KIF - Ash Pond PH Control
Phase 1 JPT Meeting Agenda
August 31, 2006 - 1:00 PM

1. Introductions

2. Purpose of meeting

3. Tony Knight questions and answers:

   a. Look at alternatives to CO2 and NaOH
      - Alternatives to CO2 that have been evaluated are stack gas emission removal and acid drip systems. Stack gas removal appeared to be a great use of the gas, however, because of the many different constituents that make up the gas, purifying the CO2 would be very difficult. This was evaluated for the PAF CO2 system.
      - Acid drip systems are an effective alternative. The main concerns with these types systems are there are no control on flow and safety concerns are moderate.

   b. Feed rate for CO2
      - Approximately 3.9 tons/day, data and calcs. in attached spreadsheet. (Very similar to the JSF flowrate)

   c. Feed rate for NaOH (or other)
      - Data will be collected this winter to help evaluate what type system will be needed for increasing the pH.

   d. Method of chemical feed recommendations
      - Because of the high efficiency of the liquid injection over the gaseous injection, the liquid injection is recommended.

   e. Location of chemical feed recommendations
      - A good location for the chemical feed would be adjacent to or inside the discharge weirs going from the main ash pond into the stilling pond.

   f. Safety considerations for all chemicals
      - Minimal safety concerns with CO2. Other chemicals that may be required for raising the pH will be evaluated at a later time.

   g. Tank Material recommendations
      - Carbon Steel Tank

4. The project is in the early stages of Phase 1. The team decided that information on the chemistry of the ash pond water (now and future) and the method of treatment based on the chemistry and pond configuration was needed before discipline engineering involvement.

Information from Tony Knight:

Based upon the pond chemistry and estimated runoff data, it appears that this system will be very similar to the system currently in the Phase II Design at JSF. I believe that there can be some cost savings for the KIF from the lessons learned from the JSF Phase I Design.

4. Design direction, phase, and schedule

a. Phase 1 begins immediately with phases 2 and 3 following.
b. All work completed in 07
c. Schedule

Date	Deliverable
8/24/06A	Chemical Data From Tony Knight
8/31/06 A	Phase 1B Start With Discipline Engineering
11/15/06	Phase 1 Study Complete
12/1/06	Tank Requisition Issued
2/15/07	Phase 2 DCN Issued
5/1/07	Tank Delivered
5/1/07	Construction Start
8/1/07	Construction Complete
8/1-8/31	Operation Checkouts
9/1/07	Turnover

6. Next steps

7. Action items

8. Other

Emory River Samples
Collected July 31, 2006

	In-Situ pH	Lab pH	Alkalinity mg/L CaCO3	TSS mg/L	TDS mg/L
Emory River					
EMR 1.9	7.5	8.55	108		
ERM 2.1	7.5	8.57	108		
ERM 2.3	7.4	8.55	104		
ERM 2.5	7.5	8.55	105		
ERM 2.7	7.4	8.52	107		
Flyash sluice	6.1	7.65	113	8.27	0.32
Bottom Ash	7.4	8.35	108	0.011	0.26
Ashpond	7.5	8.35	112	0.006	0.26

Second Round of Samples Collected from Ashpond on August 16, 2006

Initial pH 8

Ashpond Discharge Flowrate: 43.49 MGD

Pump Capacity
Coal Yard Runoff Pumps 1.37 MGD 950 gpm 1368000 gallons/day
(This flow is included in the 43.49)

Dredge Cell Flow
10 year-24 hour storm event
Peak Flow 45.2 MGD 70 cfs 45239040 gallons/day
Total Flow 11.4 MGD 1523000 cf 11392040 gallons
Note: Design for Total Flow

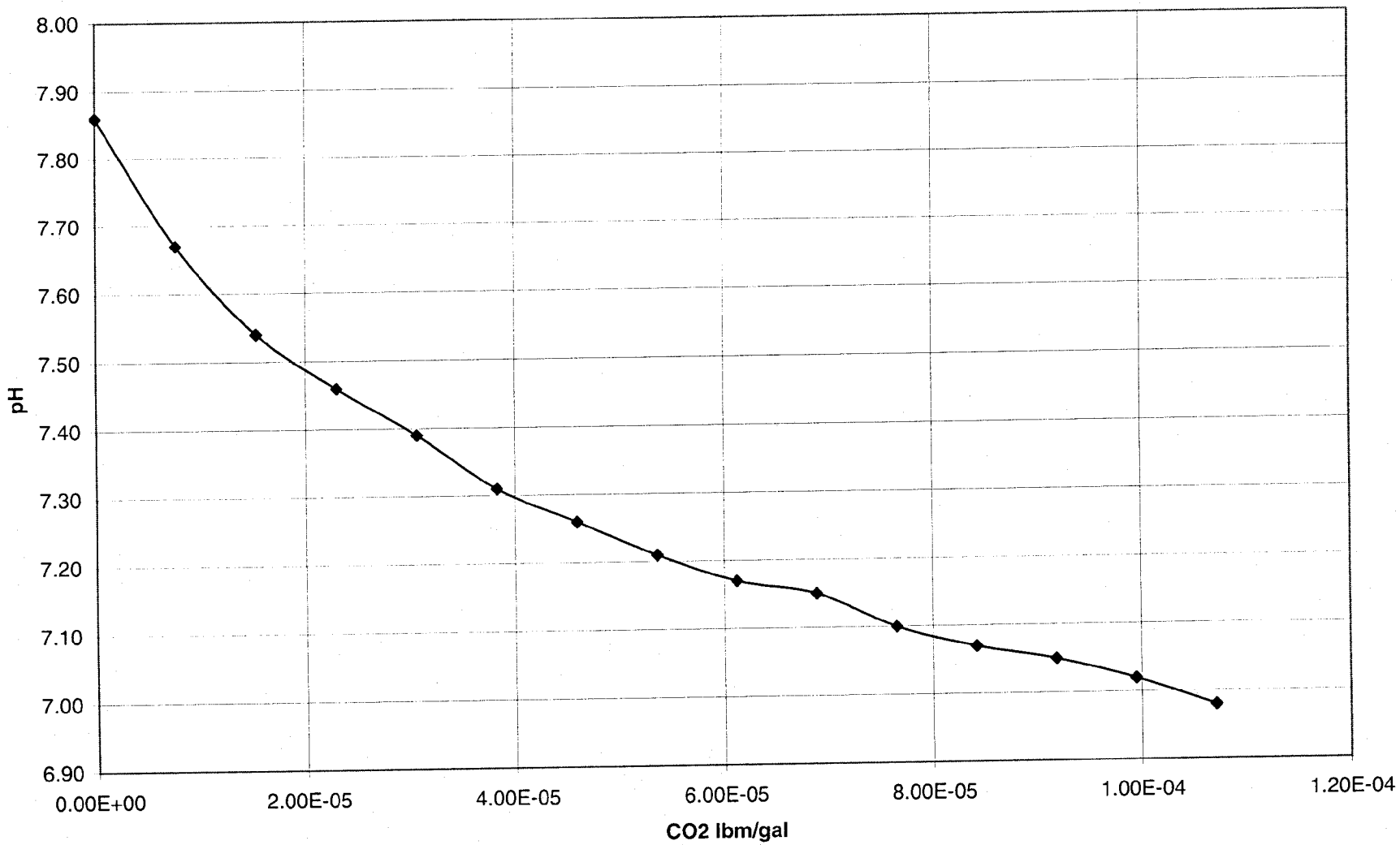
Design Flowrate 56.25 MGD (Ashpond Discharge+Dredge Cell Flow)

Pounds of CO2/day 6027.02

Tons/day 3.01

Tons/day (90% Efficiency) 3.35

Inflate by 15% 3.9



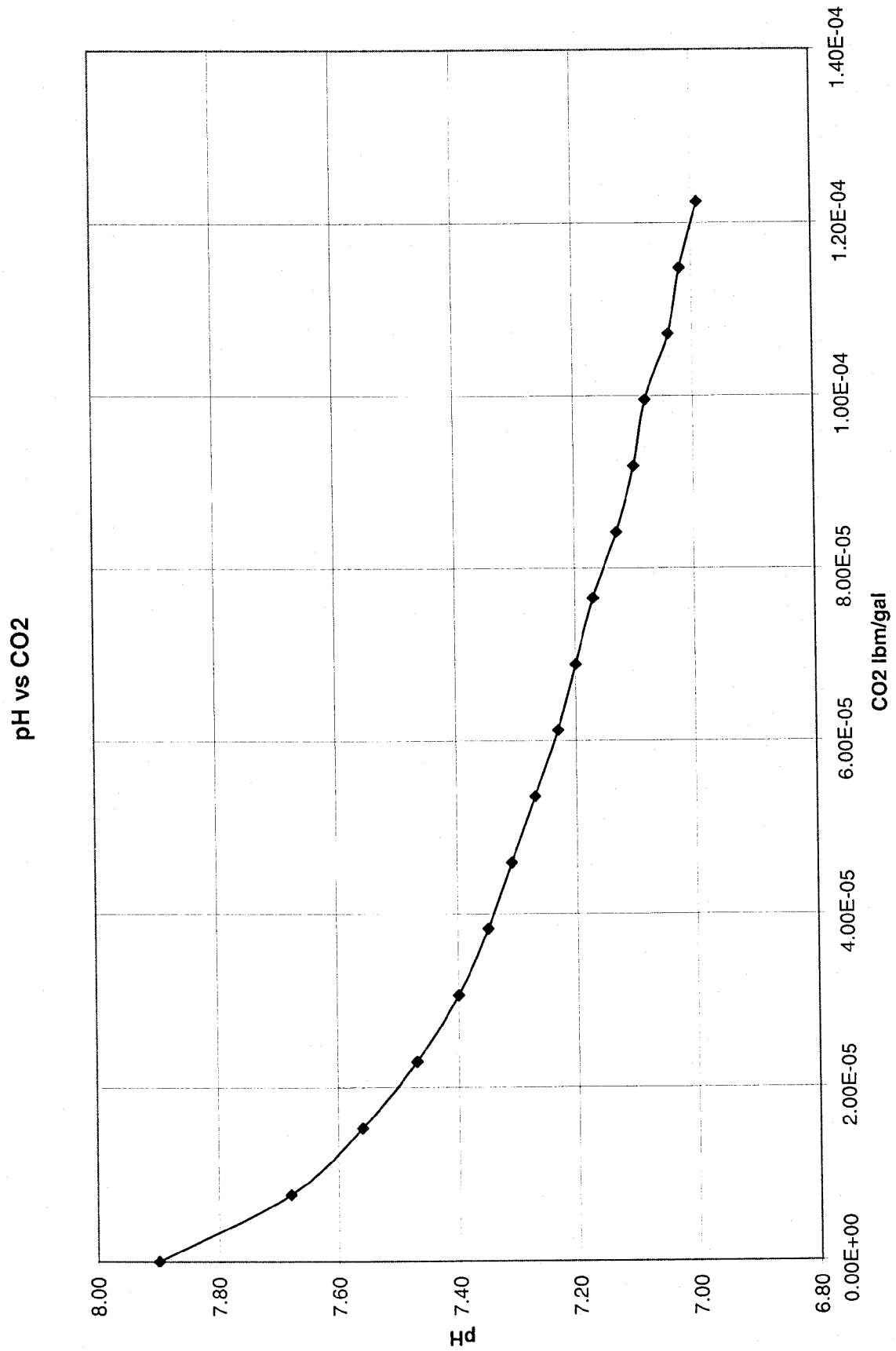
CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
2.4 ml CO2 sat Water

0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol		CO2		pH
ml	mmol	mg	lbm/gal	
0.0	0.000	0.00	0.00E+00	7.86
0.1	0.001	0.05	7.65E-06	7.67
0.2	0.002	0.09	1.53E-05	7.54
0.3	0.003	0.14	2.30E-05	7.46
0.4	0.004	0.18	3.06E-05	7.39
0.5	0.005	0.23	3.83E-05	7.31
0.6	0.006	0.28	4.59E-05	7.26
0.7	0.007	0.32	5.36E-05	7.21
0.8	0.008	0.37	6.12E-05	7.17
0.9	0.009	0.41	6.89E-05	7.15
1.0	0.010	0.46	7.65E-05	7.10
1.1	0.011	0.50	8.42E-05	7.07
1.2	0.013	0.55	9.18E-05	7.05
1.3	0.014	0.60	9.95E-05	7.02
1.4	0.015	0.64	1.07E-04	6.98


pH vs CO2
pH
8.00
7.80
7.60
7.40
7.20
7.00
6.80
0.00E+00
2.00E-05
4.00E-05
6.00E-05
8.00E-05
1.00E-04
1.20E-04
1.40E-04
CO2 lbm/gal

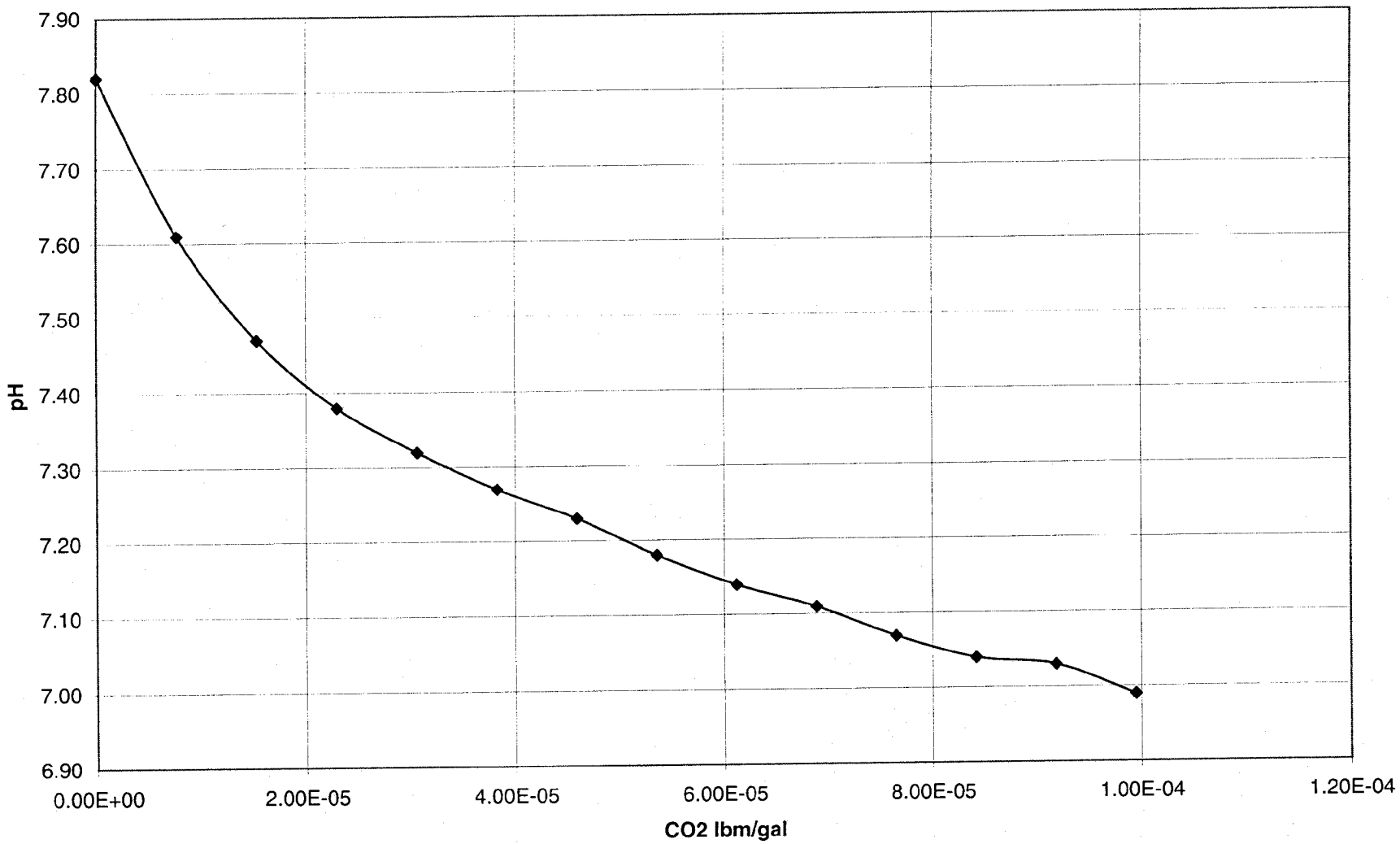
CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
2.4 ml CO2 sat Water

0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol		CO2		pH
ml	mmol	mg	lbm/gal	
0.0	0.000	0.00	0.00E+00	7.90
0.1	0.001	0.05	7.65E-06	7.68
0.2	0.002	0.09	1.53E-05	7.56
0.3	0.003	0.14	2.30E-05	7.47
0.4	0.004	0.18	3.06E-05	7.40
0.5	0.005	0.23	3.83E-05	7.35
0.6	0.006	0.28	4.59E-05	7.31
0.7	0.007	0.32	5.36E-05	7.27
0.8	0.008	0.37	6.12E-05	7.23
0.9	0.009	0.41	6.89E-05	7.20
1.0	0.010	0.46	7.65E-05	7.17
1.1	0.011	0.50	8.42E-05	7.13
1.2	0.013	0.55	9.18E-05	7.10
1.3	0.014	0.60	9.95E-05	7.08
1.4	0.015	0.64	1.07E-04	7.04
1.5	0.016	0.69	1.15E-04	7.02
1.6	0.017	0.73	1.22E-04	6.99



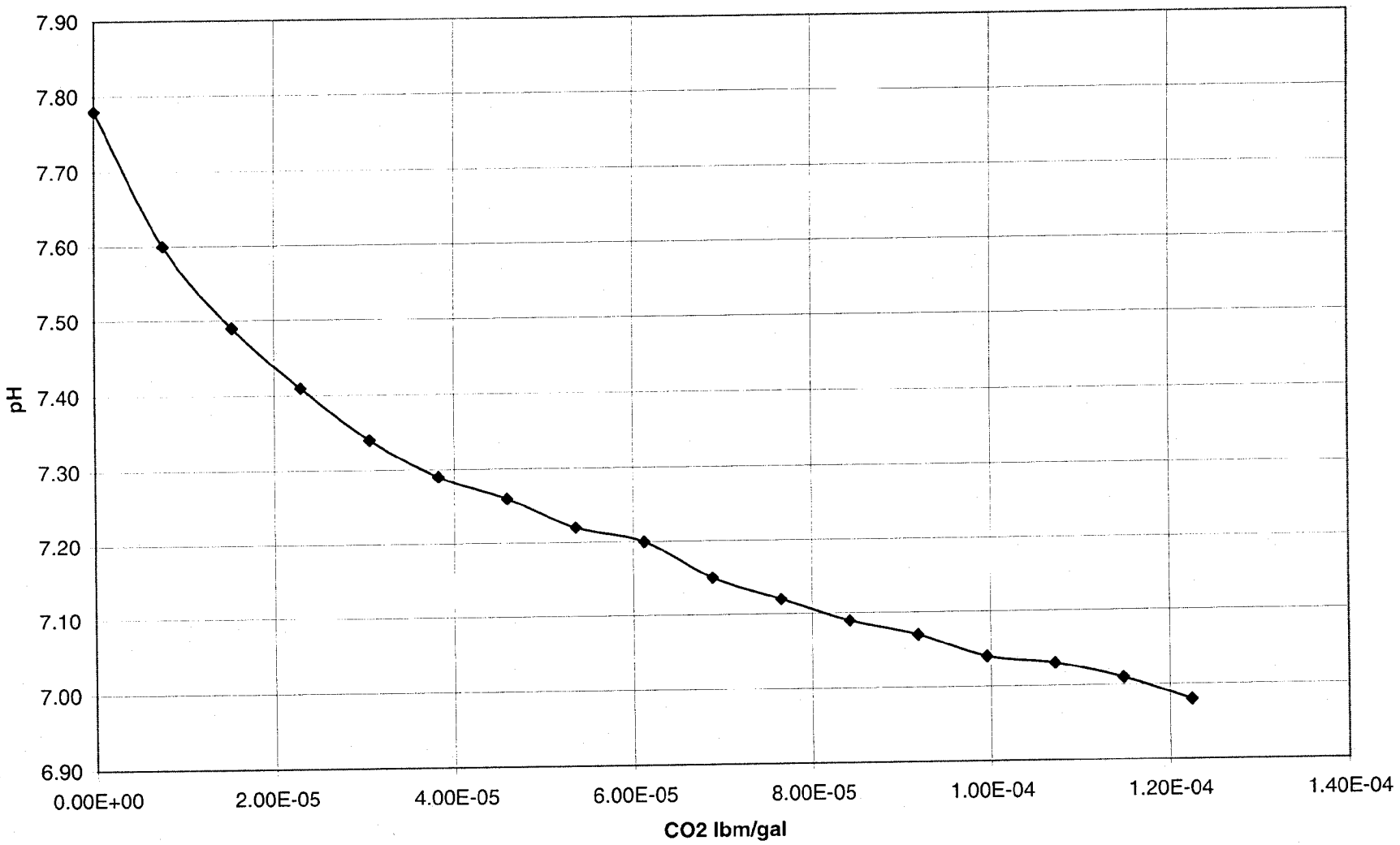
CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
2.4 ml CO2 sat Water

0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol		CO2		pH
ml	mmol	mg	lbm/gal	
0.0	0.000	0.00	0.00E+00	7.82
0.1	0.001	0.05	7.65E-06	7.61
0.2	0.002	0.09	1.53E-05	7.47
0.3	0.003	0.14	2.30E-05	7.38
0.4	0.004	0.18	3.06E-05	7.32
0.5	0.005	0.23	3.83E-05	7.27
0.6	0.006	0.28	4.59E-05	7.23
0.7	0.007	0.32	5.36E-05	7.18
0.8	0.008	0.37	6.12E-05	7.14
0.9	0.009	0.41	6.89E-05	7.11
1.0	0.010	0.46	7.65E-05	7.07
1.1	0.011	0.50	8.42E-05	7.04
1.2	0.013	0.55	9.18E-05	7.03
1.3	0.014	0.60	9.95E-05	6.99



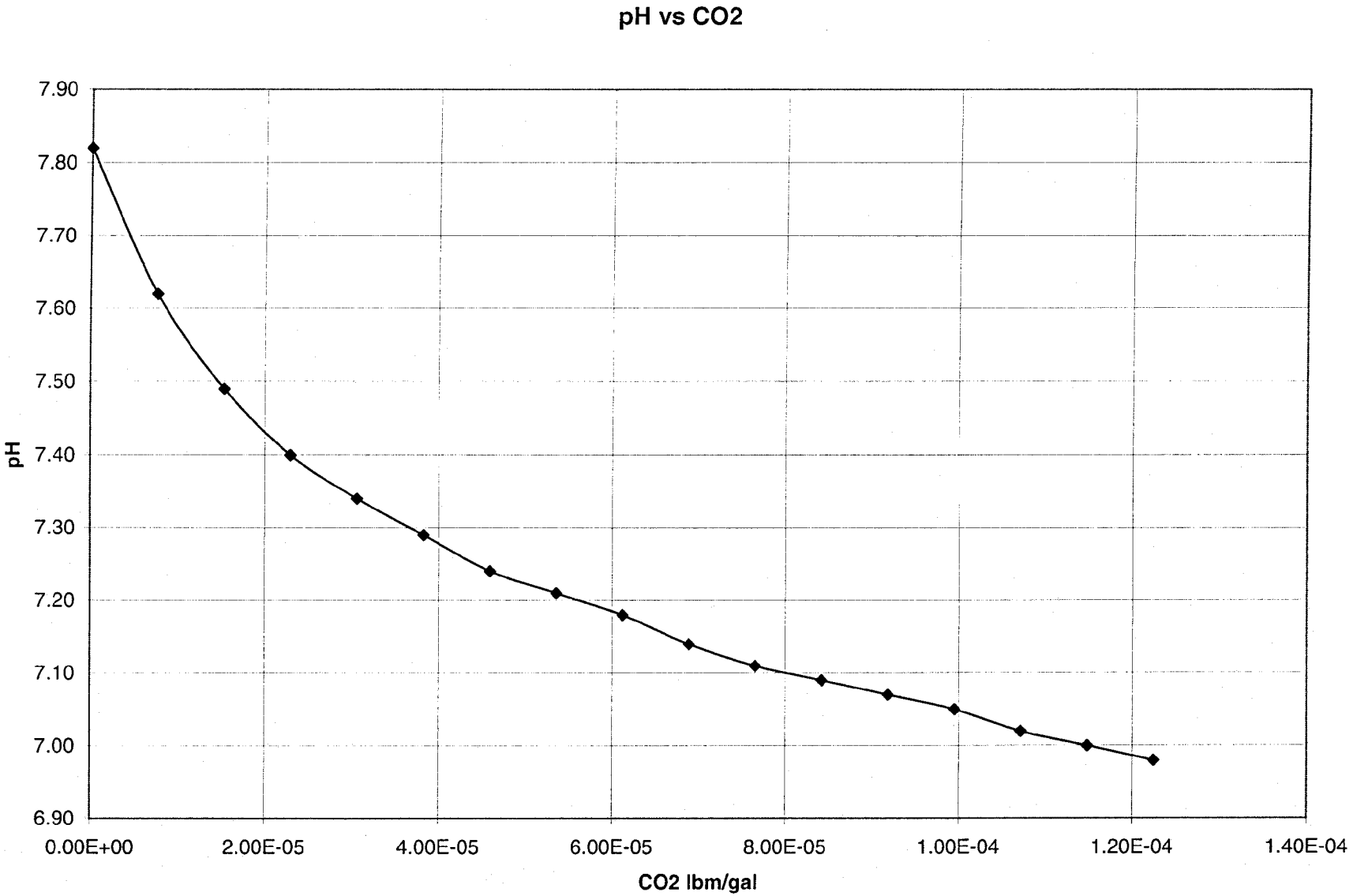
CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
2.4 ml CO2 sat Water

0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol		CO2		pH
ml	mmol	mg	lbm/gal	
0.0	0.000	0.00	0.00E+00	7.78
0.1	0.001	0.05	7.65E-06	7.60
0.2	0.002	0.09	1.53E-05	7.49
0.3	0.003	0.14	2.30E-05	7.41
0.4	0.004	0.18	3.06E-05	7.34
0.5	0.005	0.23	3.83E-05	7.29
0.6	0.006	0.28	4.59E-05	7.26
0.7	0.007	0.32	5.36E-05	7.22
0.8	0.008	0.37	6.12E-05	7.20
0.9	0.009	0.41	6.89E-05	7.15
1.0	0.010	0.46	7.65E-05	7.12
1.1	0.011	0.50	8.42E-05	7.09
1.2	0.013	0.55	9.18E-05	7.07
1.3	0.014	0.60	9.95E-05	7.04
1.4	0.015	0.64	1.07E-04	7.03
1.5	0.016	0.69	1.15E-04	7.01
1.6	0.017	0.73	1.22E-04	6.98



CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
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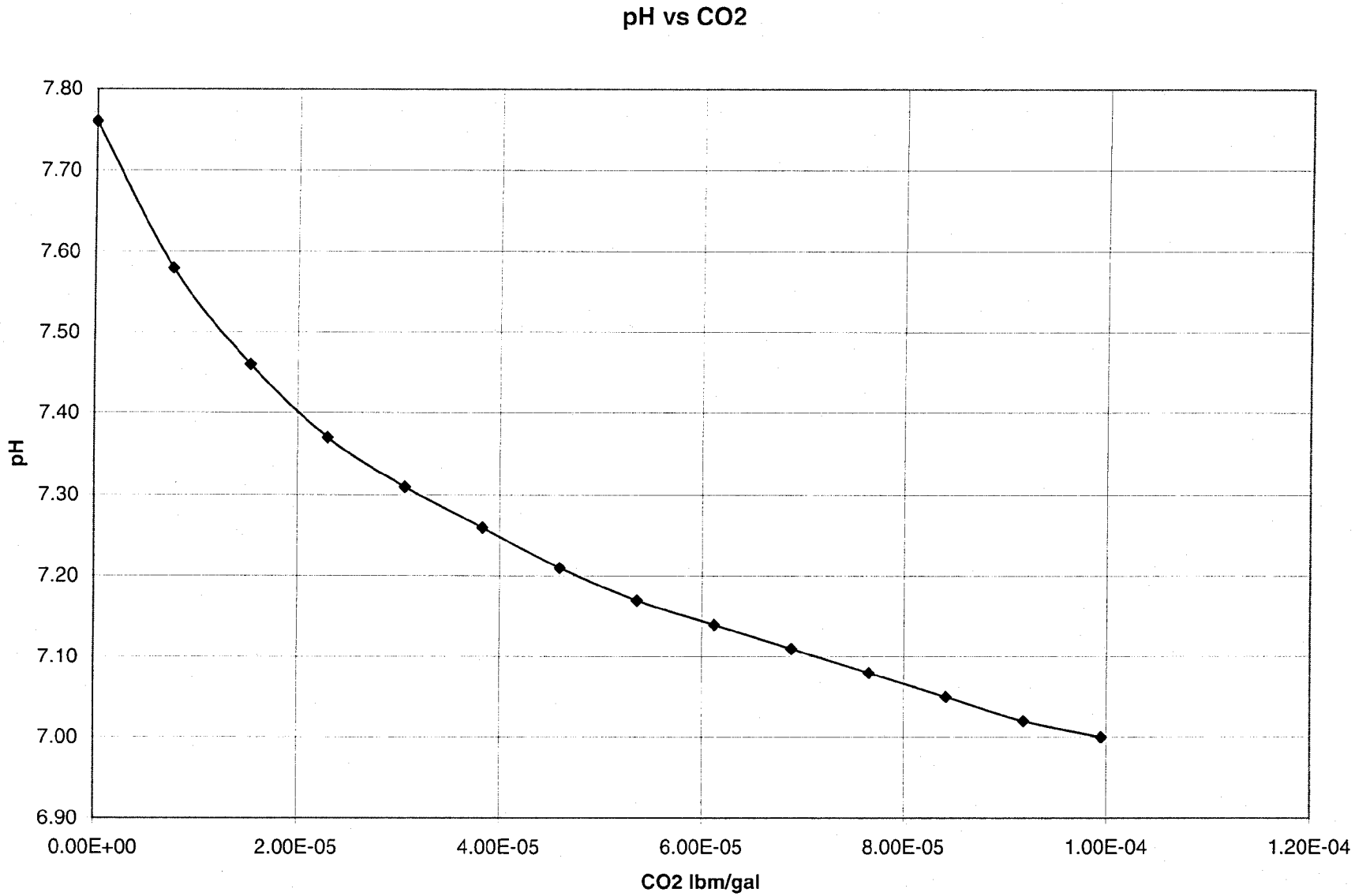
0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol ml	mmol	CO2 mg	lbm/gal	pH
0.0	0.000	0.00	0.00E+00	7.82
0.1	0.001	0.05	7.65E-06	7.62
0.2	0.002	0.09	1.53E-05	7.49
0.3	0.003	0.14	2.30E-05	7.40
0.4	0.004	0.18	3.06E-05	7.34
0.5	0.005	0.23	3.83E-05	7.29
0.6	0.006	0.28	4.59E-05	7.24
0.7	0.007	0.32	5.36E-05	7.21
0.8	0.008	0.37	6.12E-05	7.18
0.9	0.009	0.41	6.89E-05	7.14
1.0	0.010	0.46	7.65E-05	7.11
1.1	0.011	0.50	8.42E-05	7.09
1.2	0.013	0.55	9.18E-05	7.07
1.3	0.014	0.60	9.95E-05	7.05
1.4	0.015	0.64	1.07E-04	7.02
1.5	0.016	0.69	1.15E-04	7.00
1.6	0.017	0.73	1.22E-04	6.98



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Sample 50 ml

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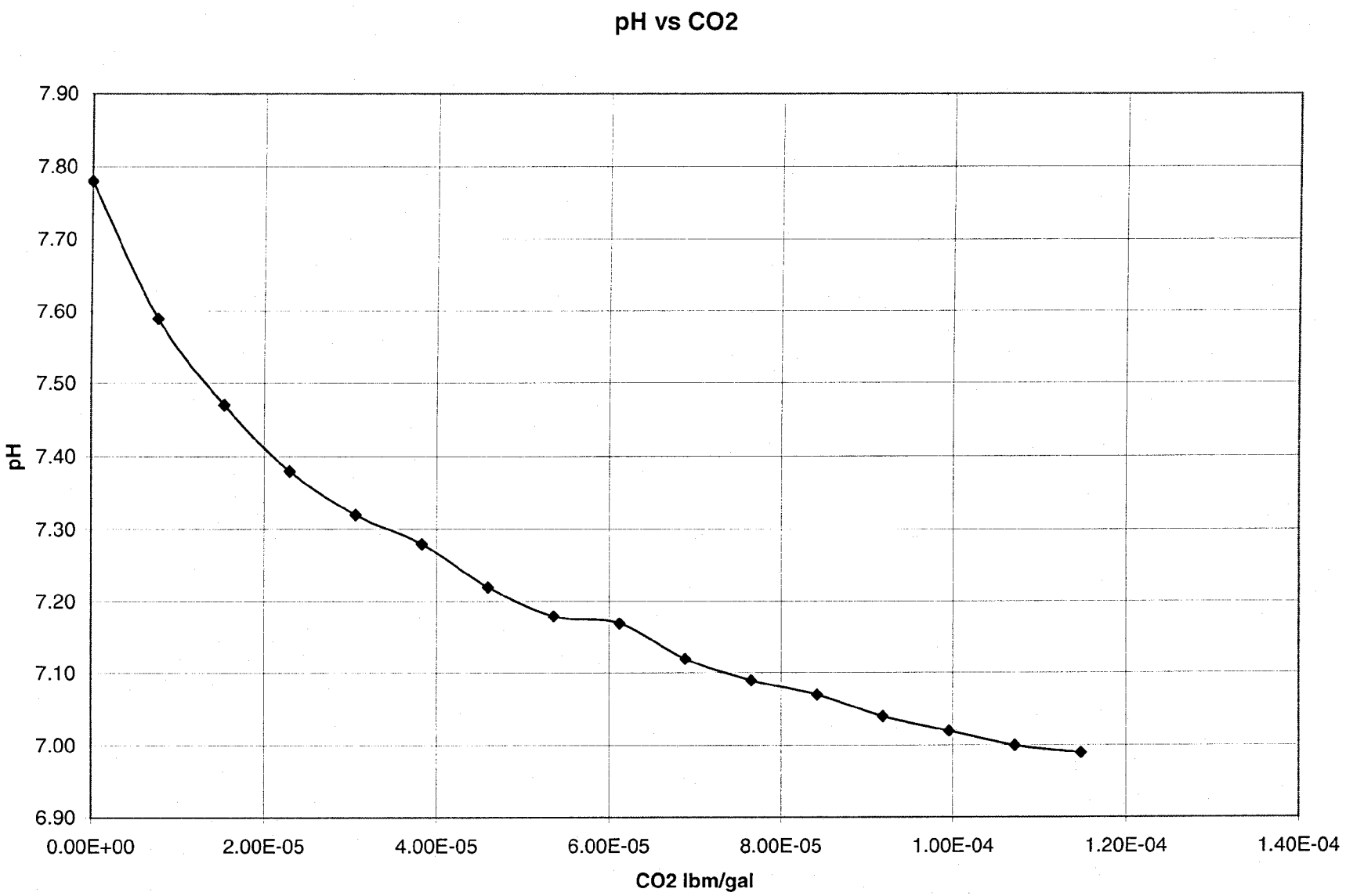
ml	mmol	mg	lbm/gal	
0.0	0.000	0.00	0.00E+00	7.76
0.1	0.001	0.05	7.65E-06	7.58
0.2	0.002	0.09	1.53E-05	7.46
0.3	0.003	0.14	2.30E-05	7.37
0.4	0.004	0.18	3.06E-05	7.31
0.5	0.005	0.23	3.83E-05	7.26
0.6	0.006	0.28	4.59E-05	7.21
0.7	0.007	0.32	5.36E-05	7.17
0.8	0.008	0.37	6.12E-05	7.14
0.9	0.009	0.41	6.89E-05	7.11
1.0	0.010	0.46	7.65E-05	7.08
1.1	0.011	0.50	8.42E-05	7.05
1.2	0.013	0.55	9.18E-05	7.02
1.3	0.014	0.60	9.95E-05	7.00



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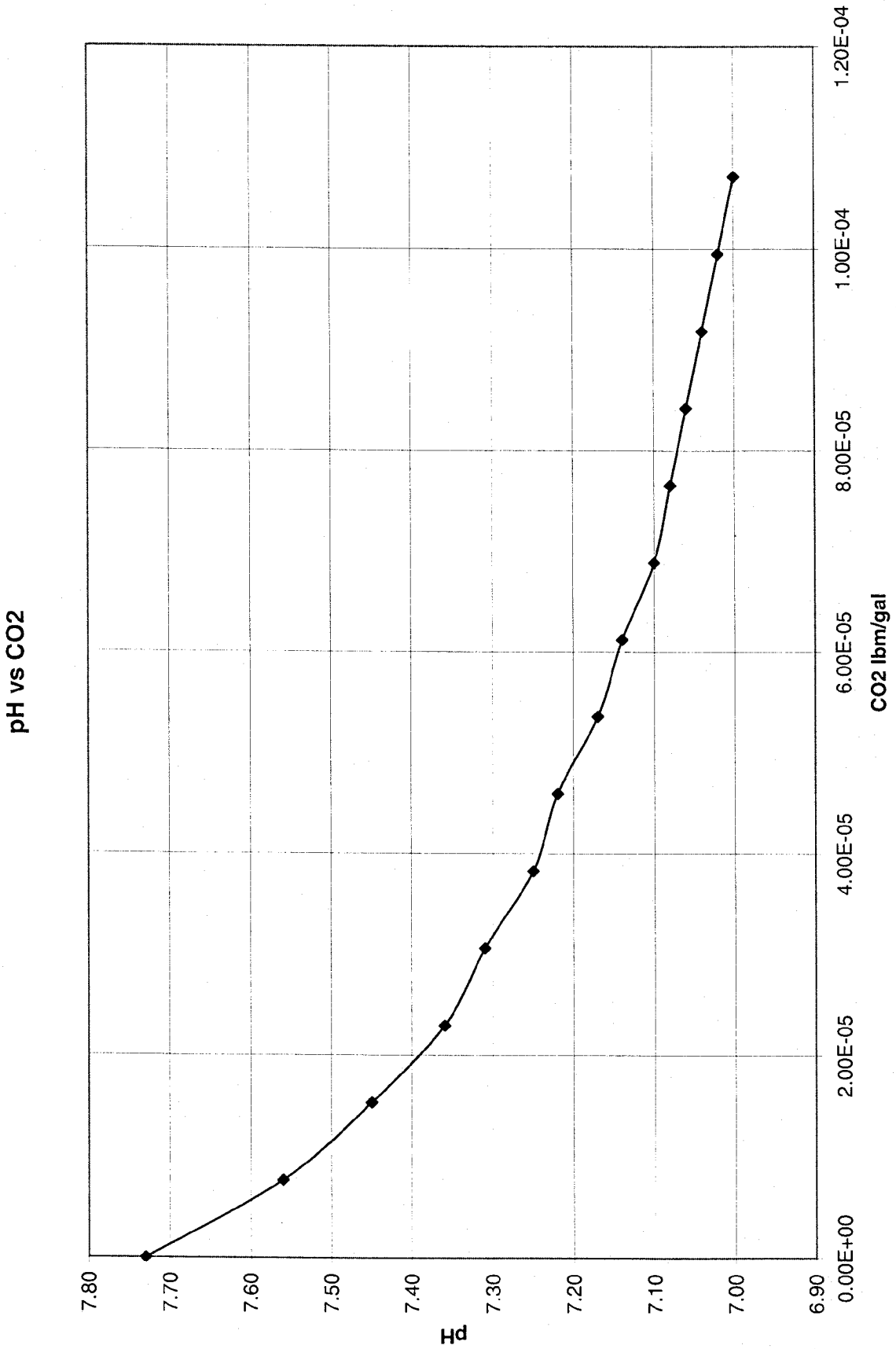
0.2	0.002	0.09	1.53E-05	7.47
0.3	0.003	0.14	2.30E-05	7.38
0.4	0.004	0.18	3.06E-05	7.32
0.5	0.005	0.23	3.83E-05	7.28
0.6	0.006	0.28	4.59E-05	7.22
0.7	0.007	0.32	5.36E-05	7.18
0.8	0.008	0.37	6.12E-05	7.17
0.9	0.009	0.41	6.89E-05	7.12
1.0	0.010	0.46	7.65E-05	7.09
1.1	0.011	0.50	8.42E-05	7.07
1.2	0.013	0.55	9.18E-05	7.04
1.3	0.014	0.60	9.95E-05	7.02
1.4	0.015	0.64	1.07E-04	7.00
1.5	0.016	0.69	1.15E-04	6.99


pH vs CO2
pH
7.80
7.70
7.60
7.50
7.40
7.30
7.20
7.10
7.00
6.90
0.00E+00
2.00E-05
4.00E-05
6.00E-05
8.00E-05
1.00E-04
1.20E-04
CO2 lbm/gal

CO2 44.01 g/mol

0.1 ml 0.5 N NaOH
2.4 ml CO2 sat Water

0.021 N CO2 0.010 M CO2

Sample 50 ml

Vol ml	mmol	CO2 mg	lbm/gal	pH
0.0	0.000	0.00	0.00E+00	7.73
0.1	0.001	0.05	7.65E-06	7.56
0.2	0.002	0.09	1.53E-05	7.45
0.3	0.003	0.14	2.30E-05	7.36
0.4	0.004	0.18	3.06E-05	7.31
0.5	0.005	0.23	3.83E-05	7.25
0.6	0.006	0.28	4.59E-05	7.22
0.7	0.007	0.32	5.36E-05	7.17
0.8	0.008	0.37	6.12E-05	7.14
0.9	0.009	0.41	6.89E-05	7.10
1.0	0.010	0.46	7.65E-05	7.08
1.1	0.011	0.50	8.42E-05	7.06
1.2	0.013	0.55	9.18E-05	7.04
1.3	0.014	0.60	9.95E-05	7.02
1.4	0.015	0.64	1.07E-04	7.00