



SEM5000 Software

OPERATING MANUAL



Operating Manual

TABLE OF CONTENTS

Manual Guidelines	3
Safety symbol	3
Hyperlinks	3
Notes	3
General Description	4
Installing SEMsoft	4
Bluetooth Connection	5
Using SEMsoft	6
Launching the Application	6
Startup Screen	7
Work Screen Overview	12
Office Mode	13
Real Time Mode	23
Troubleshooting	25

Operating Manual

MANUAL GUIDELINES

Safety symbol

Information in this manual that may affect the safety of users and others is in the following format:



Information in this manual that may affect the safety of users and others will be placed in a box identical to this one.

Failure to follow this information may result in physical injury that in some cases could be fatal, cause damage to the equipment or to the environment, or invalidate the certification of the equipment.

Hyperlinks

Hyperlinks to websites or email addresses are in the following format:

www.qedenv.com

Notes

Important/useful information and instructions are shown clearly throughout the manual in a note format. For example:

Note: For further information please contact Technical Support at QED at (800) 968-2026 or email landtec_support@qedenv.com.

Operating Manual

GENERAL DESCRIPTION

Software for the management and monitoring of the landfill areas, with OSM (Open Start Map) cartography integrated.

This software for the monitoring can be used in real time or for data download, with the instrument **SEM5000**. The software can also be used in Office mode (disconnected from the instrument), to control the work, for the export or to print the report.

It also allows the integration of shape files containing the landfill areas and the control points, to work fast and efficiently.

The data can be exported in several formats: .shp (Shape), .csv (Excel) and .kml (Google Earth).

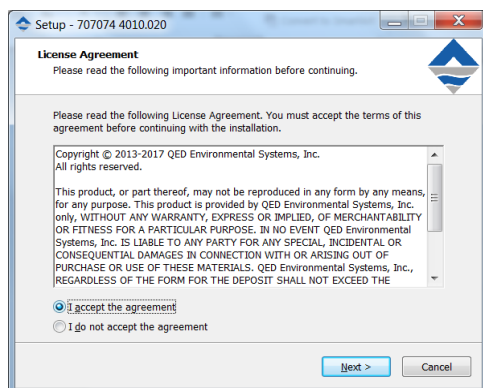
NOTE: The photos shown in this manual are indicative.

INSTALLING SEMSOFT

To install SEMsoft, double click on the file “installer.exe” and follow the instructions.

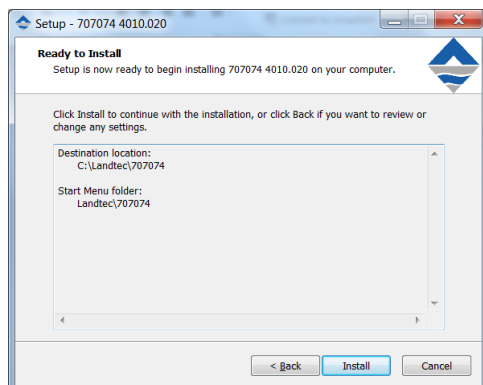
License Agreement

Choose “I Agree” to accept the conditions and then click “Next” to continue the installation.



Install Location

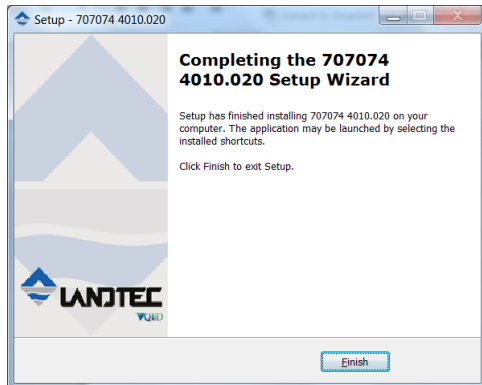
This screen displays the destination location for the software folder. Click “Install” to continue the installation.



Operating Manual

Installation completed

Once the installation is finished, the confirmation window will appear. Click “Finish” to complete the installation.



NOTE: SEMsoft will create all of the necessary storage folders on your PC upon initial installation.



DO NOT change the names of the storage folders created by SEMsoft. Doing so will result in an incompatibility with future SEMsoft versions and will not allow you to update the software.

Bluetooth Connection

Activate the Bluetooth on your PC and make sure that the PC find the instrument. Associate the two devices and enter the PIN 1-2-3-4

If you continue having problems connecting Bluetooth, follow the procedures in the following link.

These procedures are for standard drivers. In case you have another type of driver, check on the manufacturer's website.

Windows 7

<https://support.microsoft.com/en-us/help/15290/windows-connect-bluetooth-device>

windows 8.1

<https://support.microsoft.com/en-us/help/15290/windows-connect-bluetooth-device>

windows 10

<https://support.microsoft.com/en-us/help/17156/windows-10-connect-to-bluetooth-devices>

Operating Manual

USING SEMSOFT

Launching the Application

Install the SEMsoft software, provided on the flash drive with your SEM5000, on your PC, (see Appendix I). Once installed, the application will open.

The installer will automatically create a shortcut on your desktop that can be used to launch the application in the future.

Once the application is launched, a splash screen will appear with:

- The LANDTEC logo
- Software version

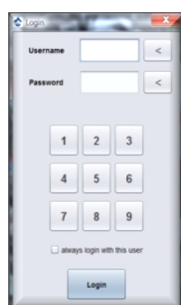


The application requires a user name and password. When you start the application for the first time, enter your desired user name and password in the corresponding fields.

Check "Always connect with this user" to connect automatically on further starts.

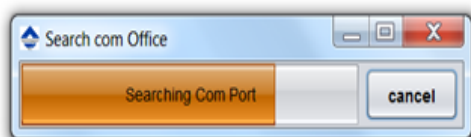
Click "Login". Your user name and password will be saved automatically.

See Appendix D for more information.

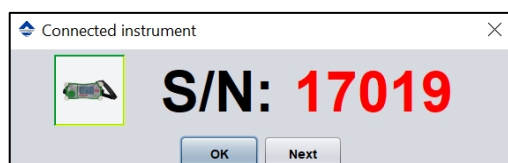


NOTE: User names and passwords are case sensitive.

The program will search for all the available com ports on the PC.



If you have the SEM5000 activated and have already paired the instrument with your PC, the software will recognize the instrument and display the instrument serial number.



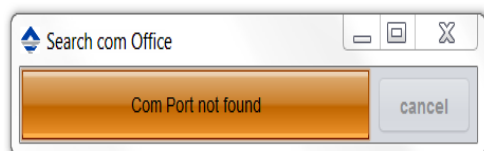
Operating Manual

Click “Okay” and the software will connect to the instrument and continue to the main screen

NOTE: In order to retrieve data from the instrument, it must be active and connected to a PC containing the associated license.

NOTE: If there are two or more instruments connected, SEMsoft will display the serial number for each unit, one at a time. Click the “Next” button until you locate the desired instrument and then click “Okay”.

If the program does not detect an instrument, the message “Com Port not found” will appear and the program will start in Office mode, (SEM5000 not connected or active).



NOTE: Office mode allows you to view and work with previously downloaded data. It will not display any data from the SEM5000 that has not yet been downloaded.

Startup Screen



The Startup splash screen will display a toolbar and an active button to start a new session. Clicking “New Session” will allow you to view and work with previously downloaded data.



NOTE: If your SEM5000 is connected and has data in its memory, the “Data Download” button will be active on the splash screen. It will also indicate the next recommended factory calibration date for the instrument.

Operating Manual

Downloading Data



Download

To download data from the SEM5000:

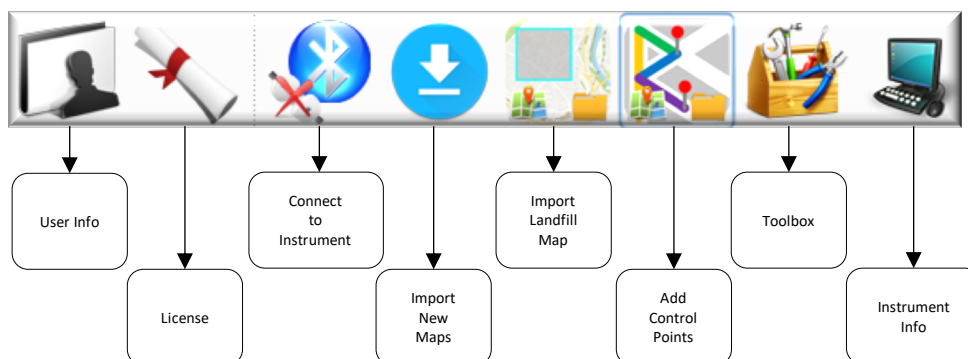
- Connect the SEM5000 to your PC. It can be connected via Bluetooth or you can connect directly by using the USB cable
- The Bluetooth for the SEM5000 is always active when the device is ON and will attempt to connect to your PC. You may need to open Bluetooth on your PC and pair the device before SEM soft will recognize it
- Click the “Download” icon on the main screen.
- Fill out the requested information in the window that appears and then click the “Download” button.

NOTE: To download data using the USB cable, plug the battery charger into the 9-pin connector of the SEM5000 battery, plug the USB cable into the battery charger, (USB1), and then plug the other end of the USB cable into your PC.



DO NOT plug the battery charger into an electrical supply during download.

Startup Screen Toolbar



User Info



The “User Info” icon allows you to insert/modify personal information.

There are two types of users: the “Administrator” and the “User”.

USER	DESCRIPTION
Administrator	<ul style="list-style-type: none"> - can modify his own information - can create new “User” (with button “Add”)
User	<ul style="list-style-type: none"> - can modify his own information

Operating Manual

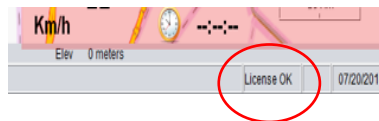
License



In order to use the SEMsoft software and associate it with your SEM5000.

- Click the “License” icon on the tool bar to open your file browser
- Select the license provided by QED at the time of purchase of the SEM5000
- Click “Open”
- The license will be imported into the software

Once the license has been added, restart the software and connect the instrument to your PC. Once everything has connected properly, the phrase “LICENSE OK” will appear in the lower, right-hand corner of the screen.



Connect to Instrument



This button allows you to connect to paired instrument after Office mode has been launched.

Import New Maps

When you open the program for the first time, it has NO maps to be displayed. Without geographic maps, the software cannot associate any of the scan data as it is saved by GPS location.

Maps must be downloaded from mapsforge.org.

To download a map, click the “Import New Maps” icon.



It opens:

The mapsforge.org web site, where you can download the desired map(s) and the Workspace Map OSM folder in which the map(s) will be saved when downloaded.

NOTE: You will be directed to the Version 4, (v4), folder on the Mapdforge website. This is the version that is compatible with SEMsoft.

NOTE: When downloading and saving maps, be sure that they save to the OSM folder located inside the Workspace folder.

After downloading your desired map(s), you must clear the cache.

Click the Toolbox icon on the toolbar and click the “Cache” button at the bottom of the pop-up window.

The software will ask if you want to clear the contents of the cache. Click “Yes”

Restart SEMsoft

Operating Manual

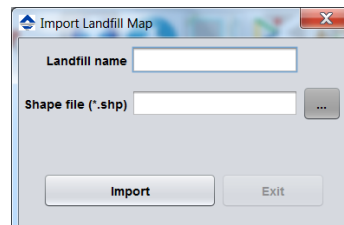
Import Landfill Map



This button allows you to import files of landfill site maps.

To import a landfill area:

- Click the “Import Landfill Map” icon in the Intro screen toolbar.
- Fill in the requested information
- Click the “Browse” button to locate the .shp file that you wish to import
- Select your file
- Click "Import"



NOTE: Imported landfill maps must be in .shp file format and contain a complete geometrical boundary of the landfill.

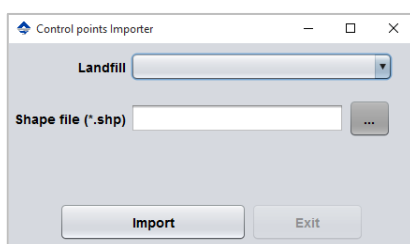
NOTE: For imported maps to be displayed, you must clear the cache and restart the software.

Add Control Points



This button allows you to import any control points, (previously created points of interest within a landfill boundary).

- Click the “Add Control Points” button
- Choose landfill from dropdown list
- Click “Browse” button to select your control points .shp file
- Click “Import”



NOTE: Control points imported in this manner must be in a .shp file format.

NOTE: For imported control points maps to be displayed, you must clear the cache and restart the software.

Operating Manual

Toolbox



The Configuration Frame dialog box contains the following settings:

- ☐ external GPS
- ☒ Map rotation
- Position Cursor: **triangle32.png**
- Report custom logo: (to be placed in 'config' folder)
- Report main title color: **#003FA6**
- Secondary title color: **#0C8041**
- Gas Thresholds (ppm):
 - Warning: **300.0**
 - Alert: **400.0**
 - Alarm: **500.0**
- ☐ Automatically login with the last user at startup
- Buttons: OK, Cancel, Cache, k

The Toolbox allows you to:

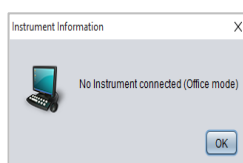
- Turn Map Rotation ON or OFF
 - Recommended for slow speed scanning
- Change the GPS position cursor
- Import your company's custom logo for use on SEM reports
- Customize your Gas Threshold levels
 - These levels relate to the color-coded GPS points
- Choose to log you in automatically on startup
- Clear the Cache

Instrument Info

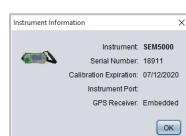


The Instrument Info icon will display information related to the current type of connection.

If you do not have a SEM5000 connected, the icon will appear as a PC and the display will advise that no instrument is connected and that you are currently working in Office mode.

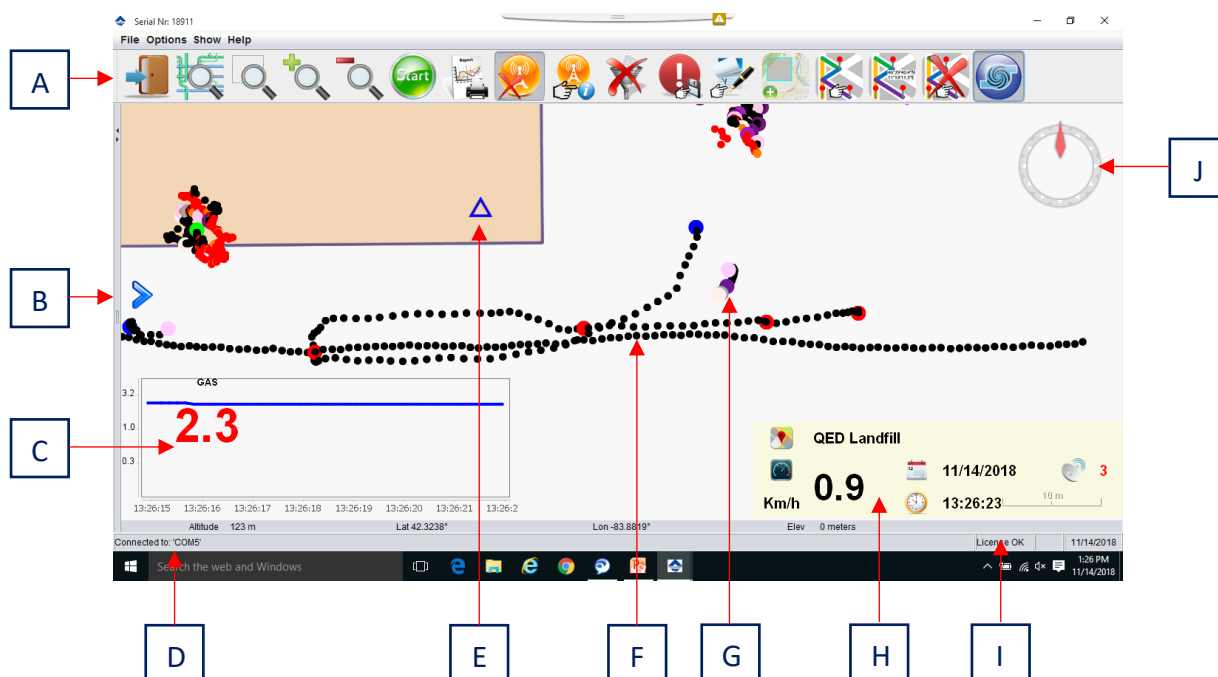


If you are connected to an instrument, the icon will appear as the SEM5000 and the display will advise the serial number of the instrument(s).



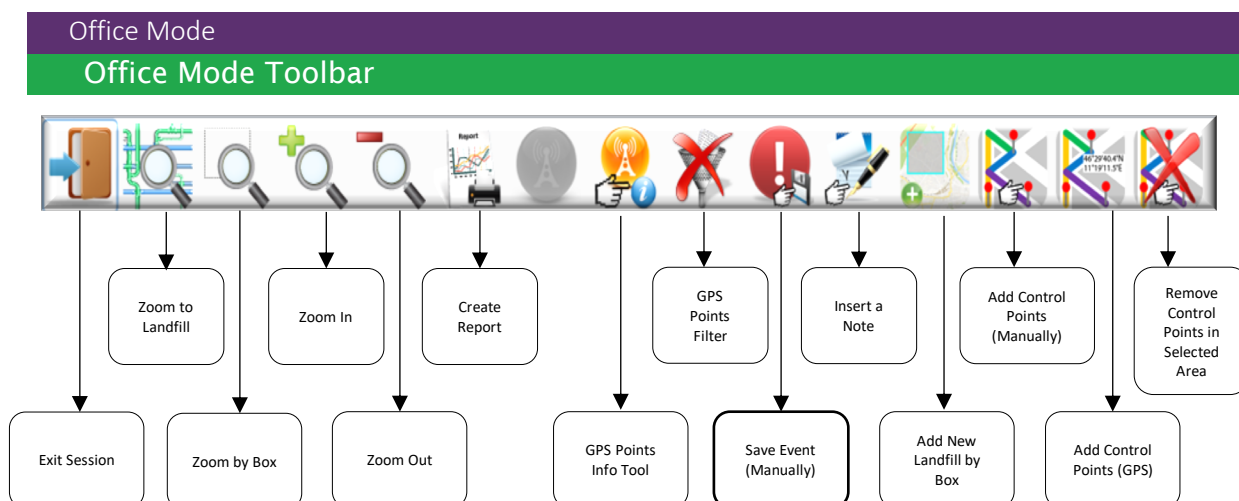
Operating Manual

Work Screen Overview



A	Toolbar <i>NOTE: Toolbar will change depending on operating mode</i>
B	Map Layers Panel Open/Close Button <i>NOTE: Refer to "Management of Map Layers" for more information</i>
C	SEM5000 Pump Status/Sample Concentration <i>NOTE: Only shown in Real Time mode</i>
D	SEM5000 Instrument Connection Indicator
E	GPS Position Indicator <i>NOTE: Only shown in Real Time mode</i>
F	GPS Points <i>NOTE: Refer to "Management of GPS/Event Points" for more information</i>
G	Event Points <i>NOTE: Refer to "Management of GPS/Event Points" for more information</i>
H	SEM5000 Information Panel (Landfill Name, Speed, Date, Time, Number of GPS Satellites)
I	SEM5000 License Indicator
J	Orientation Indicator

Operating Manual



Exit Session



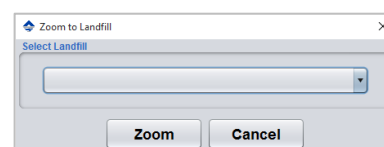
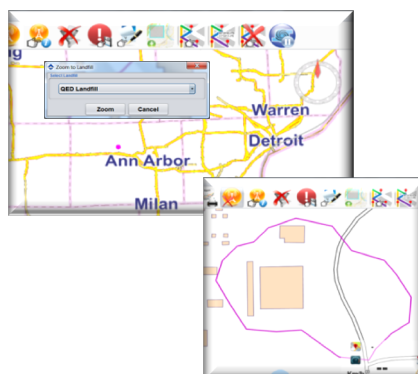
This button allows you to exit your current session and returns you to the Startup screen.

Zoom to Landfill



This button allows you to zoom to any landfill site that you have previously uploaded or created in SEMsoft.

- Click the “Zoom to Landfill” icon on the toolbar
- Click the drop-down menu in the window
- Choose your landfill
- Click “Zoom”



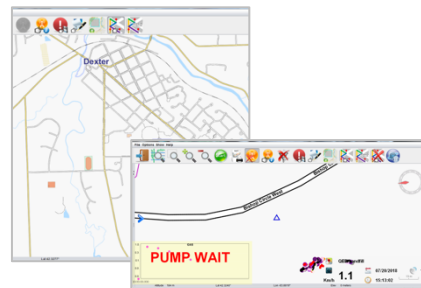
Operating Manual

Zoom by Box



This button allows you to zoom in to any point on the map.

- Click the “Zoom by Box” icon on the toolbar
- Click and drag over desired location
- Release and the software will enlarge highlighted section

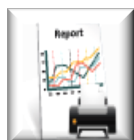


Zoom In / Zoom Out



These buttons allow you to enlarge or shrink any point on the map.

Create Report



This button allows you to create a variety of reports from you downloaded scan data: CSV, Background and KMZ

CSV Report: This report is provided in Excel format and contains the following information for each saved reading:

Time and date stamp

GPS location

Gas concentration value

Number of GPS satellites

Accuracy of satellites

Scan speed

GPS point description

Instrument ID	Instrument S/N	Landfill	Operator	Date	File savetime								
SEM5000	17019	QED Landfill	CFE	07/24/18	24/07/2018 14:07:56								
point ID	timestamp	lat	hemisLat	lon	hemisLon	gasValueAbs	gasValueRel	satellites	hdop	azimuth	speed	code	description
1	24/07/2018 13:01:28	42.32399316666667	N	-83.88210683333334	W	0	2.3	9	1.1	0	0	11	Mission Start
2	24/07/2018 13:01:41	42.32394250000001	N	-83.88212916666667	W	0	1	9	1.1	0	0	0	GPS Point
3	24/07/2018 13:01:51	42.32393233333334	N	-83.88211233333335	W	0.1	1	12	1.1	0	0.19	0	GPS Point
4	24/07/2018 13:02:01	42.32392933333334	N	-83.88209550000002	W	0	1	12	0.8	0	0.19	0	GPS Point
5	24/07/2018 13:02:01	42.32392933333334	N	-83.88209550000002	W	0	1	12	0.8	0	0.19	28	Air 1 stop
6	24/07/2018 13:02:29	42.32395266666667	N	-83.88204133333332	W	0	0.9	12	0.8	0	0	29	Gas 1 start
7	24/07/2018 13:02:32	42.3239535	N	-83.88204366666666	W	94	120.6	12	0.8	0	0.19	0	Gas 1 GPS Point
8	24/07/2018 13:02:33	42.32395266666667	N	-83.88204383333331	W	259.9	272.2	12	0.8	0	0	0	Gas 1 GPS Point
9	24/07/2018 13:02:34	42.32395266666667		-83.8820435	W	392.2	398.7	12	0.8	0	0	0	Gas 1 GPS Point
10	24/07/2018 13:02:35	42.323952999999996	N	-83.88204333333333	W	455.3	458.6	12	0.8	0	0	0	Gas 1 GPS Point
11	24/07/2018 13:02:36	42.323953333333336	N	-83.88204333333333	W	486	489.6	12	0.8	0	0	0	Gas 1 GPS Point
12	24/07/2018 13:02:37	42.323953666666666	N	-83.88204333333333	W	505.5	506.4	12	0.8	0	0	0	Gas 1 GPS Point
13	24/07/2018 13:02:38	42.323953666666666	N	-83.88204416666667	W	513.5	515.5	12	0.8	0	0	0	Gas 1 GPS Point
14	24/07/2018 13:02:39	42.3239535	N	-83.88204516666669	W	520.3	520.6	12	0.8	0	0	0	Gas 1 GPS Point
15	24/07/2018 13:02:40	42.323953333333336	N	-83.8820455	W	523.1	523.6	12	0.8	0	0	0	Gas 1 GPS Point

Operating Manual

To create a CSV report:

- Click “Create Report” Button
- Select Landfill from drop down
- Default leak values are set
- These can be manually changed
- Click “Enter” to apply new values to GPS points
- Choose Date Range of SEM event
- Choose Session from drop-down menu
- Choose Device from drop-down menu
- Click “CSV”
- Choose folder, name file and click “Save”

Background Reports: SEMsoft also creates the following standard background reports

- Calibration Procedure and Background
- Calibration Precision
- Instrument Response Time

NOTE: Background reports are automatically created using the information from the field calibration performed prior to the SEM event.

To print your background reports

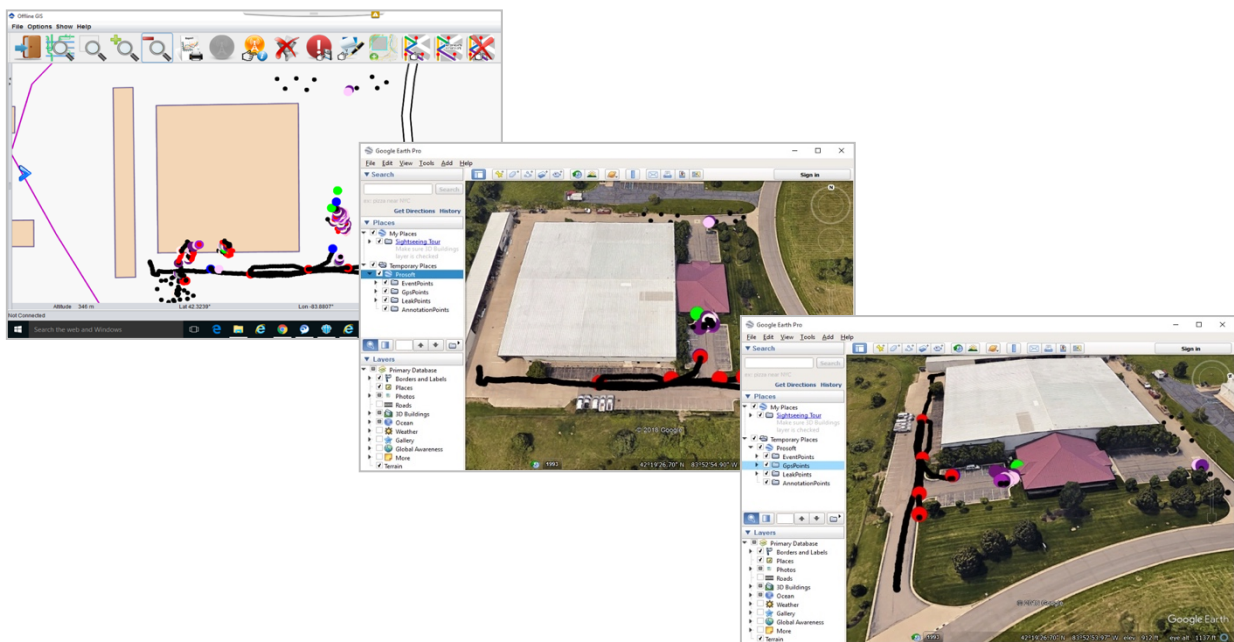
- Click “Create Report” Button
- Select Landfill from drop down
- Choose Date Range of SEM event
- Choose Session from drop-down menu
- Choose Device from drop-down menu
- Click “Create Report” again
- The reports will save to your designated folder

Operating Manual

KMZ reports: KMZ reports allow you to overlay scan data onto Google Maps area representations.

To create a KMZ report:

- Download and install Google Earth on your PC from: <https://www.google.com/earth/desktop/>
- Click “Create Report” Button
- Select Landfill from drop down
- Choose Date Range of SEM event
- Choose Session from drop-down menu
- Choose Device from drop-down menu
- Click the “KMZ” button
- The file will save to your designated folder
- Right click on the file and choose “Open with” and choose the Google Earth app



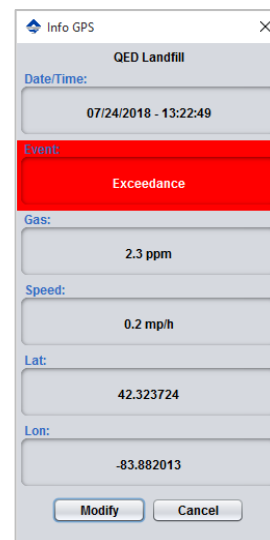
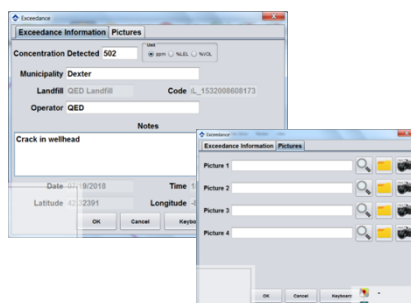
Operating Manual

GPS Points Info Tool



This button allows you to view specific data for any GPS point saved during your SEM event.

- Click “GPS Points Info” button
- Click on desired control point
- Recorded information specific to selected control point will be displayed
 - Window will display:
 - Date/Time
 - Event Type
 - Gas Concentration
 - Speed
 - GPS Coordinates
- Click “Modify” button to update information or add notes/photos
- Click “OK”

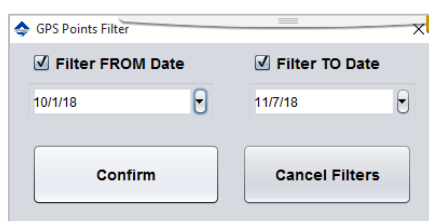


NOTE: Clicking the “Report” button after modifying an exceedance point will automatically save an exceedance report, (including any notes and photos), to your SEMsoft “Workspace Reports” folder.

GPS Points Filter



This button allows you to filter and view GPS points, from previously downloaded SEM events, by date range.



Operating Manual

Save Event (Manually)



This button allows you to manually save a GPS point or event to a SEM event while working in Office mode, (or in Real Time).

- Click “Save Event (Manually)” button
- Left-click inside landfill area, (at leak location)
- Complete background data
- Click “OK”

NOTE: You can also add up to 4 photos to each manually saved GPS point or event.

Insert a Note



This button allows you to insert notes and pictures for any control point, (saved data point), from your SEM event.

- Click “Insert a Note” button
- Left-click desired control point
- Complete information and note
- Click “Pictures” tab
- Add up to four photos from file or device
- Click “OK”

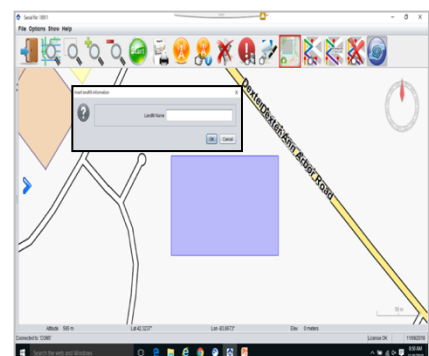
Add New Landfill by Box



There are two ways in which you can populate a landfill in SEMsoft. The first is to import your landfill site map as a .shp file. The second is to use this button to create a landfill by adding a box to the geographical map.

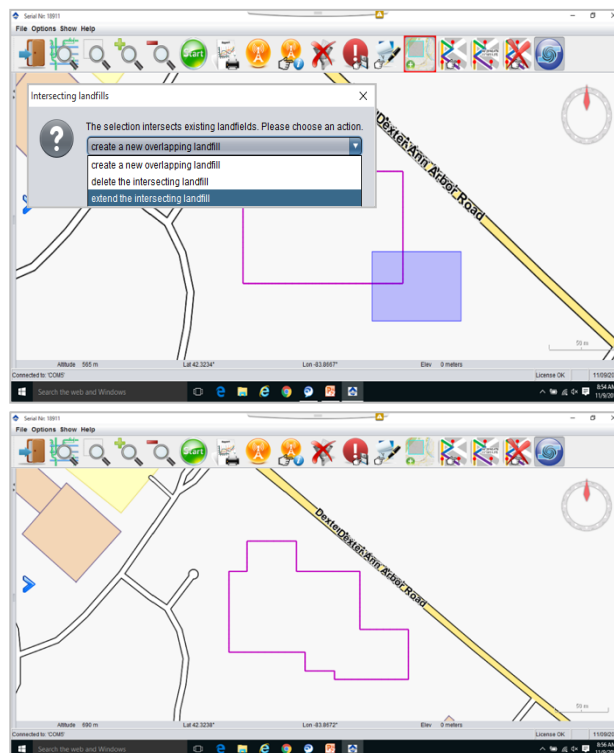
To add a landfill:

- Click “Add New Landfill” button
- Click and drag mouse to create landfill area on map
- Fill in Landfill name
- Click “OK”
- The new landfill will appear as a rectangle on the map



Operating Manual

This button also allows you to add on to an existing landfill by clicking and dragging an intersecting box over an existing site.



Add Control Points (Manually)

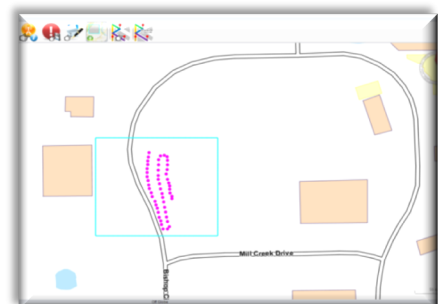


Control points are saved readings or points of interest from your surface scan. When you download scan data from your SEM event, the path that you walked will be represented on the map by a series of dots or control points.

Control points can also be added during Office mode. There are two ways to add control points post scan.

The first is to add them manually:

- Choose landfill to edit, ("Zoom to Landfill", "Zoom by Box", etc.)
- Click "Add Control Points (Manual)" button
- Left-click inside designated landfill area to assign control point.
- Continue clicking until all points have been added
- Click "Add Control Points (Manual)" button again
- Points will save automatically



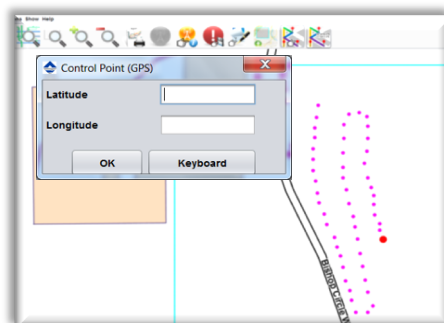
Operating Manual

Add Control Points (GPS)



Control points can also be added by using GPS coordinates, (latitude and longitude):

- Choose landfill to edit, ("Zoom to Landfill", "Zoom by Box", etc.)
- Click "Add Control Points (GPS)" button
- Add Latitude and Longitude for control point
- Click "OK"
- Repeat for each control point until all points have been added
- Click "Add Control Points (GPS)" button again
- Points will save automatically

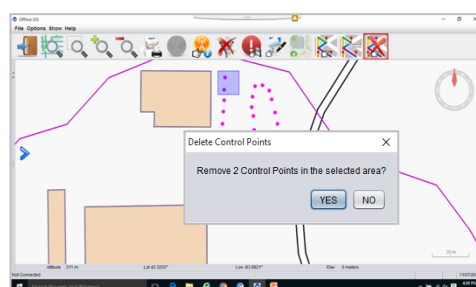


Remove Control Points in Selected Area



In the event that you have made a mistake or if the added control points are no longer of interest, this button allows you to remove control points that you have created.

- Click the "Remove Control Points" button
- Click and drag to create a box around the control points that you wish to delete
- Release the mouse
- A pop-up window will ask if you want to delete the points in the selected area
- Click "Yes"



Operating Manual

Management of GPS/Event Points

All saved readings from your survey are represented on the SEMsoft map by a color-coded dot.

Saved data points that fall below the minimum defined exceedance level will appear as a black dot. These are known as GPS points.

Data points above the minimum exceedance level or that have a special meaning are represented by larger, color-coded dots. These are known as Event Points.

-  Start Scan Event
-  Exceedance Warning 1
-  Exceedance Warning 2
-  Exceedance Warning 3
-  Scan Stopped
-  Restart Scan
-  Pause
-  End Pause
-  GPS Positioning Error

NOTE: All of the data points inside the landfill boundry are displayed with an associated color. If you delete the landfill, the points will remain on the geographical map but will be shown in gray.

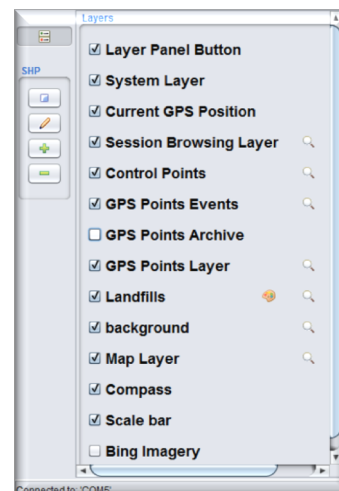
Operating Manual

Management of Map Layers

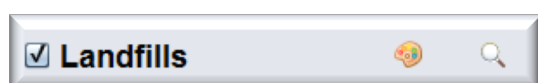
The Map Layers Panel allows you to customize your view by turning the various map layers ON or OFF.

The right side of the Map Layers Panel allows you to show or hide a number of layers, including:

- Maps
- Control Points
- GPS Points Events – All color-coded points, (exceedance, start/stop, etc.)
- GPS Points Archive – GPS points created during previous surveys, (this allows you to view survey history)
- GPS Points Layer – GPS points from your current survey
- Landfills
- Background



The panel displays the information layers that can be applied to the map. Each layer can be turned on or off by clicking the check mark in front of the title.



Where present, you can click on the magnifying glass to zoom to a desired layer or point. To change the color of the imported Shape points, click on the "Paint Palette" icon. It opens a window from which you can select the color. Click "OK" to confirm.

The left side of the panel allows you to:

- Load .shp files
- Edit .shp files
- Add/Remove GPS points



To load a .shp file:

- Click on the "Load .shp File" icon
- Select the file to import
- Click on "Open" to import the file
- The name of the imported file will appear under the "Layers" list.
- Click the magnifying glass to zoom directly on the imported points.

Operating Manual

To edit a .shp file:

- Click on the “Edit .shp File” icon
- Click on the point to be modified
 - This opens a form containing the details of the selected point.
- Make the changes
- Click "OK" to confirm

To Add or Remove GPS Points:

- Click the “Plus” button to add points
- Click the “Minus” button to remove points

Real Time Mode

The SEM5000 can save data in real time by using a laptop or tablet in the field. The two main advantages to doing this are:

- Unlimited data save
 - Since you are saving directly to the software, you aren't limited to the 480-hour memory of the instrument
- Real time progress monitoring of your path

In order to support the SEMsoft software, your device must, at a minimum, meet the following specifications:

Processor: i5
Disk: 128GB
Ram: 4GB
Bluetooth Connection
Rear Facing Camera, (optional)
USB

NOTE: SEMsoft is a Windows-based software program. It is recommended that you use a device that supports Microsoft Windows to ensure proper performance.

NOTE: It is recommended that you use a device that is certified by the American National Standards Institute, (ANSI), for use in Class I and II, Division II hazardous locations.

Note: For further information please contact Technical Support at QED at (800) 968-2026 or email landtec_support@qedenv.com.

Operating Manual

Real Time Toolbars

There are two toolbars that are used to control the SEM5000 in real time.



This toolbar displays once you start the program and connect with the SEM5000, (GPS must be active)



This toolbar displays once you start the SEM5000 and begin your survey.

Most of the toolbar buttons are the same as those used in office mode. However, there are several that are unique to the Real Time toolbars and are used to operate the instrument.

Start/Stop Survey



These buttons are used in real time to start and stop the survey. If you do not click the “Start” button prior to beginning your survey, no data will be saved. If you do not click the “Stop” button when your survey is complete, it will continue to save data until you shut off the SEM5000.

Pump Start/Stop



This button is used to control the pump of the SEM5000 during real time scanning. It is used in place of the “Function” button on the instrument.

Buzzer On/Off



This button allows you to enable or disable the audible alarm on the SEM5000.

Center Map



When working in real time, the SEMsoft geographical map will continue to move and correct itself based on your direction and GPS position. This button allows you to disable that function and lock the map into place on your screen.

NOTE: Disabling the Center Map function is recommended for slow speed scanning, (i.e. – walking).

Operating Manual

TROUBLESHOOTING

Problem	Possible Cause	Solution
SEMsoft shows that SEM5000 is not connected.	Bluetooth is not active on PC.	Activate the Bluetooth on your PC and make sure that the PC finds the instrument. Pair the SEM5000 and your PC and enter the PIN 1-2-3-4 See Appendix L for more information
Bluetooth is activated but SEMsoft shows that SEM5000 is not connected.	SEM5000 is turned off.	Turn SEM5000 on and restart SEMsoft.
Bluetooth is activated and SEM5000 is on but SEMsoft shows that SEM5000 is not connected.	Incorrect instrument chosen at start up.	Restart SEMsoft and choose correct instrument based on serial number.
Boxes at the bottom are purple	SEM5000 is not connected	Verify that SEM5000 is turned on and that Bluetooth is active on your PC. Restart SEMsoft and attempt connection.
Boxes at the bottom are yellow and an error notice appears	Instrument error	The note on the graphic indicates the type of error
Boxes at the bottom are yellow and there isn't GPS indicator displayed on the map.	GPS is not connected or unavailable	Verify that GPS is connected. If not, attempt to reconnect.
The map is not correct	Wrong map selected	Select a different map
The map is not correct	GPS is not connected or unavailable	Verify that GPS is connected. If not, attempt to reconnect.
"Failed test" appears on the screen	Gas/Air test has failed	Restart test

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