Data-Entry Verification

1. SCOPE AND APPLICATION

1.1 All data of any type that is entered by staff into a computer or transcribed from one place to another for the Laboratory Information Management System (LIMS), Statewide Biological Database (SBIO), report writing, or similar uses must undergo entry verification. Data collected electronically do not need verification, except any parts entered "by hand".

1.2 Experience has shown that even the best effort by single conscientious staff to verify data entry will result in data entry errors making their way into the computer file. Repeating this single-person verification with a different person will improve the accuracy but will still result in errors in the file.

1.3 Properly performed, the two-person verification described here should result in error-free data files.

2. SUMMARY OF METHOD

2.1 A person who **did not** enter the data reads the data from the original data source (spreadsheet, bench sheet, etc.).

2.2 A second person follows along in the data repository (database, report, spreadsheet, etc.) and checks for errors as the data is read.

2.3 Any errors in data entry are corrected in the data repository. Any errors in the original data source are corrected by marking through with one line in black ink, initialing, dating, and including a comment if necessary.

3. APPARATUS AND EQUIPMENT

3.1 Bench sheets or data sheets from which data were entered into computer.

3.2 Printout of data from computer or same data displayed on computer screen.

3.3 Computer with SBIO or LIMS programing.

4. PROCEDURE

4.1 Person A reads the data aloud from the bench sheet or data sheet from which it was entered.

4.1.1 Person A must **not** be the same one who entered the data. This is to help detect misinterpretations of entries on the raw-data sheet because of poor handwriting. Two different people are less likely to misread an entry the same way.

4.1.2 There are two reasons not to read from the printout. Reading aloud from the printout is less likely to catch data that may not have been entered during the data entry, and less likely to catch anything that may have been misinterpreted during data entry.

4.1.3 The data can be read very rapidly during verification, as any taxonomic mispronunciations or unclear reading of values will result in a "false" error. While incorrect pronunciation or reading may slow verification and may be common if using someone not familiar with the data, it creates apparent errors that are quickly realized to be correct. It should not, however, cause

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actual errors to be missed so, in the absence of someone with expertise, other staff can participate in verification, albeit at the cost of speed.

4.2 Person B follows along on the computer data printout or computer screen with what is being read by Person A.

4.2.1 Person B can be the one who entered the data or other competent staff as needed.

4.2.2 It is often useful for both people to hold a piece of paper, ruler, or other straight-edge under the line being read. Some highlight data as it is verified. These and similar techniques help keep one from losing one's place. Lines were added to the data screen in SBIO so that names and counts are easier to follow if verifying from the screen.

4.3 Verify sample information and everything that was entered or transcribed. This includes analyst names, dates, sample location, STORET number, analysis results, data qualifiers, etc.

Note: For taxonomy data, check that the number of individuals in SBIO matches the number of individuals written on the bench sheet by the taxonomist. For invertebrate samples, also check that the number of taxa generated from SBIO matches the number of taxa (for SCI data, the number of taxa in Rep 2 should match) in LIMS. For Hester-Dendy data, the number of taxa must be counted on each bench sheet since SBIO generates the number of taxa for the replicates combined. Resolve any discrepancies and make necessary corrections following step 4.5 (e.g. taxa number in LIMS).

Note: For quantitative phytoplankton samples, the total number of taxa will be number of wet taxa plus 1 more for Bacillariophyta as written on the bench sheet. Bacillariophyta is entered as part of the taxon list for wet algae in SBIO. Check that the number of diatom frustules is entered as the number of units and number of cells for Bacillariophyta. (While the Bacillariophyceae are not incorporated into the total wet taxa number on the bench sheet, they are taken into account when entered into LIMS and SBIO.)

Note: For SBIO qualitative analysis, check comment box for spelling, punctuation and proper grammar use. For quantitative analysis verify that values for *grids, sample volume, dilution factor* and *concentrated sample volume* match values on bench sheet.

Note: For microbiology analyses, verify that the results and sample ID match what is recorded on the associated printout. Verify method, dilution factors, date received/read, analyst, and whether the sample is a duplicate. For chlorophyll analyses, first verify the run ID, sample IDs, filtration, and extraction volumes prior to conversion in QCM. After converting the file, but before uploading, verify that the date, time and analyst matches the extraction date, time and analyst on the chlorophyll spec run log.

4.4 If the data contained on the computer data printout or computer screen differs in any way from what is being read out loud from the bench sheet or data sheet, Person B should stop the reading, confirm the suspected error, and correct it if necessary.

4.5 Promptly correct any errors identified in verification in the computer file or databases. When making corrections to a printed bench sheet or data sheet, draw a line through the error, initial and date the correction, and leave a comment of the correction as necessary.

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4.6 Initial and date the original data sheet as proof of verification. If a data sheet does not already have designated data entry and verification lines, write in the type of verification performed then enter initials and date as proof of verification.

5. QUALITY CONTROL AND DOCUMENTATION

5.1 Use pen with black ink for all corrections.

5.2 To correct raw data entries, place a single line through the incorrect entry, write the corrected entry near the error, initial and date the correction. If the correction requires an explanation, write a comment.

Appendix of Changes

10/05/2009	Reformatted the layout following SOP LB-001.
09/28/2010	Added taxonomy note to step 4.3. Clarified steps 4.5 and 4.6.
09/28/2015	Formatted for 508 compliance.
01/30/2019	Edited note in step 4.3 regarding verification of number of taxa
01/15/2020	Clarified Section 4.3 note.
12/28/2020	Added information regarding taxa entry of Hester-Dendys
12/14/2021	No changes.
11/22/2022	Change SBIO2 to SBIO. Added note in 4.3 for verification of qualitative and quantitative analysis. Added equipment *Computer with SBIO and LIMS.*
12/02/2022	Added note in 4.3 for verification of microbiology and chlorophyll analyses.
11/08/2023	Edited note in 4.3 for quantitative data entry in SBIO for Bacillariophyta information.

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