Environmental Protection Agency

\[ \bar{X} = \frac{X_1 + X_2 \cdots + X_n}{n} \]

and the variance is calculated by:

\[ s^2 = \frac{(X_1 - \bar{X})^2 + (X_2 - \bar{X})^2 \cdots + (X_n - \bar{X})^2}{n-1} \]

where “n” denotes the number of observations in the set of data.

The t-test uses these data summary measures to calculate a t-statistic (t*) and a comparison t-statistic (tc). The t* value is compared to the tc value and a conclusion reached as to whether there has been a statistically significant change in any indicator parameter.

The t-statistic for all parameters except pH and similar monitoring parameters is:

\[ t = \frac{X_m - \bar{X}_s}{\sqrt{\frac{s_m^2}{n_m} + \frac{s_b^2}{n_b}}} \]

If the value of this t-statistic is negative then there is no significant difference between the monitoring data and background data. It should be noted that significantly small negative values may be indicative of a failure of the assumption made for test validity or errors have been made in collecting the background data.

The t-statistic (tc), against which t* will be compared, necessitates finding tc and tmc from standard (one-tailed) tables where, tmc=t-tables with (nmc−1) degrees of freedom, at the 0.05 level of significance.

Finally, the special weightings Wb and Wm are defined as:

\[ W_B = \frac{s_b^2}{n_b} \quad \text{and} \quad W_m = \frac{s_m^2}{n_m} \]

and so the comparison t-statistic is:

\[ t_c = \frac{W_b t_b + W_m t_m}{W_b + W_m} \]

The t-statistic (t*) is now compared with the comparison t-statistic (tc) using the following decision-rule:

If t* is equal to or larger than tc, then conclude that there most likely has been a significant increase in this specific parameter.

If t* is less than tc, then conclude that most likely there has not been a change in this specific parameter.

The t-statistic for testing pH and similar monitoring parameters is constructed in the same manner as previously described except the negative sign (if any) is discarded and the caveat concerning the negative value is ignored. The standard (two-tailed) tables are used in the construction tc for pH and similar monitoring parameters.

If t* is equal to or larger than tc, then conclude that there most likely has been a significant increase (if the initial t* had been negative, this would imply a significant decrease). If t* is less than tc, then conclude that there most likely has been no change.


**Standard t—Tables 0.05 Level of Significance**

<table>
<thead>
<tr>
<th>Degrees of freedom</th>
<th>t-values (one-tail)</th>
<th>t-values (two-tail)</th>
</tr>
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</table>

Adopted from Table III of “Statistical Tables for Biological, Agricultural, and Medical Research” (1947, R. A. Fisher and F. Yates).

[47 FR 32367, July 26, 1982]

**Appendix V to Part 264—Examples of Potentially Incompatible Waste**

Many hazardous wastes, when mixed with other waste or materials at a hazardous waste facility, can produce effects which are harmful to human health and the environment, such as (1) heat or pressure, (2) fire or explosion, (3) violent reaction, (4) toxic dusts, mists, fumes, or gases, or (5) flammable fumes or gases.
Below are examples of potentially incompatible wastes, waste components, and materials, along with the harmful consequences which result from mixing materials in one group with materials in another group. The list is intended as a guide to owners or operators of treatment, storage, and disposal facilities, and to enforcement and permit granting officials, to indicate the need for special precautions when managing these potentially incompatible waste materials or components. This list is not intended to be exhaustive. An owner or operator must, as the regulations require, adequately analyze his wastes so that he can avoid creating uncontrolled substances or reactions of the type listed below, whether they are listed below or not. It is possible for potentially incompatible wastes to be mixed in a way that precludes a reaction (e.g., adding acid to water rather than water to acid) or that neutralizes them (e.g., a strong acid mixed with a strong base), or that controls substances produced (e.g., by generating flammable gases in a closed tank equipped so that ignition cannot occur, and burning the gases in an incinerator).

In the lists below, the mixing of a Group A material with a Group B material may have the potential consequence as noted.

**GROUP 1–A**

- Acetylene sludge
- Alkaline caustic liquids
- Alkaline cleaner
- Alkaline corrosive liquids
- Alkaline corrosive battery fluid
- Caustic wastewater
- Lime sludge and other corrosive alkalies
- Lime wastewater
- Lime and water
- Spent caustic

**GROUP 1–B**

- Acid sludge
- Acid and water
- Battery acid
- Chemical cleaners
- Electrolyte, acid
- Etching acid liquid or solvent
- Pickling liquor and other corrosive acids
- Spent acid
- Spent mixed acid
- Spent sulfuric acid

Potential consequences: Heat generation; violent reaction.

**GROUP 2–A**

- Zinc powder
- Other reactive metals and metal hydrides

**GROUP 2–B**

- Any waste in Group 1–A or 1–B

Potential consequences: Fire or explosion; generation of flammable hydrogen gas.

**GROUP 3–A**

- Alcohols
- Water

**GROUP 3–B**

- Any waste in Group 1–A or 1–B

Potential consequences: Fire or explosion; generation of flammable or toxic gases.

**GROUP 4–A**

- Concentrated Group 1–A or 1–B wastes
- Group 2–A wastes

Potential consequences: Fire, explosion, or violent reaction.

**GROUP 4–B**

- Acetic acid and other organic acids
- Chlorates
- Chlorine
- Chlorites
- Chromic acid
- Hypochlorites
- Nitric acid, fuming
- Perchlorates
- Permanganates
- Peroxides
- Other strong oxidizers

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

**GROUP 5–A**

- Spent cyanide and sulfide solutions
- Other water-reactive waste

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases.

**GROUP 5–B**

- Spent cyanide and sulfide solutions

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.
These include counties, city-county consolidations, and independent cities. In the case of Alaska, the political jurisdictions are election districts, and, in the case of Hawaii, the political jurisdiction listed is the island of Hawaii.