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Hanford Environmental Information System (HEIS)

Volume 9 Field Quality Control
Subject Area

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THE FIELD QUALITY CONTROL SUBJECT AREA**1.0 OVERVIEW****PURPOSE**

The purpose of the HEIS Field Quality Control subject area is to manage the data acquired from field quality control samples. Field quality control samples are used to determine if sample contamination has occurred at some point in the sampling process.

SCOPE

Four major types of data comprise the Field Quality Control subject area.

- Data about the samples--These are samples that are sent to a laboratory for analysis. Characteristics concerning the sample itself are stored in the QC Sample table.
- Data about spike samples--This type of field quality control sample is created in a laboratory and contains known chemical additives. Data concerning spike samples are stored in the Spike Component table.
- Data about chemical and/or radiologic analyses of field quality control samples--These types of samples can be analyzed using a variety of approved analysis methods. The results of all analyses are stored in the QC Result table.
- Data about the relationships between field quality control and non-quality control samples. Data about these relationships are stored in the QC Relate table.

DATA MODEL

Figure 1.0-1 is a data model showing relationships among the tables in the Field Quality Control subject area tables and their relationships with other HEIS tables. The associations are described below. Capitalized items refer to both the actual item and the Field Quality Control table in which data about that item are stored.

Each QC Sample record may have one or more QC Relate records indicating routine samples that are associated with the QC Sample. A QC Sample record that is a spike may have multiple Spike Component records

describing the chemical composition of the spike. Each QC Sample record also may have many QC Result records.

Each result record represents the measurement of a specified constituent for this sample. Each QC Sample record may have one or more QC Result Change records. The change records are automatically created when a corresponding result record is modified.

USERS

The users of the Field Quality Control subject area include (1) technical staff interested in determining the quality of the sampling or analysis process (2) data processing staff responsible for inserting and maintaining the quality control data, (3) validators interested in validating the quality of the data, and (4) regulators interested in regulatory compliance of the data.

MENU SYSTEM

The Field Quality Control subject area allows you to navigate among the Field Quality Control forms using the HEIS query-by-form interface. Section 2.2 describes how to access the various Field Quality Control forms using this interface. The Field Quality Control tables are described in Section 2.3.

Figure 1.0-1. Data Model Showing Relationships Among the Tables in the Field Quality Control Subject Area and Their Relationships with Tables Located in Other HEIS Subject Areas.

QC = Quality Control

QC subject area tables

Tables existing in other subject areas

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2.0 ACCESSING FIELD QUALITY CONTROL DATA

INTRODUCTION

The Field Quality Control menu, presented in Figure 2.0-1, shows the entry points into the Field Quality Control forms. Figure 2.0-2 is a diagram of how these forms and other forms are connected. See Section 5.3 of the *HEIS User's Guide* (DOE-RL 1994a) for a detailed description of entry point maps. Section 2.3 describes each of the tables and forms associated with individual entry points.

Figure 2.0-1. Field Quality Control Menu.

HANFORD ENVIRONMENTAL INFORMATION SYSTEM
Field QC Subject Area
MENU-OPTIONS

QC Sample and QC Relate	QC Relate - Multiple
Spike Component	Spike Component Group
QC Result	QC Result Change Update
QC Result - Multiple	QC Result Change View

MOVE: Press [NEXT RECORD], [PREV RECORD], or Arrow Keys
SELECT: Press [ACCEPT] (Browser), [DETAIL] (Max Privilege) EXIT: Press [QUIT]

Figure 2.0-2. Map of Field Quality Control Entry Points.

3.0 THE FIELD QUALITY CONTROL TABLES

3.1 QC SAMPLE TABLE

(HEIS Database Table Name: qc_sample)

INTRODUCTION

The QC Sample table contains data concerning field quality control samples. The data are supplied by the sampler from field tests and evaluations. Each quality control sample is uniquely identified by a sample number. Other important data are the origin, type, and preparation information of the QC Sample. The QC Sample table appears with related records from the QC Relate records on the QC Sample / QC Relate form shown in Figure 3.1-1. See Section 3.2 for a discussion of the QC Relate table.

SOURCE

Data for this table come from field log books, which are completed during sampling.

REQUIREMENTS

This section describes the QC Sample table and the associated entries to be made in the QC Relate table when a QC Sample is created.

Dependencies

Composite Sample Number must exist in the QC Sample table.

Prep. Lab Code must exist in the Laboratory table.

QC Relate data must be entered in order to store QC Sample data.

Related Sample Number must exist in the QC Sample table.

Routine samples may be related to QC samples only when the Owner ID of the routine sample matches that of the QC sample. The Media and Status fields in the Sample table for the routine samples must also be set correctly. The Media must not be blank, and the Status must be "U". These indicate that the sample number has been assigned to a sample.

QC Sample and QC Relate
~~QC-SAMPLE~~

Processing the Related Sample Number and Composite Sample Number fields is described in Section 4.3.3 of the *HEIS User's Guide* (DOE-RL 1994a).

Valid values for the QC Subtype field depend on the value in the QC Type field. The correct correspondence is listed below:

QC Type   QC Subtype

B	FBB, DTB, EB, FTB, MLB, TB
K	BS, DBS, MBS
R	none
D	none
S	none

**Code Lookup/
Validation**

Prep. Lab Code
 QC Origin
 QC Subtype
 QC Type
 Related Sample Type
 Sample Number in QC Relate   (NOTE: Sample Number must be provided)

Required Fields

QC Origin
 QC Type
 Sample Date/Time
 Sample Number in QC Sample*
 Sample Number in QC Relate*

**Recommended Query
Fields**

Choice 1 - Sample Number
 Choice 2 - Sample Date/Time
 Choice 3 - QC Type
               QC Subtype

**FORM FIELD NAMES/
DATABASE FIELD NAMES**

Form Field Name

Composite Flag
 Composite Sample Number
 Document Location
 Field Log ID
 Field Log Page
 Master Sample Flag
 Prep. Comment
 Prep. Date/Time
 Prep. Lab Code
 Prep. Location
 Project Leader
 QC Origin
 QC Subtype
 QC Type
 Related Comment
 Related Sample Number
 Related Sample Type
 Sample Date/Time
 Sample Number

Database Field Name

composite_flag
 composite_samp_num
 doc_loc
 field_log_id
 field_log_page
 master_samp_flag
 prep_comment
 prep_date_time
 prep_lab_code
 prep_location
 project_lead
 qc_origin
 qc_sub_type
 qc_type
 related_comment
 related_samp_num
 related_samp_type
 samp_date_time
 samp_num

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3.2 QC RELATE TABLE

(HEIS Database Table Name: qc_relate)

INTRODUCTION

The QC Relate table contains data regarding the relationship between QC samples and routine samples. The data are supplied by the sampler from field tests and evaluations. Each QC Relate record is uniquely identified by a quality control sample number and a routine sample number. QC Relate data must be entered on the QC Sample / QC Relate screen described in Section 3.1-1. A view form is shown in Figure 3.2-1.

Figure 3.2-1. QC Relate Form.

QC Relate - Multiple				
QC SAMPLE NUMBER	SAMPLE NUMBER	Related Comment	OWNER ID	ACCESS LEVEL
				-

SOURCE

Data for this table come from field log books, which are completed during sampling.

REQUIREMENTS

Dependencies

QC Sample Number must exist in the QC Sample table.

Sample Number must exist in a subject area Sample table, but it cannot be a QC Sample.

Special Processing

None.

Code Lookup/ Validation

None.

Required Fields

None.

Recommended Query Fields

Choice 1 - QC Sample Number
Sample Number

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**FORM FIELD NAMES/
DATABASE FIELD NAMES**

Form Field Name
QC Sample Number
Related Comment
Sample Number

Database Field Name
qc_samp_num
related_comment
samp_num

3.3 SPIKE COMPONENT TABLES

3.3.1 SPIKE COMPONENT TABLE (HEIS Database Table Name: spike_component)

INTRODUCTION

The Spike Component table contains data concerning chemicals added to spike field quality control samples. The data are supplied by the laboratories that create these samples and may be entered using the form shown in Figure 3.3.1-1 or the Spike Component Loader (see Section 5.4.5 in the *HEIS Operator's Guide* [DOE-RL 1994b]). Each spike component is uniquely identified by a sample number, constituent, analysis method, and preparation date/time. Other important data are the spike concentration, and spike concentration units.

Figure 3.3.1-1. Spike Component Form.

Spike Component	
SAMPLE NUMBER	_____
CONSTITUENT ID	_____
ANALYSIS METHOD ID	_____ (_____)
PREPARATION DATE/TIME	_____
Spike Concentration	_____ Spike Concentration Units _____
OWNER ID	_____ ACCESS LEVEL _____

SOURCE

Data for this table come from the laboratories that create spike samples.

REQUIREMENTS

Dependencies

Analysis Method ID must exist in the Analysis Method table.

Constituent ID must exist in the Constituent table.

Constituent ID and Analysis Method ID must exist as a pair in the Constituent Code table.

The Owner ID of the Spike Component record must be the same as the Owner ID of the associated QC Sample record.

The Sample Number must exist in the QC Sample table and be a spike sample (QC Type set to "K").

Special Processing

The Spike Concentration field is displayed in scientific notation (e.g., 1234.567 displays as 1.234567e+03).

**Code Lookup/
Validation**

Analysis Method ID
Constituent ID
Spike Concentration Units

Required Fields

Analysis Method ID*
Constituent ID*
Prep. Date/Time*
Sample Number*

**Recommended Query
Fields**

Choice 1 - Sample Number
Constituent ID
Analysis Method ID
Prep. Date/Time

**FORM FIELD NAMES/
DATABASE FIELD NAMES**

Form Field Name

Analysis Method
Component Group Name
Constituent ID
Spike Concentration
Spike Concentration Units

Database Field Name

anal_mthd_id
component_group_name
con_id
spike_conc
spike_conc_units

3.3.2 SPIKE COMPONENT GROUP TABLE

(HEIS Database Table Name: spike_component_group)

INTRODUCTION

The Spike Component Group table contains data concerning commonly used chemicals in spike field quality control samples. The data are supplied by the laboratories that create these samples. Each spike component group is uniquely identified by a component group name, constituent, and analysis method. Other important data are the spike concentration and spike concentration units. Data stored in this table can be used by the Spike Component Loader to automate data entry into the Spike Component table. The Spike Component Group form is shown in Figure 3.3.2-1.

Figure 3.3.2-1. Spike Component Group Form.

Spike Component Group	
COMPONENT GROUP NAME	_____
CONSTITUENT ID	_____
ANALYSIS METHOD ID	_____ (_____)
SPIKE CONCENTRATION	_____ SPIKE CONCENTRATION UNITS _____
OWNER ID	_____ ACCESS LEVEL _____

SOURCE

Data for this table come from the laboratories which create spike samples.

REQUIREMENTS

Dependencies

Analysis Method ID must exist in the Analysis Method table.

Constituent ID must exist in the Constituent table.

The Constituent ID and Analysis Method ID pairing must exist in the Constituent Code table.

Special Processing

The Spike Concentration field is displayed in scientific notation (e.g., 1234.567 displays as 1.234567e+03).

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**Code Lookup/
Validation**

Analysis Method ID
Constituent ID
Spike Concentration Units

Required Fields

Analysis Method ID*
Component Group Name*
Constituent ID*
Spike Concentration
Spike Concentration Units

**Recommended Query
Fields**

Choice 1 - Component Group Name
Constituent ID
Analysis Method ID

**FORM FIELD NAMES/
DATABASE FIELD NAMES**

Form Field Name

Analysis Method
Component Group Name
Constituent ID
Spike Concentration
Spike Concentration Units

Database Field Name

anal_mthd_id
component_group_name
con_id
spike_conc
spike_conc_units

3.4 QC RESULT TABLES

3.4.1 QC RESULT TABLE (HEIS Database Table Name: qc_result)

INTRODUCTION

The QC Result table contains the results of laboratory analyses performed on field quality control samples. Some properties of the samples, such as pH, temperature, and conductivity, also are stored in this table. Each record contains a result and associated data for a particular constituent for a sample.

There are two ways to access QC Result data depending on whether you want the form to display selected fields for multiple records or all fields for a single record.

- The QC Result form is shown in Figure 3.4.1-1. To access this form, choose the "QC Result" option on the Field QC Subject Area menu.
- The QC Result Multiple View form, shown in Figure 3.4.1-2, allows you to view five result records simultaneously. To access this form, choose the "QC Result - Multiple" option on the Field QC Subject Area menu.

This is a view-only form. Its purpose is to allow you to compare several selected records. To improve the performance of this form, no code lookup is available for the Lab Code field.

SOURCE

The source of the data is usually the laboratory where the analysis was performed. Typically these results are received electronically. This table also can contain data collected in the field concerning properties of the samples.

Figure 3.4.1-1. QC Result Form.

QC Result

RESULT REFERENCE NUMBER _____ (Press [DETAIL] to generate new value.)	
SAMPLE NUMBER _____	DISPLAY-ONLY SAMPLE DATE/TIME _____
CONSTITUENT ID _____	
ANALYSIS METHOD ID _____ (_____)	
LAB CODE _____	FORMAT TYPE _____ FORM NUMBER _____
Data Group _____	
LOAD DATE/TIME _____	
Date/Time Last Modified _____	Change Indicator _____
Result Received Date _____	
Analysis Date/Time _____	
Lab Extracted Date _____	
Lab Received Date _____	
Value Reported _____	Analysis Units Reported _____
Qualifiers _____	Review Flag _____
Total Analytical Error _____	Counting Error _____
Min Detectable Activity _____	Detected _____
Concentration Flag _____	Concentration Level _____
Dilution Factor _____	
Sample Aliquot Size _____	Sample Aliquot Units _____
Soil Aliquot Volume _____	Soil Extract Volume _____
Sample Part _____	Concentration Extract Volume _____ (uL)
Extraction _____	Injection Volume _____ (uL)
GPC Cleanup _____	Sulphur Cleanup _____
Column Type _____	Retention Time _____ (minutes)
GC Column Internal Diameter _____ (millimeters)	
Percent Solids _____	Artifacts _____
Percent Moisture _____	Moisture Decanted _____ Texture _____
Constituent Comment _____	
Analytical Quality Level _____	Validation Level _____
Confirm Code _____	Minimum Valid Percent _____
Lab Sample ID _____	Sample Matrix Code _____
Lab File ID _____	
SAS Number _____	Sample Contract _____
SDG Number _____	Customer Number _____
SOW Number _____	Case Number _____
Clarity Before _____	Color Before _____
Clarity After _____	Color After _____
Number TICs Found _____	Total Error _____
Data Documentation Level _____	
Document Location _____	
Result Comment _____	
OWNER ID _____	ACCESS LEVEL _____

MORE-INFORMATION
Press [DETAIL] for more information on:

_ Result Change Records
QC Result

Figure 3.4.1-2. QC Result Multiple View Form.

QC Result - Multiple

SAMPLE NUMBER	_____
Data Group	_____
CON ID	_____
Con Short Name	_____
ANAL MTHD ID	_____
Value Reported	_____
Value Units	_____
LAB CODE	_____
Conc. Flag	_____
Qualifiers	_____
Review Flag	_____
LOAD DATE/TIME	_____
Chg Date/Time	_____
Chg Indicator	_____
RRN	_____
DISPLAY ONLY	_____
Samp Date/Time	_____

REQUIREMENTS**Dependencies**

Analysis Method ID must exist in the Analysis Method table.

Constituent Comment and Lab Code must exist as a pair in the Comments table.

Constituent ID must exist in the Constituent table.

The Constituent ID and Analysis Method ID pairing must exist in the Constituent Code table.

Lab Code must exist in the Laboratory table.

Sample Number must exist in the QC Sample table.

Special Processing

A QC Result Change record is generated when a QC Result record is modified or deleted (see Section 4.3.5 of the *HEIS User's Guide* [DOE-RL 1994a] for a detailed description).

The following fields are assigned by the system and are for query only:

Change Indicator
Date/Time Last Modified
Load Date/Time
Result Reference Number

The following field is assigned by the system and is for display only:

Sample Date/Time

Instructions for the following are found in Section 4.3.4 of the *HEIS User's Guide*:

- Date restrictions
- Fields displayed in scientific notation
- The relationship between Form Number and Format Type
- Processing the Constituent Comment, Qualifier, and Review Flag fields.

**Code Lookup/
Validation**

Analytical Quality Level
Analysis Method ID
Analysis Units Reported
Column Type
Concentration Flag
Concentration Level
Confirm Code
Constituent Comment
Constituent ID
Data Documentation Level
Extraction
Form Number
Format Type
Lab Code
Qualifiers
Review Flag
Sample Aliquot Units
Sample Matrix Code
Sample Part
Texture
Validation Level

Required Fields

Analysis Method ID
Constituent ID
Form Number
Format Type
Lab Code
Load Date/Time
Result Reference Number*
Sample Number

**Recommended Query
Fields**

Choice 1 - Result Reference Number

Choice 2 - Sample Number
Constituent ID
Analysis Method ID
Lab Code
Format Type
Form Number

Choice 3 - Data Group
Load Date/Time

**FORM FIELD NAMES/
DATABASE FIELD NAMES**

<u>Form Field Name</u>	<u>Database Field Name</u>
Analytical Quality Level	aql
Analysis Date/Time	anal_date_time
Analysis Method ID	anal_mthd_id
Analysis Units Reported	anal_units_rptd
Artifacts	artifacts
Case Number	case_num
Change Indicator	change_indicator
Clarity After	clarity_after
Clarity Before	clarity_before
Color After	color_after
Color Before	color_before
Column Type	column_type
Concentration Extract Volume	conc_extract_vol
Concentration Flag	conc_flag
Concentration Level	conc_level
Confirm Code	confirm_code
Constituent Comment	con_comment
Constituent ID	con_id
Counting Error	counting_error
Customer Number	customer_num
Data Documentation Level	data_documentation_level
Data Group	data_group
Date/Time Last Modified	date_last_modified
Detected	detected
Dilution Factor	dilut_factor
Document Location	doc_loc
Extraction	extraction
Form Number	form_num
Format Type	format_type
GC Column Internal Diameter	gc_column_id
GPC Cleanup	gpc_clean_up
Injection Volume	injection_vol
Lab Code	lab_code
Lab Extracted Date	lab_extracted_date
Lab File ID	lab_file_id
Lab Received Date	lab_received_date
Lab Sample ID	lab_samp_id
Load Date/Time	load_date_time
Min Detectable Activity	min_detectable_activity
Minimum Valid Percent	min_valid_pcmt
Moisture Decanted	moisture_dec
Number TICs Found	num_tics_found
Percent Moisture	pcmt_moisture_dec
Percent Solids	pcmt_solids
Qualifiers	qualifier
Result Comment	result_comment
Result Received Date	result_received_date
Result Reference Number	rrn
Retention Time	retention_time
Review Flag	review_flag
Sample Aliquot Size	samp_aliquot_size
Sample Aliquot Units	samp_aliquot_units
Sample Contract	samp_contract
Sample Date/Time	samp_date_time
Sample Matrix Code	samp_matrix_code
Sample Number	samp_num
Sample Part	samp_part
Soil Aliquot Volume	soil_aliquot_vol
Soil Extract Volume	soil_extract_vol
SAS Number	sas_num
SDG Number	sdg_num
SOW Number	sow_num
Sulphur Cleanup	sulphur_cleanup
Texture	texture
Total Analytical Error	total_anal_error
Total Error	total_error
Validation Level	validation_level
Value Reported	value_rptd

3.4.2 QC RESULT CHANGE TABLE

(HEIS Database Table Names: qc_result_change)

INTRODUCTION

The QC Result Change table contains a time-stamped historical record of changes made to field quality control result records. Some aspects of the sample results, such as value reported and qualifiers, are subject to change. The reason for the change, the change authority and user name, the change code, and the date/time of change also are stored. The QC Result Change View form, shown in Figure 3.4.2-1, provides a way to view this historical record. To access this form, choose the "QC Result Change View" option on the Field QC Subject Area menu.

SOURCE

The source of the data is a previous record in the QC Result table. These records are automatically generated when a result record is modified or deleted. See Section 4.3.5 of the *HEIS User's Guide* (DOE-RL 1994a) for details.

REQUIREMENTS

"Dependencies" and "Special Processing" are the same as found in the QC Result table (see Section 3.2.1). The "Required Fields", "Code Lookup/Validation", and "Form Field Name/Database Field Name" lists are the same with the exception of specific changes listed in the sections below. A complete description of the change record generation process is found in Section 4.3.5 of the *HEIS User's Guide*.

Code Lookup/ Validation

All fields in the QC Result table plus -
Change Code

Required Fields

All fields in the QC Result table plus -
Change Authority
Change Code
Change Reason
Change User Name

Figure 3.4.2-1. QC Result Change View Form

QC Result Change View

RESULT REFERENCE NUMBER _____		CHANGE DATE/TIME _____	
SAMPLE NUMBER _____			
CONSTITUENT ID _____			
ANALYSIS METHOD ID _____ (_____)			
LAB CODE _____		FORMAT TYPE _____ FORM NUMBER _____	
CHANGE AUTHORITY _____		CHANGE CODE _____	CHANGE USER NAME _____
CHANGE REASON _____			
Data Group _____			
LOAD DATE/TIME _____		Change Indicator _____	
Date/Time Last Modified _____			
Result Received Date _____			
Analysis Date/Time _____			
Lab Extracted Date _____			
Lab Received Date _____			
Value Reported _____		Analysis Units Reported _____	
Qualifiers _____		Review Flag _____	
Total Analytical Error _____		Counting Error _____	
Min Detectable Activity _____		Detected _____	
Concentration Flag _____		Concentration Level _____	
Dilution Factor _____		Sample Aliquot Units _____	
Sample Aliquot Size _____			
Sample Part _____		Concentration Extract Volume _____ (uL)	
Extraction _____		Injection Volume _____ (uL)	
GPC Cleanup _____		Sulphur Cleanup _____	
Column Type _____		Retention Time _____ (minutes)	
GC Column Internal Diameter _____ (millimeters)			
Percent Solids _____		Artifacts _____	
Percent Moisture _____		Moisture Decanted _____ Texture _____	
Constituent Comment _____			
Analytical Quality Level _____		Validation Level _____	
Confirm Code _____		Minimum Valid Percent _____	
Lab Sample ID _____		Sample Matrix Code _____	
Lab File ID _____			
SAS Number _____		Sample Contract _____	
SDG Number _____		Customer Number _____	
SOW Number _____		Case Number _____	
Clarity Before _____		Color Before _____	
Clarity After _____		Color After _____	
Number TICs Found _____		Total Error _____	
Data Documentation Level _____			
Document Location _____			
Result Comment _____			
OWNER ID _____		ACCESS LEVEL _____	

**Recommended Query
Fields**Choice 1 - Result Reference Number
Change Date/TimeChoice 2 - Sample Number
Constituent ID
Analysis Method ID
Lab Code
Format Type
Form Number
Change Date/Time**FORM FIELD NAMES/
DATABASE FIELD NAMES**

All fields in the QC Result table plus -

Form Field Name
Change Authority
Change Code
Change Date/Time
Change Reason
Change User NameDatabase Field Name
change_authority
change_code
change_date_time
change_reason
change_user_name

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