

MEMORANDUM

To: Laboratory Director
Public Water System
Interested Party

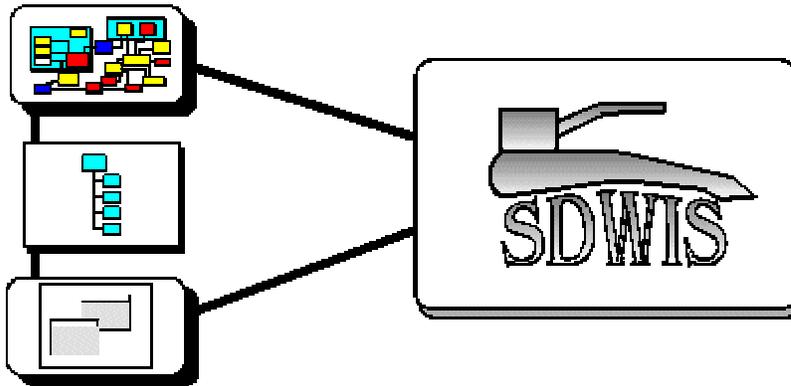
From: Thomas Reed, Drinking Water Section

Date: July 20, 2005

Subj: Electronic Data Interchange (EDI) Standard Operating Procedures

This manual has been developed to assist in the development of an EDI program. It is not intended to be a computer programming manual due to the many different laboratory information management systems (lims) that are installed today. It is assumed that the person(s) working on this technology has a strong computer programming background. The manual describes and provides examples of the file structures that are required as well as specific data requirements that will insure accuracy and consistency.

Please refer all questions to me at (860) 509-7333 or tom.reed@po.state.ct.us.



Electronic Data Interchange (EDI)

Standard Operating Procedures

State of Connecticut
Department of Public Health
Drinking Water Section
410 Capitol Avenue, MS 51WAT
Hartford, Connecticut 06134
(860) 509-7333

07/20/2005

SDWIS/STATE

SDWIS/STATE (Safe Drinking Water Information System/state version) is a database designed by EPA to help states run their drinking water programs. Sharing a name with SDWIS/FED (Safe Drinking Water Information System/federal version), SDWIS/STATE is the state counterpart to EPA's federal drinking water information system.

BACKGROUND:

Under the Safe Drinking Water Act, states monitor the drinking water systems within their jurisdictions to ensure that each public water system meets state and EPA standards for safe drinking water. Each state, at its own option, may use any data system to collect the information necessary to run its Public Water Supply Supervision (PWSS) program. Some states have developed extensive data systems to meet their specific requirements; others have less sophisticated tracking systems.

EPA's goal in developing SDWIS/STATE is to provide a single data system that can meet most needs of each state's drinking water program with high quality data. SDWIS/STATE helps states manage the information necessary to supervise public drinking water systems.

WHAT DOES SDWIS/STATE DO?

SDWIS/STATE houses three major categories of information: inventory, sampling, and monitoring. Inventory data include information on individual drinking water systems such as the system location, size, and population served. Sampling data include lab results for chemical, microbiological, and radiological contaminants regulated by EPA and the state. Monitoring information contains the schedule for sampling required under each EPA rule. By comparing the monitoring schedules to the sampling data, SDWIS/STATE can make automated non-compliance determinations for the Total Coliform Rule. EPA will update the SDWIS/STATE software periodically to add new capabilities, such as non-compliance determinations for other EPA drinking water rules.

Through its reporting capabilities, SDWIS/STATE can help states report to consumers important information about their drinking water. SDWIS/STATE can also help states meet EPA quarterly reporting requirements to EPA (SDWIS/FED) for all their public drinking water systems.

WILL SDWIS/STATE IMPROVE MY LOCAL DRINKING WATER?

By themselves, data systems cannot improve the quality of your local drinking water. SDWIS/STATE is, however, a useful tool to help states oversee public drinking water systems effectively. While not all states will choose to adopt SDWIS/STATE as their data management system (as information needs differ for each state and some states have already invested in alternative data tracking systems), SDWIS/STATE can help make your state's drinking water systems more easily and efficiently managed.

Electronic Data Interchange (EDI) Standard Operating Procedures

About Electronic Transfer

A number of labs find that the easiest and most accurate way to report new drinking water samples to the Drinking Water Section is to take advantage of electronic transfer. Electronic transfer of existing samples data saves time and data entry errors.

To use electronic transfer of samples, you need to program your laboratory information management system (lims) to create correctly formatted structure set-formatted files. These structure set-formatted files are fixed-format data files that comply with requirements of field, domain, size, position, and specified business rules, as defined in the structure sets in Appendix E of this document. Structure sets accommodate both individual samples and results as well as TCR and Lead & Copper (Pb/Cu) 90th percentile sample results. These files can be created as *txt*, *csv* or *dat* files. A completed structure set using Microsoft Access 2000 has been prepared and is included with this document package.

Preparing the Structure Set-Formatted File Structure Set Components

The structure sets are composed of four components:

1. *File Layout* describes the structure (i.e., field name, domain, size, position, optionality, and business rules of the file). There are four different file layouts for individual sample results: Total Coliform Rule (TCR), Chemical and Pb/Cu, Radionuclide, and Water Quality. The fifth file layout describes Sample Summaries which at this time the Drinking Water Section is not accepting.
2. *Permitted Values* (for those fields that have permitted values) lists the valid permitted values for each field that may only be populated by one of a discrete list of permitted values. These fields are noted with an asterisk (*) in the *Field No* column of File Layout.
3. *Mapping to SDWIS/STATE Entities and Attribute* details the correspondence between the structure set attributes and SDWIS/STATE entities and attributes.
4. *Definitions* exist for each field of the structure set.

File Layout Characteristics and Instructions

The following columns characterize the File Layout:

Field Number An arbitrary number used to designate a field in the structure set. Fields are numbered consecutively from the beginning to the end of the file. The same number refers to the same field across all the tables of the structure set. For example, Field No. 6 in the B_Sample_Sample_Summary structure set refers to the attribute B_Water_System_Number in the File Layout, Permitted Value List, Mapping, and definition tables.

Field Name The name of the field that in most cases is the same as the field name in the counterpart SDWIS/STATE table, with “B_” added to the beginning. Some field names have been modified from the counterpart SDWIS/STATE application name for clarity or because of space constraints.

Domain A field designated as one of the following:

AN alphanumeric uppercase
ANmc alphanumeric mixed case
DT date (MMDDYYYY)
TM time (24-hour clock; HHMMSS)
N numeric (including decimal, such as 6(5 (2)) = NNN.NN, where 6 = total number of characters including decimal when number is converted to ASCII, 5 n= number of significant digits, and 2 = number of significant digits to the right of the decimal)

Size The length of the field. *Note: All data is left justified, and blank spaces are added where necessary to match the specified field size.*

Position The column position where the field should be placed in the ASCII table.

Optionality Classifies each field as one of the following:

Mandatory Always required
Optional Always optional meaning that the database will accept the sample without this field being populated. However, this field may be required based on Connecticut’s regulatory requirements.
Conditionally mandatory Mandatory under the condition described; otherwise optional.

The information for what constitutes a unique row as well as business rules are also included in this column.

Additional Instructions for the Sampling Structure Set-Formatted Text File

Two separate structures support *Sampling via EDI*: _Sample_Sample_Summary characterizes a sample; B_Result_Summary_Result characterizes an individual result. Each structure contains five file layout tables: one for each of the types of samples (i.e., total coliform, chemical, lead and copper, radionuclide, and water quality). The two

structure sets, however, should be used to produce a *single text file*. This text file typically contains information for a sample on the first line, followed by the results for that sample on the following lines.

Once all sample and result information for a single sample is recorded in the file, the next line contains information for the next sample followed, on the succeeding lines, by its results. Typically, one file might contain six months of TCR samples and results, six months of lead and copper samples and results, or six months of TCR results. The B_Sample_Sample_Summary structure set should produce a 375-character fixed length record that starts with "HDR."

Each sampling input file must start with an HDR record. The B_Result_Summary_Result structure set should produce the same length record that starts with .DTR.. An input file containing samples begins each sampling input file must start with an HDR record to represent the sample information, followed by as many DTR records as there are results for the sample. For example, a file containing TCR samples, where each sample typically contains one and at most two results, might resemble the following:

```
HDR.....  
DTR.....  
HDR.....  
DTR.....  
HDR.....  
DTR.....  
DTR.....
```

By contrast, a file containing chemical samples, where there could often be multiple results per sample, might resemble the following:

```
HDR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....  
DTR.....
```

Do not forget to left justify the data in all fields and to blank fill the entire position to the right (including to the end of the 375-character string). Do not leave any blank lines at the beginning or end of the file.

Electronic Data Interchange Specifics and Examples

The following will assist in insuring that results are submitted in a consistent manner. Appendix A shows analyte groups and category information. Appendix B is a copy of an EDI file.

Water systems information such as PWSID (B_WATER_SYSTEM_NUMBER) and facility information (B_WATER_FACILITY_STATE_CODE, B_SAMPLING_POINT) will be supplied to the laboratory by the Drinking Water Section when required. In most cases the laboratory already has a listing of PWSID's since it is required when submitting water quality data to the Drinking Water Section.

The following provides guidance on most commonly asked questions:

1. **Use of EDI** – The use of electronic reporting does not replace the requirement to notify the Drinking Water Section by phone when an MCL violation is incurred.
2. **Lab Sample ID's** - Every sample requires a unique ID. No two ID's can be the same. Reference the type of sample in the ID. As an example: 39504-TC or 39506-IOC.
3. **Physical Parameters** - Physical parameters are to be reported in the CH category. For those taken in the distribution system the analyte codes are as follows: DTRB (turbidity), SCL (color), SOD (odor) and SPH (pH). For all other physical samples use the traditional analyte codes (see Appendix A).
4. **Nitrates** - Nitrate and nitrite are in the NOX group (see Appendix A).
5. **IOC and VOC Groups** – These groups must be reported in the CH sample category only (see Appendix A). Lead and Copper collected as part of IOC's must be reported from the entry point under the CH sample group.
6. **Analyte Groups** – In general, all analytes are part of groups and must be reported in that manner. The lab sample id number must reference the group – i.e. “390154-IOC”.
7. **Units of Measure** – We no longer accept UG/L. Use MG/L as the standard unit of measure except for the following: Color – CU, Odor – TON, pH – pH, Turbidity – NTU, Radionuclides – pCi/l (detailed information on radionuclides follows), Asbestos – Mfl, Temperature – C or F and Conductivity – Umhos/cm.
8. **Samples/Facilities** – Insure that samples are attached to the correct water system facility. For example in just about all cases VOC samples are from the entry point sampling point. TCR samples are from the distribution water system sampling points.
9. **Repeat Samples** – Repeats (RP) should only be done for TCR, analyte code 3100. Any other samples that are reported are routine (RT), special (SP) or confirmation (CO). Also, we are receiving legitimate repeat TCR samples without an original sample id to tie it to. Repeats are only required when there is a positive routine TCR sample.
10. **E.coli** – When a TCR sample is positive (analyte code 3100), e.coli must be reported as an additional DTR line in the same sample using analyte code 3014. See appendix B for structure.
11. **Use of wrong TCR analyte code** – 3100 must be used for distribution samples only. Raw water samples and other special samples should not be using 3100 and must not be attached to the distribution system. Special samples can be attached to the distribution system but cannot be used for compliance. Raw water total coliform must be reported as general microbiological and RTC is to be used in the Lab Sample ID.
12. **Samples with no results** – Insure that all samples have results.

13. **Lead and Copper** - Lead & Copper must be reported under one sample id and in the PBCU group.
14. **Xylene** – As required by the Public Health Code report Xylene as Xylene, Meta (2995), Xylene, Ortho (2997) and Xylene, Para (2962) not as total Xylene. If you show an occurrence of Xylene and the method that you are using cannot determine which Xylene it is attach the positive result to Xylene, Meta (2995) and report the others as “0”.
15. **Facility information** – We realize that your client list changes. We have tried to make things as consistent as possible by giving every system a distribution system with the state assigned code of 00600 and the sampling point of 4 and entry point facility with the state assigned code of 00700 and a sampling point of 3. We are currently in the process of requiring detailed sampling point plans. As these are approved we will work with the labs to keep this information up to date. Source facilities have unique state assigned facility id’s. When you add clients let the Drinking Water Section know so the facility information can be properly maintained. Also, updated lists will be emailed on a regular basis.
16. **Date Information** - In order for us to accurately determine compliance there are two date fields that we need to have populated in the EDI files. Both date fields are in the detail or "B_Result_Summary_Result" structure set layout. The first one is called "B_ANALYSIS_COMPLETION_DATE" and is the 10th field in the structure set. This is the date that you or the contracted lab completed the analysis. The second one is called "B_STATE_NOTIFY_DATE" and is the 12th field in structure set. This is the date that you send the file to us.
17. **Chlorine Residual** – Chlorine Residual is to be reported as a “field result” which is field 35 of the Header row.
18. **Radionuclides** –
 - a. The contaminant codes for all radionuclide parameters are as follows [units of measure]:
 - i. 4000 – gross alpha (net) [pCi/L]
 - ii. 4109 – gross alpha (total) [pCi/L]
 - iii. 4020 – radium-226 [pCi/L]
 - iv. 4030 – radium-228 [pCi/L]
 - v. 4006 – uranium [µg/L]
 - vi. 4100 – gross beta [pCi/L]
 - vii. 4101 – beat particle and photon radioactivity [mrem/y; SDWIS: mremy]
 - viii. 4102 – tritium [pCi/L]
 - ix. 4174 – strontium-90 [pCi/L]
 - b. All results must be reported to at least two decimal places.
 - c. Sample numbers should be followed by “-RAD” if gross alpha or radium, “-U” if uranium, and “-RADB” if gross beta, tritium, strontium-90, or beta particle and photon radioactivity.
 - d. Must submit results for the contaminant codes listed. Note that Uranium (4006) is a chemical result in units of µg/L. Beta particle and photon radioactivity (4101) is a converted result in units of millirem/year (mrem/y)
 - e. Must submit Net Gross Alpha (4000) for compliance determination. If total Gα (4109) is ND < MRL of 3.0 pCi/L, the Net Gα should be reported as ND < MDL. If there is no analyzed Uranium result to subtract from the Total

- G α then the Net G α result is the same as the Total G α result (including any +/-).
- f. Continue to submit Total G α as 4109.
 - g. Uranium result must be submitted in $\mu\text{g/L}$ units. If applicable, the result in pCi/L must be subtracted from the Total G α to determine the Net G α result. The Uranium result in $\mu\text{g/L}$ is required for compliance determination.
 - h. Units of measure for Uranium must be $\mu\text{g/L}$; **mg/L is not acceptable.**
 - i. All analyzed results must be compared to the required MDLs, whether ND or not.
 - j. **DO NOT** indicate ‘less than’ a MDL, **AND** also enter a sample result. It is either one or the other. You can indicate the MDL itself, though, in all situations.
 - k. Make sure all WSFIDs, etc. are correct & correspond to the WQ schedule.
 - l. If a direct analysis with a result >MDL, the deviation (+/-) (aka counting error) must be reported as a numerical value (do not enter +/-), except for Uranium in units of $\mu\text{g/L}$ (because U is a chemical result). There will not be a deviation for a calculated net gross alpha value. See water quality form instructions.
 - m. The method code should be used for all analyzed parameters, but NOT those substituted.
 - n. If Uranium was converted, indicate “CONV” as a comment in the B_STATE_SAMPLE_NUMBER field (field number 5) for that sample. The conversion must be brought out to at least two decimal places.

BETA PARTICLE AND PHOTON RADIOACTIVITY REPORTING SPECIFICS

- o. Only Beta Particle & Photon Radioactivity (4101) has a MCL.
- p. The regulatory minimum detection limits for the required parameters are as noted on the monitoring & reporting form.
- q. If the gross beta (4100) result is less than 50 pCi/L, no conversion to ‘mrem/y’ units is necessary for that parameter.
- r. If the tritium (4102) or strontium-90 (4174) result is less than their respective detection limit, no conversion to ‘mrem/y’ units is necessary for that parameter.
- s. If there is no conversion necessary for any of the reported contaminants, the reported value for 4101 must be ND with respect to the MCL of 4 mrem/y. (use MRL of 4 mrem/y)
- t. If there is a reportable value for 4102 and/or 4174, then that result must be converted as indicated on the monitoring and reporting form and used to determine the reported value for 4101.
- u. If the gross beta (4100) result is greater than 50 pCi/L (after subtracting the naturally-occurring K-40), additional analysis/monitoring will be required. Any further detection of individual parameters must be converted and summed to report 4101 and determine compliance with the MCL. Results for the individual parameters must also be reported.

SUBSTITUTION (only for Radium-226 and/or Uranium)

- v. Follow the correct procedure for substitution so that the result(s) are correctly determined. Refer to “Radionuclides Rule: Radium-226 and Uranium Substitution” sheet.
- w. DO NOT indicate an ‘Analysis Date’ for that parameter substituted – it has not been analyzed.
- x. In the State Sample Number field for that sample indicate “SUB R”, “SUB U”, or “SUB BOTH” as appropriate.
- y. If Uranium was converted, indicate “CONV” in the State Sample Number field for the sample; if also substituted, both should be noted here.
- z. Uranium conversion must be brought out to at least two (2) decimal places.

19. **The following cannot be submitted electronically, therefore forms are still required:** DBP – Precursors, DBP – Bromate, DBP – Chlorine Dioxide, DBP – Chlorine Dioxide Exd., SWT – Comb. Filter Eff.Turb., SWT – Ind. Filter Eff. Turb., SWT – EP&Dist. C12 Residual, SWT-Chlorine Residual, Treatment Eff., Running Annual Average.

Some other things that can assist you in improving the EDI reporting process are the use of the sampling schedules that can be found on our web page. The schedules are updated monthly and are very useful tools for the water systems and laboratories. In addition to water quality monitoring requirements, the schedules also contain a complete inventory of water system facilities and associated sampling points. Our web address is <http://www.dph.state.ct.us/BRS/Water/DWD.htm>. The Public Health Code can also be accessed from our web page. In addition, you can always call Drinking Water Section compliance staff at (860) 509-7333.

When text files have been created they are to be emailed to the following address:

drinking.water@po.state.ct.us

After the file is processed by Drinking Water Section staff an acknowledgement is sent via email stating that the file has been processed. If there are errors an error report is attached to the response. On a monthly basis a complete list of electronically processed samples is sent to the laboratory via email for audit purposes.