Calculated <u>without using</u> the proposed flow as part of the final down stream flow

New Industry

Discharger Final Design Flow (FDF) = 4 Million Gallons per Day (MGD)

De minimis Final Design Flow (DFDF) = SDF

Copper Chronic Aquatic Life Criterion = 0.021 mg/l

Stream Background Concentration of Copper = 0.0027 mg/l

Stream Design Flow (SDF) $Q_{7,10}$ in MGD	**A1**	0	0.1	1	10	20	30	40	50	60	70	80
FDF in MGD	**B1**	4	4	4	4	4	4	4	4	4	4	4
Dilution Ratio SDF/FDF (A1/B1)	**C1**	0	0.025	0.25	2.5	5	7.5	10	12.5	15	17.5	20
Final Copper WQBEL mg/l	**D1**	0.018	0.018	0.019	0.026	0.033	0.034	0.034	0.034	0.034	0.034	0.034
Increased Copper load lbs/day (*B1 x D1 x 8.34)	**E1**	0.6	0.6	0.63	0.87	1.1	1.14	1.14	1.14	1.14	1.14	1.14
Copper TAC in lbs/day (A1 x 0.021 x 8.34)	**F1**	0	0.0175	0.175	1.75	3.5	5.25	7	8.75	10.5	12.25	14
Background Load lbs/day (A1 x 0.0027 x 8.34))	**G1**	0	0.0023	0.023	0.23	0.45	0.68	0.9	1.13	1.35	1.58	1.8
Copper UAC in lbs/day (F1 - G1)	**H1**	0	0.0152	0.152	1.52	3.05	4.57	6.1	7.62	9.15	10.67	12.2
% of UAC Used by WQBEL (E1/H1) x 100	**I1**	0	3947	415	57	36	25	19	15	12.5	10.7	9.3
10 % of the UAC in mg/l **L1/(B2 x 8.34)	**J1**	0	0.00005	0.00046	0.0046	0.0093	0.0138	0.0183	0.0228	0.0275	0.032	0.0365
De minimis limit in mg/l **M1/(B2 x 8.34)	**K1**	0	0.00005	0.00046	0.0046	0.0093	0.0138	0.0183	0.0228	0.0275	0.032	0.0365
10 % of the UAC in lbs/day (H1/10)	**L1**	0	0.00152	0.0153	0.152	0.31	0.46	0.61	0.76	0.92	1.07	1.22
De minimis limit in lbs/day (H1/10)	**M1**	0	0.00152	0.0153	0.152	0.31	0.46	0.61	0.76	0.92	1.07	1.22

Total Assimilative Capacity (TAC) = Stream Design Flow x Water Quality Criterion

Background Load (BL) = Stream Design Flow x Representative Background Concentration

Unused Assimilative Capacity (UAC) = TAC - BL

Final Copper WQBEL mg/l = Monthly Average WQBEL in mg/l

*Pounds per day = Flow in MGD x Concentration in mg/l x 8.34

**Concentration in mg/l = Pounds per day / (Flow in MGD x 8.34)

1.0 ug/l = 0.001 mg/l

19-Sep-08

Calculated <u>using</u> the proposed flow as part of the final down stream flow

New Industry

Discharger Final Design Flow (FDF) = 4 Million Gallons per Day (MGD)

De minimis Final Design Flow (DFDF) = SDF + FDF

Copper Chronic Aquatic Life Criterion = 0.021 mg/l

Stream Background Concentration of Copper = 0.0027 mg/l

Stream Design Flow (SDF) $Q_{7,10}$ in MGD	**A2**	0	0.1	1	10	20	30	40	50	60	70	80
DFDF = (FDF + SDF) in MGD (A2 + 4 in MGD)	**B2**	4	4.1	5	14	24	34	44	54	64	74	84
Dilution Ratio SDF/FDF (A2/4 in MGD)	**C2**	0	0.025	0.25	2.5	5	7.5	10	12.5	15	17.5	20
Final Copper WQBEL mg/l	**D2**	0.018	0.018	0.019	0.026	0.033	0.034	0.034	0.034	0.034	0.034	0.034
Increased Copper load lbs/day (*FDF x D2 x 8.34)	**E2**	0.6	0.6	0.63	0.87	1.1	1.14	1.14	1.14	1.14	1.14	1.14
Copper TAC in lbs/day (B2 x 0.021 x 8.34))	**F2**	0.697	0.718	0.876	2.45	4.2	5.95	7.7	9.46	11.2	13	14.7
Background Load lbs/day (A2 x 0.0027 x 8.34)	**G2**	0	0.0023	0.023	0.23	0.45	0.68	0.9	1.13	1.35	1.58	1.8
Copper UAC in lbs/day (F2 - G2)	**H2**	0.697	0.716	0.853	2.17	3.75	5.27	6.81	8.33	9.85	11.42	12.9
% of UAC Used by WQBEL (E2/H2) x 100	**I2**	86	84	74	40	29	22	17	14	11.6	9.9	8.8
10 % of the UAC in mg/l (**L2/(FDF (4) x 8.34)	**J2**	0.0021	0.0021	0.0026	0.0065	0.0114	0.0159	0.0204	0.0248	0.0293	0.0341	0.0383
De minimis limit in mg/l (**M2/(FDF (4) x 8.34)	**K2**	0.0021	0.0021	0.0026	0.0065	0.0114	0.0159	0.0204	0.0248	0.0293	0.0341	0.0383
10 % of the UAC in lbs/day (H2/10)	**L2**	0.0697	0.0713	0.0853	0.217	0.38	0.53	0.68	0.83	0.98	1.14	1.28
De minimis limit in lbs/day (H2/10)	**M2**	0.0697	0.0713	0.0853	0.217	0.38	0.53	0.68	0.83	0.98	1.14	1.28

Total Assimilative Capacity (TAC) = De minimis Final Design Flow x Water Quality Criterion

Background Load (BL) = Stream Design Flow x Representative Background Concentration

Unused Assimilative Capacity (UAC) = TAC - BL

Final Copper WQBEL mg/l = Monthly Average WQBEL in mg/l

*Pounds per day = Flow in MGD x Concentration in mg/l x 8.34

**Concentration in mg/l = Pounds per day / (Flow in MGD x 8.34)

1.0 ug/l = 0.001 mg/l

19-Sep-08

Calculated <u>without using</u> the proposed flow as part of the final down stream flow

Existing Industry Expansion

Discharger Existing Design Flow (EDF) = 2 MGD
Discharger Increased Design Flow (IDF) = 3 MGD
Discharger Final Design Flow (FDF) = EDF + IDF = 5 MGD
De minimis Final Design Flow (DFDF) = SDF + EDF
Copper Criterion = 0.021 mg/l
Background Concentration = 0.0027 mg/l

Stream Design Flow (SDF) $Q_{7,10}$ in MGD	**A3**	0	0.1	1	10	20	30	40	50	60	70	80
DFDF = SDF + EDF in MGD	**B3**	2	2.1	4	12	22	32	42	52	62	72	82
Dilution Ratio SDF/FDF (A3/5 MGD)	**C3**	0	0.02	0.2	2	4	6	8	10	12	14	16
Existing Discharge WQBEL mg/l	**D3**	0.018	0.018	0.02	0.034	0.036	0.036	0.036	0.036	0.036	0.036	0.036
Final Discharge WQBEL mg/l	**E3**	0.018	0.018	0.019	0.026	0.033	0.034	0.034	0.034	0.034	0.034	0.034
Existing Discharge WQBEL lbs/day (*EDF x D3 x 8.34)	**F3**	0.3	0.3	0.33	0.57	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Increased Discharge WQBEL lbs/day (*IDF x E3 x 8.34)	**G3**	0.45	0.45	0.48	0.65	0.83	0.85	0.85	0.85	0.85	0.85	0.85
Final Discharge WQBEL lbs/day (E3 x FDF x 8.34)	**H3**	0.75	0.75	0.79	1.08	1.43	1.42	1.42	1.42	1.42	1.42	1.42
Copper TAC in lbs/day (*B3 x 0.021 mg/l x 8.34)	**I3**	0.35	0.368	0.7	2.1	3.85	5.6	7.36	9.11	10.86	12.6	14.4
Background Load lbs/day (*A3 x 0.0027 mg/l x 8.34)	**J3**	0	0.0023	0.023	0.23	0.45	0.68	0.9	1.13	1.35	1.58	1.8
Copper UAC in lbs/day (I3 - J3 - F3)	**K3**	0.05	0.066	0.357	1.59	3	4.44	5.86	7.38	8.9	10.42	12
% of UAC Used by Increased DischargeWQBEL (G3/K3)	**L3**	900	682	134	41	27.7	19.1	14.5	11.5	9.6	8.2	7.1
10 % of the UAC in mg/l (O3 / (IDF x 8.34))	**M3**	0.0001	0.00017	0.00096	0.0038	0.0072	0.0106	0.0141	0.0177	0.0213	0.0249	0.0288
Deminimis limit in mg/l (P3 / (FDF x 8.34))	**N3**	0.0073	0.0074	0.0086	0.0118	0.0161	0.0221	0.0288	0.0321	0.0357	0.0393	0.0431
10 % of the UAC in lbs/day (K3 / 10)	**O3**	0.005	0.007	0.04	0.16	0.3	0.44	0.59	0.74	0.89	1.04	1.2
De minimis limit in lbs/day (F3 + O3)	**P3**	0.305	0.307	0.37	0.73	0.9	1.04	1.19	1.34	1.49	1.64	1.8

Total Assimilative Capacity (TAC) = De minimis Final Design Flow x Water Quality Criterion
Background Load (BL) = Stream Design Flow x Representative Background Concentration
Unused Assimilative Capacity (UAC) = TAC - BL - Existing Limit (F3)

Final Copper WQBEL mg/l = Monthly Average WQBEL in mg/l

*Pounds per day = Flow in MGD x Concentration in mg/l x 8.34
**Concentration in mg/l = Pounds per day / (Flow in MGD x 8.34)
1.0 ug/l = 0.001 mg/l
19-Sep-08

Calculated <u>using</u> the proposed flow as part of the final down stream flow

Existing Industry Expansion

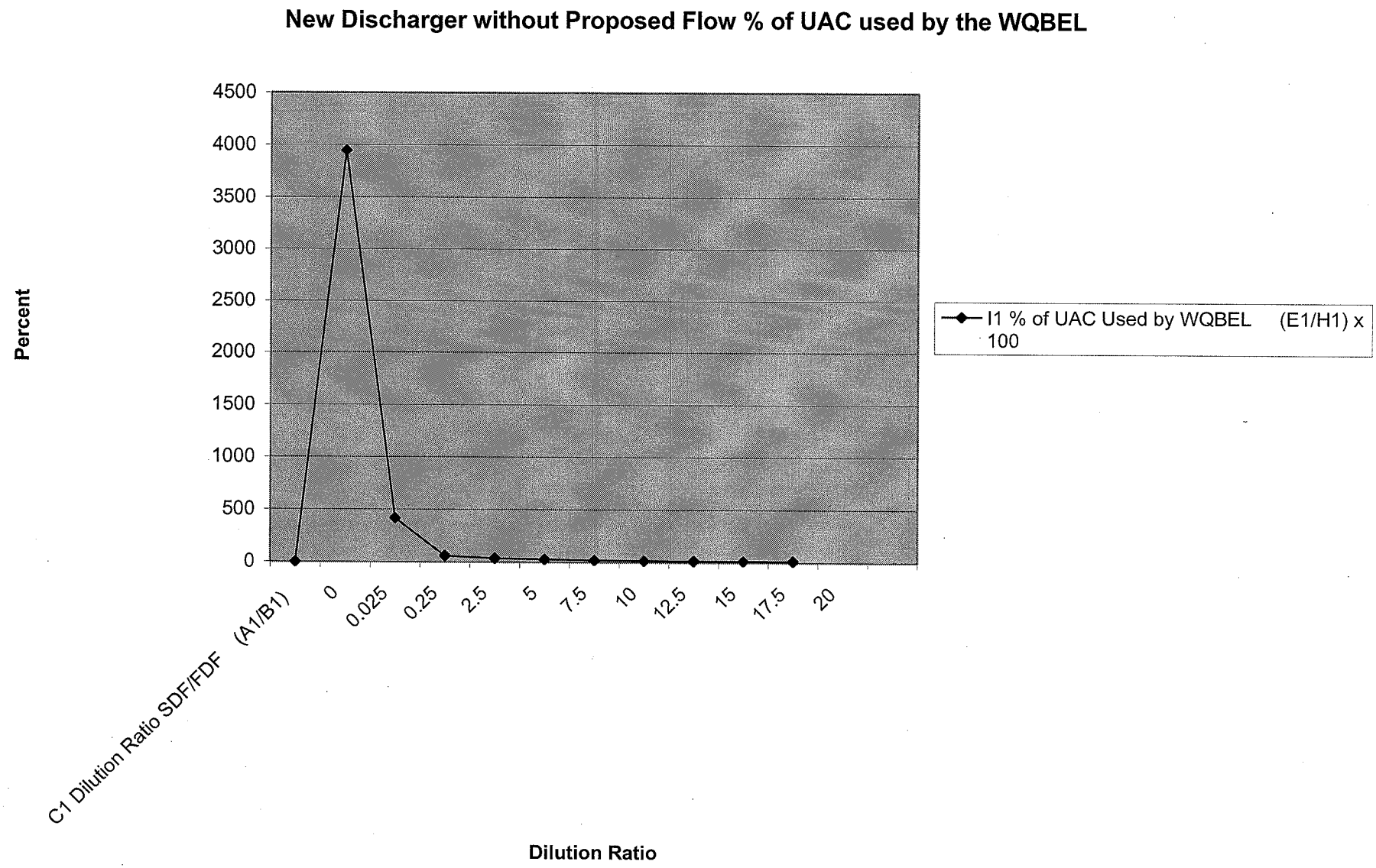
Discharger Existing Design Flow (EDF) = 2 MGD
Discharger Increased Design Flow (IDF) = 3 MGD
Discharger Final Design Flow (FDF) = EDF + IDF = 5 MGD
De minimis Final Design Flow (DFDF) = SDF + EDF + IDF
Copper Criterion = 0.021 mg/l
Background Concentration = 0.0027 mg/l

Stream Design Flow (SDF) $Q_{7,10}$ in MGD	**A4**	0	0.1	1	10	20	30	40	50	60	70	80
DFDF = (SDF + FDF) in MGD	**B4**	5	5.1	6	15	25	35	45	55	65	75	85
Dilution Ratio SDF/FDF (A4/5 MGD)	**C4**	0	0.02	0.2	2	4	6	8	10	12	14	16
Existing Discharge WQBEL mg/l	**D4**	0.018	0.018	0.02	0.026	0.036	0.036	0.036	0.036	0.036	0.036	0.036
Final Discharge WQBEL mg/l	**E4**	0.018	0.018	0.019	0.026	0.033	0.034	0.034	0.034	0.034	0.034	0.034
Existing Discharge WQBEL lbs/day (*EDF x D4 x 8.34)	**F4**	0.3	0.3	0.33	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Increased Discharge WQBEL lbs/day (*IDF x E4 x 8.34)	**G4**	0.45	0.45	0.48	0.65	0.83	0.85	0.85	0.85	0.85	0.85	0.85
Final Discharge WQBEL lbs/day (FDF x E4 x 8.34)	**H4**	0.75	0.75	0.79	1.08	1.43	1.42	1.42	1.42	1.42	1.42	1.42
Copper TAC in lbs/day (*B4 x 0.021 mg/l x 8.34)	**I4**	0.876	0.893	1.05	2.63	4.38	6.13	7.88	9.6	11.4	13.14	14.89
Background Load lbs/day (*A4 x 0.0027 x 8.34)	**J4**	0	0.0023	0.023	0.23	0.45	0.68	0.9	1.13	1.35	1.58	1.8
Copper UAC in lbs/day (I4 - J4)	**K4**	0.576	0.59	0.697	1.8	3.33	4.85	6.38	7.9	9.45	11	12.5
% of UAC Used by Increased WQBEL lbs/day (G4/K4)	**L4**	78	76	69	36	25	17.5	13.3	10.8	9	7.7	6.8
10 % of the UAC in mg/l (**O4 / (FDF x 8.34))	**M4**	0.0014	0.0014	0.0017	0.0043	0.0079	0.0118	0.0153	0.0189	0.0228	0.0264	0.03
Deminimis limit in mg/l (**P4 / (FDF x 8.34))	**N4**	0.0086	0.0086	0.0096	0.0187	0.0223	0.0261	0.0297	0.0333	0.0372	0.0408	0.0444
10 % of the UAC in lbs/day (K4/10)	**O4**	0.0576	0.06	0.07	0.18	0.33	0.49	0.64	0.79	0.95	1.1	1.25
De minimis limit in lbs/day (F4 + O4)	**P4**	0.358	0.36	0.4	0.78	0.93	1.09	1.24	1.39	1.55	1.7	1.85

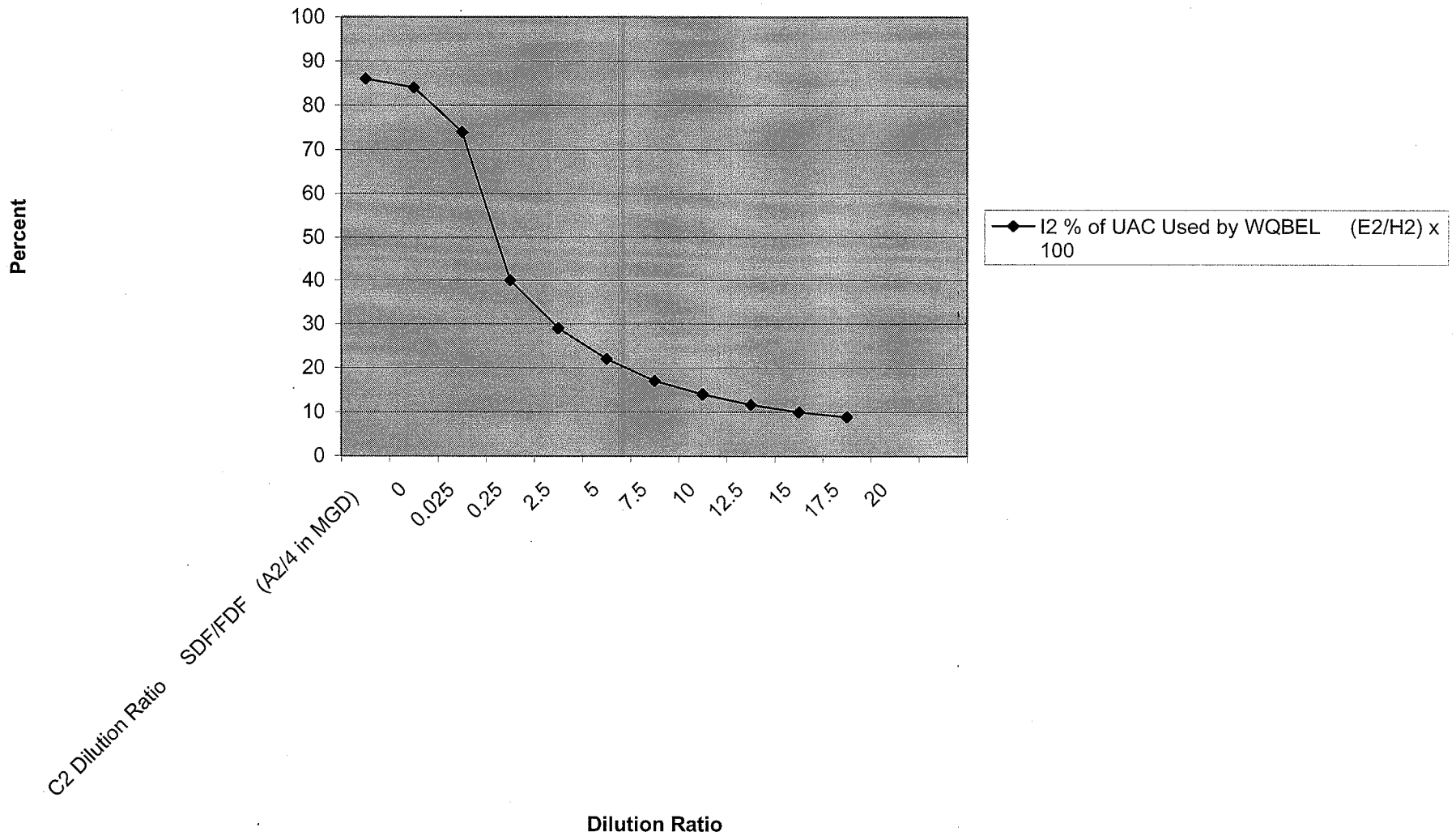
Total Assimilative Capacity (TAC) = De minimis Final Design Flow x Water Quality Criterion
Background Load (BL) = Stream Design Flow x Representative Background Concentration
Unused Assimilative Capacity (UAC) = TAC - BL

Final Copper WQBEL mg/l = Monthly Average WQBEL in mg/l

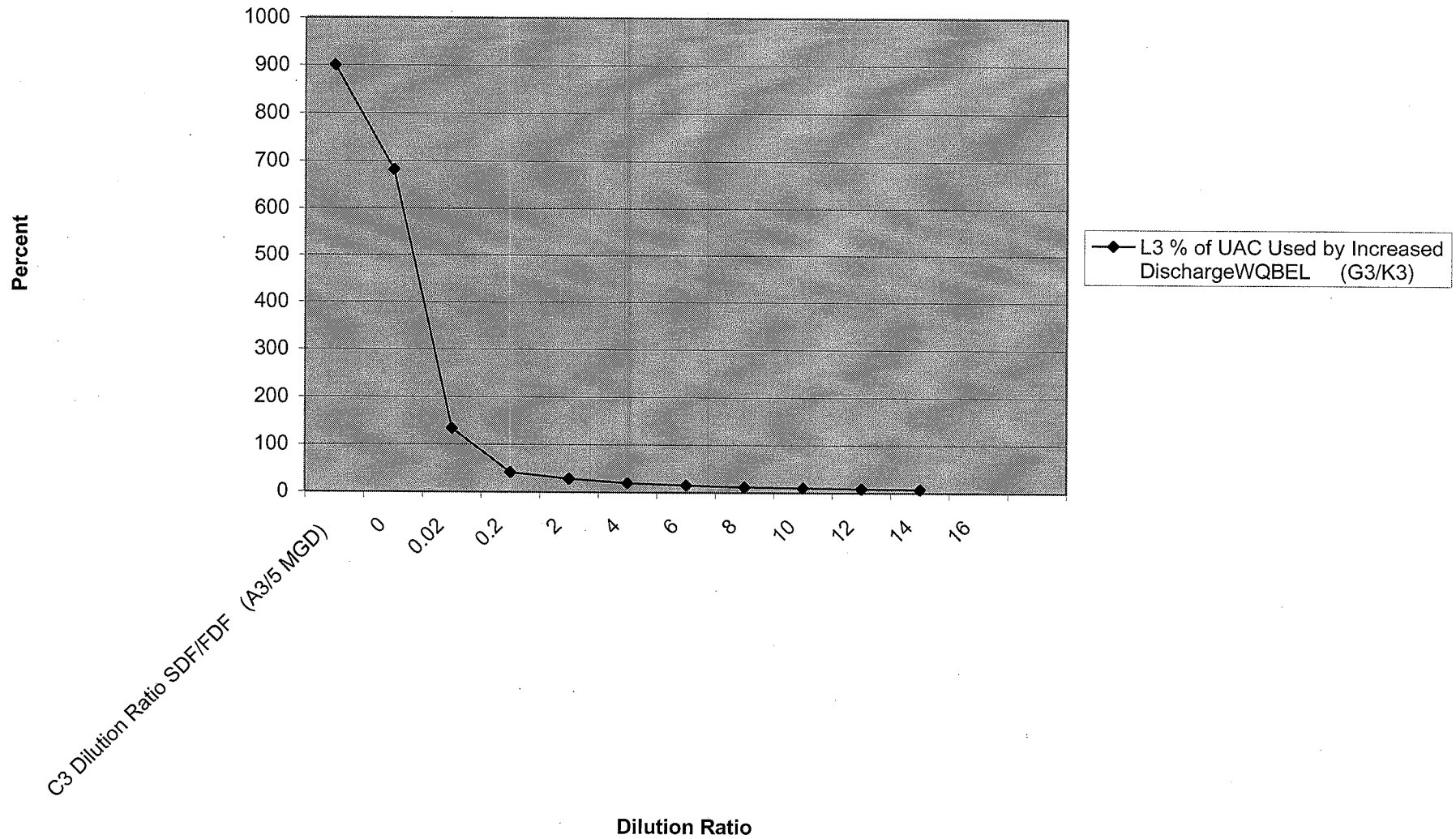
*Pounds per day = Flow in MGD x Concentration in mg/l x 8.34
**Concentration in mg/l = Pounds per day / (Flow in MGD x 8.34)
1.0 ug/l = 0.001 mg/l
19-Sep-08


New Discharger without Proposed Flow % of UAC used by the WQBEL
Percent
4500
4000
3500
3000
2500
2000
1500
1000
500
0
C1 Dilution Ratio SDF/FDF (A1/B1)
0
0.025
0.25
2.5
5
7.5
10
12.5
15
17.5
20
Dilution Ratio
I1 % of UAC Used by WQBEL (E1/H1) x 100

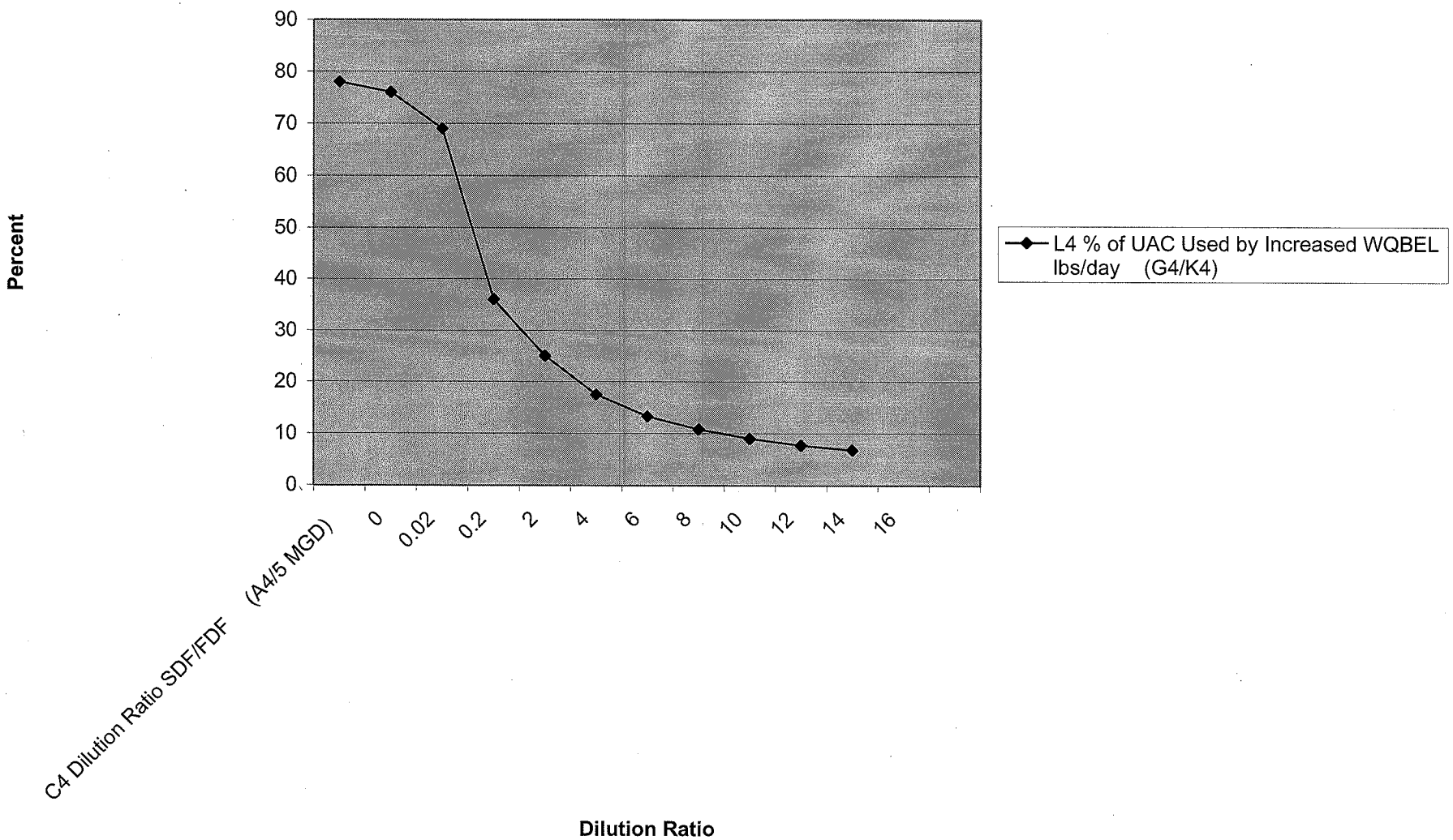
I2 New Industry with the Proposed Flow % of UAC Used by WQBEL

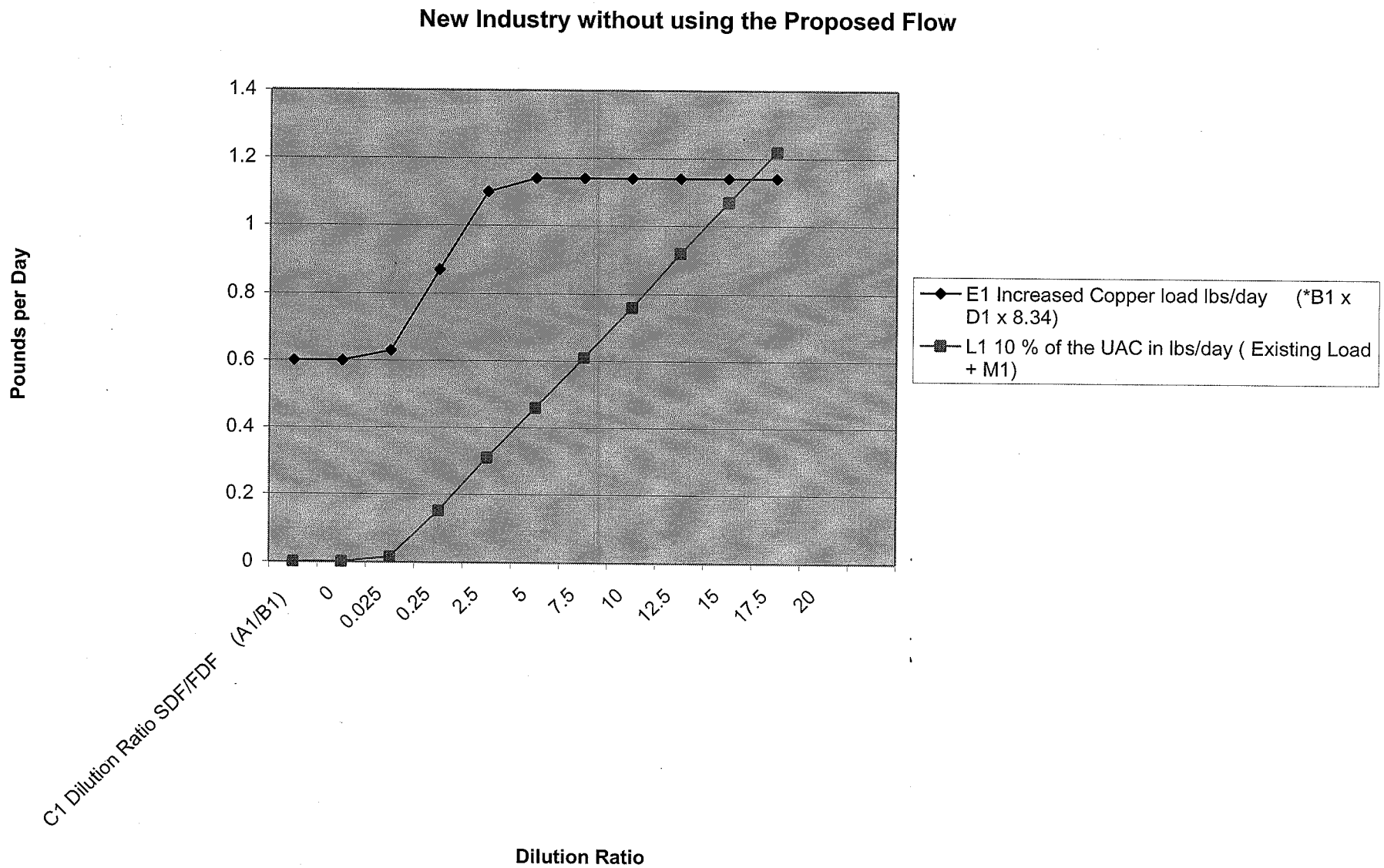


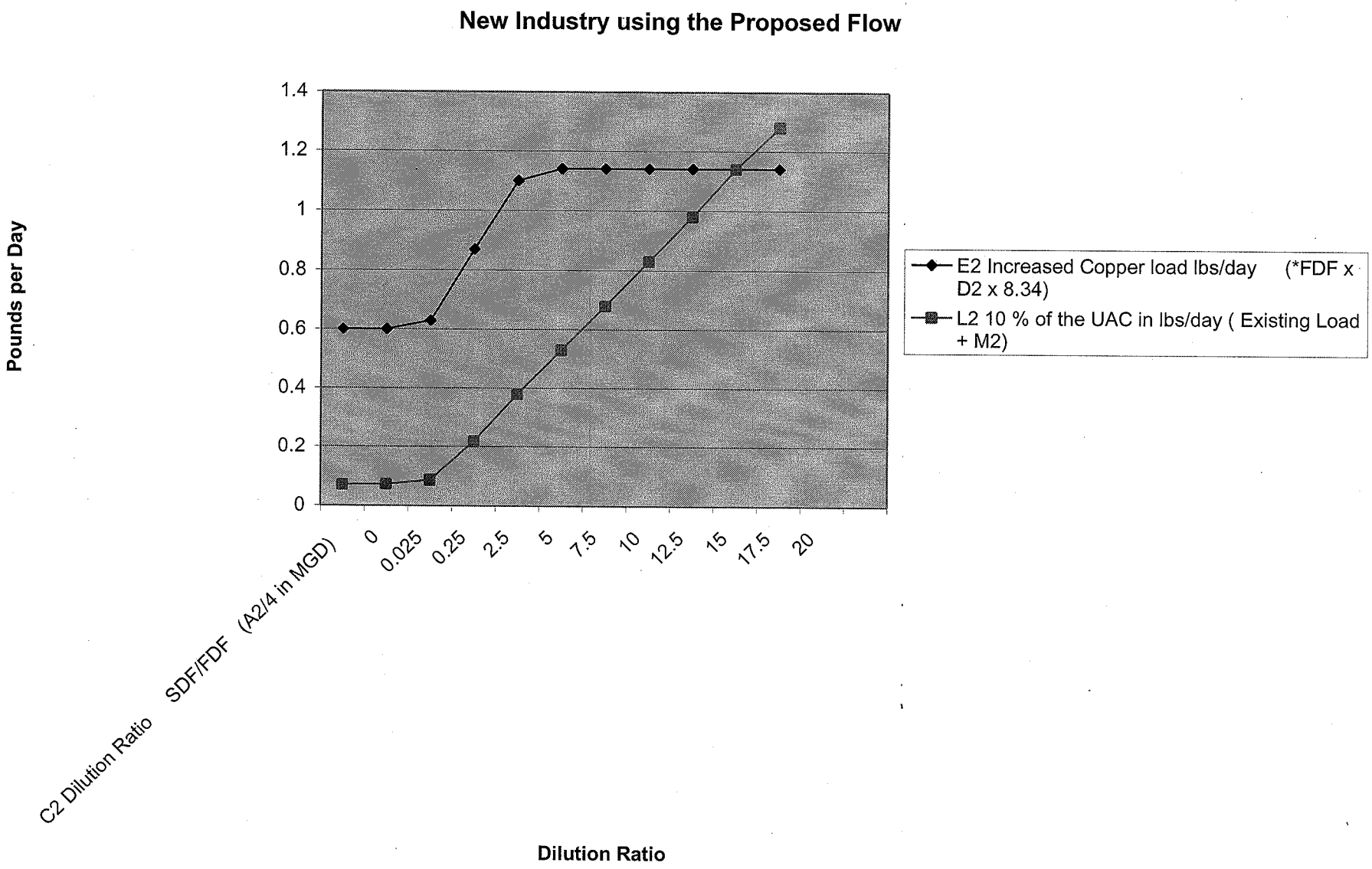
L3 Existing Industry without using the Proposed Flow % of the UAC Used by WQBEL



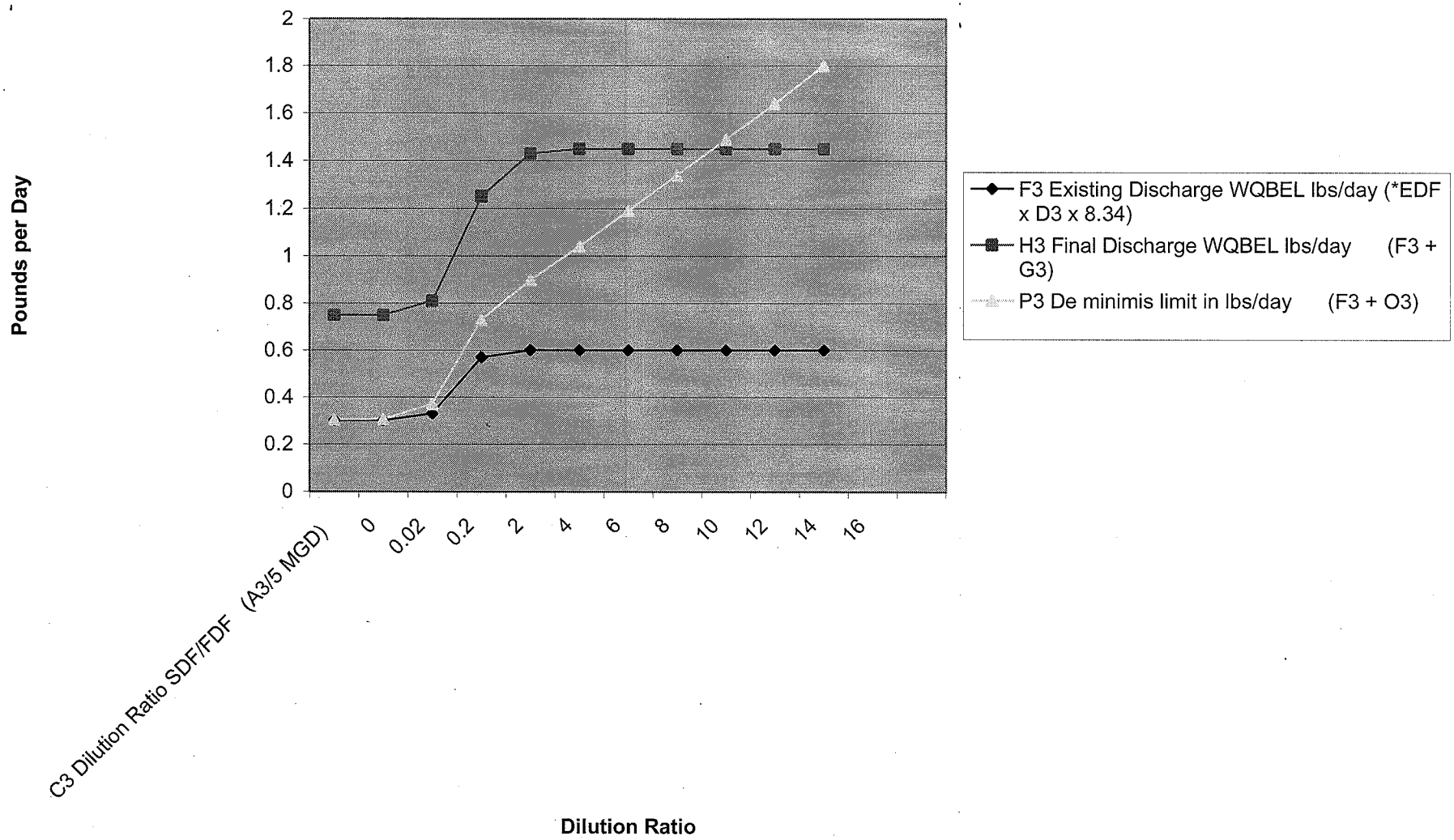
L4 % of UAC Used by Existing Industry based on using the Proposed Flow

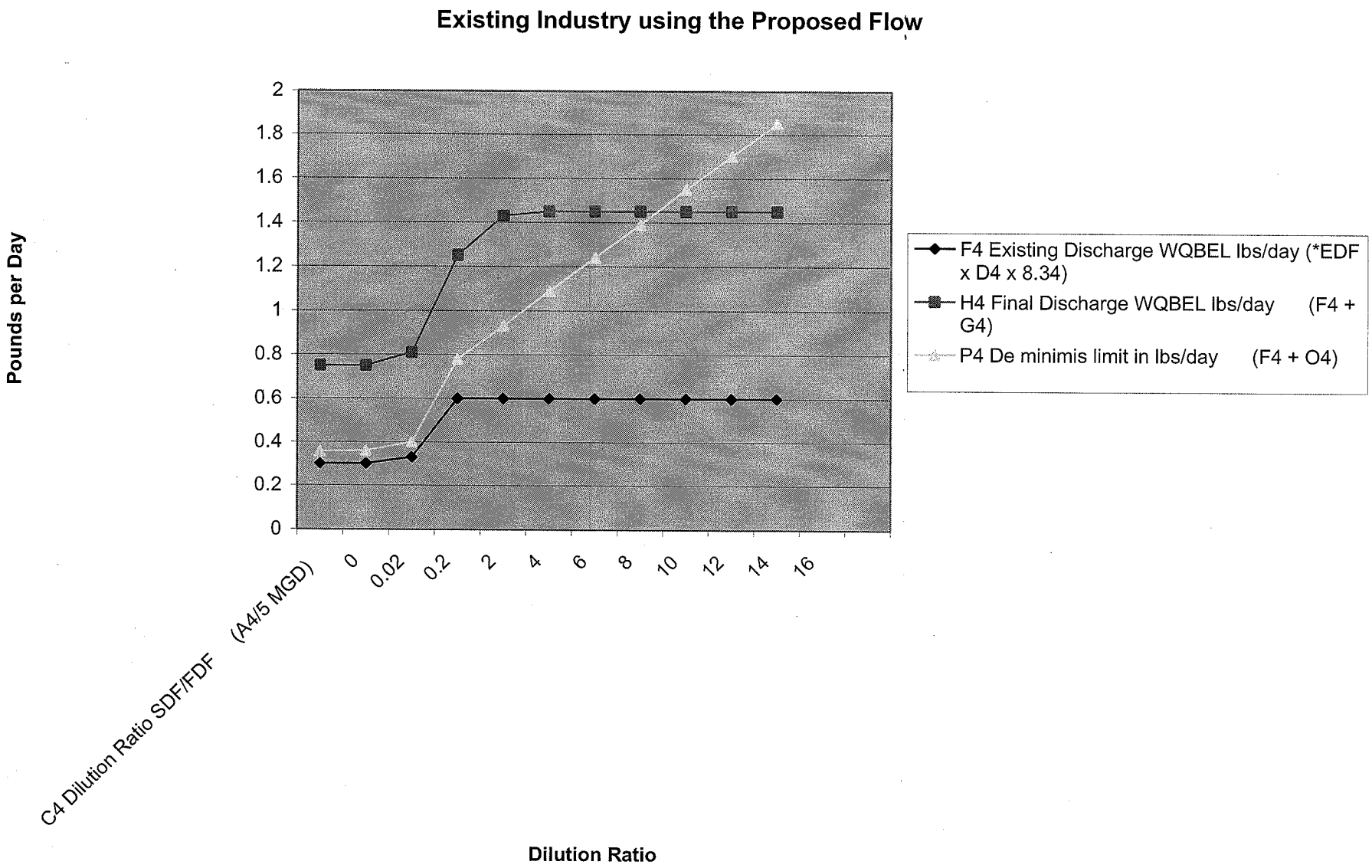


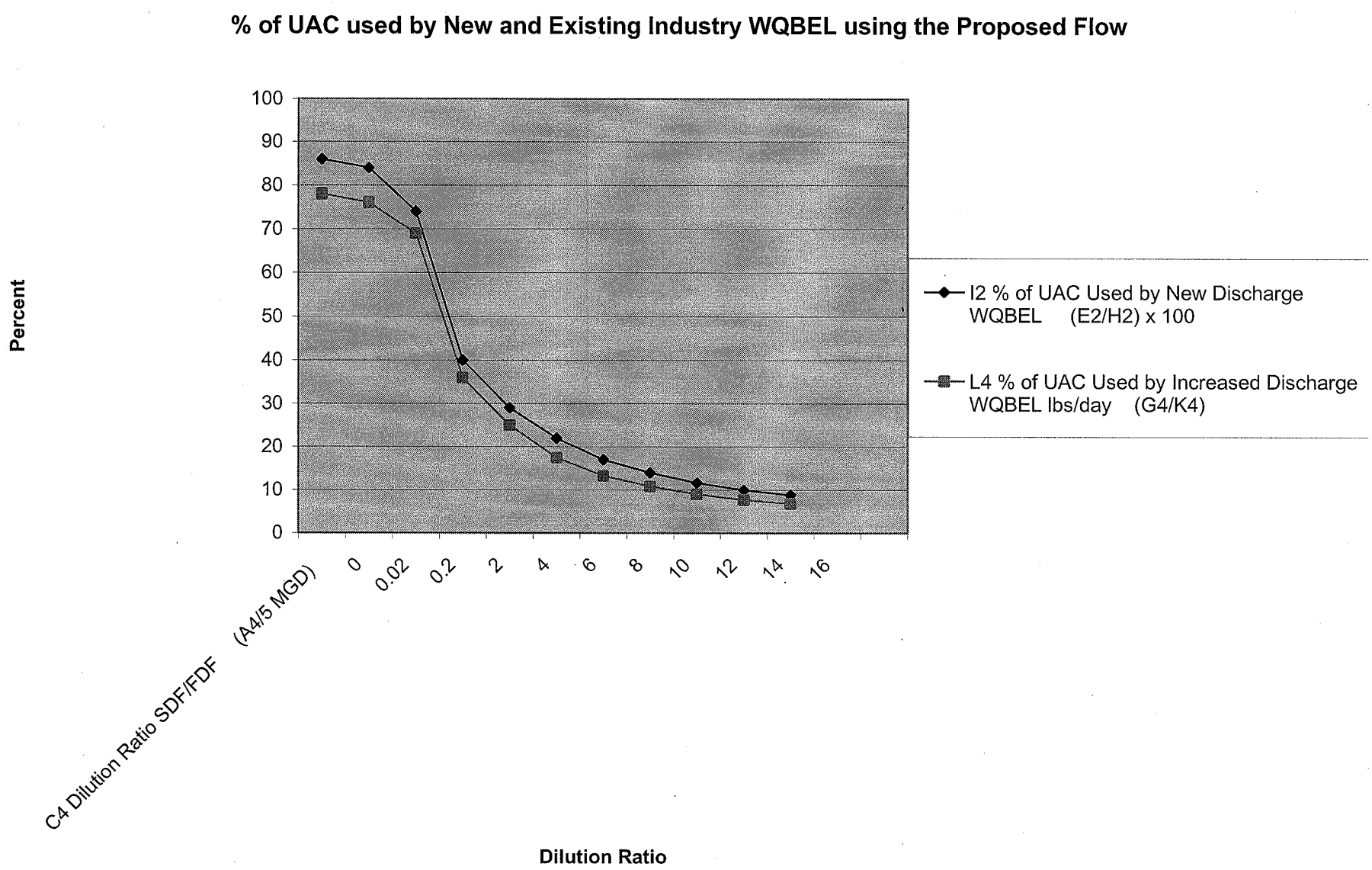

New Industry without using the Proposed Flow
Pounds per Day
1.4
1.2
1
0.8
0.6
0.4
0.2
0
C1 Dilution Ratio SDF/FDF (A1/B1)
0
0.025
0.25
2.5
5
7.5
10
12.5
15
17.5
20
Dilution Ratio
E1 Increased Copper load lbs/day (*B1 x D1 x 8.34)
L1 10 % of the UAC in lbs/day (Existing Load + M1)


New Industry using the Proposed Flow
Pounds per Day
1.4
1.2
1
0.8
0.6
0.4
0.2
0
C2 Dilution Ratio
SDF/FDF (A2/4 in MGD)
0
0.025
0.25
2.5
5
7.5
10
12.5
15
17.5
20
Dilution Ratio
E2 Increased Copper load lbs/day (*FDF x D2 x 8.34)
L2 10 % of the UAC in lbs/day (Existing Load + M2)

Existing Industry without using the Propsoed Flow




Existing Industry using the Proposed Flow
Pounds per Day
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
C4 Dilution Ratio SDF/FDF
(A4/5 MGD)
0
0.02
0.2
2
4
6
8
10
12
14
16
Dilution Ratio
F4 Existing Discharge WQBEL lbs/day (*EDF x D4 x 8.34)
H4 Final Discharge WQBEL lbs/day (F4 + G4)
P4 De minimis limit in lbs/day (F4 + O4)


% of UAC used by New and Existing Industry WQBEL using the Proposed Flow
Percent
100
90
80
70
60
50
40
30
20
10
0
C4 Dilution Ratio SDF/FDF
(A4/5 MGD)
0
0.02
0.2
2
4
6
8
10
12
14
16
Dilution Ratio
I2 % of UAC Used by New Discharge WQBEL (E2/H2) x 100
L4 % of UAC Used by Increased Discharge WQBEL lbs/day (G4/K4)