Tutorial - Introducing ESdat

For use with ESDAT version 5

(version 5 software updates available from www.esdat.com.au)

ESdat

HELPING **YOU** DO, WHAT **YOU** WANT, WITH **YOUR** DATA

Produced by ESdIS

EarthScience Information Systems

Tutorial Introducing ESdat

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Summary

The purpose of this tutorial is to provide a quick overview of ESdat functionality.

This tutorial provides an overview level introduction to the following topics:

- What ESdat is and does
- Opening ESdat databases
- Navigating through ESdat
- Data filtering
- Importing Laboratory Data
- Assigning laboratory duplicates
- Assigning unique codes to each chemical compound

Subsequent tutorials address these topics in more depth, as well as other powerful analysis and reporting tools included with ESdat.

See http://www.esdat.net/esdathelp/index.html?tutorials.htm for the full list of ESdat function and topic tutorials.

The tutorial applies to both Access and SQL versions of ESdat. The tutorial is conducted using the Access version of ESdat.

It will use the *Sample Hydrogeology and Contam* database for any examples provided.

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Introducing ESdat

ESdat is an environmental data management system, which provides an electronic data trail for all your field, laboratory and historical monitoring data.

ESdat makes it easy to import, track, manage and interrogate air, water and soil information for multiple sites, and multiple projects.

ESdat simplifies input of data from multiple sources, and uses a range of validation processes to ensure data is accurate, up to date and consistent.

The graphic below highlights the data inputs and outputs possible with ESdat.

ESdat functionality (logically) starts right from sample planning process, specifically using the LSPECS extension of ESdat.

The location and types of samples, how samples are to be collected, and the analyses to be done can be specified here, streamlining field sample collection and laboratory submission. Laboratory requests can be sent, with laboratory reports received in a specified format.

Data can be imported into an ESdat database from tablets, laboratory reports, data loggers, field notes, and/or historical data held either as handwritten notes, or from Excel spreadsheet records.

ESdat makes it easier to import this data, through the use of a range of pro-forma **import templates**, or alternatively import templates can be developed by the user for a specific purpose.

ESdat provides a library of **environmental standards**, which can be imported into a project database, against which analytical results can be compared.

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Alternatively, **site or project specific standards can be developed**, which will automatically flag exceedances for attention.

Data can be compared against environmental standards, allowing rapid identification of potential problem areas.

ESdat allows for easy organisation of data to facilitate a variety of outputs (either internal within an organisation, or to external parties).

Filtering of data allows the user to focus on the information of interest.

Filtered **data can be mapped, graphed or tabulated** for reporting and/or exported to a variety of visualisation tools.

Quality assurance reporting features also allow for rapid assessment of data provided by laboratories, facilitating QA reports and data manipulation, editing and checking as required.

In short, ESdat contains numerous features that will speed up data entry, builds in numerous QA check points, enhances consistency and efficiency of data entry and use, and provides numerous options for data option to meet user requirements.

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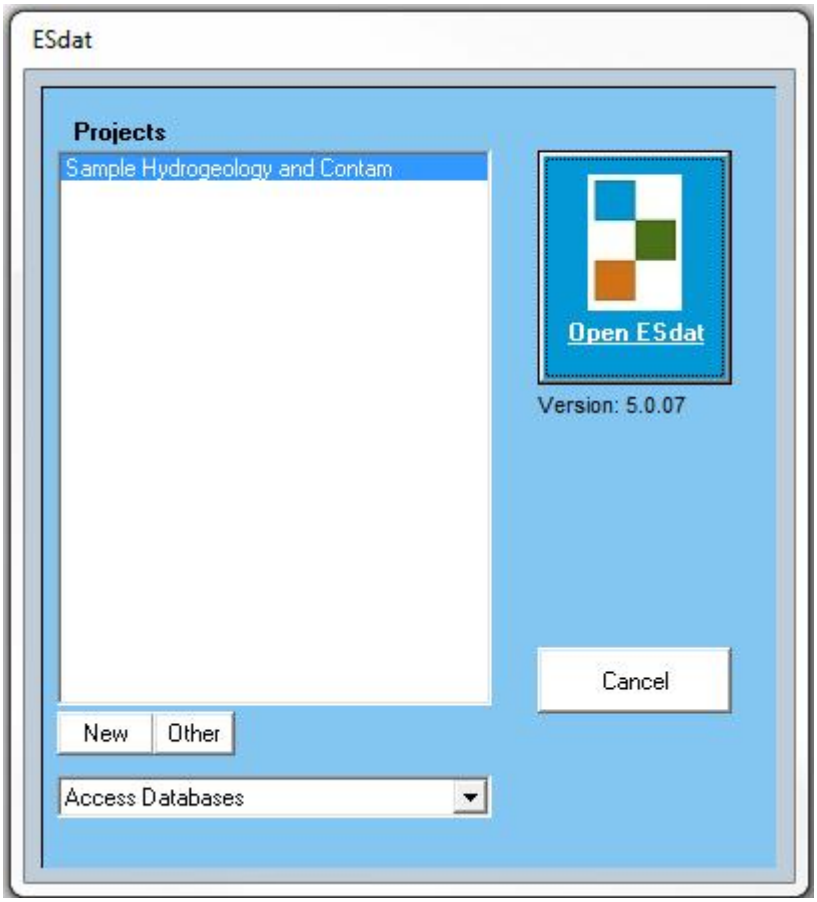
Opening the Sample Database

Start by selecting the *ESdat 5* application via: *Windows Start – All Programs – ESdat (Folder)*.

When ESdat opens, the Startup dialogue box will launch, shown in the figure below.



From the ESdat Startup dialogue box, existing databases can be opened or a new database can be created.

If this is the first time ESdat has been opened only the *Sample Hydrogeology and Contam* database will be visible, as shown in the figure above.

As more (Access*) databases are created (for new projects), they will appear in the dialogue box when ESdat is reopened.

- Click Open ESdat

A prompt will appear asking whether you want to view the ESdat Tutorial Documentation.

Clicking 'Yes' will launch the Tutorial Documentation you are now reading, clicking ‘No’ will cancel the dialogue box and continue to the program.

*For SQL Server users, please refer to the online help for management of projects

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Window Navigation

Data Views – View, Query & Interrogate Data

The figure presented on page 8 presents the ESdat *Data View*, which is the first view to appear when opening ESdat.

Major components of the ESdat Data View have been highlighted in the figure presented on page 8.

A copy of page 8 can be printed as a hard copy (or opened in a separate window) to refer to and assist navigation during completion of this (and subsequent) tutorials.

The buttons at the top of the screen (in the pale green area) are **View Type** buttons (or Command buttons) used to open the following ESdat functions:

- LSPECS (Laboratory Sample Planning Electronic Custody and Signoff)
- Import Views
- Data Views
- Reports
- Check Units

The following description focuses upon the Data Views View Type.

The blue buttons below the View Type buttons are the **Data-Type** buttons, which allow access to different types of data within a database, such as:

- Location
- Boreholes / Wells
- Geology
- Water Levels
- A variety of Chemistry results
- Logger Data

These **Data Type buttons can be customised** if required.

The **Filter Area** is located beneath the Data-Type buttons. When a filter is constructed it appears in the **Filter Text** area.

Three tabs are visible beneath the Filter Area:

- Data
- Map
- Filter

The **Data** tab presents the selected Data Type in a tabular format. For example, if the Water Chemistry Data Type is selected, all water chemistry results will appear under the Data tab.

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The toolbar to the left of the data relates to actions affecting the data panel (such as editing, sorting or summarising), and the tool options will change depending on whether Data, Map or Filter are selected.

Click on the Map Panel and note the tools available. Then click back to the Data Panel and note the different tools available.

The **Map** tab presents the same selected data (if associated with coordinates) in a map display. For example, if the water chemistry data is associated with surveyed coordinates (such as surveyed groundwater wells) this can be displayed under the Map tab. This data can be shown with a basemap if available – one of the many available mapping capabilities.

The **Filter tab** assists in the creation of a filter, to focus on a particular sub-set of data. For example, if the water chemistry data contains heavy metals analysis, the filter allows the user to focus in on a particular metal. Or a particular depth of well.

When a database is opened, Location information (the first Data Type) is displayed by default.

Click through the different Data Type buttons in both the Data and the Map Panels, and note the different information displayed for each Data Type selection.

(The data being viewed is of course, part of the demonstration *Sample Hydrogeology and Contam* database.)The **Exports** toolbar on the right shows the external links, reporting and export options for data within ESdat (e.g. Excel, Google Earth).

Once data has been selected and filtered as required, these options allow exporting of the data to the desired output or application.

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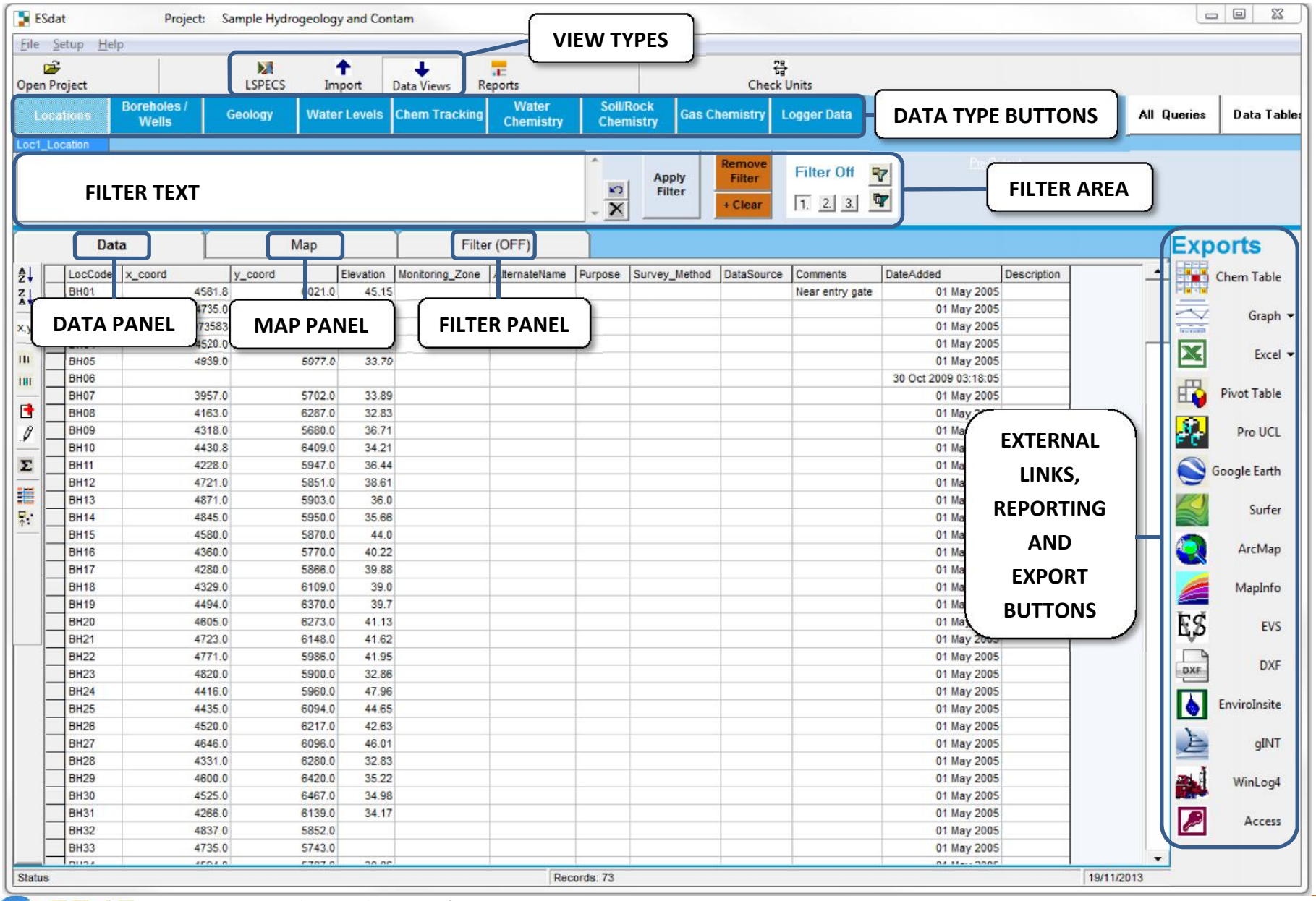
VIEW TYPES
DATA TYPE BUTTONS
FILTER TEXT
FILTER AREA
DATA PANEL
MAP PANEL
FILTER PANEL
EXTERNAL LINKS, REPORTING AND EXPORT BUTTONS
ESdat
Project: Sample Hydrogeology and Contam
File Setup Help
Open Project
LSPECS
Import
Data Views
Reports
Check Units
Locations
Boreholes / Wells
Geology
Water Levels
Chem Tracking
Water Chemistry
Soil/Rock Chemistry
Gas Chemistry
Logger Data
All Queries
Data Tables
Loc1_Location
Apply Filter
Remove Filter
+ Clear
Filter Off
Data
Map
Filter (OFF)
Exports
Chem Table
Graph
Excel
Pivot Table
Pro UCL
Google Earth
Surfer
ArcMap
MapInfo
EVS
DXF
EnviroInsite
gINT
WinLog4
Access
Status
Records: 73
19/11/2013

Import View – Import Data

The figure presented on page 10 presents the ESdat *Import* View.

Major components of the ESdat Data View screen have been highlighted.

The blue area at the left of the Import view labelled ***Blank Import Templates*** provides eight buttons to access templates for the major types of data imported into ESdat:

- Locations (sample location details, such as soil bores, test pits or sediment samples)
- Wells (groundwater well construction details)
- Field Chemistry (or other field parameters, such as temperature)
- Historical Chemistry (as distinct from ESdat format lab supplied analytical reports)
- Groundwater levels (including NAPL measurements)
- Time-variant TOC (where well collar heights (i.e. TOC) have varied over time through damage, subsidence or similar)
- Borehole/Geological logging - Standard (i.e. environmental) and Geotechnical logs

The ***All Data Tables*** section at the bottom of the blue areas provides a list of all blank import template data tables as well as reference tables (labelled as 'zRef_') in the database.

The reference tables refer to existing information (data) that has been imported into ESdat to allow specific functionality.

For example, reference table '*zRef_Environmental_Standards*' includes third party published assessment criteria that are used to create summary tables to allow comparison of analytical data against the criteria.

The orange area labelled ***Files*** allows importing of a range of specific files, including:

- laboratory analysis (as supplied by the analytical laboratory in the correct ESdat format)
- logger data
- populated Import Templates (i.e. templates from the blue area that have been populated with data)
- data interchange file (for transferring data from one database to another)
- documents (which allows generation of a record of documents such as previous reports relating to a project and the file directory for easy access)
- AGS format files (geotechnical and geo-environmental file format)

The orange area labelled ***Library*** allows importing of the following reference files:

- Environmental Standards (refer to the ESdat site for available standards - http://www.esdat.com.au/Environmental_Standards.aspx)
- Post Import Calcs: designed to provide more sophisticated calculating or updating functionality than is available using the combined compounds functionality
- Combined compounds: allows automatic addition of compounds (such as TPH fractions)

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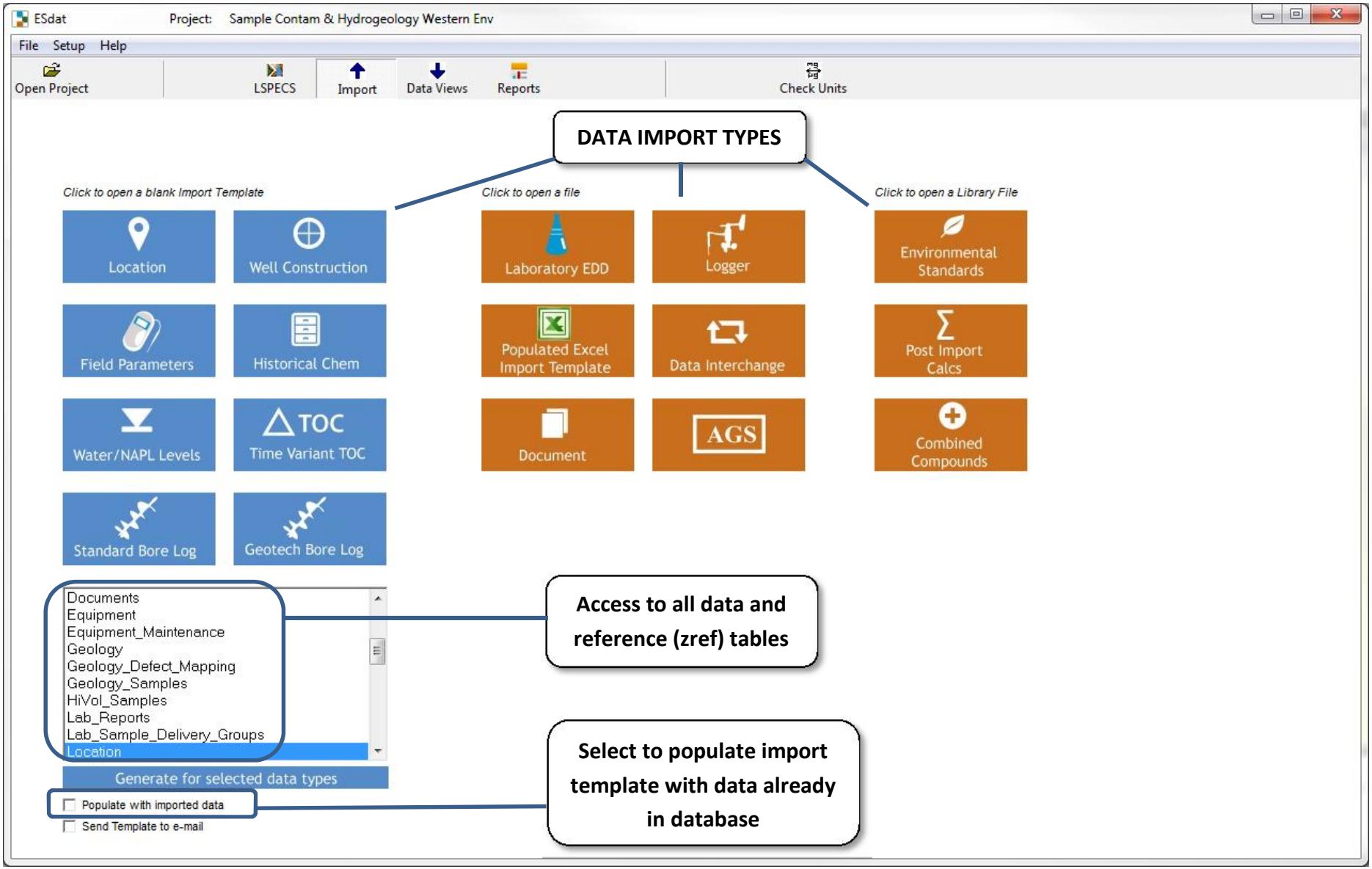

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Importing Laboratory Chemistry

Laboratory chemistry data supplied in the ESdat format can be automatically imported using an ESdat.

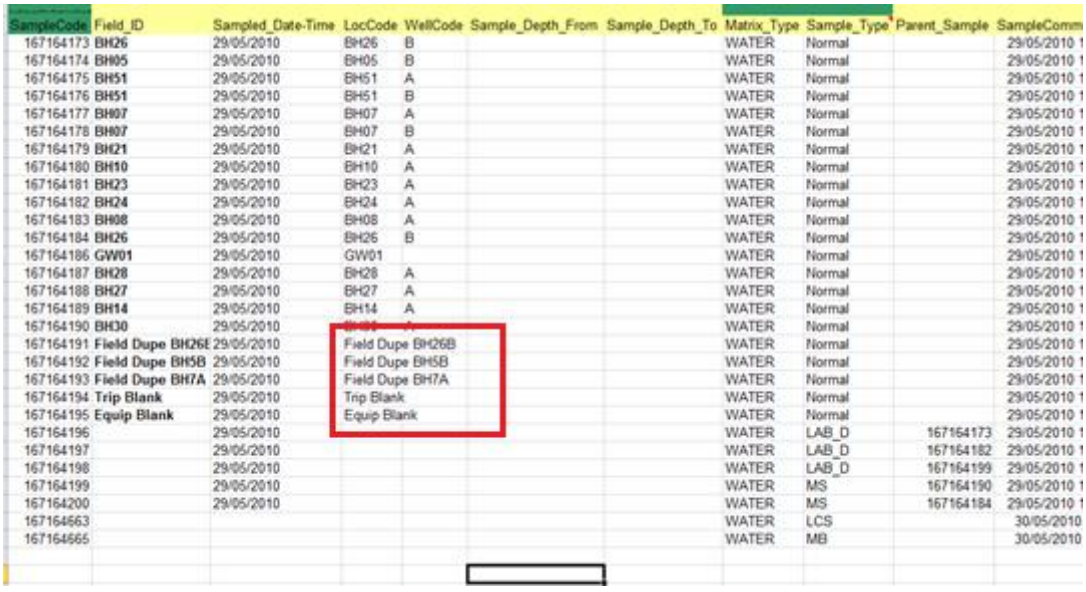
- In ESdat click the *Import* View Type button
- From the orange *Files* area, select *Laboratory*

This will open the *Select ESdat Sample of Chemistry Result EDD file* dialogue box.

- Navigate to the Sample Directory, typically:
- C:\Program Files\EScIS\ESdat 5\Sample Contam; or
- C:\Program Files (x86)\EScIS\ESdat 5\Sample Contam (on 64 bit PCs)
- Select the file **Sample01.Labmark36.Sample22.csv**
- If a dialogue box appears stating "*Lab Report already exists*" and "*Do you wish to delete and re-import…*" click *Yes*

The lab data will load in Excel, initially showing the Sample data (note two tabs at the bottom of the Excel page – *Chemistry_Samples* and *Chemistry_Results*).

There are a number of QA Samples in the data that need have the Sample Type updated and duplicates to be reconciled with parent samples (as shown in rows 22-26 in the figure below).



SampleCode	Field_ID	Sampled_Date-Time	LocCode	WellCode	Sample_Depth_From	Sample_Depth_To	Matrix_Type	Sample_Type	Parent_Sample	SampleComm
167164173	BH26	29/05/2010	BH26	B			WATER	Normal		29/05/2010 1
167164174	BH05	29/05/2010	BH05	B			WATER	Normal		29/05/2010 1
167164175	BH51	29/05/2010	BH51	A			WATER	Normal		29/05/2010 1
167164176	BH51	29/05/2010	BH51	B			WATER	Normal		29/05/2010 1
167164177	BH07	29/05/2010	BH07	A			WATER	Normal		29/05/2010 1
167164178	BH07	29/05/2010	BH07	B			WATER	Normal		29/05/2010 1
167164179	BH21	29/05/2010	BH21	A			WATER	Normal		29/05/2010 1
167164180	BH10	29/05/2010	BH10	A			WATER	Normal		29/05/2010 1
167164181	BH23	29/05/2010	BH23	A			WATER	Normal		29/05/2010 1
167164182	BH24	29/05/2010	BH24	A			WATER	Normal		29/05/2010 1
167164183	BH08	29/05/2010	BH08	A			WATER	Normal		29/05/2010 1
167164184	BH26	29/05/2010	BH26	B			WATER	Normal		29/05/2010 1
167164186	GW01	29/05/2010	GW01				WATER	Normal		29/05/2010 1
167164187	BH28	29/05/2010	BH28	A			WATER	Normal		29/05/2010 1
167164188	BH27	29/05/2010	BH27	A			WATER	Normal		29/05/2010 1
167164189	BH14	29/05/2010	BH14	A			WATER	Normal		29/05/2010 1
167164190	BH30	29/05/2010	[illegible]				WATER	Normal		29/05/2010 1
167164191	Field Dupe BH26E	29/05/2010	Field Dupe BH26B				WATER	Normal		29/05/2010 1
167164192	Field Dupe BH5B	29/05/2010	Field Dupe BH5B				WATER	Normal		29/05/2010 1
167164193	Field Dupe BH7A	29/05/2010	Field Dupe BH7A				WATER	Normal		29/05/2010 1
167164194	Trip Blank	29/05/2010	Trip Blank				WATER	Normal		29/05/2010 1
167164195	Equip Blank	29/05/2010	Equip Blank				WATER	Normal		29/05/2010 1
167164196		29/05/2010					WATER	LAB_D	167164173	29/05/2010 1
167164197		29/05/2010					WATER	LAB_D	167164182	29/05/2010 1
167164198		29/05/2010					WATER	LAB_D	167164199	29/05/2010 1
167164199		29/05/2010					WATER	MS	167164190	29/05/2010 1
167164200		29/05/2010					WATER	MS	167164184	29/05/2010 1
167164663							WATER	LCS		30/05/2010
167164665							WATER	MB		30/05/2010

For the Field Duplicates (*Field Dupe*):

1. the correct *Sample Type* needs to be nominated as the laboratory has assumed a normal sample as it was a blind duplicate
2. the parent sample of the duplicate also needs to be reconciled (i.e. which sample has been duplicated).

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In this example data, the *Field_ID* column provides the parent sample information. Alternatively, field notes may be the source of this information.

To do this for *Field Dupe BH26B* (Row 22) do the following:

- Click on cell I22 (Sample Type column)
- select *Field_D* from the drop-down menu

A dialogue box will open prompting you to *Click on the SampleCode of the sample for which this is a duplicate*.

- Click anywhere in Row 16 (the Parent Sample)
- click *OK*

You will notice that in Row 22 (the duplicate sample):

1. the *Parent_Sample* column (Column J) is updated to show the *SampleCode* of the *Parent Sample*
2. The *Location Code* (*LocCode*) column is updated with the location of the *Parent Sample*
3. The *Field_ID* column remains unaltered

- Repeat this procedure for the other Field Duplicates (Row 23 and Row 24).

There are also two blank samples in this batch (see Lines 25 and 26).

The type of blank needs to be specified.

- In the row containing *Trip Blank* (Row 25), click on the *Sample_Type* cell (column I)
- From the dropdown menu, select *Trip_B*
- In the row containing *Equipment Blank* (Row 26), click on the *Sample_Type* cell
- From the dropdown menu, select *Rinsate*

Note the Field ID is left as it was specified in the field, but the LocCode, which was originally identical to the Field ID, is now blank.

The data should appear consistent with the figure overleaf:

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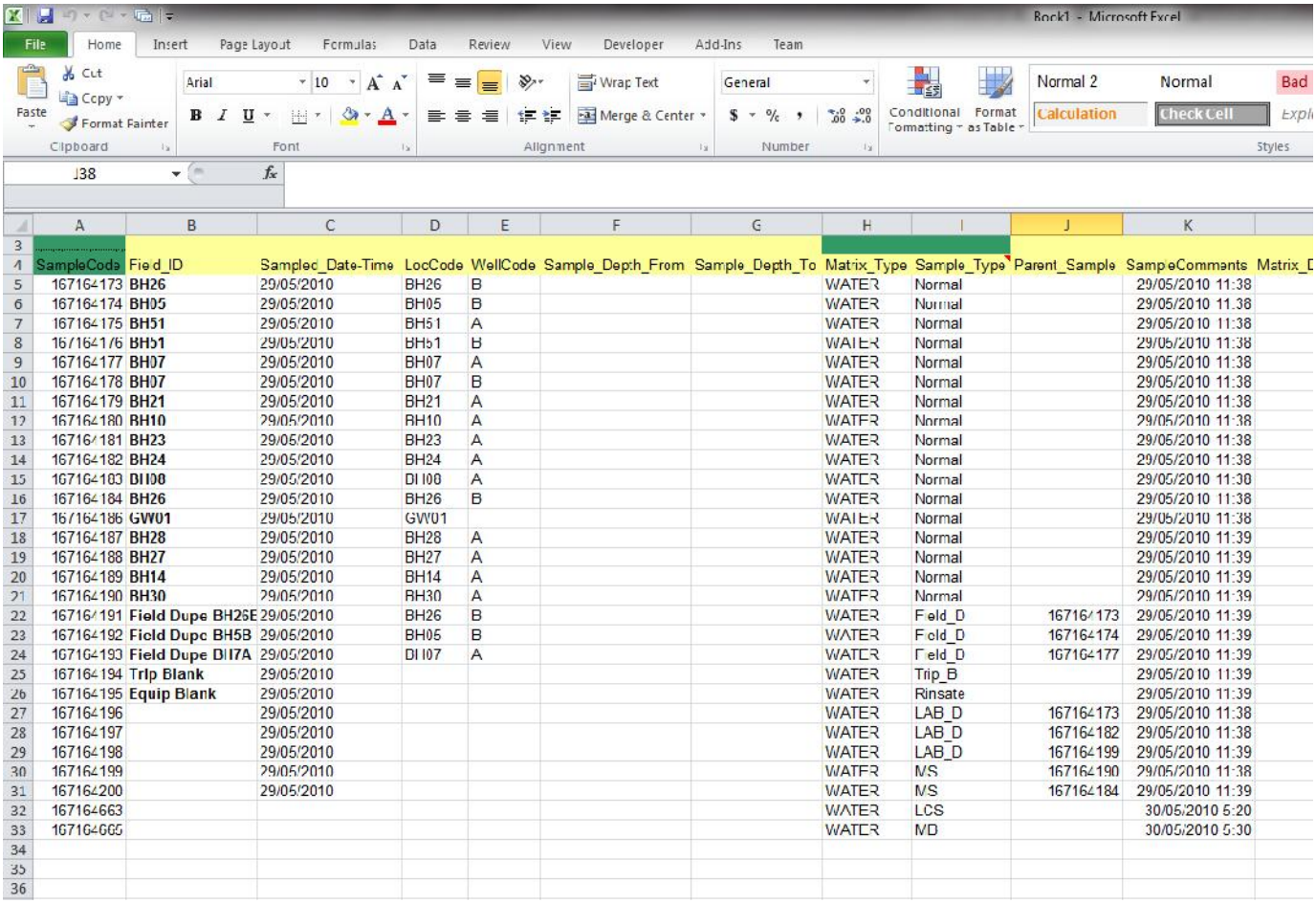

	A	B	C	D	E	F	G	H	I	J	K
3											
4	SampleCode	Field_ID	Sampled_Date-Time	LocCode	WellCode	Sample_Depth_From	Sample_Depth_To	Matrix_Type	Sample_Type	Parent_Sample	SampleComments
5	167164173	BH26	29/05/2010	BH26	B			WATER	Normal		29/05/2010 11:38
6	167164174	BH05	29/05/2010	BH05	B			WATER	Normal		29/05/2010 11:38
7	167164175	BH51	29/05/2010	BH51	A			WATER	Normal		29/05/2010 11:38
8	167164176	BH51	29/05/2010	BH51	B			WATER	Normal		29/05/2010 11:38
9	167164177	BH07	29/05/2010	BH07	A			WATER	Normal		29/05/2010 11:38
10	167164178	BH07	29/05/2010	BH07	B			WATER	Normal		29/05/2010 11:38
11	167164179	BH21	29/05/2010	BH21	A			WATER	Normal		29/05/2010 11:38
12	167164180	BH10	29/05/2010	BH10	A			WATER	Normal		29/05/2010 11:38
13	167164181	BH23	29/05/2010	BH23	A			WATER	Normal		29/05/2010 11:38
14	167164182	BH24	29/05/2010	BH24	A			WATER	Normal		29/05/2010 11:38
15	167164183	DI108	29/05/2010	DI108	A			WATER	Normal		29/05/2010 11:38
16	167164184	BH26	29/05/2010	BH26	B			WATER	Normal		29/05/2010 11:38
17	167164186	GW01	29/05/2010	GW01				WATER	Normal		29/05/2010 11:38
18	167164187	BH28	29/05/2010	BH28	A			WATER	Normal		29/05/2010 11:39
19	167164188	BH27	29/05/2010	BH27	A			WATER	Normal		29/05/2010 11:39
20	167164189	BH14	29/05/2010	BH14	A			WATER	Normal		29/05/2010 11:39
21	167164190	BH30	29/05/2010	BH30	A			WATER	Normal		29/05/2010 11:39
22	167164191	Field Dupe BH26B	29/05/2010	BH26	B			WATER	Field_D	167164173	29/05/2010 11:39
23	167164192	Field Dupe BH5B	29/05/2010	BH05	B			WATER	Field_D	167164174	29/05/2010 11:39
24	167164193	Field Dupe DI17A	29/05/2010	DI107	A			WATER	Field_D	167164177	29/05/2010 11:39
25	167164194	Trip Blank	29/05/2010					WATER	Trip_B		29/05/2010 11:39
26	167164195	Equip Blank	29/05/2010					WATER	Rinsate		29/05/2010 11:39
27	167164196		29/05/2010					WATER	LAB_D	167164173	29/05/2010 11:38
28	167164197		29/05/2010					WATER	LAB_D	167164182	29/05/2010 11:38
29	167164198		29/05/2010					WATER	LAB_D	167164199	29/05/2010 11:39
30	167164199		29/05/2010					WATER	MS	167164190	29/05/2010 11:38
31	167164200		29/05/2010					WATER	MS	167164184	29/05/2010 11:39
32	167164663							WATER	LCS		30/05/2010 5:20
33	167164665							WATER	MD		30/05/2010 5:30
34											
35											
36											

Note the Field ID is left as it was specified in the field, but the LocCode, which was originally identical to the Field ID, is now blank.

- From the Excel (top) toolbar select the *ADD-INS* tab
- Click on the *Upload Data* icon
- Accept the defaults and click *Import*

The data will now turn green indicating it has been uploaded successfully.

Still in the same Excel workbook:

- Navigate to the *Chemistry Results* Sheet (via the tabs at the bottom of the Excel window)
- Import the Chemistry data (as per the previous two steps)

The laboratory data is now imported.

Note: Excel is used as a tool to update the ESdat database. The data are not stored in Excel there is no need to save changes in Excel.

However, Excel can be kept open as a reference to explore while reading the following section (and closed at the end of this tutorial without saving).

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Assigning ChemCodes

When combining data from different sources, or comparing data against environmental standards, consistent and unique identification of chemical compounds is essential.

Inconsistent compound identification can make querying and manipulating data very difficult.

For example, total iron may be reported from different laboratories as Fe (total), Fe (Total), Total Iron, and Iron (total)). ESdat refers to these different names as *ChemName*.

As can be seen from this example, the same compound can have multiple *ChemNames* (tetrachloroethylene is another example – it is also known as PERC, tetrachloroethene, perchloroethylene).

When importing analytical data into ESdat, it's essential that an appropriate and unique code be assigned to each unique compound, regardless of which *ChemName* has been attributed by the laboratory.

In ESdat this code is referred to as the *ChemCode*.

In order to provide a consistent point of reference for varying compound names the CAS (Chemical Abstracts Service) Registry Number system is used (where possible) as the *ChemCode* within ESdat.

CAS Registry Numbers (often referred to as CAS RNs or CAS Numbers) are universally used to provide a unique, unmistakable identifier for chemical substances.

A CAS Registry Number itself has no inherent chemical significance but provides an unambiguous way to identify a chemical substance or molecular structure when there are many possible systematic, generic, proprietary or trivial names (*ChemNames*).

CAS Registry Numbers are used in many other public and private databases as well as chemical inventory listings and are included in all CAS-produced databases.

(https://www.cas.org/about-cas/faqs#casrn)

This provides a unique and consistent code for each compound.

ESCIS has adopted CAS Registry Numbers as the ChemCode, which are stored within a reference table (*Chemistry Lookup Table*) within the database against each corresponding unique chemical substance.

A variety of corresponding *ChemNames* for unique compounds are also stored in the reference table against the relevant unique *ChemCode*.

Laboratory analytical data is typically provided with a consistent *ChemCode* for each chemical, however, occasionally a *ChemCode* supplied by the laboratory will not be provided or will not be consistent with the database and will require updating.

Historical chemistry data also require ChemCodes to be assigned.

ESdat provides a method to assign or update a *ChemCode* if required. (ESdat also automatically notifies the user when this is required during the import process).

The *Associate Chem Codes* panel shown in the figure overleaf is used during import to assign or resolve problems with *ChemCodes*.

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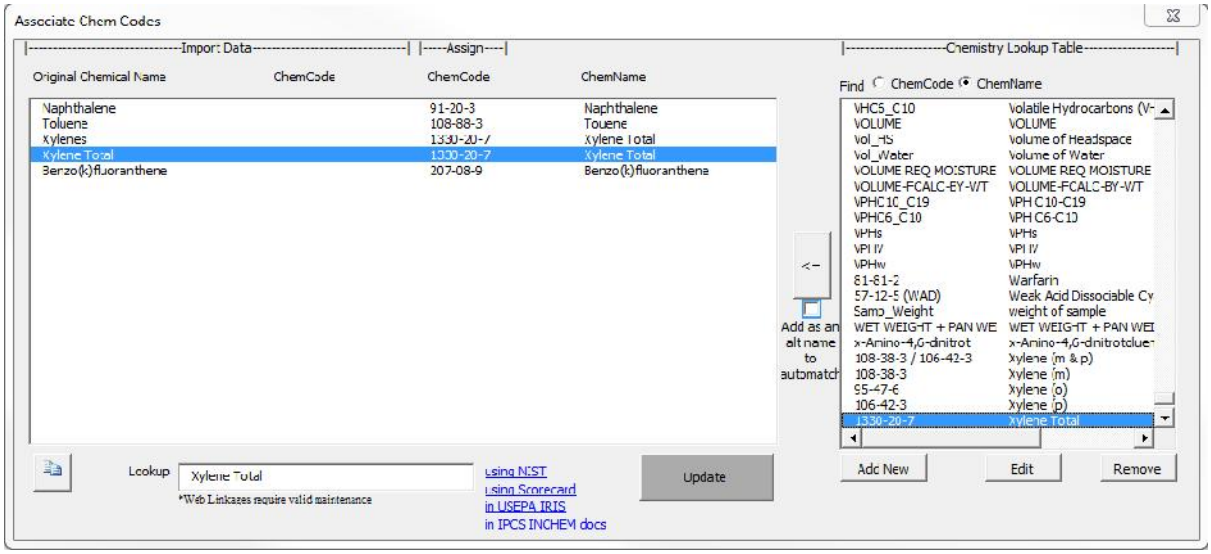

- Return to the open Excel import template left open at the end of Page 13
- Under the ADD-INS tab, select the *Get Chem Codes* button to open the *Associate Chem Codes* panel

(Note – as there were no *ChemCode* issues during the importation of the current demonstration laboratory data no edits are required)

Matching against existing ChemCodes

ESdat compares the chemical name to be imported from the data source (left panel) with a list of names for each compound in the database reference table (right panel) as well as known alternative names for the compound.

If users need to repeatedly match a compound against a *ChemCode* in the database reference table, clicking the *Update Lookup List* checkbox when matching a code will add the alternative name against that *ChemCode* to the ESdat reference table.

The compound will then be found automatically on future imports.

Adding new ChemCodes

If users are unable to match a suitable *ChemCode* from the lookup list (right panel) users will need to add a suitable *ChemCode*.

If adding a *ChemCode* provided by a laboratory users should generally use the code provided by the laboratory after confirming it is appropriate.

In other situations users should use a CAS Number where possible. A CAS Number can be obtained from the lookup links at the bottom of the form (ie NIST etc.). For TPH (TRH/PHC) fractions a general syntax is used and users should look at existing *ChemCode* and use the same syntax.

Where a suitable CAS number or other *ChemCode* is not found users can create a *ChemCode* of their choice. The choice of *ChemCode* is not critical, but users should be consistent in using a unique and particular *ChemCode* for a unique and particular compound.

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When *ChemCodes* are added to a database they are added either to just that project database (Access versions), or to a central database table (SQL Server versions).

- After reviewing, close the *Associate Chem Codes* panel
- Close the Excel template without saving

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