

Tutorial 1 and 2
V
For use with ESDAT v 3.3.1

(v 3 software updates available from www.esdat.com.au)

Using the ESDAT Environmental and Hydrogeology System or
the ESDAT Landfill System



Preface

This guide is split into a quick demonstration (Tutorial 1), and more thorough explorations (Tutorial's 2 and 3). This documentation along with sample files is included in the subdirectories of the ESDAT installation directory; typically C:\Program Files\ESDAT\.

This tutorial is applicable in concept to any database you may use through ESDAT, which can work with any database structure. For more general information on ESDAT see www.esdat.com or the ESDAT help files.

The database most widely used through ESDAT is the ESIS Environmental and Hydrogeology database, which, in combination with ESDAT offers specific, and customisable inputs and outputs for contaminated site investigations and resource hydrogeology. This system as well as the landfill system has been used for these tutorials. The sample databases are Access based, although SQL Server databases are also supported for large datasets.

If you require assistance with any problems, or have any questions you can contact EarthScience Information Systems using the details given below.

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Software Requirements

Essential:

Microsoft Windows NT, 2000, or XP

Microsoft Excel 2000, XP, 2003

Possible links provided to software you may have on your machine:

Surfer 7,8

ArcView 3.x

ArcGIS 8.2, 8.3, 9.x

Mapinfo 6.x, 7.x

gINT 4,5,6,7

WinLog 3,4

Access 2000, XP, 2003

EVS add-in (available separately)

Installing ESDAT

In order to install ESDAT and the sample databases from the distribution files:

1. Download the ESDATv3Install.msi file to your hard drive
2. Double Click to install.
3. From time to time an update may be available from our web site, if you have a licenced version you will be automatically notified.

Opening the sample database

Once you have installed ESDAT do the following

Click on the Windows Start button

Under the programs menu select ESDAT/ESDAT

A startup form will appear, where you can open new or existing databases, import, use factual reports functionality, or cancel the form. A list of recent databases appears on the left. The most recent database used (Sample Contam) will be highlighted.

Select the sample database you wish to use (contaminated site or landfill) and click "Open".

This will load the sample database. You will be presented with location information for the data points.

ESDAT Window Navigation

The ESDAT window is arranged with a line of green buttons near the top. These buttons (which are referred to from here-on as datatype buttons) represent different types of data such as water chemistry or location information. The location information opens by default when we open a database.

Above the datatype buttons are some command buttons used to open different ESDAT functions such as the GIS Window, and the Factual Reports. We will cover these later.

The main portion of the screen is the data panel, which shows the data related to the selected datatype (green button).

The toolbar on the left relates to actions affecting the data panel.


The larger toolbar on the right shows the external links which can be accessed through ESDAT, these are used to export or link data with other packages.

Tutorial 1

The purpose of this tutorial is to provide a quick overview of ESDAT's functionality.

We will firstly look at producing the factual reports, then we will carry out a simple data analysis and extraction. Further analysis and reporting is included in subsequent tutorials.

Factual Reporting

Along the top toolbar is a  Reports button. Click this. You are presented with the Factual Reports form.

Reporting Chemistry QA errors

The most common (but not only) method of reporting Chemistry QA data in ESDAT is to use the Chemistry QA Checker.

1. Click the Chemistry QA Checker (the left button).

A form will load, on the right are the different types of checks you can run and their settings. These are standard tests for chemistry QA problems, such as violated holding times, all the settings are configurable. On the top left are a list of sample delivery groups (batch numbers for samples), we could alternatively select the samples by the sampled date or select all the data.

2. Click the "Export All Data" checkbox and click "QA Summary and QA Errors"

Any potential problems in the data (such as holding time exceedances, duplicate RPD violations) are identified and where a potential problem exists a link to the relevant data is provided. A link to a summary of the chemistry QA tests arranged by compound is provided at the top of the list. Click some of the links to view the QA problems.

3. Close the Chemistry QA Report and the Chemistry QA Checker form.

Tabulating Chemistry

1. Still in the “Factual Reports” form click “Chemistry Output Tables”
2. Select the “Water” matrix (Surface Water (SW) for the Landfill System)
3. Select a date range of all data before the current date (select by Sampled Date and deselect the checkbox in the minimum date dropdown)
4. For “Method_Types” click the “Load” button. We could select a sub-set of the available compounds, or output all (by not selecting any). Don’t select any.
5. Click “Next”

We can now specify the layout of the table, and the sample information to be included.

6. Change the orientation of the data to “Chemical Names across the top”. Review the other options without changing and click “Finish”.

The table is now produced in Excel.

7. In Excel select the ANZECC Guideline value and click the “Bold” button (top left of the sheet). Select any other guideline and click “italic”.

The exceedances of these guidelines are shown in the specified format.

8. Repeat the above steps playing with different options.
9. Close the Factual Reports form.


Graphing Time-Series Chemistry

1. In ESDAT select the "Water Chemistry" datatype (Groundwater (GW) for the landfill system)
2. Click the graph icon on the right toolbar.

A series of graphs showing available time-series chemistry is generated. Environmental guideline levels are indicated by dotted black lines. Note that with the default setting all graphs show the same date range.

Importing Laboratory Chemistry

Laboratory derived chemistry data can be automatically imported using a particular file format provided by the laboratories. (As of January 2007 compliant labs are LabMark; ALS; MGT; and Amdel (partially))

1. In ESDAT click the  Import button and select Laboratory File.
2. Select the file " Sample01.Labmark36.Chemistry22.csv" located in the sample directory (this will typically be c:\Program Files\ESDAT\Sample Contam (or Sample Landfill), or for a network installation in "install location"\Sample)

The lab data will load in Excel, initially showing the Sample data.




Your Field_ID, Sampling Date, and Depth will be shown. The LocCode (location) column is by default populated with the Field_ID. Where a location is not applicable the value can be deleted or edited. To a large extent this is done automatically as we will see below.

We need to tell ESDAT which are the Field Duplicates, and which sample they are a duplicate of.

3. In column I (Sample Type) select "Field_D" from the drop down in cells I22-I24.

4. When prompted select the parent sample (cell A5 for the first). This tells us that the sample in row 22 is a duplicate of the sample in row 5. Do the same for the other Field Duplicates.
5. Specify the blanks as the different type of blanks (Trip Blank and 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 now specifies the samples location, if applicable.

6. In the Excel toolbar click on the  icon, accept the defaults and click "import".
7. Still in the same Excel workbook change to the Chemistry Sheet and import the chemistry data. You will receive a small number errors related to an invalid ChemCode (ChemCodes are used to provide an unambiguous reference for a compound). This error is caused by the ChemCode provided by the lab differing from expected values.
8. To fix the ChemCode click on the  icon in the Excel toolbar. The correct ChemCode for Potassium will be automatically found. (the right panel shows the original ChemName used in the import data, the ChemCode (if provided), and the name and code used in ESDAT). Click the "Update" button, and then click  to import the corrected data.

The laboratory data is now imported. Close Excel.

Analysis functionality

ESDAT allows you to filter, summarise, view and export your data through an intuitive interface, which enables the user to "experiment" with ideas relating to their data. At all times the user is kept "close" to their data.


In this tutorial we will select some water level data using their locations on a map and graph and contour it.


GIS Window

To open the GIS Window:

1. Click on the GIS Window button ( View Map) at the top of the screen


To label the points:

1. Move your mouse to the datatype “Water Levels” (“Groundwater” for the Landfill System) and click on the query “WaterLevel_AHD”
2. You now have all the water level data displayed in the data panel. The GIS Window shows the data locations read directly from the database and plotted against a basemap of the site.
3. Click the label button () on the map toolbar and the label will iterate between the Location Code, the Water Level range, no label, and back to the Location Code.
4. Select (drag a square) around the northernmost 5 or 6 points (position the mouse, depress the left mouse button, drag a square over the data points, release the button).

The selected points will turn yellow. To add these locations to the filter click the  button (left side of the map toolbar). You will see that a list of these locations have been added to the filter.

5. In the filter panel click the "Apply Filter" button

We now have only the filtered data in the Data Panel, and in the GIS Window. We are going to graph this data


6. On the right toolbar click on the dropdown arrow to the right of the  button and select “Customise Display”.

A form will load which gives you options for graphing.

7. Accept the defaults (repeat this later and try varying them, eg. produce a new chart for changes in “Monitoring Unit”, and use the “MultiChart template”).
8. Click “Plot” (bottom left).

ESDAT will plot the data using Excel. This chart has some important differences from regular Excel charts; the data links directly to data stored in ESDAT. This means that as more data becomes

available this chart can be automatically updated to include the new data. The graph template can be customised, which will be discussed in later tutorials.

9. Click the  button at the bottom right of the screen.

You can try replacing or adding from the data you filtered in ESDAT.

10. Select one or more of the data series and click "Replace"

11. Close Excel without saving

Having seen the data as a time-series chart, we are now going to look at contouring this data for a particular date.

Contouring

In ESDAT Clear the filter by clicking on the red "Remove Filter + Clear" button.

In the Data Panel one of the columns is the "Date_Time". We can filter for a value by double clicking on the value in the data panel.

1. Double-click on the date "11 Dec 01" ("31 Oct 90" for the landfill system)

This repopulates the filter with this date.

2. To apply the filter double click the same data again or click the green "Apply Filter" button.

Double clicking the same value twice applies the filter. When the filter is applied the filter tab should read "Filter (ON)"

3. Click on the  button.

4. Click "Contour".

Surfer will now open and you will see the contoured water levels, with data points.

5. Close Surfer without saving and go back to ESDAT.

We have had a brief demonstration of some of the basic functionality of ESDAT. You can now experiment with your own particular interest, or work through the next tutorial in sequence.

Tutorial 2

This tutorial assumes previous completion of Tutorial 1, and builds on the concepts in greater depth as well as introducing new features.


Filtering

We have seen a brief example of the use of the filter in the above overview. The filter uses the following concepts:


- A double click on a value in the data panel or on a point on the map adds the selected data to the filter
- Double Clicking on the same value/point again applies the filter
- Multiple points can be selected from the map by dragging a square around them
- More sophisticated filters can be constructed using the "Filter" panel, or more sophisticated again using the pre-output filter or manually editing the filters.

Try the following

1. Double click on a number of points on the map. Click Apply Filter

Only the filtered points should appear on the map, and the data in the data panel will relate to only these points. Clear the filter ()

We would like to see what Lead water chemistry results are available in the 'lower aquifer' groundwater.

1. Select Water Chemistry data (Groundwater chemistry in Landfill system).
2. Close the map panel so we can see more of the data ( at the top of the screen)
3. In the data panel, double click on a cell containing the value "Lead" in the column "ChemName";

4. In the column "Monitoring Unit" (scroll to the right) double click on a cell containing "Lower Aquifer". To apply the filter double click on this cell (or another with the same value) again, or click "Apply Filter" in the filter panel.

We can also construct the filter from the "Filter" panel.

1. Clear the Filter.
2. Click on the "Filter" tab
3. To populate the filter do the following:

Click on "ChemName"

Double click on "Lead"

Click on "Monitoring Unit",

Double click on "Lower Aquifer",

The filter string should read:

ChemName = 'Lead' And

MonitoringUnit = 'Lower Aquifer'

4. Click Apply Filter to obtain just this data. (If you have made a mistake in constructing the filter you will get a message box telling you so)


You can see the locations of these points in the map panel if you have it open (or if you open it). The data associated with this filter is shown in the Data panel. Later we will look at what you can do with the data once you have filtered it.

You can construct the filter by using either of the methods, or using them in combination. There are comprehensive guidelines on more sophisticated use of the Filter in the Help files.

Location Groups

ESDAT has the ability to assign locations to a number of zones (called Location or Spatial Groups) for the purpose of filtering.

To create your own group


1. select a number of the locations on the map (or filter by any other criteria in the data panel) and populate and apply the filter Filter.
2. Click the  button located on the datagrid toolbar, and when prompted enter a meaningful name for the group.
3. Clear the filters.
4. In the "Filter" dialogue scroll down to the bottom of the field names (on the left) and click on the name "Group", and double click the name you entered which appears on the right panel.

Apply the filter. If you have the GIS Window open you will note that all the locations are those you selected in creating the Location Group. Try Applying and Removing the filter and note the change.


Plotting Graphs

General

Select the water level elevation data and filter for 'BH1', 'BH2' and 'BH3' either using the map, the data panel, or the filter panel. The Filter Panel is easiest for this example. In an example of an easier use of the filter panel, click once on LocCode, and double click on BH1, BH2, and BH3. Click Apply Filter.


1. Click on the Graph Icon on the right ()

Excel will open and the data will be plotted.

2. Click on the  button at the bottom right.
3. Select only 'BH3-A' and click 'Replace'.

4. Click the button again and select only 'BH3-B' and click 'Add'. This way we can alter the composition of the graph.


The data used to create this graph is in the worksheet "Data_Waterlevel" in the same Excel book.

5. Click on the "Data_Waterlevel" tab to open this worksheet. As an exercise delete part of the data related to BH3-A or BH3-B. Switch back to the graph and some data will be missing.
6. Click the  button, and click "Update". The data will be repopulated with data from the database.

We can use the same approach to update graphs to reflect new data imported into the database. We will do this later using this graph.

Save this excel workbook in a location you will remember.

Chemistry Graphs

1. Clear the filter, select the Water Chemistry data, (if using the Landfill example filter for 10-20 compounds or graphing may take a while)
2. Click on the arrow to the right of the graph icon ()
3. Change from the "Chemistry Pre-Defined" Format, to "Generic".
4. Change the chart format from "Landscape Template" to "MultiChart Template"
5. Review the options and click "Plot".

The data will be plotted in Excel. Redo the above, but use all the defaults (ie use the Chemistry Pre-Defined format)

The Chemistry Pre-Defined format is faster, looks more report-ready, and can include environmental standards, however cannot be automatically updated as more data becomes available (they must be regenerated).

The Generic format can be automatically updated as more data becomes available, however it doesn't include environmental standards. The data for the generic format is also stored in a separate sheet for each graph, whereas all the data for the Chemistry Pre-Configured Format is stored in the one sheet (you can see the data sheets within Excel).


ArcView and ArcMap Export

This section assumes a basic ability to use ArcGIS. ArcGIS must be installed. ESDAT also exports shape files to Arcview 3 (an earlier version of ArcMap), however this tutorial only deals with ArcMap9. The shapefile export works in the same manner.

In ESDAT

1. If using the Contaminated Site example select Water Chemistry, and filter for Chromium and Copper Calcium data, with a Total_or_Filtered value of "T" collected on 30th Jan 04.

If using the Landfill example select Groundwater Chemistry and filter for Ammonia, Ammonium, Nitrite and Nitrate on 19th Feb 98

2. Click on the ArcMap icon ()
3. Select the "Use Chem Label Transformations" check box (if using ArcGIS 9.x), and click "Plot".

A blank ArcMap project will open with the data points shown. (If ArcMap is not installed where expected you will have to navigate to the executable)

The data exported, and saved in the file "ESDAT-Shapefile" is only temporary. To save a permanent copy in ArcGIS/ArcView the file must be renamed. (In ArcGIS right click the file, Select Data – Export Data, and change the file name.



To have full ability to move and edit the labels in ArcGIS, ArcGIS requires that the labels be transformed into Annotation.

You can add basemaps to this file, and move the labels to facilitate better viewing. If you have Maplex for ArcGIS you can use this to facilitate better automatic label placement.

In ArcMap


1. Start a new map and add the basemap Sitemap.shp from the directory in which the sample dataset is stored (this will typically be C:\Program Files\ESDAT\Sample ____\Sitemap.shp)– this will give a site map.
2. Save the file in a convenient directory and close ArcMap

To export data from ESDAT using this map as a basemap

1. click , Click on the browse button () and navigate to the file you saved. Select it, and it will be added to the drop down selection.
2. Select “Live link to data” and click "Plot".

The current data will be plotted over the basemap you just created and will be linked to the database. Labelling will need to be specified in ArcMap.

Excel Export

1. In ESDAT use any data and click on the Excel icon .

You will see that you have a number of options, to only export selected rows, to maintain the link to the database, or to produce a Pivot Table or Pivot Chart (Pivot Tables and Charts are tools available through Excel, and Excel has comprehensive documentation on their use). ESDAT links to a superior Pivot-Table to that available in Excel (discussed later), so Excel Pivot Tables are not recommended unless you are already familiar with their use. Selecting "Maintain Link to Database" will format cells with no boundaries, (this is a standard to indicate that the cells are linked to an external database), and the data can be updated as new data is loaded into the database.

2. Accept the defaults and Click Export.

gINT Link

*Complete this only if your organisation uses gINT for geological logging.

Click on the gINT icon on the right side of the screen. You will be presented with three options. Select "Link Data". Navigate to the gINT file (stored in the Sample directory)

To link to the Geology/Stratigraphy information stored in gINT, select Geology/Stratigraphy and click "Update Link".

In the main screen if you go to the "Geology" datatype (along the top) and click on Geol2_gINT_Geology you will see a gINT table. If you click on Geol2_gINT_Sequences(bgl) or (AOD) you will see the geology table cross-tabbed to give the depth to, or elevation of sequence tops in the columns.

By clicking on the Surfer contour button you can now contour sequence tops or depths and view them in Surfer.

To check that the borehole information in gINT conforms with that in the ESDAT database click the gINT icon, and select "Check database synchronicity". You will see that one gINT borehole name is not found in the ESDAT database due to a space being included before the number (the name entered into ESDAT doesn't have a space). This can be fixed from within gINT or by editing the gINT_Point/gINT_Location table within ESDAT. Now click on the coordinates tab and you will see that some boreholes have slightly different coordinates in gINT than in ESDAT. To fix this click on the "Make gINT data conform to ESDAT data" button. Click the Lithology tab, and click "Import data to ESDAT" (3 points – related to the invalid location wont be imported)

The geology information in gINT is now both linked (through a live link) to ESDAT, and the data is stored in ESDAT's dedicated geology table. Producing two copies of the same data is generally undesirable, so one copy (eg. the gINT version) should be considered the master geology file. Copying the data into ESDAT's geology table however, allows us to include the downhole lithology information in the chemistry output tables where a chemistry sample is collected and where lithology has been logged.

Produce a chemistry table of all soil data using the Factual Reports Chemistry Output Tables. When you have the option to select the sample information to be included in the table (the second screen in the production of the table) include “Lithological Description” in the output.

WinLog Link

*Complete this only if your organisation uses WinLog for geological logging.



Click on the WinLog icon on the right side of the screen ().

Select “Link Data”. You will be prompted if you would like to create a new winlog database, or use an existing one, click on “Existing”. Navigate to the gINT file (stored in the Sample directory). You will now be prompted for the data types to create a link to, select Geology/Stratigraphy and click on “Update Link”. The WinLog data is now linked through ESDAT.

If you move the mouse to the “Geology” datatype button (along the top) and click on Geol2_WinLog_Lithology you will see the lithology information available in the WinLog project. If you click on Geol2_WinLog_Facies (bgl) or (AOD) you will see the geology table cross-tabbed to give the depth to, or elevation of sequence tops in the columns.

By clicking on the Surfer contour button you can now contour facies tops or depths and view them in Surfer.

To check that the borehole information in WinLog conforms with that in the ESDAT database click the WinLog icon, and select “Check database synchronicity”. You will see that one of the boreholes has slightly different coordinates in WinLog than in ESDAT. Fixing this must be completed from within WinLog.

Click on the Lithology tab and you will see that there is lithology information in WinLog but not in ESDAT. As we have linked into the WinLog database it is not necessary to have the same data stored in the ESDAT database, causing duplication. We can however copy this data into ESDAT where it can be included in chemistry output tables. To do so click “Import data to ESDAT”.

Produce a chemistry table of all soil data using the Factual Reports Format 2. When you have the option to select the sample information to be included in the table (the second screen in the production of the table) include “Lithological Description” in the output. When the table is produced some of the samples have lithology information included (you may have to scroll to the right).

PivotTable List Export

Although factual reports are provided for chemistry data, sometimes users need to restructure other chemistry or other data in a specific manner. ESDAT provides two tools for this. The easiest to use is the PivotTable List export.

The PivotTable List is a tool hidden within Microsoft Office (you will need to have Office). Linked with ESDAT it can be a useful tool to restructure filtered ESDAT data.

1. Select some chemistry data and click the PivotTable List button.

A table of the data will be automatically generated. The chemistry Method Name, ChemName and Units will be listed across the columns, and the SampleCode down the rows.

2. Drag the Method Name, ChemName, and Output Unit next to the SampleCode. (make sure you complete the drag in the grey (row) area, ie within the SampleCode or leftmost column)

The data will be restructured to suit this new layout.

3. Click the Field List button (second from the right in the top toolbar)

4. Select LocCode and drag it next to SampleCode on the table.

Using this you can add extra fields to the table. Fields can be deleted by selecting them and pressing the delete key.


5. From the Menus select Edit – Copy All, and click OK on the messagebox.

6. Paste the data into Excel

This tool is quite handy, and easy to use, but copying from it to Excel can be quite slow when used with large output tables. Data should be filtered to that desired prior to copying the data to the clipboard. ESDAT's Cross-Tab summary (described later) is better able to handle restructuring of large tables, but is sometimes not as intuitive to use.

Aggregate Summary

The Aggregate Summary can be used to obtain statistics and summaries of your data. For example, for water chemistry concentrations covering the whole site, and portions of the site.

1. Select Water Chemistry data.
2. click on the  button (to the left of the data panel)


You will now have a dialogue box in front of you with the tabs "Aggregate Summary" and "Cross Tab Summary".

3. Using the "Aggregate Summary" double click on "LocCode", "WellCode", "ChemName", and four times double click on "Concentration".

These fields with the instruction "Group By" will appear on the summary construction table.


4. Underneath the four Concentration labels click on the "Group By" text and change them to Min, Avg, Max, and Count respectively.
5. Click "View Summary" and "Close".

You can now see a summary of the minimum, average, maximum, and the count for concentrations of each chemical at each well and location.

6. Click the  again. Select the text LocCode and WellCode in the bottom panel, right click and select delete . Click "View Summary" and "Close".




You can now see a summary of the minimum, average, maximum and the count for concentrations of each chemical over the entire site.

Mapping


Select the datatype "Soil Chemistry" and click on the GIS Window button ( View Map) at the top of the screen

1. Select (drag a square) around the northernmost 5 or 6 points (position the mouse, depress the left mouse button, drag a square over the data points, release the button).

The selected points will turn yellow.


2. To add these locations to the filter click the  button (left side of the map toolbar). You will see that a list of these locations have been added to the filter.
3. In the filter panel click the "Apply Filter" button
4. Filter for ChemName In('Chromium' , 'Copper' , 'Lead')
5. Click Apply Filter
6. Click the  button 3 times, you will see the label change from the LocCode to a stacked label to no label.
7. Clear the filter
8. Filter for the ChemName = 'Chromium'
9. Click Apply Filter
10. Click the  button 3 times, you will see the label iterate between: the LocCode; the concentration range for Chromium, with points coloured by the maximum concentration; to no label with colouring.

To further customize the labels and colours:


1. Choose the output most closely matching what you want
2. Click the  button to show the layers.
3. Double click on the Soil Chemistry layer to bring up the layer dialogue.

4. Play around with the layer options. (for this data, which is points you can ignore the “Area” and “Lines” tabs.


To alter the position of existing locations into the map

1. Click the edit button () on the map toolbar.
2. Select a point and drag it to a new location



To add a new point on the map

1. click the add point button () on the maps edit toolbar.
2. click on the map
3. When prompted enter a location code (eg BH New)
4. Add any other desired information to the Location Table and click OK
5. As you are probably looking at chemistry data you will have the option to add a sample, close the form without doing this as the excel import templates are still the best method for adding chemistry data.




To interrogate a point

1. Ensure the Information button () is toggled on.
2. Click on a point

To remove a layer


1. Ensure you can see the list of layers (Click the  button if necessary)
2. Select the Backdrop Layer
3. Click the Delete Layer button ()

To add a layer

1. Click the Add Layer button ()
2. Navigate to the file “Backdrop1.JPG” in the sample folder (typically c:\program files\esdat\sample01 contam)
3. As this file does not have extents associated with it (ie a jpw world file) the user will have to position it. Select the corners of the image and drag to get the best location. You can use the zoom buttons ( ) if required. When finish turn off the edit button.

To export a layer


Layers can be exported to a variety of formats from the map. This is in addition to the exports to programs provided in ESDAT's export toolbar. In particular the export of chemical labeling data to exports other than shape files is currently only available from this functionality.

1. Select the soil chemistry layer
2. click the Export Layer button ()
3. Select an export format (eg dxf or mif). (If you try to export point data to a raster image you will get an error message)


Data Reprojection

On the fly reprojection of data is available, although is currently limited. Any base layers represented in WGS84 (ie most regional and national datasets) are automatically reprojected to UTM (ie Australia's MGA, and most other national grids) so the data overlays properly. (If your data is not in MGA/UTM this will not work properly and you will have to use consistent projections for all layers. On-the-fly reprojection will be improved in future versions.

Data Importing

Click on the  icon and select the data table "Water Level". Click "Create Import Template". ESDAT will produce a template in Excel for you, into which you can paste the data then import it.




Some sample data for import has been provided to illustrate certain features.

1. Open the file "New Data.xls" in the Sample directory (this will typically be C:\Program Files\ESDAT\Sample01) .
2. Copy the water level data from this file to the relevant sheets in the workbook you just created and arrange the data in the correct columns.
3. Click on the  icon in Excel, accept the defaults and click Import.

The first data row will be imported (shaded a pale shade of green) to the database, and the second will generate an error telling you that the record already exists. To compare the data you are trying to


import with the data already in the database click the option “Compare Import Records with Existing Duplicate Records” and click “Import”. The new data will be shown next to the existing data (scroll to the right). Differences will be highlighted in purple (note the data is the same, the only differences are fields which have been filled in with a default). There is no point in overwriting the existing information so we can close Excel.

This means of importing can be used for any data tables in the database, including any tables you may add or modify yourself.

*Switch to, or open the file we saved earlier containing the graph. With the graph selected click on the  button and click “Update” (to see the  button you may need to click on  and select ESDAT Charting) .

Notice that the new data for BH3-A is now represented on the graph.

Field Chemistry

1. In ESDAT click on the  icon, Select “Assisted Chemical Formats”, and double-click on “Field Chemistry”.

We will be presented with an excel worksheet for importing field chemistry data. Some predefined field parameters have been loaded, and the CAS Code is given above.

2. Type in some sample data as shown below: (A formula for creating the sample code is automatically generated.)

SampleCode	LocCode	Sampled_Date-Time	WellCode	Sample_Depth_From	Matrix_Type	SampleComments	E.CONDUCTIVITY			
							Electrical	pH	Redox	Temp
							uS/cm	pH_Units	mV	oC
BHL_01Jan_04__3	BH1	1/01/2004		3	soil		500	8.1		21
	BH10	1/01/2004		5	soil		700	7.7		20


(use TW instead of soil for the Landfill System)

3. import the data (click the  button on the toolbar).



The fields available for import can be customised, for example a “Sample_Depth_To” can be added. This is covered in the help files.

Historical Chemistry

Historical chemistry can be imported into ESDAT in one of two formats, a tabular (Cross-Tab) format the same as the field import above, which is similar to the presentation of data in reports; and a columnar format, where the chemicals are listed in a single column and the sample information is repeated for each chemical result. The Columnar format is convenient if transferring data obtained from other databases. The Cross-Tab format is convenient if importing data from report tables. To import in the Cross-Tab format do the following.

1. In ESDAT click on the  icon, Select "Assisted Chemical Formats", and double-click on "Historical Chemistry".
2. Copy the chemistry data from the "New Data.xls" file and paste in the historical chemistry import. Arrange the data so that the chemical names are along the top (where Analyte1, etc.. are originally), the units are filled in, and the sample information is in the correct column. Your screen should look like the image below.

SampleCode	LocCode	Sampled_Date-Time	WellCode	Sample_Depth_From	Matrix_Type	Arsenic	Chromium	Cu
						mg/L	mg/L	mg/L
	BH1	08-Jan-04			water	0.17		
	BH1	30-Jan-04			water	0.004	0.21	1.05
	BH2	08-Jan-04			water	0.002		
	BH2	30-Jan-04			water	0.17	0.064	0.005

3. Click the  icon, which will attempt to automatically assign CAS Codes or allow you to assign them manually. Arsenic and Chromium will be found automatically, select Cu and type in "Cop". The code for copper will be found in the right panel. Double click this and click "Update".
4. In Excel click the  icon and import the data.

Chemistry Output Units

Results in ESDAT are converted to a consistent unit for each compound, allowing results imported in various units (eg ug/L and mg/L) to be output in the one unit. This makes tables, graphs, and maps easier to produce and read. The calculation raises the possibility however that a conversion between the measurement unit and the output unit does not exist in the database. ESDAT runs checks on this in both the Chemistry QA Error Checker, and under the menu Data – Check Chemistry Unit Conversions. The latter menu also allows the user to add a conversion, or to change the output units.

1. Click the button “Check Units”

There is one error – a soil result measured in mg. Clearly this is an error and the measurement data needs to be looked at rather than applying a conversion. If for the moment we assume that it should be mg/kg and rather than fixing the data we want to apply a conversion do the following.

2. Click in the Conversion box, select “Add Conversion” and type in the conversion (1000).

Checks are also run to check that the most appropriate unit is used for a compound. For example if mg/L is the output unit, but the concentrations are low ESDAT will recommend that the output units be changed to ug/L.


3. To look at the recommended output unit changes select the corresponding tab, and click in the “Change?” column for those you wish to change.

Deleting Data

To delete the data we just imported into ESDAT select the “Samples” data type button. You can filter by the Sample Delivery Group (SDG), which is typically unique for each lab file (16716 for this batch); or the “Data Added” Field where the date is today, or you can filter by any other field.

1. In the Builder Filter dialogue (under the Filter tab) double click on "Date Added", click the "=" button, and double click on today's date in the left panel. Click OK and Apply the filter.

To edit or delete the data you need to enter Edit Mode,

2. Click the Data tab and click the  icon (on the toolbar along the left edge of the screen). The button should turn red.

3. Select the top left corner of the data grid (to select all the data), right click, and click on Delete Row(s).

You will be prompted to ensure you want to delete the data, select yes. The samples we imported today, and the associated chemistry results have now been deleted.

Tutorial 3 – Advanced Users

Adding extra Matrices

By default the Hydrogeology and Environmental system comes with matrices of “Soil”, “Water” and “Gas”, the Landfill system comes with matrices of “SW”, “GW”, “Leachate”, “TW” (Trade Waste), “Gas” and “Dust”. Extra matrices can be added if desired.

1. In ESDAT select Setup – Chemistry – Add Sampling Matrix
2. Select the matrix state which best describes the new matrix. Double click on “Solid”
3. Tye in a new matrix (Sediment for the Hydrogeology and Environmental System, Soil for the Landfill system) and click Submit.

A datatype button for the new sampling matrix will appear in ESDAT and you will be able to import to this matrix.

Combined Compounds

ESDAT can automatically sum compounds to create an output for the sum. ESDAT comes with a summation of Aldrin + Dieldrin, and TCE + DCE + VCE..

To add another (eg Ammonium) we have to add Ammonium as a valid ChemName. In ESDAT select Import – Chemistry Lookup and type Ammonium into the ChemName column, Look up the ChemCode and specify the output units for this compound (eg mg/L and mg/kg). Import this data.

To specify how this compound will be calculated select Import – Combined Compounds in ESDAT. Type or Paste and import the following data (the names have to be exact to match those in ESDAT, they can be obtained by selecting View – Chemistry Lookup in ESDAT and filtering for the desired compounds, and copying them):

Nitrate (as N)	Total N
Nitrite (as N)	Total N
Ammonia as N	Total N
Ammonium	Total N

The combined compound will be calculated whenever chemistry data is imported, or when instructed from the ESDAT menu Setup – Chemistry – Combined Compounds, where some options for the calculation can be specified.

ESDAT Database Interaction

Complete this section if you have even a passing interest on using Access databases and in making your own modifications and customisations of ESDAT outputs.

Click on the Access icon on the right. ESDAT will open the current database in Access.

Examine the list of Queries (click the Queries button on the left) and you will notice that the queries match those appearing under the Data-Type buttons in ESDAT. If you open them in Access you will see exactly the same data. If you alter and save them in Access you will see the changes when looking at them through ESDAT.

There is a rainfall table in the database, but there is no rainfall output in ESDAT. We can view this table (there is no data in it) in one of two ways.

1. In ESDAT under the “Data Tables” button click on the name “Rainfall”. The table (with no data) will load, or
 - 2.a) In ESDAT select the menu Setup-> Data Type Buttons.
 - b) Add a description “Rainfall” and a prefix type “Rain”, ensuring the case is correct.
 - c) Open Access and create a new query called Rain_Rainfall, construct the query using location information from the Locations table to allow the points to be plotted spatially.

To view immediately through ESDAT you may have to refresh the connection to the database by selecting Setup->Refresh Connection in ESDAT.

Using this approach you can customise the interface for any data types or database, or to create new queries. Try opening one of the other queries which you can see through ESDAT to see how the data is manipulated.

Custom Chemistry QA outputs

Data received from the laboratory can be checked for QA issues such as: Holding Times; Lab and Field Duplicate RPD's; Detects in Blanks; Lab Control Sample errors; Certified Reference Material errors; Surrogate errors; and Matrix Spike errors. The QA checker, which identifies these errors has been introduced in Tutorial 1.

Sometimes users want a particular aspect of Chemistry QA, or want to produce their own reports outside of the QA checker. For this, Chemistry QA information is also available under the “Chem QC” datatype button.

Some users may want, for example, to report their complete Field Duplicate information, but want to restructure it to look different from that presented in the Data Summary of the QA Checker. You can use the outputs under “Chem QC” along with the PivotTable List to achieve the data outputs and structure you require:

1. Under “Chem QC” select “QC4_Duplicates”, and filter for field duplicates.
Review the data that is available to you in this output.
2. Click the PivotTable List button.
3. Drag SDG, Parent Field ID, Dupe Field Id and Sampled Date/Time to the row headers.
4. Drag Method Type, Compound, and Result Unit to the column headers.
5. Drag Parent Result, Dupe Result, and RPD to the detail area.
6. Select Copy All, and paste the data into a reporting package, such as Excel.

(If pasting into Excel the use of two formatting functions generally make the data look clearer. Format – Column – Autofit Selection, and Format – Cells – Alignment – deselect Merge Cells.)


An alternative output from the Chemistry QA Checker is available. The output to Internet Explorer precedes the Excel outputs, and although the errors table is identical the summary information is in a different format which may be more suitable to your needs.

1. Open the Chemistry QA Checker
2. Review and alter the QA parameters to suit your needs
3. Produce the Excel Summary and Errors Export and review
4. In the Chemistry QA Checker click “Output to Explorer” and click the “QA Summary” button.
These summaries focus on summarizing data by SDG and sample matrix, rather than the

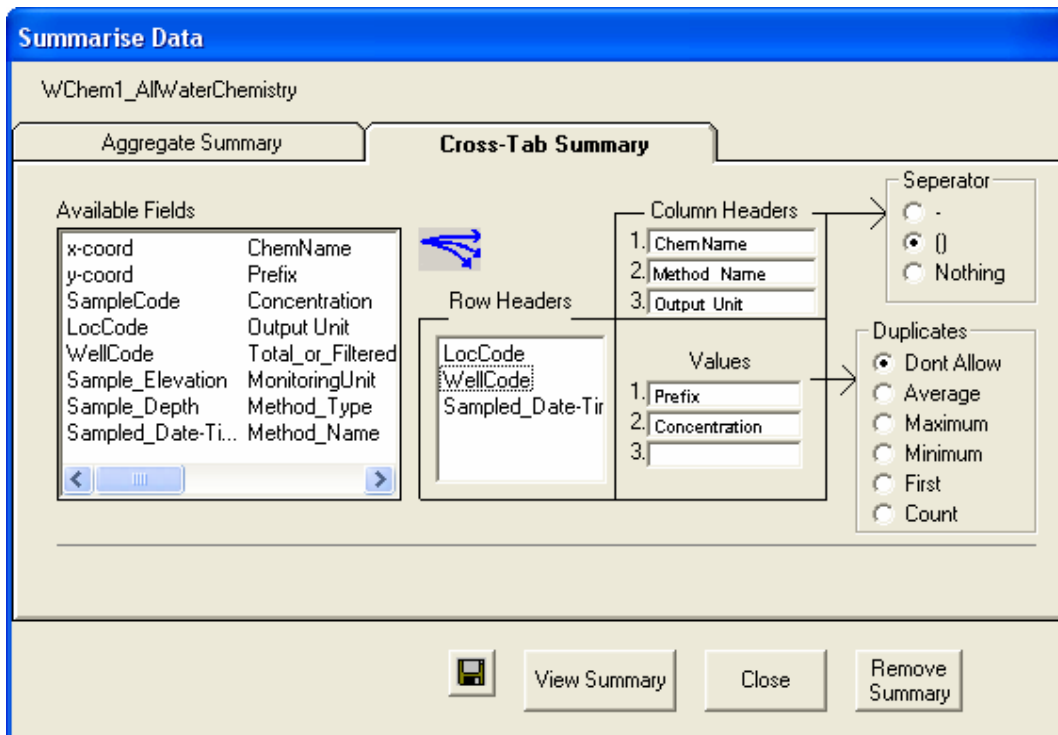
summary by compound and sample matrix in the Excel export. A complete list of the Field and Interlab Duplicates is also produced.

5. Review and close the reports. Close the Chemistry QA Checker form.

Cross-Tab Summary


1. Using Water Chemistry data In ESDAT click on the  button on the left (DataPanel) toolbar.
2. Click on the tab "Cross-Tab Summary".
3. Double click on LocCode, WellCode and Sampled_Date/Time,
4. Drag ChemName to the first Column Header, Total or Filtered to the second Column Header, and Output Units to the third Column Header.
5. Change the Column Header separator from a dash to the brackets.
6. Drag Prefix to the first value and Concentration to the second value.

The Cross-Tab summary should look like the picture on the next page.



Click “View Summary” and “Close”.

You can now see the data with the chemical names and units along the top. The chemical concentrations with their prefix are shown for every location and date. This table is different from the Pivotlist described previously as it is possible to calculate a statistic (eg average) for each combination of row and column header. In the pivot list each individual value will be displayed, which may in some occasions be preferable.

If we want to save this view of the data click the  button again and click the save button along the bottom. You will be prompted for a query name, type “Wchem4_WaterChemistryCrosstabbed” (ensuring capitalization for the WChem prefix is correct). Click “Close”.

Select the menu Setup – Refresh Connection. Under the Water Chemistry data type button this query should now appear, if you click on it you will see the same data you just summarised.

General instructions for starting a new project:

1. Starting Project

Start ESDAT. Click on the “New” icon, then

Type the project name in the Identification Code;

Select “Hydrology and Environmental”,

Specify the location for the new database (click the ...box). Click OK.

2. Loading Location data (optional)

From the ESDAT menus select Import, Data Tables,

In the white Listbox double click on the “Location” table

A template will open in Excel. Paste in the data.

Select the up arrow (↑) on the Excel toolbar, click Import. Fix any problems and reimport.

3. Loading Lab Data

From the ESDAT menus select Import, Laboratory File.

Navigate to the laboratory file. (The laboratory file must be in the ESDAT format)

Select the “Sample” file. The file should then open up in Excel.

Specify the field duplicates and blanks and import as described in the tutorials

*When a field duplicate is imported, it is important that the sample type is changed from *Normal* to *Field_D* under the Sample Type column, similarly Interlab Duplicates must be changed to Interlab_D. The parent sample will need to be assigned in the Parent Sample column. Details on this can be obtained from the field person/sampler.

4. Check the data using the Chemistry QA Error Checker, and tabulate the data using the Chemistry Table Export.