OHIO ATTY GENERAL
MAR 26 10 56 AM '92
ENVIRONMENTAL ENFORCEMENT

FILED
LORAIN COUNTY
MAR 23 1 48 PM '92
DONALD [illegible] MONTGOMERY
CLERK

COURT OF COMMON PLEAS
LORAIN COUNTY, OHIO

STATE OF OHIO, *ex rel.*, LEE FISHER, ATTORNEY GENERAL OF OHIO	*	CASE NO. 99291-87 JUDGE FLOYD D. HARRIS
Plaintiff	*	
v.	*	
ROSS INCINERATION SERVICES, INC.	*	
Defendant	*	**AMENDED CONSENT DECREE**

*****

On October 17, 1988, the State of Ohio, (hereinafter "Plaintiff") and the Defendant Ross Incineration Services, Inc. (hereinafter "Ross") entered into a consent decree for the settlement and dismissal of this case.

Sometime thereafter, in or around October, 1989, the United States Environmental Protection Agency (hereinafter "U.S. EPA") commenced an administrative enforcement action, Docket No. V-W-89 R-47, before a Regional Hearing Administrator in the U.S. EPA, Region V. In or around February, 1992, the U.S. EPA and Ross entered into a Consent Agreement and Final Order for the purposes of resolving the issues involved in that respective administrative action.

As a result of the Consent Agreement executed between the U.S. EPA and Ross, it is now necessary to amend the Consent Agreement entered into between the Plaintiff and Ross in this Court on October 17, 1988.

IT IS THEREFORE ORDERED, ADJUDGED AND DECREED as follows:

1. Ross has developed a groundwater monitoring program (hereinafter "System") which will include five (5) background wells (MW-2, MW-5, SI-8, MW-16, and MW-17) and

fifteen (15) detection wells (GWP-6, GWP-18, MW-8, MW-11A, MW-11B, MW-13, MW-14B, MW-15, MW-19, MW-20B, MW-21B, MW-22, MW-23B, MW-24A and MW-25A) in both the Berea Aquifer and the till zone of saturation.

2. Monitoring wells SI-8, MW-16 and MW-17 located in the till zone of saturation, together with monitoring wells MW-2 and MW-5 located in the Berea Aquifer, shall be designated background wells. This provision modifies paragraphs 4 and 5 of the original Consent Decree by requiring Ross to designate two (2) additional background or upgradient wells.

3. Twelve (12) wells (GWP-6, GWP-18, MW-8, MW-11B, MW-13, MW-14B, MW-15, MW-19, MW-20B, MW-21B, MW-22 and MW-23B) located in the till zone of saturation will be designated as detection wells. Three (3) wells (MW-11A, MW-24A and MW-25A) shall be designated as detection wells in the Berea Aquifer.

4. The approximate location of all wells will be shown on Exhibit 1 attached hereto and made a part of this Amended Consent Decree.

5. Ross will cease its use of production well MW-7 within thirty (30) days after the date of this Amended Consent Decree.

6. Ross will comply with O.A.C. Rules 3745-65-90 through 3745-65-94, except as follows:

(A) Of the list of groundwater quality parameters in O.A.C. Rule 3745-65-92(B)(2) Ross needs only to sample for chloride, sodium and sulfate. This provision modifies paragraphs 6 and 7 of the original Consent Decree.

(B) Of the list of indicator parameters in O.A.C. Rule 3745-65-92(B)(3), Ross needs only to include the constituents in Appendix IX, 40 CFR, Part 264. This provision modifies paragraphs 6 and 7 of the original Consent Decree.

(C) To comply with O.A.C. Rule 3745-65-92(D)(2), the samples Ross collects to indicate groundwater contamination need only be obtained and analyzed as follows:

- At least annually, for the constituents in Appendix IX, 40 CFR, Part 264; and
- At least semiannually for the inorganic constituents in Appendix IX, 40 CFR, Part 264, except for cyanide and sulfide, and for any constituent(s) of Appendix IX, 40 CFR, Part 264, which was present above the detection limit at the previous annual sampling event.

These provisions modify paragraphs 6 and 7 of the original Consent Decree.

(D) To comply with O.A.C. Rule 3745-65-93(B), Ross needs only to comply with the following:

- For each inorganic parameter sampled pursuant to O.A.C. Rule 3745-65-92(D), as stated above, Ross shall conduct a statistical comparison to the background arithmetic mean using ANOVA, test of proportions or the alternative methods of statistical comparison as specified in Exhibit 2.
- For each organic parameter sampled pursuant to O.A.C. Rule 3745-65-92(D)(2), as stated above, Ross shall conduct a comparison to the practical quantitation limits (PQL's) as specified in Exhibit 3.
- For the groundwater quality parameters sampled pursuant to O.A.C. Rule 3745-65-92(D)(1), Ross need not perform statistical analysis unless deemed appropriate by Ross.

These provisions modify paragraphs 6 and 7 of the original Consent Decree.

(E) To comply with O.A.C. Rule 3745-65-93(C)(1), Ross need only to comply with the following:

- If a comparison for the background wells made under paragraph (B) of this rule show a significant increase of an inorganic parameter or an exceedance of a PQL for an organic parameter, Ross shall submit this information in accordance with paragraph (A)(2)(b) of O.A.C. Rule 3745-65-94.

This provision modifies paragraphs 6 and 7 of the original Consent Decree.

(F) To comply with O.A.C. Rule 3745-65-93(C)(2), Ross need only to comply with the following:

> * If the comparisons for the detection well made under paragraph (B) of this rule show a significant increase of an inorganic parameter or an exceedance of the PQL for an organic parameter, Ross shall then immediately obtain additional ground water samples from those detection wells where a significant increase or exceedance was detected, as specified in Exhibit 1 of the Consent Agreement and Final Order between the U.S. EPA and Ross entered into in March, 1992.

This provision modifies paragraphs 6 and 7 of the original Consent Decree.

(G) To comply with O.A.C. Rule 3745-65-93(D)(1), Ross need only to comply with the following:

> * If the analysis performed under paragraph (C)(2) of this rule confirms the significant increase of an inorganic parameter or an exceedance of a PQL for an organic parameter, Ross shall provide written notice to the Director, within seven (7) days of the date of such confirmation, that the facility may be affecting groundwater quality.

This provision modifies paragraphs 6 and 7 of the original Consent Decree.

7. This Amended Consent Order, amends paragraphs 4, 5, 6 and 7 of the Original Consent Decree. Except as set forth in paragraph 8, Ross shall continue to comply with the Original Consent Decree as modified by this Amended Consent Decree.

8. The Ohio Environmental Protection Agency (hereinafter "Ohio EPA") is currently reviewing Ross' application for renewal of its hazardous waste installation and operation permit ("Ohio Part B Permit"). If Ross is issued an Ohio Part B Permit or any other permit issued by the Director of Ohio EPA or the Hazardous Waste Facility Board, Ross shall comply with the requirements of any such permit. Furthermore, any provisions in the

Amended Consent Decree or the Original Consent Decree which may conflict with or contradict a requirement of Ross' Ohio Part B Permit or any other permit shall be superseded by the permit requirement and shall not relieve Ross from complying with the requirements of the permit.

DATE

Floyd D. Harris

JUDGE FLOYD D. HARRIS

APPROVED:

LEE FISHER
ATTORNEY GENERAL OF OHIO

TIMOTHY J. KERN (No. 0034629)
Assistant Attorney General
Environmental Enforcement
30 East Broad Street, 25th Floor
Columbus, Ohio 43266-0410
Telephone: (614) 466-2766

FOR AND ON BEHALF OF THE OHIO ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF OHIO

RICHARD D. PANZA (No. 0011487)
WICKENS, HERZER & PANZA
A Legal Professional Association
1144 West Erie Avenue
P.O. Box 840
Lorain, Ohio 44052-0840

ATTORNEY FOR DEFENDANT, ROSS INCINERATION SERVICES, INC.

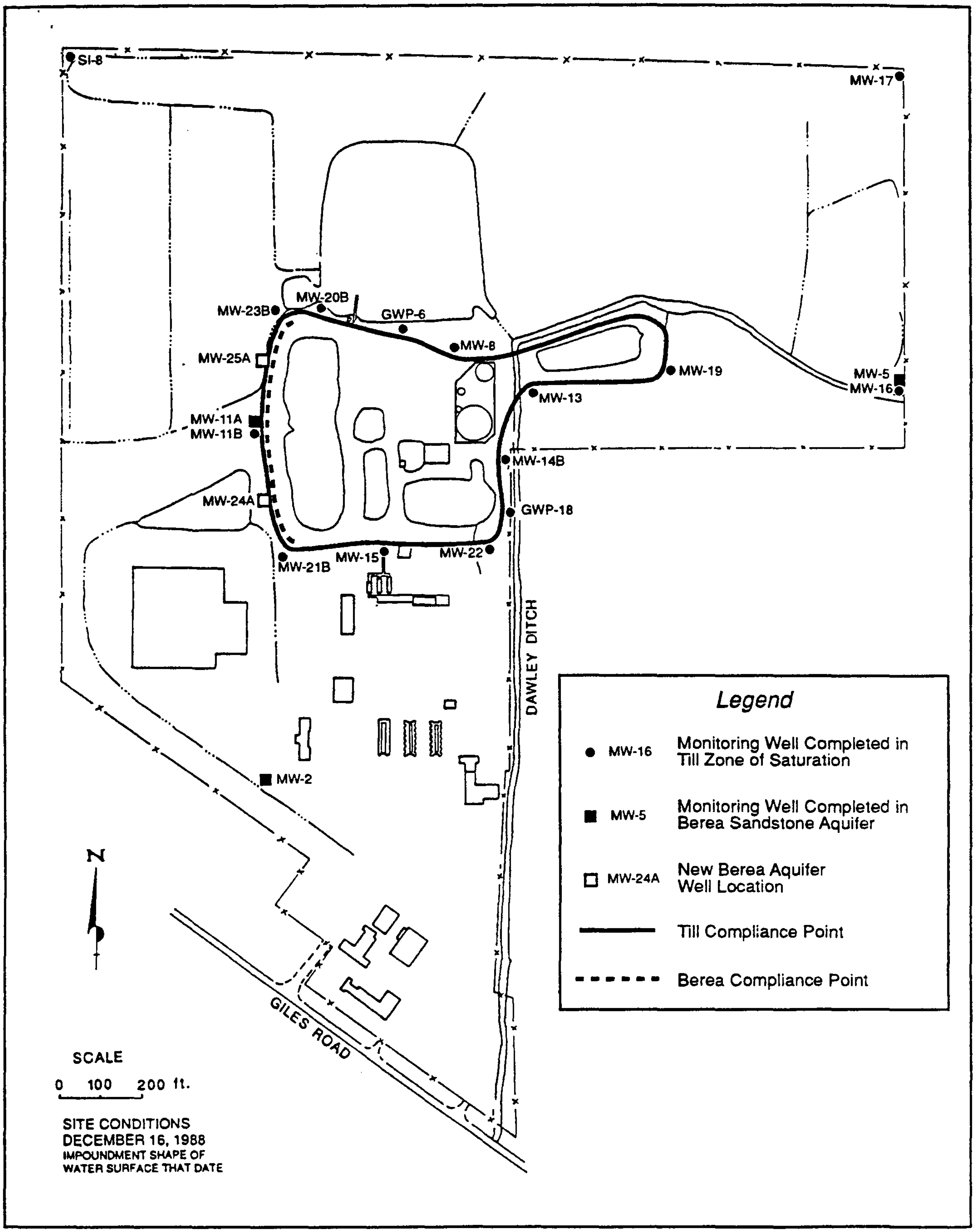

Figure 1-1. Compliance point and monitoring well locations.

Exhibit 2

APPENDIX B

METHODS OF STATISTICAL ANALYSIS FOR INORGANIC DATA

Procedure for Detecting Differences in Concentrations of Cyanide, Sulfide, and the 17 Appendix IX Metals

The attached procedures are to be used for the detection monitoring program. These procedures assume the following:

- There are two water-bearing zones -- a shallow zone (i.e., the till zone of saturation) and a bedrock zone (i.e., the Berea Aquifer) -- that are to be tested separately.
- The till zone is monitored by 3 background wells and 12 detection wells for a total of 15 wells.
- The Berea Aquifer is monitored by 2 background wells and 3 detection wells for a total of 5 wells.
- Each of the wells in the two zones is to be sampled twice each year. Annually, each of the samples is to be analyzed for cyanide, sulfide, and the 17 Appendix IX Metals. Semiannually, each of the samples is to be analyzed for the 17 Appendix IX Metals only.
- A statistical test or alternative comparison method will be conducted twice annually to compare concentrations of each of the analytes between background and detection wells in each of the 2 water-bearing zones. This will involve conducting 38 comparisons (2 water-bearing zones times 19 analytes) after the annual sampling round and 34 comparisons (2 water-bearing zones times 17 analytes) after the semiannual sampling round.
- Each statistical test for an analyte will involve using analytical results from the current sampling of the detection wells and analytical results from all samplings of the background wells. Therefore, the number of detection samples will remain constant while the number of background samples will increase over time (the appropriateness of this procedure will be reevaluated annually).
- The statistical tests of the analytes will involve comparing means (parametric analysis of variance, ANOVA), ranks (nonparametric ANOVA), proportions of results above detection limits (test of proportions), or highest concentrations (alternative method of comparison)

between analyses from background wells and analyses from detection wells.

- The most appropriate comparison method will be selected on the basis of the total number of analyses available and the number of analyses above the detection limit (i.e., the number of "detects").

- For analyses from wells in the till zone of saturation, the method of comparison may involve an analysis of variance (ANOVA), a Mann-Whitney U-test (i.e., a nonparametric ANOVA), a test of proportions, or the alternative method of comparison as specified in the attached procedures.

- For analyses from wells in the Berea Aquifer, the method of comparison may involve a Mann-Whitney U-test, the test of proportions, or the alternative method of comparison as specified in the attached procedure. (Note: because of the small number of samples, the ANOVA procedure is not recommended.)

Procedure for detecting statistical differences in concentrations of Cyanide, Sulfide, and the 17 Appendix IX Metals between background and detection wells in the till zone of saturation.

Complete the following steps for each of the analytes:

1. Recode data reported as below detection limits (i.e., data flagged with a 'U') by one-half the detection limit reported for the analyte.

2. Calculate the current mean $(\overline{X})$ and standard deviation (S) of the background wells and the detection wells using the formulas:

$$\overline{X_D} = \frac{X_{D1} + X_{D2} + \dots + X_{D12}}{12}$$

$$\overline{X_b} = \frac{X_{b1} + X_{b2} + X_{b3}}{3}$$

$$S_D = \sqrt{\frac{\sum_{i=1}^{12} (X_{Di} - \overline{X_D})^2}{11}}$$

$$S_b = \sqrt{\frac{\sum_{j=1}^{3} (X_{bj} - \overline{X_b})^2}{2}}$$

where:

X_{Di} = *The concentration of an analyte in the "i" the detection well where "i" is between 1 and 12.*

$\overline{X_D}$ = *The mean concentration of the concentration of an analyte in the 12 detection wells.*

S_D = *The standard deviation of the concentration of an analyte in the 12 detection wells.*

X_b = *The concentration of an analyte in the "j" the background well where "j" is between 1 and 3.*

$\overline{X_b}$ = *The mean concentration of an analyte in the 3 background wells.*

S_b = *The standard deviation of the concentration of an analyte in the 3 background wells.*

3. Check for outliers in the background wells by comparing each concentration to the value:

$$\overline{X_b} + 3S_b$$

Any value greater than this limit should be evaluated to verify that there were no sampling or analysis errors. If a sampling or analysis error can be identified, the value should be corrected (if possible) or resampled (if practical). Otherwise, the value should be retained. (Note: The purpose of this step (and step 4) is to provide a rapid and simple method for identifying possible outliers. The formulas are based on an informal statistical rule-of-thumb which is in turn based on normal population distributions in which 99% of the members of a population will lie within three standard deviations of the mean. Because the formula is not used as the basis for excluding data (rather, they are used to identify data that should be examined further), this simple approach was deemed more practicable than a more sophisticated statistical methodology. Using a statistical test to exclude outliers without further consideration of possible sampling and analysis perturbations was judged to be scientifically inappropriate. The approach proposed is conservative and well within the bounds of what is considered normal practice in exploratory data analysis.)

4. Check for outliers in the detection wells using the procedure described in Step 3 and the value:

$$\overline{X_D} + 3S_D$$

5. Compare $\overline{X_D}$ to $\overline{X_b}$. If $\overline{X_D}$ is less than or equal to $\overline{X_b}$, conclude that there is no meaningful difference between background wells and detection wells for this analyte. Skip the rest of the steps.

6. Calculate the proportion of the data below the detection limits from the pool of data consisting of: Results from the current sampling of the detection wells; Results from the current sampling of the background wells; Results from all historical samplings of the background wells. Use

this data set for all subsequent steps. If all data from the detection wells are below the detection limits, conclude that there is no difference between the background wells and the detection wells and skip the rest of the steps.

7. Use the following guidance to select a statistical method:

   - Fewer than 15% nondetects and at least 25 samples -- use the parametric ANOVA.

   - Fewer than 50% nondetects and at least 24 samples -- use the Mann-Whitney U-test (nonparametric ANOVA).

   - More than 50% nondetects and at least 5 detects -- use the test of proportions.

   - If none of the statistical tests are appropriate -- use the "alternative method of comparison".

8. If the "alternative method of comparison" is required, compare the concentration in each detection well to the highest concentration reported in a background well (or the highest detection limit reported if all results are below detection limits). If any detection well has a concentration over five times the highest concentration detected in the background wells, conclude that there is a difference between the background and the detection wells. Otherwise, conclude that there is no difference. Skip the rest of the steps.

9. If the test of proportions, was selected, follow the attached procedure for the test. Then skip the rest of the steps.

10. If the Mann-Whitney U-test was selected, follow the attached procedure for the test. Then skip the rest of the steps. (Note: The nonparametric ANOVA procedure specified in U.S. EPA's guidance (i.e., the Kruskal-Wallis test) requires at least three groups (USEPA, 1989, p. 5 - 15). In the proposed procedure, there are only two groups (i.e., the background wells and the detection wells), so the Kruskal-Wallis test is inappropriate. The two-group nonparametric ANOVA alternative to the Kruskal-Wallis test is the Mann-Whitney U-test. This test has been described by many authors including Roscoe (1969, p. 175 - 180) and Hays (1973, p. 778 - 780). This test was at one time proposed by the U.S. EPA as an alternative to the t-test.)

11. If the parametric ANOVA procedure was selected, follow the attached

procedure for the test.

Procedure for detecting statistical differences in concentrations of Cyanide, Sulfide, and the 17 Appendix IX Metals between background and detection wells in the Berea Aquifer.

Complete the following steps for each of the analytes:

1-2. Complete steps 1 and 2 as described for the till zone of saturation, using the formulas:

$$\overline{X_D} = \frac{X_{D1} + X_{D2} + X_{D3}}{3}$$

$$\overline{X_b} = \frac{X_{b1} + X_{b2}}{2}$$

$$S_C = \sqrt{\frac{\sum_{i=1}^{3} (X_{Di} - \overline{X_D})^2 + \sum_{j=1}^{2} (X_{bj} - \overline{X_b})^2}{4}}$$

where:

S_c is the combined standard deviation of the background wells and the detection

3-5. Complete steps 3, 4, and 5 as described for the till zone of saturation, using the formulas:

$$\overline{X_b} + 3S_c$$

$$\overline{X_D} + 3S_c$$

6-7. Complete steps 6 and 7 as described for the till zone of saturation, using the following guidance to select a statistical method:

- Fewer than 50% nondetects and at least 9 samples -- use the Mann-Whitney U-test (nonparametric NOVA).
- More than 50% nondetects and at least 5 detects -- use the test of proportions.
- If neither of the statistical tests are appropriate -- use the alternative method of comparison.

8-10. Complete steps 8, 9, and 10 as described for the till zone of saturation. (Note: the parametric ANOVA is not appropriate for analyzing data from the Berea Aquifer because of the number of samples is not sufficient.)

PROCEDURE FOR THE TEST OF PROPORTIONS

1. Ensure that there are enough samples to conduct the test. The minimum sample size required is given by the larger of the two expressions:

$$n = 5/[(h_D + h_b)/(n_D + n_b)]$$

$$n = 5/[1 - ((h_D + h_b)/(n_D + n_b))]$$

where:

n = *The minimum sample size required by the test.*

n_D = *The number of detection samples.*

n_b = *The number of background samples.*

h_D = *The number of "hits" (i.e., analyses above the detection limit) in the detection samples.*

h_b = *The number of hits in the background samples.*

If there are not enough samples to conduct a test of proportions, the alternative method of comparison should be used.

2. Calculate the standard error of the difference in proportions using the formula:

$$S_p = \sqrt{\Bigg[\frac{(h_D + h_b)}{(n_D + n_b)}\Bigg] 1 - \frac{(h_D + h_b)}{(n_D + n_b)}\Bigg]\Bigg[\frac{1}{n_D} + \frac{1}{n_b}\Bigg]}$$

3. Calculate the test statistic using the formula:

$$p = \frac{\left(\frac{h_D}{n_D} - \frac{h_b}{n_b}\right)}{S_p}$$

(Note: The two terms in the numerator of the formula are reversed compared to the formula that appears in the U.S. EPA's guidance (USEPA, 1989, p. 8 - 4) so that the value of the test statistic (p) will usually be positive. This change will have no bearing on the interpretation of the test because the <u>absolute value</u> of the test statistic is the value that is compared to 1.64 (USEPA, 1989, p. 8 - 5). This modification was made to facilitate programming the procedure.)

4. For a one-sided test at the 95% level, there is a statistically greater proportion of detects in the detection wells than in the background wells whenever **p** is greater than 1.64 (For a one-sided test at the 99% level, **p** must be greater than 2.33). The critical values for this test are based on the normal distribution and will not change with sample size.

5. If a significant difference in the proportion of detects in the detection wells is found, inspect the analytical results from the detection wells to verify their validity. If appropriate, resample the wells.

PROCEDURE FOR THE MANN-WHITNEY U-TEST

1. Rank from highest to lowest all the analytical concentrations from all of the wells and all of the sampling rounds. Note which concentrations are from background (b) wells and from downgradient (D) wells.

2. Sum the rankings for all the background wells (R_b) and for all the downgradient wells (R_D). If two or more concentrations are tied, use the average rank between the concentrations.

3. Calculate U-Statistics using the formulas:

$$U_D = n_D n_b + \frac{n_b(n_b + 1)}{2} - R_b$$

and

$$U_b = n_D n_b + \frac{n_D (n_D + 1)}{2} - R_D$$

4. Let U_C equal the smaller of the U_b and U_D.

5. If the calculated value of $U(U_C)$ is equal to or smaller than the tabulated value of U (U_T), then conclude there is a significant difference between the background wells and the detection wells. Table 1 lists values of U_T for the test. If U_C is greater than U_T, conclude that there is a statistical difference.

6. If a significant difference in the ranks of the analyses from the detection wells is found, inspect the data to verify their validity. If appropriate, resample the wells.

TABLE 1

Tabulated Values of U for the Mann-Whitney U-test

Number of Background Analyses	Tabulated Value of U (i.e., U_T)	
	For the Till Zone of Saturation (12 Detection Wells)	For the Berea Aquifer (3 Detection Wells)
6	-	2
7	-	2
8	-	3
9	-	4
10	-	4
11	-	5
12	42	5
13	47	6
14	51	7
15	55	7
16	60	8
17	64	9
18	68	9
19	72	10
20	77	11
21	81	11
22	85	12
23	90	13
24	94	13
25	98	14
26	103	15
27	107	15
28	111	16

TABLE 1

Tabulated Values of U for the Mann-Whitney U-test

Number of Background Analyses	Tabulated Value of U (i.e., U_T)	
	For the Till Zone of Saturation (12 Detection Wells)	For the Berea Aquifer (3 Detection Wells)
29	116	17
30	120	17
31	124	18
32	128	19
33	133	19
34	137	20
35	141	21
36	146	21
37	150	22
38	154	23
39	159	23
40	163	24

PROCEDURE FOR THE ANALYSIS OF VARIANCE

1. Calculate the mean of the analyte concentrations in the detection wells using the formula:

$$\overline{X_D} = \frac{\sum_{W=1}^{n_D} X_{Dw}}{n_D}$$

where:

$\overline{X_D}$ = *The mean of the analyte concentrations in the detection wells.*

n_D = *The number of detection wells sampled* (*i.e.* 12 *in the till zone of saturation*).

2. Calculate the mean of the analyte concentrations in the background wells using the formula:

$$\overline{X_b} = \frac{\sum_{r=1}^{n_r} \sum_{w=1}^{n_b} X_{brw}}{\sum_{r=1}^{n_r} n_{br}}$$

where:

$\overline{X_b}$ = ***The mean of the analyte concentrations in the background wells.***

n_b = ***The number of background wells sampled*** (*i.e.*, 3 ***in the till*** zc

n_{br} = ***The number of background wells sampled during sampling round "r".***

X_{brw} = ***The analyte concentration in background well "w" during sampling round "r".***

3. Calculate the residuals (errors) for each analysis from well detection "w" using the formula:

$$X_{eDw} = X_{Dw} - \overline{X_D}$$

4. Calculate the residuals (errors) for each analysis from background well "w" during sampling round "r" using the formula:

$$X_{ebwr} = X_{brw} - \overline{X_b}$$

5. Calculate the mean of the residuals using the formula:

$$\overline{X}_e = \frac{\left[\sum_{r=1}^{n_r} \sum_{w=1}^{n_b} X_{ebrw}\right] + \left[\sum_{w=1}^{n_D} X_{eDw}\right]}{n_D + \sum_{r=1}^{n_r} n_{br}}$$

6. Calculate the standard deviations of the residuals using the formulas:

$$S_{eb} = \sqrt{\frac{\sum_{r=1}^{n_r} \sum_{w=1}^{n_b} (X_{ebrw} - \overline{X}_e)^2}{\left[\sum_{r=1}^{n_r} n_{br}\right] -1}}$$

$$S_{eD} = \sqrt{\frac{\sum_{w=1}^{n_D} (X_{eDw} - \overline{X}_e)^2}{n_D \ -1}}$$

7. If $\overline{X}_e$ is not approximately equal to zero or if S_{eb} and S_{eD} are not approximately equal (i.e., different by a factor of more than 5), take the natural logarithms of all the analytical concentrations (from all wells and all sampling rounds), and repeat steps 1 through 7. If the logarithms also fail this step, use the Mann-Whitney U-test instead of ANOVA.

8. Calculate the total sum of squares using the formula:

$$SS_T = \left[\left[\sum_{r=1}^{n_r}\sum_{w=1}^{n_b} X_{brw}^2\right] + \sum_{w=1}^{n_D} X_{Dw}^2\right] - \left[\frac{\left[\left[\sum_{r=1}^{n_r}\sum_{w=1}^{n_b} X_{brw}\right] + \sum_{w=1}^{n_D} X_{Dw}\right]^2}{\sum_{r=1}^{n_r}(n_{br}) + n_D}\right]$$

9. Calculate the error sum of squares using the formula:

$$SS_E = \left[\left[\sum_{r=1}^{n_r}\sum_{w=1}^{n_b} X_{brw}^2\right] + \sum_{w=1}^{n_D} X_{Dw}^2\right] - \left[\left[\sum_{r=1}^{n_r}\left[\frac{(\sum_{w=1}^{n_b} X_{brw})^2}{n_{br}}\right]\right] + \left[\frac{(\sum_{w=1}^{n_D} X_{Dw})^2}{n_D}\right]\right]$$

10. Calculate the facility impact sum of squares (and mean square) using the formula:

$$SS_F = SS_T - SS_E$$

(Note: The mean square for the facility impact is equal to the sum of the squares for the facility impact, because there is only one degree of freedom for the facility impact term.)

11. Calculate the mean square error using the formula:

$$MS_E = \frac{SS_E}{\left[\left[\sum_{r=1}^{n_r} n_{br})\right] + n_D - 2\right]}$$

12. Calculate the F - statistic using the formula:

$$F = SS_F / MS_E$$

13. If the calculated F statistic is greater than the tabulated F statistic, conclude that there is a significant difference between the background and the detection wells. Table 2 lists values of the F-statistic. The F-statistic will have 1 and (n_t - 2) degrees of freedom where:

$$n_t = \left[\sum_{r=1}^{n_r} n_{br}\right] + n_D$$

Thus, for 12 detection wells and 3 background wells, the value of $F_{(1,13)}$ at the 95% level would be 4.67. If the calculated F-statistic is less than the tabulated F-statistic, conclude that there is no significant difference between the two sets of wells and skip the rest of the steps. If the calculated F-statistic is greater than the tabulated F-statistic, conclude that there is a statistically significant difference and proceed to the step 14.

14. Compute Bonferroni's Critical Limit (B) using the formula:

$$B = \overline{X_b} + t_B \sqrt{MS_E\left({}^1/n_b + {}^1/n_D\right)}$$

where:

MS_E is the mean square error (calculated in step 11).

$\overline{X_b}$ is the mean of all the background analyses (calculated in step 2).

n_b is the number of background analyses.

n_D is the number of detection analyses (i.e., 12).

t_B is Bonferroni's t-value listed in Table 2.

15. Compare each analysis from a detection well to B. Any analysis greater than B should be considered statistically greater than background. Inspect these differences to verify their validity. If appropriate, resample the wells.

TABLE 2

Tabulated Values of the F-Statistic and Bonferroni's t-statistic for the Analysis of Varience (95% Confidence Level, Two-tailed Tests)

Number of Background Analyses	Total Number of Analyses (n_t)	Tabulated F-Statistic (df = 1, n_t - 2)	Bonferroni's t-statistic (df = 10, n_t - 12)
3	15	4.67	-
6	18	4.49	4.40
9	21	4.38	3.73
12	24	4.32	3.43
15	27	4.24	3.29
18	30	4.20	3.21
21	33	4.16	3.13
24	36	4.13	3.09
27	39	4.11	3.06
30	42	4.08	3.03
33	45	4.07	3.01
36	48	4.05	2.99
39	51	4.04	2.98
42	54	4.03	2.96
45	57	4.02	2.94
48	60	4.01	2.92

EXHIBIT 3

TABLE 1-1. SUMMARY OF TARGET PQL's FOR ORGANIC APPENDIX IX CONSTITUENTS

COMPOUND	CAS RN	TARGET[1] PQL (ug/l)
Acenaphthene	83-32-9	10
Acenapthylene	208-96-8	10
Acetone	67-64-1	50
Acetophenone	98-86-2	10
Acetonitrile: Methyl Cyanide	75-05-8	50
2-Acetylaminofluorene; 2 AAF	53-96-3	30
Acrolein	107-02-8	20
Acrylonitrile	107-13-1	10
Aldrin	309-00-2	10
Allyl Chloride	107-05-1	5
4-Aminobiphenyl	92-67-1	20
Aniline	62-53-3	10
Anthracene	120-12-7	10
Aramite	140-57-8	20
Benzene	71-43-2	5
Benzo[a]anthracene; Benzanthracene	56-55-3	10
Benzo[b]fluoranthene	205-99-2	10
Benzo[k]fluoranthene	207-08-9	10
Benzo[ghi]perylene	191-24-2	10
Benzo[a]pyrene	50-32-8	10
Benzyl alcohol	100-51-6	20
alpha BHC	319-84-6	10
beta BHC	319-85-7	40
delta BHC	319-86-8	30
gamma BHC; Lindane	58-89-9	10
Bis(2-chloroethoxy)methane	111-91-1	10
Bis(2-chloroethyl)ether	111-44-4	10
Bis(2-chloroisopropyl)ether; Bis(2-chloro-1-methylethyl) ether; 2,2'-Di-chlorodiisopropyl ether	108-60-1	10
Bis(2-ethylhexyl)phthalate	117-81-7	10
Bromodichloromethane	75-27-4	5
Bromoform; Tribromomethane	75-25-2	5
4-Bromophenyl phenyl ether	101-55-3	10
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	20
Carbon Disulfide	75-15-0	5
Carbon Tetrachloride	56-23-5	5
Chlordane	57-74-9	10
4-Chloroanaline; p-Chloroaniline	106-47-8	20
Chlorobenzene	108-90-7	5
Chlorobenzilate	510-15-6	30
p-Chloro-m-cresol	59-50-7	10
Chloroethane; Ethyl chloride	75-00-3	10
Chloroform	67-66-3	5
2-Chloronaphthalene	91-58-7	10

TABLE 1-1. (CONTINUED)

COMPOUND	CAS RN	TARGET PQL[1] (ug/l)
2-Chlorophenol	95-57-8	10
4-Chlorophenyl phenyl ether	7005-72-3	10
Chloroprene	126-99-8	5
Chrysene	218-01-9	10
m-Cresol (coelutes with p-Cresol)	106-39-4	10
o-Cresol	95-48-7	10
p-Cresol (coelutes with m-Cresol)	106-44-5	10
4,4'- DDD	72-54-8	10
4,4'-DDE	72-55-9	10
4,4'-DDT	50-29-3	10
Diallate	2303-16-4	10
Dibenz[a,h]anthracene	53-70-3	10
Dibenzofuran	132-64-9	10
Dibromochloromethane; Chlorodibromomethane	124-48-1	5
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	10
1,2-Dibromoethane; Ethylene dibromide	106-93-4	5
Di-n-butyl phthalate	84-74-2	10
1,2-Dichlorobenzene; o-Dichlorobenzene	95-50-1	10
1,3-Dichlorobenzene; m-Dichlorobenzene	541-73-1	10
1,4-Dichlorobenzene; p-Dichlorobenzene	106-46-7	15
3,3'-Dichlorobenzidine	91-94-1	25
trans-1,4-Dichloro-2-butene	110-57-6	5
Dichlorodifluoromethane	75-71-8	10
1,1-Dichloroethane	75-34-3	5
1,2-Dichloroethane; Ethylene Dichloride;	107-06-2	5
1,1-Dichloroethylene Vinylidene chloride	75-35-4	5
trans-1,2-Dichloroethylene	156-60-5	5
2,4-Dichlorophenol	120-83-2	10
2,6-Dichlorophenol	87-65-0	10
1,2-Dichloropropane	78-87-5	5
cis-1,3-Dichloropropene	10061-01-5	5
trans-1,3-Dichloropropene	10061-02-6	5
Dieldrin	60-57-1	10
Diethyl phthalate	84-66-2	10
Thionazin; O,O Diethyl	297-97-2	10

TABLE 1-1. (CONTINUED)

COMPOUND	CAS RN	TARGET[1] PQL (ug/l)
O-2-pyrazinyl phosphorothioate;		
Dimethoate	60-51-5	10
p-(Dimethylamino)azobenzene[2]	60-11-7	20
7,12-Dimethylbenz[a] anthracene	57-97-6	20
3,3' Dimethylbenzidine	119-93-7	10
a,a-Dimethylphenethylamine; alpha, alpha-Dimethyl-phenethylamine	122-09-8	(3)
2,4-Dimethylphenol	105-67-9	20
Dimethyl phthalate	131-11-3	10
1,3-Dinitrobenzene; m-Dinitrobenzene	99-65-0	50
4,6-Dinitro-o-cresol	534-52-1	50
2,4-Dinitrophenol	51-28-5	50
2,4-Dinitrotoluene	121-14-2	10
2,6-Dinitrotoluene	606-20-2	10
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	88-85-7	20
Di-n-octyl phthalate	117-84-0	10
1,4-Dioxane	123-91-1	100
Diphenylamine	122-39-4	10
Disulfoton	298-04-4	10
Endosulfan I	959-98-8	10
Endosulfan II	33213-65-9	0.05
Endosulfan sulfate	1031-07-8	10
Endrin	72-20-8	10
Endrin aldehyde	7421-93-4	10
Ethylbenzene	100-41-4	5
Ethyl methacrylate	97-83-2	5
Ethyl methanesulfonate	62-50-0	10
Famphur	52-85-7	10
Fluoranthene	206-44-0	10
Fluorene	86-73-7	10
Heptachlor	76-44-8	10
Heptachlor epoxide	1024-57-3	10
Hexachlorobenzene	118-74-1	10
Hexachlorobutadiene	87-68-3	10
Hexachlorocyclopentadiene	77-47-4	(3)
Hexachloroethane	67-72-1	10
Hexachlorophene	70-30-4	(3)
Hexachloropropene	1888-71-7	50
2-Hexanone	591-78-6	50
Indeno(1,2,3-cd)pyrene	193-39-5	10
Isobutyl alcohol[2]	78-83-1	1600
Isodrin	465-73-6	10
Isophorone	78-59-1	10

TABLE 1-1. (CONTINUED)

COMMON NAME	CAS RN	TARGET PQL (ug/l)[1]
Isosafrole	120-58-1	10
Kepone	143-50-0	10
Methacrylonitrile	126-98-7	20
Methapyrilene[2]	91-80-5	100
Methoxychlor	72-43-5	10
Methyl bromide; Bromomethane	74-83-9	10
Methyl chloride; Chloromethane	74-87-3	10
3-Methylcholanthrene	56-49-5	10
Methylene bromide; Dibromomethane	74-95-3	5
Methylene chloride; Dichloromethane	75-09-2	5
Methyl ethyl ketone; MEK	78-93-3	10
Methyl iodide; Iodomethane	74-88-4	10
Methyl methacrylate	80-62-6	5
Methyl methanesulfonate	66-27-3	10
2-Methylnapthalene	91-57-6	10
Methyl parathion; Parathion methyl	298-00-0	10
4-Methyl-2-pentanone; Methyl isobutyl ketone	108-10-1	50
Naphthalene	91-20-3	10
1,4 Naphthoquinone[2]	130-15-4	200
1-Naphthylamine	134-32-7	10
2-Naphthylamine[2]	91-59-8	20
2-Nitroaniline; o-Nitroaniline	88-74-4	50
3-Nitroaniline; m-Nitroaniline	99-09-2	50
4-Nitroaniline; p-Nitroaniline	100-01-6	50
Nitrobenzene	98-95-3	10
2-Nitrophenol; o-Nitrophenol	88-75-5	10
4-Nitrophenol; p-Nitrophenol	100-02-7	50
4-Nitroquinoline 1-oxide	56-57-5	20
N-Nitrosodi-n-butylamine	924-16-3	10
N-Nitrosodiethylamine	55-18-5	10
N-Nitrosodimethylamine	62-75-9	20
N-Nitrosodiphenylamine[4]	86-30-6	10
N-Nitrosodi-n-propylamine; N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	10
N-Nitrosomethylethylamine	10595-95-6	20
N-Nitrosomorpholine	59-89-2	10
N-Nitrosopiperidine	100-75-4	10
N-Nitrosopyrrolidine	930-55-2	10

TABLE 1-1. (CONTINUED)

COMPOUND	CAS RN	TARGET PQL (ug/l) [1]
5-Nitro-o-toluidine	99-55-8	10
Parathion	56-38-2	10
Polychlorinated biphenyls; PCBs, total	See Note 5	1
Pentachlorobenzene	608-93-5	10
Pentachloroethane [2]	76-01-7	200
Pentachloronitrobenzene	82-68-8	10
Pentachlorophenol	87-86-5	50
Phenacetin	62-44-2	20
Phenanthrene	85-01-8	10
Phenol	108-95-2	10
p-Phenylenediamine	106-50-3	(3)
Phorate	298-02-2	10
2-Picoline	109-06-8	10
Pronamide [2]	23950-5-5	20
Propionitrile; Ethyl cyanide	107-12-0	20
Pyrene	129-00-0	10
Pyridine	110-86-1	50
Safrole	94-59-7	10
Silvex; 2,4,5-TP	93-72-1	2
Styrene	100-42-5	5
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	2
2,3,7,8-TCDD; 2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	0.001
Tetrachlorodibenzo-p-dioxins, total	See Note 6	0.001
Pentachlorodibenzo-p-dioxins, total	See Note 6	0.0015
Hexachlorodibenzo-p-dioxins, total	See Note 6	0.0018
Tetrachlorodibenzofurans, total	See Note 6	0.0008
Pentachlorodibenzofurans, total	See Note 6	0.0012
Hexachlorodibenzofurans, total	See Note 6	0.0016
1,2,4,5 Tetrachlorobenzene	95-94-3	20
1,1,1,2 Tetrachloroethane	630-20-6	5
1,1,2,2 Tetrachloroethane	79-34-5	5
Tetrachloroethylene; Perchloroethylene; Tetrachloroethene	127-18-4	5
2,3,4,6-Tetrachlorophenol [2]	58-90-2	50
Tetraethyl dithiopyrophosphate; Sulfotepp	3689-24-5	10
Toluene	106-88-3	5
o-Toluidine	95-53-4	10
Toxaphene	8001-35-2	10

TABLE 1-1. (CONTINUED)

COMPOUND	CAS RN	TARGET PQL (ug/l) [1]
1,2,4-Trichlorobenzene	120-82-1	10
1,1,1-Trichloroethane; methylchloroform	71-55-6	5
1,1,2-Trichloroethane	79-00-5	5
Trichloroethylene; Trichloroethene	79-01-6	5
Trichlorfluoromethane	75-69-4	5
2,4,5-Trichlorophenol	95-95-4	20
2,4,6-Trichlorophenol	88-06-2	10
1,2,3-Trichloropropane	96-18-4	5
0,0,0-Trienthyl phosphorothioate	126-68-1	10
1,3,5-Trinitrobenzene; sym-Trinitrobenzene [2]	99-35-4	50
Vinyl acetate	108-05-4	50
Vinyl Chloride	75-01-4	10
Xylenes (total)	1330-20-7	5

[1] The PQL's listed are the lowest concentrations of analytes that can be reliably determined within specified limits of precision and accuracy by the indicated methods in an essentially uncontaminated groundwater matrix under routine laboratory operating conditions and using the current laboratory contractor. The current laboratory evaluates PQL's contractor every six months and will make every effort to maintain the PQL's listed above unless the experimental results of the periodic PQL studies dictate otherwise. Ohio EPA will be notified immediately if any of the PQL's change as a result of these studies or if the use of a different laboratory contractor is necessary. The Ohio EPA notification of a PQL change will also include sufficient justification by the laboratory for the PQL change. PQL's listed for the common laboratory contaminents shall be used in conjunction with the procedure described in Section 1.4.2.

[2] The PQL shown for this specific chemical may be lowered after further evaluation of the PQL relative to instrument sensitivity using the specific method.

[3] These compounds are unstable in the standards or are not recovered from samples.

TABLE 1-1. (CONTINUED)

4 Reported as diphenylamine. N-Nitrosodiphenylamine decomposes in the gas chromotographic inlet and cannot be separated from diphenylamine.

5 Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor-1016 (CAS RN 12674-11-2), Aroclor-1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), and Aroclor-1260 (CAS RN 11096-82-5).

6 This category contains isomer chemicals. The PQL shown is an average value for the isomers.