STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: trans-1,2-Dichloroethylene
COMMENT:

Sample	
Order	Concentration
1	5.000
2	5.000
3	5.000
4	16.200
5	20.000
6	25.000
7	250.000
8	710.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	1036.200
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	152.62

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Trichloroethene
COMMENT:

Sample	
Order	Concentration
1	5.00
2	5.00
3	5.00
4	20.00
5	25.00
6	44.60
7	250.00
8	710.00
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
705.00	0.6052	426.67
245.00	0.3164	77.52
39.60	0.1743	6.90
5.00	0.0561	0.28
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	511.367
Shapiro-Wilk W:	0.611
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

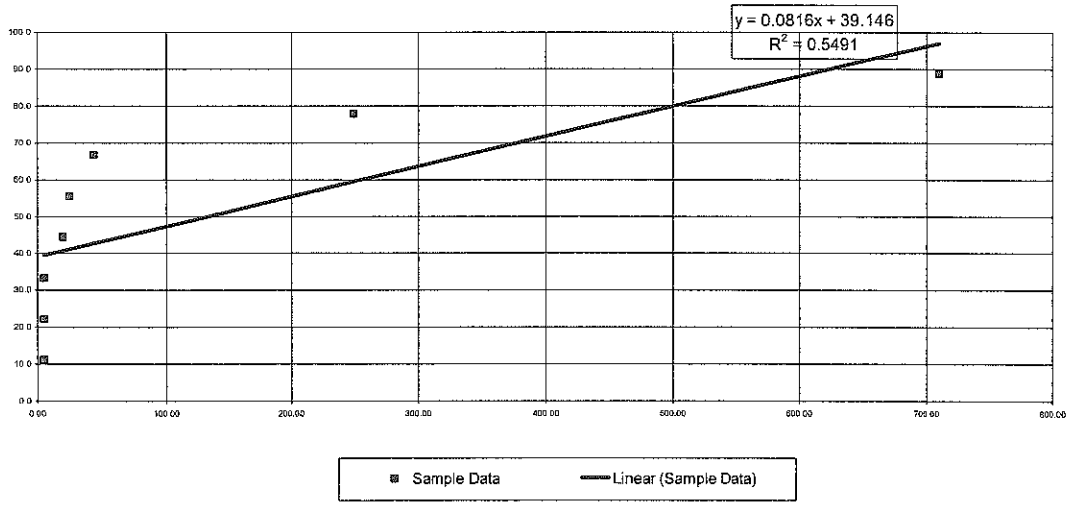
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	133.075
Sample Standard Devation:	247.276

25% Quatrile:	5.0
50% Quatrile(median):	22.5
75% Quatrile:	96.0
Inter-Quatrile Range:	91.0
Upper Cutoff:	232.4

Required Level of Confidence:	95%
Upper Confidence Limit:	298.71
Upper Tolerance Limit:	630.0

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Trichloroethene
COMMENT:

Sample	
Order	Log Conc.
1	0.70
2	0.70
3	0.70
4	1.30
5	1.40
6	1.65
7	2.40
8	2.85
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
2.15	0.6052	1.30
1.70	0.3164	0.54
0.95	0.1743	0.17
0.10	0.0561	0.01
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	2.011
Shapiro-Wilk W:	0.876
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

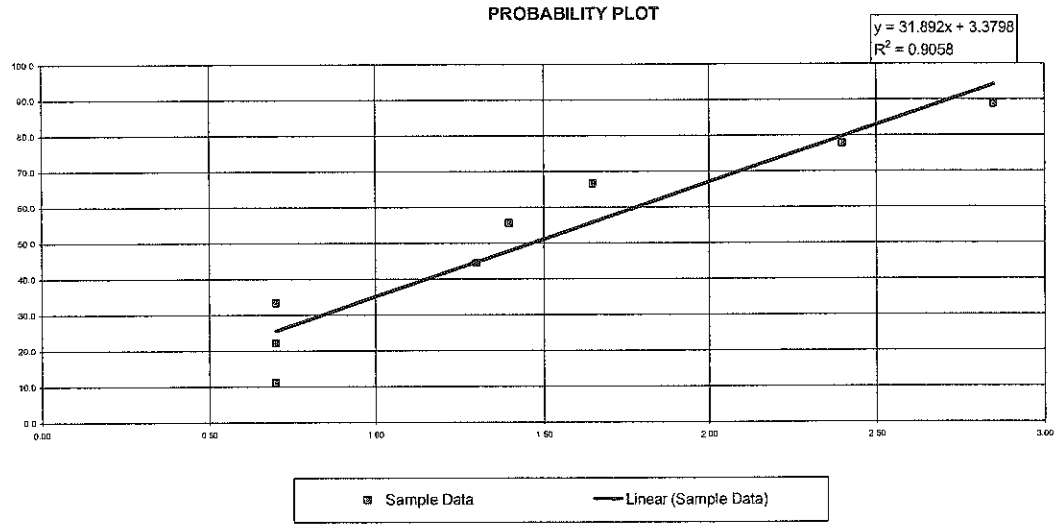
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	1.462
Sample Standard Devation:	0.812

25% Quatrile:	5.0
50% Quatrile(median):	22.5
75% Quatrile:	96.0
Inter-Quatrile Range:	90.95
Upper Cutoff:	232.38

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	2.01	
Upper Tolerance Limit:	3.09	1241.5

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Trichloroethene
COMMENT:

Sample Order	Sample Concentration
1	5.000
2	5.000
3	5.000
4	20.000
5	25.000
6	44.600
7	250.000
8	710.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	1064.600
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	156.48

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Vinyl Chloride
COMMENT:

Sample	
Order	Concentration
1	10.00
2	14.80
3	110.00
4	173.00
5	216.00
6	570.00
7	710.00
8	745.00
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
735.00	0.6052	444.82
695.20	0.3164	219.96
460.00	0.1743	80.18
43.00	0.0561	2.41
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	747.374
Shapiro-Wilk W:	0.845
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

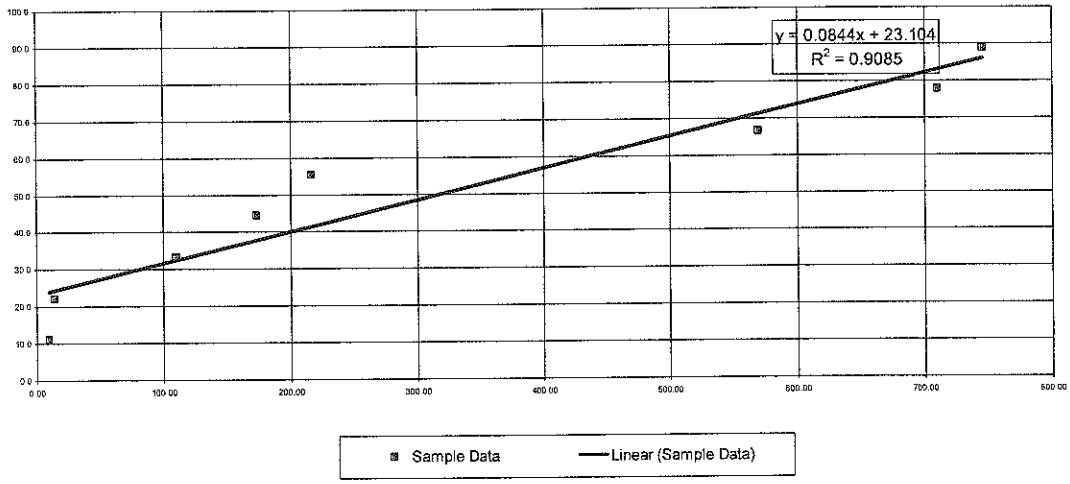
Normality?: Appears Normally Distributed

Number of Samples:	8
Sample Mean:	318.600
Sample Standard Devation:	307.288

25% Quatrile:	86.2
50% Quatrile(median):	194.5
75% Quatrile:	605.0
Inter-Quatrile Range:	518.8
Upper Cutoff:	1383.2

Required Level of Confidence:	95%
Upper Confidence Limit:	524.43
Upper Tolerance Limit:	936.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Vinyl Chloride
COMMENT:

Sample	
Order	Log Conc.
1	1.00
2	1.17
3	2.04
4	2.24
5	2.33
6	2.76
7	2.85
8	2.87
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
1.87	0.6052	1.13
1.68	0.3164	0.53
0.71	0.1743	0.12
0.10	0.0561	0.01
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	1.795
Shapiro-Wilk W:	0.867
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

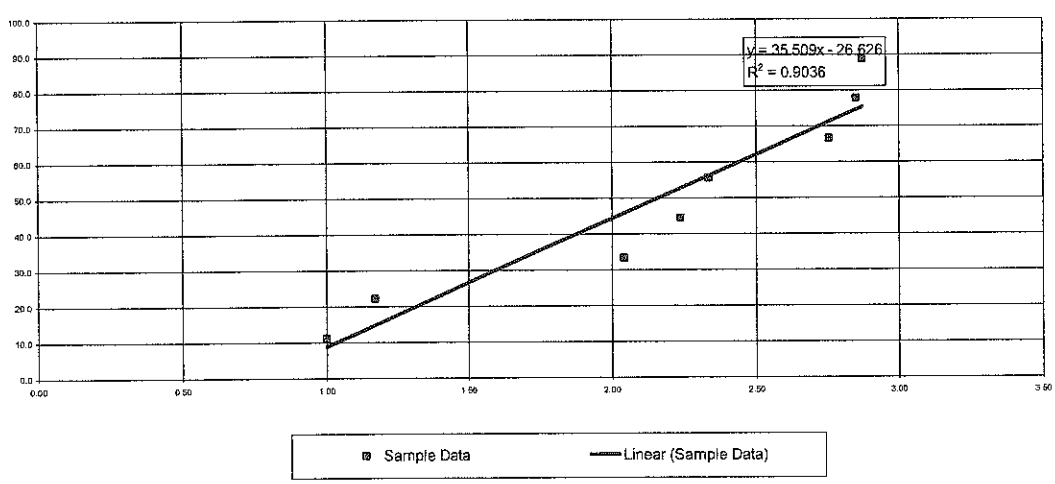
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	2.158
Sample Standard Devation:	0.729

25% Quatrile:	86.2
50% Quatrile(median):	194.5
75% Quatrile:	605.0
Inter-Quatrile Range:	518.80
Upper Cutoff:	1383.20

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	2.65	
Upper Tolerance Limit:	3.62	4188.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Vinyl Chloride
COMMENT:

Sample Order	Sample Concentration
1	10.000
2	14.800
3	110.000
4	173.000
5	216.000
6	570.000
7	710.000
8	745.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	2
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	2548.800
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	354.69

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Xylenes (total)
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

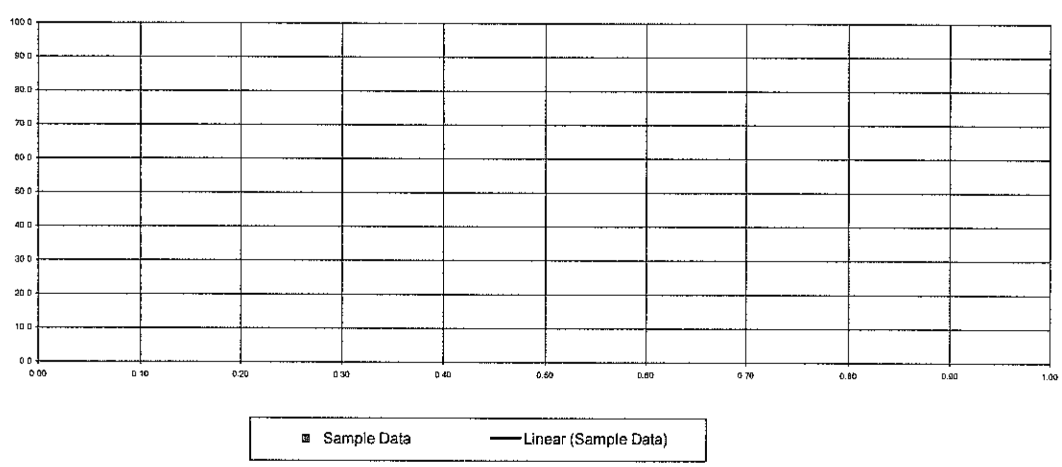
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Xylenes (total)
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

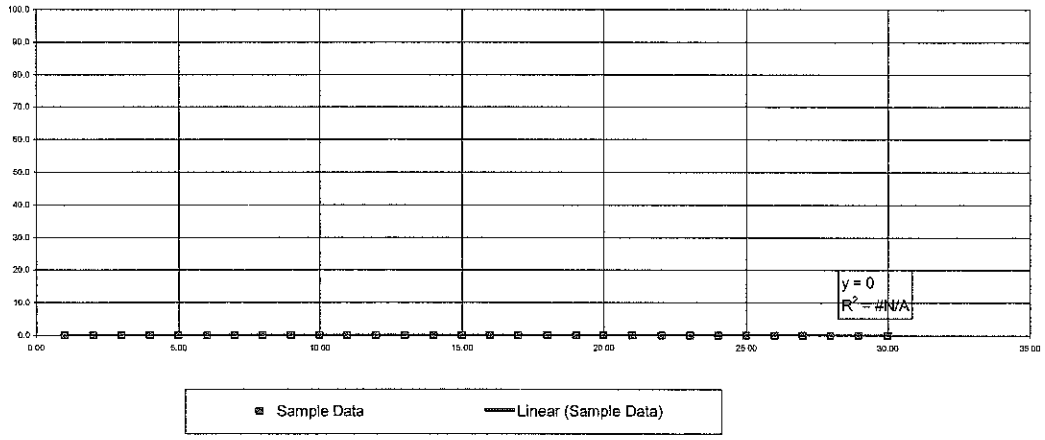
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well B
COMPOUND: Xylenes (total)
COMMENT: All ND

Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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WELL F

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1,1-Trichloroethane
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution Probability	Normal Distribution Quatrile

Shapiro-Wilk Normality Test Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

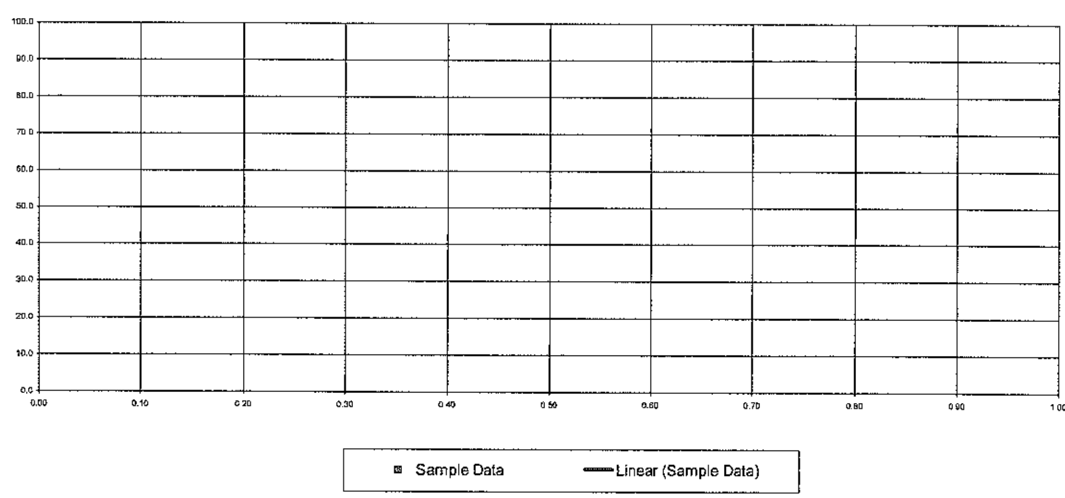
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1,1-Trichloroethane
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

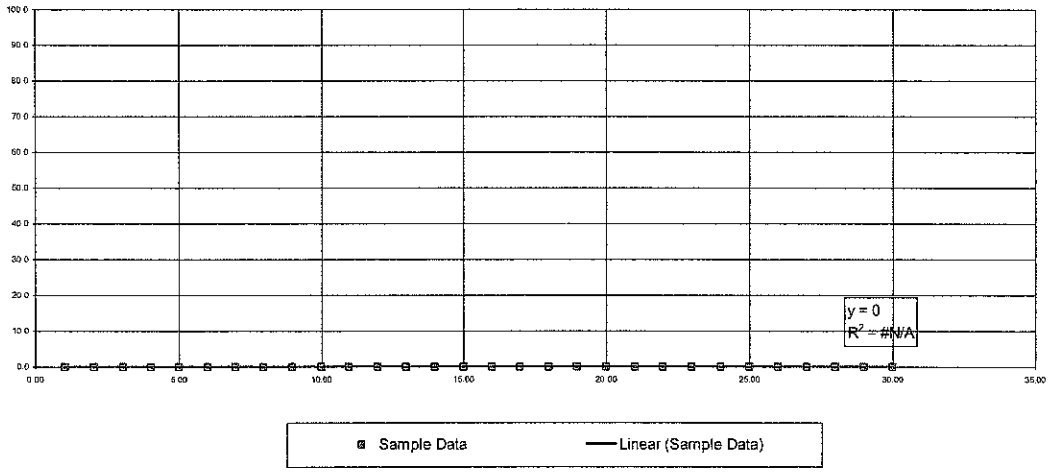
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1,1-Trichloroethane (ug/L)
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1-Dichloroethane
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16					#VALUE!	#VALUE!
17					#VALUE!	#VALUE!
18					#VALUE!	#VALUE!
19					#VALUE!	#VALUE!
20					#VALUE!	#VALUE!
21					#VALUE!	#VALUE!
22					#VALUE!	#VALUE!
23					#VALUE!	#VALUE!
24					#VALUE!	#VALUE!
25					#VALUE!	#VALUE!
26					#VALUE!	#VALUE!
27					#VALUE!	#VALUE!
28					#VALUE!	#VALUE!
29					#VALUE!	#VALUE!
30					#VALUE!	#VALUE!

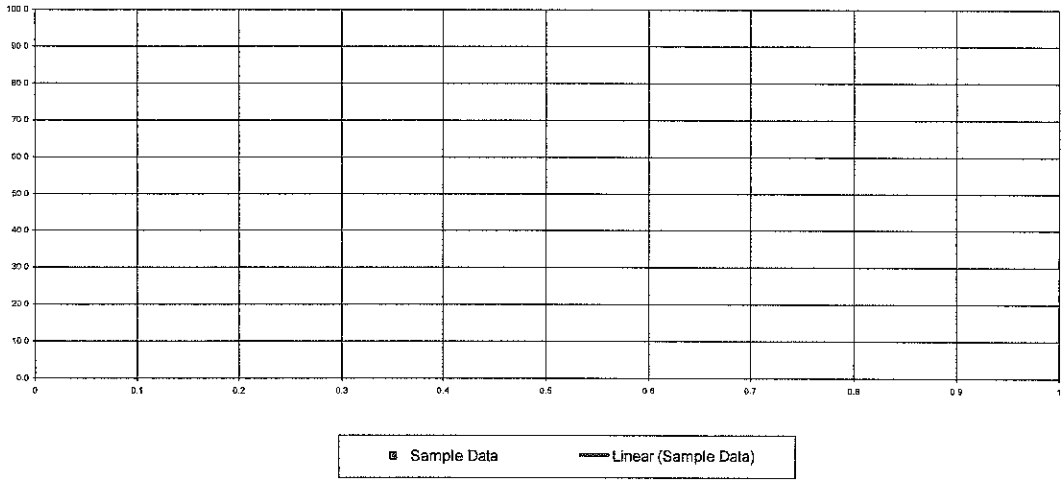
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Deviation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1-Dichloroethane
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

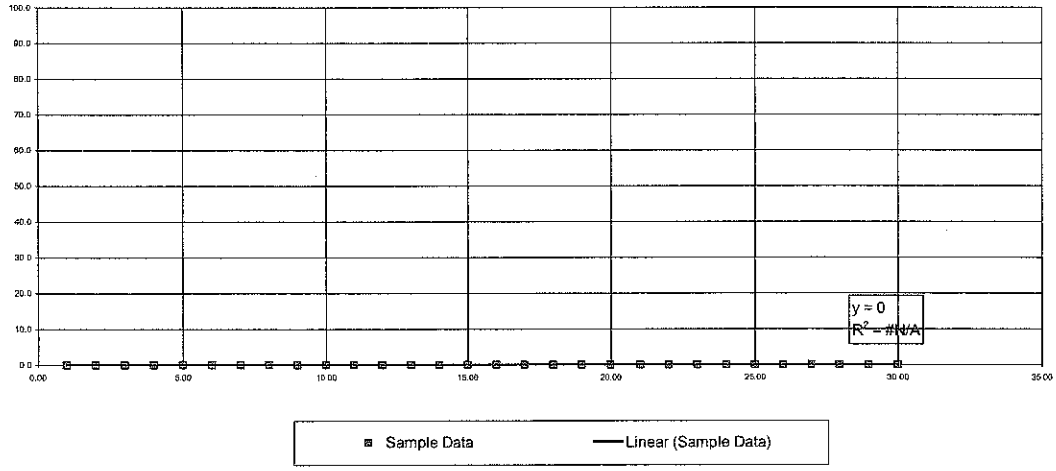
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 1,1-Dichloroethane
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 2-Butanone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

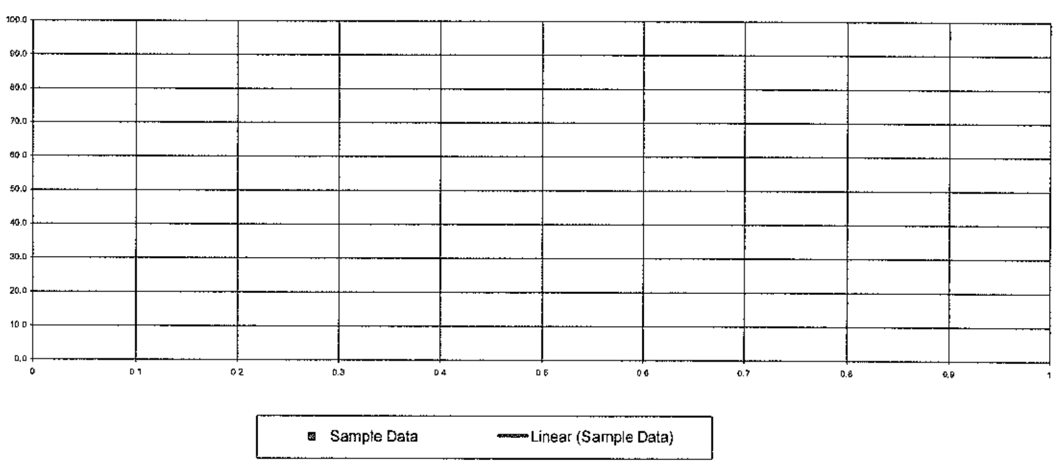
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 2-Butanone
COMMENT: All ND

Sample Order	Sample Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution Probability	Normal Distribution Quatrile

Shapiro-Wilk Normality Test Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

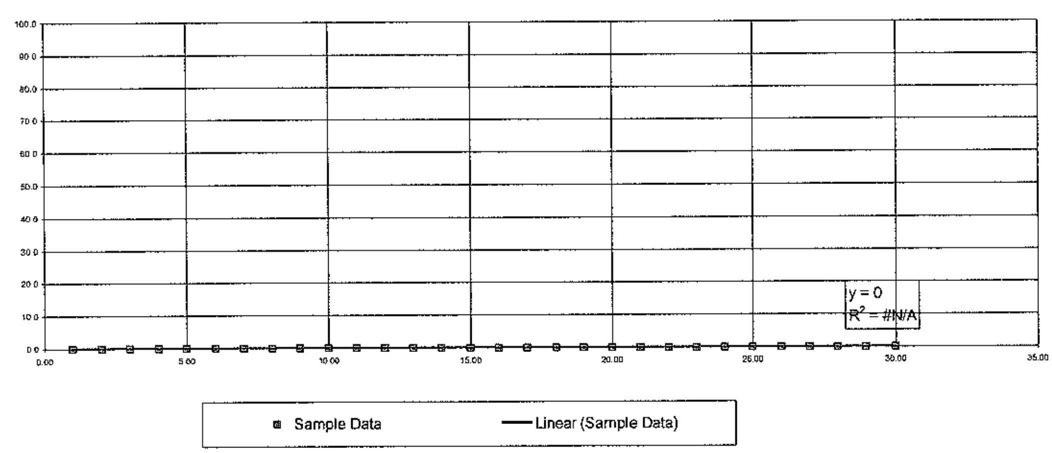
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: 2-Butanone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

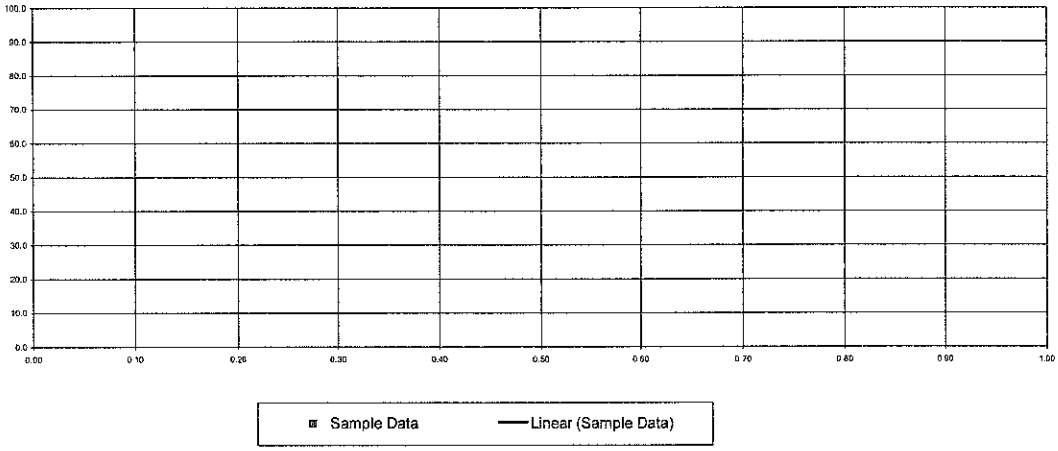
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Deviation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

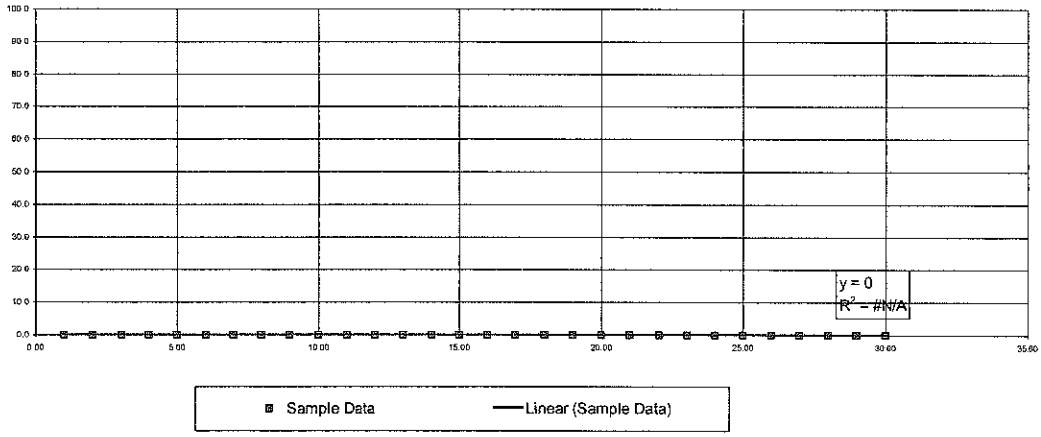
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

#DIV/0!	
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!	
Shapiro-Wilk W:	#VALUE!	
Critical Value:		5%
Shapiro-Wilk Comparison W:	#VALUE!	

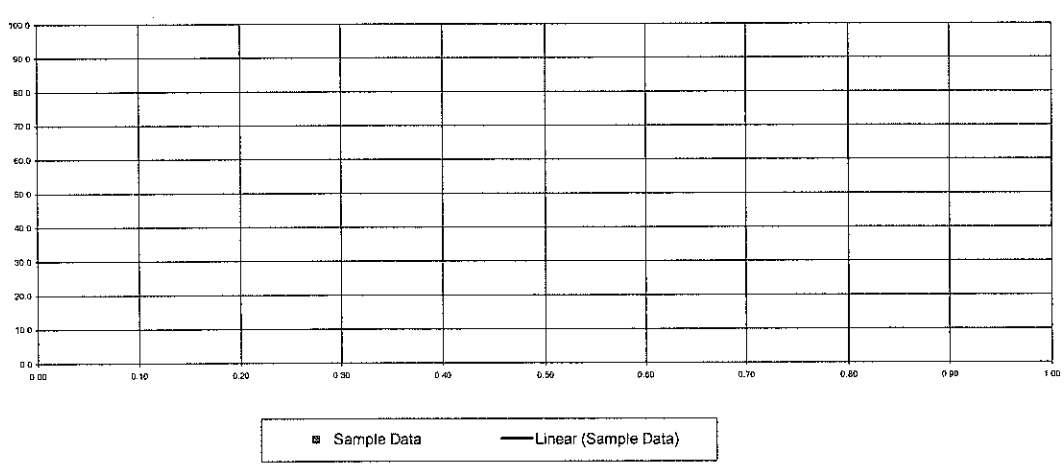
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

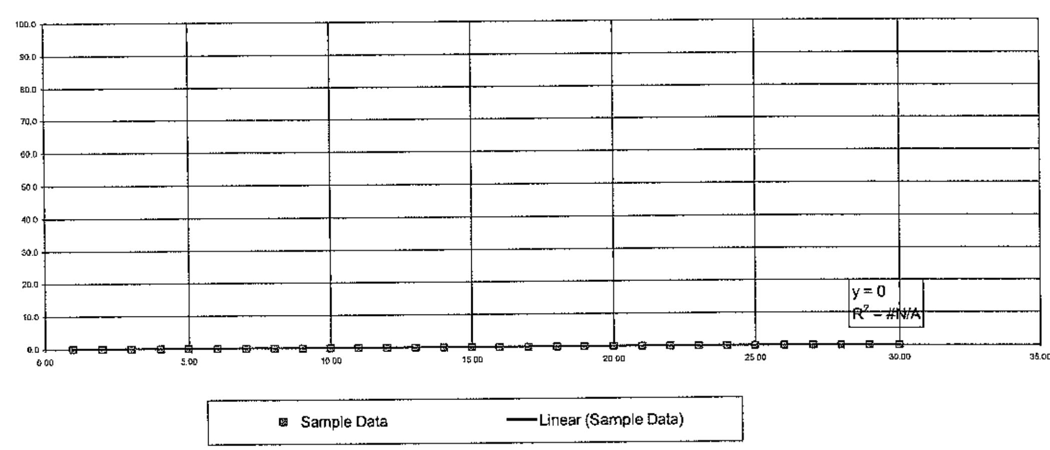
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

#DIV/0!	
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992. (p. 36)

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Chloroethane
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

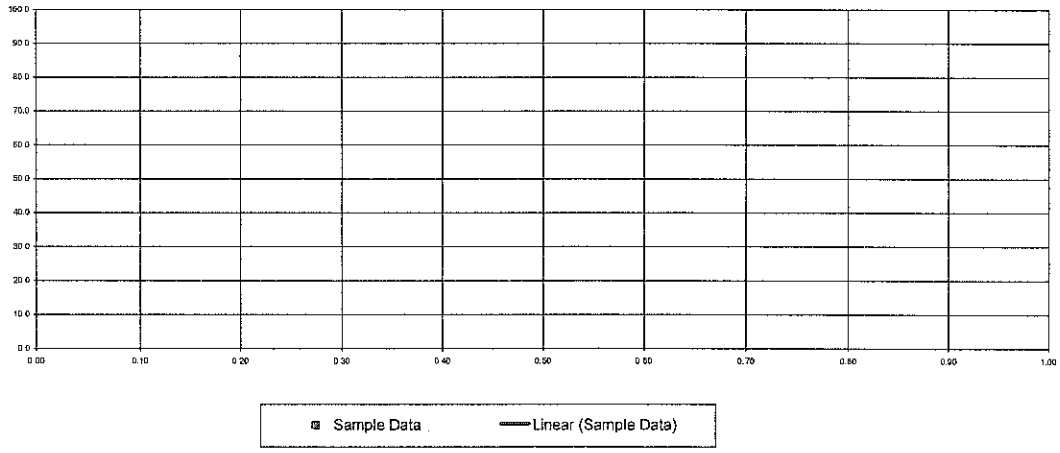
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Chloroethane
COMMENT: All ND

Sample Order	Sample Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution Probability	Normal Distribution Quatrile

Shapiro-Wilk Normality Test Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

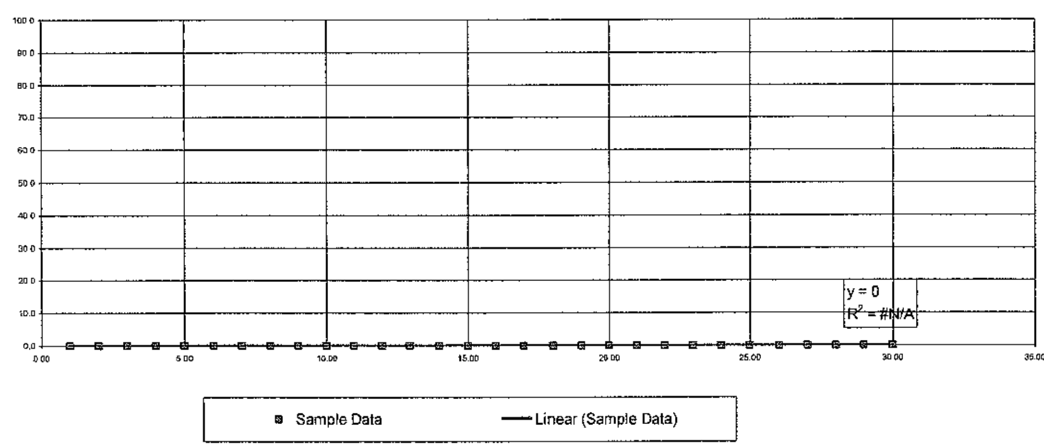
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Chloroethane
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992. (p. 36)

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Sample	
Order	Concentration
1	5.00
2	5.00
3	37.20
4	47.10
5	51.00
6	64.00
7	66.00
8	89.40
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
84.40	0.6052	51.08
61.00	0.3164	19.30
26.80	0.1743	4.67
3.90	0.0561	0.22
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	75.269
Shapiro-Wilk W:	0.933
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

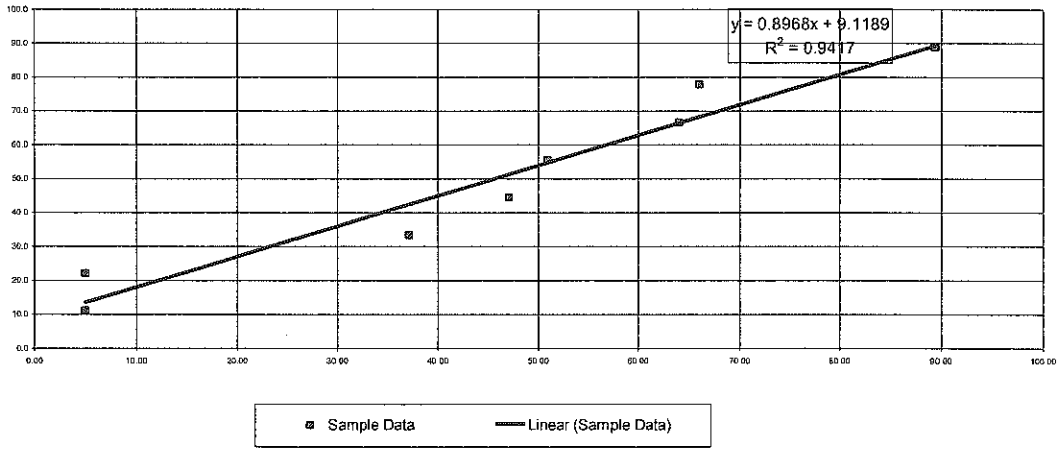
Normality?: Appears Normally Distributed

Number of Samples:	8
Sample Mean:	45.588
Sample Standard Devation:	29.452

25% Quatrile:	29.2
50% Quatrile(median):	49.1
75% Quatrile:	64.5
Inter-Quatrile Range:	35.4
Upper Cutoff:	117.5

Required Level of Confidence:	95%
Upper Confidence Limit:	65.32
Upper Tolerance Limit:	104.8

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Sample	
Order	Log Conc.
1	0.70
2	0.70
3	1.57
4	1.67
5	1.71
6	1.81
7	1.82
8	1.95
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
1.25	0.6052	0.76
1.12	0.3164	0.35
0.24	0.1743	0.04
0.03	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	1.155
Shapiro-Wilk W:	0.759
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

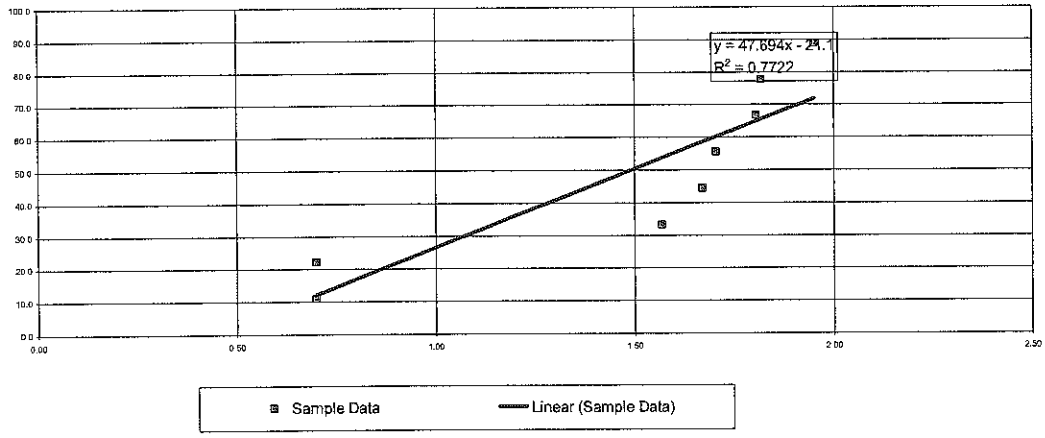
Normality?: Does Not Appear LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	1.491
Sample Standard Devation:	0.501

25% Quatrile:	29.2
50% Quatrile(median):	49.1
75% Quatrile:	64.5
Inter-Quatrile Range:	35.35
Upper Cutoff:	117.53

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	1.83	
Upper Tolerance Limit:	2.50	315.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Sample	
Order	Concentration
1	5.000
2	5.000
3	37.200
4	47.100
5	51.000
6	64.000
7	66.000
8	89.400
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	2
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	364.700
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	59.38

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Ethylbenzene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

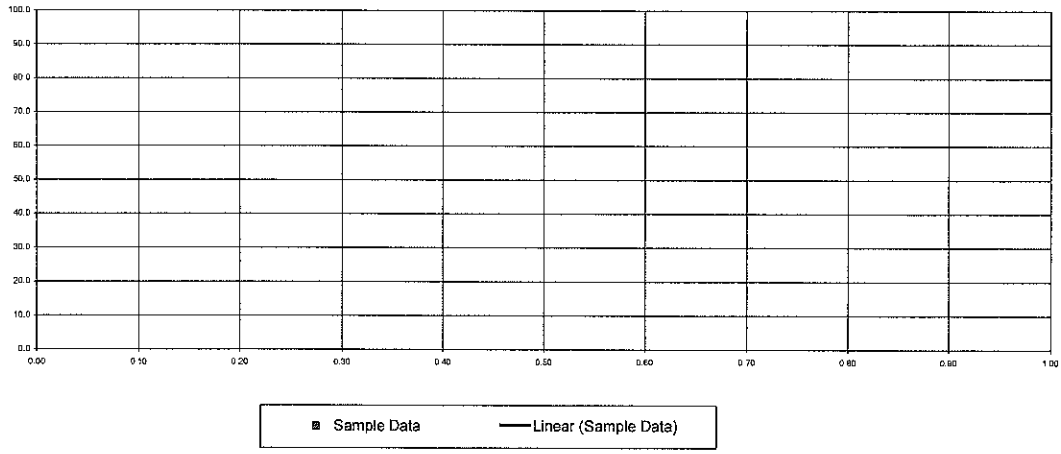
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Ethylbenzene
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

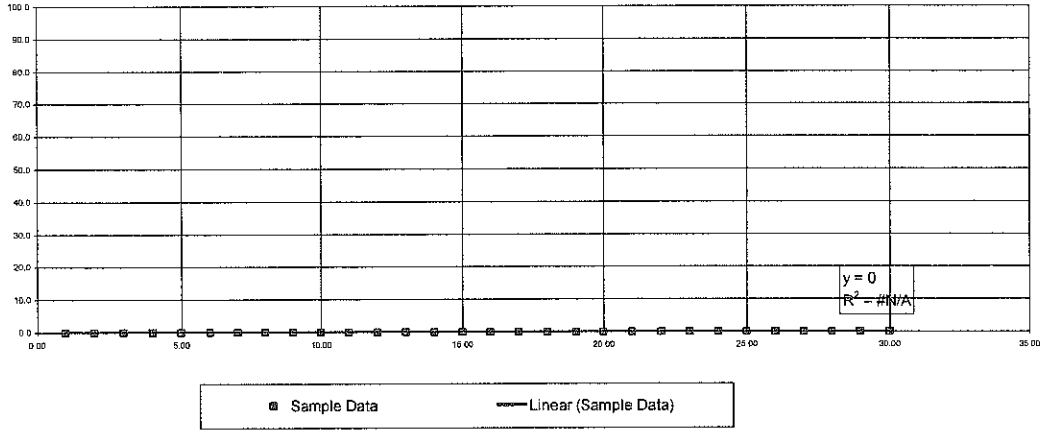
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Ethylbenzene
COMMENT: All ND

Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Methylene chloride
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

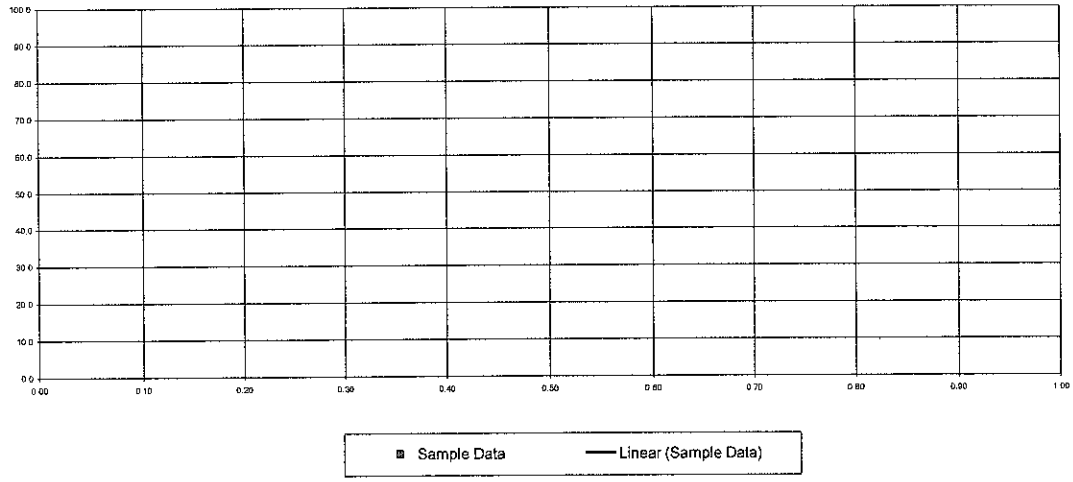
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Methylene chloride
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

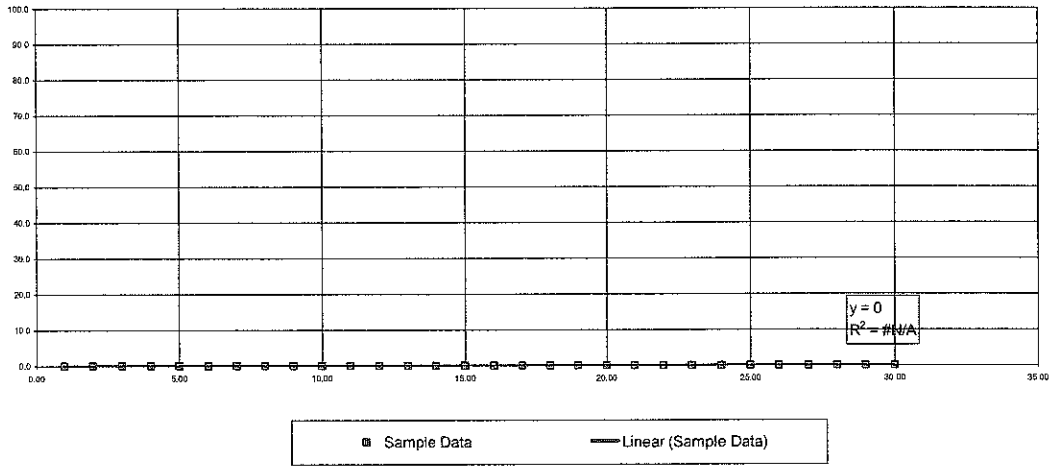
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well F
COMPOUND: Methylene chloride
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16					#VALUE!	#VALUE!
17					#VALUE!	#VALUE!
18					#VALUE!	#VALUE!
19					#VALUE!	#VALUE!
20					#VALUE!	#VALUE!
21					#VALUE!	#VALUE!
22					#VALUE!	#VALUE!
23					#VALUE!	#VALUE!
24					#VALUE!	#VALUE!
25					#VALUE!	#VALUE!
26					#VALUE!	#VALUE!
27					#VALUE!	#VALUE!
28					#VALUE!	#VALUE!
29					#VALUE!	#VALUE!
30					#VALUE!	#VALUE!

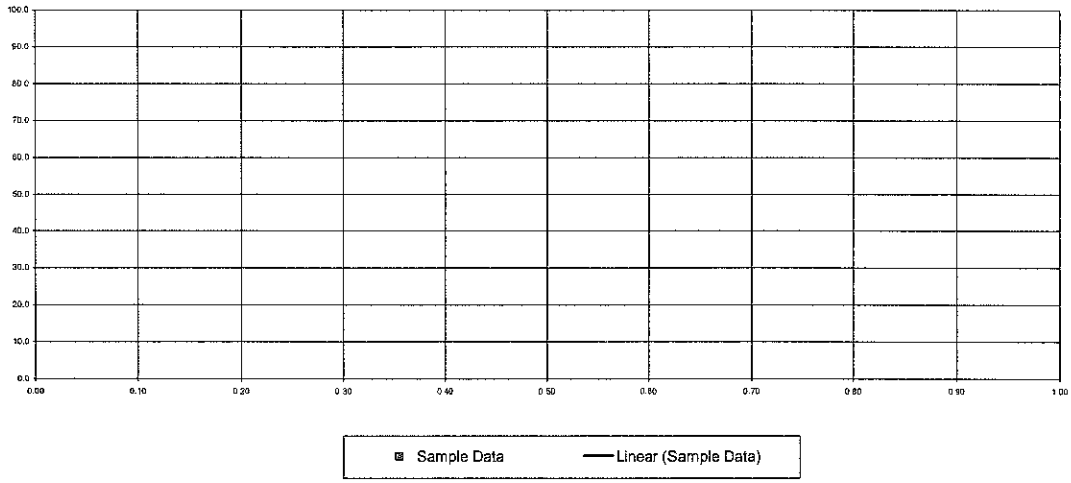
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

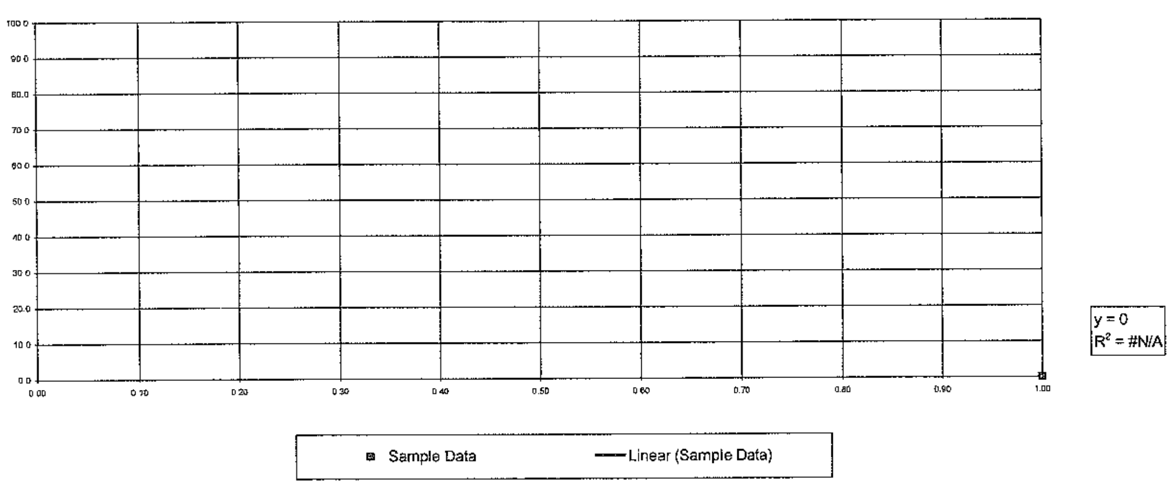
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	4
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Toluene
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	1.70	11.1	-1.22	17.20	0.6052	10.41
2	1.70	22.2	-0.76	3.30	0.3164	1.04
3	1.70	33.3	-0.43	3.30	0.1743	0.58
4	5.00	44.4	-0.14	0.00	0.0561	0.00
5	5.00	55.6	0.14		0.0000	
6	5.00	66.7	0.43		0.0000	
7	5.00	77.8	0.76		0.0000	
8	18.90	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	12.029
Shapiro-Wilk W:	0.646
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

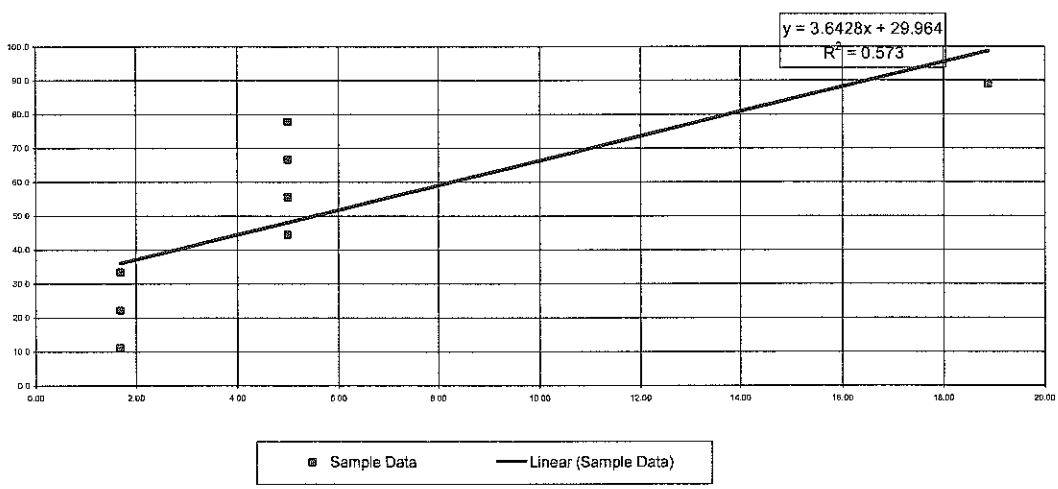
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	5.500
Sample Standard Devation:	5.655

25% Quatrile:	1.7
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	3.3
Upper Cutoff:	10.0

Required Level of Confidence:	95%
Upper Confidence Limit:	9.29
Upper Tolerance Limit:	16.9

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Toluene
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	0.23	11.1	-1.22	1.05	0.6052	0.63
2	0.23	22.2	-0.76	0.47	0.3164	0.15
3	0.23	33.3	-0.43	0.47	0.1743	0.08
4	0.70	44.4	-0.14	0.00	0.0561	0.00
5	0.70	55.6	0.14		0.0000	
6	0.70	66.7	0.43		0.0000	
7	0.70	77.8	0.76		0.0000	
8	1.28	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.00	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	0.863
Shapiro-Wilk W:	0.822
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

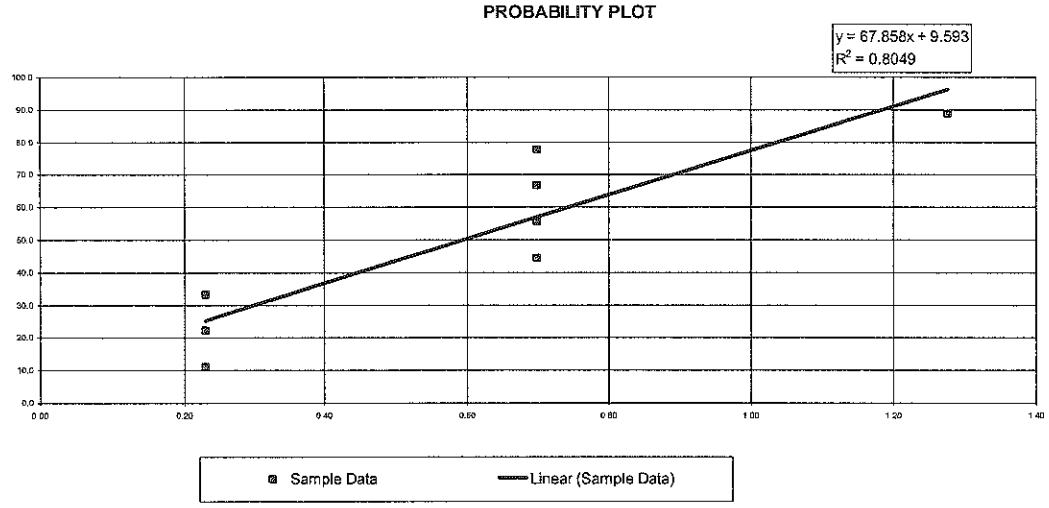
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.595
Sample Standard Devation:	0.360

25% Quatrile:	1.7
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	3.30
Upper Cutoff:	9.95

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.84	
Upper Tolerance Limit:	1.32	20.8

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Toluene
COMMENT:

Sample Order	Sample Concentration
1	1.700
2	1.700
3	1.700
4	5.000
5	5.000
6	5.000
7	5.000
8	18.900
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	44.000
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	10.44

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

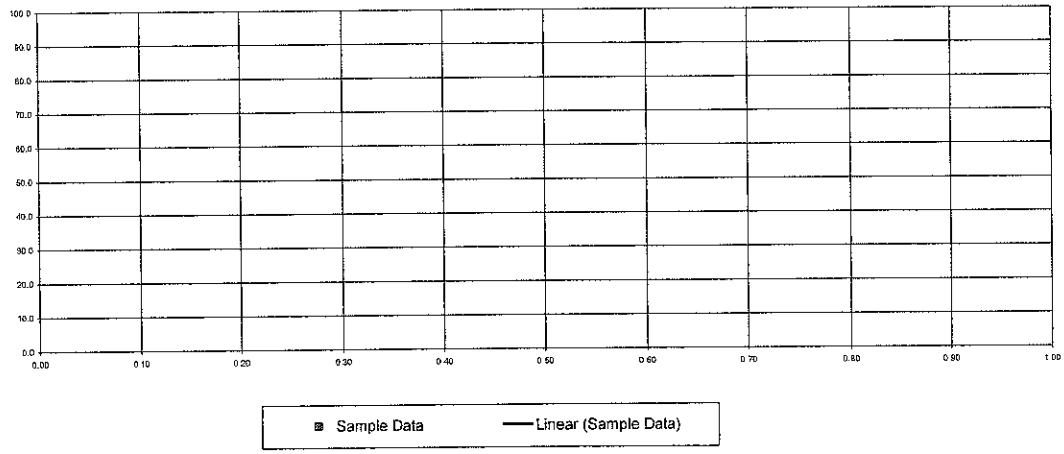
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

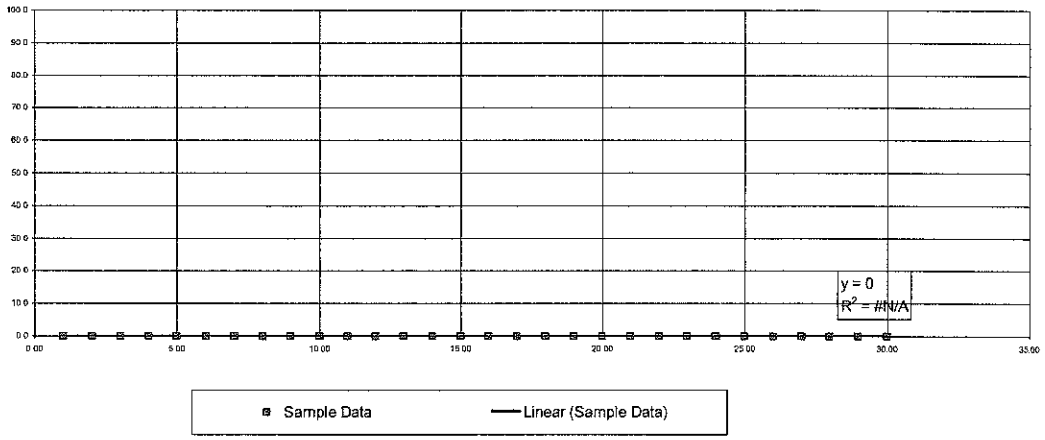
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Trichloroethene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

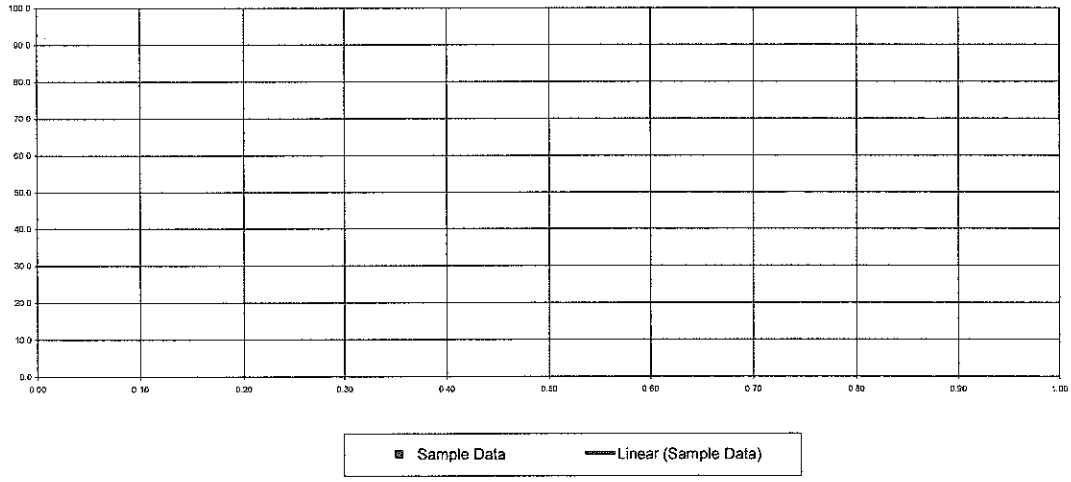
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Trichloroethene
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

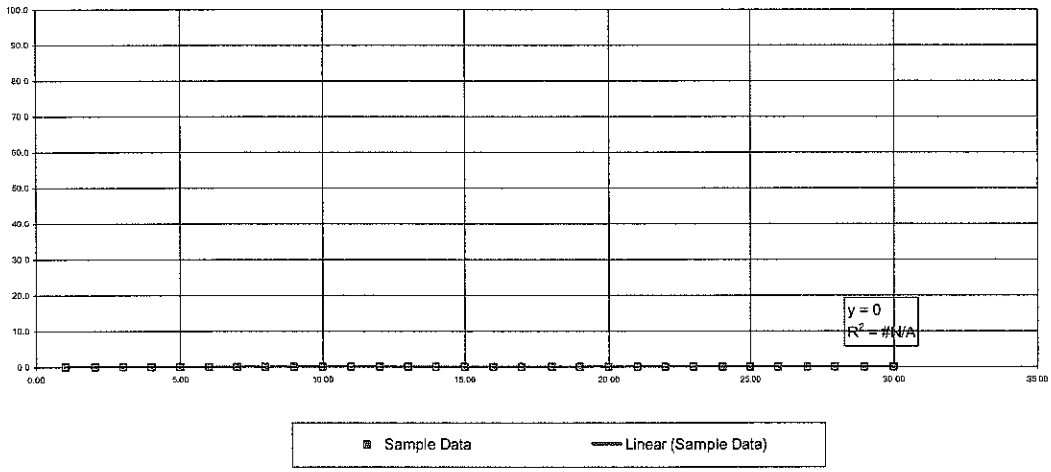
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Trichloroethene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Vinyl Chloride
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	1.70	11.1	-1.22	8.80	0.6052	5.33
2	2.00	22.2	-0.76	8.00	0.3164	2.53
3	7.90	33.3	-0.43	2.10	0.1743	0.37
4	10.00	44.4	-0.14	0.00	0.0561	0.00
5	10.00	55.6	0.14		0.0000	
6	10.00	66.7	0.43		0.0000	
7	10.00	77.8	0.76		0.0000	
8	10.50	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	8.223
Shapiro-Wilk W:	0.694
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

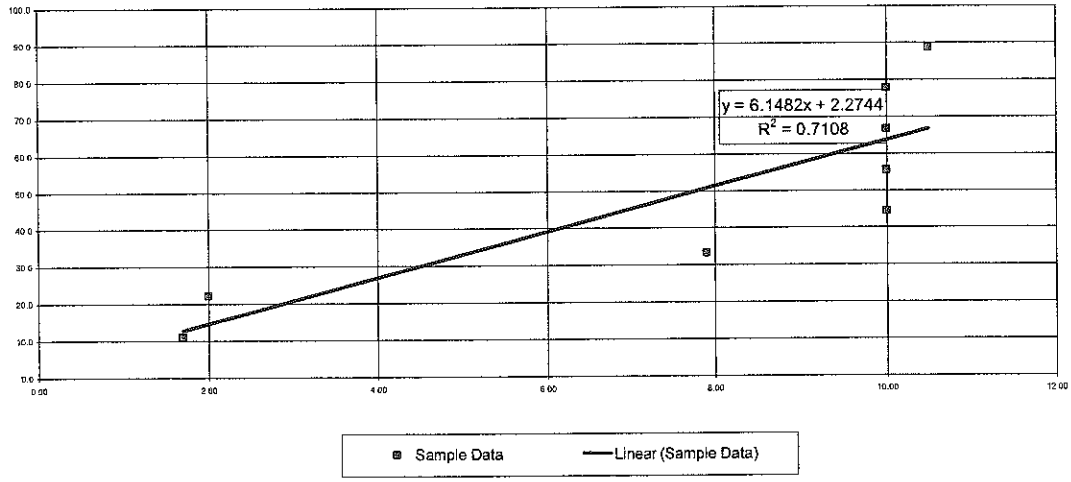
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	7.763
Sample Standard Devation:	3.732

25% Quatrile:	6.4
50% Quatrile(median):	10.0
75% Quatrile:	10.0
Inter-Quatrile Range:	3.6
Upper Cutoff:	15.4

Required Level of Confidence:	95%
Upper Confidence Limit:	10.26
Upper Tolerance Limit:	15.3

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Vinyl Chloride
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	0.23	11.1	-1.22	0.79	0.6052	0.48
2	0.30	22.2	-0.76	0.70	0.3164	0.22
3	0.90	33.3	-0.43	0.10	0.1743	0.02
4	1.00	44.4	-0.14	0.00	0.0561	0.00
5	1.00	55.6	0.14		0.0000	
6	1.00	66.7	0.43		0.0000	
7	1.00	77.8	0.76		0.0000	
8	1.02	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.00	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	0.718
Shapiro-Wilk W:	0.651
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

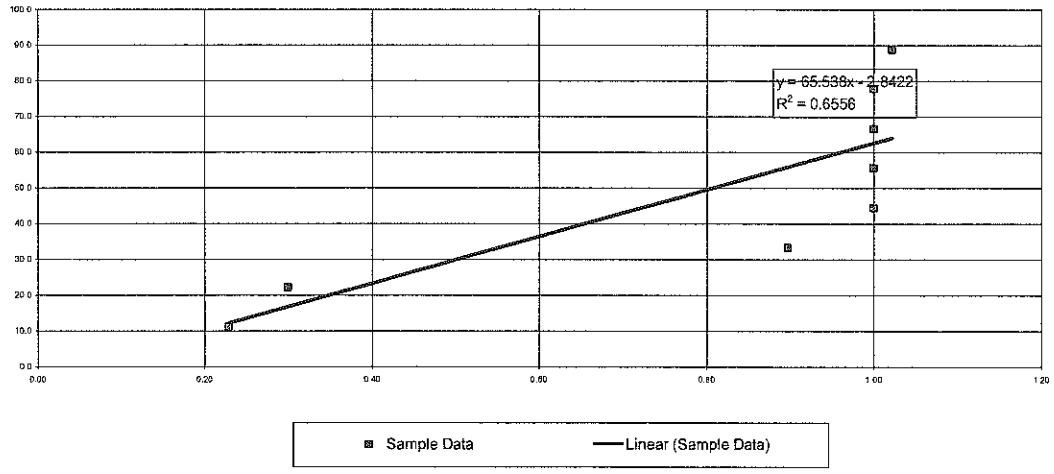
Normality?: Does Not Appear LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.806
Sample Standard Devation:	0.336

25% Quatrile:	6.4
50% Quatrile(median):	10.0
75% Quatrile:	10.0
Inter-Quatrile Range:	3.58
Upper Cutoff:	15.36

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	1.03	
Upper Tolerance Limit:	1.48	30.3

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Vinyl Chloride
COMMENT:

Sample Order	Sample Concentration
1	1.700
2	2.000
3	7.900
4	10.000
5	10.000
6	10.000
7	10.000
8	10.500
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	5
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	62.100
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	13.59

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Xylenes (total)
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

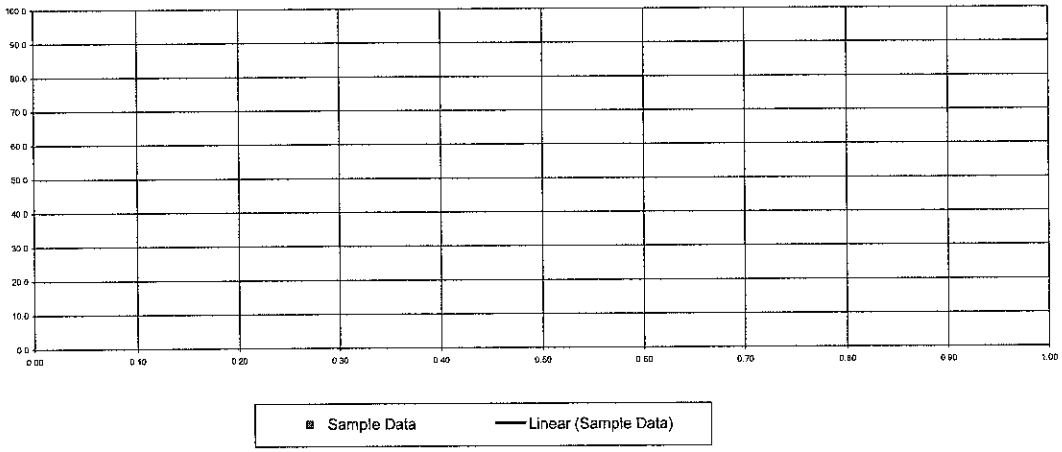
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Xylenes (total)
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

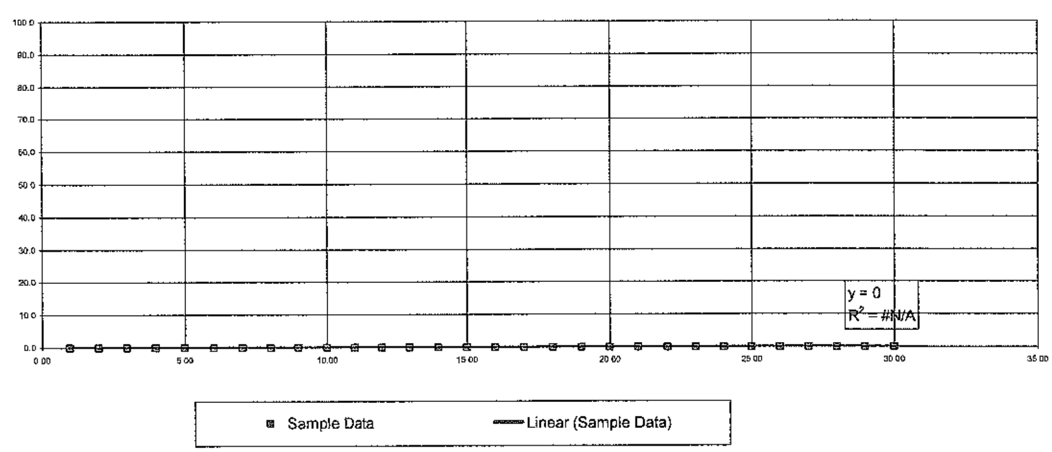
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well F
COMPOUND: Xylenes (total)
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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WELL G

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1,1-Trichloroethane
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	1.00	11.1	-1.22	24.00	0.6052	14.52
2	1.00	22.2	-0.76	5.88	0.3164	1.86
3	5.00	33.3	-0.43	0.00	0.1743	0.00
4	5.00	44.4	-0.14	0.00	0.0561	0.00
5	5.00	55.6	0.14		0.0000	
6	5.00	66.7	0.43		0.0000	
7	6.88	77.8	0.76		0.0000	
8	25.00	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	16.385
Shapiro-Wilk W:	0.653
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

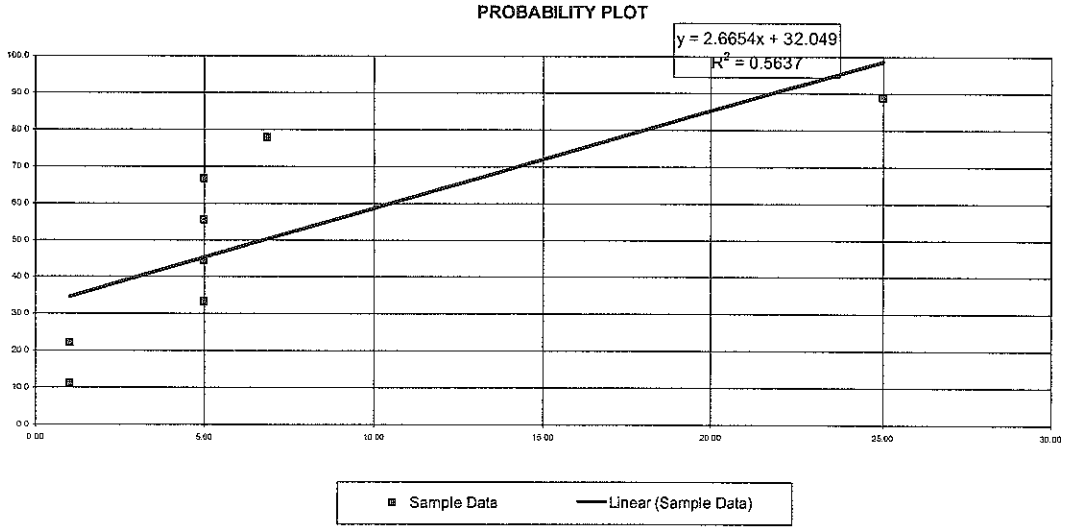
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	6.735
Sample Standard Devation:	7.667

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.5
Inter-Quatrile Range:	1.5
Upper Cutoff:	7.7

Required Level of Confidence:	95%
Upper Confidence Limit:	11.87
Upper Tolerance Limit:	22.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1,1-Trichloroethane
COMMENT:

Sample	
Order	Log Conc.
1	0.00
2	0.00
3	0.70
4	0.70
5	0.70
6	0.70
7	0.84
8	1.40
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
1.40	0.6052	0.85
0.84	0.3164	0.27
0.00	0.1743	0.00
0.00	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	1.111
Shapiro-Wilk W:	0.854
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

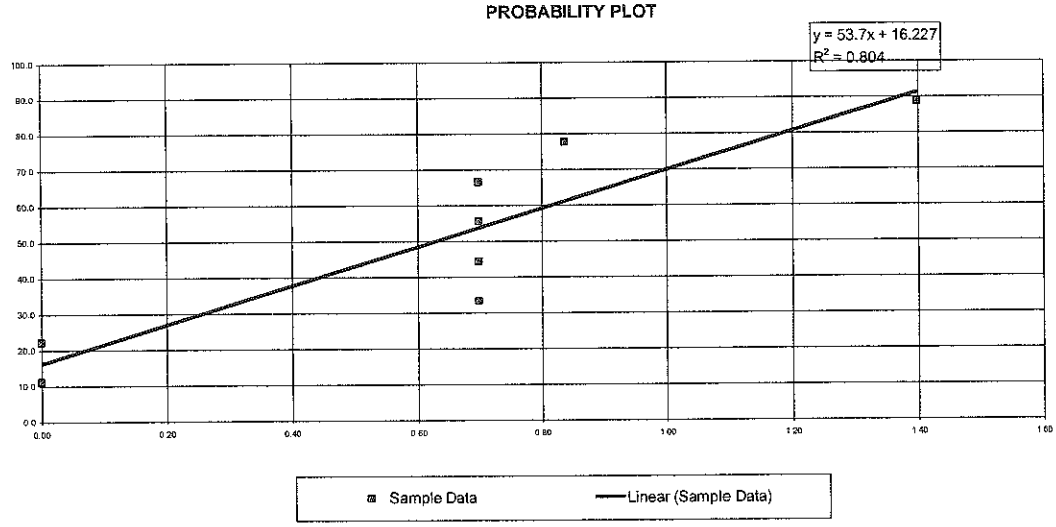
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.629
Sample Standard Devation:	0.454

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.5
Inter-Quatrile Range:	1.47
Upper Cutoff:	7.68

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.93	
Upper Tolerance Limit:	1.54	34.8

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1,1-Trichloroethane (ug/L)
COMMENT:

Sample	
Order	Concentration
1	1.000
2	1.000
3	5.000
4	5.000
5	5.000
6	5.000
7	6.880
8	25.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	6
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	53.880
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	12.18

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1-Dichloroethane
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	3.8	11.1	-1.22	62.20	0.6052	37.64
2	5	22.2	-0.76	10.50	0.3164	3.32
3	5	33.3	-0.43	3.04	0.1743	0.53
4	5.87	44.4	-0.14	0.63	0.0561	0.04
5	6.5	55.6	0.14		0.0000	
6	8.04	66.7	0.43		0.0000	
7	15.5	77.8	0.76		0.0000	
8	66	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	41.531
Shapiro-Wilk W:	0.551
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

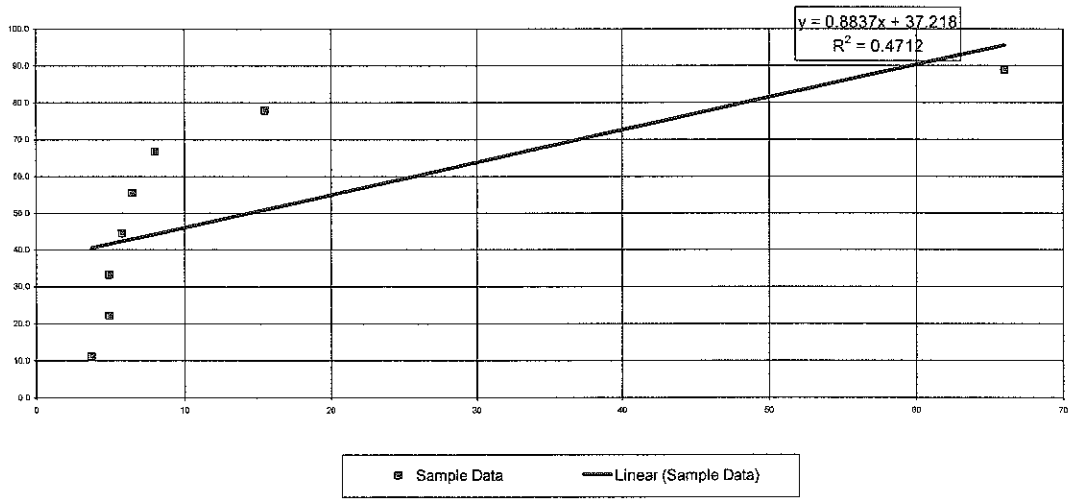
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	14.464
Sample Standard Devation:	21.140

25% Quatrile:	5.0
50% Quatrile(median):	6.2
75% Quatrile:	9.9
Inter-Quatrile Range:	4.9
Upper Cutoff:	17.3

Required Level of Confidence:	95%
Upper Confidence Limit:	28.62
Upper Tolerance Limit:	56.9

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1-Dichloroethane
COMMENT:

Sample	
Order	Log Conc.
1	0.58
2	0.70
3	0.70
4	0.77
5	0.81
6	0.91
7	1.19
8	1.82
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
1.24	0.6052	0.75
0.49	0.3164	0.16
0.21	0.1743	0.04
0.04	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	0.944
Shapiro-Wilk W:	0.790
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

Normality?: Does Not Appear LogNormally Distributed

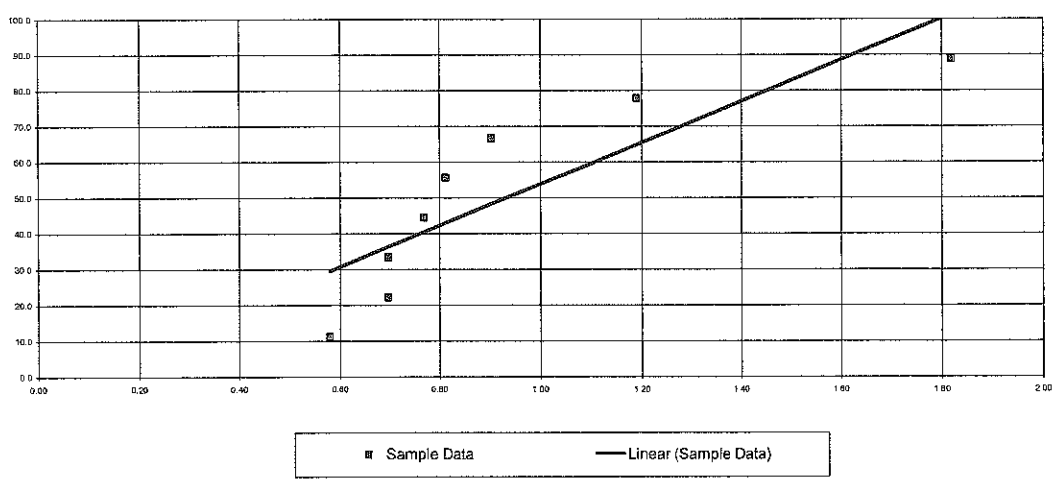
	log()
Number of Samples:	8
Sample Mean:	0.934
Sample Standard Devation:	0.402

25% Quatrile:	5.0
50% Quatrile(median):	6.2
75% Quatrile:	9.9
Inter-Quatrile Range:	4.91
Upper Cutoff:	17.26

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	1.20	
Upper Tolerance Limit:	1.74	55.1

PROBABILITY PLOT

$y = 58.073x - 4.258$
$R^2 = 0.7341$



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 1,1-Dichloroethane
COMMENT:

Sample	
Order	Concentration
1	3.800
2	5.000
3	5.000
4	5.870
5	6.500
6	8.040
7	15.500
8	66.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	2
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	115.710
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	22.33

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 2-Butanone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

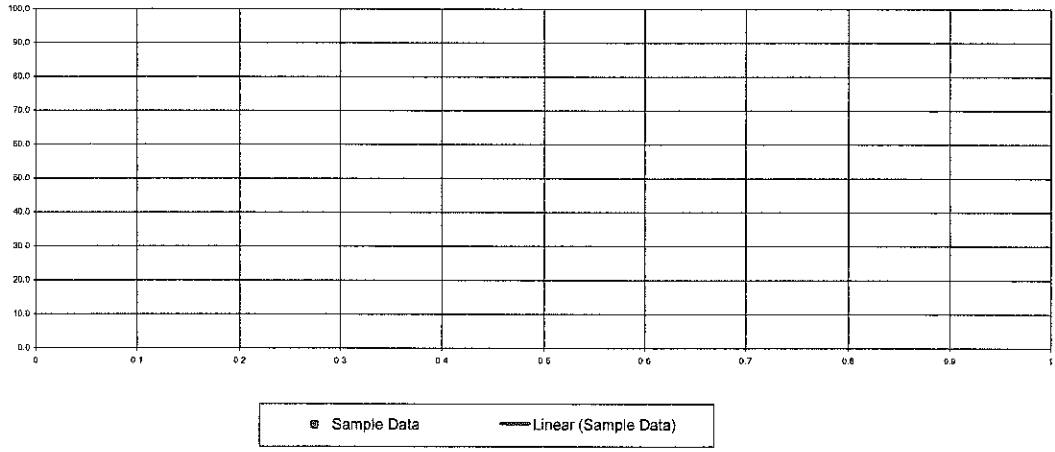
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 2-Butanone
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

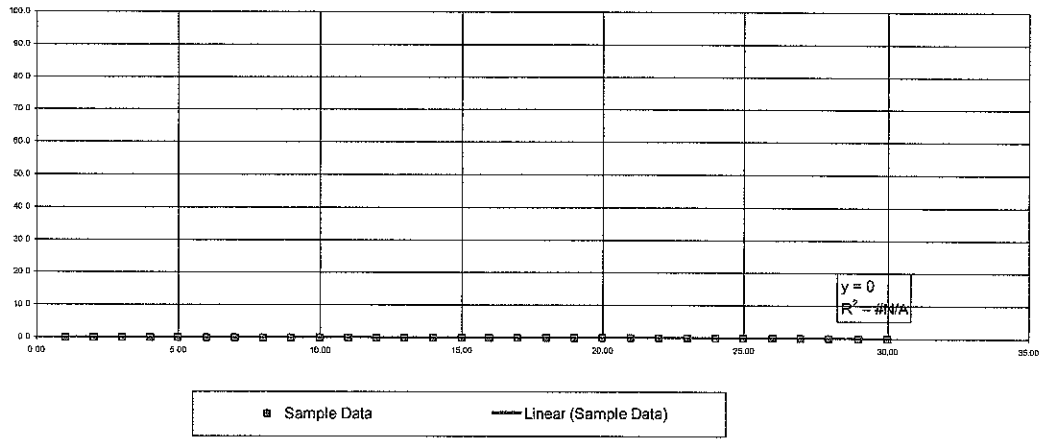
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: 2-Butanone
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

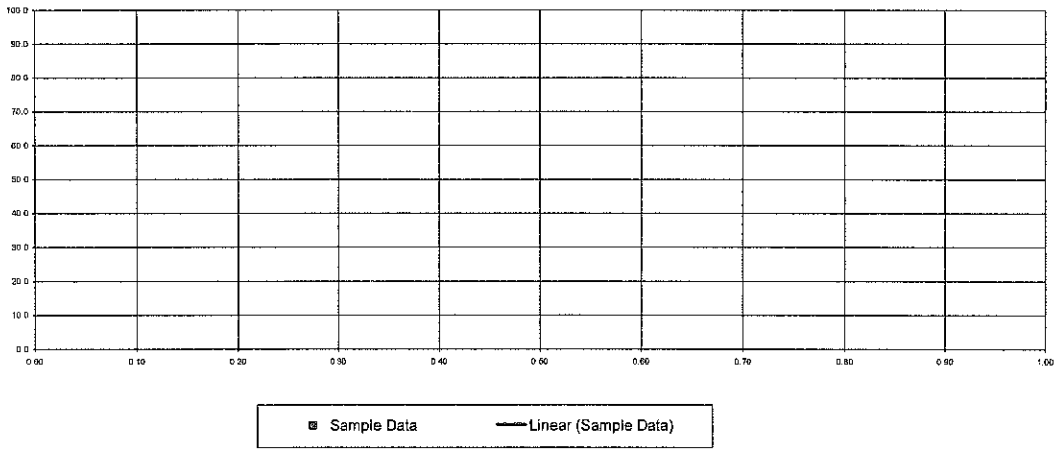
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

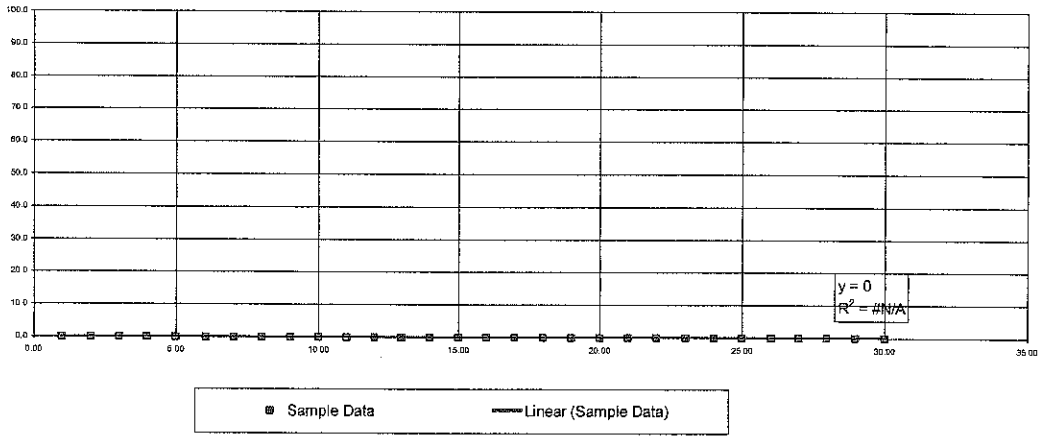
Normality?: #VALUE!

		log()
Number of Samples:		0
Sample Mean:	#DIV/0!	
Sample Standard Devation:	#DIV/0!	

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

		log()	Natural Scale
Required Level of Confidence:		95%	
Upper Confidence Limit:	#DIV/0!		
Upper Tolerance Limit:	#DIV/0!		#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: 4-Methyl-2-Pentanone
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!	
Shapiro-Wilk W:	#VALUE!	
Critical Value:		5%
Shapiro-Wilk Comparison W:	#VALUE!	

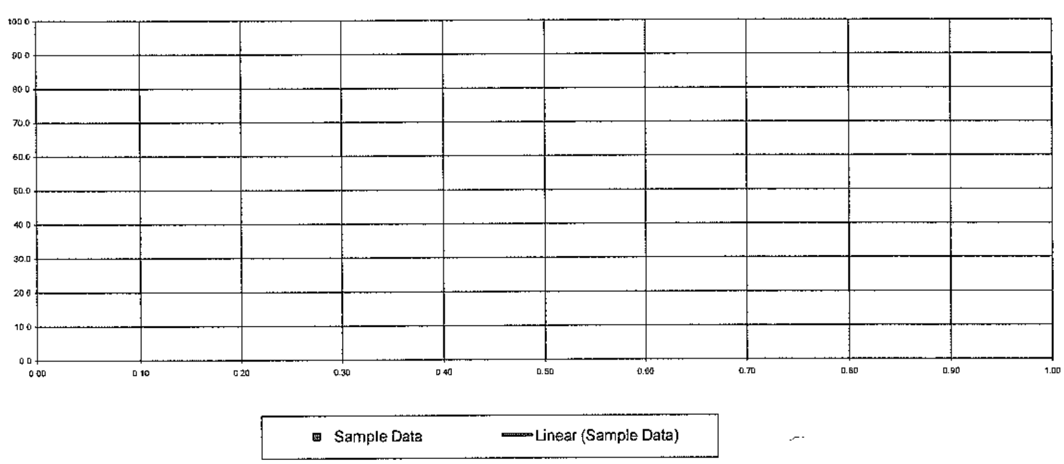
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

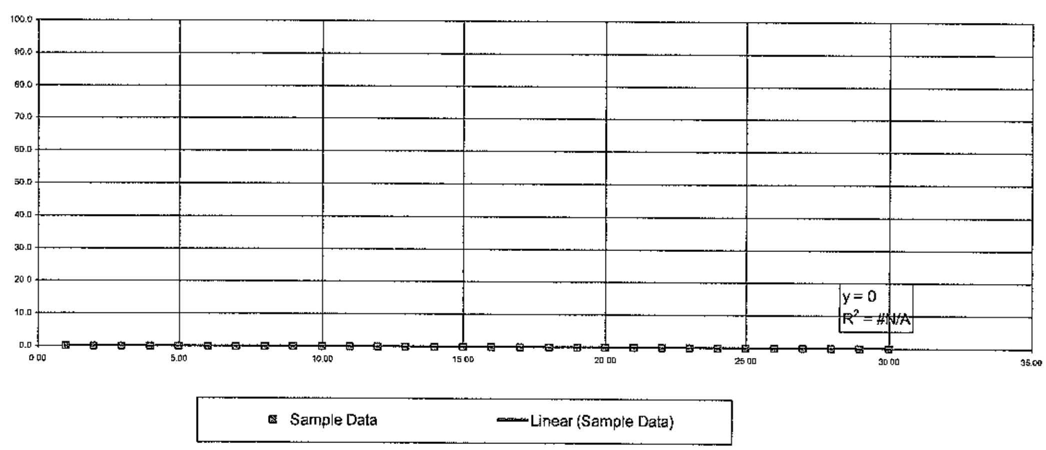
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Acetone
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
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Poisson Distribution

	#DIV/0!
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992, (p. 36)

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Chloroethane
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

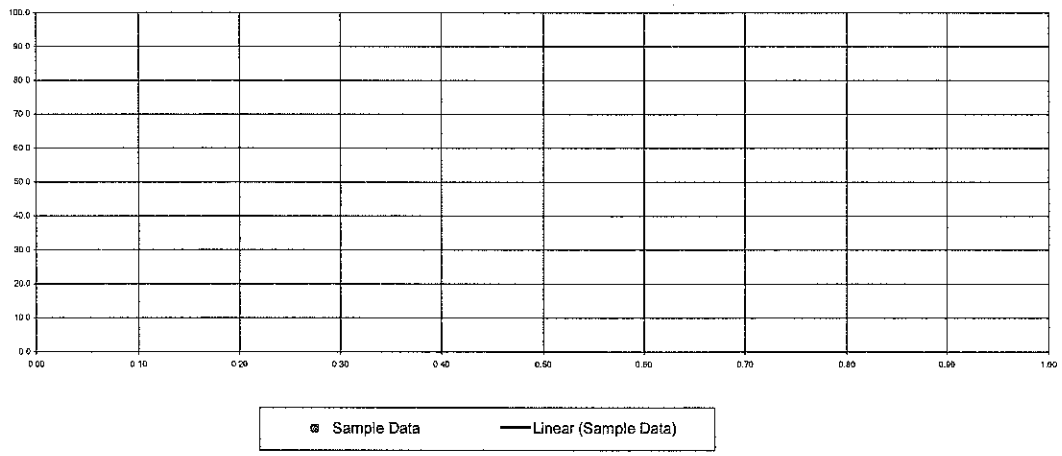
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Deviation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Chloroethane
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992. (p. 36)

STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Chloroethane
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum: #VALUE!
Shapiro-Wilk W: #VALUE!
Critical Value: 5.0%
Shapiro-Wilk Comparison W: #VALUE!

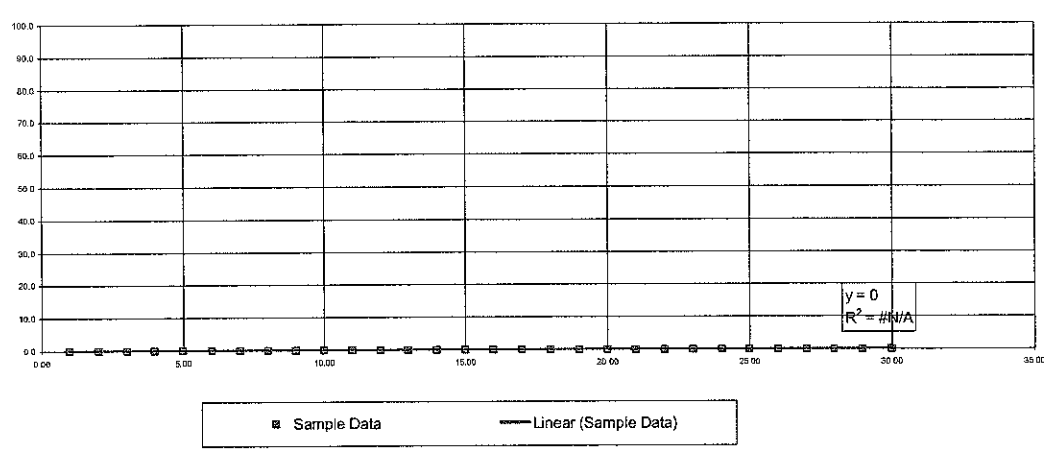
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Sample	
Order	Concentration
1	1.00
2	2.50
3	5.00
4	5.00
5	5.00
6	5.76
7	11.20
8	86.00
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
85.00	0.6052	51.44
8.70	0.3164	2.75
0.76	0.1743	0.13
0.00	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	54.327
Shapiro-Wilk W:	0.510
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

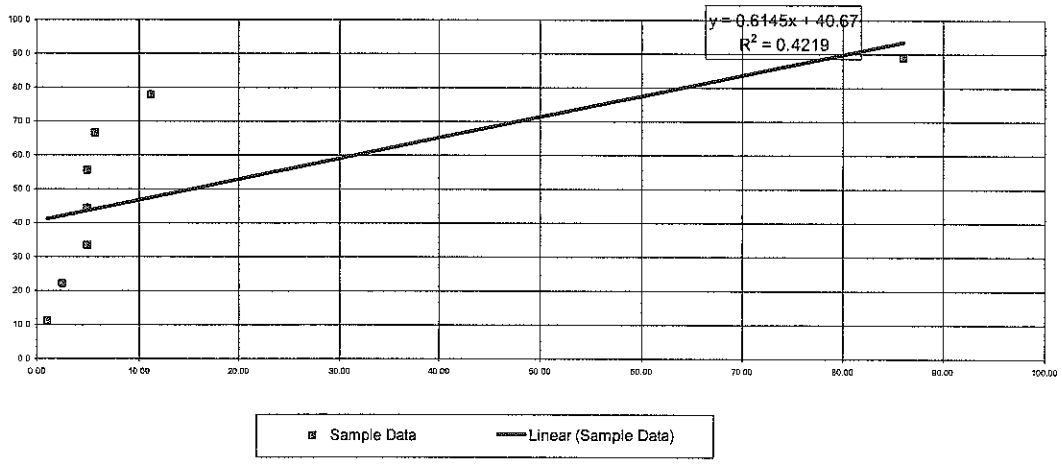
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	15.183
Sample Standard Devation:	28.767

25% Quatrile:	4.4
50% Quatrile(median):	5.0
75% Quatrile:	7.1
Inter-Quatrile Range:	2.7
Upper Cutoff:	11.2

Required Level of Confidence:	95%
Upper Confidence Limit:	34.45
Upper Tolerance Limit:	73.0

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	0.00	11.1	-1.22	1.93	0.6052	1.17
2	0.40	22.2	-0.76	0.65	0.3164	0.21
3	0.70	33.3	-0.43	0.06	0.1743	0.01
4	0.70	44.4	-0.14	0.00	0.0561	0.00
5	0.70	55.6	0.14		0.0000	
6	0.76	66.7	0.43		0.0000	
7	1.05	77.8	0.76		0.0000	
8	1.93	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.00	
16						
17						
18						
19						
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22						
23						
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26						
27						
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Shapiro-Wilk Sum:	1.388
Shapiro-Wilk W:	0.883
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

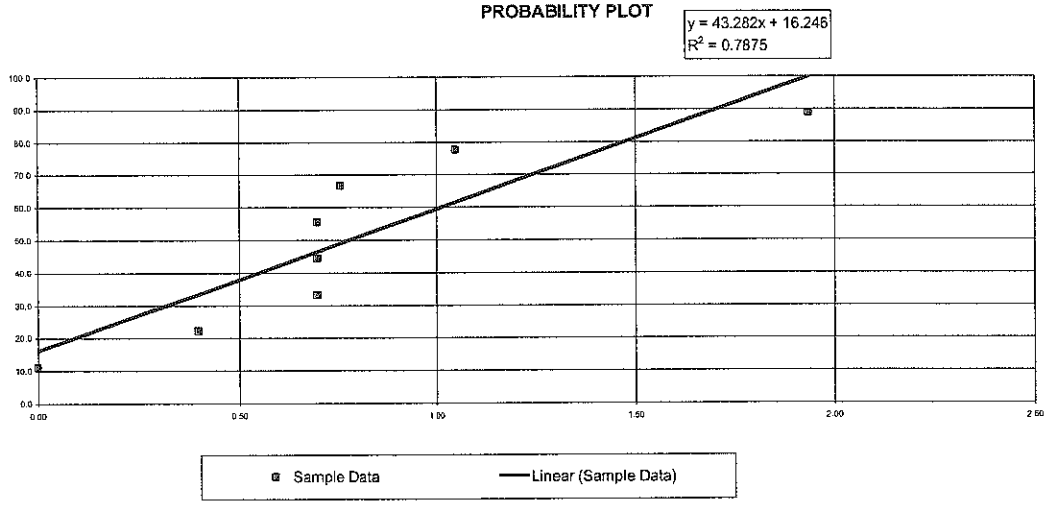
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.780
Sample Standard Devation:	0.558

25% Quatrile:	4.4
50% Quatrile(median):	5.0
75% Quatrile:	7.1
Inter-Quatrile Range:	2.75
Upper Cutoff:	11.24

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	1.15	
Upper Tolerance Limit:	1.90	79.7

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: cis-1,2-Dichloroethylene
COMMENT:

Order	Sample Concentration
1	1.000
2	2.500
3	5.000
4	5.000
5	5.000
6	5.760
7	11.200
8	86.000
9	
10	
11	
12	
13	
14	
15	
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Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	4
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	121.460
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	23.24

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Ethylbenzene
COMMENT:

Sample	
Order	Concentration
1	1.00
2	1.00
3	5.00
4	5.00
5	5.00
6	5.00
7	5.00
8	6.00
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
5.00	0.6052	3.03
4.00	0.3164	1.27
0.00	0.1743	0.00
0.00	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	4.292
Shapiro-Wilk W:	0.685
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

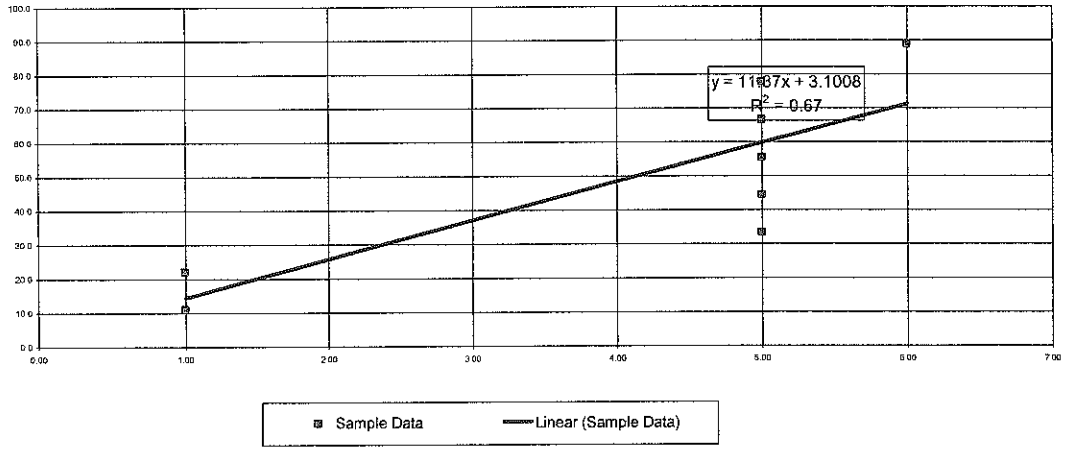
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	4.125
Sample Standard Devation:	1.959

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	1.0
Upper Cutoff:	6.5

Required Level of Confidence:	95%
Upper Confidence Limit:	5.44
Upper Tolerance Limit:	8.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Ethylbenzene
COMMENT:

Sample	
Order	Log Conc.
1	0.00
2	0.00
3	0.70
4	0.70
5	0.70
6	0.70
7	0.70
8	0.78
9	
10	
11	
12	
13	
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19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
0.78	0.6052	0.47
0.70	0.3164	0.22
0.00	0.1743	0.00
0.00	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.00	

Shapiro-Wilk Sum:	0.692
Shapiro-Wilk W:	0.625
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

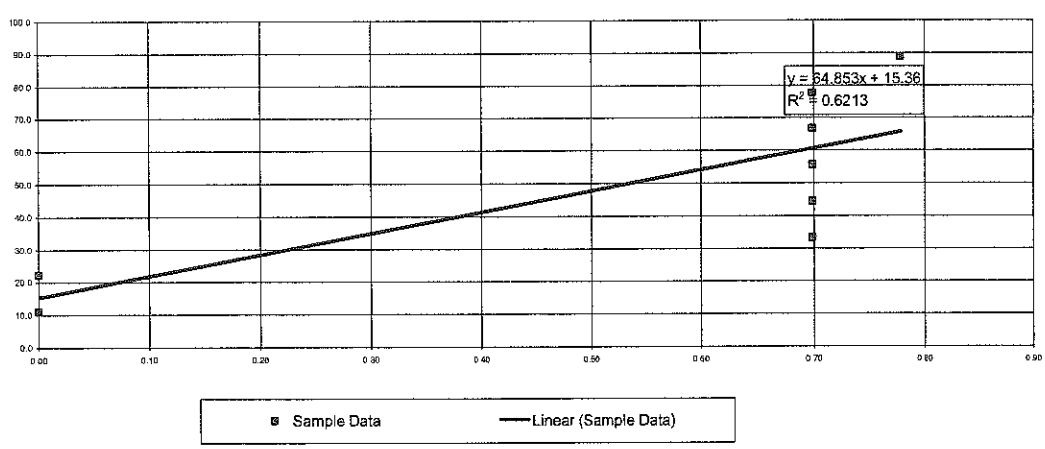
Normality?: Does Not Appear LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.534
Sample Standard Devation:	0.331

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	1.00
Upper Cutoff:	6.50

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.76	
Upper Tolerance Limit:	1.20	15.8

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Ethylbenzene
COMMENT:

Sample Order	Sample Concentration
1	1.000
2	1.000
3	5.000
4	5.000
5	5.000
6	5.000
7	5.000
8	6.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
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25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	33.000
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	8.44

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Methylene chloride
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

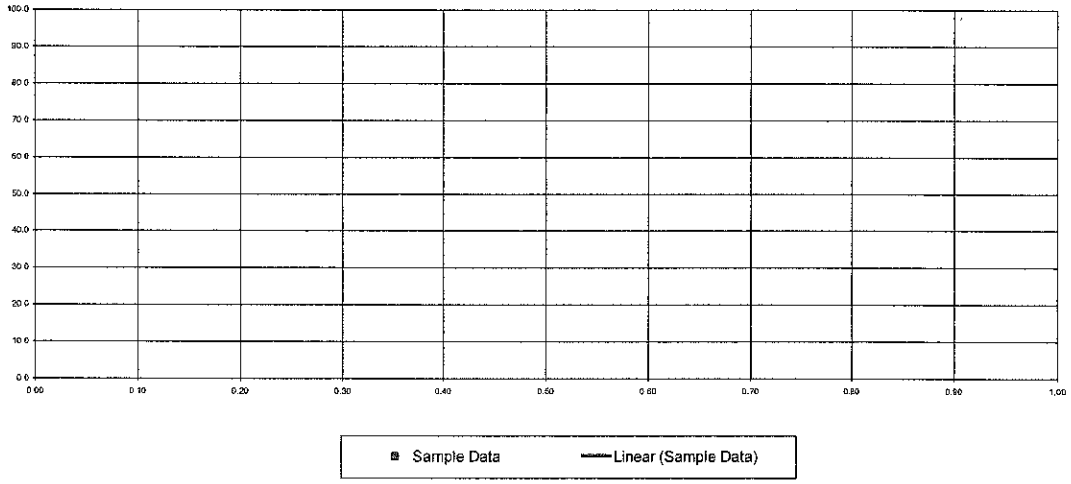
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Methylene chloride
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

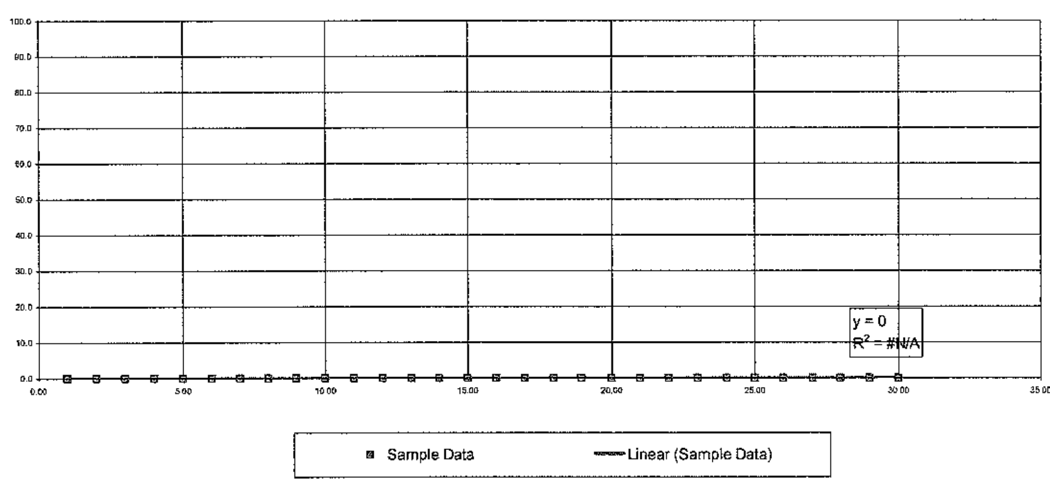
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukil Chemical Corporation
LOCATION: Well G
COMPOUND: Methylene chloride
COMMENT: All ND

Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

	#DIV/0!
Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992. (p. 36)

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

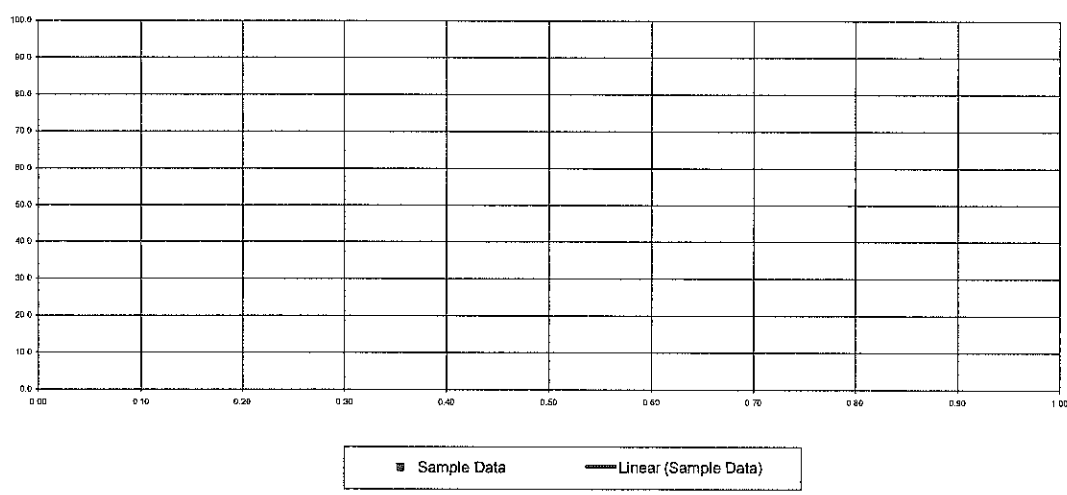
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
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Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!

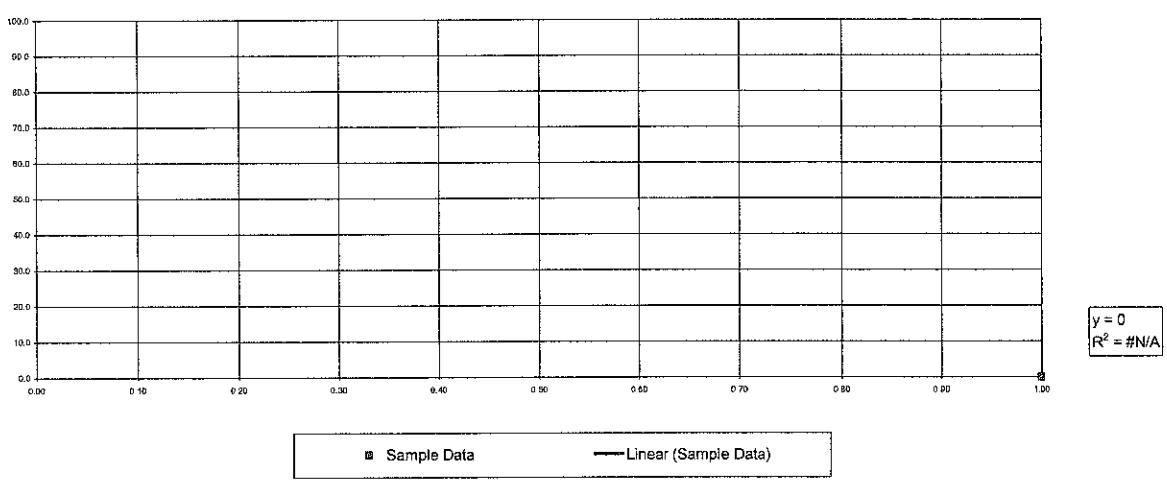
Normality?: #VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Tetrachloroethene
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
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29	
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Poisson Distribution **#DIV/0!**

Number of Non-detects	4
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992. (p. 36)

STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Toluene
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
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10	
11	
12	
13	
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Normal Distribution Probability	Normal Distribution Quatrile

Shapiro-Wilk Normality Test Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

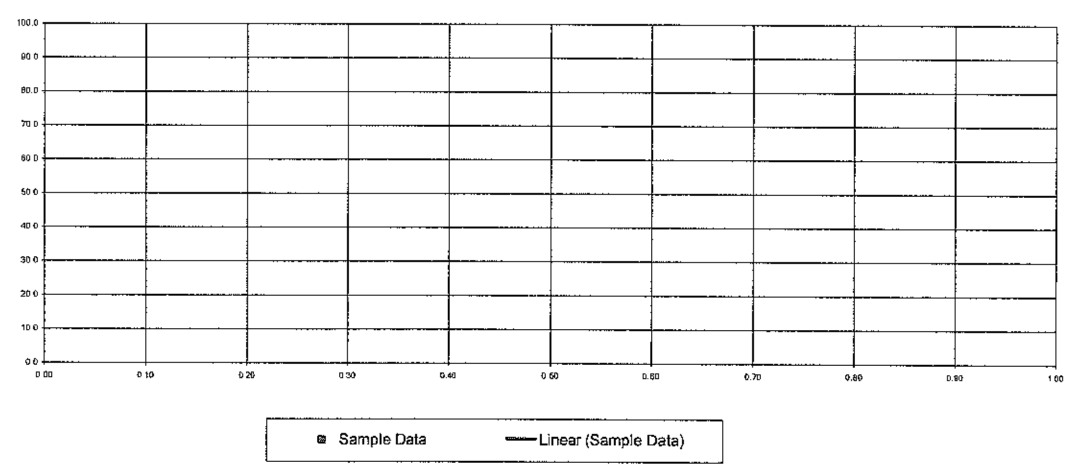
Normality?: #VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Toluene
COMMENT: All ND

Sample	
Order	Log Conc.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
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23	
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26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

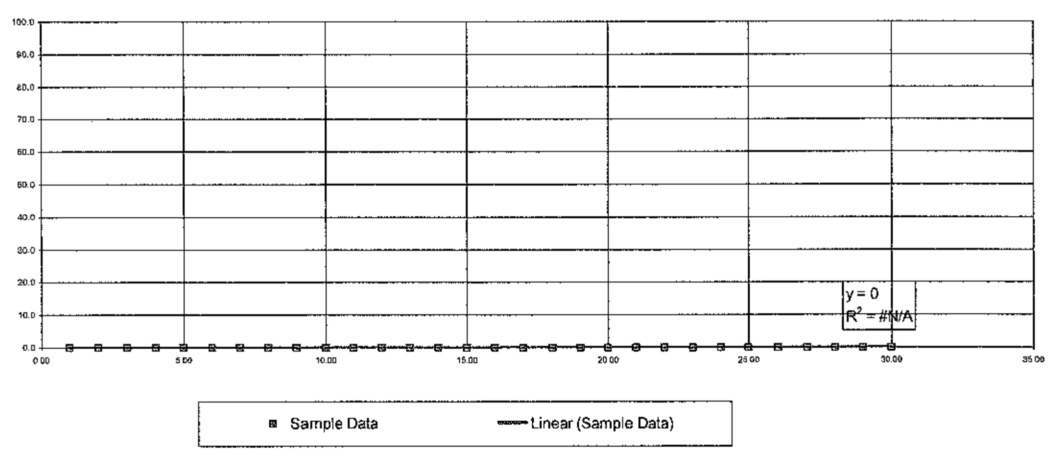
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Toluene
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
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29	
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Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample	
Order	Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
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21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!
	#VALUE!	#VALUE!

Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5%
Shapiro-Wilk Comparison W:	#VALUE!

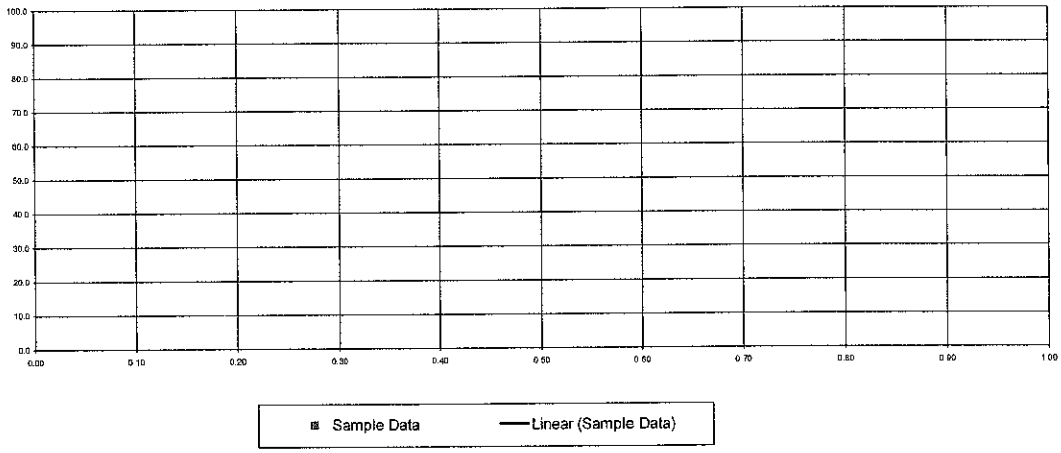
Normality?:	#VALUE!

Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

Required Level of Confidence:	95%
Upper Confidence Limit:	#DIV/0!
Upper Tolerance Limit:	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1					#VALUE!	#VALUE!
2					#VALUE!	#VALUE!
3					#VALUE!	#VALUE!
4					#VALUE!	#VALUE!
5					#VALUE!	#VALUE!
6					#VALUE!	#VALUE!
7					#VALUE!	#VALUE!
8					#VALUE!	#VALUE!
9					#VALUE!	#VALUE!
10					#VALUE!	#VALUE!
11					#VALUE!	#VALUE!
12					#VALUE!	#VALUE!
13					#VALUE!	#VALUE!
14					#VALUE!	#VALUE!
15					#VALUE!	#VALUE!
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

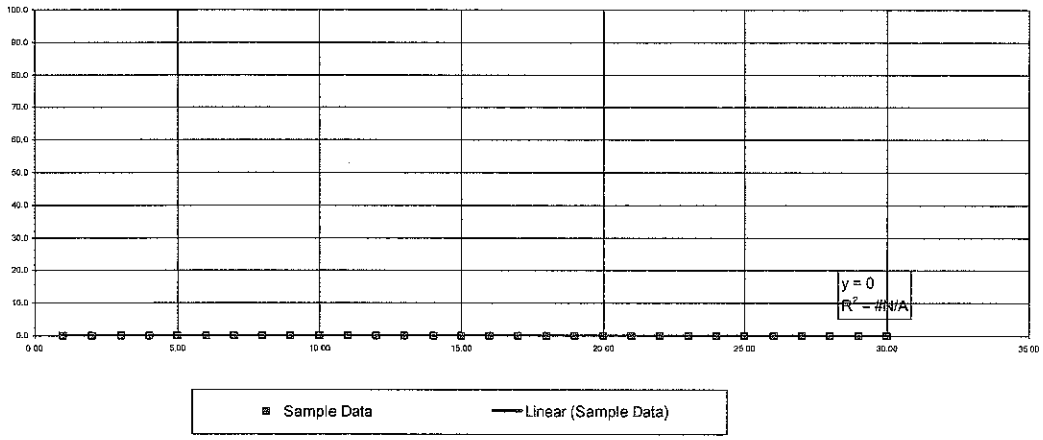
Shapiro-Wilk Sum:	#VALUE!
Shapiro-Wilk W:	#VALUE!
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	#VALUE!
Normality?:	#VALUE!

	log()
Number of Samples:	0
Sample Mean:	#DIV/0!
Sample Standard Devation:	#DIV/0!

25% Quatrile:	#NUM!
50% Quatrile(median):	#NUM!
75% Quatrile:	#NUM!
Inter-Quatrile Range:	#NUM!
Upper Cutoff:	#NUM!

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	#DIV/0!	
Upper Tolerance Limit:	#DIV/0!	#DIV/0!

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: trans-1,2-Dichloroethylene
COMMENT: All ND

Sample Order	Sample Concentration
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
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23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution **#DIV/0!**

Number of Non-detects	8
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	0.000
Number of Samples:	0.000
t-distribution (-1, 0.1)	#NUM!
c	#DIV/0!
Poisson Prediction Limit:	#DIV/0!

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Trichloroethene
COMMENT:

Sample	
Order	Concentration
1	1.00
2	1.00
3	5.00
4	5.00
5	5.00
6	5.00
7	5.00
8	11.00
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
11.1	-1.22
22.2	-0.76
33.3	-0.43
44.4	-0.14
55.6	0.14
66.7	0.43
77.8	0.76
88.9	1.22

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
10.00	0.6052	6.05
4.00	0.3164	1.27
0.00	0.1743	0.00
0.00	0.0561	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	7.318
Shapiro-Wilk W:	0.793
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

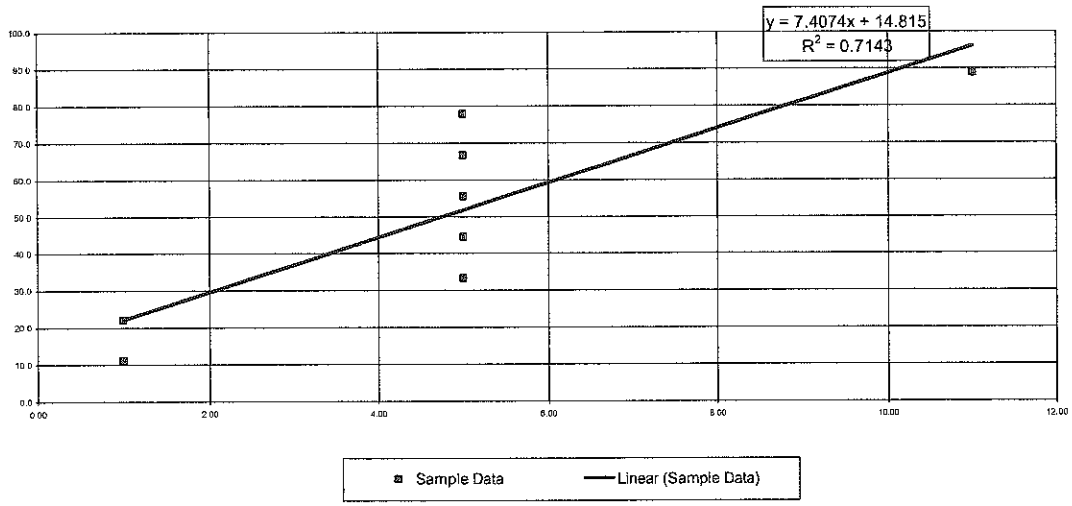
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	4.750
Sample Standard Devation:	3.105

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	1.0
Upper Cutoff:	6.5

Required Level of Confidence:	95%
Upper Confidence Limit:	6.83
Upper Tolerance Limit:	11.0

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Trichloroethene
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Log Conc.	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	0.00	11.1	-1.22	1.04	0.6052	0.63
2	0.00	22.2	-0.76	0.70	0.3164	0.22
3	0.70	33.3	-0.43	0.00	0.1743	0.00
4	0.70	44.4	-0.14	0.00	0.0561	0.00
5	0.70	55.6	0.14		0.0000	
6	0.70	66.7	0.43		0.0000	
7	0.70	77.8	0.76		0.0000	
8	1.04	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.00	
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	0.851
Shapiro-Wilk W:	0.759
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

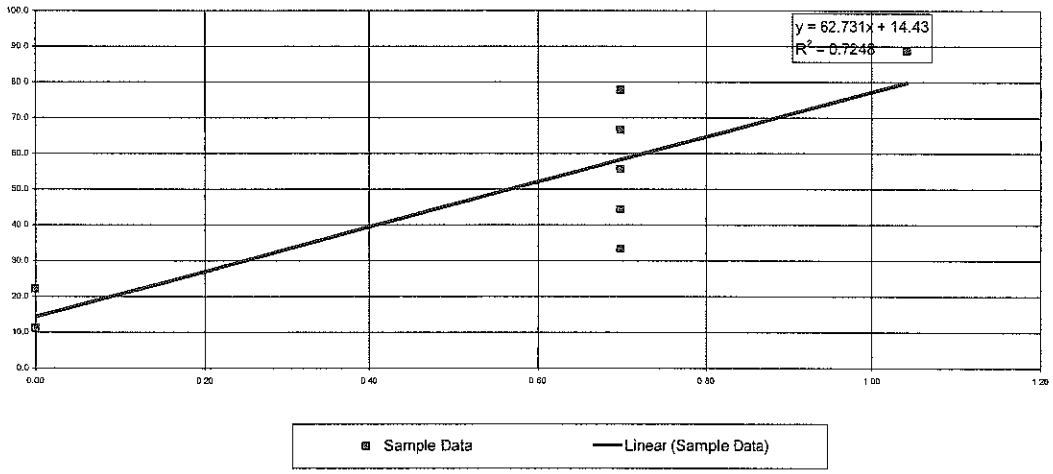
Normality?: Does Not Appear LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.567
Sample Standard Devation:	0.369

25% Quatrile:	4.0
50% Quatrile(median):	5.0
75% Quatrile:	5.0
Inter-Quatrile Range:	1.00
Upper Cutoff:	6.50

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.81	
Upper Tolerance Limit:	1.31	20.4

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Trichloroethene
COMMENT:

Sample	
Order	Concentration
1	1.000
2	1.000
3	5.000
4	5.000
5	5.000
6	5.000
7	5.000
8	11.000
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	38.000
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	9.36

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Vinyl Chloride
COMMENT:

Sample		Normal Distribution		Shapiro-Wilk Normality Test		
Order	Concentration	Probability	Quatrile	Residual	Coefficient (a)	Product (b)
1	1.00	11.1	-1.22	9.00	0.6052	5.45
2	1.00	22.2	-0.76	9.00	0.3164	2.85
3	2.00	33.3	-0.43	8.00	0.1743	1.39
4	5.90	44.4	-0.14	4.10	0.0561	0.23
5	10.00	55.6	0.14		0.0000	
6	10.00	66.7	0.43		0.0000	
7	10.00	77.8	0.76		0.0000	
8	10.00	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16						
17						
18						
19						
20						
21						
22						
23						
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26						
27						
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29						
30						

Shapiro-Wilk Sum:	9.919
Shapiro-Wilk W:	0.759
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8180

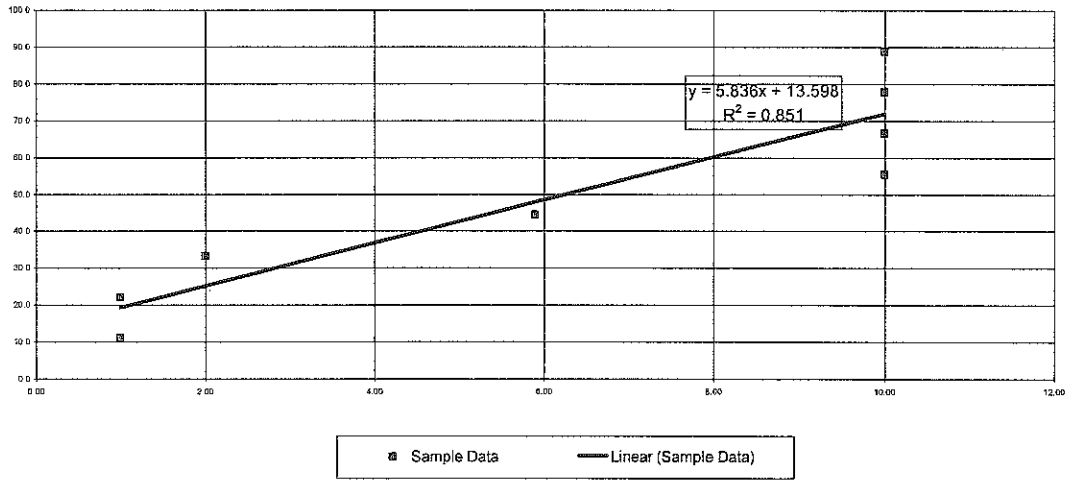
Normality?: Does Not Appear Normally Distributed

Number of Samples:	8
Sample Mean:	6.238
Sample Standard Devation:	4.302

25% Quatrile:	1.8
50% Quatrile(median):	8.0
75% Quatrile:	10.0
Inter-Quatrile Range:	8.3
Upper Cutoff:	22.4

Required Level of Confidence:	95%
Upper Confidence Limit:	9.12
Upper Tolerance Limit:	14.9

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Vinyl Chloride
COMMENT:

Sample Order	Sample Log Conc.	Normal Distribution Probability	Normal Distribution Quatrile	Shapiro-Wilk Normality Test Residual	Shapiro-Wilk Normality Test Coefficient (a)	Shapiro-Wilk Normality Test Product (b)
1	0.00	11.1	-1.22	1.00	0.6052	0.61
2	0.00	22.2	-0.76	1.00	0.3164	0.32
3	0.30	33.3	-0.43	0.70	0.1743	0.12
4	0.77	44.4	-0.14	0.23	0.0561	0.01
5	1.00	55.6	0.14		0.0000	
6	1.00	66.7	0.43		0.0000	
7	1.00	77.8	0.76		0.0000	
8	1.00	88.9	1.22		0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16					0.00	
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	1.056
Shapiro-Wilk W:	0.759
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8180

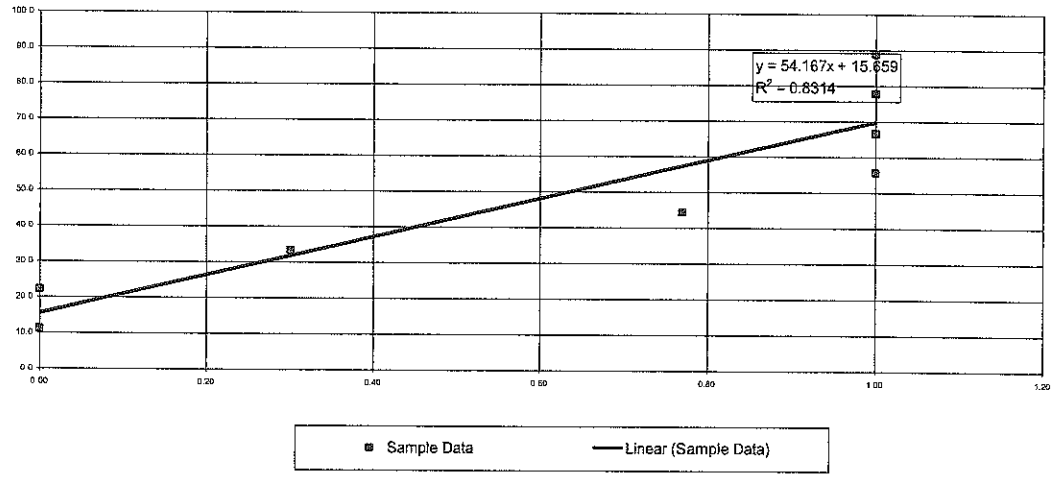
Normality?: Does Not Appear LogNormally Distributed

	log()
Number of Samples:	8
Sample Mean:	0.634
Sample Standard Devation:	0.458

25% Quatrile:	1.8
50% Quatrile(median):	8.0
75% Quatrile:	10.0
Inter-Quatrile Range:	8.25
Upper Cutoff:	22.38

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.94	
Upper Tolerance Limit:	1.55	35.9

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Vinyl Chloride
COMMENT:

Sample Order	Sample Concentration
1	1.000
2	1.000
3	2.000
4	5.900
5	10.000
6	10.000
7	10.000
8	10.000
9	
10	
11	
12	
13	
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29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	7
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	49.900
Number of Samples:	8.000
t-distribution (7, 0.1)	1.89
c	0.125
Poisson Prediction Limit:	11.49

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STATISTICAL EVALUATION USING NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Xylenes (total)
COMMENT:

Sample	
Order	Concentration
1	2.00
2	2.00
3	5.00
4	5.00
5	5.00
6	6.70
7	15.00
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

Normal Distribution	
Probability	Quatrile
12.5	-1.15
25.0	-0.67
37.5	-0.32
50.0	0.00
62.5	0.32
75.0	0.67
87.5	1.15

Shapiro-Wilk Normality Test		
Residual	Coefficient (a)	Product (b)
13.00	0.6233	8.10
4.70	0.3031	1.42
0.00	0.1401	0.00
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	
	0.0000	

Shapiro-Wilk Sum:	9.527
Shapiro-Wilk W:	0.781
Critical Value:	5%
Shapiro-Wilk Comparison W:	0.8030

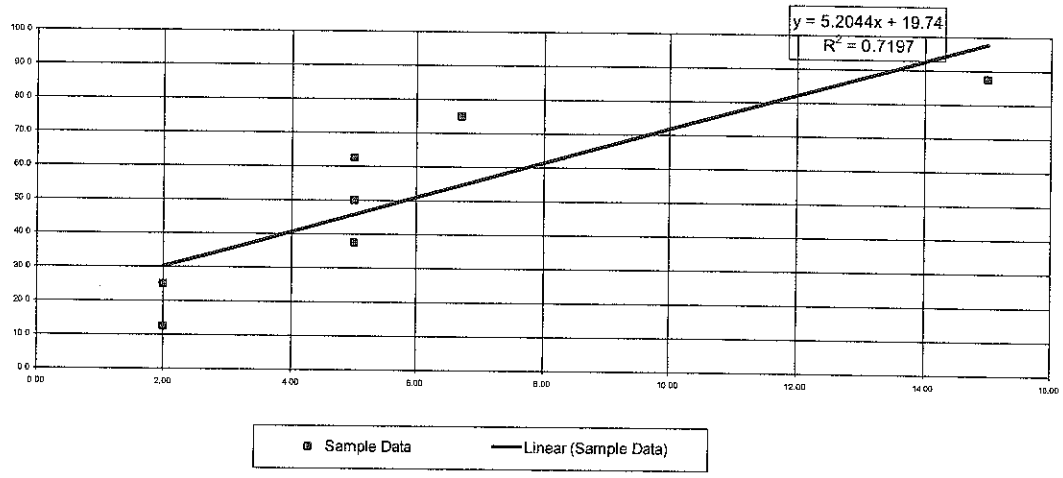
Normality?: Does Not Appear Normally Distributed

Number of Samples:	7
Sample Mean:	5.814
Sample Standard Devation:	4.402

25% Quatrile:	3.5
50% Quatrile(median):	5.0
75% Quatrile:	5.9
Inter-Quatrile Range:	2.4
Upper Cutoff:	9.4

Required Level of Confidence:	95%
Upper Confidence Limit:	9.05
Upper Tolerance Limit:	15.0

PROBABILITY PLOT



STATISTICAL EVALUATION USING LOG-NORMAL DISTRIBUTION

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Xylenes (total)
COMMENT:

Sample Order	Sample Log Conc.	Normal Distribution Probability	Normal Distribution Quatrile	Shapiro-Wilk Normality Test Residual	Shapiro-Wilk Normality Test Coefficient (a)	Shapiro-Wilk Normality Test Product (b)
1	0.30	12.5	-1.15	0.88	0.6233	0.55
2	0.30	25.0	-0.67	0.53	0.3031	0.16
3	0.70	37.5	-0.32	0.00	0.1401	0.00
4	0.70	50.0	0.00		0.0000	
5	0.70	62.5	0.32		0.0000	
6	0.83	75.0	0.67		0.0000	
7	1.18	87.5	1.15		0.0000	
8					0.0000	
9					0.0000	
10					0.0000	
11					0.0000	
12					0.0000	
13					0.0000	
14					0.0000	
15					0.0000	
16					0.00	
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Shapiro-Wilk Sum:	0.705
Shapiro-Wilk W:	0.894
Critical Value:	5.0%
Shapiro-Wilk Comparison W:	0.8030

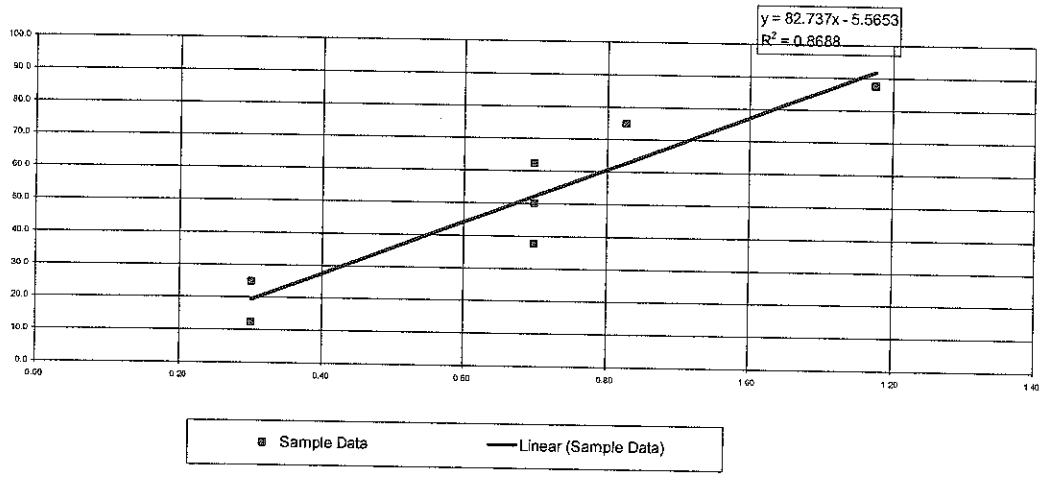
Normality?: Appears LogNormally Distributed

	log()
Number of Samples:	7
Sample Mean:	0.672
Sample Standard Devation:	0.304

25% Quatrile:	3.5
50% Quatrile(median):	5.0
75% Quatrile:	5.9
Inter-Quatrile Range:	2.35
Upper Cutoff:	9.38

	log()	Natural Scale
Required Level of Confidence:	95%	
Upper Confidence Limit:	0.90	
Upper Tolerance Limit:	1.30	20.1

PROBABILITY PLOT



STATISTICAL EVALUATION USING POISSON BASED PREDICTION LIMIT

PROJECT: Hukill Chemical Corporation
LOCATION: Well G
COMPOUND: Xylenes (total)
COMMENT:

Sample Order	Sample Concentration
1	2.000
2	2.000
3	5.000
4	5.000
5	5.000
6	6.700
7	15.000
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
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21	
22	
23	
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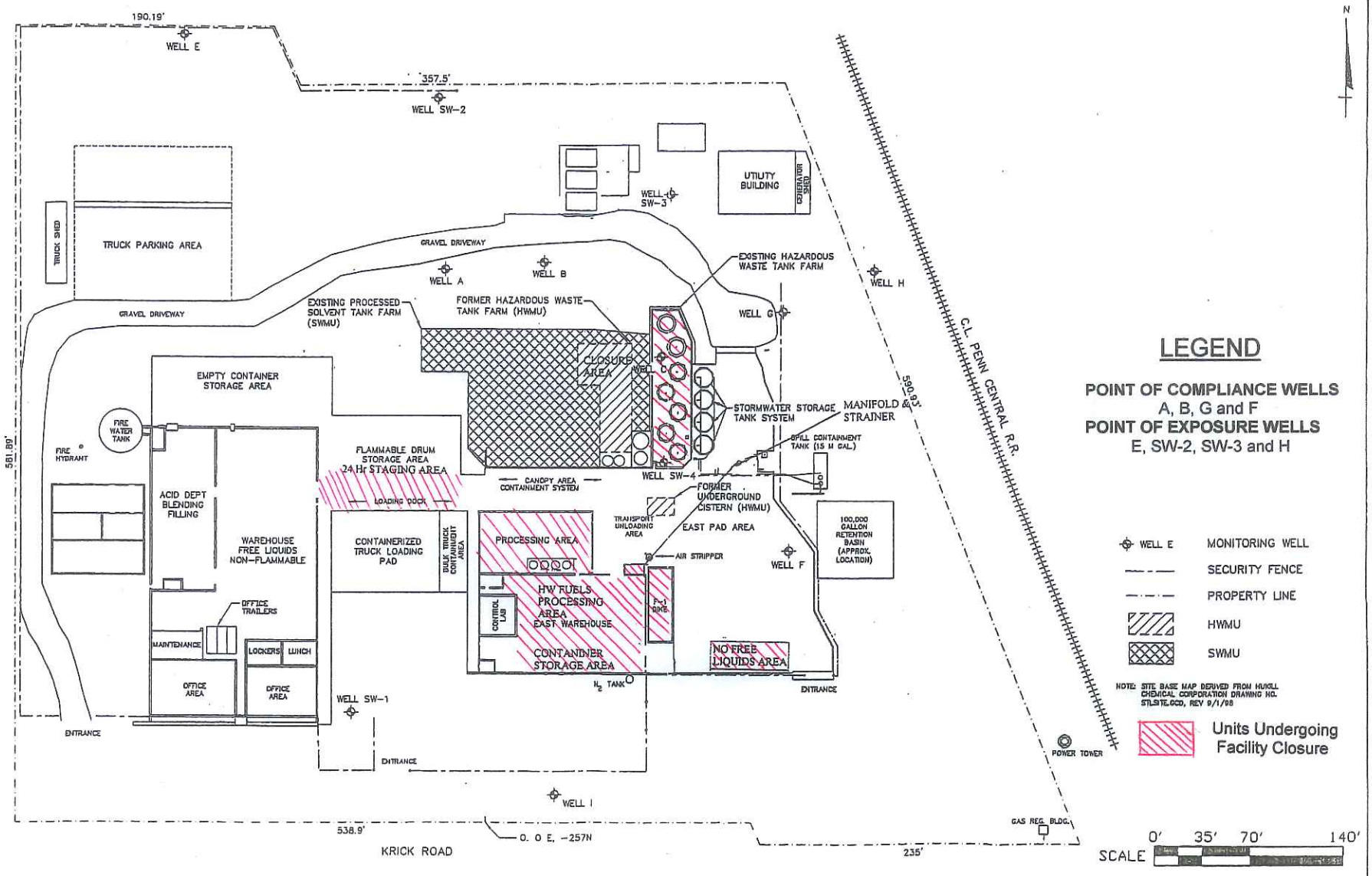
25	
26	
27	
28	
29	
30	

Poisson Distribution

Poisson based Prediction Limit may not be Appropriate

Number of Non-detects	6
Required Tolerance Interval:	95.0%
Required Confidence Level:	95.0%
Concentration Sum:	40.700
Number of Samples:	7.000
t-distribution (6, 0.1)	1.94
c	0.143
Poisson Prediction Limit:	11.10

Statistical Analysis of Groundwater Monitoring at RCRA Facilities, July 1992, (p. 36)



SECTION E

SITE MAP

HUKILL CHEMICAL CORPORATION
BEDFORD, OHIO

MAY 2004

33621.06

3621X019.DWG

SECTION E

Appendix A

HUKILL CHEMICAL CORPORATION

7013 KRICK ROAD • BEDFORD, OHIO 44146-4493 • 216 / 232-9400 • FAX 216 / 232-9477

Over Forty Years of Quality Products and Services

May 23, 1990

U.S. Army Corps of Engineers, Buffalo District
Attn: Regulatory Branch
1776 Niagara Street
Buffalo, N.Y. 14207-3199

Dear Engineer:

Hukill Chemical Corporation (HCC) would like to enclose the existing storm drainage ditch which runs from south to north along the eastern side of their property. This would allow us to fill in the east area to provide space for further expansion.

The area containing the storm ditch which is below the existing plant grade is about 0.6 acres. The HCC property surrounding this area is all at a higher elevation. The storm drain water is conducted onto the property from under the Conrail railroad tracks through a 30 inch diameter reinforced concrete pipe. The water in this ditch is conducted off the HCC property through a 36 inch diameter reinforced concrete pipe.

The HCC Outfall 001 has an NPDES permit and currently conducts surface water, NO process water, into the storm drain ditch. We are complying with the NPDES Permit and plan to contain low flow condition water from the Outfall 001 for testing and proper disposal.

We also plan to replace the existing 1,500 gallon containment tank, not shown, with a 15,000 gallon containment tank which will help us meet the NPDES Permit requirements. This containment system will serve to help contain any materials that may get into the system during an emergency spill situation.

We have contracted the services of an engineering firm to design the enclosure for the storm drain ditch. The drawings enclosed with this permit application have been adapted from the engineering firm's preliminary design.

The area containing the ditch does not appear as a wetlands on the "Soil Survey of Cuyahoga County, Ohio." It is in an "EIF" area which does not appear on the list of Hydric soils or on the list of Non-Hydric Map Units with Hydric Components. It does not appear to meet the description of Hydric soil. The National Wetlands Inventory Map of the area does not indicate that this ditch and surrounding area is a wetlands.

We hope that the Corps will consider this a minor activity and be able to issue a general permit so that HCC may complete the proposed enclosure this summer.

Please call Ed Price, Engineering Consultant, if you have any questions regarding the enclosed application. He can be reached at the Hukill Chemical Corporation, phone (216) 232-9400. He will be contacting you shortly, as advised by your office, to find out how you have determined the application should be processed.

Sincerely yours,
HUKILL CHEMICAL CORPORATION

Robert Hukill

Robert L. Hukill
President

enclosure

cc: Ed Price, Engineering Consultant

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0702-0036
Expires 30 June 1989

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application *(see sample drawings and instructions)* and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. APPLICATION NUMBER *(To be assigned by Corps)*

2. NAME AND ADDRESS OF APPLICANT

Robert L. Hukill, President
Hukill Chemical Corporation
7013 Krick Road
Bedford, Ohio 44146

Telephone no. during business hours

A/C ( ) _____ *(Residence)*
A/C (216) 232-9400 *(Office)*

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

Telephone no. during business hours

A/C ( ) _____ *(Residence)*
A/C ( ) _____ *(Office)*

Statement of Authorization: I hereby designate and authorize _____ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

SIGNATURE OF APPLICANT

DATE

4. DETAILED DESCRIPTION OF PROPOSED ACTIVITY

4a. ACTIVITY

We propose to enclose the existing storm drain ditch in reinforced concrete pipe (RCP) from the existing headwall on the south end to the existing headwall at the north end. This is a straight line distance of approximately 270 feet. We propose to install three manholes located upstream, downstream and at the intersection of Hukill's Outfall 001. We also propose to install one catch basin to provide surface drainage and lead to the north end of the proposed RCP. Then we propose to use engineered fill techniques to bring the level to the existing plant level.

4b. PURPOSE

The purpose of this proposed project is to provide additional plant expansion to the east of Hukill's existing facilities. The compacted fill area will provide space for roadway, storage tank dikes and a future rail siding.

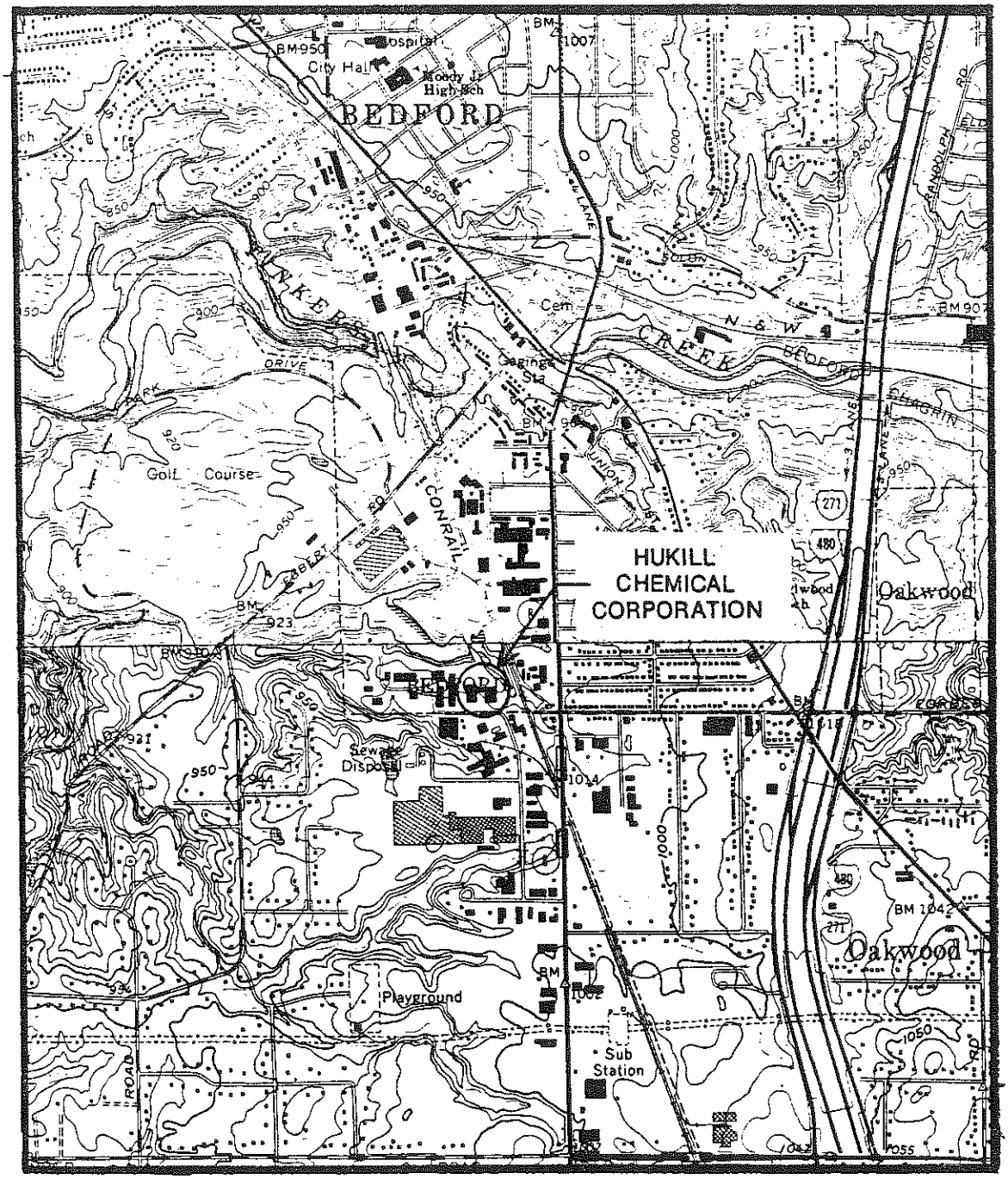
4c. DISCHARGE OF DREDGED OR FILL MATERIAL

Not applicable.

FIGURE 2

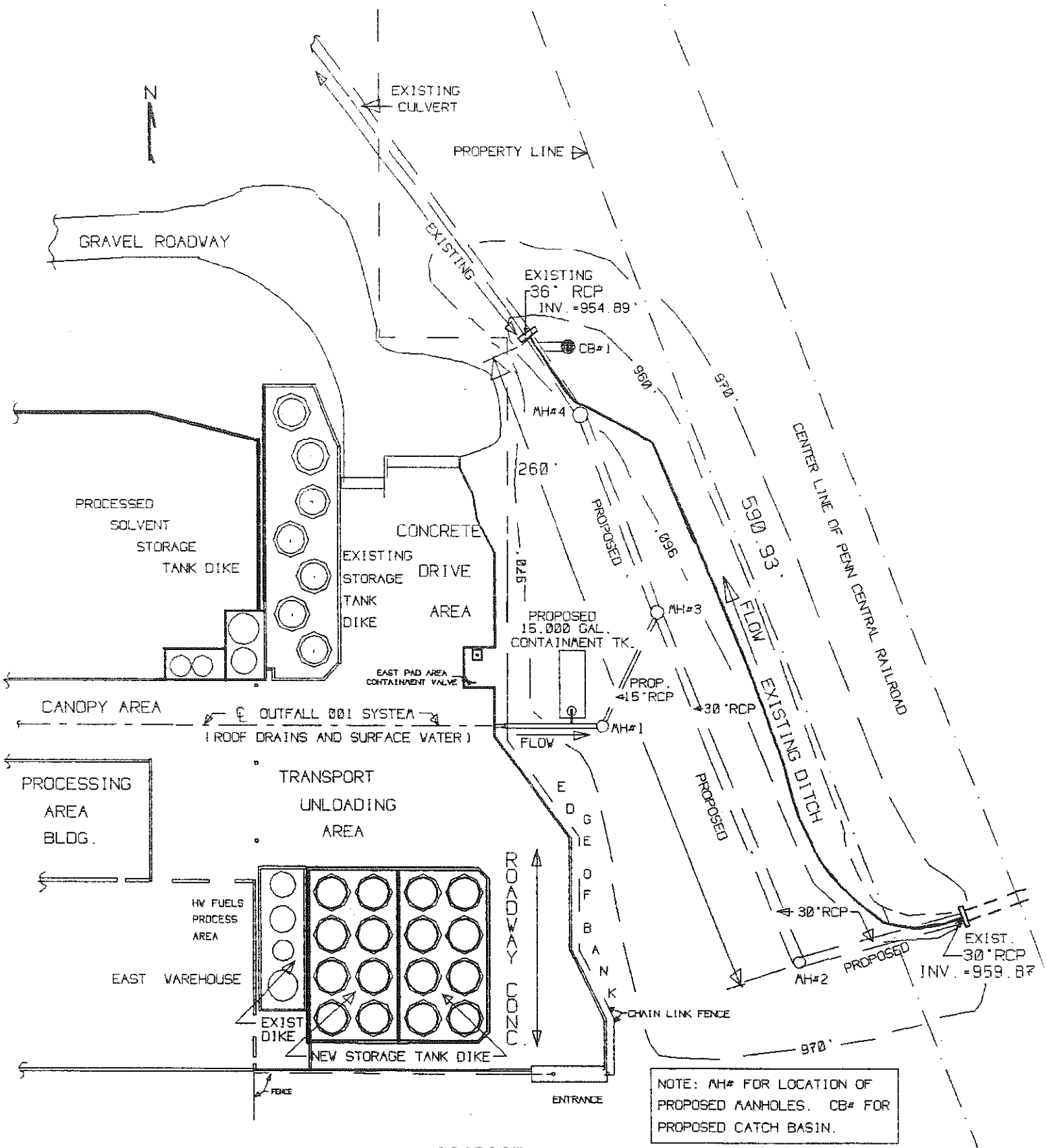
HUKILL CHEMICAL CORPORATION
BEDFORD, OHIO

N

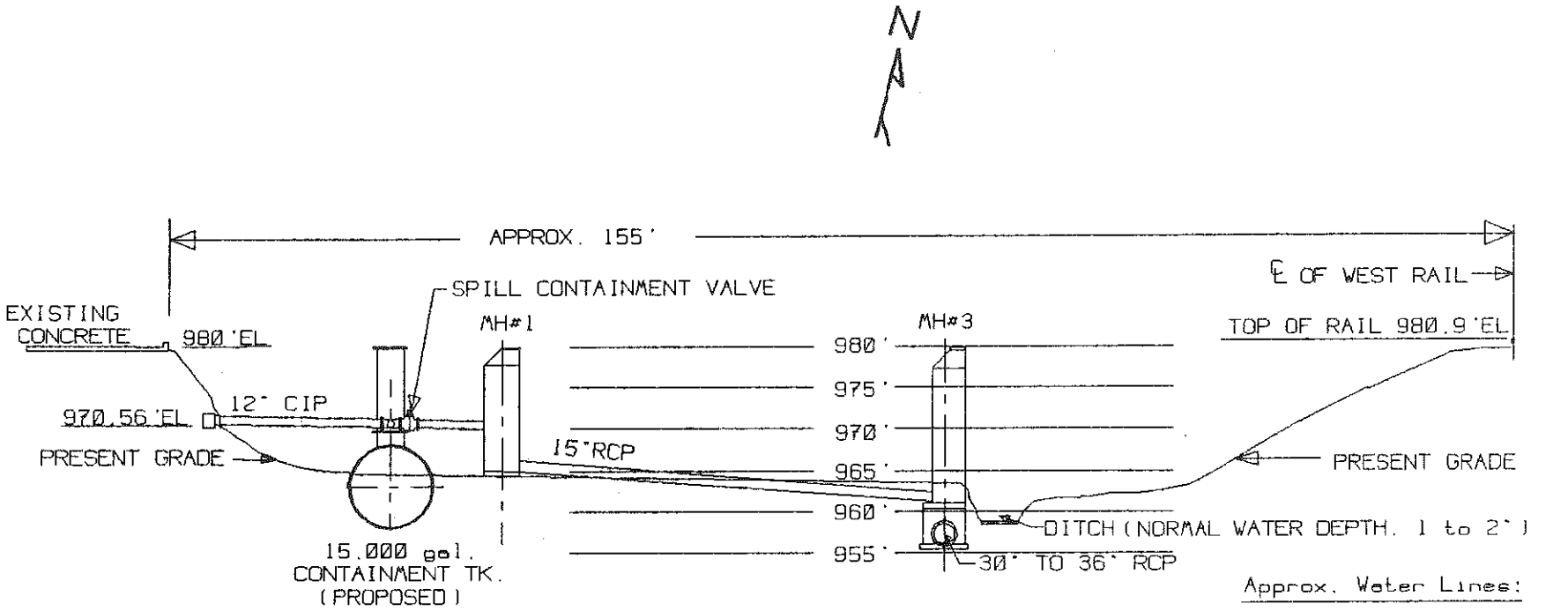


SCALE 1:2400

USGS MAP



PROPOSED ENCLOSURE OF DRAINAGE DITCH
(TRIBUTARY OF TINKER'S CREEK)
CUYAHOGA COUNTY, OHIO
HUKILL CHEMICAL CORPORATION
PLAN VIEW MAP - EAST SECTION
\SITEDWGS\ACPERMIT.DWG
Scale: 1" = 50'
Rev. 5/21/90



Approx. Water Lines:

High Water 1 foot

Low Water 1 to 2 inches

NOTE: PROPOSE TO ENCLOSE THE EXISTING STORM DRAINAGE DITCH AND THEN USE COMPACTED FILL TO BRING AREA TO GRADE OF EXISTING CONCRETE ROADWAY. WILL PROVIDE CATCH BASIN AT NORTH END TO TAKE SURFACE RUN-OFF TO STORM DRAIN.

PROPOSED ENCLOSURE OF DRAINAGE DITCH
(TRIBUTARY OF TINKER'S CREEK)
CUYAHOGA COUNTY, OHIO
HUKILL CHEMICAL CORPORATION

PROFILE VIEW AT OUTFALL LINE

\SITEDWGS\ACPERMA.DWG

Scale: 1" = 20'

Rev. 5/22/90

SHEET 3 of 3

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

RECEIVED
JUN 15 1990
HUKILL CHEMICAL CORP.

REPLY TO
ATTENTION OF

June 6, 1990

Regulatory Branch

SUBJECT: Processing No. 90-494-29, Nationwide Permits
33 CFR 330.5(a)(26)

Hukill Chemical Corporation
Mr. Robert Hukill
7013 Krick Road
Bedford, Ohio 44146

Waterway: Unnamed trib. (Tinkers Creek)
Town: Bedford
County: Cuyahoga
State: Ohio

Dear Mr. Hukill:

The proposed channel enclosure is authorized by the enclosed Nationwide permit provided the attached conditions and management practices are satisfied. Please note that our verification of the applicability of the Nationwide Permit is valid until the permit are modified, reissued, or revoked. All the Nationwide Permits are scheduled to be modified, reissued, or revoked prior to January 13, 1992. It is your responsibility to remain informed of changes to the Nationwide Permits. A public notice announcing the changes will be issued when they occur. Please note that if you commence or are under contract to commence this activity before the date the Nationwide Permits are modified or revoked, you will have twelve months from the date of modification or revocation to complete the activity under the present terms and conditions of these Nationwide Permits.

You are encouraged to contact the appropriate state and local governmental officials to insure that the proposed work complies with their requirements.

Questions pertaining to this matter should be directed to Ms. Lisa Norfolk, who may be contacted by calling 716-879-4324, or by writing to the above address.

Sincerely,

Allan H. Lieberman

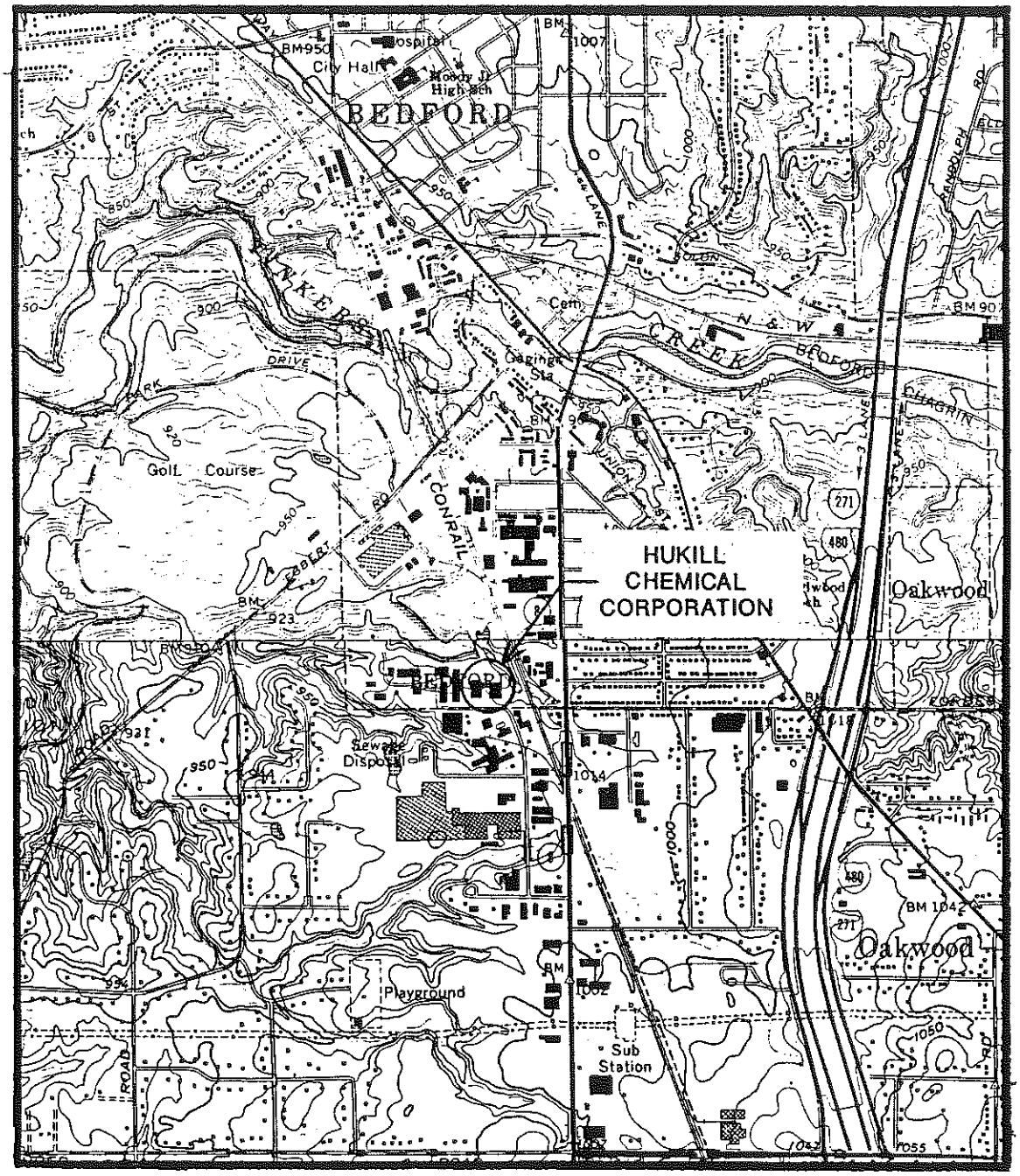
for Hugh F. Boyd III
Colonel, U.S. Army
Commanding

Enclosures

FIGURE 2

HUKILL CHEMICAL CORPORATION
BEDFORD, OHIO

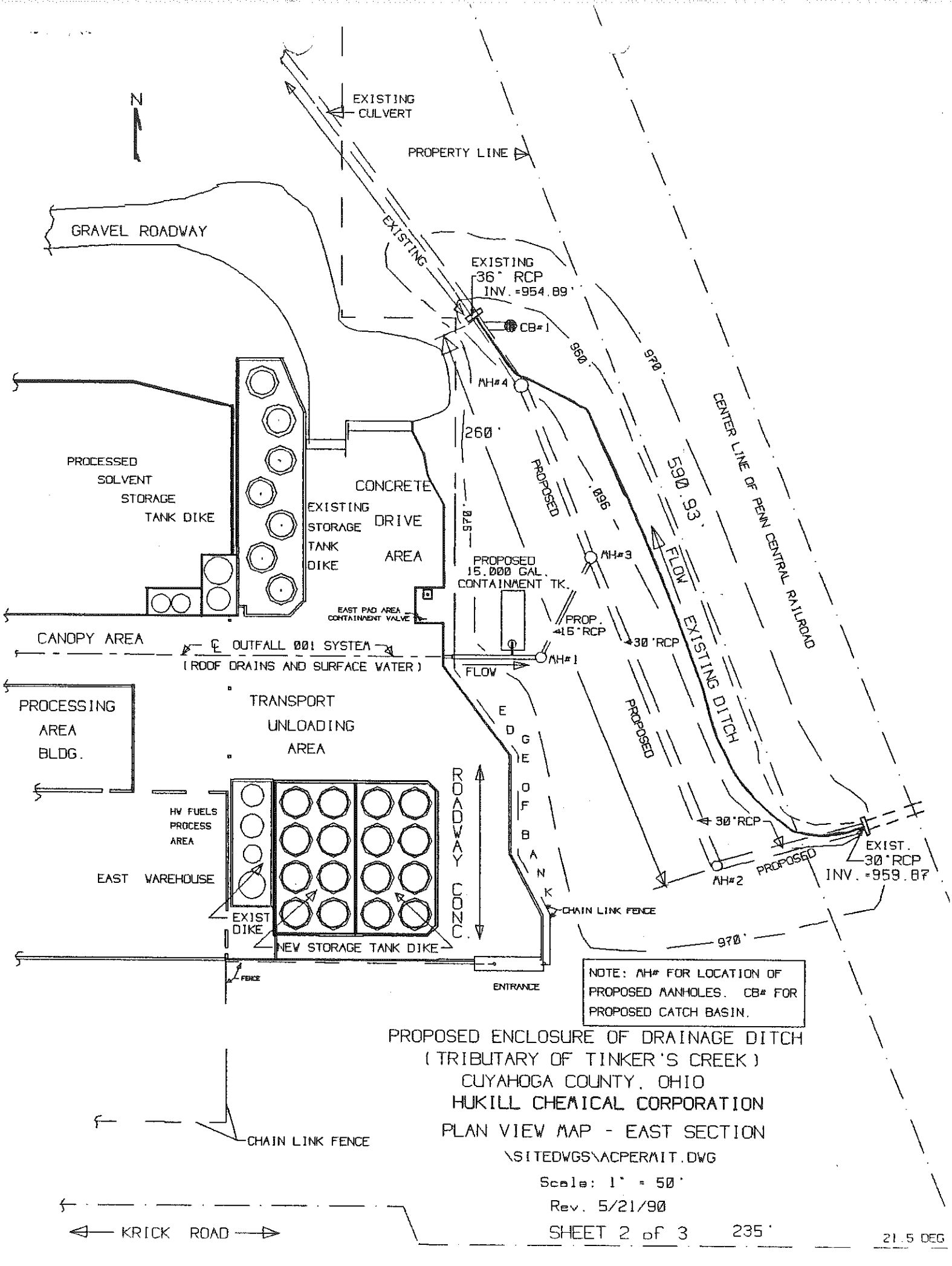
N



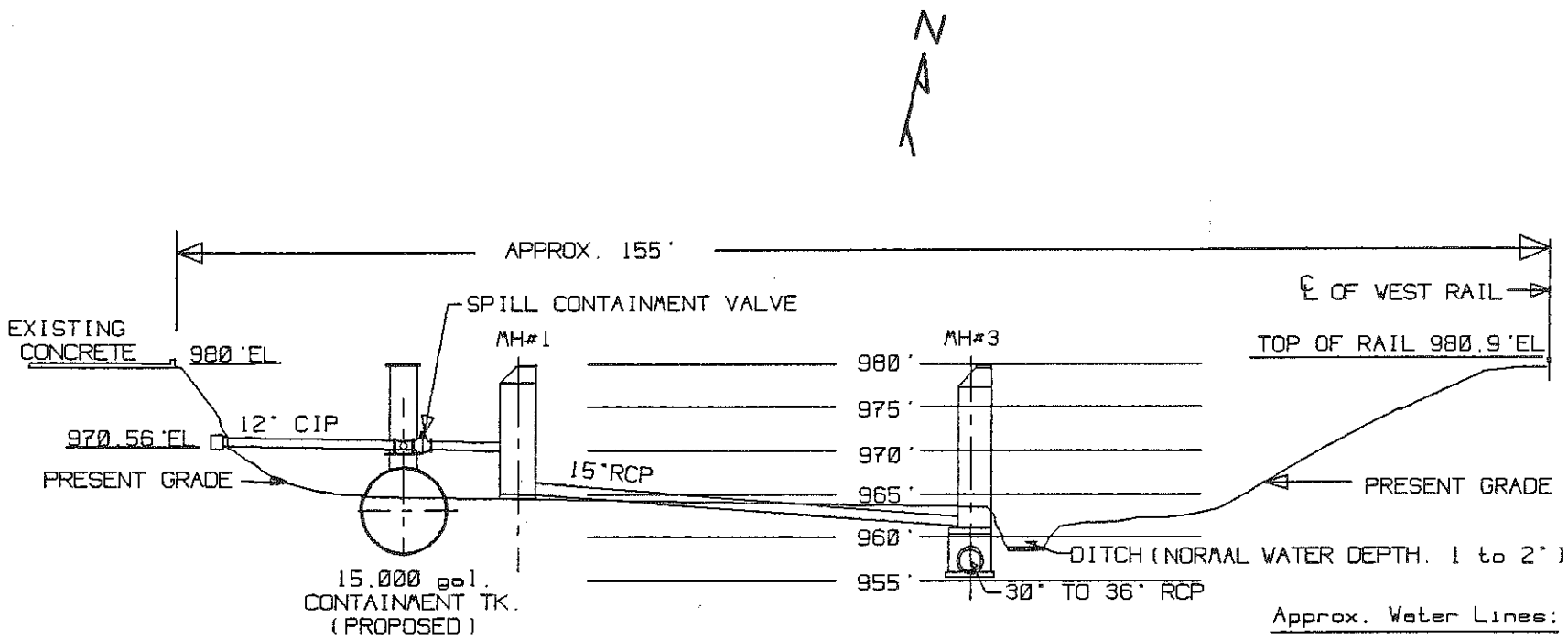
SCALE 1:2400

USGS MAP

Sheet 1 of 3



PROPOSED ENCLOSURE OF DRAINAGE DITCH
(TRIBUTARY OF TINKER'S CREEK)
CUYAHOGA COUNTY, OHIO
HUKILL CHEMICAL CORPORATION
PLAN VIEW MAP - EAST SECTION
\SITEDWGS\ACPERMIT.DWG
Scale: 1" = 50'
Rev. 5/21/90
SHEET 2 of 3



Approx. Water Lines:
High Water 1 foot
Low Water 1 to 2 inches

NOTE: PROPOSE TO ENCLOSE THE EXISTING STORM DRAINAGE DITCH AND THEN USE COMPACTED FILL TO BRING AREA TO GRADE OF EXISTING CONCRETE ROADWAY. WILL PROVIDE CATCH BASIN AT NORTH END TO TAKE SURFACE RUN-OFF TO STORM DRAIN.

PROPOSED ENCLOSURE OF DRAINAGE DITCH
(TRIBUTARY OF TINKER'S CREEK)
CUYAHOGA COUNTY, OHIO
HUKILL CHEMICAL CORPORATION

PROFILE VIEW AT OUTFALL LINE
\SITEDWGS\ACPERMA.DWG
Scale: 1" = 20'
Rev. 5/22/90
SHEET 3 of 3

ACTIVITIES AUTHORIZED UNDER 33 CFR 330.5(a):

(26) Discharges of dredged or fill material into the waters listed in paragraphs (a)(26)(i) and (ii) of this section except those which cause the loss or substantial adverse modification of 10 acres or more of such waters of the United States, including wetlands. For discharges which cause the loss or substantial adverse modification of 1 to 10 acres of such waters, including wetlands, notification to the district engineer is required in accordance with Section 330.7 of this section. [Section 404]

(i) Non-tidal rivers, streams, and their lakes and impoundments, including adjacent wetlands, that are located above the headwaters.

(ii) Other non-tidal waters of the United States, including adjacent wetlands, that are not part of a surface tributary system to interstate waters or navigable waters of the United States (i.e. isolated waters).

330.5(b) Conditions.

The following special conditions must be followed in order for the nationwide permits identified in paragraph (a) of this section to be valid:

(1) That any discharge of dredged or fill material will not occur in the proximity of a public water supply intake.

(2) That any discharge of dredged or fill material will not occur in areas of concentrated shellfish production unless the discharge is directly related to a shellfish harvesting activity authorized by paragraph (a)(4) of this section.

(3) That the activity will not jeopardize a threatened or endangered species as identified under the Endangered Species Act (ESA), or destroy or adversely modify the critical habitat of such species. In the case of Federal agencies, it is the agencies' responsibility to comply with the requirements of the ESA. If the activity may adversely affect any listed species or critical habitat, the District Engineer must initiate Section 7 consultation in accordance with the ESA. In such cases, the District Engineer may:

(i) Initiate section 7 consultation and then, upon completion, authorize the activity under the nationwide permit by adding, if appropriate, activity specific conditions, or

(ii) Prior to or concurrent with section 7 consultation, he may recommend discretionary authority (See section 330.8), or use modification, suspension, or revocation procedures (See 33 CFR 325.7).

(4) That the activity shall not significantly disrupt the movement of those species of aquatic life indigenous to the waterbody (unless the primary purpose of the fill is to impound water);

(5) That any discharge of dredged or fill material shall consist of suitable material free from toxic pollutants (see section 307 of the Clean Water Act) in toxic amounts;

(6) That any structure or fill authorized shall be properly maintained.

(7) That the activity will not occur in a component of the National Wild and Scenic River System; nor in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status;

(8) That the activity shall not cause an unacceptable interference with navigation;

(9) That, if the activity may adversely affect historic properties which the National Park Service has listed on, or determined eligible for listing on, the National Register of Historic Places, the permittee will notify the District Engineer. If the District Engineer determines that such historic properties may be adversely affected, he will provide the Advisory Counsel on Historic Preservation an opportunity to comment on the effects on such historic properties or he will consider modification, suspension, or revocation in accordance with 33 CFR 325.7. Furthermore, that, if the permittee before or during prosecution of the work authorized, encounters a historic property that has not been listed or determined eligible for listing on the National Register, but which may be eligible for listing in the National Register, he shall immediately notify the District Engineer;

(10) That the construction or operation of the activity will not impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights;

(11) That in certain states, an individual state water quality certification must be obtained or waived (See § 330.9);

(12) That in certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (See § 330.10);

(13) That the activity will comply with regional conditions which may have been added by the Division Engineer (See § 330.8(a)); and

(14) That the management practices listed in § 330.6 of this part shall be followed to the maximum extent practicable.

(Continued on Reverse Side)

Part 330.6 Management Practices.

(a) In addition to the conditions specified in part 330.5 of this Part, the following management practices shall be followed, to the maximum extent practicable, in order to minimize the adverse effects of these discharges on the aquatic environment. Failure to comply with these practices may be cause for the District Engineer to recommend, or the Division Engineer to take, discretionary authority to regulate the activity on an individual or regional basis pursuant to part 330.8 of this Part.

(1) Discharge of dredged or fill material into waters of the United States shall be avoided or minimized through the use of other practical alternatives.

(2) Discharges in spawning areas during spawning seasons shall be avoided.

(3) Discharges shall not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

(4) If the discharge creates an impoundment of water, adverse impacts on the aquatic ecosystem caused by the accelerated passage of water and/or the restriction of its flow shall be minimized.

(5) Discharge in wetlands areas shall be avoided.

(6) Heavy equipment working in wetlands shall be placed on mats.

(7) Discharges into breeding areas for migratory waterfowl shall be avoided.

(8) All temporary fills shall be removed in their entirety.

Professional Service Industries, Inc.

TESTED FOR: Hukill Chemical
7013 Krick Rd.
Bedford, Ohio 44146
Attn: Ed Price

PROJECT: Ford Motor Company
Walton Hills Facility
Walton Hills, Ohio

DATE: June 11, 1990

OUR REPORT NO.: 141-00074-1

REMARKS: As requested by Mr. Ed Price from Hukill Chemical, we reported to the above referenced project this date to obtain proctor samples. We met with Mr. Larry Righi from Ford Motor Company at the site for instructions on where to sample the material. Two samples were taken from stockpiled material. One (1) from the parking lot area and one (1) from the dye storage area. Samples were delivered to our laboratory for testing.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.
Inspector: K. McJunkins

cc: Hukill Chemical (2)
KM:sk

Rec'd 6/25/90

Professional Service Industries, Inc.

REPORT OF MOISTURE DENSITY RELATIONSHIP OF SOIL

TESTED FOR: Hukill Chemical Corp.
7013 Krick Rd.
Bedford, Ohio 44146

PROJECT: Ford Motor Company
Walton Hills, Ohio

DATE: June 11, 1990

OUR REPORT NO.: 141-00074-2

TEST DATA Soil I.D. No. 1

Visual Classification: Brown & Gray Silty Clay, some sand and shale Fragments. (CL)

Sample Source: Material from Ford, Walton Hills Die Storage Area obtained by PSI Technician on June 11, 1990

Method of Test: ASTM D698 Standard Test (Method "C")

Test Results:

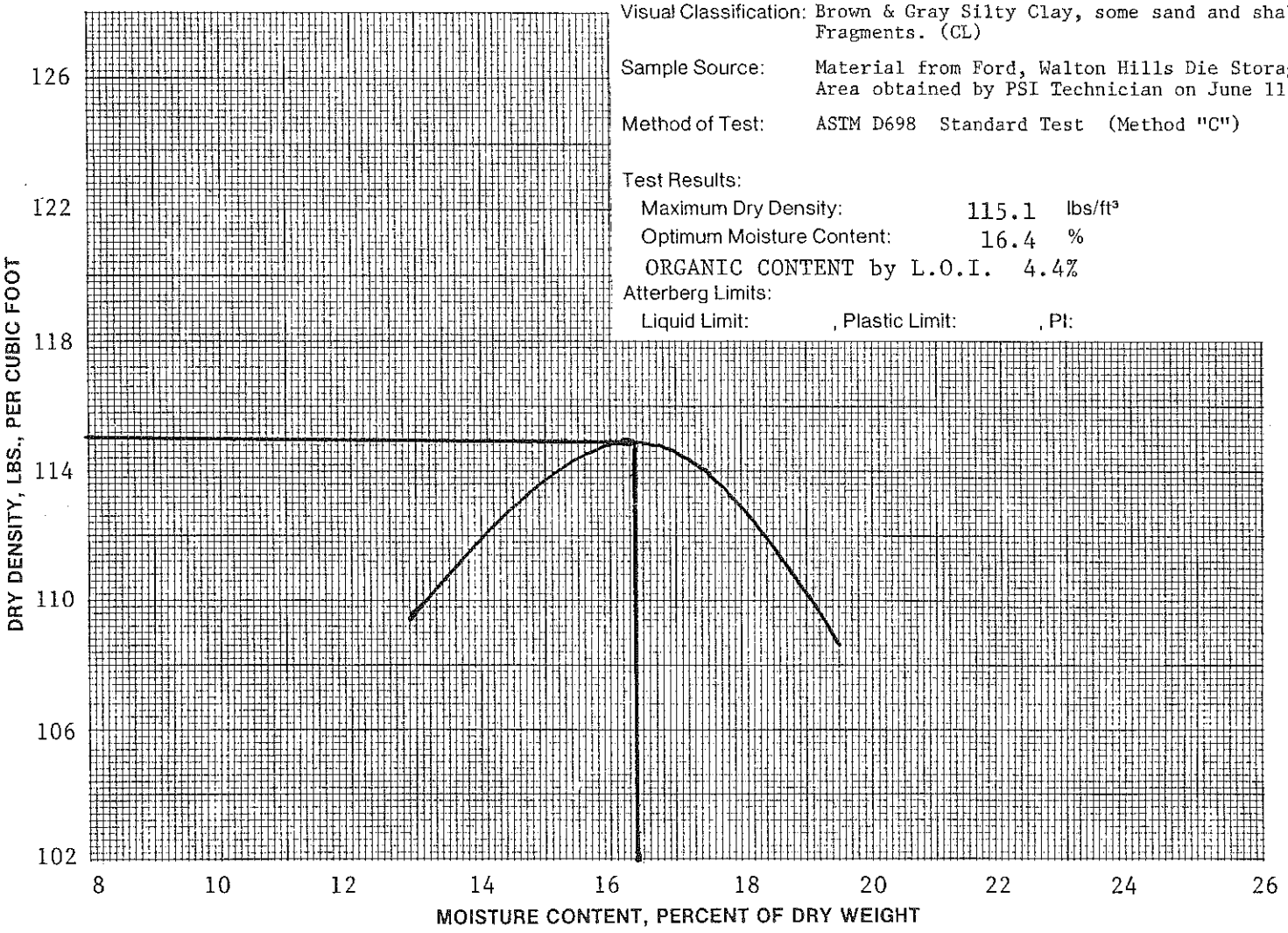
Maximum Dry Density: 115.1 lbs/ft³

Optimum Moisture Content: 16.4 %

ORGANIC CONTENT by L.O.I. 4.4%

Atterberg Limits:

Liquid Limit: , Plastic Limit: , PI:



Respectfully submitted,
Professional Service Industries, Inc.

cc: Hukill Chemical Co.:Ed Price (2)

:mh

Professional Service Industries, Inc.

REPORT OF MOISTURE DENSITY RELATIONSHIP OF SOIL

TESTED FOR: Hukill Chemical Corp.
7013 Krick Rd.
Bedford, Ohio 44146

PROJECT: Ford Motor Company
Walton Hills, Ohio

DATE: June 11, 1990

OUR REPORT NO.: 141-00074-3

TEST DATA Soil I.D. No. 2

Visual Classification: Brown & gray silty clay, some sand and shale fragments. (CL)

Sample Source: Material from Ford, Walton Hills inside parking lot obtained by PSI Technician on June 11, 1990.

Method of Test: ASTM D698 Standard Test (Method "C")

Test Results:

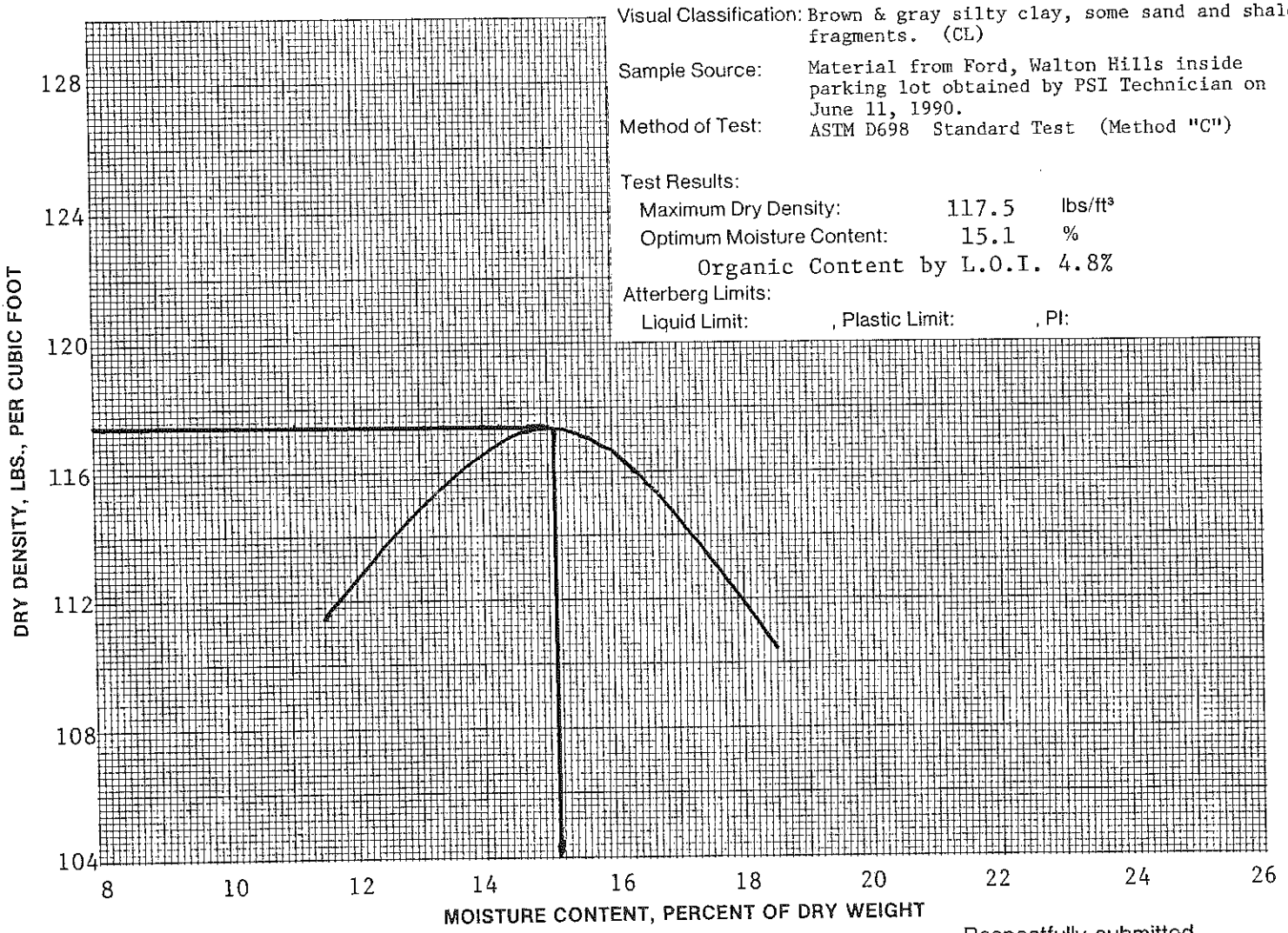
Maximum Dry Density: 117.5 lbs/ft³

Optimum Moisture Content: 15.1 %

Organic Content by L.O.I. 4.8%

Atterberg Limits:

Liquid Limit: , Plastic Limit: , PI:



Respectfully submitted,
Professional Service Industries, Inc.

cc: Hukill Chemical Co.:Ed Price (2)

:mh

5555 Canal Road • Cleveland, OH 44125 • Phone: 216/447-1335 • Fax: 216/642-7008

Professional Service Industries, Inc.

Rec'd 8/7/90

REPORT OF MOISTURE DENSITY RELATIONSHIP OF SOIL

TESTED FOR: Hukill Chemical
7013 Krick Rd.
Bedford, Ohio 44146
Attn: Mr. Ed Price

PROJECT: Hukill Chemical
7013 Krick Rd.
Bedford, Ohio 44146

DATE: July 5, 1990

OUR REPORT NO.: 141-00074-4

TEST DATA Soil I.D. NO. 3

Visual Classification: Brown and gray silty clay, some sand, trace gravel, rock fragments and root fibers. (CL)

Sample Source: On site excavated material obtained by PSI technician on July 5, 1990.

Method of Test: ASTM D698 (Standard Test "A")

Test Results:

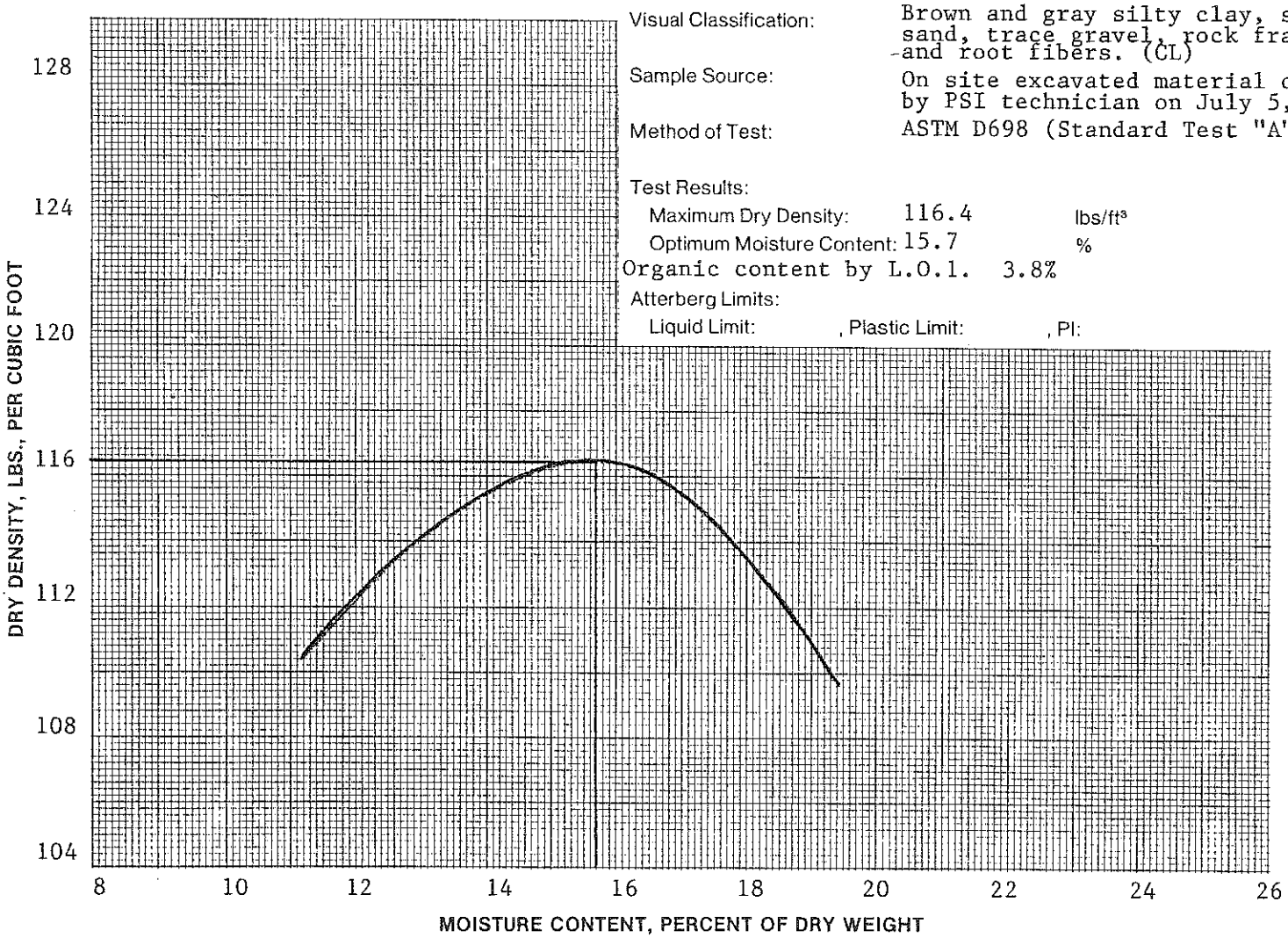
Maximum Dry Density: 116.4 lbs/ft³

Optimum Moisture Content: 15.7 %

Organic content by L.O.I. 3.8%

Atterberg Limits:

Liquid Limit: , Plastic Limit: , PI:



cc. Hukill Chemical (2)

Respectfully submitted,
Professional Service Industries, Inc.

PSI:sk

Professional Service Industries, Inc.

TESTED FOR:
Hukill Chemical Corporation
7013 Krick Rd.
Bedfor, Ohio 44146

PROJECT:
Hukill Chemical
Walton Hills, Ohio

DATE: July 5, 1990

OUR REPORT NO.: 141-00074 -3

REMARKS: As requested, we visited the site to obtain a proctor sample of the in place material at the bottom edge of the cut as shown on the attached drawing. We explained to the Hukill Chemical personnel that we could not provide a sketch showing where the soft spots are in the fill with out the contractor present to run a proof rolling of the area. The preposed fill area appeared to be all brown and gray mottled clay over undetermined subsurface material. Our inspection will continue.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

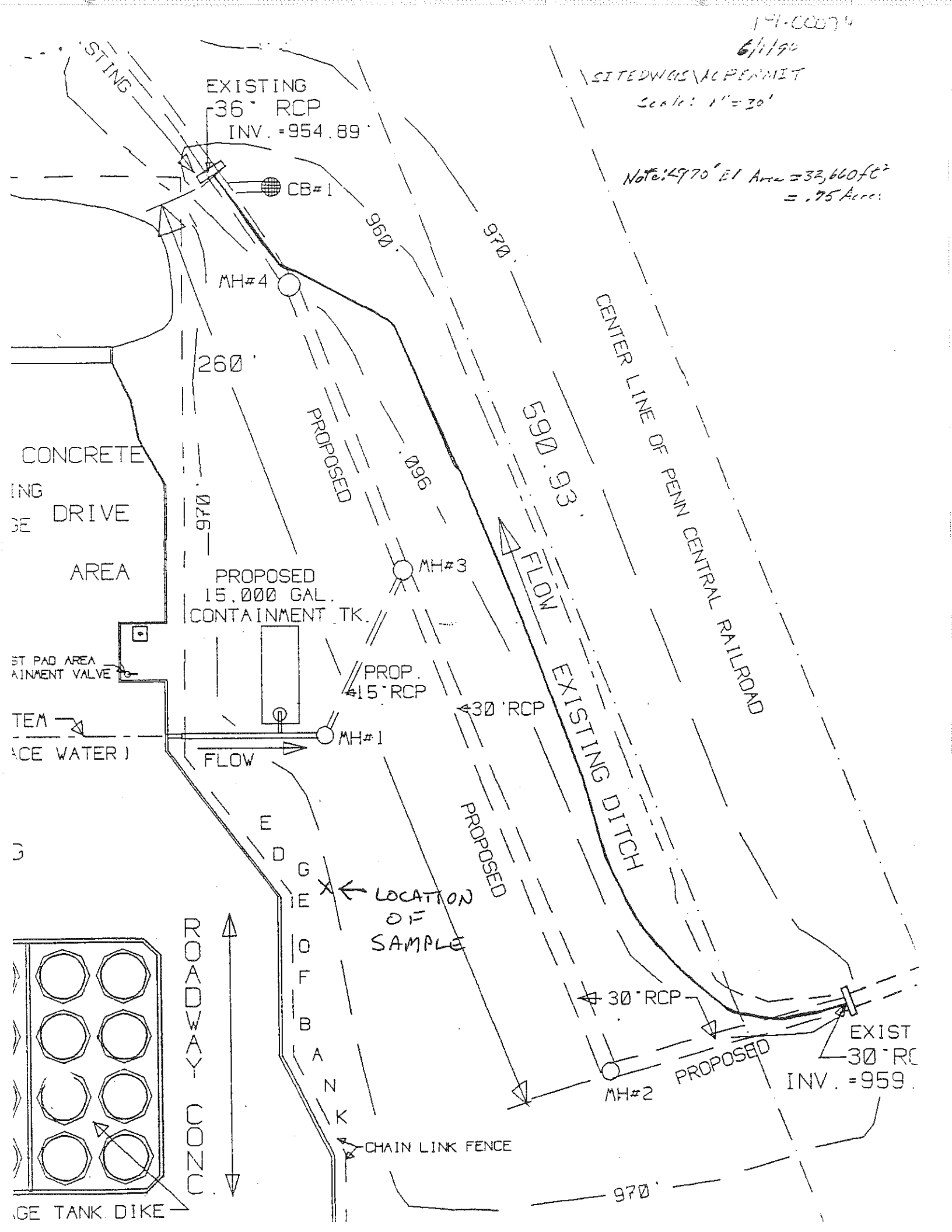
Inspector: Nicholas J. Gerold

cc: Hukill Chemical (2)

NJG:bjg

RECEIVED
JUL 17 1990
HUKILL CHEMICAL CORP.

5555 Canal Road • Cleveland, OH 44125 • Phone: 216/447-1335 • Fax: 216/642-7008


14-0007
6/1/90
\SITEDWGS\ACPERMIT
Scale: 1"=30'
Note: 970' El Area = 32,660 ft²
= .75 Acres
EXISTING
36" RCP
INV. =954.89'
CB#1
960'
970'
MH#4
260'
CONCRETE
DRIVE
AREA
970'
PROPOSED
096
590.93
CENTER LINE OF PENN CENTRAL RAILROAD
MH#3
FLOW
EXISTING DITCH
PROPOSED 15,000 GAL.
CONTAINMENT TK.
PROP.
15" RCP
30" RCP
MH#1
FLOW
PROPOSED
EDGE OF BANK
LOCATION OF SAMPLE
ROADWAY CONC.
30" RCP
PROPOSED
MH#2
EXIST
30" RC
INV. =959.
CHAIN LINK FENCE
970'
GE TANK DIKE

Rec'd from Peau Pevix 5/16/90

RECEIVED
OCT 16 1989
WALBRIDGE ALDINGER

CHEMICAL TESTING

FORD MOTOR

WALTON HILLS STAMPING PLANT

WALTON HILLS, OHIO

W/C DATA Sheet

LORAIN FIKA
441-6300

Professional Service Industries, Inc.

2X10

Date: 4.7

Professional Service Industries, Inc.

September 26, 1989

Ford Motor
Walton Hills Stamping Plant
7845 Northfield Road
P. O. Box 211
Walton Hills, Ohio 44146

Attention: Mr. Larry Righi

Re: Chemical Testing
PSI File Number: 142-95113

Gentlemen:

Per your request, a wood sample and a soil/gravel sample were subjected to chemical tests to determine the presence of the following parameters:

Cyanide	Silver
pH	Arsenic
Sulfide	Barium
Copper	Cadmium
Zinc	Chromium
PCB	Mercury
Lead	Selenium

The results of these tests are included in Tables 1 through 8 in the Appendix.

9000 Bank Street • Cleveland, OH 44125 • Phone: 216/642-7000

Ford Motor
September 26, 1989

We appreciate the opportunity of working with you on this project. Should you have any questions regarding the contents of this submittal, please do not hesitate to call.

Very truly yours,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Craig A. Lass
Staff Engineer

Vijay K. Khosla, Ph.D., P.E.
Division Manager

CAL/md

3cc: Ford Motor

APPENDIX

TABLE NO. 1

SAMPLE ID : WOOD SAMPLE

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 9/ 7/89

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Silver	9/ 8- 9/12/89	ND	0.02	mg/l
Arsenic	9/ 8/89	ND	0.005	mg/l
Barium	9/ 8- 9/11/89	ND	0.2	mg/l
Cadmium	9/ 8- 9/12/89	ND	0.02	mg/l
Chromium	9/ 8- 9/11/89	ND	0.05	mg/l
Mercury	9/ 8/89	ND	0.005	mg/l
Lead	9/ 8- 9/12/89	ND	0.1	mg/l
Selenium	9/ 8/89	ND	0.005	mg/l

NOTE: ND (None Detected)

Initial pH	5.4	su
Final pH	5.2	su
Amount of acetic acid used per method	20	ml

TABLE NO. 2

SAMPLE ID : WOOD SAMPLE

ANALYTICAL REPORT

PARAMETER	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Cyanide	9/ 6/89	1.7	0.1	mg/kg
pH	9/ 6/89	5.4		su
Sulfide	9/ 6/89	65	50	mg/kg

NOTE: ND (None Detected)

TABLE NO. 3

SAMPLE ID : WOOD SAMPLE

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Copper	9/ 6- 9/12/89	220	2	mg/kg
Zinc	9/ 6- 9/12/89	420	20	mg/kg

NOTE: ND (None Detected)

TABLE NO. 4

SAMPLE ID: WOOD SAMPLE

POLYCHLORINATED BIPHENYLS
METHOD 8080 LIST - GC

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	2
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = mg/kg) as rec'd
-- (Not Analyzed)

TABLE NO. 5

SAMPLE ID : SOIL/GRAVEL SAMPLE

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 9/ 7/89

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT			DWS Limit
Silver	9/ 8- 9/12/89	0.03	0.02	mg/l	ok	5.0
Arsenic	9/ 8/89	0.008	0.005	mg/l	ok	5.0
Barium	9/ 8- 9/11/89	1.3	0.2	mg/l	ok	100.0
Cadmium	9/ 8- 9/12/89	0.04	0.02	mg/l	ok	1.0
Chromium	9/ 8- 9/11/89	ND	0.05	mg/l	ok	5.0
Mercury	9/ 8/89	ND	0.005	mg/l	ok	0.2
Lead	9/ 8- 9/12/89	ND	0.1	mg/l	OK	5.0
Selenium	9/ 8/89	0.016	0.005	mg/l	ok	1.0

NOTE: ND (None Detected)

Initial pH	10.0	su
Final pH	5.0	su
Amount of acetic acid used per method	400	ml

TABLE NO. 6

SAMPLE ID : SOIL/GRAVEL SAMPLE

ANALYTICAL REPORT

PARAMETER	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Cyanide	9/ 6/89	1.4	0.1	mg/kg
pH	9/ 6/89	10.0		su
Sulfide	9/ 6/89	190	50	mg/kg

NOTE: ND (None Detected)

TABLE NO. 7

SAMPLE ID : SOIL/GRAVEL SAMPLE

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Copper	9/ 6- 9/12/89	43	2	mg/kg
Zinc	9/ 6- 9/12/89	210	20	mg/kg

NOTE: ND (None Detected)

TABLE NO. 8

SAMPLE ID: SOIL/GRAVEL SAMPLE

POLYCHLORINATED BIPHENYLS
METHOD 8080 LIST - GC

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	—

OTE: ND (None Detected, lower detectable limit = 1 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = mg/kg) as rec'd
— (Not Analyzed)

RECEIVED
OCT 20 1989
INDUSTRIAL CONSTRUCTION
CO., INC.

Appendix C

Quality Assurance And Quality Control

Appropriate use of analytical data generated requires reliance on the quality control practices incorporated in the sampling and analytical methods and procedures. The facility requires the use of approved methods for sampling and analysis operations such as those described in USEPA SW-846 Test Methods for Evaluating Solid Waste.

Specific quality assurance and quality control is dependent on such things as sample matrix, type of analysis, and types of instruments involved. The facility requires that laboratories performing hazardous waste determination have a documented quality assurance program in place to assure the reliability of data. To verify adherence to the documented quality assurance program, the facility conducts routine audits of the laboratory. Typically, these audits consist of reviews of the laboratories organization, chain of custody procedures, calibration procedures and frequency, analytical procedures and standard operating procedures, data reduction, data validation, data reporting, internal quality control checks, internal audits, preventative maintenance, corrective action, quality assurance reports to management, training, instrumentation, laboratory approvals, certifications, laboratory cleanliness, and other appropriate areas.

To maintain sample integrity, the facility collects samples in accordance with SW-846 guidance. Holding times, preservatives, sample containers, and sampling techniques identified in SW-846 are strictly adhered to. Chain of custody procedures are followed to track the sample in-house and accompany each sample to the laboratory and are returned to the facility when analysis is complete.

To verify reproducibility and reliability of data, the facility routinely submits duplicates and blanks as blind samples to the laboratories. Duplicate samples will be

collected at a frequency of one per ten samples . The data generated from blank samples are used to indicate cross contamination or laboratory contamination. The data generated from duplicates are used to verify reproducibility. Trip blanks will also be use at a frequency of one per shipping container carrying VOC samples. Once the data has been found acceptable, they are compared to the appropriate regulatory threshold and the waste is handled appropriately. The data are then filed at the facility for a minimum of three years. All these measures combine to provide a system wherein the confidence and reliability of the data can be reasonably assured.

Appendix D

OBSERVATION WELL GENERALIZED CONSTRUCTION

Well No. PROPOSED
Boring No.

PROJECT	Hukill Chemical Company	FILE NO.	NA
LOCATION	Generalized Observation Well Construction	PROJECT MGR.	NA
CLIENT	Hukill Chemical Company	FIELD REP.	NA
CONTRACTOR	TBD	DATE INSTALLED	PROPOSED
DRILLER	TBD	WATER LEVEL	NA

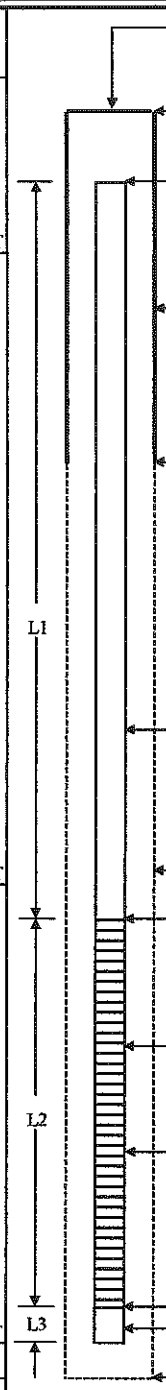
Ground El. ____ ft
El. Datum ____

Location: Proposed Well

☑ Guard Pipe
☐ Roadway Box

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
	0.0 FT CONCRETE 1.0 FT
	1.0 FT BENTONITE 18.0 FT
	18.0 FT SILICA SAND 30.0 FT
	~30.5 (Bottom of Exlporation)

(Numbers refer to depth from ground surface in feet)



(Not to Scale)

Type of protective cover/lock		
Height/Depth of top of guard pipe/roadway box above/below ground surface	3.0	ft
Height/Depth of top of riser pipe above/below ground surface	2.5	ft
Type of protective casing:	STEEL GUARD PIPE	
Length	5.0	ft
Inside Diameter	4.000	in
Depth of bottom of guard pipe/roadway box		ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	(+ 0.5)	1.5
Bentonite Seal	1.0	17.0

Type of riser pipe:	SCHEDULE 40 PVC	
Inside diameter of riser pipe	2.0	in
Type of backfill around riser	SAND/BENTONITE	
Diameter of borehole	4.25	in
Depth to top of well screen	~20	ft
Type of screen	SCHEDULE 40 PVC	
Screen gauge or size of openings	No 10, 0.01	in
Diameter of screen	2.0	in
Type of backfill around screen	#5 or #7 SILICA SAND	
Depth of bottom of well screen	~30	ft
Bottom of Silt trap	~30.2	ft
Depth of bottom of borehole	~30.5	ft

____ ft + ____ ft + ____ ft = ____ ft
Riser Pay Length (L1) + Length of screen (L2) + Length of silt trap (L3) = Pay length

COMMENTS: PROPOSED MONITORING WELL CONSTRUCTION. All depths and thicknesses are approximate

Form # 3010

Monitoring Well Development

The newly installed monitoring well will be developed by pumping or bailing. Mild surging will be used if necessary. A submersible pump may also be used to develop the wells by raising and lowering the pump intake throughout the screened interval.

Turbidity, temperature, pH, conductivity, ORP and DO will be measured using a Horiba® U-22 water quality meter, or equivalent. Water level monitoring will be conducted during well development activities. Development will continue until the turbidity of the development water is equal to or less than 5 nephelometric turbidity units (NTUs). In the event that turbidity values of less than 5 NTUs cannot be achieved, well development may also be considered complete if all of the following conditions are met:
- a minimum of ten well volumes have been removed in addition to any volume of water or fluid that was introduced into the well and/or formation during construction and development; and/or
- temperature, pH, and conductivity, ORP, and DO have stabilized to plus or minus 10 percent (or 0.5 SU for pH) over a minimum of at least three well volumes.

Equipment Decontamination Procedures

To reduce the potential risk of contaminant transfer from areas of contamination to other areas, decontamination of personnel and equipment will be performed. Decontamination will also serve to limit the potential for cross contamination between samples. Field quality assurance measures, such as field blanks and duplicates, will be used to evaluate the effectiveness of the decontamination procedures. The degree of decontamination required will be dependent on the nature of the activity, and on the amount of exposure to contaminants.

A. Decontamination of Sampling Equipment

To reduce the risk of contaminant transfer on and off the Site, all equipment in contact with potentially contaminated media will be decontaminated by Alconox-wash procedures prior to entering or leaving the Site.

To reduce the risk of contaminant transfer within the Site and cross contamination between samples, all equipment (excluding the entire drill rig), and containers will be decontaminated by washing between sampling locations. The drill rig will be decontaminated between borings at different areas of the Site.

B. Decontamination Equipment and Solutions

Decontamination equipment and solutions are generally selected based on ease of decontamination and disposability. Soft-bristle scrub brushes or long-handle brushes are used to remove soil. Water in buckets or garden sprayers are used for rinsing. Large

galvanized wash tubs, stock tanks or wading pools are used to hold wash and rinse solutions. Large plastic garbage cans or other similar containers lined with plastic bags are used to store contaminated clothing. Contaminated liquids are stored temporarily in plastic or metal drums until they can be characterized and disposed of properly.

Personal protective equipment, sampling tools and other equipment are decontaminated after use by scrubbing them with detergent solutions followed by rinses with potable water. Equipment that is heavily contaminated and cannot be effectively decontaminated will be disposed of properly.

C. Decontamination of Monitoring Equipment

Because sensitive monitoring instruments are difficult to decontaminate, care should be exercised to prevent contamination. Sensitive monitoring instruments should be protected when they are at risk of exposure to contaminants. This may include enclosing them in plastic bags allowing an opening for the sample intake. Ventilation ports should not be covered.

D. Disposal of Wash Solutions and Contaminated Equipment

All contaminated wash water will be collected and disposed of properly . Contaminated clothing and spent equipment will likewise be secured in drums or other containers, properly labeled and disposed of.