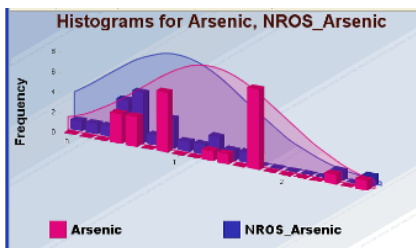# ProUCL Statistical Support Software for Site Investigation and Evaluation

Background

ProUCL is a comprehensive statistical software package initially developed by EPA for computing confidence, prediction, and tolerance intervals and upper limits 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 by adding new tools and statistical methods.

EPA Regions, States, contractors, and other stakeholders use ProUCL to establish background levels and exposure point concentrations, determine outliers in data sets, and compare background and site sample data sets for site evaluation and risk assessment.

ProUCL histogram graphical example

Function

ProUCL provides numerous statistical methods and graphical tools to address many environmental sampling issues. ProUCLcan be run on environmental data sets with or without nondetect (ND) data. Calculating upper statistical limits is a primary function of the software. The graphical analyses offered includes probability plots, histograms (see example graphic), box plots, and line/trend plots. Results for statistical intervals are offered with several options and relevant cautions. Other available tests include one- 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 or consultation with a statistician is helpful to understand and properly assess the assumptions and input requirements for statistical tests used in decision making. Input data sets require columns of detected values for contaminants and whether each value is a detect or ND at the quantitation limit. The user can also add variables for grouping data, regression, or sample dates for time series analysis. Statistical tests can be selected from drop-down menus, and relevant options from subsequent menus. Results may be exported to Excel spreadsheets and graphs generated can be inserted in documents. Data can be evaluated for fit to normal, lognormal, or gamma distributions. Output includes 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 support 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. SCMTSC has developed and presented webinar

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ProUCL version 5.2.00 (June 2022) is the most recent update. Users can download the software free of charge from the USEPA webpage:
https://www.epa.gov/land-research/proucl-software

training classes 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/ProUCLAdv_031611/
https://clu-in.org/conf/tio/ProUCLAtoZ1_012720/
https://clu-in.org/conf/tio/ProUCLAtoZ2_021020/
and
https://clu-in.org/conf/tio/ProUCLAtoZ3_030920/

ProUCL 5.2 Modifications

SCMTSC updated ProUCL to version 5.2 in June of 2022. ProUCL now includes:

- Updated guidance and support documents
- Changes to UCL recommendations to achieve an accurate estimate of the mean in addition to achieving adequate coverage

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