

**APPENDIX A: WATER QUALITY DATA ELEMENTS FOR CHEMICAL
AND MICROBIOLOGICAL ANALYTES**

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition

This version of the file, Final WQDE 20010622, last revised 20011024, shows the changes recommended and accepted by the National Water Quality Monitoring Council on June 06, 2001, based on its WQDE modification policy.

1.0 Contact	
1.1 Sources of Data (Alternate Names: Data Owner, Data Source, Sampling Entity, Laboratory Name and Address)	This element identifies the primary sources or providers of data to the system, whether within or outside the agency, including: name, address, telephone number including area code and e-mail address of the agency to direct questions about the sample analytical results.
1.1.1 Organization Formal Name	The legal, formal name of an organization that is the primary source of data.
1.1.2 Mailing Address	The exact address where a mail piece is intended to be delivered, including urban-style street address, rural route, and PO Box.
1.1.3 Mailing Address City Name	The name of the city, town, or village where the mail is delivered.
1.1.4 Mailing Address State Name	The name of the state where mail is delivered.
1.1.5 Mailing Address ZIP Code/ International Postal Code	The combination of the 5-digit Zone Improvement Plan (ZIP) code and the four-digit extension code (if available) that represents the geographic segment that is a subunit of the ZIP code, assigned by the U.S. Postal Service to a geographic location to facilitate mail delivery; or the postal zone specific to the country, other than the U.S., where the mail is delivered.
1.1.6 Telephone Number	The telephone number including area code of the person who is the point of contact for an establishment.
1.1.7 Electronic Mail Address Text	The text that describes an electronic mail address of a person located at an establishment.
1.2 Sampling Entity/Person	Name, address, telephone number including area code and e-mail address of the organization or person to direct questions about the sample collection.
1.2.1 Sampling Entity/Person Formal Name	The legal, formal name of an organization that is the sampling entity.

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
1.2.2 Mailing Address	The exact address where a mail piece is intended to be delivered, including urban-style street address, rural route, and PO Box.
1.2.3 Mailing Address City Name	The name of the city, town, or village where the mail is delivered.
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1.2.6 Telephone Number	The telephone number including area code of the person who is the point of contact for an establishment.
1.2.7 Electronic Mail Address Text	The text that describes an electronic mail address of a person located at an establishment.
1.3 Laboratory/Field (Alternate Names: Laboratory Name and Address)	Name, address, telephone number including area code and e-mail address of the organization to direct questions about the laboratory analysis. Field denotes measurements conducted in the field.
1.3.1 Laboratory Formal Name	The formal title of the laboratory facility.
1.3.2 Mailing Address	The exact address where a mail piece is intended to be delivered, including urban-style street address, rural route, and PO Box.
1.3.3 Mailing Address City Name	The name of the city, town, or village where the mail is delivered.
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1.3.5 Mailing Address ZIP Code/ International Postal Code	The combination of the 5-digit Zone Improvement Plan (ZIP) code and the four-digit extension code (if available) that represents the geographic segment that is a subunit of the ZIP code, assigned by the U.S. Postal Service to a geographic location to facilitate mail delivery; or the postal zone specific to the country, other than the U.S., where the mail is delivered.
1.3.6 Telephone Number	The telephone number including area code of the person who is the point of contact for an establishment.
1.3.7 Electronic Mail Address Text	The text that describes an electronic mail address of a person located at an establishment.
2.0 Results	
2.1 Result Value	Reportable numerical measure of the result for the chemical or microbiological analyte, or other characteristic, being analyzed.
2.1.1 Result Value Unit of Measure Name	The name of the determinate quantity for a standard of measurement used for measuring dimension, capacity, or amount of something (e.g., mg/L, pCi/L, CFU/mL, etc.).
2.2 Analyte Name (Alternate Names: Analyte, Analyte Name, Constituent, Contaminant, Parameter, Chemical, Taxon, Metric, Index)	The name assigned to a substance or feature that describes it in terms of its molecular composition, taxonomic nomenclature or other characteristic. This field is optional if the analyte is adequately described in one of the following subelements.
2.2.1 Chemical Identifier/Number (Chemicals only) (Alternate Names: EPA Preferred Number, Constituent Identification Number; Contaminant; Chemical)	Chemical Identifier/Number is the unique number assigned to all chemical substances in the Chemical Abstract Service's (CAS) Registry or, in the EPA Chemical Registry System, to chemical groupings for which CAS Registry Numbers do not exist and cannot be assigned.
2.2.2 Biological Identification Number (Alternate Names: ITIS Taxonomic Serial Number, ICTVdB Taxon Identifier, EPA Biological Registry System Number)	The unique identification number assigned by either the Integrated Taxonomic Information System, (ITIS) the International Committee on Taxonomy of Viruses, or the EPA Biological Registry System .

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
2.2.2.1 Biological Systematic Context Name (Alternate Names: Biological Context Name, Biological Group Context Name)	The name of the classification system used to assign a systematic name to a biological entity.
3.0 Reason for Sampling	
3.1 Reason for Sample Collection See also 6.1 Sample Type	A text field to include such reasons as: (a) Reconnaissance/Occurrence Survey (b) Trend analysis (c) Permit Compliance (d) Pollution Event (e) Storm Event (f) Research (g) Regulatory benchmark (h) Bioaccumulation (i) Deposition (j) Other entries as applicable
4.0 Date/Time	
4.1 Sample Collection Start Date (Alternate Names: Date; Sample Collection Date; Sampling Date; Year, Month and Day)	The calendar date when collection of the analyte was started, reported as 4-digit year, 2-digit month, and 2-digit day in YYYYMMDD format.
4.2 Sample Collection Start Time Measure (Alternate Names: Time; Sample Collection Time; Collected; Collected End; Hour and Minute; Hour, Minute and Second)	The measure of clock time and time zone when collection of the analyte was begun, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.
4.3 Sample Collection End Date (Alternate Names: Date; Sample Collection Date; Sampling Date; Year, Month and Day)	The calendar date when collection of the analyte was finished, reported as 4-digit year, 2-digit month, and 2-digit day in YYYYMMDD format.
4.4 Sample Collection End Time Measure (Alternate Names: Sample Collection Time; Collected; Collected End; Hour and Minute; Hour, Minute and Second)	The measure of clock time and time zone when collection of the analyte was finished, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
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5.0 Location	
5.1 Water Body/Aquifer Name (Alternate Name: Receiving Water Name)	Name of the lake, stream, river, estuary, aquifer, reach name in the National Hydrography Dataset or other water feature related to the physical site.
5.2 Sample Station Identifier (Alternate Names: Sampling Station/Facility Identification Number; Site Number, Well Identifier)	The name or number that uniquely identifies the sample station.
5.3 Sampling Station Type Name (Alternate Names: Facility Type; Site Type)	<p>The descriptive name for a type of sampling station. The valid sampling facility choices are:</p> <ul style="list-style-type: none"> (a) Ambient <ul style="list-style-type: none"> (i) River/Stream (ii) Canal <ul style="list-style-type: none"> Drainage Irrigation Transport (iii) Lake (iv) Wetland <ul style="list-style-type: none"> Estuarine, emergent Estuarine, forested Estuarine, scrub-shrub Lacustrine, emergent Palustrine, emergent Palustrine, forested Palustrine, moss-lichen Palustrine, shrub-scrub Riverine, emergent Constructed (v) Reservoir (v) Riverine Impoundment (vi) Estuary (vii) Tidal Fresh (viii) Tidal Brackish (ix) Ocean (x) Great Lake (xi) Well (xii) Subsurface unsaturated/vadose zone (xiii) Spring
5.3 Sampling Station Type Name (cont'd)	

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	(b) Water Supply/Source Influent (i) Raw/untreated water (drinking/com/ind) (ii) Finished/treated water for drinking (A) From treatment system (B) Entry Point to the distribution system after treatment (C) Within the distribution system (D) End of the distribution system with longest residence time (E) Point in distribution system with lowest disinfection residual (F) Household/drinking water tap (iii) Unknown (comment field) (c) Within treatment process (comment field) (d) Wastewater/Effluent (i) End of pipe (ii) Within mixing zone (iii) Downstream from mixing zone (iv) Upstream from mixing zone (e) Storm Sewer (f) Combined Sewer (g) Land Runoff
5.3 Sampling Station Type Name (continued) (Alternate Names: Facility Type; Site Type)	(h) Mine/Mine Drainage (i) Landfill (j) Waste Pit (k) Other entries as applicable
5.4 Latitude Measure (Alternate Names: Latitude; Latitude of Sampling Station)	The measure of the angular distance on a meridian north or south of the equator in degrees, and decimal degrees.
5.5 Longitude Measure (Alternate Names: Longitude; Longitude of Sampling Station)	The measure of the angular distance on a meridian east or west of the prime meridian in degrees, and decimal degrees.
5.6 Latitude/Longitude Accuracy	
5.6.1 Horizontal Accuracy Measure	The measure of the accuracy (in meters) of the latitude and longitude coordinates.

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
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5.6.2 Source Map Scale Number	The number that represents the proportional distance on the ground for one unit of measure on the map or photo.
5.6.3 Coordinate Data Source Name	The name of the party responsible for providing the latitude and longitude coordinates.
5.7 Latitude/Longitude Method	
5.7.1 Horizontal Collection Method	The method used to determine the latitude and longitude coordinates for a point on the earth.
5.7.2 Horizontal Reference Datum	The code that represents the reference datum used in determining latitude and longitude coordinates. Can include the NAD27 North American Datum of 1927, the NAD83 North American Datum of 1983, the World Geodetic System of 1984, or other entries as applicable
5.7.3 Reference Point (Alternate Names: Sample Point Identifier)	The place for which geographic coordinates were established. Entries may include: <ul style="list-style-type: none"> - Facility/Station Building Entrance or Street Address - Facility Center/Centroid - Boundary Point - Intake Point - Treatment/Storage Point - Release Point - Monitoring Point - Other entries as applicable
5.8 Altitude of the Sampling Station	
5.8.1 Vertical Measure (Alternate Name: Elevation, Altitude)	The measure of elevation above or the depth below a reference datum.
5.8.1.1 Vertical Collection Method	The method used to establish the elevation or depth of the sampling site

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
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5.8.1.2 Vertical Reference Datum	The reference datum used to determine the vertical measure
5.8.1.3 Vertical Measure Unit of Measure	The unit for expressing the vertical measure
5.9 Altitude of Sampling Station Features	
5.9.1 Water Level (Alternate Names: Depth to Water)	<p>(a) Surface Water:</p> <p>(i) Quantitative measurement of water level: The level of the water surface at the sampling point.</p> <p>(ii) Qualitative measurement of water level:</p> <p>(A) Tidal</p> <p>(1) High</p> <p>(2) Low</p> <p>(B) Stream Stage</p> <p>(1) Flood (over bank)</p> <p>(2) High</p> <p>(3) Medium</p> <p>(4) Low</p> <p>(b) Ground Water: The vertical distance from the land surface to the water surface level in a well</p>
5.9.1.1 Water Level Unit of Measure	The unit for measuring the water level, where applicable.
5.9.2 Bottom Depth Measure (Surface Water)	The measure of the distance from the water surface to the channel or lake bottom.
5.9.3 Depth at Completion Measure (Ground Water)	The measure indicating the total depth of the well upon completion of construction.
5.9.3.1 Bottom Depth/Depth at Completion Unit of Measure	The unit for measuring the distance from the surface to the bottom..
5.9.4 Depth to Top of Well Open Interval (Alternate Name: Depth to Top)	The depth to the top of the open interval. Openings are permeable portions of the well casings or lining. Openings may be protected with screens, fractured rock, or other devices/materials.

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
5.9.4.1 Depth to Top of Well Open Interval Unit of Measure	The unit for measuring the distance down to the top of the open interval
5.10 Altitude of Sample (Alternate Names: Sample Collection Water Depth)	The numerical measure of the vertical location of sample collection.
5.10.1 Sample Depth/Altitude Units Text (Alternate Names: Sample Collection Water Depth Unit of Measure)	The text that describes the units for sample Depth/Altitude.
5.11 Water Discharge Rate Value (Alternate Names: Flow, yield)	The numerical value of the discharge rate of the water being sampled
5.11.1 Water Discharge Rate Unit of Measure	The text that describes the units for the discharge rate of the water being sampled

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
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6.0 Sample Collection	
<p>6.1 Sample Type</p> <p>(Alternate Names: Quality Control Sample Type)</p>	<p>The type of sample being described. Permitted values include:</p> <ul style="list-style-type: none"> (1) Field Measurement/Observation <ul style="list-style-type: none"> (a) Routine Measurement/ Observation (b) Replicate Measurement/Observation (2) Sample <ul style="list-style-type: none"> (a) Routine Sample (b) Field Blank (c) Field Replicate (d) Depletion Replicate (d) Integrated Time Series (d) Integrate Flow Proportioned (g) Integrate Horizontal Profile (h) Integrated Vertical Profile (i) Composite Without Parents (j) Positive Control (Microbio.) (k) Negative Control (Microbio.) (l) Other entries as applicable (3) Sample Created from Sample (No subtypes recommended) (4) Composite Sample with Parents (No subtypes recommended) (5) Quality Control Sample <ul style="list-style-type: none"> (a) Trip blank (b) Reagent Blank (c) Equipment Blank (d) Pre-preservative Blank (e) Post-preservative Blank (f) Field Spike (g) Field Blank (h) Reference Sample (i) Measurement Precision Sample (j) Other entries as applicable

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6.2 Media Sampled (Alternate Names: Sample Medium Code, Water Source Type, Water Body Type)	The environmental media sampled at a site. The environmental material about which results are reported from either direct observation or collected samples. Includes water, sediment, precipitation and other entries as applicable.
6.3 Sample Temperature	Temperature of the sample when collected
6.3.1 Temperature Unit Measure	Fahrenheit, or Centigrade
6.4 Sample Identification (Alternate Names: Sample Number, Sample Identification Number)	The unique name, number, or code assigned to identify the sample.
6.5 Sample Collection Method	The method used to collect the sample: <ul style="list-style-type: none"> (a) Surface Water <ul style="list-style-type: none"> (i) Grab (ii) Pump (iii) Collection filter – positive charge (iv) Collection filter - negative charge (v) Insitu monitor (probe) (vi) Composite <ul style="list-style-type: none"> (A) Flow weighted (B) Proportional (C) Cross sectional (D) Integrated Depth (vii) Other entries as applicable (b) Ground Water <ul style="list-style-type: none"> (i) High flow submersible pump (specify water flow rate) (ii) Low flow submersible pump (specify water flow rate) (iii) Bladder pump (iv) Bailer (v) Other entries as applicable

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
6.5 Sample Collection Method (cont'd)	(c) Precipitation/Atmospheric (i) Grab (ii) Pump (iii) Collection filter – positive charge (iv) Collection filter – negative charge (v) Continuous (specify water flow rate) (vi) Other entries as applicable
6.6 Sample Preservation / Treatment	
6.6.1 Container Type	Free text: Sample container type
6.6.2 Container Color	Free text: Sample container color
6.6.3 Container size	The container size used in sample collection
6.6.3.1 Container size unit of measure	The unit of measures used in specifying the container size
6.6.4 Sample collection filtering (Alternate Name: Sample Fraction)	Filtered, unfiltered, or the specific fraction
6.6.5 Chemical preservation method	The method used to preserve the sample in the field by the sampling entity. This entry is intended to include preservation techniques that are <u>NOT</u> specified as part of the Analytical Method, element 7.1: (a) Chemical added (1) Acidification (2) Antioxidant (3) Mercuric oxide (4) Other (comment field) (b) None (c) Other entries as applicable

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6.6.6 Temperature preservation method	<p>The method used to preserve the sample in the field by the sampling entity. This entry is intended to include preservation techniques that are <u>NOT</u> specified as part of the Analytical Method, element 7.1:</p> <p>Temperature Preservation Method. Suggested entries include:</p> <ul style="list-style-type: none"> (a) Wet Ice (4 deg C) (b) Dry Ice (-78.5 deg C) (c) Cold Packs (4 deg C) (d) Refrigerated (4 deg C) (e) Frozen (0 deg C) (f) Frozen (-20 deg C) (g) Frozen (-50 deg C) (h) Freeze Dried (i) None (j) Other entries as applicable
6.10 Sample volume	The numerical value of the volume of the sample
6.10.1 Sample volume unit of measure	The unit of measures used in specifying the sample volume
6.11 Sample weight	The numerical value of the sample weight
6.11.1 Sample weight unit of measure	The unit of measures used in specifying the sample weight

7.0 Sample Analysis	
7.1 Extraction/Processing Date	The calendar date when an extract for a sample analysis was taken for sample analysis, reported as 4-digit year, 2-digit month, and 2-digit day.

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
7.2 Extraction Process Time	The measure of clock time and time zone when the extraction of the sample was completed, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.
7.3 Analysis Date (Alternate Names: Date; Year, Month, and Day)	The calendar date when analysis of the analyte was finished, reported as 4-digit year, 2-digit month, and 2-digit day in YYYYMMDD format.
7.4 Analysis Time	The measure of clock time and time zone when analysis of the analyte was completed, reported as a 24-hour day with 2-digit hour, 2-digit minute, and 2-digit second.
7.5 Analytical Method Number (Alternate Names: Analytical Method, Method References)	The method number of the analytical method used, represented as a reference number: (a) EPA (Specify number) (b) ASTM (Specify number) (c) SM (Specify number) (d) Other methods as applicable
7.6 Sample Size (Microbiologicals only)	The size of the sample used for analysis
7.6.1 Sample Size Unit of Measure (Microbiologicals only)	The unit of measure of the size of the sample, measured in Liters or milliliters.
7.7 Serial Dilution (Microbiologicals only)	The serial dilution is expressed as a numerical factor representing the number of equal volumes of dilute added to the sample and to be applied to the same units as the “Analytical Result Unit of Measure”

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
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7.8 Composite Sample	<p>Composite samples for microorganisms are:</p> <ul style="list-style-type: none"> (a) Time <ul style="list-style-type: none"> (i) Flow weighted (ii) Proportional (iii) Cross sectional (iv) Integrated Depth (b) Flow <ul style="list-style-type: none"> (i) Flow weighted (ii) Proportional (iii) Cross sectional (iv) Integrated Depth (c) Spatial <ul style="list-style-type: none"> (i) Flow weighted (ii) Proportional (iii) Cross sectional (iv) Integrated Depth (d) Other entries as applicable
7.9 Run Batch (Alternate Names: Sample Batch Identification Number; Batch Number)	A lab-defined identifier for a batch of analyses done on one instrument that make up a sequence of analyses during which the instrument is continuously in control.
7.10 (Spiking) Amount or Dose Added (Alternate Names: Spiking Concentration)	<p>For Chemicals: The amount (weight or volume) or final concentration of an analyte that has been spiked into an aliquot at any time during the analysis process.</p> <p>For Microorganisms: The dose of method organisms/cells added to a sample to be analyzed for calculating analytical precision and accuracy where the value reported use the same unit of measure reported for Analytical Results.</p>

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
7.10.1 Spiking Amount or Dose Added Unit of Measure	The name of the determinate quantity for a standard of measurement used for measuring dimension, capacity, or amount of something (e.g., mg/L, pCi/L, CFU/mL, etc.)
7.11 Analytical Precision (Alternate Names: Precision of Value)	A measure of the agreement among individual measurements of the same property in duplicate laboratory samples (duplicate laboratory spiked samples) under prescribed similar conditions to estimate variability in the measurement method or procedures. Precision is expressed as: (a) Standard Deviation (SD) $SD = \left[\frac{\sum (x_i - \text{avg } x)^2}{n-1} \right]$ (b) % Relative Standard Deviation (RSD), % RSD = $(SD / \text{mean concentration}) \times 100$, or (c) Relative Percent Difference (RPD), $RPD = \frac{ X_1 - X_2 }{\{(X_1 + X_2)/2\}} \times 100$
7.12 Analytical Accuracy/Error (Alternate Names: Bias of Value; Analytical Accuracy Measure)	(a) Accuracy is a measure of confidence in a measurement and can be assessed by calculating: (i) % deviation $\% \text{ deviation} = \frac{(\text{average } x - \text{true value})}{\text{true value}} \times 100$; or (ii) % recovery (Rec) $\% \text{ Rec} = \frac{(\text{amt. found in Spiked sample} - \text{amt. found in sample})}{\text{amt. in spiked sample}} \times 100$ Accuracy describes how close a result is to the true value measured through the use of spikes, surrogates, standards, or performance evaluation samples. (b) Error (i) Type I error (False positive) - a numerical value indicating the magnitude of Type I error (ii) Type II error (False Negative) - a numerical value indicating the magnitude of Type II error

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
7.13 Controls	
7.13.1 Positive Control (Microbiologicals only)	Identification of organisms used for determining accuracy: Genus and species
7.13.2 Positive Control Result (Microbiologicals only)	The analytical result of measuring the positive control: Presence or Absence
7.13.3 Negative Control (Microbiologicals only)	Identification of organisms used for determining accuracy: Genus and species
7.13.4 Negative Control Result (Microbiologicals only)	The analytical result of measuring the negative control: Presence or absence
7.14 Detection / Quantitation Level Measure (Alternate Names: Detection Limit; Detection Level)	The measure that describes the quantity of analyte below which the sample analysis equipment will not detect the analyte accurately. If the lowest numerical value that a laboratory can report reliably for a test result based on the laboratory's experience with the method and equipment is different than the Detection Limit Measure and set by Statute or Regulation, then it should be reported as the Regulatory Reporting Level.
7.14.1 Detection / Quantitation Level Unit of Measure Name	The name of the determinate quantity for a standard of measurement used for measuring dimension, capacity, or amount of something (e.g., mg/L, pCi/L, CFU/mL, etc.).

Data Elements for Reporting Water Quality Results of Chemical and Microbiological Analytes	
Data Element	Definition
7.15 Detection / Quantitation Level Type (Alternate Names: Detection Limit Type)	The type of detection level used in the analysis of a chemical constituent: (a) Instrument detection level (b) Method detection level (c) Estimated detection level (d) Practical quantitation limit (e) Limit of detection (f) Long term method detection level (g) Regulatory reporting level . Drinking Water Maximum Contaminant Level . Water quality standard or criteria . Alternate concentration level (h) Other entries as applicable
7.16 QA/QC Exception Flags	Flags should allow for: Analyzed past holding time - Dual quantification difference > 40% RPD - Estimated value, quantification doesn't meet SOP criteria - Duplicate injection precision not met - Spike recovery outside of control limits - Spike out of calibration range
7.16.1 QA/QC Comment Field	Text noting other aspects of the quality assurance and control