Digital Water-Quality Data Base for the West Branch Canal Creek Area, Aberdeen Proving Ground, Maryland

Authors: Vanessa C. Smith and Matthew G. Lesniewski, 2001
Version 1.1

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Digital Water-Quality Data Base

Abstract

This CD-ROM contains part of a data base that was developed by the U.S. Geological Survey (USGS) as part of a study in cooperation with the U.S. Army at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. (Figure 1.) This part includes only selected data that were verified and approved for publication from November 1998 through September 1999. The data include descriptions and locations of sampling sites, field parameters measured, and the results of analyses for inorganic and organic constituents.

Introduction

The purpose of this data base is to store ground-water and surface-water data collected at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. (Figure 2.) These data were collected in support of an ongoing USGS investigation of ground-water contamination in the wetland, including an evaluation of the factors controlling the fate and transport of the contaminants, and an analysis of natural attenuation as a possible remediation method. The data include descriptions and locations of sampling sites, field parameters measured, and the results of analyses for inorganic and organic constituents.

The user of the enclosed data base should be familiar with Microsoft Access and structured query language (SQL). This data base is structured in a relational data base data model with tables containing data in columns that fit into predefined categories. The data base structure is designed to support the ground-water-flow and solute-transport modeling of natural attenuation processes at Canal Creek. After meeting with the project staff, a set of basic criteria for inclusion in the data base was outlined. These were used as a starting point for the initial data base design. After further discussions, a final revised set of criteria was established. This set was then translated into an appropriate field and file structure for the data base.

Entity Relationship Diagram of the Digital Water-Quality Data Base for the West Branch Canal Creek Area, Aberdeen Proving Ground, Maryland

A full view of all the tables and fields in the data base and the overall structure of the data

base is shown in an Entity Relationship Diagram included on this CD-ROM. This graphical representation of the data-base relationships is provided as an aid to understanding the structure of the data base. The diagram is comprised of three basic elements: entity types, attributes, and relationships. An entity is an object that stores data and is represented by rectangles on the diagram. The data base stores information about sampling locations, samples collected for analyses, results of analyses performed on each sample, and information about the various types of sampling locations. The entity information is called an attribute and is represented by ovals on the diagram. Each entity type in the data base has the same set of attributes with different attribute values. All tables are related to one another through defined relationships using the primary keys shown in diamonds on the diagram.

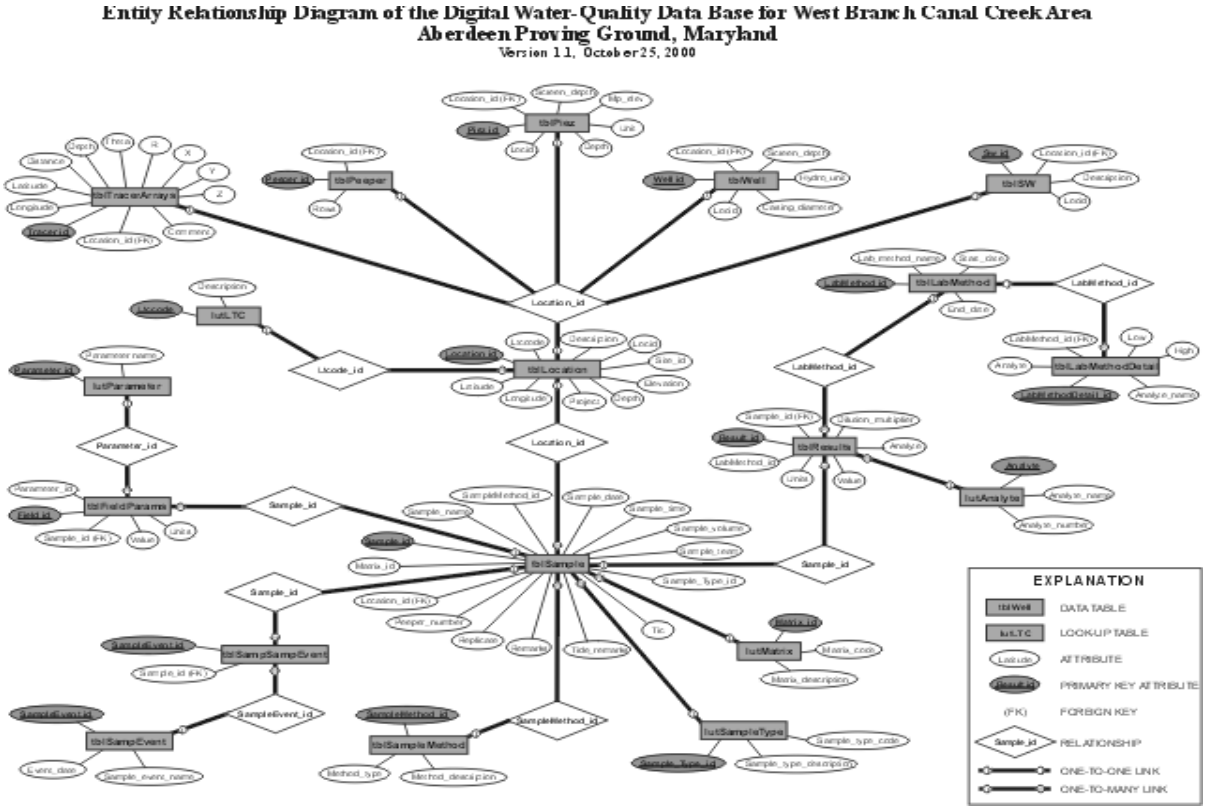

Figure 3. Entity relationship diagram of the digital water-quality data base (click to enlarge).

Table Description

Naming conventions are used for tables and fields. Names consist of whole words or phrases that describe the data contained in each table. All tables have a prefix of either "tbl" for basic data tables or "lut" for lookup tables, which are used to classify or quantify information in a data table. For example, "tblSample" is a table that contains basic data on samples, such as collection date and time, sample matrix, and sample location. The table "lutSampleType" is a lookup table that defines the type of sample that was collected such as a replicate or duplicate sample.

Every table in the data base has a field or a combination of fields that uniquely identifies each record in the table. This unique identifier is called the primary key and is labeled (PK) in the data dictionary. Primary keys have an "_id" suffix. For example, the location_id field in the location table is the primary key for that table; no two records in the location table have the same value in the location_id field. This provides a method to identify one particular record in the table. When a field in one table matches the primary key of another table, this is referred to as a foreign key (FK). Foreign keys are labeled (FK) in the data dictionary. For example, the location_id field in the sample table is a foreign key in that table. The location_id field links the location table and the sample table.

Each row in a data table contains unique data for the categories defined by the columns. For example, the location table describes sampling locations with columns for latitude, longitude, elevation, and so forth. The sample table describes the samples that were collected with columns for data such as sample date, sample method, sample matrix, and location. By linking the sample and location tables, the user can view data on both the sample and the location where the sample was collected.

Data Dictionary

A Data Dictionary is provided to explain the layout of the data base. Instructions explaning how to read the data dictionary listings are also included. The data dictionary provides information on each table in the data base, including the table name, the number of fields and records, and the date and time the table was last updated. The tables are described in terms of the fields they contain, including field name, a brief description of the information in the field, and the type and size of the field.

Digital Water-Quality Data Base

References

Lorah, M.M., and Clark, J.S., 1996, Contamination of ground water, surface water, and soil, and evaluation of selected ground-water pumping alternatives in the Canal Creek Area of Aberdeen Proving Ground, Maryland: U.S. Geological Survey Open-File Report 95-282, 318 p.

Lorah, M.M., Olsen, L.D., Smith, B.A., Johnson, M.A., and Fleck, W.B., 1997, Natural attenuation of chlorinated volatile organic compounds in a freshwater tidal wetland, Aberdeen Proving Ground, Maryland: U.S. Geological Survey Water-Resources Investigations Report 97-4171, 95 p.

Alternate Formats

For your convenience, this report is provided in alternate formats on this CD-ROM. When printing pdf documents, be sure to select the "fit to page" option in your print menu.

Adobe Acrobat (PDF):
Introduction | Figure 1 | Figure 2 | Entity Relationship Diagram

Microsoft Word:
Introduction | Data Dictionary

Other Documents (ASCII Text):
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For Comments or questions contact vcsmith@usgs.gov
Last Modified: Fri January 26, 10:27 EST 2001
Pages designed by Matthew Lesniewski

U.S. GEOLOGICAL SURVEY

Digital Water-Quality Data Base for the West Branch Canal Creek Area, Aberdeen Proving Ground, Maryland
Open-File Report 01-63

[This File is the 1_README.TXT file.]

Please read this document first before viewing the contents of this CD-ROM.

INTRODUCTION:

This Compact Disc (CD-ROM) contains U.S. Geological Survey (USGS) Open-File Report 01-63, titled "Digital Water-Quality Data Base for the West Branch Canal Creek Area, Aberdeen Proving Ground, Maryland," by Vanessa C. Smith and Matthew G. Lesniewski.

This CD-ROM contains part of a data base that was developed by the U.S. Geological Survey as part of a study in cooperation with the U.S. Army at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. This part includes only selected data from November 30, 1998 to September 30, 1999 that were verified and approved for publication.

The contents of this report and CD-ROM have been approved for public release and unlimited distribution by the U.S. Army -- Distribution Number 3723-A-6.

THIS CD-ROM MAY BE OBTAINED FROM:

U.S. Geological Survey
8987 Yellow Brick Road
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Telephone: (410) 238-4200
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OR

U.S. Geological Survey
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TO GET STARTED:

The file "INDEX.HTM" must be loaded into any web browser to begin viewing the CD.

On a Windows 95/98/NT PC, the "INDEX.HTM" should automatically load into Netscape (r) or Internet Explorer (r) when you insert the CD-ROM. If it does not auto-open, open your CD-ROM drive under "My Computer" and double-click on the file "INDEX.HTM" to open this in your default web browser.

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Some links included on this CD-ROM may lead to Web pages at several internet locations. Users must have internet access to retrieve these pages. These internet locations may change during the useful lifetime of this CD-ROM; therefore, users may have difficulty reaching the external pages, even with an internet connection.

REQUIRED SOFTWARE:

MICROSOFT ACCESS (r)

The Digital Water-Quality Data Base can be viewed using Microsoft Access 2000 (r) or later. Access 2000 (r) is only available for computers with the Microsoft Windows (r) operating system. For more information about Microsoft Access 2000 (r), please see http://www.microsoft.com/office/

ADOBE ACROBAT READER (r)

The ACROBAT directory on this CD-ROM contains English language installers for Adobe Acrobat Reader for both Windows and Macintosh. For more information about Adobe Acrobat, or for other languages or versions, please see the Adobe Acrobat Reader web page at http://www.adobe.com/products/acrobat/readstep.html

For Windows NT and Windows 95/98, a 32-bit version (RS405ENG.EXE) is provided. A 16-bit version (RS16E301.EXE) is provided for Windows 3.1. For Macintosh, a PowerPC version (RS405ENG.HQX) is provided.

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The overall layout of the disc is as follows:

```
\
|  1_readme.txt          This File
|  disclaim.txt          Disclaimer
|  index.htm             Introduction in HTML Format
|  water.mdb             Water-Quality Data Base
|
+---acrobat              Adobe Acrobat Reader
|      rs16e301.exe      Reader 3.01 for Windows 3.1
|      rs405eng.exe      Reader 4.05 for Windows 95/98/NT
|      rs405eng.hqx      Reader 4.05 for PowerPC Macintosh
|
+---htmldocs             Documents in HTML Format
|      datadict.htm      Data Dictionary
|      erdiag.htm        Entity-Relationship Diagram
|      fig1.htm          Figure 1
|      fig2.htm          Figure 2
|
+---pdfdocs              Documents in PDF Format
|      erdiag.pdf        Entity-Relationship Diagram
|      fig1.pdf          Figure 1
|      fig2.pdf          Figure 2
|      intro.pdf         Introduction
|
+---worddocs             Documents in Microsoft Word Format
       datadict.doc      Data Dictionary
       intro.doc         Introduction
```

(Note: Only files related to this report are listed. Support files are not displayed in this list.)

For additional information, contact:

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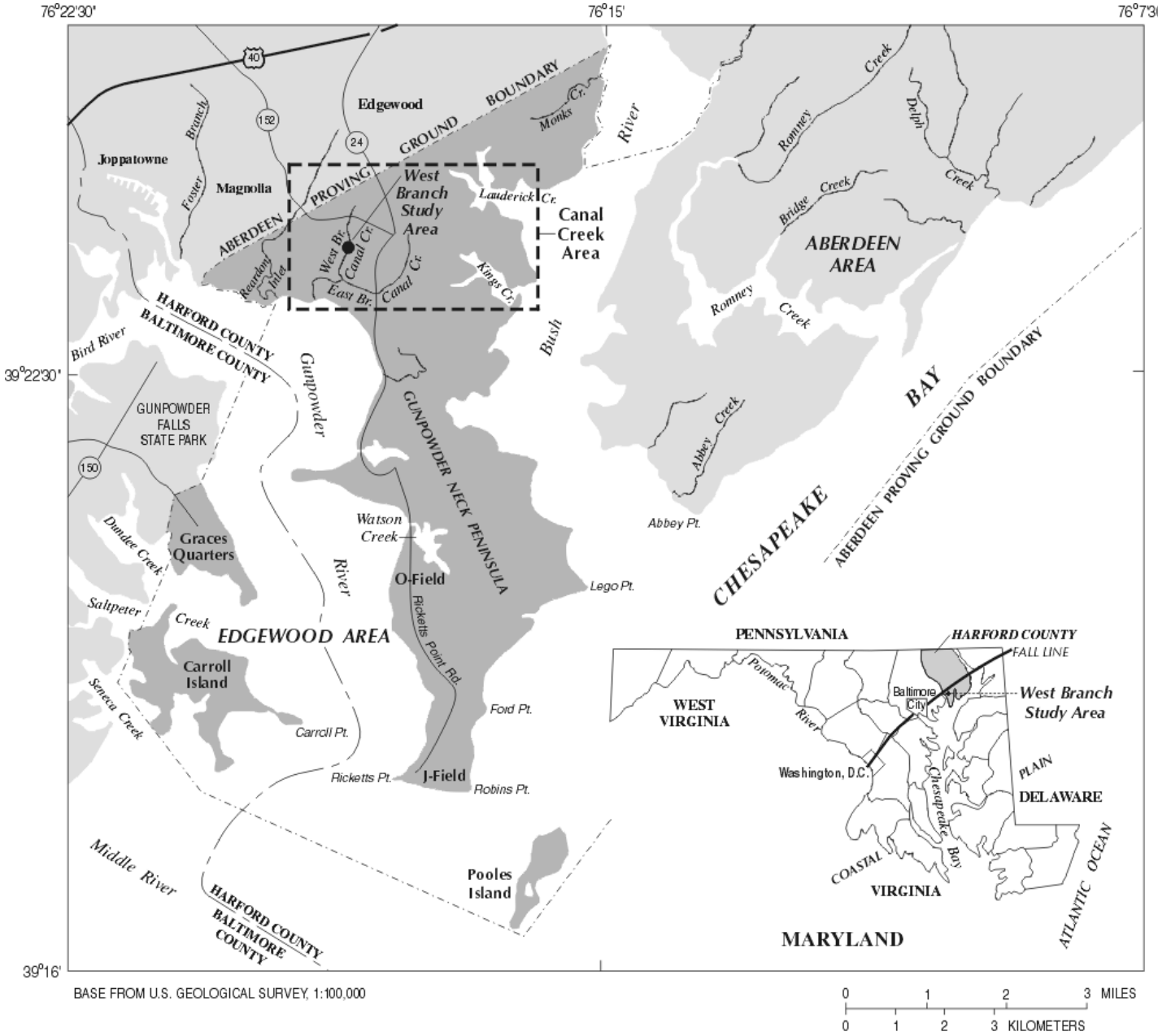
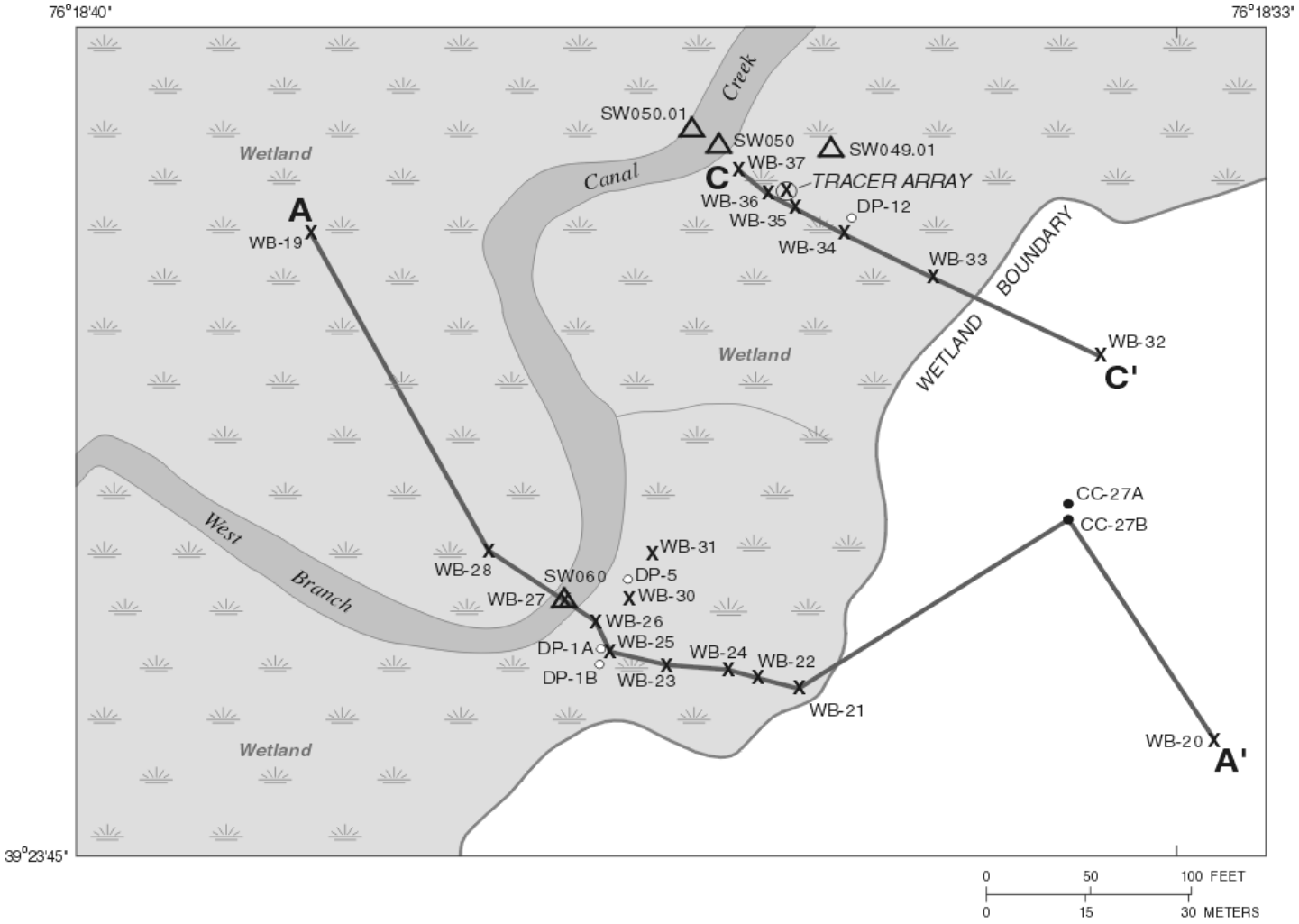


Figure 1. Location of Canal Creek area and West Branch study area, Aberdeen Proving Ground, Maryland (modified from Lorah and others, 1997, p. 5).



EXPLANATION

- ● 4" WELL FROM PREVIOUS STUDY
- ○ 2" PIEZOMETER SITE
- A—A' LINE OF SECTION
- X 0.75-INCH PIEZOMETER SITE
- ⊗ TRACER ARRAY
- SW060 △ SURFACE-WATER SITE AND IDENTIFICATION NUMBER

CC-27A
DP-12
WB-20 WELL OR PIEZOMETER SITE NUMBER

Figure 2. Locations of sampling sites and transects A-A' and C-C' in the wetland study area along West Branch Canal Creek, Aberdeen Proving Ground, Maryland (modified from Lorah and Clark, 1996, p. 106).

Entity Relationship Diagram of the Digital Water-Quality Data Base for West Branch Canal Creek Area Aberdeen Proving Ground, Maryland

Version 1.1, October 25, 2000

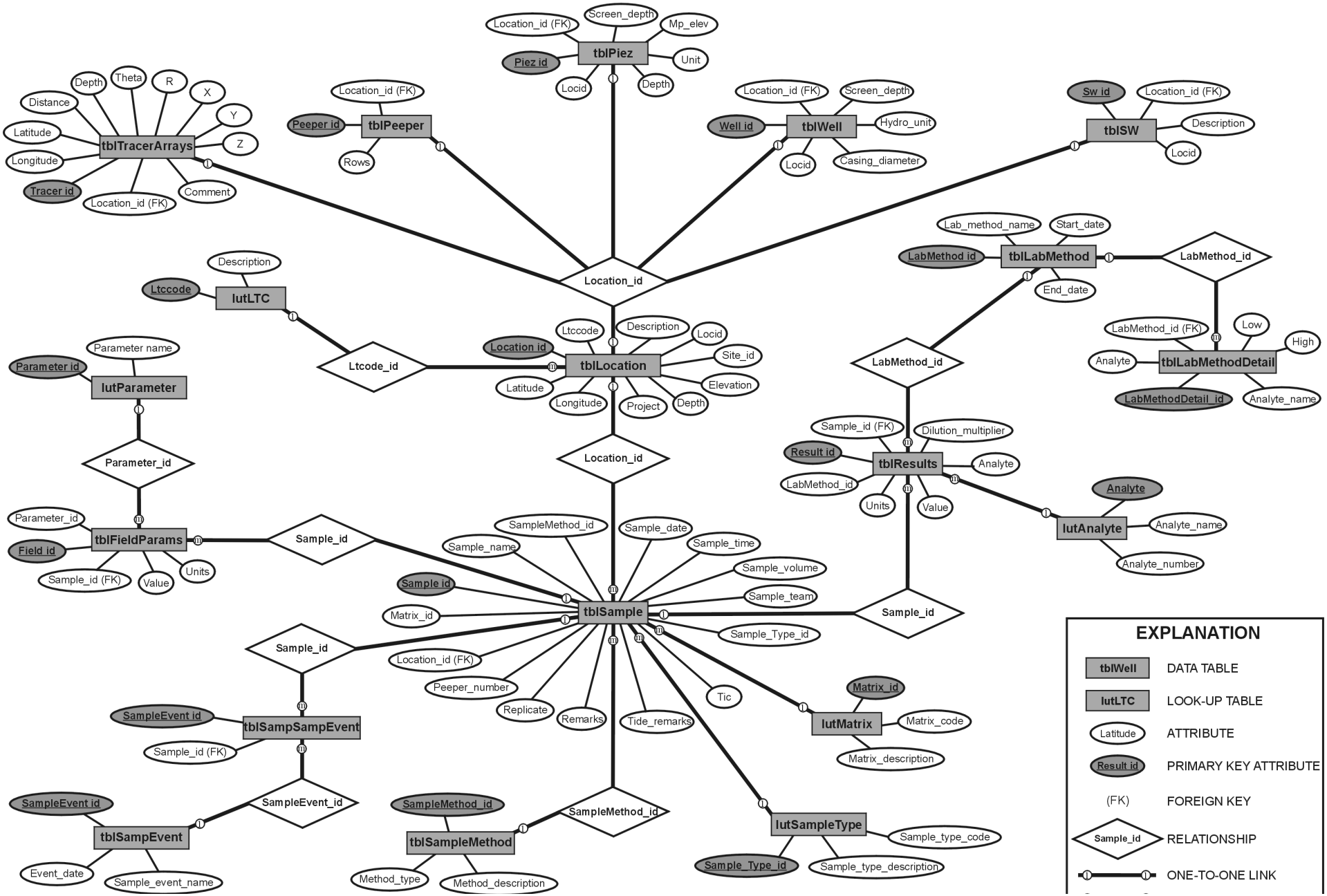
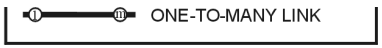


Figure 3. Entity Relation Diagram for Digital Water Quality Database



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Digital Water-Quality Data Base

Data Dictionary

How to read the Data Dictionary listings:

The description of each table begins with the header information:

Table name.
Number of fields.
Number of records at the time the dictionary was generated.
Date of last update to the table.
Description of the table contents.

The tables are listed in alphabetical order starting with the look-up tables.

Below each Table description, definition information is presented for each field in the table, including the following attributes:

Field position (order number) within the table.
Field name
PK Fields that uniquely identify each record in a table (checked if field is part of the Primary Key for the table).
FK Fields that obtain their value from another table (checked if field is a Foreign Key).
Rqd (checked if field is Required to have a value for each record in the table; if unchecked, field is optional).
Data type of the field.
Size of the field (allowed number of characters for Text fields; for other data types it represents the number of bytes used for storage).
Default value for the field (usually refers to a Foreign Key value representing a selection from a domain table).
Description of the field

List of Tables contained within the Data Base:

Table Name	Fields	Records	Date and Time
lutAnalyte	3	85	9/19/2000 8:45

Table description: The lutAnalyte table stores the name and abbreviated code representing an analyte.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Analyte	☑		☑	Text	50		Abbreviated code representing analyte
2 Analyte_name				Text	50		Name of analyte
3 Analyte_number				Number(Long)	4	0	Numerical code from purge-and-trap gas chromatograph with mass-selective detector (GC/MSD) identifying the analyte

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Table Name	Fields	Records	Date and Time
lutLTC	2	7	9/19/2000 8:45

Table description:The lutLTC table stores the code name and description of the sampling location type and is referenced by the location table.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Ltccode	☑		☑	Text	50		Unique code used to identify the location type
2 Description				Text	50		Description of the location type Domain options: HP - Hoverprobe LB - Lab sample PP - Peeper PZ - Piezometer SW - Surface water TA - Tracer array WL - Well

---

Table Name	Fields	Records	Date and Time
lutMatrix	3	4	9/19/2000 8:45

Table description:The lutMatrix table stores the code name and description of the sampling medium collected for analysis and is referenced by tblSample table.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Matrix_id	☑		☑	Number(Long)	4	0	Matrix identifier
2 Matrix_code				Text	50		Unique code assigned to matrix
3 Matrix_description				Text	50		Description of sampling medium collected for analysis

							Domain options: WG - Ground water WQ - Water quality WS - Surface water

---

Table Name	Fields	Records	Date and Time
lutParameter	2	15	9/19/2000 8:45

Table description:The lutParameter table stores the parameter name of field parameters and is referenced by the tblFieldParams table.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Parameter_id	☑		☑	Number(Long)	4	0	Parameter identifier
2 Parameter_name				Text	50		Name of field parameter

Table Name	Fields	Records	Date and Time
lutSampleMethod	3	6	9/19/2000 8:45

Table description: The lutSampleMethod table stores the code and description of the method used to collect samples and is referenced by the tblSample.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 SampleMethod_id	☑		☑	Number(Long)	4	0	Sample method identifier
2 Method_type				Text	50		Unique code assigned to sampling method
3 Method_description				Text	50		Description of sampling method used to collect the sample Domain options: Sub - Submersible pump Per - Peristaltic pump Hand - Hand pump Syr - Syringe Bail - Bailer

---

Table Name	Fields	Records	Date and Time
lutSampleType	3	3	9/19/2000 8:45

Table description: The lutSample table stores the code and description of the type of sample collected and is referenced by the tblSample.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 SampleType_id	☑		☑	Number(Long)	4	0	Sample type identifier
2 Sample_type_code				Text	50		Unique code assigned to sample type

3 Sample_type_description				Text	50		Description of sample type collected Domain options: N - Normal sample DUP - Duplicate sample BL - Blank sample

---

Table Name	Fields	Records	Date and Time
lutUnits	2	5	9/19/2000 8:45

Table description: The lutUnits table stores codes for the units of measure used in the analyses of samples and is referenced by tblSample and tblFieldParams.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Units_id	☑		☑	Number(Long)	4	0	Units identifier
2 Units				Text	50		Unit of measure

Table Name	Fields	Records	Date and Time
tblFieldParams	6	143	9/19/2000 8:45

Table description: The tblFieldParams table stores information and results for field parameters

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Field_id	☑		☑	Auto Number(Long)	4	0	Field sample identifier
2 Sample_id		☑		Number(Long)	4	0	Identifier of sample
3 Location_id		☑		Number(Long)	4	0	Identifier of location
4 Parameter_id		☑		Number(Long)	4	0	Identifier of parameter
5 Value				Text	50		Analytical value
6 Units				Text	50		Measurement unit

Table Name	Fields	Records	Date and Time
tblLabMethod	4	18	9/19/2000 8:45

Table description: The tblLabMethod table stores information on the lab method used on samples analyzed using the GC/MSD purge-and-trap gas chromatograph with mass-selective detector and the dates the method was applied.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 LabMethod_id	☑		☑	Auto Number(Long)	4		Lab method identifier
2 Lab_method_name				Text	255		Name of lab method
3 Start_date				Date/Time	8		Start date of lab method
4 End_date				Date/Time	8		End date of lab method

Table Name	Fields	Records	Date and Time
tblLabMethodDetail	6	1152	9/19/2000 8:45

Table description: The tblLabMethodDetail table stores information on the concentration of the lowest and highest calibration standard (upper and lower reporting limit) for each parameter in the lab method.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 LabMethodDetail_id	☑		☑	Auto Number(Long)	4		Lab method detail identifier
2 LabMethod_id		☑		Number(Long)	4	0	Identifier of lab method
3 Analyte_name				Text	255		Long name of analyte
4 Analyte				Text	50		Short name of analyte
5 Low				Number(Double)	8		Concentration of the lowest calibration standard (lower reporting limit)
6 High				Number(Double)	8		Concentration of the highest calibration standard (upper reporting limit)

Table Name	Fields	Records	Date and Time
tblLocation	10	353	9/19/2000 8:45

Table description: The tblLocation stores information on sampling locations.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Location_id	☑		☑	Auto Number(Long)	4		Location identifier
2 Locid				Text	15		Location name assigned to the location where samples or measurements are collected
3 Ltccode		☑		Text	2		Coded value describing location where samples or measurements are taken
4 Site_id				Text	255	Null	USGS site identification
5 Latitude				Text	15		Latitude of location
6 Longitude				Text	15		Longitude of location
7 Elevation				Text	8		Elevation of ground surface at sampling location
8 Depth				Text	8		Total depth of sampling location, measured in feet relative to ground
9 Project				Text	50		Project area of location
10 Description				Text	50		Description of location

Table Name	Fields	Records	Date and Time
tblPeeper	3	3	9/19/2000 8:45

Table description: The tblPeeper table stores information on peepers used to collect samples.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Peeper_id	☑		☑	Number(Long)	4	0	Peeper site identifier
2 Location_id		☑		Number(Long)	4	0	Identifier of location
3 Rows				Number(Long)	4	0	Number of rows in peeper

Table Name	Fields	Records	Date and Time
tblPiez	7	78	9/19/2000 8:45

Table description: The tblPiez table stores information on piezometers used to collect samples.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Piez_id	☑		☑	Number(Long)	4	0	Piezometer identifier
2 Location_id		☑		Number(Long)	4	0	Identifier of location
3 Locid				Text	255		Unique name given to piezometer
4 Unit				Text	255		Hydrogeologic unit
5 Screen_depth				Text	255		Depth of screen (in feet)
6 Depth				Number(Double)	8		Total depth
7 Mp_elevation				Number(Double)	8		Measuring-point elevation of piezometer measured in feet, relative to ground surface

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Table Name	Fields	Records	Date and Time
tblResults	7	12540	9/19/2000 8:45

Table description: The tblResults table stores information on the analytical results of a sampling test procedure.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Result_id	☑		☑	Number(Long)	4	0	Result identifier
2 Sample_id		☑		Number(Long)	4	0	Identifier of sample
3 Analyte				Text	50		Name of compound analyzed
4 Value				Text	50		Value of analyte
5 Units				Text	50		Unit of measure
6 Dilution_multiplier				Text	50		Dilution multiplier used for the sample
7 LabMethod_id		☑		Number(Long)	4	0	Identifier of lab method

Table Name	Fields	Records	Date and Time
tblSampEvent	3	10	9/19/2000 8:45

Table description: The tblSampEvent table stores information on a sampling event

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 SampleEvent_id	☑		☑	Number(Long)	4	0	Sample event identifier
2 Sample_event_name				Text	50		Name of sampling event
3 Event_date				Text	50		Date/dates of sampling event

Table Name	Fields	Records	Date and Time
tblSample	15	459	9/19/2000 8:45

Table description: The tblSample table stores information on samples collected for analysis.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Sample_id	☑		☑	Number(Long)	4	0	Sample identifier
2 Sample_name				Text	50		Name given to sample
3 Location_id		☑		Number(Long)	4	0	Identifier of location where sample was collected
4 SampleType_id		☑		Number(Long)	4	0	Identifier of the sample type
5 Sample_volume				Number(Long)	4	0	Volume of sample
6 Replicate				Text	50		Replicate number of the sample
7 Sample_date				Date/Time	8		Date sample was collected
8 Sample_time				Date/Time	8		Time sample was collected
9 SampleMethod_id		☑		Number(Long)	4	0	Identifier of the sampling method
10 Matrix_id		☑		Text	50		Identifier of sample matrix
11 Tic				Text	50		Tentatively identified compound found in sample
12 Peeper_number				Number(Long)	4	0	Peeper cell number from which the sample was collected
13 Tide_remarks				Text	150		Tide at the time sample was taken
14 Remarks				Text	255		Remarks on the sample
15 Sample_team				Text	50		Sampling team

Table Name	Fields	Records	Date and Time
tblSampSampEvent	2	443	9/19/2000 8:45

Table description: The tblSampSampEvent stores the sample event associated with each sample

Field Name	PK	FK	Rqd	Type	Size	Default	Description

1 SampleEvent_id	☑	☑	☑	Number(Long)	4	0	Sample event identifier
2 Sample_id	☑	☑	☑	Number(Long)	4	0	Identifier of sample

Table Name	Fields	Records	Date and Time
tblSW	4	5	9/19/2000 8:45

Table description: The tblSW stores general information on surface-water sampling sites

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 SW_id	☑		☑	Number(Long)	4	0	Surface-water identifier
2 Location_id		☑		Number(Long)	4	0	Identifier of location
3 Locid				Text	50		Site name
4 Description				Text	50		Description of location

Table Name	Fields	Records	Date and Time
tblTracerArrays	12	100	9/19/2000 8:45

Table description: The tblTracerArrays stores general information on tracer array sampling locations

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Tracer_id	☑		☑	Auto Number(Long)	4		Tracer array identifier
2 Location_id		☑		Number(Long)	4	0	Location identifier perpendicular to the creek (in inches)
3 X				Number(Double)	8		Rectilinear coordinate perpendicular to the creek (in inches)
4 Y				Number(Double)	8		Rectilinear coordinate parallel to the creek (in inches)
5 Z				Number(Double)	8		Vertical distance from the injection point (in inches)
6 Theta				Number(Double)	8		Angular coordinate in the radial direction
7 R				Number(Double)	8		Radial distance from the origin in the radial coordinate system
8 Latitude				Number(Long)	4	0	Latitude of tracer array
9 Longitude				Number(Long)	4	0	Longitude of tracer array
10 Comment				Text	50		Comment regarding tracer array
11 Depth				Number(Double)	8		Vertical distance from land surface to the piezometer opening (in inches)
12 Distance				Number(Double)	8	0	Linear distance from the tracer injection point to the piezometer measuring point (in inches)

Table Name	Fields	Records	Date and Time
tblWell	6	124	9/19/2000 8:45

Table description: The tblWell table stores general information on wells.

Field Name	PK	FK	Rqd	Type	Size	Default	Description
1 Well_id	☑		☑	Auto Number(Long)	4		Well identifier
2 Location_id		☑		Number(Long)	4	0	Identifier of location
3 Locid				Text	50		Name of well
4 Casing_diameter				Number(Double)	8		Diameter of well (in inches)
5 Screen_depth				Text	50		Depth of screen (in feet)
6 Hydro_unit				Text	50		Hydrogeomorphic unit

Summary Count of Table and Fields:

Table and Field Listing

Number of Tables	20
Total Number of Fields	103
Unique Key Fields	37
Non-Key Fields	66
Total Number of Records	15,553

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Digital Water-Quality Data Base for the West Branch Canal Creek Area, Aberdeen Proving Ground, Maryland

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Version 1.1

Abstract

This CD-ROM contains part of a data base that was developed by the U.S. Geological Survey (USGS) as part of a study in cooperation with the U.S. Army at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. This part includes only selected data from November 1998 through September 1999 that were verified and approved for publication. The data include descriptions and locations of sampling sites, field parameters measured, and the results of analyses for inorganic and organic constituents

Introduction

The purpose of this data base is to store ground-water and surface-water data collected at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. These data were collected in support of an ongoing USGS investigation of ground-water contamination in a wetland, including an evaluation of the factors controlling the fate and transport of the contaminants, and an analysis of natural attenuation as a possible remediation method. The data include descriptions and locations of sampling sites, field parameters measured, and the results of analyses for inorganic and organic constituents.

The user of the enclosed data base should be familiar with Microsoft Access and structured query language (SQL). This data base is structured in a relational data base data model with tables containing data in columns that fit into predefined categories. The data base structure is designed to support the ground-water-flow and solute-transport modeling of natural attenuation processes at Canal Creek. After meeting with the project staff, a set of basic criteria for inclusion in the data base was outlined. These were used as a starting point for the initial data base design. After further discussions, a final revised set of criteria was established. This set was then translated into an appropriate field and file structure for the data base.

A full view of all the tables and fields in the data base and the overall structure of the data base is shown in an Adobe Acrobat PDF file named ERDiagram.pdf included on this CD-ROM. This graphical representation of the data-base relationships is provided as an aid to understanding the structure of the data base. The diagram is comprised of three basic elements: entity types, attributes, and relationships. An entity is an object that stores data and is represented by rectangles on the diagram. The data base stores information about sampling locations, samples collected for analyses, results of analyses performed on each sample, and information about the various types of sampling locations. The entity information is called an attribute and is represented by ovals on the diagram. Each entity type in the data base has the same set of attributes with different attribute values. All tables are related to one another through defined relationships using the primary keys shown in diamonds on the diagram.

Naming conventions are used for tables and fields. Names consist of whole words or phrases that describe the data contained in each table. All tables have a prefix of either

"tbl" for basic data tables or "lut" for lookup tables, which are used to classify or quantify information in a data table. For example, "tblSample" is a table that contains basic data on samples, such as collection date and time, sample matrix, and sample location. The table "lutSampleType" is a lookup table that defines the type of sample that was collected, such as a replicate or duplicate sample.

Every table in the data base has a field or a combination of fields that uniquely identifies each record in the table. This unique identifier is called the primary key and is labeled (PK) in the data dictionary. Primary keys have an "_id" suffix. For example, the location_id field in the location table is the primary key for that table; no two records in the location table have the same value in the location_id field. This provides a method to identify one particular record in the table. When a field in one table matches the primary key of another table, this is referred to as a foreign key (FK). Foreign keys are labeled (FK) in the data dictionary. For example, the location_id field in the sample table is a foreign key in that table. The location_id field links the location table and the sample table.

Each row in a data table contains unique data for the categories defined by the columns. For example, the location table describes sampling locations with columns for latitude, longitude, elevation and so forth. The sample table describes the samples that were collected with columns for data such as sample date, sample method, sample matrix, and location. By linking the sample and location tables, the user can view data on both the sample and the location where the sample was collected.

A Data Dictionary is enclosed on this CD-ROM in an MS Word document named Data Dictionary. Instructions on how to read the data dictionary listings are provided with

it. The data dictionary provides information on each table in the data base, including the table name, the number of fields and records, and the date and time the table was last updated. The tables are described in terms of the fields they contain, including field name, a brief description of the information in the field, and the type and size of the field.

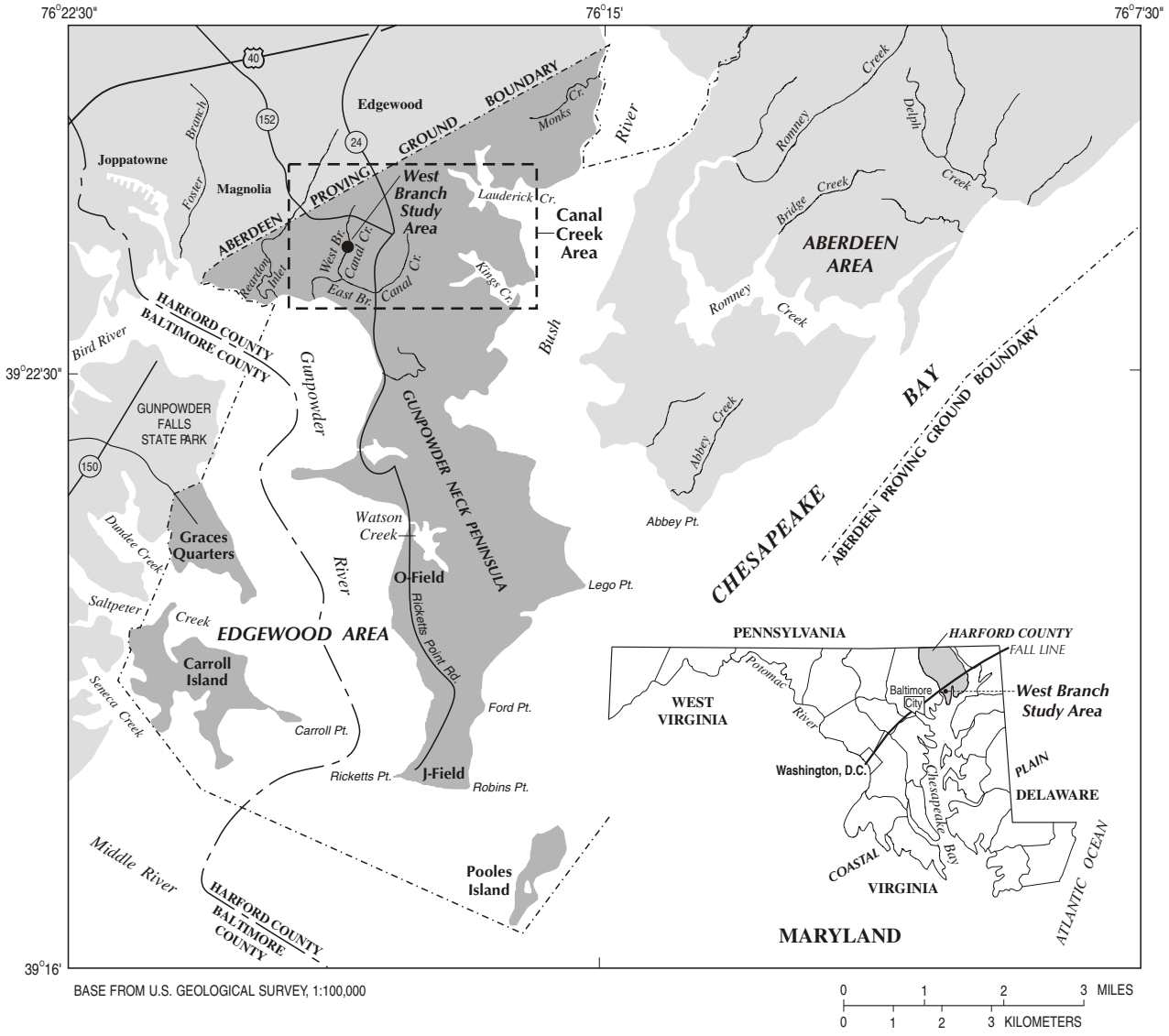


Figure 1. Location of Canal Creek area and West Branch study area, Aberdeen Proving Ground, Maryland (modified from Lorah and others, 1997, p. 5).

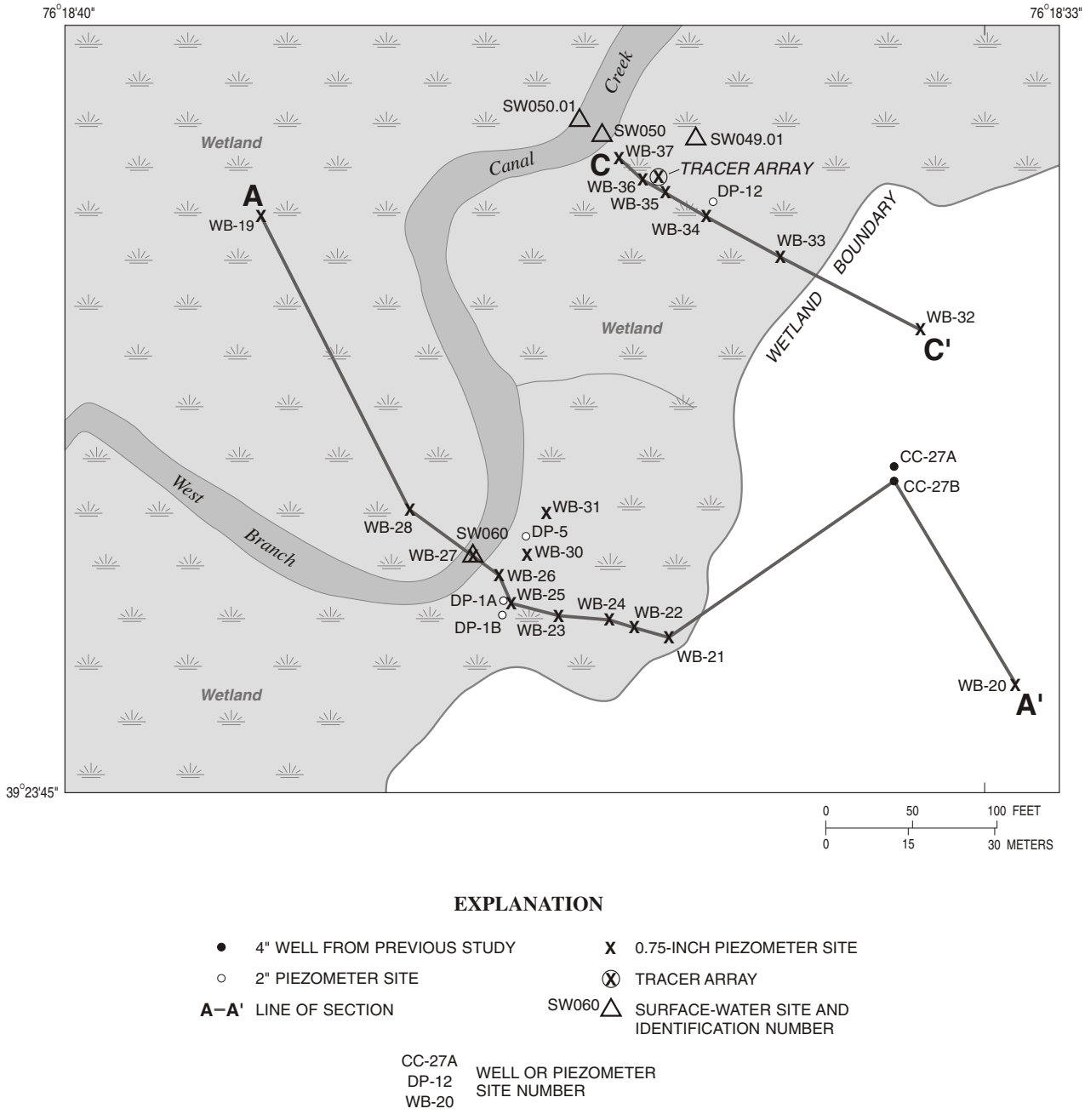
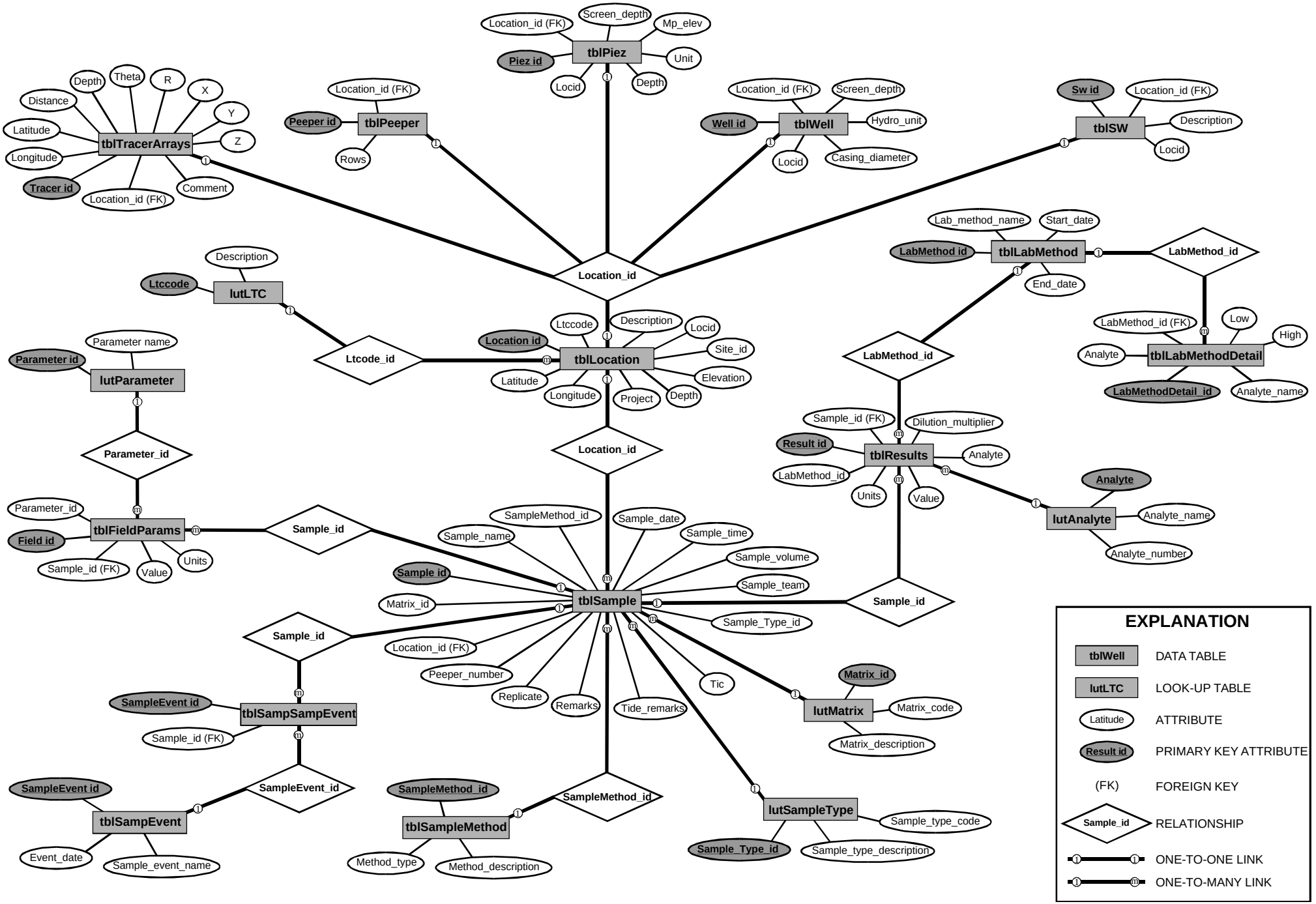


Figure 2. Locations of sampling sites and transects A-A' and C-C' in the wetland study area along West Branch Canal Creek, Aberdeen Proving Ground, Maryland (modified from Lorah and Clark, 1996, p. 106).

Entity Relationship Diagram of the Digital Water-Quality Data Base for West Branch Canal Creek Area Aberdeen Proving Ground, Maryland

Version 1.1, October 25, 2000



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