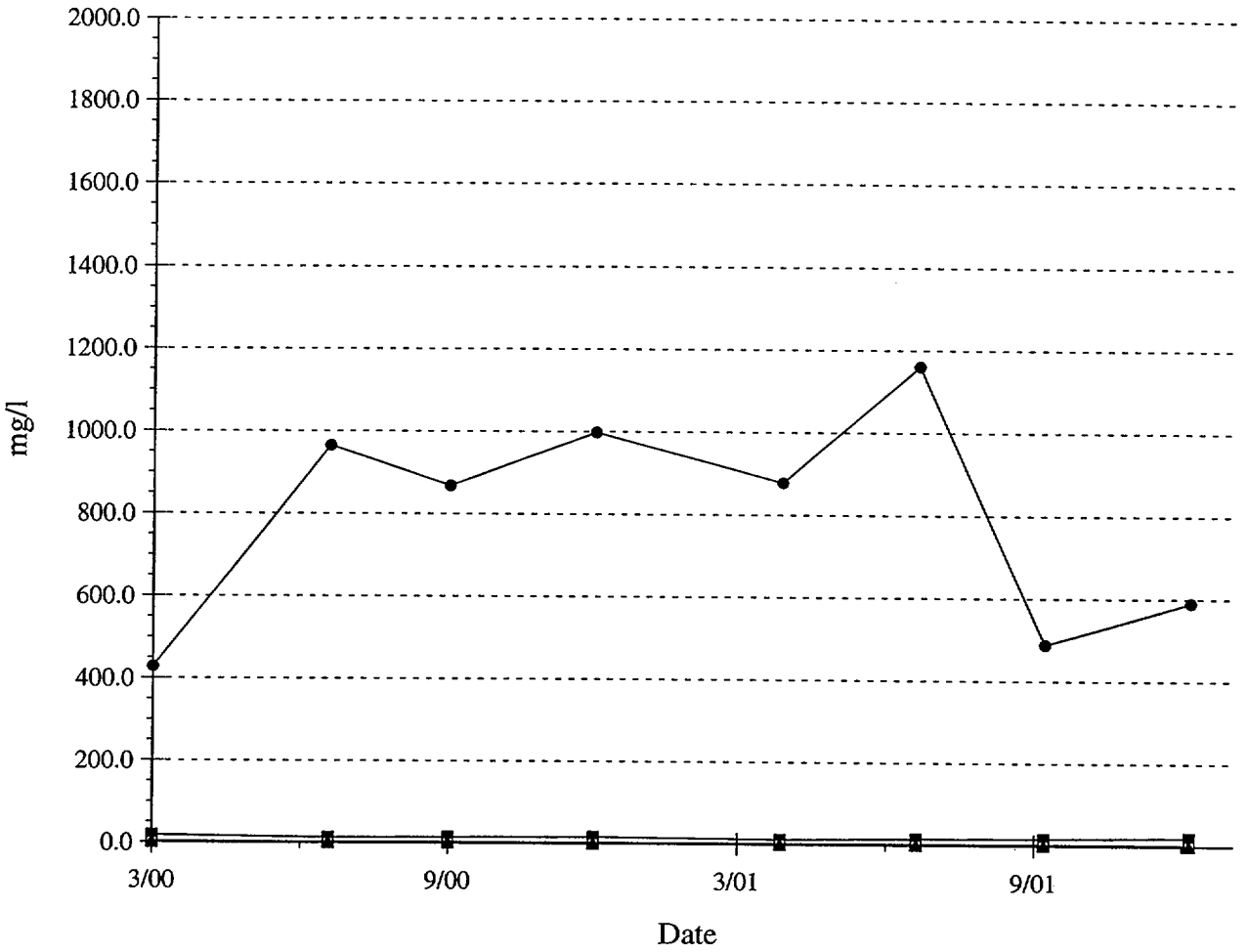
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-17B

Inorganic Data Versus Time
MWD-11 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RFD 5/01	
CHECKED —	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

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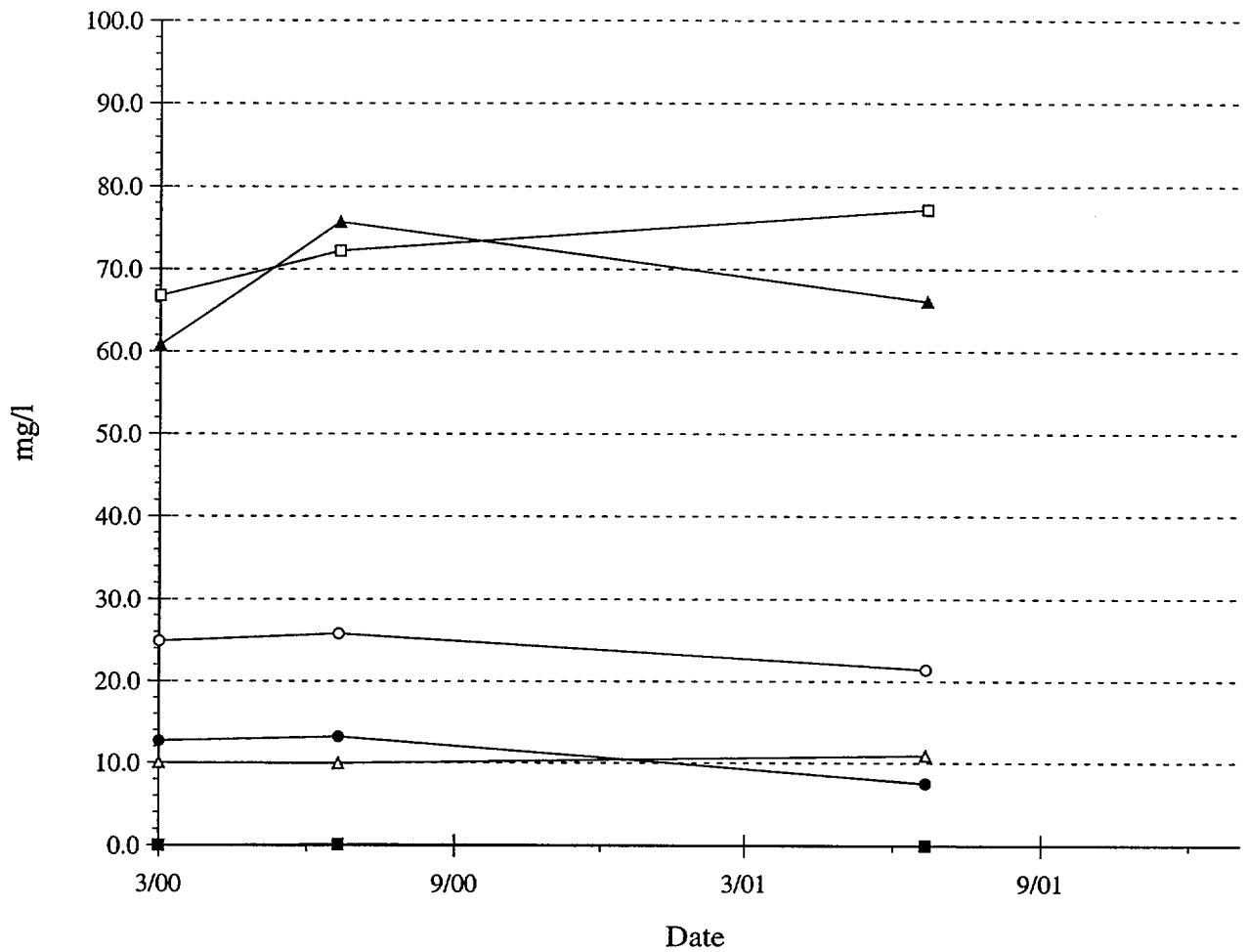

Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-18A

Metals Data Versus Time
MWS-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RHO 5/02
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DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

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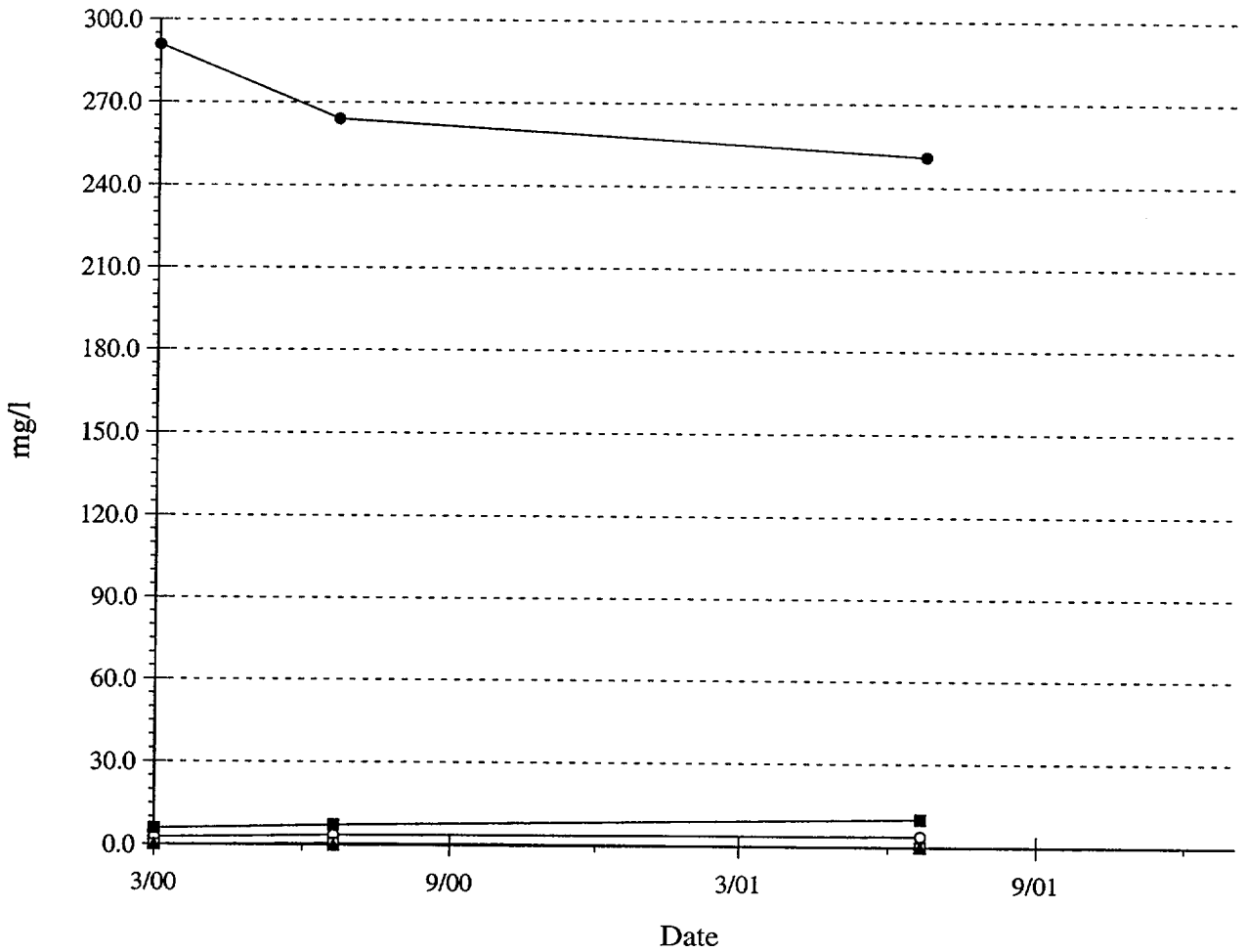

Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-18B

Inorganic Data Versus Time
MWS-4 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RED SNL
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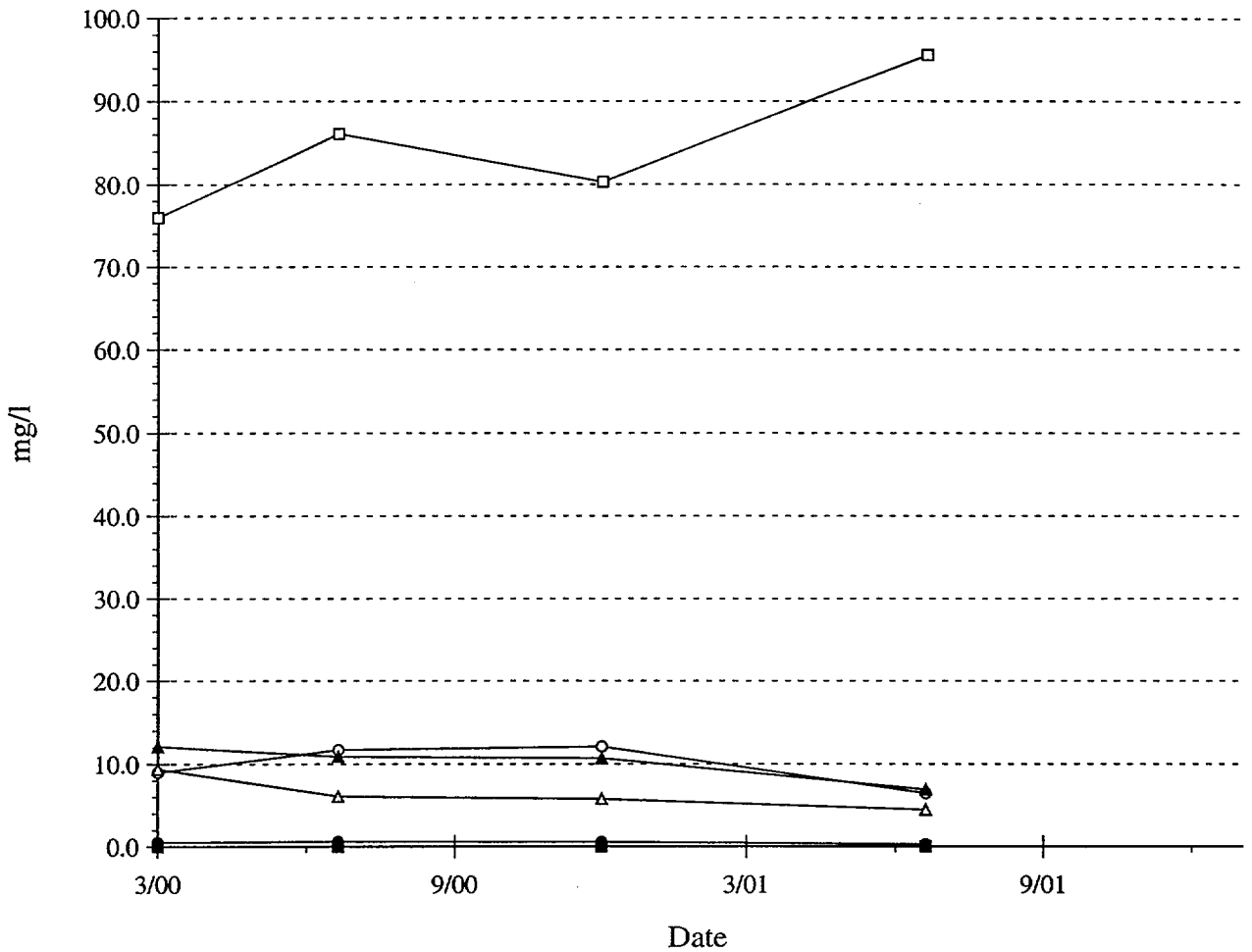
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-19A

Metals Data Versus Time
MWS-5 (Filtered)
Tulsa, Oklahoma

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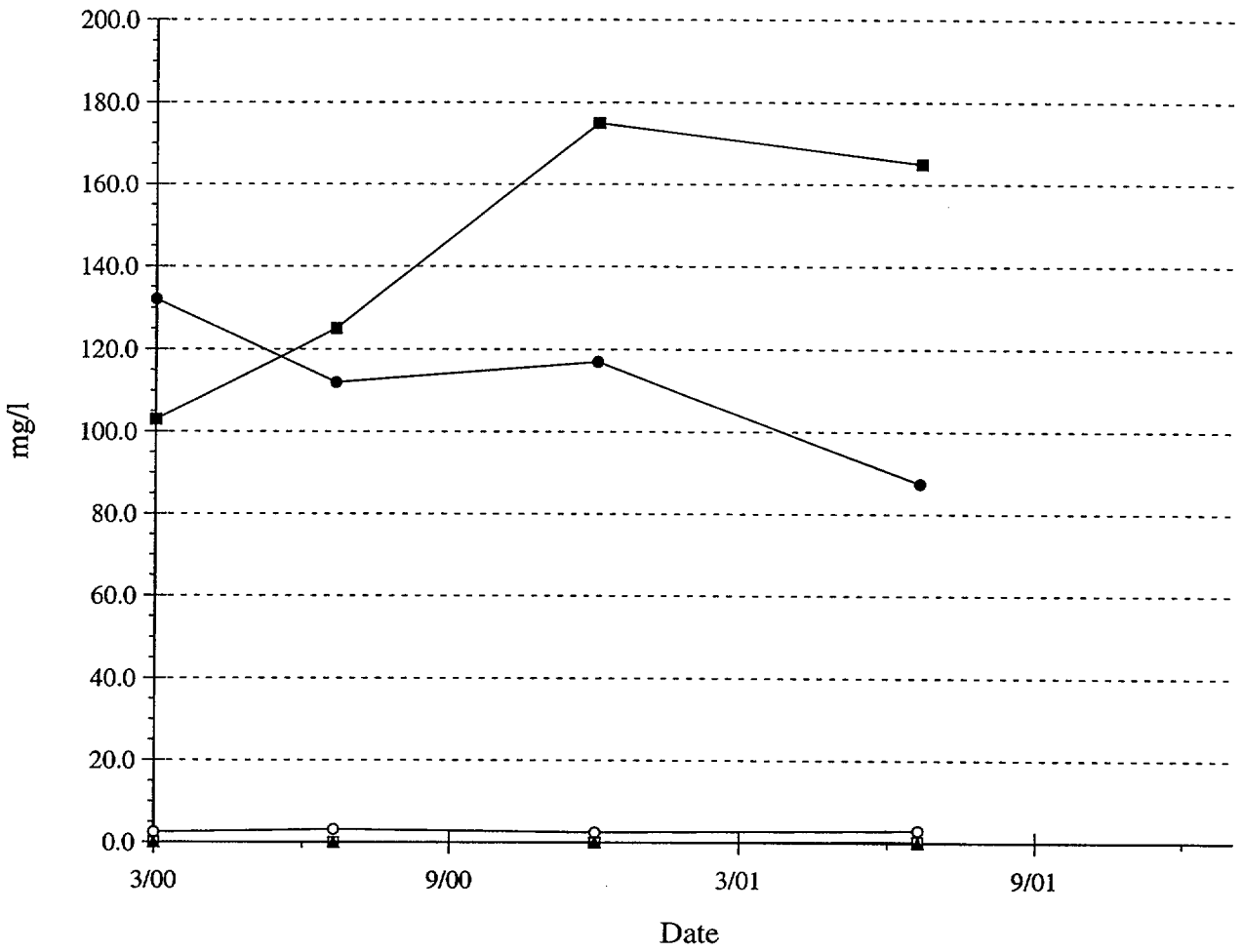
Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RH 5/02
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-19B

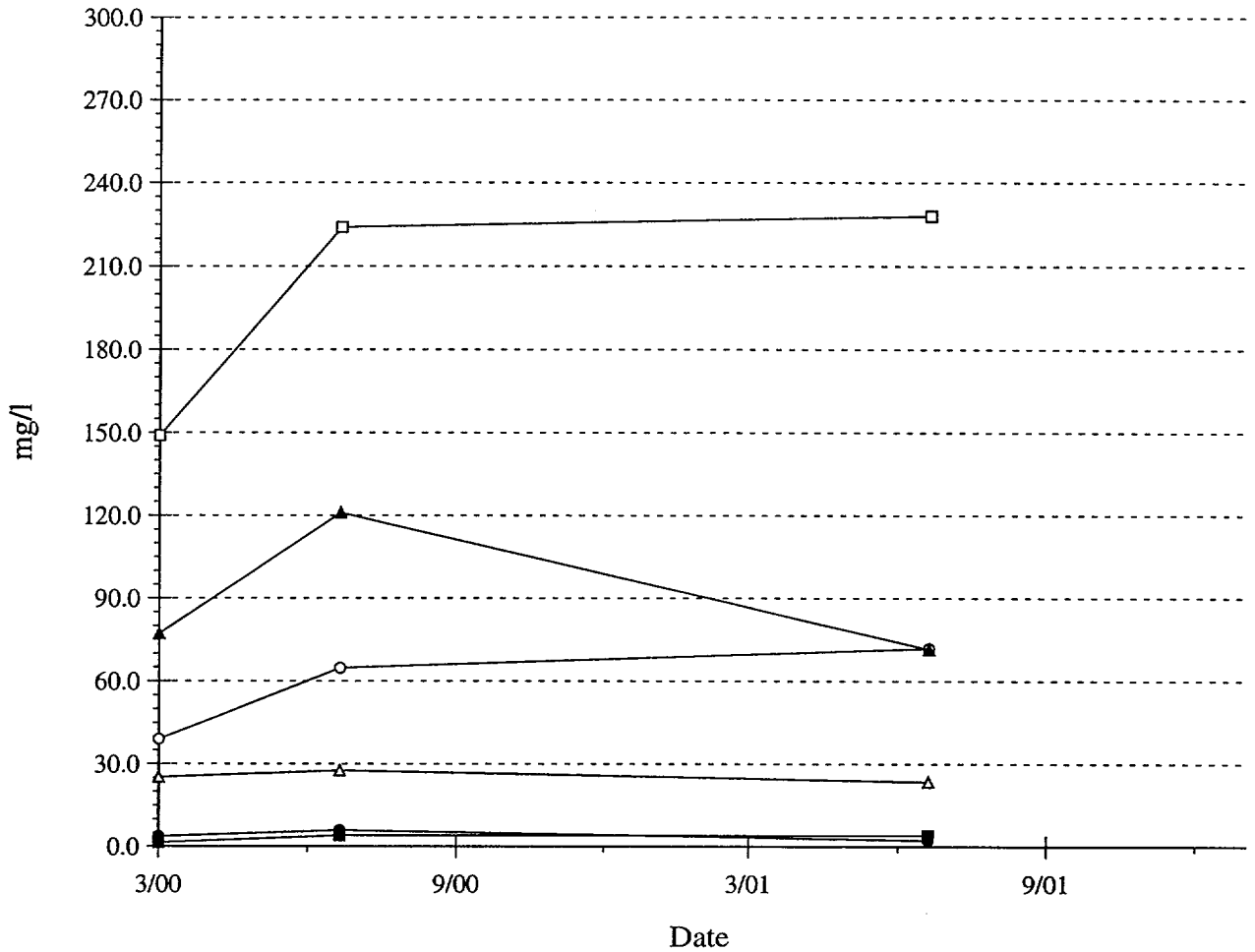
Inorganic Data Versus Time
MWS-5 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RPO SM
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-20A

Metals Data Versus Time
MWS-6 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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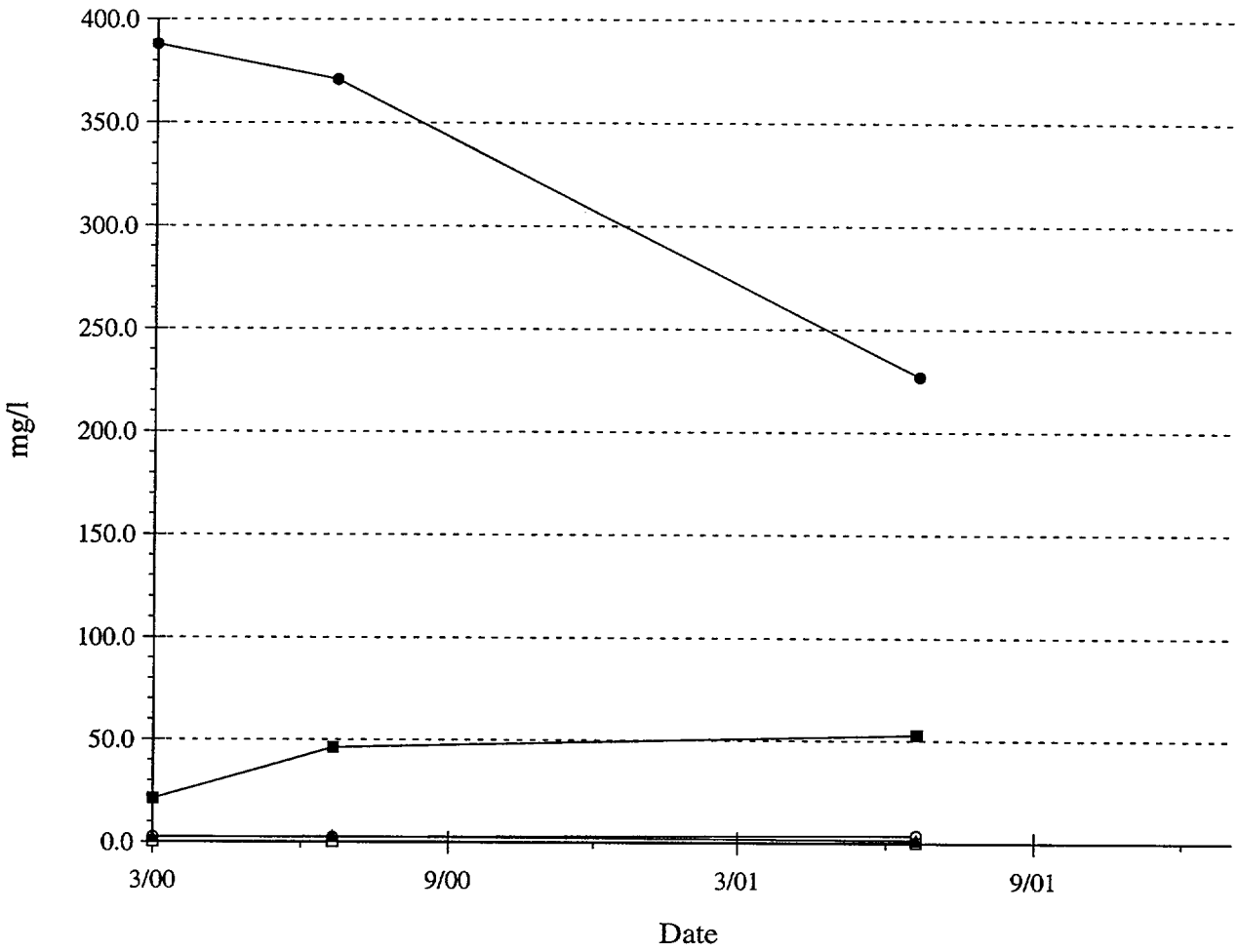
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-20B

Inorganic Data Versus Time
MWS-6 (Filtered)
Tulsa, Oklahoma

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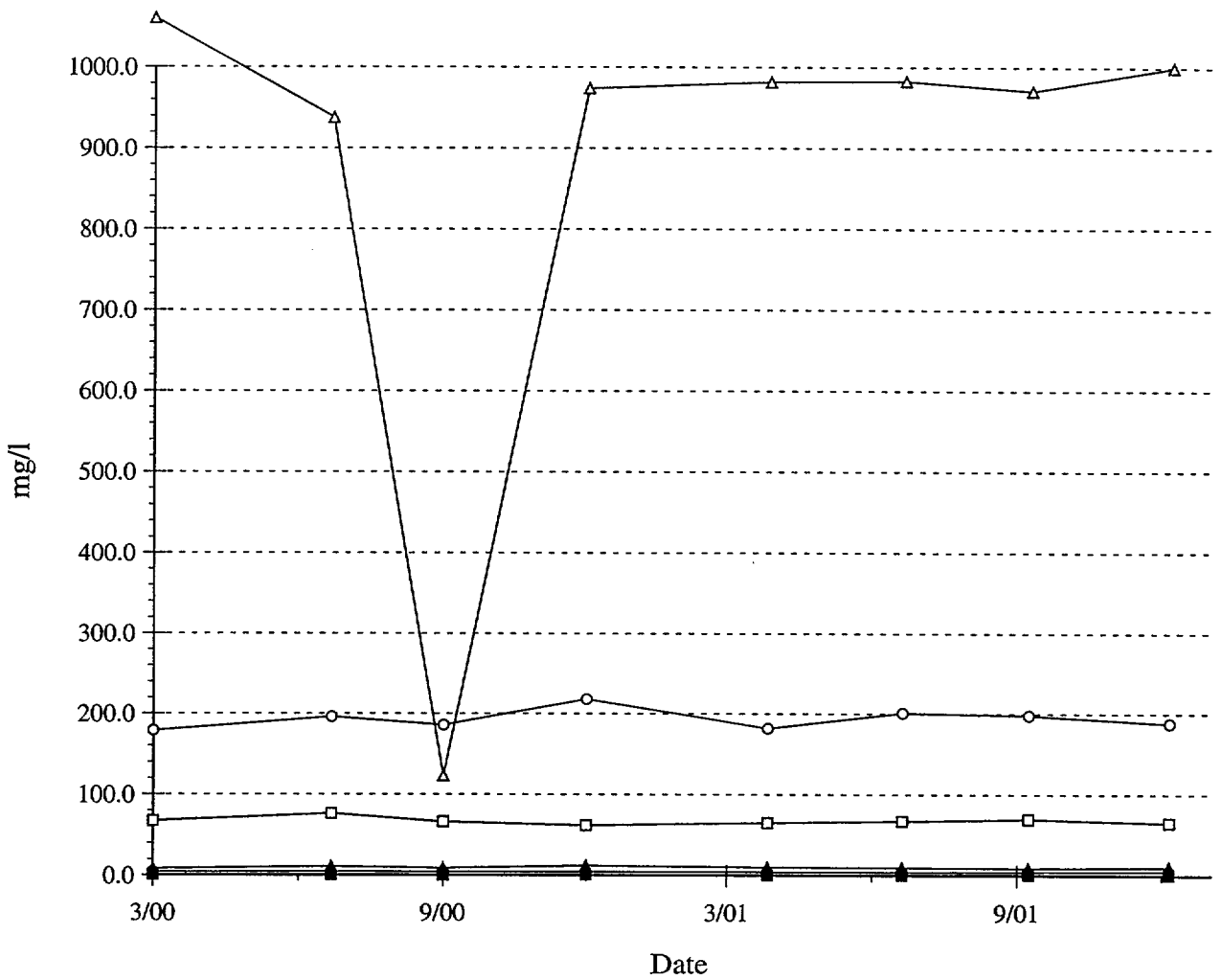
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-21A

Metals Data Versus Time
ST-3 (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

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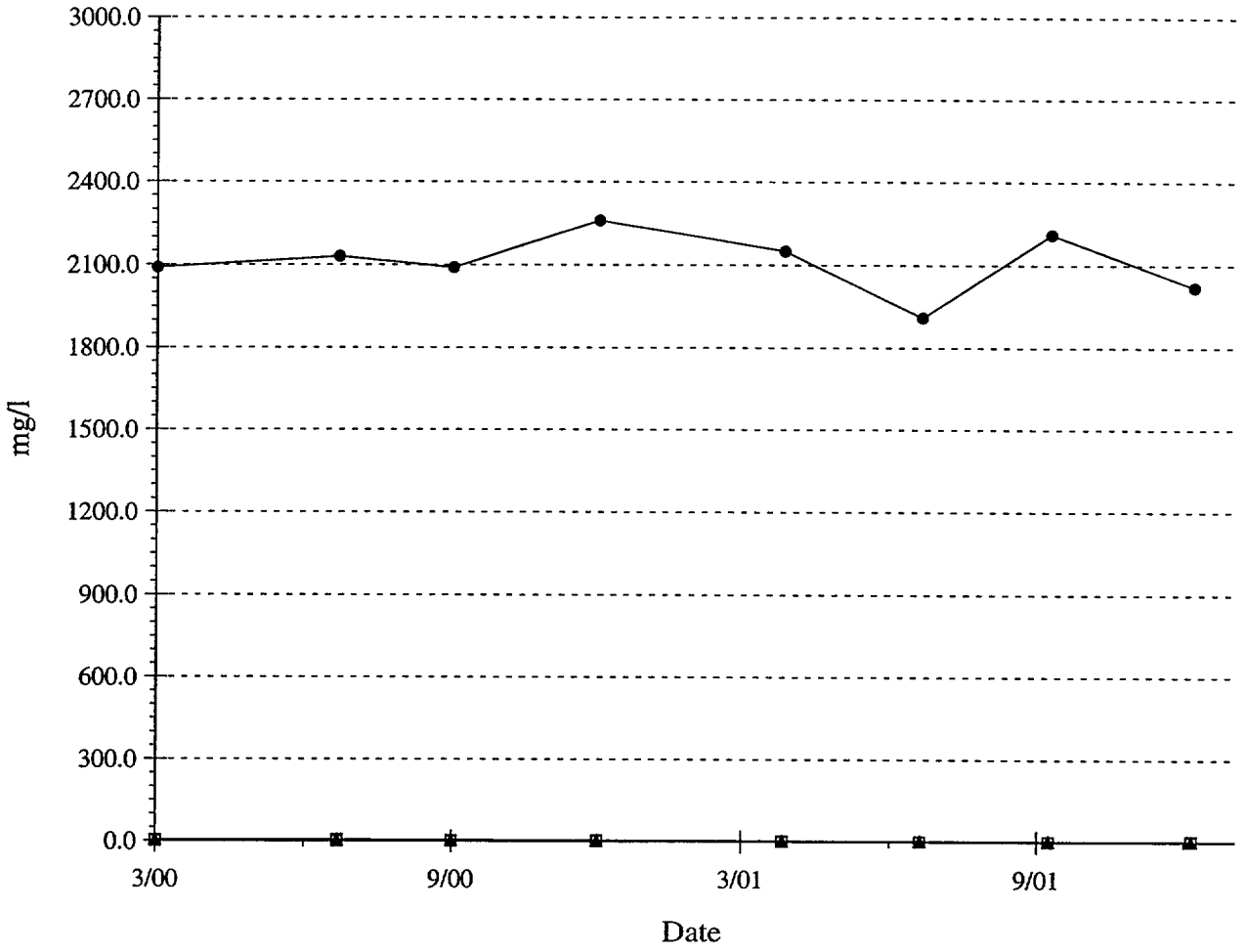
CHECKED	—
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-21B

Inorganic Data Versus Time
ST-3 (Filtered)
Tulsa, Oklahoma

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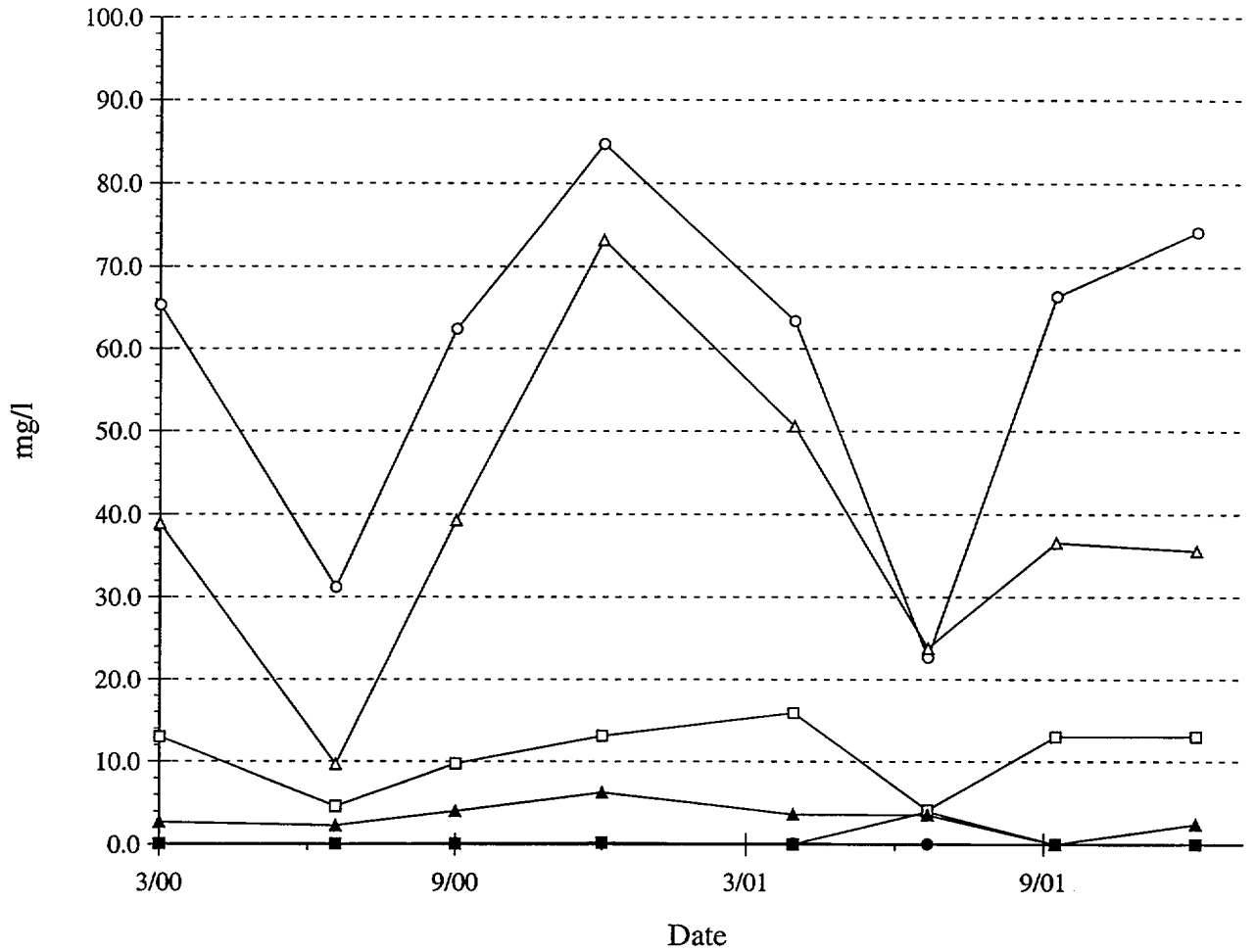
Baton Rouge, Louisiana

APPROVED	RFO 5/02
CHECKED	-
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-22A

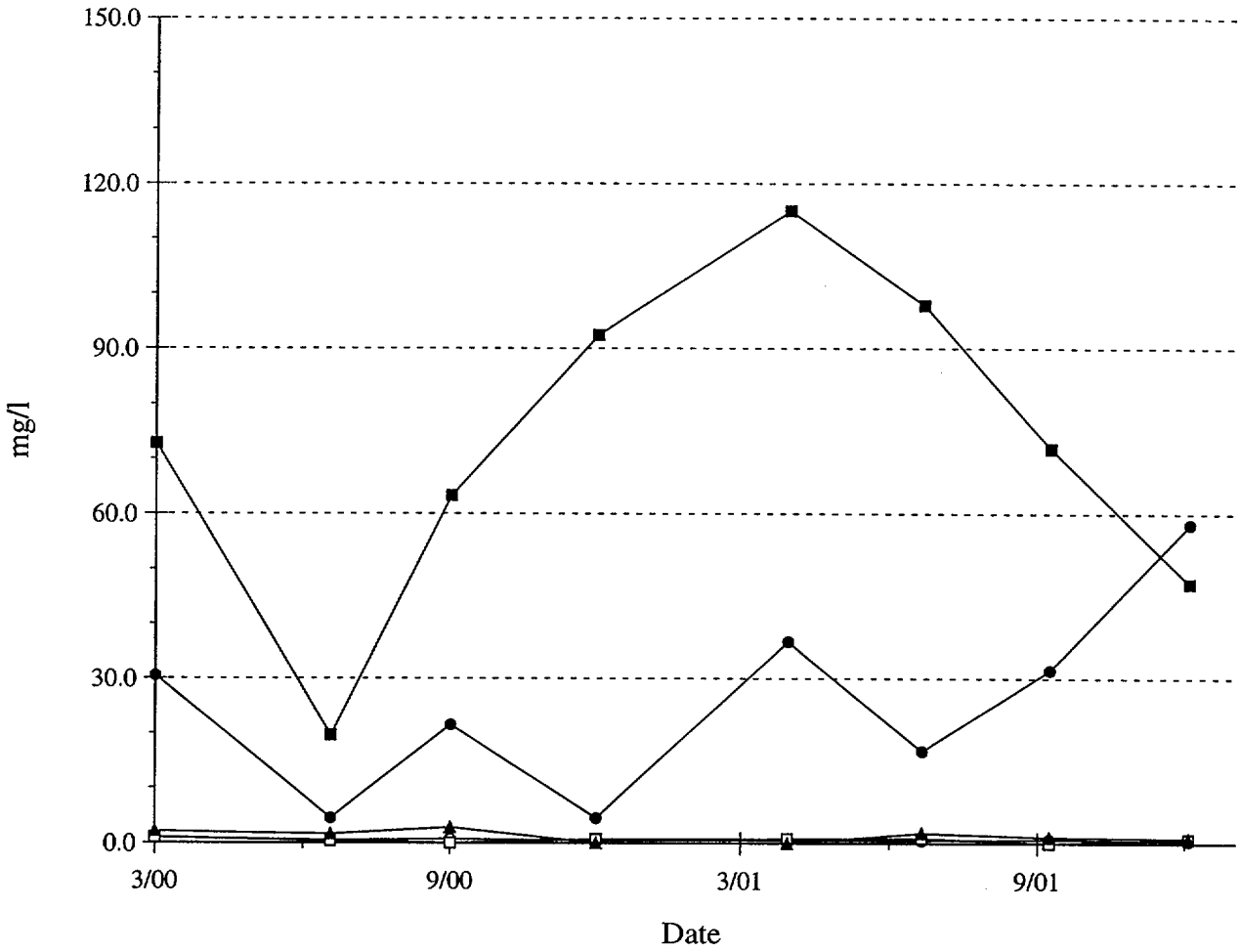
Metals Data Versus Time
Fresh Water Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RFO SM	
CHECKED –	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-22B

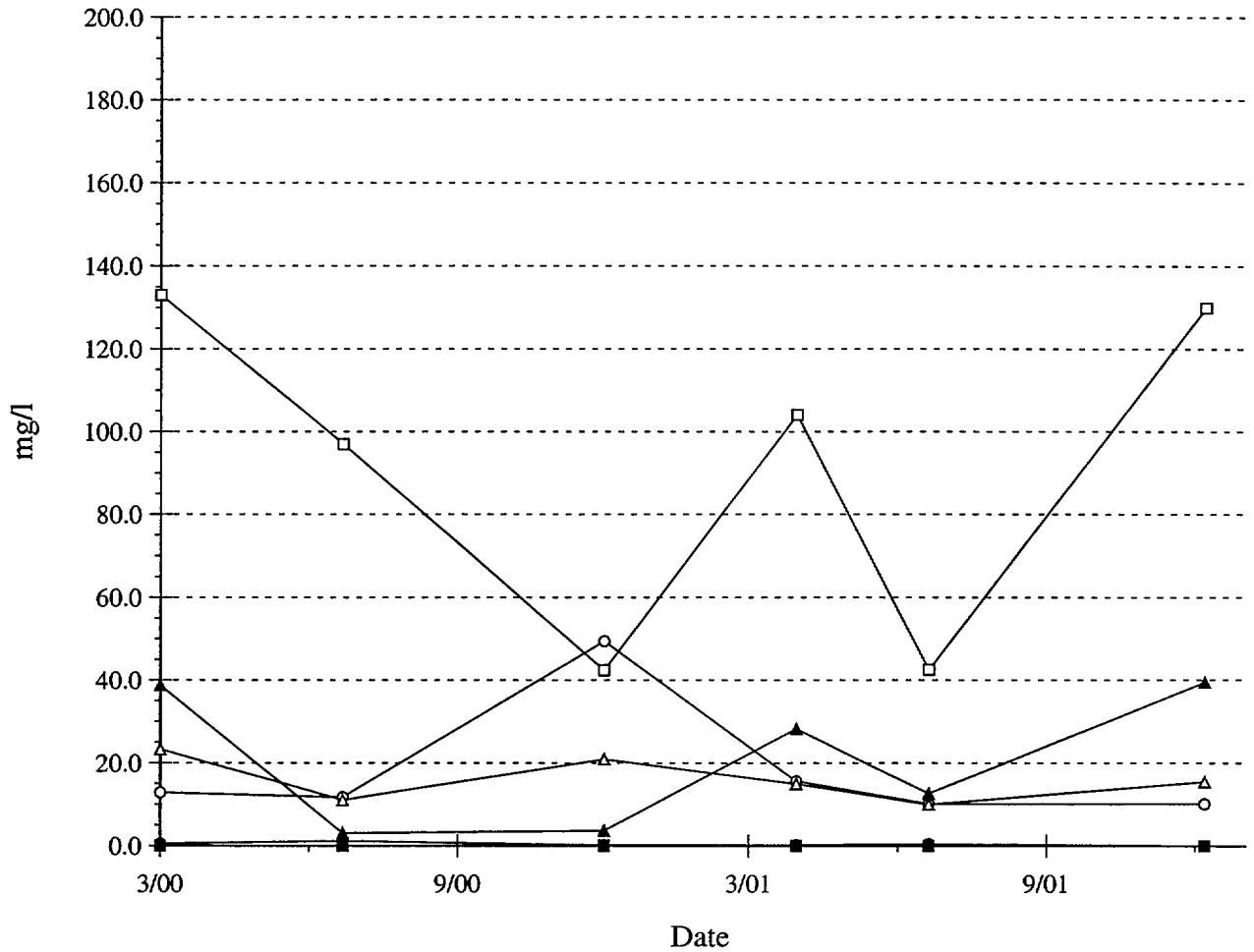
Inorganic Data Versus Time
Fresh Water Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RAO 5/2
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-23A

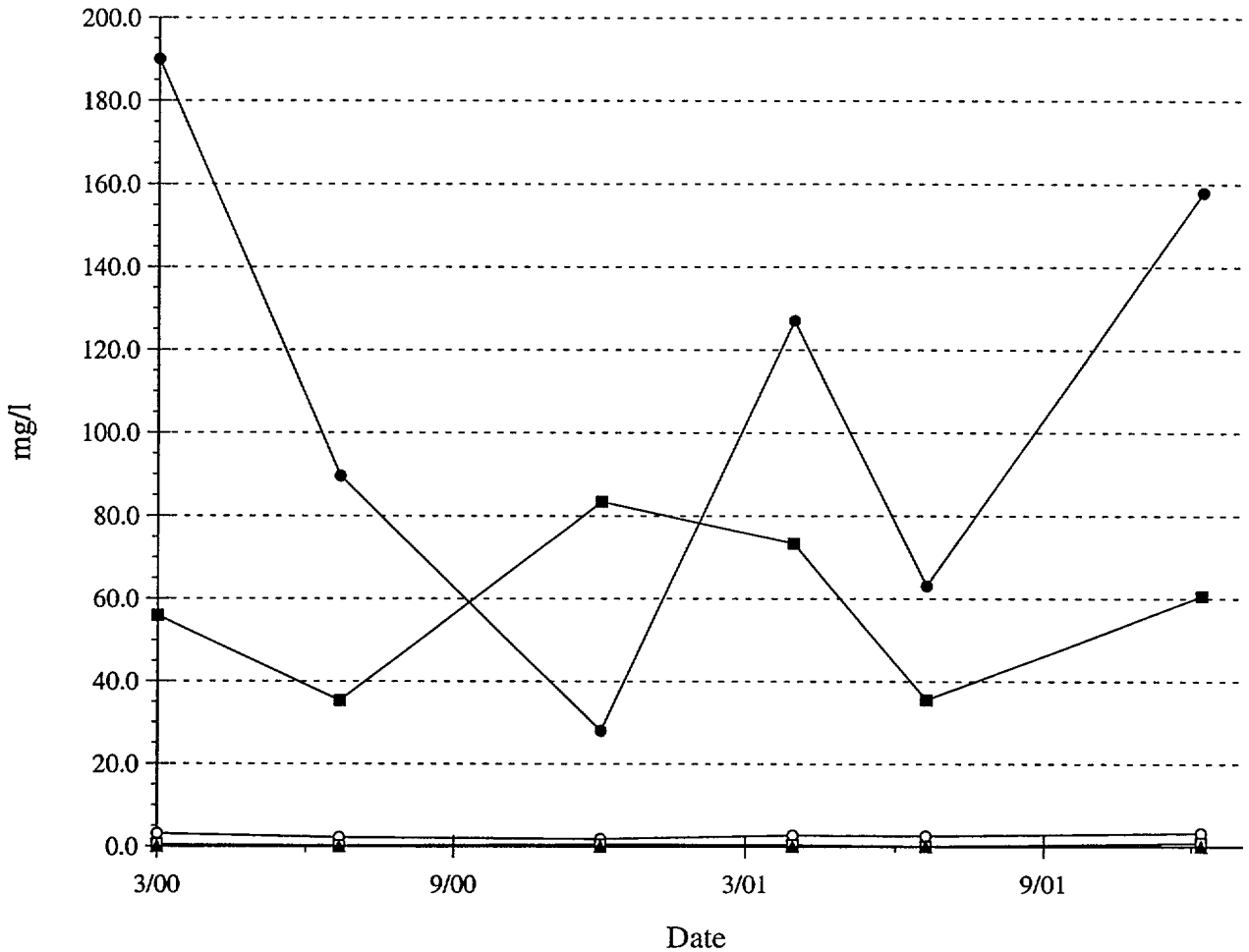
Metals Data Versus Time
Retention Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	
CHECKED	
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-23B

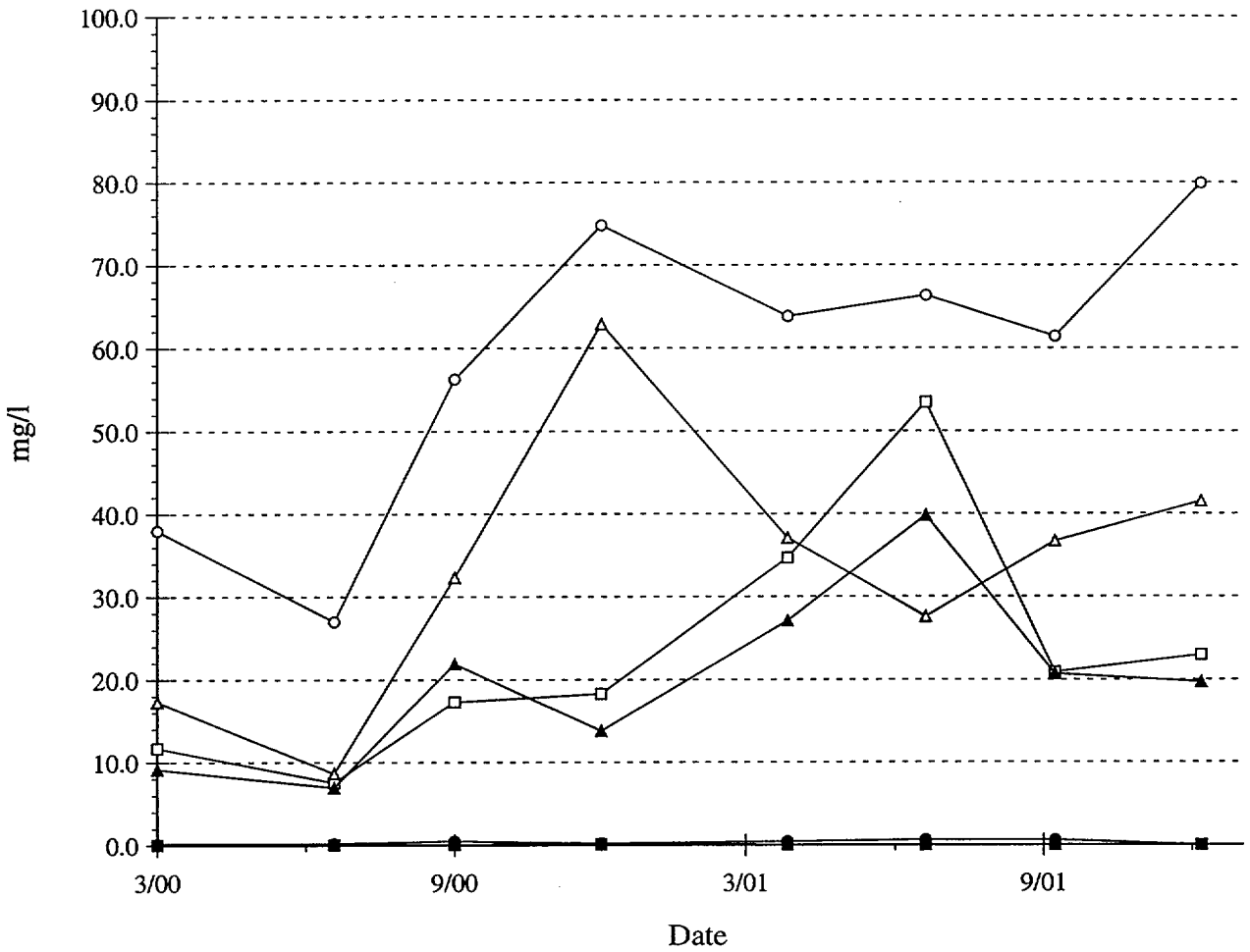
Inorganic Data Versus Time
Retention Pond (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RAD S/n
CHECKED	—
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Barium
- ○ Calcium
- ■ Iron
- □ Magnesium
- ▲ Potassium
- △ Sodium

Figure D-24A

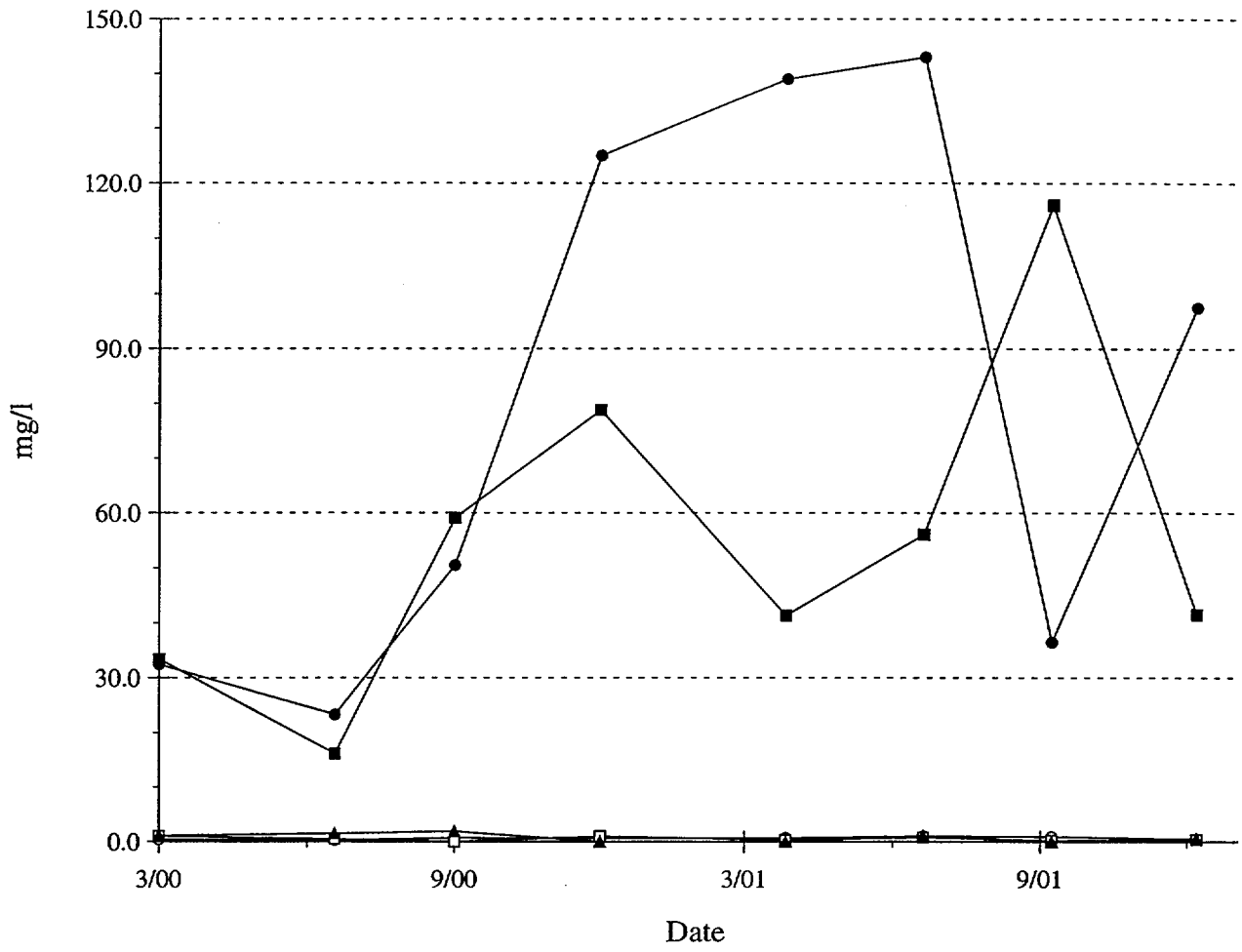
Metals Data Versus Time
Fulton Creek (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED RFO 5/02	
CHECKED –	
DRAWN ZZZ 05/15/2002	
DRAWING NUMBER	

Earth Sciences Consultants, Inc.



Legend

- ● Chloride
- ○ Fluoride
- ■ Sulfate
- □ Nitrate
- ▲ Silica Dioxide

Figure D-24B

Inorganic Data Versus Time
Fulton Creek (Filtered)
Tulsa, Oklahoma

PREPARED FOR

Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana

APPROVED	RKO 5/02
CHECKED	–
DRAWN	ZZZ 05/15/2002
DRAWING NUMBER	

Earth Sciences Consultants, Inc.

Appendix E

Unfiltered Groundwater and Surface Water Quality Data

Table E-1
Groundwater and Surface Water Quality Data
Third Quarter (September) 2001 Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification						
		P-1 Unfiltered	P-2 Unfiltered	P-3 Unfiltered	P-4 Unfiltered	P-5 Unfiltered	P-7 Unfiltered	P-8 Unfiltered
Field Measurements:								
pH, Field	pH units	6.89	6.68	6.71	Well Plugged	7.20	6.67	6.90
Specific Conductance @ 25°C	µmhos/cm	780	945	2100		2050	662.5	1800
Turbidity	NTU	172	5.65	30.55		8.24	888.25	27.45
Redox Potential	mV	-(1)	-	-		-	-	-
Dissolved Oxygen	mg/l	5.88	3.07	4.42		2.61	3.79	2.68
Temperature	°C	23.92	20.05	28.45		21.08	24.3	22.33
Laboratory Analysis:								
pH, Lab	pH units	6.90	6.79	7.04		7.30	6.70	6.78
Specific Conductance @ 25°C	µmhos/cm	868	988	2230		1990	690	1660
Radium-226	pCi/l	1.18±0.178	0.433±0.15	0.419±0.13		0.577±0.17	0.622±0.16	0.256±0.13
Radium-228	pCi/l	ND±0.049	0.61±0.052	1.75±0.060		0.908±0.05	ND±0.048	ND±0.048
Thorium-228	pCi/l	0.371±0.09	0.199±0.08	0.137±0.09		0.127±0.08	2.00±0.230	0.082±0.05
Thorium-230	pCi/l	0.720±0.12	0.785±0.14	0.482±0.12		0.781±0.15	1.37±0.195	0.637±0.12
Thorium-232	pCi/l	0.376±0.09	0.184±0.07	0.120±0.07		0.110±0.07	1.63±0.207	0.079±0.06
Alkalinity	mg/l $CaCO_3$	433	543	255		215	311	154
Chloride	mg/l	18.8	14.7	620		428	20.5	218
Fluoride	mg/l	0.5	0.4	0.6		0.6	0.8	0.6
Nitrate	mg/l NO_3-N	0.3	0.2	<0.2		<0.2	0.3	0.5
Silica Dioxide	mg/l	2.5	3.0	2.4		1.6	2.3	2.2
Sulfate	mg/l	30.1	8.6	53.6		4.9	44.8	1.0
Barium	mg/l	<0.590	1.26	<0.280		5.33	0.642	5.51
Calcium	mg/l	224	202	268		65.8	120	218
Iron	mg/l	26.2	1.29	1.13		0.30	65.7	15.9
Magnesium	mg/l	11.0	13.3	58.6		34.7	19.9	30.8
Potassium	mg/l	<8.90	<8.90	21.9		300	16.0	18.4
Sodium	mg/l	17.2	27.9	50.5		40.1	20.1	23.4

See footnotes at end of table.

Table E-1
(Continued)

Parameter	Units	Sample Identification						
		P-10 Unfiltered	MWD-2 Unfiltered	MWD-4 Unfiltered	MWD-5 Unfiltered	MWD-6 Unfiltered	MWD-7 Unfiltered	MWD-8 Unfiltered
Field Measurements:								
pH, Field	pH units	6.90	6.89	6.79	7.84	7.24	6.83	7.40
Specific Conductance @ 25°C	µmhos/cm	670	747.5	1700	1100	2425	1000	2125
Turbidity	NTU	16.65	35.8	180.5	15.3	129.5	21.75	37.75
Redox Potential	mV	-	-	-	-	-	-	-
Dissolved Oxygen	mg/l	6.81	6.4	4.18	3.81	7.71	5.11	4.66
Temperature	°C	25.15	22.38	23.63	22.78	20.98	23.18	21.93
Laboratory Analysis:								
pH, Lab	pH units	7.04	7.02	6.86	7.55	7.43	6.86	7.46
Specific Conductance @ 25°C	µmhos/cm	735	779	1770	1160	2770	902	2190
Radium-226	pCi/l	0.130±0.10	0.167±0.13	0.331±0.13	0.786±0.15	1.17±0.213	0.250±0.12	1.02±0.170
Radium-228	pCi/l	ND±0.048	0.169±0.05	1.08±0.054	1.10±0.056	ND±0.047	1.52±0.043	2.11±0.060
Thorium-228	pCi/l	0.071±0.14	0.047±0.06	0.197±0.31	0.414±0.11	0.266±0.11	0.214±0.08	0.117±0.09
Thorium-230	pCi/l	0.513±0.20	0.350±0.10	0.730±0.39	2.00±0.226	1.20±0.183	0.703±0.13	0.246±0.10
Thorium-232	pCi/l	0.055±0.14	0.026±0.06	0.513±0.26	0.439±0.11	0.437±0.10	0.142±0.06	0.101±0.07
Alkalinity	mg/l $CaCO_3$	354	322	291	109	87.0	273	154
Chloride	mg/l	21.0	28.5	200	199	264	83.2	500
Fluoride	mg/l	0.6	0.7	0.5	1.5	1.0	0.4	2.0
Nitrate	mg/l NO_3-N	<0.2	0.4	0.3	<0.2	<0.2	0.7	0.3
Silica Dioxide	mg/l	2.0	2.2	2.3	1.1	1.1	1.9	1.1
Sulfate	mg/l	5.4	45.0	76.6	3.6	3.4	11.9	2.8
Barium	mg/l	<0.280	<0.280	<0.590	4.22	5.03	2.14	20.2
Calcium	mg/l	129	98.3	175	52.6	148	35.4	64.5
Iron	mg/l	0.230	1.08	3.11	1.51	6.14	1.55	2.80
Magnesium	mg/l	11.1	18.9	82.9	24.6	78.4	16.5	125
Potassium	mg/l	13.1	14.7	30.0	146	222	157	206
Sodium	mg/l	16.6	22.7	45.6	25.3	40.2	18.6	2.66

See footnotes at end of table.

Table E-1
(Continued)

Parameter	Units	Sample Identification						
		MWD-9 Unfiltered	MWD-10 Unfiltered	MWD-11 Unfiltered	MWS-4 Unfiltered	MWS-5 Unfiltered	MWS-6 Unfiltered	MWS-11 Unfiltered
Field Measurements:								
pH, Field	pH units	6.98	7.03	7.27	IS	IS	6.94	Dry
Specific Conductance @ 25°C	µmhos/cm	712.5	1100	2125	IS	IS	1925	
Turbidity	NTU	420.75	360.5	32.78	IS	IS	30.18	
Redox Potential	mV	-	-	-	-	-	-	
Dissolved Oxygen	mg/l	5.07	1.58	3.94	IS	IS	3.63	
Temperature	°C	24.63	27.1	19.83	IS	IS	24.38	
Laboratory Analysis:								
pH, Lab	pH units	6.92	7.00	7.38	IS	IS	IS	
Specific Conductance @ 25°C	µmhos/cm	733	1280	3100	IS	IS	IS	
Radium-226	pCi/l	0.567±0.15	0.824±0.16	0.716±0.15	IS	IS	IS	
Radium-228	pCi/l	0.879±0.05	0.094±0.05	3.93±0.073	IS	IS	IS	
Thorium-228	pCi/l	0.359±0.11	0.296±0.10	23.3±0.886	IS	IS	IS	
Thorium-230	pCi/l	0.462±0.11	0.451±0.12	3.25±0.332	IS	IS	IS	
Thorium-232	pCi/l	0.231±0.11	0.231±0.09	0.913±0.20	IS	IS	IS	
Alkalinity	mg/l $CaCO_3$	227	263	257	IS	IS	IS	
Chloride	mg/l	47.2	169	495	IS	IS	IS	
Fluoride	mg/l	0.9	1.1	2.3	IS	IS	IS	
Nitrate	mg/l NO_3-N	0.5	0.4	<0.2	IS	IS	IS	
Silica Dioxide	mg/l	1.9	1.9	1.1	IS	IS	IS	
Sulfate	mg/l	19.8	19.6	17.9	IS	IS	IS	
Barium	mg/l	<0.590	1.49	3.52	IS	IS	IS	
Calcium	mg/l	101	91.5	84.4	IS	IS	IS	
Iron	mg/l	8.4	8.61	4.42	IS	IS	IS	
Magnesium	mg/l	29.4	59.5	242	IS	IS	IS	
Potassium	mg/l	<8.90	83.1	201	IS	IS	IS	
Sodium	mg/l	19.9	26.0	51.6	IS	IS	IS	

See footnotes at end of table.

Table E-1
(Continued)

Parameter	Units	Sample Identification				
		Retention Pond Unfiltered	ST-2 Unfiltered	ST-3 Unfiltered	Fresh Water Pond Unfiltered	Fulton Creek Unfiltered
Field Measurements:						
pH, Field	pH units	Dry	IS	7.32	7.88	8.14
Specific Conductance @ 25°C	µmhos/cm		IS	6050	510	700
Turbidity	NTU		IS	1.58	594	38.6
Redox Potential	mV		-	-	-	-
Dissolved Oxygen	mg/l		IS	4.91	4.81	691
Temperature	°C		IS	21.78	30.52	26.88
Laboratory Analysis:						
pH, Lab	pH units		IS	7.34	7.63	7.86
Specific Conductance @ 25°C	µmhos/cm		IS	6400	542	651
Radium-226	pCi/l		IS	2.57±0.260	0.285±0.15	0.103±0.16
Radium-228	pCi/l		IS	1.65±0.059	1.16±0.040	0.285±0.05
Thorium-228	pCi/l		IS	0±0.054	0.308±0.14	0.154±0.07
Thorium-230	pCi/l		IS	0.433±0.11	0.379±0.13	0.445±0.11
Thorium-232	pCi/l		IS	0.096±0.06	0.111±0.15	0.119±0.06
Alkalinity	mg/l $CaCO_3$		IS	142	184	183
Chloride	mg/l		IS	2130	32.0	38.6
Fluoride	mg/l		IS	0.4	0.8	1.0
Nitrate	mg/l NO_3-N		IS	0.2	0.2	0.3
Silica Dioxide	mg/l		IS	2.0	1.1	<0.5
Sulfate	mg/l		IS	<1	71.0	106
Barium	mg/l		IS	4.94	<0.590	0.700
Calcium	mg/l		IS	206	67.3	69.8
Iron	mg/l		IS	1.46	1.84	1.43
Magnesium	mg/l		IS	70.5	13.0	23.5
Potassium	mg/l		IS	9.94	5.86	22.1
Sodium	mg/l		IS	959	36.7	40.4

(1) Dash denotes not analyzed.

Table E-2
Groundwater and Surface Water Quality Data
Fourth Quarter (December) 2001 Monitoring Event
Former Kaiser Aluminum Speciaty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification						
		P-1 Unfiltered	P-2 Unfiltered	P-3 Unfiltered	P-4 Unfiltered	P-5 Unfiltered	P-7 Unfiltered	P-8 Unfiltered
Field Measurements:								
pH, Field	pH units	6.81	7.04	6.88	Well Plugged	7.45	6.88	7.15
Specific Conductance @ 25°C	µmhos/cm	600	800	1700		1600	400	600
Turbidity	NTU	29.7	6.35	8.42		5.08	234.5	15.97
Dissolved Oxygen	mg/l	5.75	3.37	9.51		5.98	2.64	1.95
Temperature	°C	18.4	18.9	17.75		16.15	20.52	19.08
Laboratory Analysis:								
pH, Lab	pH units	6.84	6.85	6.98		7.16	6.71	6.95
Specific Conductance @ 25°C	µmhos/cm	767	1020	2220		1890	675	1610
Radium-226	pCi/l	0.127±0.13	0.081±0.11	0.596±0.13		0.07±0.139	0.189±0.19	0.182±0.16
Radium-228	pCi/l	0.159±0.04	0.564±0.04	1.15±0.050		0.157±0.04	0±0.143	0±0.049
Thorium-228	pCi/l	0.078±0.09	0.016±0.06	0.599±0.17		0.008±0.09	0.255±0.08	0±0.086
Thorium-230	pCi/l	0.162±0.11	0±0.085	0.335±0.14		0±0.105	0.065±0.08	0.472±0.15
Thorium-232	pCi/l	0.054±0.08	0.039±0.06	0.395±0.13		0.034±0.09	0.161±0.08	0.098±0.08
Alkalinity	mg/l $CaCO_3$	402	578	263		227	316	177
Chloride	mg/l	17.1	14.1	571		397	19.5	412
Fluoride	mg/l	0.3	0.3	0.5		0.5	0.4	0.5
Nitrate	mg/l NO_3-N	0.2	0.2	<0.2		<0.2	0.2	0.3
Silica Dioxide	mg/l	2.4	2.9	2.3		1.7	2.6	2.4
Sulfate	mg/l	19.7	4.2	49.7		7.5	27.6	2.7
Barium	mg/l	0.304	1.21	<0.294		3.95	<0.294	5.48
Calcium	mg/l	170	197	246		51.8	152	230
Iron	mg/l	1.16	1.28	5.58		0.243	6.56	20.7
Magnesium	mg/l	9.38	15.8	50.1		26.8	15.4	31.9
Potassium	mg/l	<7.20	<1.72	12.6		263	<7.20	3.10
Sodium	mg/l	16.6	25.2	55.7		33.3	18.9	26.1

Table E-2
(Continued)

Parameter	Units	Sample Identification						
		P-10 Unfiltered	MWD-2 Unfiltered	MWD-4 Unfiltered	MWD-5 Unfiltered	MWD-6 Unfiltered	MWD-7 Unfiltered	MWD-8 Unfiltered
Field Measurements:								
pH, Field	pH units	6.89	7.04	7.01	7.91	7.82	6.82	7.67
Specific Conductance @ 25°C	µmhos/cm	400	800	975	1050	1800	550	1550
Turbidity	NTU	115.88	6.35	18.75	1.15	6.68	1.07	0.95
Dissolved Oxygen	mg/l	4.61	3.37	7.43	2.16	3.98	5.38	8.68
Temperature	°C	20.67	18.9	18.8	17.4	20.85	19.2	19.6
Laboratory Analysis:								
pH, Lab	pH units	7.12	7.03	6.84	7.66	7.36	6.80	7.37
Specific Conductance @ 25°C	µmhos/cm	712	758	1400	1190	2330	855	2180
Radium-226	pCi/l	1.35±0.188	0.111±0.13	0.296±0.11	1.94±0.242	0.428±0.17	1.05±0.189	1.90±0.265
Radium-228	pCi/l	1.04±0.050	0.375±0.04	0.710±0.05	0±0.051	0.314±0.04	0.855±0.04	1.72±0.060
Thorium-228	pCi/l	0.619±0.16	0±0.070	0.059±0.09	0±0.100	0.066±0.06	0±0.065	0.059±0.09
Thorium-230	pCi/l	0.205±0.13	0.052±0.09	0.289±0.14	0.685±0.18	0.165±0.14	0±0.072	0.132±0.13
Thorium-232	pCi/l	0.268±0.12	0.026±0.07	0±0.096	0±0.088	0.004±0.06	0.015±0.06	0.015±0.07
Alkalinity	mg/l $CaCO_3$	390	322	297	107	95	256	162
Chloride	mg/l	20.0	36.9	240	268	673	102	564
Fluoride	mg/l	0.7	0.6	0.6	1.6	1.8	0.4	1.3
Nitrate	mg/l NO_3-N	0.3	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	1.9	1.9	2.2	1.0	1.0	1.8	1.2
Sulfate	mg/l	4.6	36.3	73.4	2.8	11.5	7.8	5.3
Barium	mg/l	<0.294	<0.140	<0.294	4.33	3.34	1.24	18.1
Calcium	mg/l	170	109	140	43.8	76.2	51.6	63.4
Iron	mg/l	4.44	<0.105	1.80	<0.105	0.163	<0.105	2.41
Magnesium	mg/l	13.4	22.5	62.5	23.2	110	14.5	121
Potassium	mg/l	2.50	6.26	27.9	149	216	140	182
Sodium	mg/l	17.9	19.6	42.3	26.1	52.1	22.0	25.9

Table E-2
(Continued)

Parameter	Units	Sample Identification						
		MWD-9 Unfiltered	MWD-10 Unfiltered	MWD-11 Unfiltered	MWS-4 Unfiltered	MWS-5 Unfiltered	MWS-6 Unfiltered	MWS-11 Unfiltered
Field Measurements:								
pH, Field	pH units	7.13	7.22	7.53	IS	IS	6.94	Dry
Specific Conductance @ 25°C	µmhos/cm	600	1075	1550	IS	IS	19.25	
Turbidity	NTU	5.28	7.55	2.15	IS	IS	30.18	
Dissolved Oxygen	mg/l	2.09	3.99	6.35	IS	IS	3.63	
Temperature	°C	19.55	17.72	19.9	IS	IS	24.38	
Laboratory Analysis:								
pH, Lab	pH units	6.95	7.01	7.38	IS	IS	IS	
Specific Conductance @ 25°C	µmhos/cm	705	1300	2260	IS	IS	IS	
Radium-226	pCi/l	0.162±0.12	0.202±0.09	1.86±0.307	IS	IS	IS	
Radium-228	pCi/l	1.68±0.054	0±0.041	1.21±0.051	IS	IS	IS	
Thorium-228	pCi/l	0±0.096	0±0.075	0.142±0.10	IS	IS	IS	
Thorium-230	pCi/l	0.053±0.10	0.039±0.12	0.017±0.10	IS	IS	IS	
Thorium-232	pCi/l	0±0.081	0±0.076	0±0.081	IS	IS	IS	
Alkalinity	mg/l $CaCO_3$	218	253	251	IS	IS	IS	
Chloride	mg/l	86.8	239	590	IS	IS	IS	
Fluoride	mg/l	0.3	0.9	2.2	IS	IS	IS	
Nitrate	mg/l NO_3-N	<0.2	<0.2	<0.2	IS	IS	IS	
Silica Dioxide	mg/l	1.9	1.8	1.1	IS	IS	IS	
Sulfate	mg/l	34.0	13.7	18.4	IS	IS	IS	
Barium	mg/l	<0.294	1.14	0.819	IS	IS	IS	
Calcium	mg/l	85.7	95.4	58.7	IS	IS	IS	
Iron	mg/l	0.235	0.176	0.167	IS	IS	IS	
Magnesium	mg/l	25.3	62.4	189	IS	IS	IS	
Potassium	mg/l	8.37	63.0	142	IS	IS	IS	
Sodium	mg/l	20.3	26.2	59.8	IS	IS	IS	

Table E-2
(Continued)

Parameter	Units	Sample Identification				
		Retention Pond Unfiltered	ST-2 Unfiltered	ST-3 Unfiltered	Fresh Water Pond Unfiltered	Fulton Creek Unfiltered
Field Measurements:						
pH, Field	pH units	9.31	IS	7.34	7.55	7.76
Specific Conductance @ 25°C	µmhos/cm	600	IS	4175	575	400
Turbidity	NTU	10.8	IS	1.23	6.05	3.9
Dissolved Oxygen	mg/l	8.3	IS	3.76	11.42	9.84
Temperature	°C	19.8	IS	18.7	14.45	18
Laboratory Analysis:						
pH, Lab	pH units	9.23	IS	7.33	7.43	7.65
Specific Conductance @ 25°C	µmhos/cm	1100	IS	6080	647	844
Radium-226	pCi/l	3.00±0.605	IS	2.01±0.235	0.197±0.15	0.635±0.18
Radium-228	pCi/l	0.747±0.05	IS	4.05±0.065	0.276±0.04	0±0.049
Thorium-228	pCi/l	0.217±0.10	IS	0±0.094	0.020±0.07	0±0.081
Thorium-230	pCi/l	0.458±0.13	IS	0.006±0.11	0.027±0.12	0.028±0.12
Thorium-232	pCi/l	0.232±0.09	IS	0±0.076	0±0.104	0±0.067
Alkalinity	mg/l $CaCO_3$	297	IS	141	183	194
Chloride	mg/l	156	IS	2040	59.1	98.5
Fluoride	mg/l	3.4	IS	0.6	0.4	0.5
Nitrate	mg/l NO_3-N	0.8	IS	<0.2	0.7	0.4
Silica Dioxide	mg/l	<0.5	IS	1.8	0.9	0.6
Sulfate	mg/l	63.1	IS	1.8	45.6	37.8
Barium	mg/l	<0.294	IS	5.17	<0.140	<0.294
Calcium	mg/l	10.1	IS	190	61.8	85.0
Iron	mg/l	<0.105	IS	1.07	0.356	<0.105
Magnesium	mg/l	127	IS	64.8	10.9	24.4
Potassium	mg/l	38.5	IS	10.2	2.94	20.7
Sodium	mg/l	15.4	IS	1030	34.4	42.9

Appendix F

NRC Inspection Report

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

cc: Paul Handa
Max Scott
Dave Tourdot
Bill Vinzant

FEB 2002

February 6, 2002

Mr. J. William Vinzant
Regional Environmental Manager
Corporate Environmental Affairs
Kaiser Aluminum and Chemical Corporation
9141 Interline Avenue, Suite 1A
Baton Rouge, Louisiana 70809-1957

SUBJECT: NRC INSPECTION REPORT 040-02377/01-02

Dear Mr. Vinzant:

This refers to the inspection conducted on December 6-7, 2001, at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The purpose of the inspection was to determine whether decommissioning and remediation activities were being conducted in accordance with the commitments made in your Remediation Plans and other documents. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. The final inspection findings were presented to Mr. Paul Handa, Site Administrator, on February 1, 2002. The enclosed report presents the results of that inspection. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mr. Robert J. Evans at (817) 860-8234 or Dr. D. Blair Spitzberg at (817) 860-8191.

Sincerely,

Charles Z. Cain
for Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket No.: 040-02377
License No.: STB-472 (terminated)

Enclosure:
NRC Inspection Report
040-02377/01-02

cc w/enclosure:
Mr. Paul Handa, Site Administrator
Kaiser Aluminum & Chemical Corporation
7311 East 41st Street
Tulsa, Oklahoma 74145

Douglas Wilson
Manager, Environmental Services
Office of Environmental Services
City of Tulsa
4818 South Elwood Avenue
Tulsa, Oklahoma 74107-8129

Mr. George Brozowski, Regional Health Physicist
U.S. Environmental Protection Agency, Region VI
1445 Ross Avenue
Mail Stop-6PDT
Dallas, Texas 75202

Mr. Mike Broderick, Administrator
Oklahoma Department of Environmental Quality
Waste Management Division
Radiation Management Section
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	040-02377
License No.:	STB-472 (Terminated in March 1971)
Report No.:	040-02377/01-02
Property Owner:	Kaiser Aluminum & Chemical Corp. (Kaiser)
Facility:	Former Kaiser Aluminum Specialty Products Facility
Location:	7311 East 41st Street Tulsa, Oklahoma
Inspection Dates:	December 6-7, 2001
Inspector:	Robert J. Evans, PE, CHP, Health Physicist Fuel Cycle & Decommissioning Branch
Accompanied by:	Linda M. Psyk, Health Physicist Materials Safety and Inspection Branch Division of Industrial and Medical Nuclear Safety Office of Nuclear Material Safety and Safeguards
Approved By:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle & Decommissioning Branch
Attachments:	Supplemental Inspection Information Photographs Taken at the Former Kaiser Facility

EXECUTIVE SUMMARY

Former Kaiser Aluminum Specialty Products Plant
NRC Inspection Report 040-02377/01-02

This was an announced inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by the Standard Magnesium Company and Kaiser Magnesium. This inspection included a review of the groundwater and surface water sampling programs.

Closeout Inspections and Surveys

- Kaiser has conducted quarterly sampling of surface and groundwater since 1999. The inspector observed sampling in progress and concluded that Kaiser collected the samples in accordance with the requirements specified in the applicable work plan, implementing procedures, and an industry standard. The samples were analyzed for the radionuclides specifically mentioned in the work plan and implementing procedures (Section 1).

- Five samples were collected by the NRC simultaneously with the collection of Kaiser's samples at the same locations. The samples were analyzed by both the NRC's and Kaiser's contract laboratories. The sample results were considered to be in reasonable agreement. In cases where there was not agreement within the statistical errors, the results were very low and well below any applicable effluent concentration limit. The licensee will continue to sample the surface water and groundwater to identify any radionuclides or trends present in the surface waters and groundwater monitoring wells (Section 1).

Report Details

Summary of Site Status

From 1958 until 1971, Standard Magnesium Corporation, and later Kaiser Magnesium, possessed thorium for use in the manufacture of magnesium anodes. License STB-472 was terminated by the U.S. Atomic Energy Commission during March 1971. During November 1993, an NRC inspector toured the Kaiser Aluminum facility and determined that the site was still contaminated with radioactive material. The site was subsequently added to the NRC's Site Decommissioning Management Plan during August 1994.

Remediation of the site will occur in phases. Phase I involved remediation of offsite contamination, while Phase II involved remediation of onsite contamination. The Phase I Adjacent Land Remediation Plan was approved by the NRC on April 4, 2000. Offsite remediation occurred between October 2000 and May 2001. About 285,000 cubic feet of soil was moved from offsite locations into the restricted area. The Phase I final radiological status survey was recently submitted to the NRC but has not been approved.

The Phase II Remediation Plan was also submitted to the NRC and is under review by the NRC. Kaiser recently conducted a radiological characterization survey in the former operational area, and this information will be submitted to the NRC in a future survey report. Kaiser will submit an addendum to the Phase II Remediation Plan to account for residual contamination identified in the former operational area.

1 Closeout Inspection and Surveys (83890)

1.1 Scope

Kaiser's water sampling program was reviewed and compared to the requirements specified in the applicable work plan, implementing procedures, and an industry standard. Groundwater and surface water samples were collected and analyzed by both the NRC's and Kaiser's contract laboratories for comparison of the sample results.

1.2 Observations and Findings

Kaiser began collecting water samples on a quarterly basis during September 1999. Kaiser sampled 23 wells and 3 surface water sites. The purpose of the routine water sampling and analysis program was to monitor the nature and extent of any radioactivity in the water within the vicinity of the Retention and Reserve Pond areas. Previous analytical results indicate that the groundwater in the upper-most water bearing unit (the shallow overburden unit) may be impacted by previous disposal of thorium-bearing dross material in and around the surface impoundments, the Retention Pond, and the Reserve Pond. The radionuclides of concern at the Kaiser site include thorium-232, thorium-230, thorium-228, radium-228, and radium-226.

The inspector observed Kaiser's representatives obtain groundwater and surface water samples during the inspection. The work was compared to Kaiser's Work Plan For

Groundwater and Surface Water Monitoring as well as the Ground Water Sampling and the Surface Water Sampling Procedures. The inspector also compared the sampling protocol to the industry standard, "Standard Guide for Sampling Groundwater Monitoring Wells," American Society for Testing and Materials (ASTM) Guide D4448-85a.

The inspector observed Kaiser measure the water level in selected wells, purge the wells, collect the samples, flush the equipment between samples, and conduct field analyses of the samples. The field analyses included measurement of water pH, temperature, conductivity, dissolved oxygen content, and turbidity. Kaiser collected both filtered and unfiltered samples. The filtered samples were collected using a 0.45 micron filter. Kaiser's samples were kept in cold storage until transfer to the local laboratory for analysis. Chain of custody forms were used for all samples collected. Overall, Kaiser conducted the sampling program in accordance with the implementing procedures, work plan, and ASTM guide.

During the inspection, the NRC inspector obtained five water samples, including two surface water and three groundwater samples. The samples were collected at the same time Kaiser collected its samples. The samples were filtered in the field with a 0.45-micron filter. The samples were analyzed by the NRC's contract laboratory, Oak Ridge Institute for Science and Education (ORISE), for comparison to samples analyzed by Kaiser's contract laboratory, Outreach Laboratory. The sample results, in units of picocuries per liter (pCi/l), were:

Fulton Creek (pCi/l)

	Alpha	Th-232	Th-230	Th-228	Ra-228	Ra-226
NRC	1.8 ± 1.7	-0.02±0.14	0.14 ± 0.16	-0.02±0.23	0.48 ± 0.99	0.08 ± 0.18
Kaiser	N/A	0.00 ± .066	.706 ± .180	0.00 ± .075	0.00 ± .050	.349 ± .144

Retention Pond (pCi/l)

	Alpha	Th-232	Th-230	Th-228	Ra-228	Ra-226
NRC	9.2 ± 2.8	0.03 ± 0.09	0.03 ± 0.14	0.00 ± 0.15	2.5 ± 1.0	0.07 ± 0.16
Kaiser	N/A	0.00 ± .063	.506 ± .170	.046 ± .079	1.27 ± .057	1.29 ± .205

Monitoring Well MWD-8 (pCi/l)

	Alpha	Th-232	Th-230	Th-228	Ra-228	Ra-226
NRC	16.1± 4.6	0.04 ± 0.06	0.27 ± 0.17	0.31 ± 0.22	6.9 ± 1.5	0.34 ± 0.25
Kaiser	N/A	0.00 ± .093	.063 ± .132	0.00 ± .098	3.86 ± .068	.987 ± .170

Monitoring Well P-5 (pCi/l)

	Alpha	Th-232	Th-230	Th-228	Ra-228	Ra-226
NRC	12.3± 3.9	0.06 ± 0.07	0.13 ± 0.11	0.26 ± 0.23	1.8 ± 1.2	0.71 ± 0.36
Kaiser	N/A	0.00 ± .053	0.00 ± .099	.008 ± .077	1.79 ± .053	.099 ± .119

Monitoring Well MWD-10 (pCi/l)

	Alpha	Th-232	Th-230	Th-228	Ra-228	Ra-226
NRC	3.2 ± 2.3	0.07 ± 0.10	0.09 ± 0.13	0.07 ± 0.13	0.4 ± 1.2	0.11 ± 0.14
Kaiser	N/A	0.00 ± .090	.229 ± .145	0.00 ± .107	.673 ± .048	0.00 ± .140

Outreach Laboratory was not required to analyze the samples for gross alpha concentrations. Therefore, gross alpha sample results were not provided by this laboratory. The radium-228 sample results from ORISE were considered "qualified" results because the laboratory experienced difficulties in reaching the minimum detectable concentration based on the limited sample volumes available for analyses.

Water effluent concentrations are specified in Table 2 to Appendix B of 10 CFR Part 20. These concentrations, when averaged over a year, represent effluent limits. The most restrictive radionuclide in the thorium series is thorium-232 which has an effluent concentration limit of 3 E-8 microcuries per milliliter of water, or 30 pCi/l. The effluent concentration limits for both radium-226 and radium-228 is 60 pCi/l. No sample result exceeded any respective effluent concentration limits.

As reference points, the U.S. Environmental Protection Agency provides limits for selected radionuclides in drinking water. 40 CFR 141.15 provides the maximum contaminant levels (MCLs) for community water systems. The MCLs for combined radium-226 and radium-228 is 5 pCi/l, while the gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/l. However, according to Kaiser, the site's groundwater is not likely to ever be a drinking water source.

During this sampling event, one NRC sample result exceeded the MCL of 5 pCi/l for combined radium-226 and radium-228. The NRC measured 7.24 pCi/l for combined radium-226 and radium-228 from well MWD-8, while Kaiser measured 4.85 pCi/l for the same well. For comparison, the June 2001 sample result (the last sample result available during the inspection) was 3.35 pCi/l. Well MWD-8 is a deep overburden unit well that is located in the northeastern corner of the property in the general area of the former Reserve Pond.

The sample obtained from MWD-8 also exceeded the gross alpha MCL of 15 pCi/l. The NRC measured 16.1 pCi/l in the water sample obtained from well MWD-8. As noted before, Outreach Laboratory did not measure the MWD-8 sample for gross alpha.

In summary, the sample results were considered to be in reasonable agreement between the two laboratories. A few of the comparisons were not in agreement within the statistical errors but all of the results in these cases were very low and well below any applicable effluent concentration limit. Consequently, the lack of agreement in these cases is not a significant concern to the NRC.

No sample result exceeded the 10 CFR Part 20 effluent concentration limits, while one sample result exceeded the MCLs for community water systems. The sample obtained from well MWD-8 exceeded the gross alpha and combined radium-226 and radium-228 MCLs. Neither the NRC nor Kaiser had attempted to confirm the MWD-8 sample results through subsequent sampling. Additional quarterly sampling will be necessary to establish any trends that may be present in and around the site.

1.3 Conclusions

Kaiser has conducted quarterly sampling of surface and groundwater since 1999. The inspector observed sampling in progress and concluded that Kaiser collected the samples in accordance with the requirements specified in the applicable work plan, implementing procedures, and an industry standard. The samples were analyzed for the radionuclides specifically mentioned in the work plan and implementing procedures.

Five samples were collected by the NRC simultaneously with the collection of Kaiser's samples at the same locations. The samples were analyzed by both the NRC's and Kaiser's contract laboratories. The sample results were considered to be in reasonable agreement. In cases where there was not agreement within the statistical errors, the results were very low and well below any applicable effluent concentration limit. The licensee will continue to sample the surface water and groundwater to identify any radionuclides or trends present in the surface waters and groundwater monitoring wells.

2 Exit Meeting Summary

The inspector reviewed the scope and findings of the inspection during the exit briefing that was conducted at the conclusion of the onsite inspection on December 7, 2001. In addition, a final telephonic exit briefing was conducted on February 1, 2002, to discuss the water sample results. Kaiser did not identify as proprietary any information provided to, or reviewed, by the inspector.

ATTACHMENT 1

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Kaiser Aluminum & Chemical Corp.

D. Anderson, Environmental Specialist, A&M Engineering and Environmental Services, Inc.
P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.
I. Taner, Chief Geologist, A&M Engineering and Environmental Services, Inc.

INSPECTION PROCEDURES USED

IP 83890 Closeout Inspection and Surveys

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None.

Closed

None.

Discussed

None.

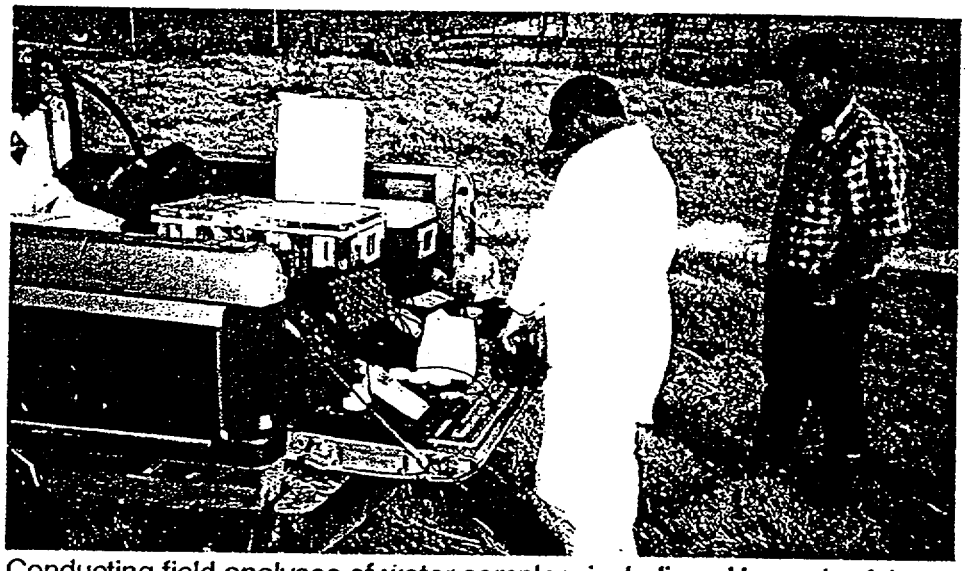
LIST OF ACRONYMS USED

ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulation
IP	Inspection Procedure
MCL	maximum contaminant level
NRC	Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
pCi/l	picocuries per liter
Ra	radium
Th	thorium

ATTACHMENT 2

WATER SAMPLING AT KAISER ALUMINUM & CHEMICAL CORP.

Kaiser representatives collecting surface water samples from Fulton Creek.



Conducting field analyses of water samples, including pH, conductivity, dissolved oxygen, temperature, and turbidity.