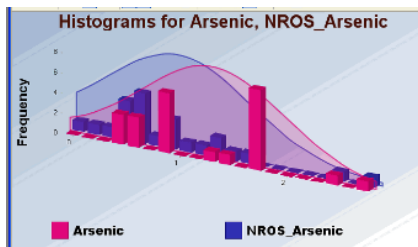


## ProUCL: Statistical Support Software for Site Investigation and Evaluation

### Background

ProUCL is a comprehensive statistical software package initially developed by EPA for computing statistical intervals to respond to concerns at a specific Superfund site. With significant interest, use, and user feedback on the software from the remediation community, EPA has updated the software adding new tools and statistical methods.

EPA regions, states, contractors, and other stakeholders use ProUCL to establish background levels, determine outliers in data sets, and compare background and site sample data sets for site evaluation and risk assessment.



### Function

ProUCL provides numerous and varied statistical methods and graphical tools to address many environmental sampling and statistical issues. It can be run on environmental data sets with and without nondetect (ND) data samples. Calculating upper statistical limits is a primary function of the software and the graphical analyses offered includes probability plots, histograms, box plots, and line/trend plots. Results for statistical intervals are offered with several options and relevant cautions. Other available tests that may apply to groundwater

monitoring include single and two-sample hypotheses tests, ANOVA, regression, trend evaluation, outlier, and goodness-of-fit tests.

### Ease of Use

ProUCL requires no formal background in statistics, but some statistical training is helpful to understand the assumptions and input requirements for statistical tests used in decision making. Input data sets are straightforward, requiring columns of detected values for contaminants and if each value is a detect or a nondetect at the quantitation limit. The user can also add variables to provide grouping data, regression variables, or sample dates. Desired statistical tests can be selected from drop-down menus, and relevant options from subsequent menus. Results from within the program may be exported to an Excel spreadsheet and graphs can be inserted in documents. Data can be evaluated for fit to normal, lognormal, or gamma distributions. Outputs include recommendations, cautions, and cited references.

### User Support and Training

The EPA Site Characterization and Monitoring Technical Support Center (SCMTSC) provides user support for ProUCL when possible. This may include developing or reviewing statistical sampling plans or background/risk numbers for EPA Superfund project managers or technical staff. SCMTSC also provides short term technical support to both internal and external users. The SCMTSC Annual Report documents this support and can provide a snapshot of ProUCL use.

The SCMTSC developed and presented webinar training classes

ProUCL version 5.1.00 (May 2016) is the most recent update. Users can download the software free of charge from the USEPA Regional Science Program (RSP) webpage

<https://www.epa.gov/land-research/proucl-software>

through CLU-IN on the use of ProUCL. These courses can be viewed at:

[http://www.clu-in.org/conf/tio/ProUCLBasic\\_030911/](http://www.clu-in.org/conf/tio/ProUCLBasic_030911/) and [http://www.clu-in.org/conf/tio/ProUCLAdv\\_031611/](http://www.clu-in.org/conf/tio/ProUCLAdv_031611/)

Additional training will be considered and announced dependent on budget considerations.

### ProUCL 5.1 Modifications

SCMTSC updated ProUCL to version 5.1 in May of 2016. ProUCL now includes:

- Windows 8 compatibility
- Updated guidance and support documents
- UCLs/EPCs and Upper Limits/BTVs modules enhancements
- an upper simultaneous limit (USL) statistic

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