



Envision™ Landfill Gas Analyzer



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April 2018



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1 Introduction

Elkins Earthworks® would like to welcome you to the Envision® gas analyzer system. The Envision® gas analyzer, designed by Elkins Earthworks® is manufactured in the United States. The equipment was designed for the field technician as well as project managers. The Envision® gas analyzer is a two-part system, the sensor unit (Envision®) and the handheld computer. This unique pairing makes field activities more productive by giving the user the ability to expand functionality by using GPS, bar-coding, and other features that the Windows® operating system can offer.

There are currently 4 models of Envision gas analyzer:

ENV100 – has internal heating pads and is not certified intrinsically safe

ENV200 – does not have internal heating pads and is certified intrinsically safe

ENV200 “B” – same as ENV200 with added capability to measure barometric pressure

ENVAUS – does not have internal heating pads, is not certified intrinsically safe, and has borehole flow measurement capability

2 The Envision® System

The Envision® gas meter is a unique field instrument utilized primarily for the measurement of CH₄, CO₂, O₂, pressure, temperature, and flow within landfill gas and bio-gas collection systems. The Envision® gas analyzer package is comprised of two components: the handheld computer and the sensor unit (Envision®).

2.1 Handheld Computer

Elkins Earthworks® currently offers 4 models of handheld computers that can run the Gas Analyzer proprietary software to operate the Envision® sensor unit. The handheld computers typically communicate with Envision® via Bluetooth® wireless technology.



2.1.1 Trimble® Nomad



The Nomad is a highly ruggedized field computer from Trimble. The Trimble series handhelds are all-in-one field computers for GIS (Geographic Information System) data collection and mobile GIS applications, combining a handheld computer powered by the Windows Mobile 6 or 6.1 operating system. The Trimble series handhelds connect to the Envision® via Bluetooth® or via serial cable. They come standard with Bluetooth and 802.11 (Wi-Fi). Optional features may also be selected such as GPS, barcode scanner, and/or an internal camera.

2.1.2 Xplore Bobcat



Xplore's Bobcat ruggedized tablet is IP65 rated, runs Windows 7, 8.1, or 10 and has a bright 10" touch screen. It has a battery life of 8 hours (standard) or 14 hours (optional dual battery). Wi-Fi, GPS, Bluetooth, and Ethernet communications are standard with optional 4G LTE. The Bobcat has a variety of pluggable ports, cameras in the front and back and optional barcode scanner, fingerprint scanner, and near-field communication. It can survive multiple drops at a height of 4 feet onto plywood over concrete.

2.1.3 Juniper Archer 2



The Archer 2 is an IP68 rugged handheld unit from Juniper Systems. It runs the Windows Embedded Handheld 6.5.3 operating system (includes Windows Office Mobile) and has a 4.3" high visibility touch screen. It can operate up to 20 hours on a single charge.

2.1.4 Juniper Mesa 2



Juniper's Mesa 2, 8.5" x 5.5", IP68 ruggedized tablet comes with the Windows 10 operating system and runs 8 – 10 hours on a single charge. It has options for Bluetooth, Wi-Fi, 4G LTE, camera, GPS, barcode scanner, RFID, and hot-swappable batteries.



2.1.5 Envision® Gas Analyzer



The Envision® gas analyzer houses the gas and pressure sensors. The gas analyzer utilizes infrared sensors to measure CH₄ and CO₂. The Envision® uses an electrochemical cell to measure O₂ concentration and an accurate thermistor temperature probe to measure wellhead gas temperatures. Data generated by the Envision® gas analyzer is relayed to the handheld PC via Bluetooth or serial cable several times per second.

2.1.5.1 Gas Ports

The Envision® gas analyzer ENV100 and ENV200 models have four (4) ports located on the front of the unit.



Figure 1 ENV100 and ENV200 Port Labels

Port listing from right to left:

Calibrate/Static/Sample port – This port is used to calibrate the unit with calibration gas, to measure static wellhead pressure, and to sample for gas quality.

Impact Port – This port is used to generate a differential pressure for calculating flow. **Do not connect pressurized calibration gasses to this port.**

Available – This port is used to acquire an available (system) vacuum at the monitoring port. **Do not connect pressurized calibration gasses to this port.**

Exhaust – This port is used to exhaust the gasses that are pumped through the sample train for measurement. Only connect an exhaust hose to this port. **Do not apply pressure to the exhaust port.**



The Envision® gas analyzer ENVAUS model is slightly different in that the yellow “Available” port is now labeled “Borehole Flow” (see photo below). Instead of measuring available (system) vacuum at this port, it is used to measure low-level borehole flow instead. The “Calibrate/Static/Sample” port is then used to measure available (system) vacuum.

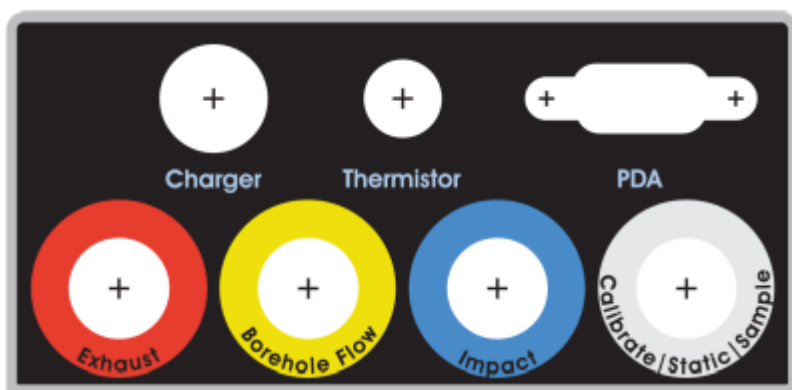


Figure 2 ENVAUS Port Labels

2.1.5.2 Cable Ports

Charger port – This port is used to charge the unit with the supplied wall charger. The Envision should run a full, normal working day without needing to be recharged. Plug the charger in overnight to charge the unit. It usually takes about 4 hours to fully charge an Envision. The charging circuit will turn off automatically when the unit has reached a full charge. **Do not plug the charger into the unit in an explosive environment.**

Thermistor Port – The wired thermistor plugs in to this port. If you have purchased a wireless (Bluetooth) thermometer from Elkins Earthworks, it may be used in place of the wired thermistor.

PDA Port – The PDA port may be used to directly connect the Envision to a handheld device (with a serial port) if Bluetooth is unavailable or not working correctly. A standard 9 pin serial cable may be used.

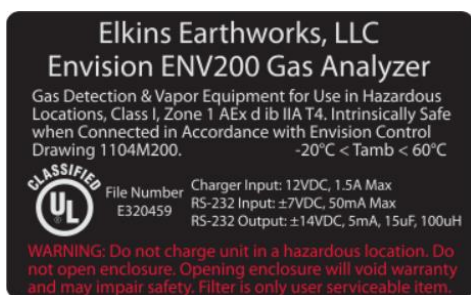


3 Safety

Landfill gas is normally safely extracted from landfills and conveyed to appropriate control devices. However, during the course of monitoring each extraction point, exposure may occur. As such, it is important to follow all site-specific safety protocols when monitoring. Working at a landfill typically requires site specific health and safety plans. While performing monitoring at a landfill, the user should be aware of the items included in the site specific health and safety plan. It is important to know that all personal protection equipment and safety protocols as appropriate must be used when using this instrument. All vents on the meter are designed to exhaust to the atmosphere. Since landfill gas contains methane, no smoking is permitted while using the instrument. Calibration gases must be handled with utmost care and with adequate ventilation.

It is the sole responsibility of the user of the Envision® sensor unit and handheld PC to determine the appropriate location that either unit can be utilized within as monitoring conditions may change. The Envision® sensor unit handheld PC are not intended for use in confined space entries but for the continuous monitoring of gasses within a landfill gas collection system.

4 Certification



Envision® model ENV200 has been UL certified for use in hazardous locations (Class 1, Zone 1, AEx d ib IIA T4) when connected in accordance with control drawing 1104M200. Although models ENV100 and ENVAUS are based on a similar design, these models have not been certified for use in explosive atmospheres. It is important that this manual be followed closely and that any repair to the Envision® gas analyzer is made at the approved Elkins Earthworks® repair facility. Opening the Envision® gas analyzer and breaking the housing warranty seals may result in voiding the unit's warranty as well as compromising the unit's safety. The charger should not be connected when an explosive atmosphere is present.

The Envision® sensor unit also meets FCC regulations for a Class A Digital Device Part 15, Subpart B, Sections 15.107b & 15.109b



5 Trimble® Handheld Computer Preparation

Note: The Trimble Nomad has traditionally been the default handheld PC used with the Envision gas analyzer. Although other handheld units have been recently introduced, this section of the manual has been retained for reference.



The Trimble handheld computer is the prime driver for the Envision® gas analyzer. The Trimble handheld computer, provided with the Envision® gas analyzer package, has already been prepared for field use. A screen protector has already been applied to your Trimble unit. An extra screen protector has been included in the packaging.

The operational software for the Envision® Gas Analyzer has been installed at the factory. The Trimble handheld computers operate on the Microsoft Mobile 6.0, 6.1, or 6.5 operating systems. The features on the Trimble are similar to those on the standard Microsoft XP and Vista operating systems found on many desktops and laptops. For general information on the features of the Trimble Nomad and Windows Mobile 6.0, 6.1, or 6.5 please refer to the supplemental information provided in the packaging of the Envision® Gas Analyzer.

5.1 Turning on the Trimble Handheld Computer

To turn on the Trimble handheld computer, the user must press the green power button located at the lower left side of the Trimble keypad.



5.2 Turning off the Trimble Handheld Computer

- 1) Press the green power button for two seconds
- 2) Tap the shutdown button on the touch screen
- 3) Tap yes on the popup screen if you agree with the warning message

5.3 Backlight and Power Settings

Elkins Earthworks® has already adjusted your Trimble handheld computer for the following backlight and power settings:

Parameter	Battery Power	External Power
Backlight*	Never turns off	Never turns off
Backlight Brightness	100%	100%
Keypad on Time	1 minute	1 minute
Keypad Brightness	100%	100%
Hibernation**	Never	Never

* If the user changes the backlight setting the Envision® will lose Bluetooth connection when the unit enters and recovers from the backlight being powered on and off. The unit will regain Bluetooth connection almost instantly.

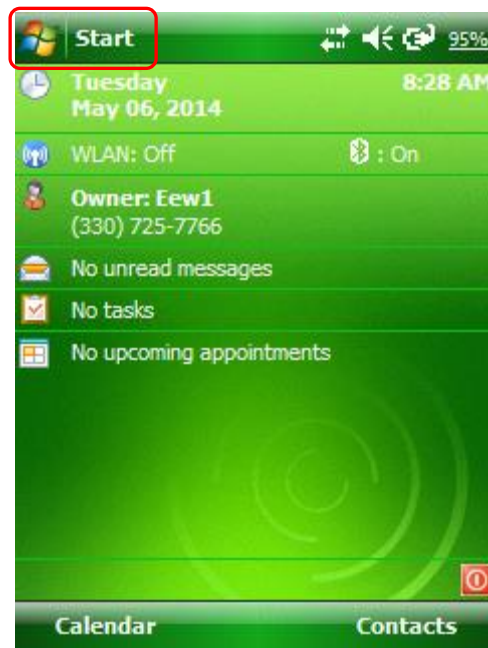
** Hibernation mode will cause the Envision® to lose connection and will need to be reconnected once the Nomad is turned back on. Elkins Earthworks® recommends that these settings remain as set upon delivery.



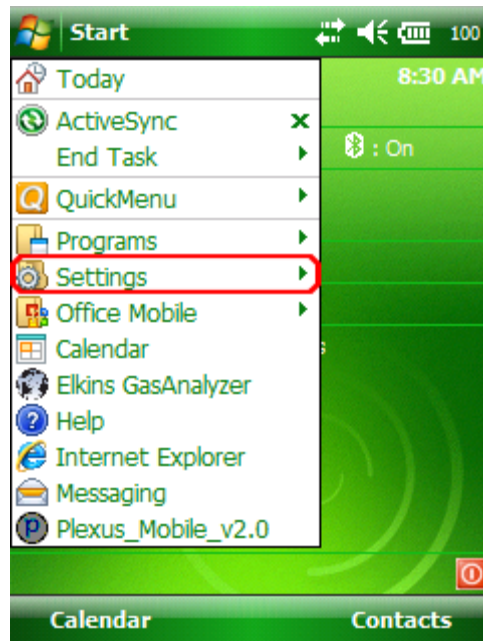
Changing Backlight Settings

If the user would like to change these settings, then follow the steps below:

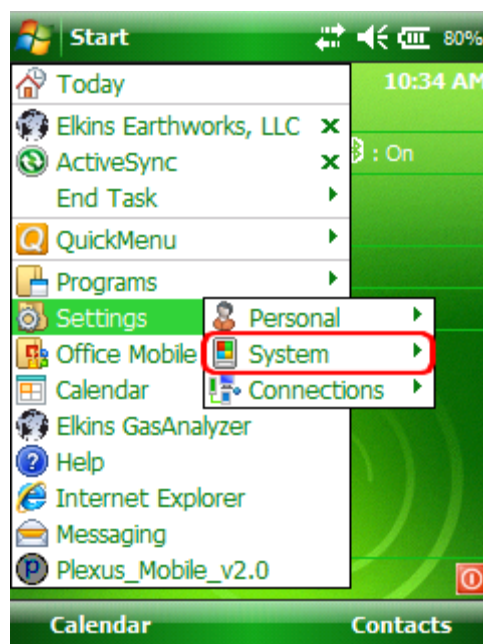
- 1) Turn on the Trimble handheld computer by pressing the green power button on the handheld computer keypad.
- 2) On the touch screen tap the “Start” button in the upper left hand corner of the touch screen



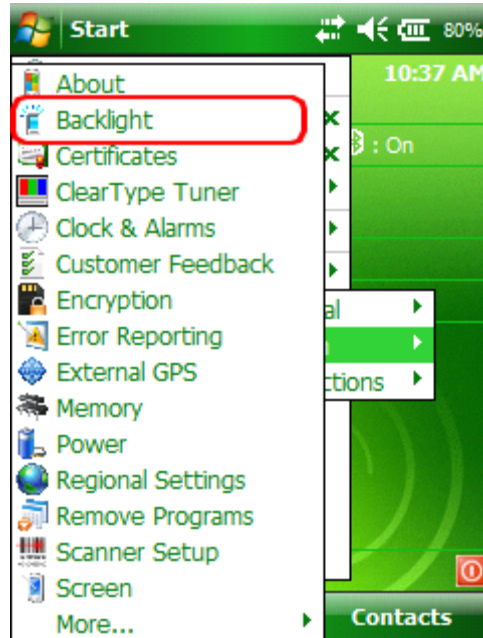
3) Tap "Settings"



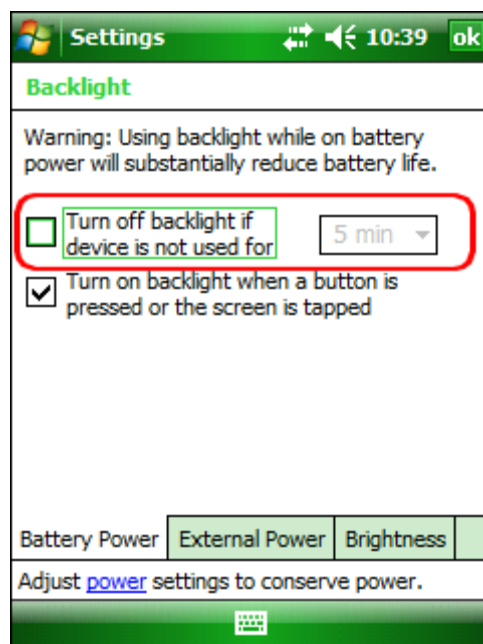
4) Next tap "System"



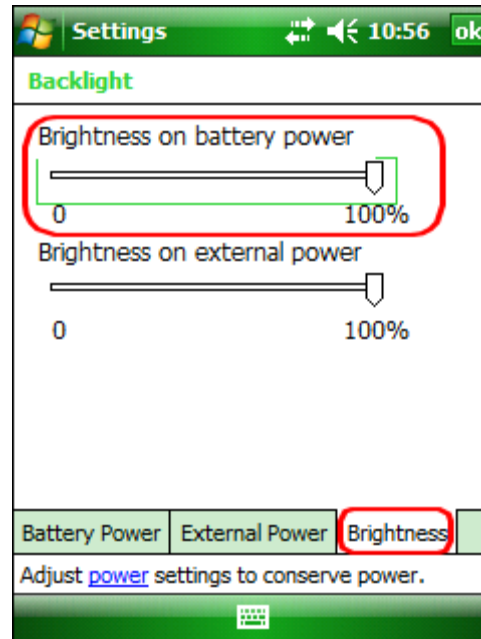
5) Next tap "Backlight"



- 6) On the “Battery Power” and “External Power” screens, uncheck the “Turn off backlight if device is not used for” box.



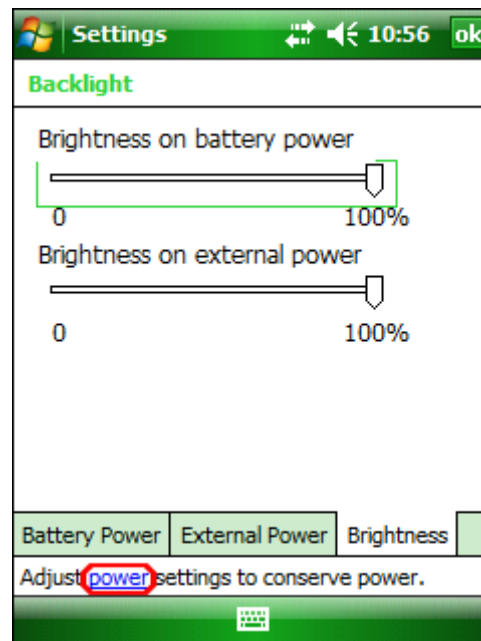
7) Tap on the Brightness tab at the bottom of the screen.



8) Increase the brightness to 100%

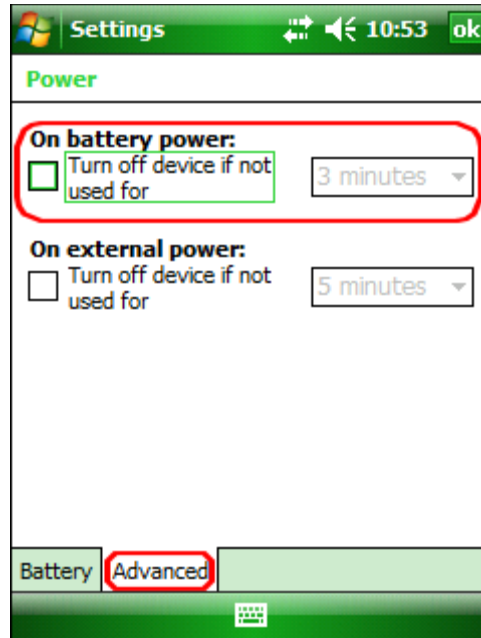


- 9) At the bottom of the “Brightness” screen select “Power” in the adjust power setting to conserve power.





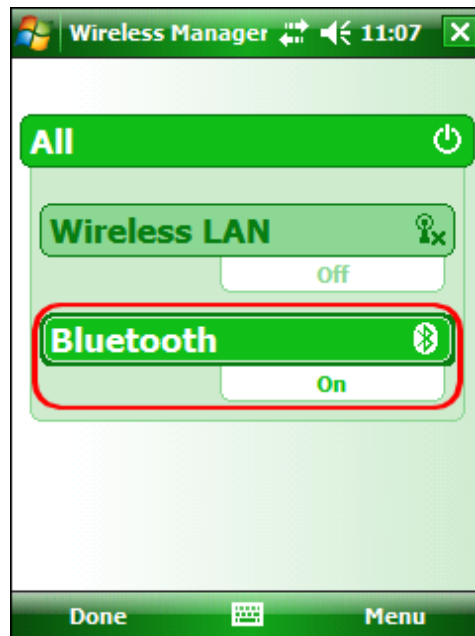
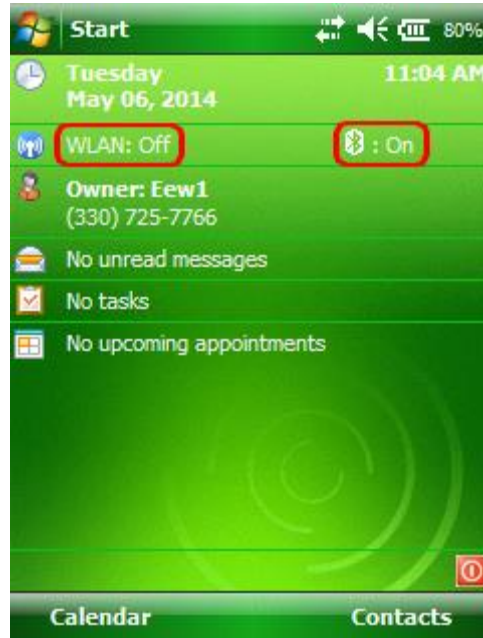
- 10) Select the “Advanced” tab then uncheck the box “Turn off device if not used for”. This will keep the unit from going into hibernation. If the Trimble handheld computer goes into hibernation it will lose connection with the Envision® gas analyzer.



- 11) Exit by tapping the “OK” button twice.

5.4 Enable Bluetooth®

The primary way to connect with the Envision® gas analyzer is via Bluetooth® connection. The unit ships from the factory with Bluetooth enabled. The gas analyzer software will also enable Bluetooth. However, if Bluetooth becomes disabled, tap the Bluetooth icon on the Main Windows Screen. Also, the gas analyzer software may automatically turn the WLAN (wireless network) off to prevent it from interfering with the Bluetooth connection.



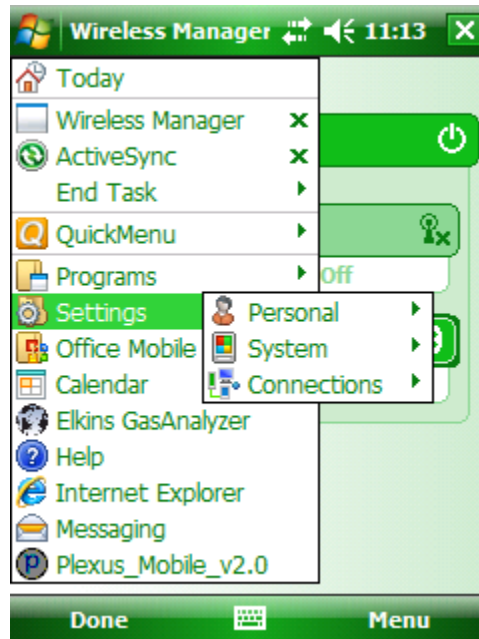
Next, on the Wireless Manager Screen tap the Bluetooth button and Bluetooth will activate.



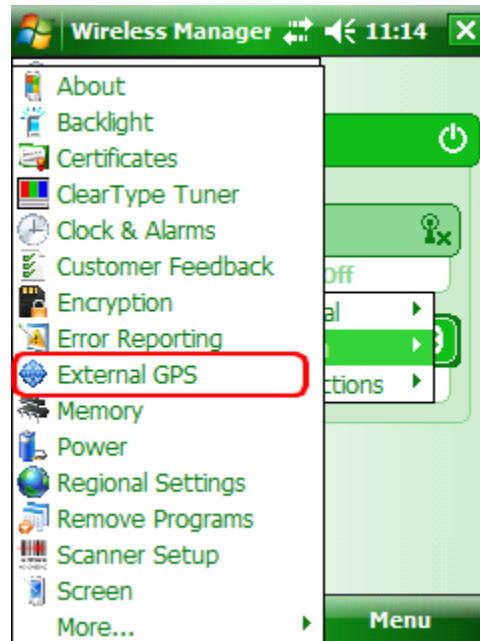
5.5 Enable GPS

The Envision® gas analyzer system software is designed to utilize GPS to locate monitoring points. Units that are purchased with the GPS option require no setup to enable the GPS feature. The software developed for the Envision® gas analyzer automatically turns the GPS on and off when needed. Do not change any of the GPS settings in the Trimble handheld computer. The Trimble handheld computer has been shipped with default settings. If the GPS fails to connect the user should check the GPS in the following manner:

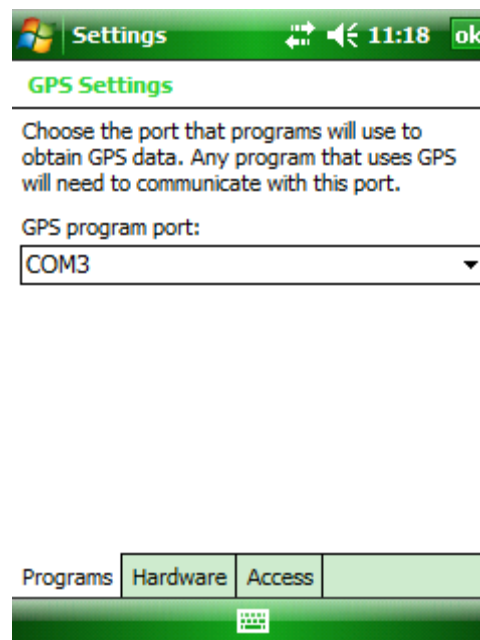
- 1) Tap the “Start” button in the upper left corner of the screen and tap settings



2) Tap System and then External GPS

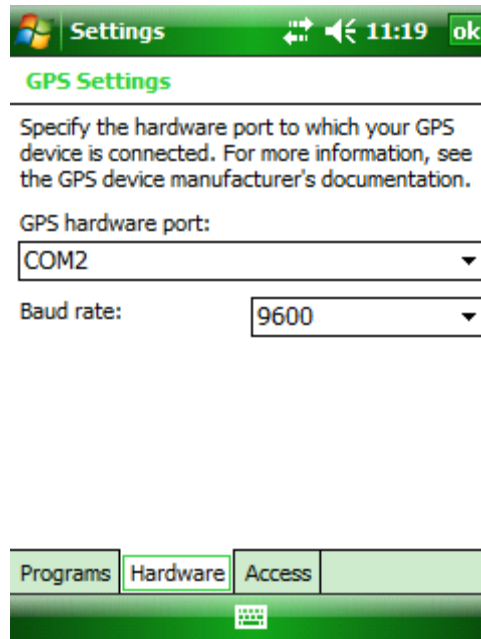


3) Verify GPS program port is set to COM 3

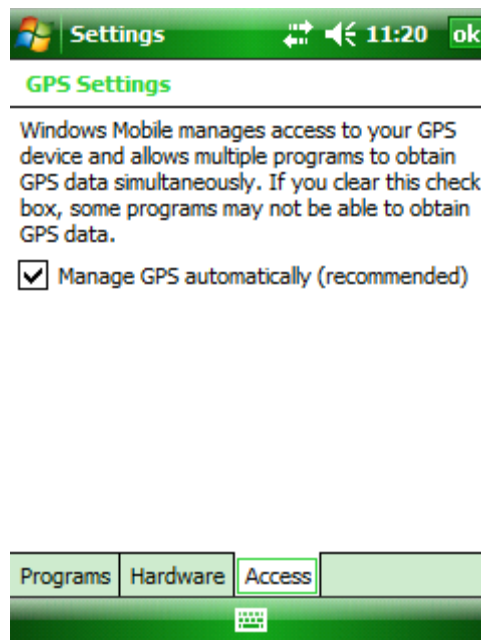




- 4) GPS Hardware Port is set to COM2 and BAUD rate 9600



- 5) Verify that this box is checked too.





6 Envision® Gas Analyzer Application

The “Elkins Gas Analyzer” program is the software developed to run the Envision® gas analyzer. To activate the Gas Analyzer program, follow the steps below:

- 1) Click Start in the upper left hand corner of the screen and tap the “Elkins Gas Analyzer” button in the drop down menu. Note: If the Gas Analyzer is not listed in the main menu, click on “Programs”. It should be listed there.

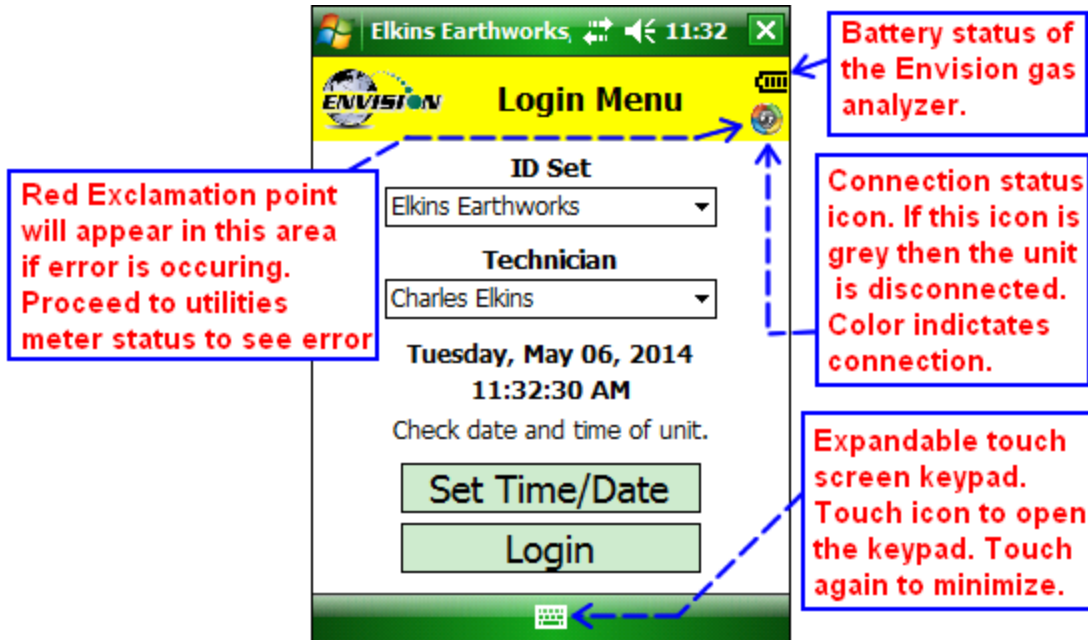


- 2) The application will start and the “Login Menu” will appear
- 3) If the “Elkins Gas Analyzer” program is already running, then the application will open to the last screen that the user was viewing.



6.1 Software Screen Properties

The detail below illustrates the main features common to each screen of the Elkins Gas Analyzer Program.





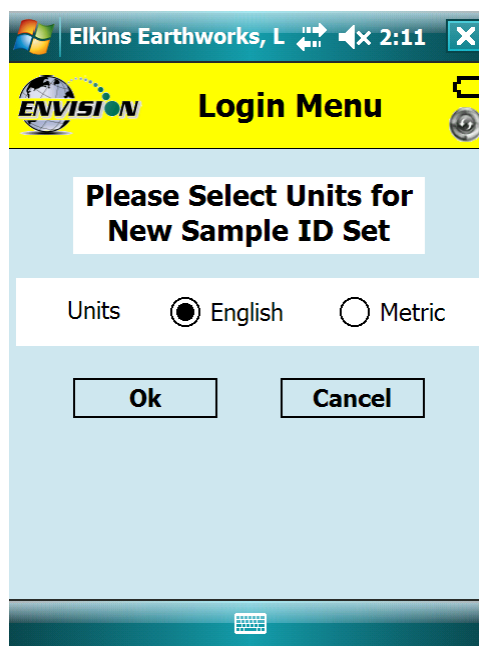
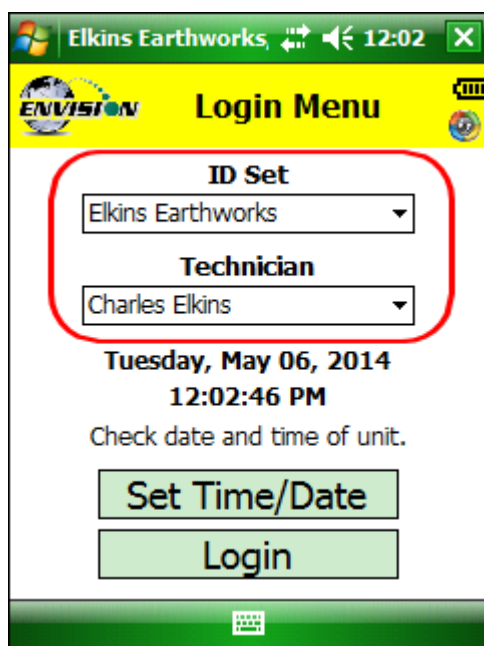
6.2 “Login Screen” - Logging to the Elkins Gas Analyzer Software

Once the Elkins Gas Analyzer program is started from the “Start Menu” the “Login Menu” will appear. This screen is intended to allow the user to login to the Elkins Gas Analyzer program.

The screenshot shows a software window titled "Elkins Earthworks" with a standard Windows taskbar at the top. The window has a yellow header bar with the "ENVISION" logo on the left and the title "Login Menu" in the center. Below the header, the interface is white. It features two dropdown menus: "ID Set" with "Elkins Earthworks" selected, and "Technician" with "Charles Elkins" selected. Below these, the date and time are displayed as "Tuesday, May 06, 2014" and "12:02:46 PM". A text prompt "Check date and time of unit." is shown. At the bottom of the main area are two green buttons: "Set Time/Date" and "Login". A small "Elkins Earthworks" logo is visible in the bottom right corner of the window.

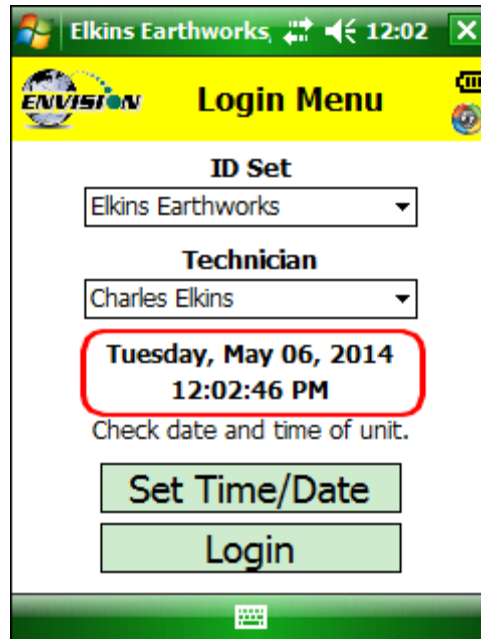


- 1) Select the Desired ID set and the name of the Technician who will be using the Envision® gas analyzer from the drop down menu located at the center of the “Login Menu” screen. ID sets may be added to this drop down menu by utilizing the “Elkins Earthworks® Configuration Editor” software that may be installed on your personal computer. The “Elkins Earthworks® Configuration Editor” software is provided on the Elkins Earthworks® software Flash drive included in the original packaging of the Envision® gas analyzer. Both ID sets and technician names may also be added directly from the drop down list on the Login Menu. When adding a new ID set, the user may be prompted to choose either English or Metric units of measurement.





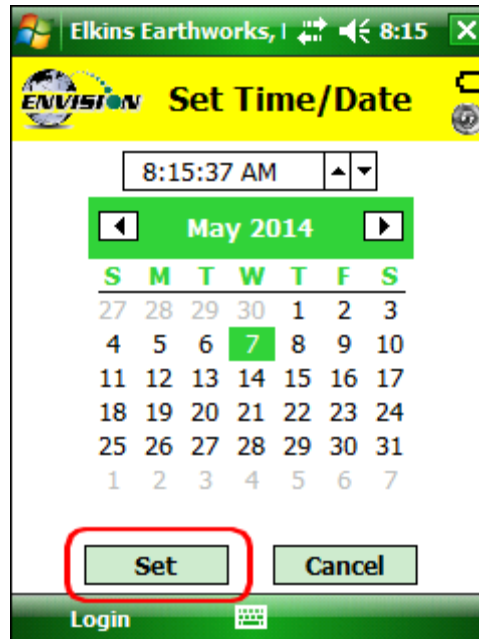
- 2) Verify that the date and time is correct as displayed on the login screen



- 3) If date and/or time is incorrect then tap the “Set Time/Date” button



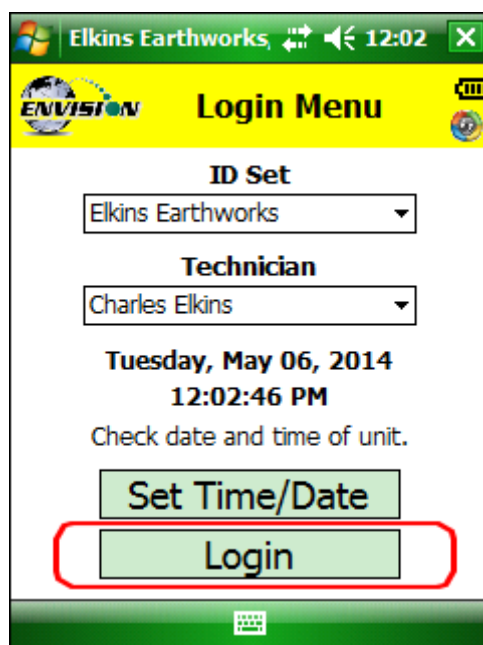
- 4) The “Set Time/Date” screen will appear and you may then adjust to the correct date and/or time



- 5) Tap the “Set” button when the date and time have been corrected. This will return the user to the Login Screen.



- 6) If the user name and time are now correct, then tap the “Login” button at the bottom of the screen.



6.3 Connecting and Disconnecting the Envision® Gas Analyzer

6.3.1 Connecting to the Envision® Gas Analyzer

The user can connect to the Envision® gas analyzer in one of two ways, by Bluetooth or serial connection.

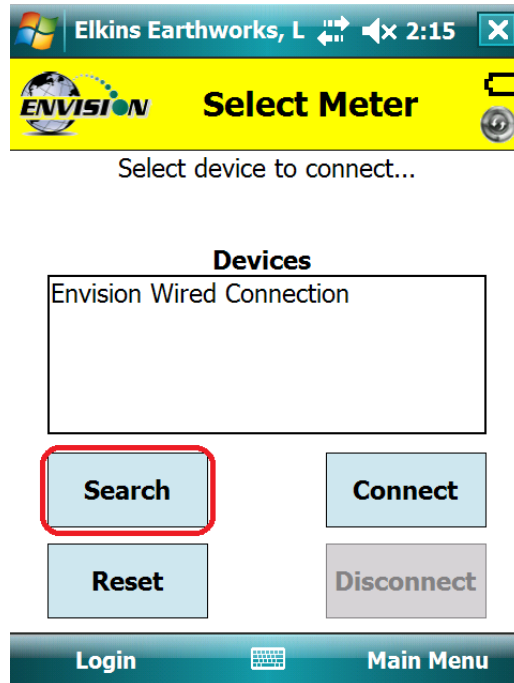
6.3.2 Bluetooth Connection

Once the user is logged in, the user can now search for and connect to an Envision® gas analyzer.

- 1) On the handheld computer make sure that the “Select Meter” screen is displayed
- 2) Turn on the Envision® gas analyzer by pressing the power button on the front of the Envision® gas analyzer
- 3) The Envision® gas analyzer will maintain a solid green light next to the power button
- 4) Next press the Bluetooth® button on the face of the Envision® gas analyzer. The blue light on the Envision® gas analyzer will blink now that it is discoverable and can allow the handheld computer to find it.



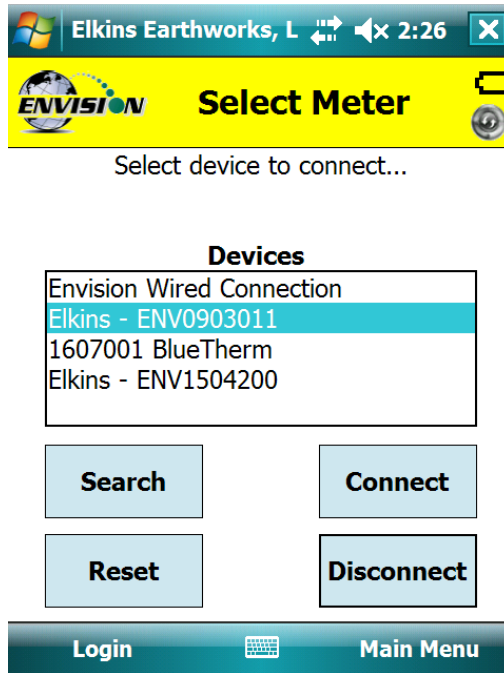
- 5) The user should now tap the “Search” button on the “Select meter” screen on the handheld computer.



- 6) The handheld computer screen will display “Searching...” above the “Meters” box and will change to “Select Meter to connect” once the Envision® gas analyzer is discovered.

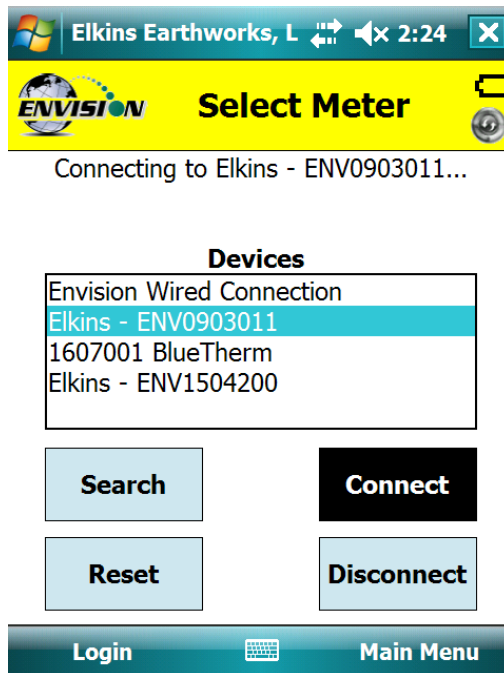


- 7) The Envision® gas analyzer should be displayed in the box titled “Devices”. Each discoverable Envision® unit should appear and will be defined by the name Elkins Envision® followed by the unit’s serial number.



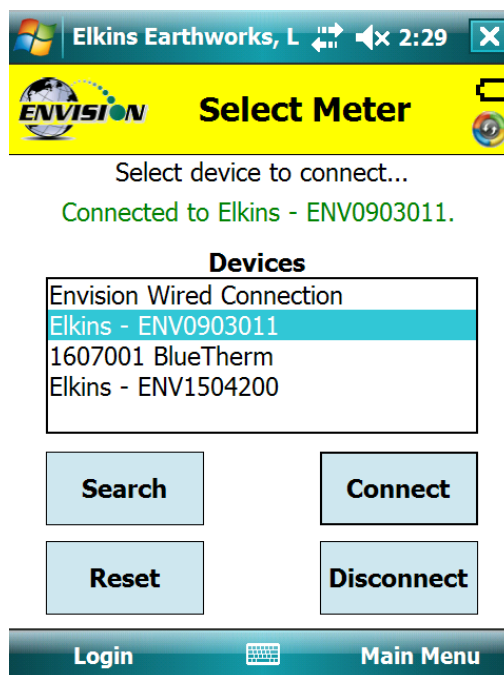


- 8) Select the desired analyzer by tapping the Envision® Meter ID and then tapping “Connect”. If you are using a Bluetherm® temperature probe, you may also select it and connect to it at this time.





- 9) Once the connection is made the words “Connected to” will be displayed in green above the “Meters” screen. The blinking blue light on the Envision® gas analyzer will stop blinking and will now show solid blue. The connection symbol in the yellow header box on the Trimble handheld computer screen will now be multicolored indicating a connection with the Envision® gas analyzer. The battery strength indicator located in the yellow header box will now display the approximate battery level of the Envision® gas analyzer.



- 10) Once connected, tap the “Main Menu” button on the lower right hand corner of the screen.

6.3.3 Serial Connection (if desired)

If the user has problems with the Bluetooth link or desires to make a direct wired connection to the Envision® gas analyzer, the user may use a standard RS232 Serial cable connection. This connection requires an RS232 port on the handheld computer.

- 1) Tap “Login” on the “Login Menu”
- 2) Connect the handheld computer to the Envision® gas analyzer with the RS232 serial cable
- 3) Select “Serial Connection” in the analyzer display area.

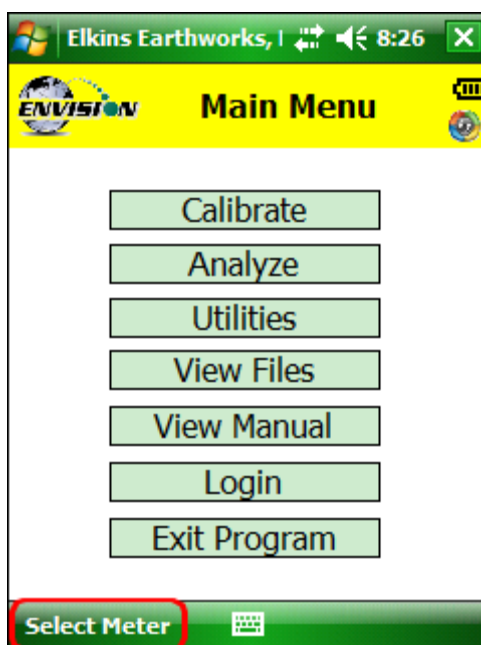


- 4) Tap the button connect and the word “Connected to” will be displayed above the “Meters” screen.
- 5) Once connected tap the “Main Menu” button on the lower right hand corner of the screen.

6.3.4 Disconnecting from the Envision®

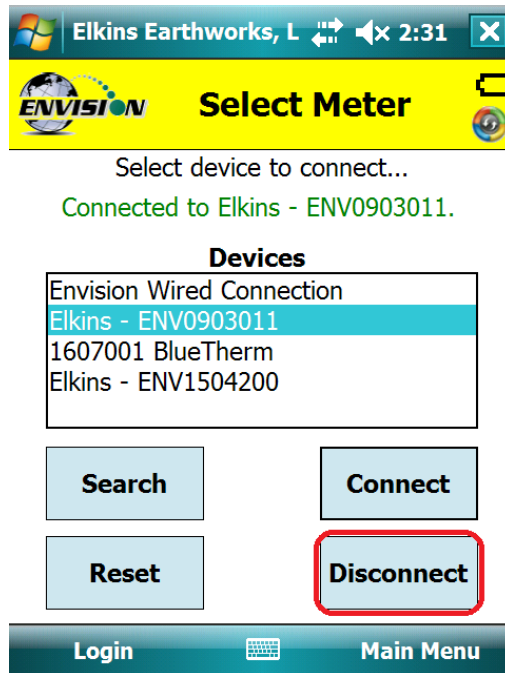
To disconnect from the Envision® gas analyzer follow the steps listed below:

- 1) From the “Main Menu” tap the “Select Meter” button on the lower left corner of the touch screen.





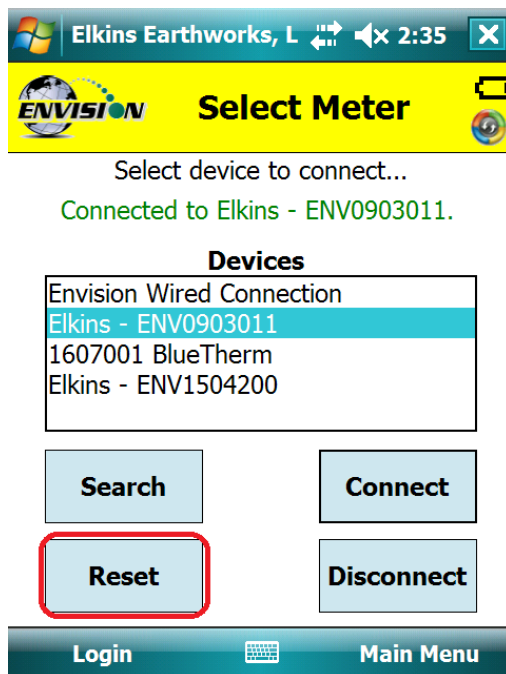
2) Tap the “Disconnect” button





6.3.5 Resetting Bluetooth

If the connection to the Envision happens to drop, it may be necessary to reset Bluetooth in order to reconnect. After Bluetooth resets, it is necessary to search again to find the Envision.



6.4 Main Menu

The “Main Menu” is the user’s access point for all of the features included in the Elkins Gas Analyzer software. On this screen the user may select any one of the functions indicated on the buttons or the user may return to the “Select Meter” screen by tapping the “Select Meter” button in the lower left corner of the touch screen. The following sections will walk the user through each of the functions indicated on the “Main Menu” screen.

6.5 Calibration

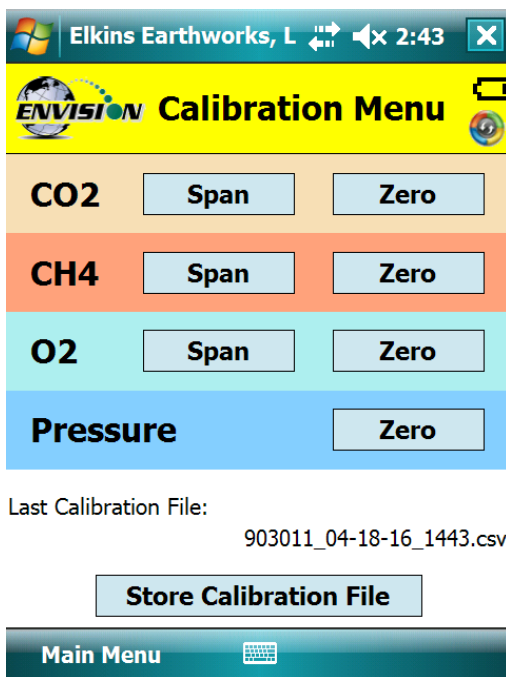
The Envision® gas analyzer has three internal gas measurement sensors (CH₄, CO₂ and O₂) and five pressure sensors that have been calibrated in the factory. The factory calibration results are stored within the Envision® gas analyzer and can only be altered in the factory. The Envision® gas analyzer should be field calibrated prior to each monitoring event. The field calibration file is stored within the handheld computer.



To enter the calibration area of the software, tap the “Calibrate” button on the “Main Menu” screen. The calibration process of the Envision® gas analyzer was built to be simple for the field user. Follow the calibration procedure described below to accurately calibrate the Envision® gas analyzer.

Each gas sensor should be calibrated with a zero gas and a span gas. The technician may calibrate sensors in any order. However, for greatest accuracy, CO2 span should be calibrated before CH4 span (minimizes cross-sensitivity). It is also recommended that when one gas sensor is calibrated that all sensors should be calibrated for zero and span.

The calibration menu is shown below. The CSV (comma separated variable) file containing the last calibration information is stored on the handheld PC. This file may be opened in any text editor (or Microsoft Excel).

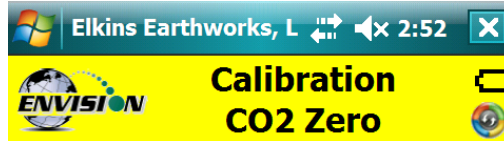




6.5.1 Zero Gas Calibration

The typical order of calibration is to do zero gas first, followed by span gas.

- 1) Tap the “Zero” button of the gas that is to be calibrated. This action will take the software to the “Calibration ... Zero” screen
- 2) The user now has the ability to scan the barcode on the calibration cylinder. Tap the “Scan Barcode” button and aim the scanner laser at the barcode on the calibration gas cylinder being utilized. The barcode number will automatically populate the “Calibration Gas Cylinder #” text box. The user can manually type in the bottle lot# using the numeric keypad on the Trimble or the user may proceed without entering a cylinder number. This data will be recorded in the calibration .csv file that is stored during the calibration process.



Calibration Gas Cylinder #

Scan
Barcode

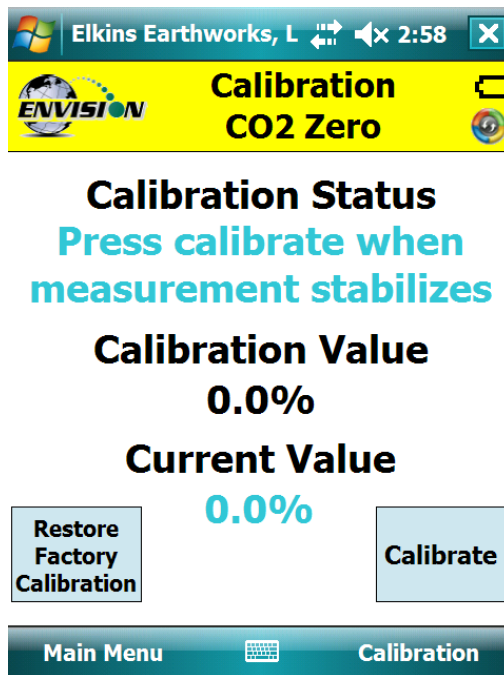
**Attach Calibration Gas and open
regulator valve**

Start Calibration





- 3) Attach the calibration gas to the Static sample port located on the front of the Envision® gas analyzer and open the regulator valve. Elkins Earthworks® strongly recommends the use of a Demand Flow regulator. **Warning – If using a tunable regulator, use a setting of .5 LPM and attach the calibration gas only to the Static port. Do not attach the calibration gas to the Exhaust, Impact or Available ports. Pressures above 200" H2O on any port may result in a damaged pressure sensor.**
- 4) Tap the “Start Calibration” button. This action will turn on the sample pump and will change the handheld computer display.
- 5) The following image shows the zero calibration screen. The “Calibration Value” located in the middle should be 0.0%.

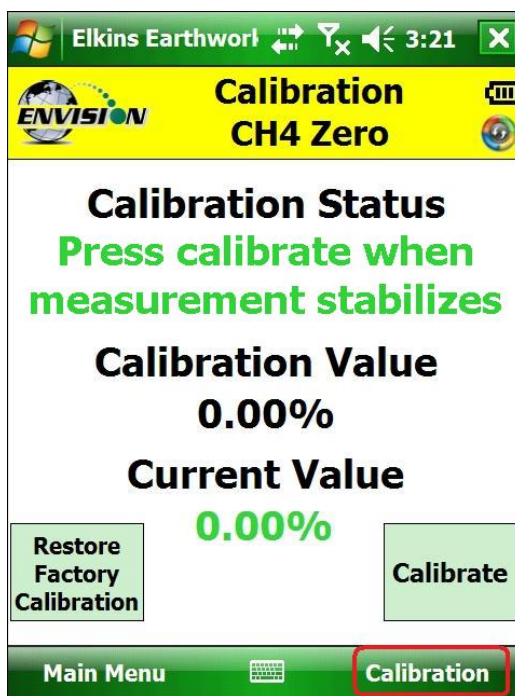


- 6) When the “Current Value” is less than 1% the Calibration status will display “Press calibrate when measurement stabilizes”. This does not mean that the sensor has fully stabilized but that the unit is within the 1% tolerance allowed when zeroing. Tap the “Calibrate” button once the current value has stabilized. **If this button is pressed before the measurement is fully stabilized, the calibration will be inaccurate and, in some cases, make the Envision unable to pass a span calibration.** If the measurement continues to fall



after the button is pressed, it is ok to press the calibrate button a second (or third) time to get a better zero.

- a. If the "Current Value" is between 0% and 1% then the handheld computer will adjust and store your calibration once the user taps the "calibrate" button.
 - b. If the "Current Value" is greater than 1% then the handheld computer will display the following message "Current measurement is outside of expected range. Please verify calibration gas value and/or restore factory calibration." The technician may discard the field calibration value and restore the factory calibration value by tapping the "Restore Factory Calibration" button on the "Calibration ... Zero" screen. The technician should then try to recalibrate. If the unit will not calibrate then the user should contact technical support at Elkins Earthworks® at 330-725-7766.
- 7) The pump will continue to run and the sensors will continue to monitor until the user returns to the "Calibration" menu by tapping the "Calibration" button in the lower right hand corner of the touch screen.



- 8) Now that the Trimble handheld computer has returned to the "Calibration Menu" the user will notice that the parameter that has been calibrated is now highlighted in green. The user may now select the next gas to calibrate.



Elkins Earthworks, L

3:13

ENVISION

Calibration Menu

CO2	Span	Zero
CH4	Span	Zero
O2	Span	Zero
Pressure	Zero	

Last Calibration File: 903011_04-18-16_1443.csv

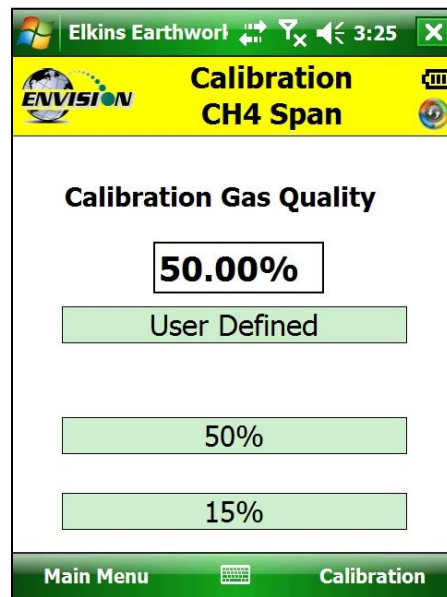
Store Calibration File

Main Menu

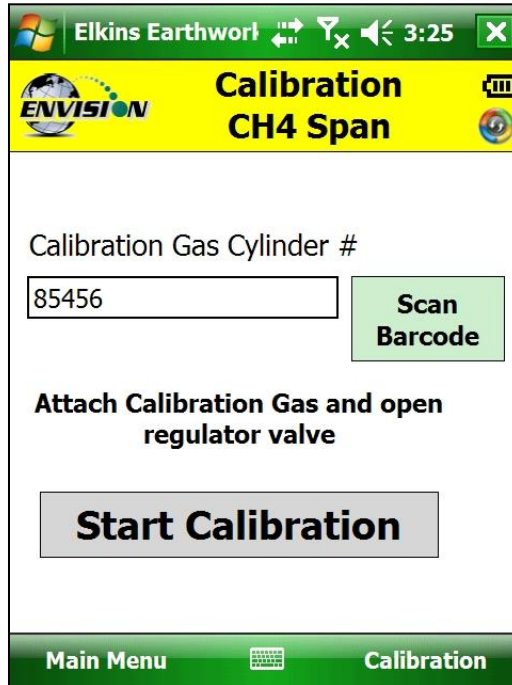


6.5.2 Span Gas Calibration

- 1) On the “Calibration Menu” tap the “Span” button of the gas that is to be calibrated. This will take the user to the “Calibration ... Span” screen.
- 2) On this screen there are two preset calibration gas values and one text box that the user can type in a user defined calibration gas value using the touch screen keyboard or numeric keypad. If selecting a user defined gas quality, the user must enter a value 0.1% to 100%.



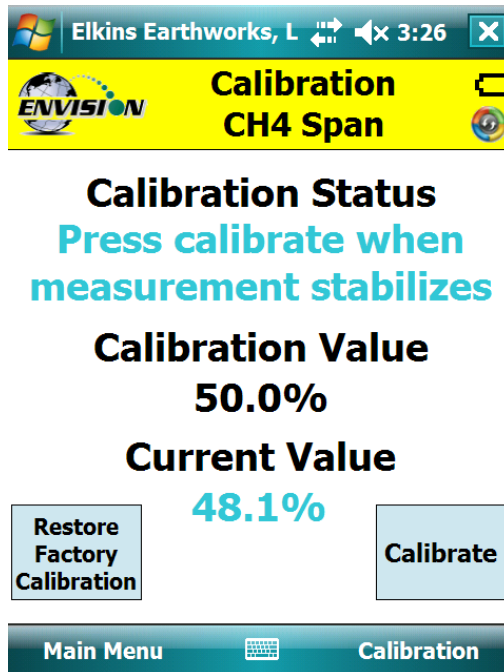
- 3) If the user types in a span gas value, he must first type in the desired gas quality then tap the “User Defined” button. Once the user taps “User Defined” or either one of the two predetermined gas qualities, the screen will then change to the “Calibration ... Span” screen.
- 4) The user now has the ability to scan the barcode on the calibration cylinder. Tap the “Scan Barcode” button and aim the scanner laser at the barcode on the calibration gas cylinder being utilized. The label number will automatically populate the “Calibration Gas Cylinder #” text box. The user can manually type in the bottle lot# using the numeric keypad on the Trimble or the user may proceed without entering cylinder #. This data will be recorded in the calibration .csv file that is stored at the end of the calibration process.



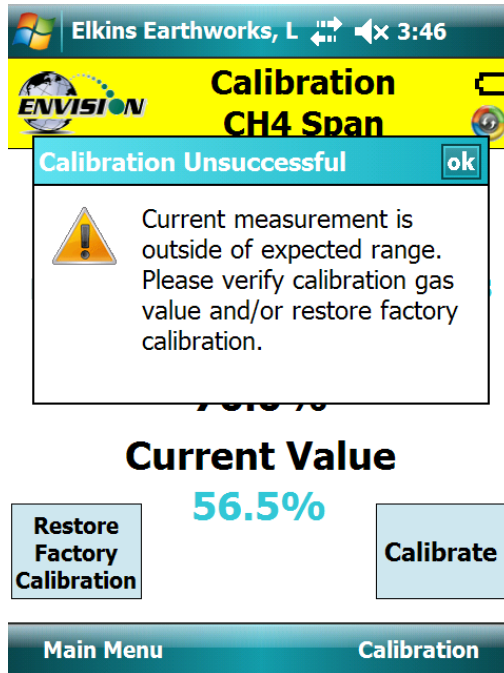
- 5) Attach the calibration gas to the Static sample port located on the front of the Envision® gas analyzer and open the regulator valve. Elkins Earthworks® strongly recommends the use of a Demand Flow regulator. **Warning – If using a tunable regulator, use a setting of .5 LPM and attach the calibration gas only to the Static port. Do not attach the calibration gas to the Exhaust, Impact or Available ports. Pressures above 200" H2O on any port may result in a damaged pressure sensor.**
- 6) Tap the “Start Calibration” button. This action will turn on the sample pump and will change the display. The “Calibration Value” located in the middle of the touch screen should be the same as the gas quality that is being used for calibration and will not fluctuate.



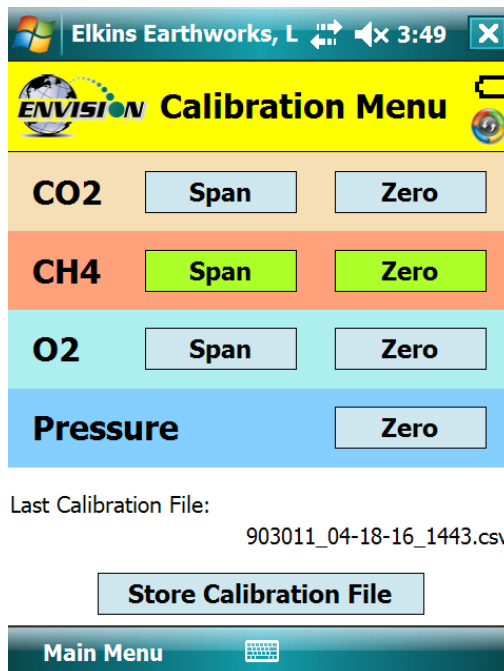
- 7) Once the sensors are initiated and warmed up the “Current Value” will fluctuate. When the “Current Value” is between 0% and 20% (relative) of the calibration gas value the Calibration status will display “Press calibrate when measurement stabilizes”. Tap the “Calibrate” button once the current value has stabilized. **If this button is pressed before the measurement is fully stabilized, the calibration will be inaccurate.** If the measurement continues to change after the button is pressed, it is ok to press the calibrate button a second (or third) time to get a better span.



- If the “Current Value” is between 0% and 20% (relative) of the calibration gas value, then the handheld computer will adjust and store the calibration value once the user taps the “calibrate” button.
- If the “Current Value” is greater than 20% (relative) of the calibration gas value, then the handheld computer will display the following message “Current measurement is outside of expected range. Please verify calibration gas value and/or restore factory calibration.” The technician may discard the field calibration value and restore the factory calibration value by tapping the “Restore Factory Calibration” button on the “Calibration ... Span” screen. The technician should then try to recalibrate. If the unit will not calibrate then the user should contact technical support at Elkins Earthworks® at 330-725-7766.



- 8) Now that the handheld computer has returned to the “Calibration Menu” the user will notice that the parameter that has been calibrated is now highlighted in green. The user may now select the next gas to calibrate.



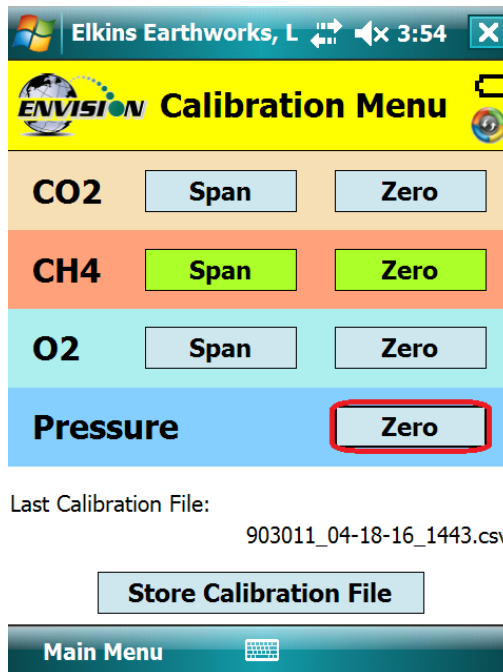


6.5.3 Pressure Sensor Calibration

The Envision® gas analyzer has 5 internal pressure sensors. These sensors should be field calibrated at the beginning and periodically during the monitoring event. The pressure sensors may be zeroed from two different locations in the Elkins Earthworks® Analyzer software.

From the “Calibration Menu”

- 1) Tap the “Pressure Zero” button. The screen will change to the “Pressure Calibration” screen.





- 2) On the “Pressure Calibration” screen allow the pressures in the 5 pressure blocks to stabilize. The ENV100/200 screen is shown to the left and ENVAUS screen is shown to the right below.

Elkins Earthworks, L 4:31

Pressure Calibration

Pressure Sensor	Low Pressure " H2O	High Pressure " H2O
System		0.00
Static	0.00	0.00
Differential	0.004	0.009

All hoses should be disconnected and shielded from wind.

Restore Factory Calibration

Zero Sensors

Main Menu Calibration

EEW Gas Analyzer I 11:38

Pressure Calibration

Pressure Sensor	Low Pressure mB	High Pressure mB
Static	0.00	0.11
Differential	0.000	0.005

Borehole 0.0 LPH

All hoses should be disconnected and shielded from wind.

Restore Factory Calibration

Zero Transducers

Main Menu Analyze

The Envision ENV200 “B” models have the added capability to measure barometric pressure. This measurement is shown on the screen below.



Elkins Earthworks, 10:31

Pressure Calibration

Pressure Sensor	Low Pressure " H2O	High Pressure " H2O
System		0.00
Static	0.00	-0.13
Differential	0.044	-0.009

Barometric Pressure 29.22 "Hg

All hoses should be disconnected and shielded from wind.

Restore Factory Calibration Zero Sensors

Main Menu Calibration

- 3) Ensure that the sample fittings are disconnected from the wellhead and shielded from wind
- 4) Tap the "Zero Sensors" button on the lower center part of the touch screen.



- 5) The values in the green pressure boxes should now read close to 0.00" H2O. Due to the high sensitivity of the sensors the values may still fluctuate but they should be close to the target value.

Pressure Sensor	Low Pressure " H2O	High Pressure " H2O
System		0.00
Static	0.00	0.04
Differential	-0.001	0.001

All hoses should be disconnected and shielded from wind.

Restore Factory Calibration Zero Sensors

Main Menu Calibration

- 6) The user may also restore the factory calibration by tapping the "Restore Factory Calibration" button.
- 7) Tap the "Calibration" button on the lower right of the screen to return to the main "Calibration" screen. The pressure sensor calibration menu is also accessible from the pressure measurement screen in the analyze portion of the software. On the read "Pressures" screen tap the "Calibrate Sensors" button. This action will take you to the pressure sensor calibration screen that was just described in the previous section.



Elkins Earthworks, L

4:38

ENVISION

Pressures

Site: Demo Landfill

ID: DEMGW001

Initial

System	0.0 "H2O	Lock Initial
Static	0.00 "H2O	
Differential	0.000 "H2O	Calibrate Sensors
Flow	0 SCFM	

Analyze

Comments

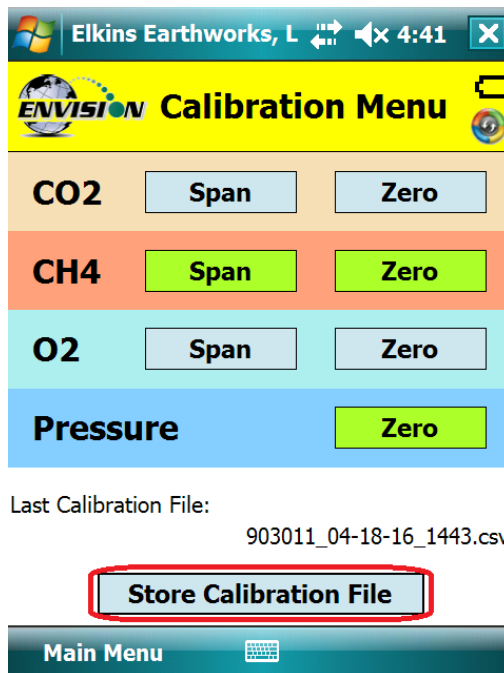
Follow the same pressure calibration procedure as detailed in the previous section then tap the Analyze button in the lower right corner of the screen.

Warning: Never apply vacuums greater than -200" H₂O or pressure greater than +200" H₂O to any of the pressure sensors during calibration or measurement activities. These extreme pressures can damage the pressure sensors within the Envision® gas analyzer.



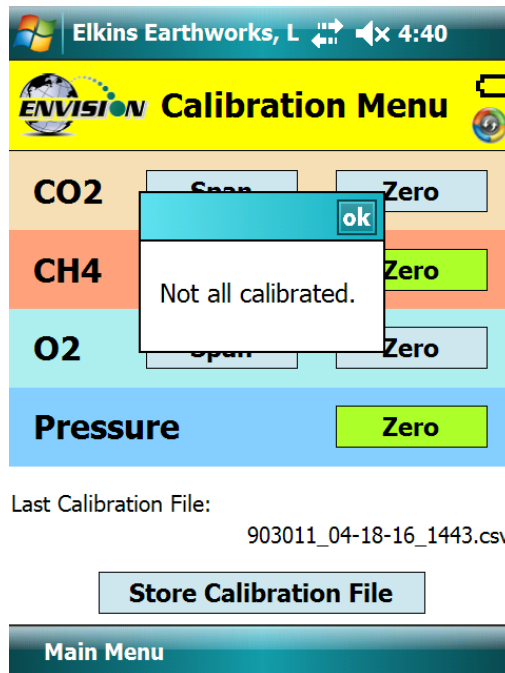
6.5.4 Storing a Calibration File

Once all of the calibration gases have been calibrated the user can select the option to “Store Calibration File”. This feature will generate a .csv file with all of the calibration information generated during the calibration activity.





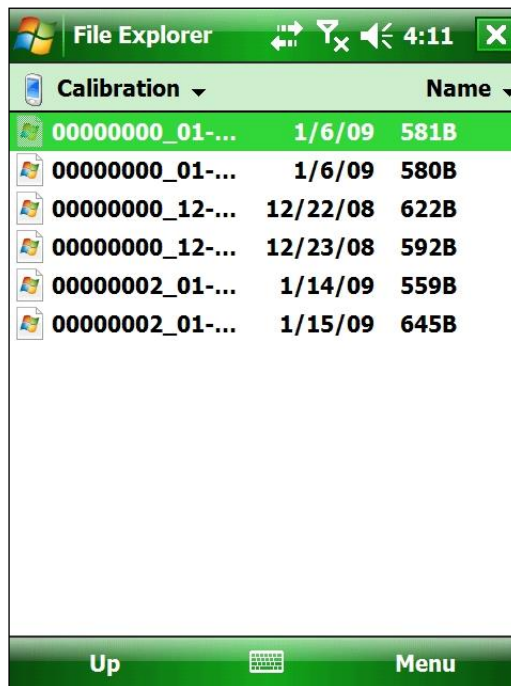
If the user has failed to calibrate all of the parameters a warning screen will appear and will indicate “Not all calibrated”.



This is a warning box so that the user can go back and calibrate the remaining parameters, if desired. If the user taps the “OK” box in the warning message it will return the screen back to the “Calibration Menu” so that the remaining parameters can be calibrated. If the user does not calibrate the remaining parameters and taps the “Store Calibration File” button again the unit will store a “Calibration File” but will place NA in the fields that were not calibrated. Elkins Earthworks® recommends that each parameter be calibrated at least once during each monitoring event.



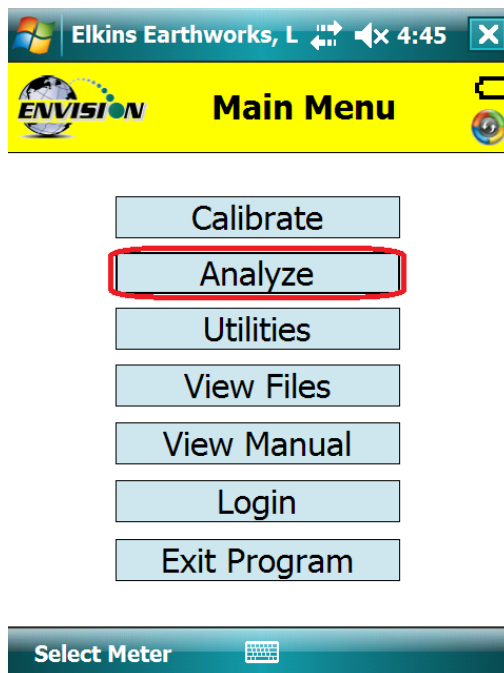
Once the “Store Calibration File” button is selected the Trimble handheld computer will store the calibration file in the Trimble handheld computer in File Explorer: my documents/Elkins Earthworks/calibration. The file is named as such: meter serial number_month-day-year_time (i.e. 000108_7-20-2008_1028).





6.6 Analyze

The Analyze feature of the Envision® software allows the user to measure and record gas qualities, associated pressures and comments for selected monitoring points. To enter the “Analyze” portion of the software go to the main menu and tap the “Analyze” button. The handheld computer will automatically progress to the “Select ID” screen.



6.6.1 Select ID

To make it easier for a user to locate and identify a well or location to monitor, the Envision® software utilizes three different search methods: manual, GPS or barcode scanner. In Section 0 there are specific instructions on how to configure an ID set utilizing the “Elkins Earthworks® Gas Analyzer Configuration Editor”.



6.6.1.1 Manually Select ID

On the “Select ID” screen you may manually select the monitoring point by following the instructions below:

The screenshot displays the 'Select ID' interface within the 'Elkins Earthworks, LLC' application. The top status bar is green with the company name and standard mobile UI icons. Below this, a yellow header contains the 'ENVISION' logo and the title 'Select ID'. The main content area includes two dropdown menus: 'Site:' set to 'ElkinsEarthworks' and 'ID:' set to 'Laboratory'. Below these is a 'Wellhead Type:' field with the value 'OrificePlate'. A row of three buttons—'GPS', 'Search', and 'Barcode'—is present. Under 'Search', there is a '90 secs.' timer and a red 'Purge' button. To the right is a 'Zero Pressures' button. A 'Well ID Maintenance' section contains an 'Edit Site/ID/Type' button. The bottom green navigation bar features 'Main Menu' and 'Analyze' buttons.



- 1) Use the combo boxes labeled “Site” and “ID” to locate the monitoring point that is to be monitored.

The screenshot shows the 'Select ID' screen of the ENVISION software. The title bar indicates 'Elkins Earthworks, LLC'. The screen features a yellow header with the ENVISION logo and the title 'Select ID'. Below the header, there are two dropdown menus: 'Site:' with 'ElkinsEarthworks' selected, and 'ID:' with 'Laboratory' selected. A red rectangle highlights the 'ID:' dropdown menu. Below these, there is a 'Wellhead' dropdown menu with 'Laboratory' selected. The screen also includes buttons for 'GPS', 'Search', and 'Barcode'. A '90 secs.' timer is displayed next to a red 'Purge' button. A 'Zero Pressures' button is also present. At the bottom, there is a 'Well ID Maintenance' section with an 'Edit Site/ID/Type' button. The footer contains 'Main Menu' and 'Analyze' buttons.



- 2) If the “Site” or “ID” is not stored in the ID list, the user can manually create a Site and/or ID within the “Well ID Maintenance” feature accessible via the “Well ID Maintenance” button at the bottom of the “Select ID” screen. Instructions on how to Use the “Well ID Maintenance” function can be found in 6.9.1 “Well ID Maintenance”.

Elkins Earthworks, LLC

Select ID

Site: ElkinsEarthworks

ID: Laboratory

Wellhead Type: OrificePlate

GPS Search Barcode

90 secs. Zero Pressures

Purge

Well ID Maintenance

Edit Site/ID/Type

Main Menu Analyze

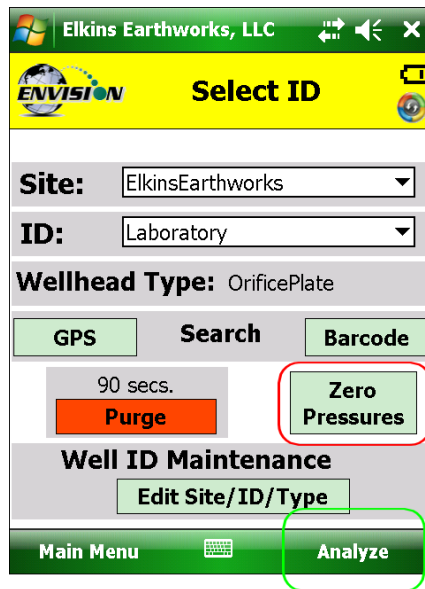


- 3) Once the correct ID is selected the user should tap the “Purge” button. The sample pump will turn on and the button will turn green. The timer will count down 90 seconds or until the O₂ percent in the meter is at least 18% then the pump will turn off. The purge cycle may end if either the Envision® meter detects that the sample train is clear of methane or the user taps the “Purge” button again.

The screenshot shows the 'Select ID' screen of the Envision application. The top status bar indicates 'Elkins Earthworks, LLC'. The screen has a yellow header with the Envision logo and the title 'Select ID'. Below the header, there are two dropdown menus: 'Site:' with 'ElkinsEarthworks' selected and 'ID:' with 'Laboratory' selected. Underneath these is a label 'Wellhead Type:' followed by 'OrificePlate'. A row of three buttons is present: 'GPS', 'Search', and 'Barcode'. Below this row, there is a red rectangular box highlighting a button that says '90 secs.' above 'Purge'. To the right of this box is a button labeled 'Zero Pressures'. Below these buttons is a section titled 'Well ID Maintenance' containing an 'Edit Site/ID/Type' button. At the very bottom, there is a green bar with 'Main Menu' and 'Analyze' buttons.



- 4) Once the purge is complete keep your sample trains disconnected and shielded from the wind then tap the “Zero Pressures” button. The user can also decide to skip the “Zero Pressures” feature and go directly to the Analyze screen by pressing the “Analyze” button in the lower right corner of the screen.





6.6.1.2 GPS Selection of ID

If the user desires to locate the monitoring point via GPS, then follow the instructions detailed below:

- 1) Stand at the location to be monitored – The first connection may take several minutes for the GPS to lock after the handheld computer is first turned on. Each location after this should be instantaneous.
- 2) Tap the GPS button on the handheld computer's touch screen.

Elkins Earthworks, LLC

Select ID

Site: ElkinsEarthworks

ID: Laboratory

Wellhead Type: OrificePlate

GPS Search Barcode

90 secs. Zero Pressures

Well ID Maintenance

Edit Site/ID/Type

Main Menu Analyze

- 3) Once the "GPS" button is pushed a status message will be displayed above the Site text box that will indicate "Reading GPS", then either "GPS not locked", "Site/ID selected by GPS", or "Failed to find GPS match".
- 4) The handheld computer will automatically populate the "Site" and "ID" text box with the nearest monitoring point.
- 5) If the GPS does not find a monitoring point, then the status will change to "Failed to find GPS match". If the ID is known, the user can manually select the "Site" and "ID" then tap the "Well ID Maintenance" button to mark the GPS coordinates for that location. Instructions on how to use the "Well ID Maintenance" function can be found in section 6.9.1.



- 6) If sample points are located within 30 feet of each other, then the GPS function will select the closest point to your location.

6.6.1.3 Barcode Selection of ID

If you desire to select the well to be measured by barcode, please follow the instructions below:

- 1) Walk up to the point to be monitored
- 2) Locate the barcode on the item to be monitored
- 3) On the “Select ID” screen tap the “Barcode” button on the Trimble handheld computer touch screen and aim the laser scanner at the barcode

Elkins Earthworks, LLC

ENVISION **Select ID**

Site: ElkinsEarthworks

ID: Laboratory

Wellhead Type: OrificePlate

GPS Search **Barcode**

90 secs. **Purge** Zero Pressures

Well ID Maintenance

Edit Site/ID/Type

Main Menu Analyze



- 4) A status message will be displayed above the “Site” that will indicate “Scanning Barcode”

The screenshot shows the ENVISION Select ID screen. At the top, the title bar reads 'Elkins Earthworks, LLC'. Below it, the ENVISION logo and 'Select ID' are displayed. A status message 'Scanning barcode...' is highlighted with a red box above the Site dropdown. The Site dropdown is set to 'ElkinsEarthworks' and the ID dropdown is set to 'Laboratory'. The Wellhead Type is 'OrificePlate'. There are three buttons: 'GPS', 'Search', and 'Barcode'. Below these, there is a '90 secs.' timer and a 'Purge' button. To the right, there is a 'Zero Pressures' button. At the bottom, there is a 'Well ID Maintenance' section with an 'Edit Site/ID/Type' button. The footer contains 'Main Menu' and 'Analyze' buttons.

- 5) Once the barcode has been verified the status will change to “Site/ID selected by Barcode”

The screenshot shows the ENVISION Select ID screen after a successful barcode scan. The title bar now includes the time '10:03'. The status message 'Site/ID selected by Barcode' is highlighted with a red box above the Site dropdown. The Site dropdown is now set to 'Demo Landfill' and the ID dropdown is set to 'DEMGW002'. The Wellhead Type remains 'OrificePlate'. The buttons 'GPS', 'Search', and 'Barcode' are still present. Below them, the '90 secs.' timer and 'Purge' button are visible, along with the 'Zero Pressures' button. The 'Well ID Maintenance' section with the 'Edit Site/ID/Type' button is at the bottom. The footer still shows 'Main Menu' and 'Analyze' buttons.



- 6) The handheld computer will automatically populate the “Site” and “ID” text box with the correct monitoring point.
- 7) If the barcode does not find a monitoring point, then the status will change to “Failed to find Barcode match”. If the ID is known, the user can manually select the Site and ID then tap the “Well ID Maintenance” button to mark the barcode for that location. Instructions on how to Use the “Well ID Maintenance” function can be found in section 6.9.1.



6.6.2 Analyze

This feature allows the user to measure the gas qualities and pressures for a selected sample point. The “Analyze” screen is accessed by pressing the “Analyze” button in the lower right of the “Select ID” screen.

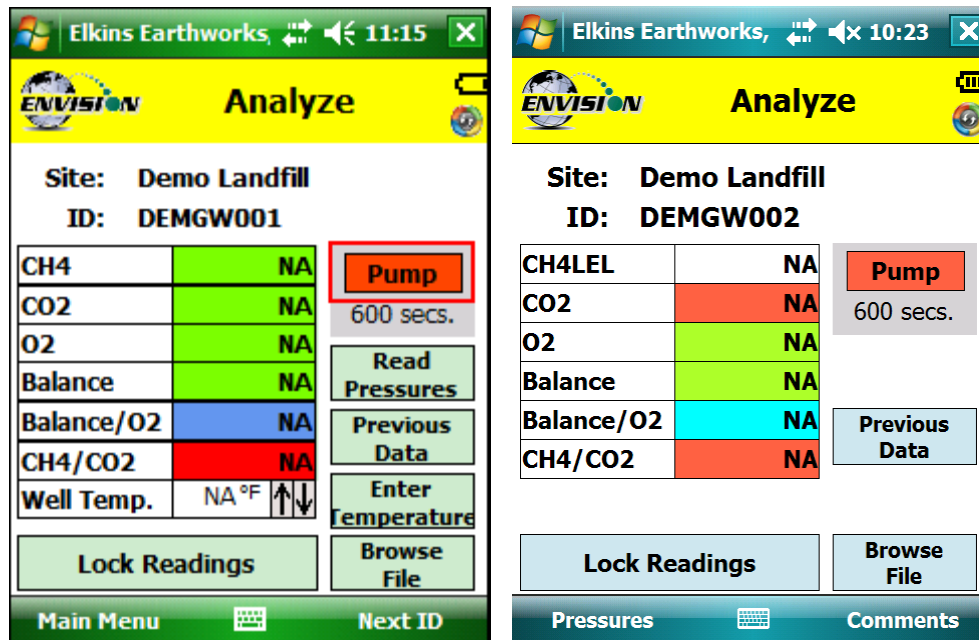
Note: The typical screen progression is from gas concentration analysis to pressure analysis. However, if the wellhead type is set to “Probe”, the screen progression is reversed.

6.6.2.1 Analyze Screen (ENV100/200)

6.6.2.1.1 Pump

This button activates the sample pump located within the Envision® gas analyzer.

The left screen is for a typical well. The right screen is for a probe.



The button is red when the pump is off and green when activated. The default on time for the pump is 600 seconds. To activate the pump, tap the “Pump” button once. The sensor will then go through a 20 second warm-up before actual gas values will appear. The pump may be turned off by tapping the “Pump” button again. If the pump is turned off, then the gas values will return to the default “NA”. To lock the gas values the user must tap the “Lock Readings” or “Read Pressures”. The pump time can be



changed within the Configuration Editor as described in section 0.

6.6.2.1.2 Read Pressures

The Envision® unit measures Available, Applied, and Differential pressures. In order to view and record these pressures the user must go to the “Read Pressures” screen.

The left screen is for a typical well. The right screen comes up if the Wellhead Type is set to “Probe”.

Left Screen (Typical Well):

Site: **ElkinsEarthworks**
ID: **Laboratory**

Initial

System	0.0 "H2O
Static	0.00 "H2O
Differential	0.000 "H2O
Flow	0 SCFM

Buttons: **Lock Initial**, **Calibrate Sensors**

Bottom: **Analyze**, **Comments**

Right Screen (Probe):

Site: **Demo Landfill**
ID: **DEMGW002**

Static: **0.00 "H2O**

Buttons: **Lock**, **Calibrate Sensors**, **Analyze**

Bottom: **Main Menu**, **Next ID**



6.6.2.1.3 Previous Data

If the user desires to view data previously recorded on the handheld computer, then the Previous Data button should be tapped.

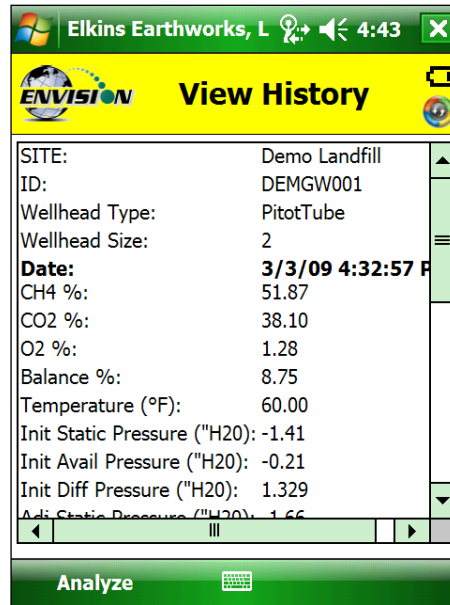
The screenshot shows the 'Analyze' screen of the ENVISION software. The title bar at the top reads 'Elkins Earthworks, LLC'. Below the title bar, the 'ENVISION' logo and the word 'Analyze' are displayed. The screen shows the following data:

Site: ElkinsEarthworks	
ID: Laboratory	
CH4	NA
CO2	NA
O2	NA
Balance	NA
Balance/O2	NA
CH4/CO2	NA
Well Temp.	NA °F

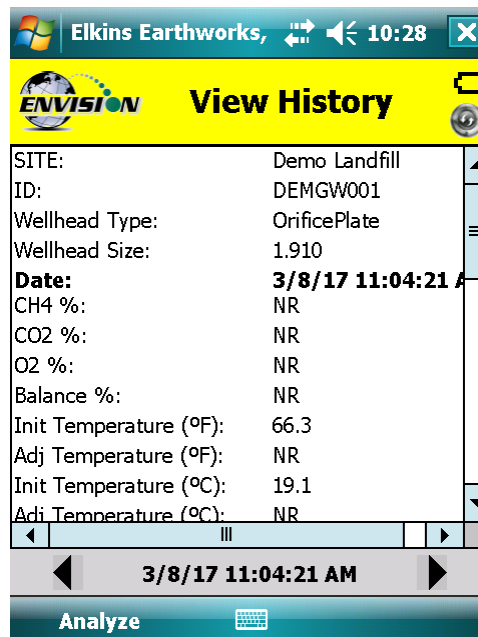
Buttons on the right side of the screen include: Pump (600 secs.), Read Pressures, Previous Data (highlighted with a red circle), Enter Temperature, and Browse File. At the bottom, there are buttons for Main Menu and Next ID.



This button will take the handheld computer to the “View History” screen. The “View History” screen will display any historical well data for the selected ID located in the site’s current month output file located on the handheld computer.



To return to the “Analyze” screen tap the Analyze button in the bottom left hand corner of the screen. Newer software versions have the ability to look back at all previous measurements (below).





6.6.2.1.4 Enter Temperature

Press the “Enter Temperature” button to allow manual entry of well temperature. This will override any thermistor that happens to be attached to the Envision.

Elkins Earthworks, L 1:45

Analyze

Site: **Demo Landfill**
ID: **DEMGW001**

CH4	NA	Pump 600 secs.
CO2	NA	
O2	NA	Read Pressures
Balance	NA	
Balance/O2	NA	Previous Data
CH4/CO2	NA	
Well Temp.	NA °F ↑↓	Enter Temperature

Lock Readings **Browse File**

Main Menu **Next ID**



Use the hard or soft keypads to enter a temperature value, then hit Ok.

The screenshot shows the 'Analyze' screen of the ENVISION software. At the top, the title bar reads 'Elkins Earthworks, L' and '1:48'. Below the title bar, the ENVISION logo is on the left and the word 'Analyze' is in the center. The site information is displayed as 'Site: Demo Landfill' and 'ID: DEMGW001'. A keypad overlay is present with the text 'Use keypad to enter value' and an 'Ok' button. The keypad includes numbers 1-0, function keys like Tab, CAP, Shift, and Ctrl, and arrow keys. At the bottom, there are buttons for 'Main Menu' and 'Next ID'.

6.6.2.1.5 Browse File

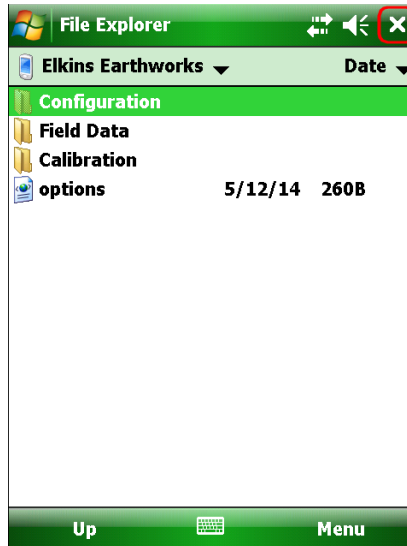
The “Browse File” button will take the handheld computer to the File Explorer.

The screenshot shows the 'Analyze' screen of the ENVISION software. At the top, the title bar reads 'Elkins Earthworks, LLC' and '1:48'. Below the title bar, the ENVISION logo is on the left and the word 'Analyze' is in the center. The site information is displayed as 'Site: Demo Landfill' and 'ID: DEMGW001'. A table of data is shown with columns for gas type, color, and value. The 'Well Temp.' row shows 'NA °F' with up and down arrows. To the right of the table are buttons for 'Pump', 'Read Pressures', 'Previous Data', 'Enter Temperature', and 'Browse File'. The 'Browse File' button is highlighted with a red rectangle. At the bottom, there are buttons for 'Main Menu' and 'Next ID'.

CH4	NA
CO2	NA
O2	NA
Balance	NA
Balance/O2	NA
CH4/CO2	NA
Well Temp.	NA °F



This will allow you to search for previously stored .csv (comma separated variable) files for viewing. Applications are available for the handheld computer that will allow the user to view .csv files.



To return to the “Analyze” screen tap the X in the upper right hand corner of the screen.

6.6.2.1.6 Lock Readings

The “Lock Readings” button is designed to lock the gas values and to turn off the pump. This feature locks the readings so if you decide to come back to this screen your readings will not change. This feature does not actually “Store” the gas qualities into the .csv file.



The screenshot shows the 'Analyze' screen of the ENVISION application. At the top, the title bar reads 'Elkins Earthworks, LLC'. Below it, the 'Analyze' header is in yellow. The site information is 'Site: Demo Landfill' and 'ID: DEMGW001'. A table displays gas readings: CH4 (red, NA), CO2 (red, NA), O2 (green, NA), Balance (green, NA), Balance/O2 (blue, NA), CH4/CO2 (red, NA), and Well Temp. (NA °F with up/down arrows). To the right of the table are buttons: 'Pump' (orange), '600 secs.' (grey), 'Read Pressures' (green), 'Previous Data' (green), 'Enter Temperature' (green), and 'Browse File' (green). At the bottom, a green bar contains 'Main Menu' and 'Next ID'. The 'Lock Readings' button is highlighted with a red rectangle.

CH4	NA
CO2	NA
O2	NA
Balance	NA
Balance/O2	NA
CH4/CO2	NA
Well Temp.	NA °F

After the “Lock readings” button is tapped the button will change to “readings saved”. The values are now locked. The values can be unlocked by tapping the pump button. In order for the data to be stored to a .csv file the user must tap “Store” on the last analyze screen.



6.6.2.1.7 Next ID

This button will allow you to select another ID without having to proceed through the entire sample procedure. However, this will not store any of the data that you have gathered for the current ID.

The screenshot shows the 'Analyze' screen of the ENVISION software. The title bar indicates 'Elkins Earthworks, LLC'. The header bar is yellow with the ENVISION logo and the word 'Analyze'. Below the header, the site information is displayed: 'Site: Demo Landfill' and 'ID: DEMGW001'. A table of gas readings is shown with columns for the gas type, a color-coded status bar, and the reading value. The readings are: CH4 (red, NA), CO2 (red, NA), O2 (green, NA), Balance (green, NA), Balance/O2 (blue, NA), CH4/CO2 (red, NA), and Well Temp. (NA °F). To the right of the table are buttons for 'Pump' (600 secs.), 'Read Pressures', 'Previous Data', 'Enter Temperature', 'Lock Readings', and 'Browse File'. At the bottom, there are two buttons: 'Main Menu' and 'Next ID'. The 'Next ID' button is highlighted with a red rectangle.

Gas	Status	Reading
CH4	Red	NA
CO2	Red	NA
O2	Green	NA
Balance	Green	NA
Balance/O2	Blue	NA
CH4/CO2	Red	NA
Well Temp.		NA °F

6.6.2.1.8 Main Menu

This button will exit the user from “Analyze” and take the user back to the “Main Menu”. However, this will not store any of the data that you have gathered for the current ID.

This screenshot is identical to the one above, showing the 'Analyze' screen of the ENVISION software. The only difference is that the 'Main Menu' button at the bottom left is highlighted with a red rectangle, instead of the 'Next ID' button.



6.6.2.2 Analyze Screen (ENVAUS)

The ENVAUS gas analyzer Analyze screen is similar to the ENV100/200 screens above except that it has an added logging function capability. This allows the user to log gas concentration measurements to a file. The user can select the total logging time and measurement interval from the “Well ID Maintenance” screen (see section 6.9.1). The ENVAUS “Analyze” screens are shown below. The logging timer will count down to zero then stop.

EEW Gas Analyzer I 11:43				EEW Gas Analyzer I 12:02			
Analyze				Analyze			
Site: Demo Landfill				Site: Demo Landfill			
ID: DEMGW001				ID: DEMGW001			
CH4	NA	Pump	600 Sec.	CH4	0.0%	0.0%	Stop Logging 592 Sec.
CO2	NA						
O2	NA	Start Logging	O2	21.1%			
Balance	NA	600 Sec.	Balance	78.9%			
Balance/O2	NA		Balance/O2	3.7			
CH4/CO2	NA	Previous Data	CH4/CO2	0.0			
Well Temp.	NA °C		Well Temp.	NA °C			
Lock Readings		Enter Temperature	Lock Readings		Enter Temperature		
Select ID		Pressures	Select ID		Pressures		

6.6.2.3 Gas Quality and Gas Quality Ratios

The Envision® gas analyzer measures concentrations of three gases: CH₄, CO₂ and O₂. The balance gas is calculated by subtracting the total of these three gas qualities from 100%.



6.6.2.3.1 Gas Qualities

Elkins Earthworks, LLC	
Analyze	
Site: Demo Landfill	
ID: DEMGW001	
CH4	52.82%
CO2	31.52%
O2	1.06%
Balance	14.59%
Balance/O2	13.72
CH4/CO2	1.68
Well Temp.	NA °F
Lock Readings	
Main Menu	
Next ID	

Pump
499 secs.

Read Pressures

Previous Data

Enter Temperature

Browse File

CH₄ - Methane

CH₄ is measured via an internal Infrared sensor. The measurement range of the sensor is 0-100% CH₄.

CH₄ – LEL (Lower Explosive Limit)

By tapping the CH₄ box the handheld computer will display the CH₄ LEL%. The user can return to the standard CH₄% by tapping the CH₄ box again. Note: 100% LEL is equal to 5% CH₄.

CO₂ – Carbon Dioxide

CO₂ is measured via an infrared sensor. The measurement range of the sensor is 0-100% CO₂.

O₂ - Oxygen

O₂ is measured via an electrochemical sensor. The measurement range of the sensor is 0 – 25% O₂.

Balance Gas

Balance gas is a calculated value. It is calculated as follows:

Balance gas = 100%- CH₄- CO₂- O₂



6.6.2.3.2 Gas Ratios

The screenshot shows the ENVISION software interface for 'Elkins Earthworks, LLC'. The main title is 'Analyze'. The site information is 'Site: Demo Landfill' and 'ID: DEMGW001'. The data table shows gas percentages: CH4 (52.82%), CO2 (31.52%), O2 (1.06%), Balance (14.59%), and Balance/O2 (13.72). The CH4/CO2 ratio is 1.68, which is highlighted with a red box. The Well Temp. is NA °F. The interface includes buttons for 'Pump', 'Read Pressures', 'Previous Data', 'Enter Temperature', 'Lock Readings', 'Browse File', 'Main Menu', and 'Next ID'.

Gas	Percentage
CH4	52.82%
CO2	31.52%
O2	1.06%
Balance	14.59%
Balance/O2	13.72
CH4/CO2	1.68
Well Temp.	NA °F

Balance/ O₂

- Results near "4" indicate a direct air leak into the sample train, sample fitting or wellhead.
- User should be familiar with interpreting the range of ratios for Balance/ O₂. Information is available within the SWANA Landfill Gas O&M Manual available at www.swana.org.

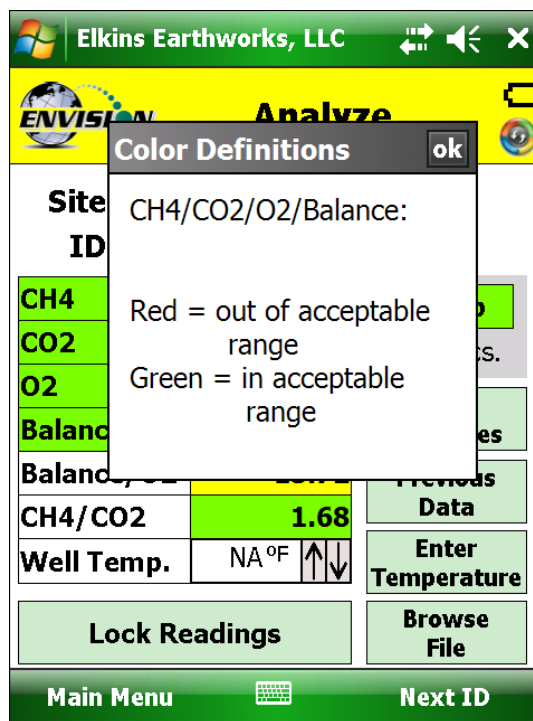
CH₄/ CO₂

- Ratio lower than 1.1 may indicate potential for stressed conditions on a landfill gas well.
- The ratio may assist in drawing attention to different phases of landfill gas production.
- User should be familiar with interpreting the range of ratios for CH₄/ CO₂. Information is available within the SWANA Landfill Gas O&M Manual available at www.swana.org.



6.6.2.4 Color Definitions

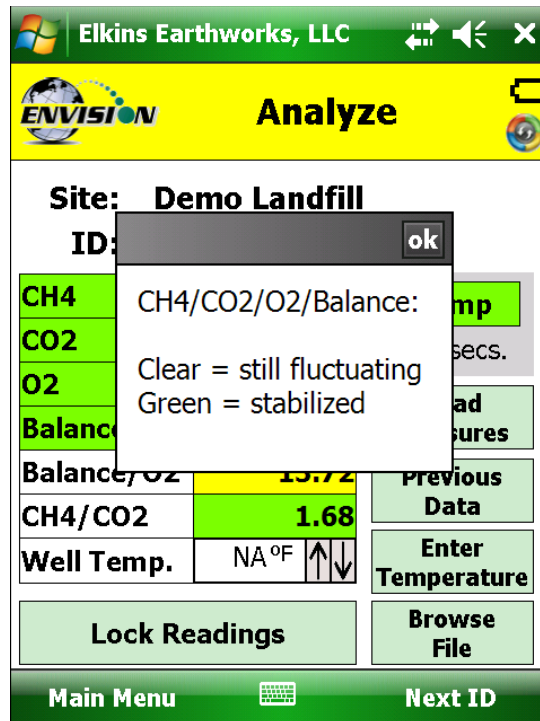
The Elkins Gas Analyzer software has been programmed to help the user make tuning decisions by using acceptable ranges which have been set up using the Configuration Editor software. When the gas sensor is in the acceptable range the gas quality text box will turn from red to green. The color key can be displayed by touching the gas quality text box. Tap “OK” to close the color key.



These ranges are programmable for each well by utilizing the Configuration Editor as detailed in section 0.



The software is also programmed to detect when the gas sensors have stabilized. When the gas sensor has stabilized the gas quality text box will turn from clear to green. The color key can be displayed by touching the sensor title. Tap “OK” to close the color key.



The user may progress to the next screen by pressing the “Read Pressures” button. The user may also elect to go back to the main menu by tapping the “Main Menu” button.

6.6.3 Read Pressures (ENV100/200)

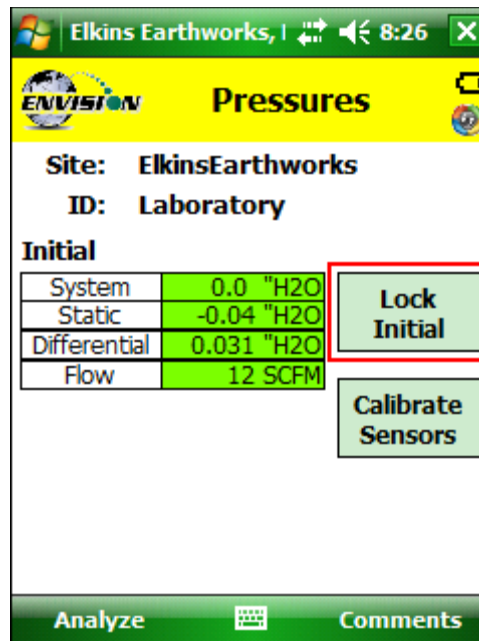
The Envision® gas analyzer is built with five internal pressure sensors. The software is programmed to use the sensor that is the most accurate for the range being measured. Listed below are the sensors and their ranges.

Pressure Sensor	Low Pressure ("H ₂ O)	High Pressure ("H ₂ O)
System	NA	-138 to +138
Static	-5 to +5	-138 to +138
Differential	-5 to +5	-30 to +30

6.6.3.1 Wellhead

When the pressure sensors are in the acceptable programmed range, as programmed by the user in the Configuration Editor, the pressure text box will turn from red to green. The color key can be displayed by touching the gas quality text box. Tap “OK” to close the color key.

When the user is satisfied with the Initial pressures they may tap the Lock Initial button to lock in the initial pressures.



The screenshot shows the 'Pressures' screen in the ENVISION application. The title bar indicates 'Elkins Earthworks, I' and the time is 8:26. The screen displays the following information:

- Site:** ElkinsEarthworks
- ID:** Laboratory
- Initial** section with a table of pressure values:

System	0.0 "H2O
Static	-0.04 "H2O
Differential	0.031 "H2O
Flow	12 SCFM

To the right of the table is a button labeled 'Lock Initial', which is highlighted with a red rectangle. Below this button is another button labeled 'Calibrate Sensors'. At the bottom of the screen are two buttons: 'Analyze' and 'Comments'.



Once the lock initial pressure button is tapped the “Adjusted” pressures will appear and will start fluctuating.

The screenshot shows a software interface titled "Elkins Earthworks, I" with a status bar at the top showing "8:28". The main title is "Pressures". Below the title, the site is identified as "ElkinsEarthworks" and the ID as "Laboratory".

Initial

System	0.3 "H2O
Static	-0.04 "H2O
Differential	0.033 "H2O
Flow	13 SCFM

Adjusted

System	0.3 "H2O
Static	-0.04 "H2O
Differential	0.028 "H2O
Flow	12 SCFM

The "Adjusted" table is highlighted with a red border. To the right of the tables are three buttons: "Unlock Initial", "Calibrate Sensors", and "Lock Adjusted". At the bottom are two buttons: "Analyze" and "Comments".



Once the user makes an adjustment and the sensors have stabilized the user can tap the “Lock Adjusted” button. The button will then change to “Unlock Adjusted”. If the “Unlock Adjusted” button is pushed it will unlock the adjusted values allowing them to fluctuate. The user may now lock the value again. Failure to lock the values will result in the adjusted values not being stored in the output file.

The screenshot shows a mobile application interface for 'Elkins Earthworks'. The title bar at the top is green and contains the text 'Elkins Earthworks, I', a signal strength icon, a battery icon, and the time '8:29'. Below the title bar is a yellow header with the 'ENVISION' logo on the left and the word 'Pressures' in the center. The main content area has a white background and displays the following information:

Site: ElkinsEarthworks
ID: Laboratory

Initial

System	0.3 "H2O
Static	-0.04 "H2O
Differential	0.033 "H2O
Flow	13 SCFM

Adjusted

System	0.7 "H2O
Static	-0.04 "H2O
Differential	0.027 "H2O
Flow	12 SCFM

On the right side of the screen, there are two green buttons: 'Unlock Initial' and 'Calibrate Sensors'. Below the 'Adjusted' table, there is a green button labeled 'Unlock Adjusted' which is highlighted with a red rectangular border. At the bottom of the screen, there is a green bar with two white buttons: 'Analyze' and 'Comments'.

The user may also access the pressure sensor calibrate (zero pressures) screen from these screens. Make sure that the hoses are disconnected and sheltered from the wind when calibrating the pressure sensors. For calibration instructions refer to section 6.5.3.



If the user has defined this monitoring point as “User Defined” then the user may type in a flow measurement for both the Initial and Adjusted flows.

The screenshot shows a software interface for 'Elkins Earthwork' with a yellow header bar containing the 'ENVISION' logo and the title 'Pressures'. Below the header, the site information is displayed: 'Site: Elkins' and 'ID: ELKGW001'. A section titled 'Initial' contains a table with four rows: 'Available' (-7.9 "H2O), 'Applied' (0.25 "H2O), 'Differential' (0.121 "H2O), and 'Flow' (18 SCFM). The 'Flow' row is highlighted with a red border. To the right of the table are two buttons: 'Lock Initial' and 'Calibrate Sensors'. At the bottom of the screen are two buttons: 'Analyze' and 'Comments'.

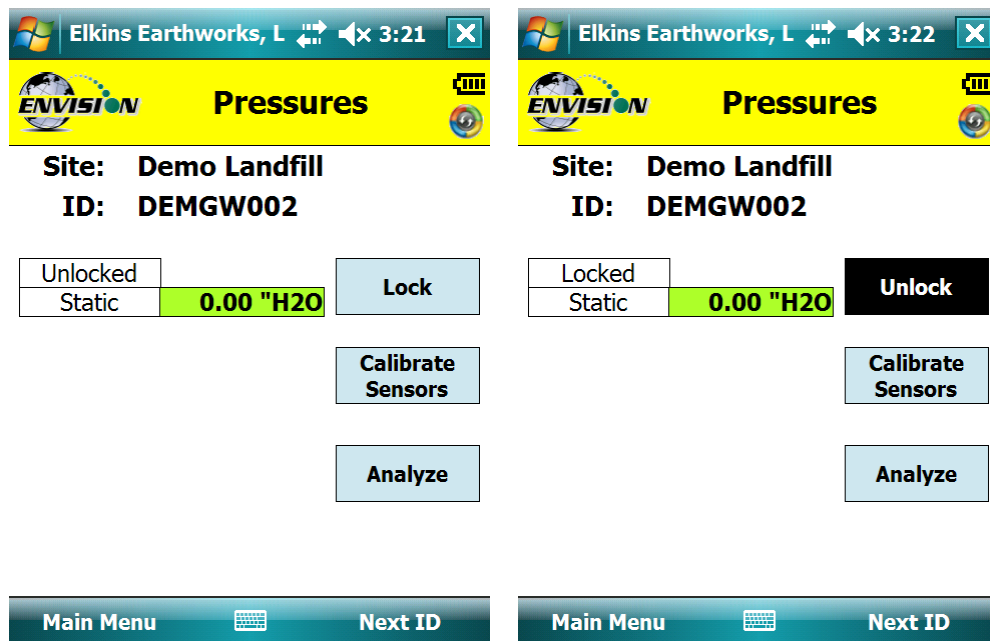
Initial	
Available	-7.9 "H2O
Applied	0.25 "H2O
Differential	0.121 "H2O
Flow	18 SCFM

Use the “Comments” button to progress to the next screen or tap the “Analyze” button to go back to the “Analyze” screen.



6.6.3.2 Probe

If the Wellhead type is Probe, the screen progression begins with a pressures measurement and ends with gas concentration measurements. This screen is complete when the user presses the “Lock” button. Select the “Analyze” button to continue to the gas concentration measurement screens.



6.6.4 Read Pressures (ENVAUS)

Although the ENVAUS model has much in common with the ENV100/200 sections above, it does not have the “System” pressure sensor. It uses the “Static” pressure sensor to measure “System” pressure. Therefore, the user is provided step-by-step, on-screen instructions to guide through the process of switching tubing. Because of this however, the ENVAUS has the additional capabilities of measuring borehole flow and atmospheric pressure. See section 13.2 for specifications.



6.6.4.1 Wellhead Type

The following images show screen progressions for non-borehole wellhead types.

EEW Gas Analyzer BI 2:09

Well Pressures

Site: Demo Landfill
ID: DEMGW001

Initial

Static	-0.01 mB
Differential	0.00 mB
Flow	0 scmh

Lock Initial

Zero Pressures

Analyze Comments

EEW Gas Analyzer BI 2:10

Well Pressures

Site: Demo Landfill
ID: DEMGW001

Initial

Static	-0.01 mB
Differential	0.00 mB
Flow	0 scmh

Unlock Initial

Adjusted

Static	-0.02 mB
Differential	0.00 mB
Flow	0 scmh

Lock Adjusted

Zero Pressures

Analyze Comments



Because there is no separate pressure sensor to measure “System” pressure on the ENVAUS, the user is prompted to move the tubing which is connected to the Envision “Static” port to the “System” port on the well head.

EEW Gas Analyzer BI 2:57

Well Pressures

Move Tubing Connection

Please connect the Static (white) port on the Envision to the system (available) port on the well.

ok

Static	-0.01 mB
Differential	0.00 mB
Flow	0 scmh

Adjusted

Adjusted

Static	-0.01 mB
Differential	0.00 mB
Flow	0 scmh

Zero Pressures

Analyze

Comments

EEW Gas Analyzer BI 2:12

Well Pressures

Site: Demo Landfill

ID: DEMGW001

Initial

Static	-0.01 mB	Unlock Initial
Differential	0.00 mB	
Flow	0 scmh	Unlock Adjusted

Adjusted

Adjusted

Static	-0.01 mB
Differential	0.00 mB
Flow	0 scmh

Lock System

Zero Pressures

System -0.01 mB |

Analyze

Comments



6.6.4.2 Borehole Type

The pressures screen progression for a wellhead of type “BoreHole” is shown below.

The first screenshot shows the 'Select ID' screen. A dialog box titled 'Move Tubing Connection' is displayed, stating: 'Please connect Static (white) port for pressure measurement.' The screen also shows a large yellow area for data, buttons for 'Previous Data' and 'Zero Pressures', and a bottom bar with 'Main Menu' and 'Analyze'.

The second screenshot shows the 'Borehole Pressures' screen. It displays the site information: 'Site: Demo Landfill' and 'ID: DEMGW002'. The status is 'Pressure Unlocked'. A table shows the following data:

Bar Pressure	982.2 mB
BH Pressure	-0.01 mB

Buttons for 'Lock Pressure', 'Previous Data', and 'Zero Pressures' are visible. The bottom bar includes 'Select ID' and 'Analyze'.

Pressing the “Lock Pressure” button brings up the following screens.

The first screenshot shows the 'Borehole Pressures' screen with a dialog box titled 'Move Tubing Connection' stating: 'Pressure locked. Please connect the borehole to the Borehole Flow (yellow) port to measure flow.' The screen also shows a large yellow area for data, buttons for 'Previous Data' and 'Zero Pressures', and a bottom bar with 'Select ID' and 'Analyze'.

The second screenshot shows the 'Borehole Pressures' screen. It displays the site information: 'Site: Demo Landfill' and 'ID: DEMGW002'. The status is 'Pressure Locked'. A table shows the following data:

Bar Pressure	982.2 mB
BH Pressure	-0.01 mB
BH Flow	0.3 LPH

Buttons for 'Pressure Locked', 'Lock Flow', 'Timed Flow', 'Previous Data', and 'Zero Pressures' are visible. The bottom bar includes 'Select ID' and 'Analyze'.



The flow may be locked by pressing the “Lock Flow” button. The user may also select “Timed Flow” to log the flow measurements to a file. The time interval and total number of measurements may be set either on the “Well ID Maintenance” screen or in the Configuration Editor.

EEW Gas Analyzer BI

3:06

ENVISION

Borehole Pressures

Site: Demo Landfill

ID: DEMGW002

Flow Locked

Bar Pressure	982.2 mB
BH Pressure	-0.01 mB
BH Flow	0.3 LPH

Pressure Locked

Unlock Flow

Timed Flow

Previous Data

Zero Pressures

Select ID

Analyze

EEW Gas Analyzer BI

3:07

ENVISION

Borehole Pressures

Site: Demo Landfill

ID: DEMGW002

Logging Flow.....

Bar Pressure	982.2 mB
BH Pressure	-0.01 mB
BH Flow	0.3 LPH

010 sec 00.3 lph
005 sec 00.3 lph
000 sec 00.3 lph

Pressure Locked

Unlock Flow

Stop Logging

Previous Data

Zero Pressures

Select ID

Analyze



6.7 Comments

The comments screen is accessed from the “Pressures” screen (or from the “Analyze” screen for probes or boreholes). The “Comments” screen is designed to give the user several opportunities to comment on the sample point.

The user may check boxes from a group of populated comments. These comments are populated by the use of the Configuration Editor as described in section 0.

The image displays two screenshots of the 'Comments' screen in the Elkins Earthworks application. Both screenshots show the same header information: 'Elkins Earthworks, I', '8:53', and 'X'. The title bar is yellow with the 'ENVISION' logo and the word 'Comments'. The main content area is white with a yellow header bar.

Left Screenshot: The 'Site:' field is 'ElkinsEarthworks' and the 'ID:' field is 'Laboratory'. Below this, the 'Valve' section has an 'Adjust' field with a dropdown arrow highlighted by a red box. The 'Well' section has a 'Comment' field, a 'Condition' field, and a 'Repairs' field. At the bottom, there are 'Pressures' and 'View Data' buttons.

Right Screenshot: The 'Valve Adjustments' section is expanded, showing a list of checkboxes for valve states: 'No Change', 'Opened Valve 1/2 turn or...', 'Opened Valve 1/2 to 1 turn', 'Opened Valve > 1 turn', 'Closed Valve 1/2 turn or l...', 'Closed Valve 1/2 to 1 turn', 'Closed Valve > 1 turn', and 'Valve completely closed'. An 'OK' button is visible below the list. The bottom navigation bar remains the same with 'Pressures' and 'View Data' buttons.



The open text boxes can be populated by tapping on the text box and tapping the keyboard symbol to open the touch screen keyboard. The user may then type in any comment that is needed.

Elkins Earthworks, I 8:57

Comments

Site: ElkinsEarthworks
ID: Laboratory

Valve Adjust: 1
Comment: Stripped valve

Well

123 1 2 3 4 5 6 7 8 9 0 - = < >
Tab q w e r t y u i o p []
CAP a s d f g h j k l ; '
Shift z x c v b n m , . / < >
Ctl áü ` \ | _ { } ~

Pressures View Data

Once the user is done making comments they may progress to the next screen by tapping the “View Data” button. The user may also return to the Pressures Screen by tapping the “Pressures” button.

Elkins Earthworks, I 12:42

Comments

Site: ElkinsEarthworks
ID: ID 1

Valve Adjust: 1
Comment: Stripped valve

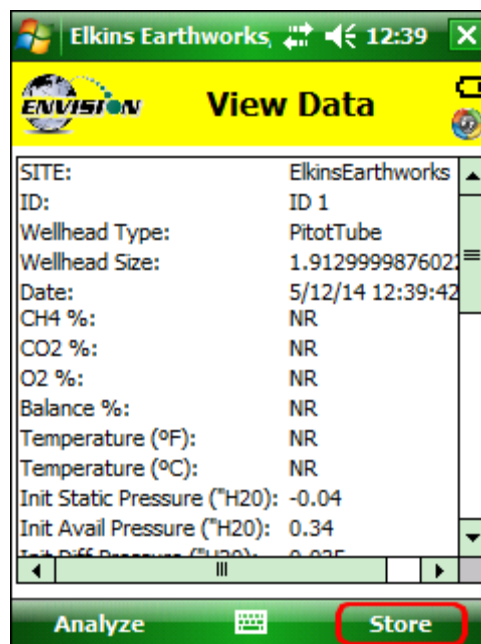
Well
Comment:
Condition: 1
Repairs: 2

Pressures View Data



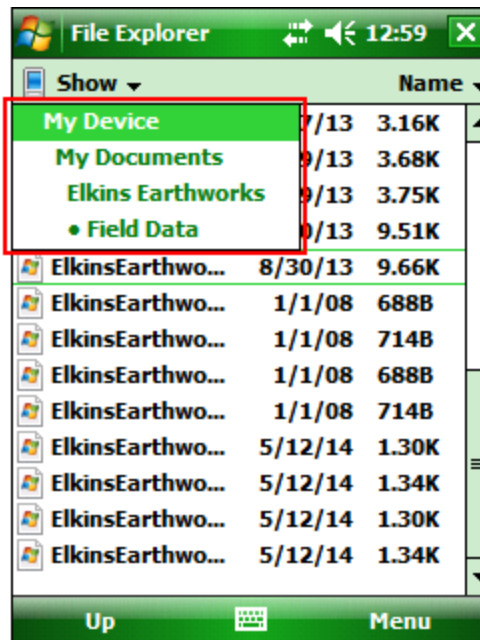
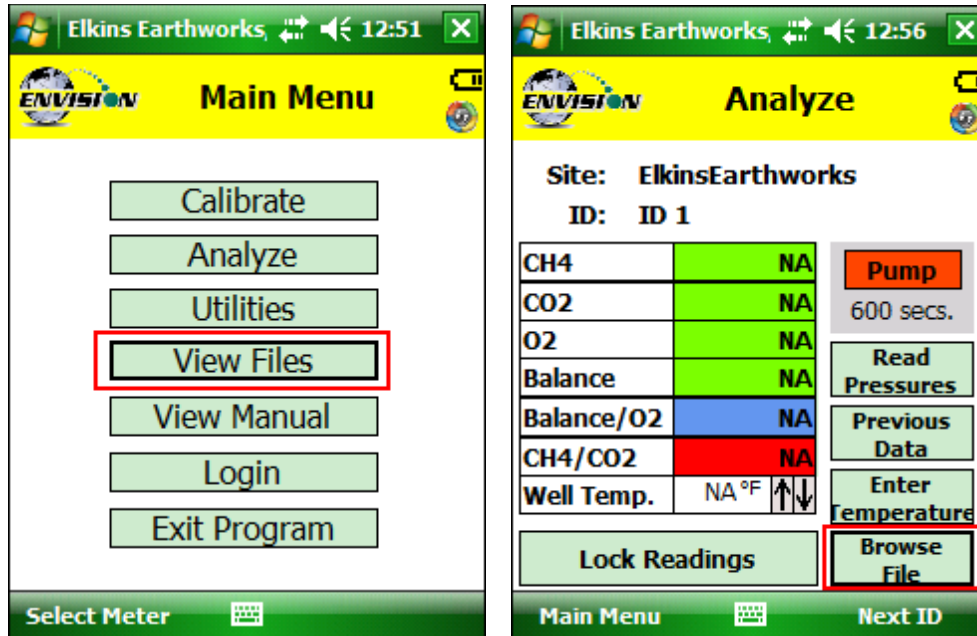
6.8 View and Store Data

The “View Data” screen is intended to let the user view all of the data collected for this ID. If the user is satisfied with the data viewed on this screen, then the user can tap the “Store” button to save the data in the .csv file. If the user is not satisfied with the results, then the user may tap the “Analyze” button to go back and take the reading again.





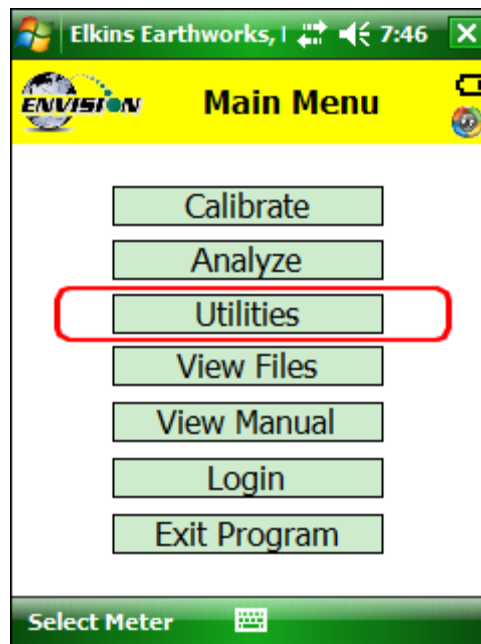
Once the store button is tapped the data is stored in a .csv file on the handheld computer. The data may be accessed by either pressing “View Files” on the Main Menu or “Browse File” on the Analyze screen. The files are located in the directory as shown below.





6.9 Utilities

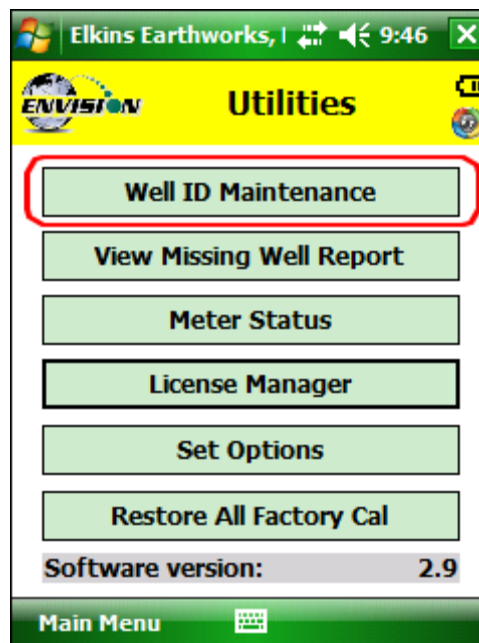
The “Utilities” menu is accessible from the main menu. The “Utilities” menu contains the information needed to assist in keeping the user informed about the status of the Envision® gas analyzer.





6.9.1 Well ID Maintenance

The “Well ID Maintenance” feature of the utility menu is intended to allow the user to create or delete ID’s while in the field.



Tapping the “Well ID Maintenance” button will take the user to the “Well ID Maintenance Screen”.



6.9.1.1 Create New Site

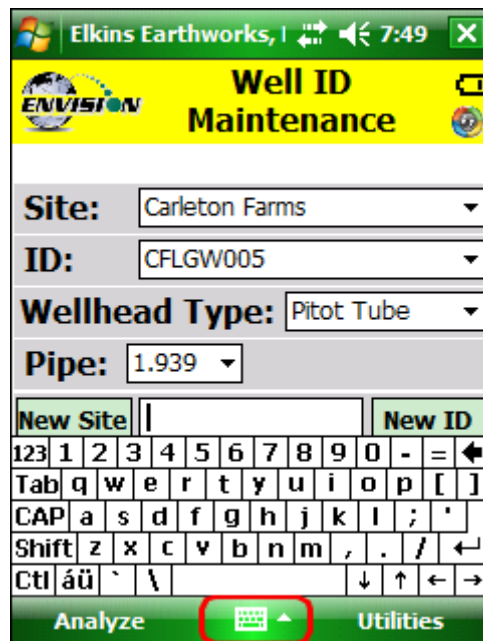
The Well ID maintenance screen will allow the user to make a new site for the existing ID set installed in the handheld computer. Note: In later versions of the gas analyzer software, the “Clear Site” button has been removed to protect the user from inadvertently deleting all wells associated with a certain site. The site may still be cleared using the Configuration Editor software.

- 1) Tap the text box between the “New Site” and “New ID”.

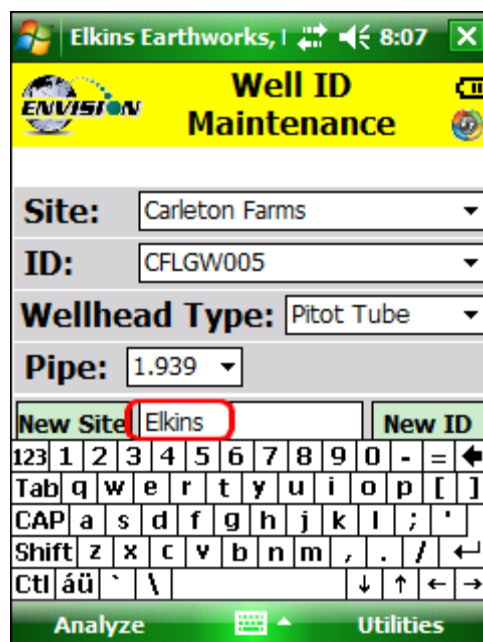
The screenshot shows the 'Well ID Maintenance' screen on a handheld device. The top status bar indicates 'Elkins Earthworks, I' and the time '7:49'. The screen title is 'Well ID Maintenance'. Below the title, there are four dropdown menus: 'Site' (Carleton Farms), 'ID' (CFLGW005), 'Wellhead Type' (Pitot Tube), and 'Pipe' (1.939). Below these menus are two buttons: 'New Site' and 'New ID'. The 'New Site' button is highlighted with a red box. Below these buttons are three more buttons: 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom of the screen, there are three buttons: 'GPS', 'Search Mark', and 'Barcode'. The bottom status bar shows 'Analyze' and 'Utilities'.



- 2) Open the touch screen keyboard by tapping the key board Icon at the bottom of the touch screen.



- 3) Type in the name of the new site





- 4) Tap the “New Site” button

The screenshot shows the 'Well ID Maintenance' screen. At the top, there's a status bar with 'Elkins Earthworks, I', signal strength, and time '8:07'. Below is a yellow header with the 'ENVISION' logo and the title 'Well ID Maintenance'. The form contains several dropdown menus: 'Site:' with 'Carleton Farms', 'ID:' with 'CFLGW005', 'Wellhead Type:' with 'Pitot Tube', and 'Pipe:' with '1.939'. Below these are two buttons: 'New Site' (highlighted with a red box) and 'New ID'. At the bottom is a green bar with 'Analyze' and 'Utilities' buttons. A virtual keyboard is visible at the bottom of the screen.

- 5) The new site name will now appear in the “Site” text box and a default ID will be generated.

The screenshot shows the 'Well ID Maintenance' screen after the 'New Site' button was tapped. The 'Site:' dropdown now shows 'Elkins' and the 'ID:' dropdown shows 'ID 1'. The 'New Site' and 'New ID' buttons are still present. Below them are three buttons: 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom, there are three more buttons: 'GPS', 'Search Mark' (with 'Search' in red and 'Mark' in blue), and 'Barcode'. The green bar at the very bottom still has 'Analyze' and 'Utilities' buttons. The status bar at the top now shows the time '8:14'.



- 6) Tap the keyboard key to close the touch screen keyboard.
- 7) The new Site is now stored in the ID set located on the handheld computer.

6.9.1.2 Create New ID

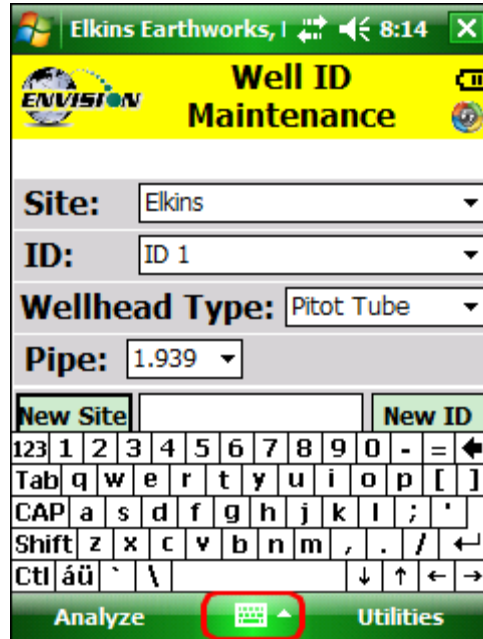
The Well ID maintenance screen will allow the user to make a new site for the existing ID set installed in the handheld computer.

- 1) Tap the text box between the “New Site” and “New ID”

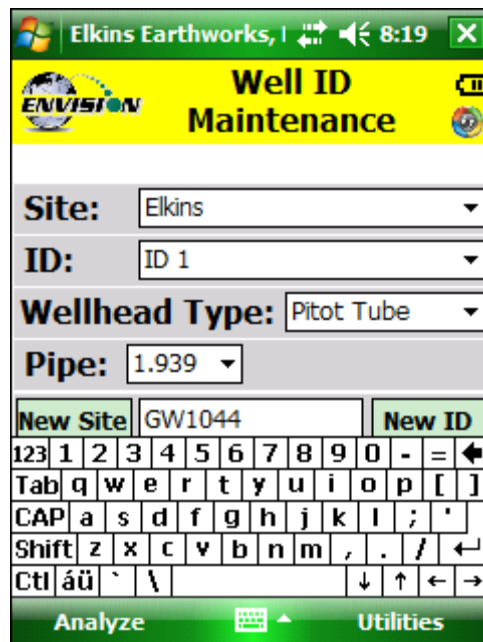
The screenshot shows the 'Well ID Maintenance' screen on a handheld device. The top status bar indicates 'Elkins Earthworks, I', signal strength, and time '8:14'. The title bar is yellow with the 'ENVISION' logo and the text 'Well ID Maintenance'. The main content area has a light gray background and contains several dropdown menus: 'Site:' with 'Elkins', 'ID:' with 'ID 1', 'Wellhead Type:' with 'Pitot Tube', and 'Pipe:' with '1.939'. Below these are two buttons: 'New Site' and 'New ID'. The 'New Site' button is highlighted with a red rectangular box. Below these buttons are three more buttons: 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom of the screen are three buttons: 'GPS', 'Search Mark' (with 'Search' in red and 'Mark' in blue), and 'Barcode'. The very bottom of the screen has a green bar with the text 'Analyze' and 'Utilities'.



- 2) Open the touch screen keyboard by tapping the key board Icon at the bottom of the touch screen.



- 3) Type in the name of the new ID



- 4) Drop down the keyboard by tapping the keyboard button



- 5) Select the Wellhead Type. If the user desires to manually type in a flow at the selected point each time, then the user may select user input.

Elkins Earthworks, | 8:21

Well ID Maintenance

Site: Elkins

ID: ID 1

Wellhead Type: Pitot Tube

Pipe: 1.939

New Site: GW1044

Save Changes Clear

GPS Search Mark

Analyze Utilities



- 6) Select the appropriate wellhead “Pipe” size (When applicable).

The screenshot shows the 'Well ID Maintenance' screen. The 'Pipe' dropdown menu is open, displaying a list of values: 1, 1.5, 2, 3, 4, 6, 8, and 1.939. The value 1.939 is highlighted at the bottom of the list. The 'Wellhead Type' is set to 'Pitot Tube'. Other fields include 'Site: Elkins' and 'ID: ID 1'. Buttons for 'New Site', 'Save Changes', 'Clear Site', 'Clear ID', 'GPS', 'Search', 'Mark', and 'Barcode' are visible. The bottom bar contains 'Analyze' and 'Utilities' buttons.

- 7) Select the appropriate “Plate” if using an orifice plate.

The screenshot shows the 'Well ID Maintenance' screen. The 'Plate' dropdown menu is open, displaying a list of values: 0.25, 0.25, 0.5, 1, 1.25, 1.5, and 1.75. The value 0.25 is highlighted at the top of the list. The 'Wellhead Type' is set to 'Orifice Plate'. Other fields include 'Site: Elkins' and 'ID: ID 1'. Buttons for 'New Site', 'Save Changes', 'Clear Site', 'Clear ID', 'GPS', 'Search', 'Mark', and 'Barcode' are visible. The bottom bar contains 'Analyze' and 'Utilities' buttons.



- 8) Once all of the parameters are correct tap the “New ID” button

- 9) The new ID name will now appear in the “ID” text box.
- 10) The new ID is now located on the handheld computer.
- 11) If the user is at the monitoring point, the GPS location or Well Barcode may now be recorded by using the mark feature.



12) Tap the “Mark” button so that it is highlighted in red

A screenshot of a mobile application interface titled "Well ID Maintenance". The screen has a yellow header with the ENVISION logo and a green status bar at the top showing "Elkins Earthworks, I" and the time "8:27". Below the header, there are several input fields: "Site:" with a dropdown menu showing "Elkins", "ID:" with a dropdown menu showing "GW1044", "Wellhead Type:" with a dropdown menu showing "Orifice Plate", "Pipe:" with a dropdown menu showing "1.939", and "Plate:" with a dropdown menu showing "0.25". Below these fields are buttons for "New Site", "New ID", "Save Changes", "Clear Site", and "Clear ID". At the bottom of the form area are three buttons: "GPS", "Search Mark" (which is highlighted with a red border), and "Barcode". The bottom of the screen features a green navigation bar with the text "Analyze" and "Utilities".

13) Tap the GPS button to mark the GPS coordinates or tap the Barcode button to mark the Barcode.

A screenshot of the same "Well ID Maintenance" mobile application interface. In this view, the "GPS" and "Barcode" buttons at the bottom of the form area are highlighted with red borders. The "Search Mark" button remains highlighted with a red border. All other elements, including the header, input fields, and navigation bar, are identical to the previous screenshot.



- 14) Once the GPS location or Barcode has been recorded then a comment will appear at the top of the screen “Site/ID marked by GPS” or “Site/ID marked by Barcode”. If the location failed to mark, then the message will read “GPS data not valid” or “Failed to find Barcode”.

- 15) The new ID is now updated and located on the handheld computer.

6.9.1.3 Edit Well Information

The Wellhead Type, Pipe, and Plate sizes may also be changed for any existing ID. Simply select the ID and choose the corresponding parameters. Be sure to hit “Save Changes” when complete.

6.9.1.4 Delete Site

Note: In later versions of the gas analyzer software, the “Clear Site” button has been removed to protect the user from inadvertently deleting all wells associated with a certain site. The site may still be cleared using the Configuration Editor software.

The software on the handheld computer will let the user delete a site from the configuration file loaded on the handheld computer. Deleting the site will NOT delete any data stored in the field (.csv) data files. **CAUTION: Deleting a site will also delete all the wells associated with it.**



- 1) Open the "Well ID Maintenance Screen"
- 2) Select the Site that is to be deleted from the dropdown menu

Elkins Earthworks, I 8:40

Well ID Maintenance

Site: Demo Landfill

ID: Elkins

Wellhead Type: Pitot Tube

Pipe: 1.939

New Site New ID

Save Changes Clear Site Clear ID

GPS Search Mark Barcode

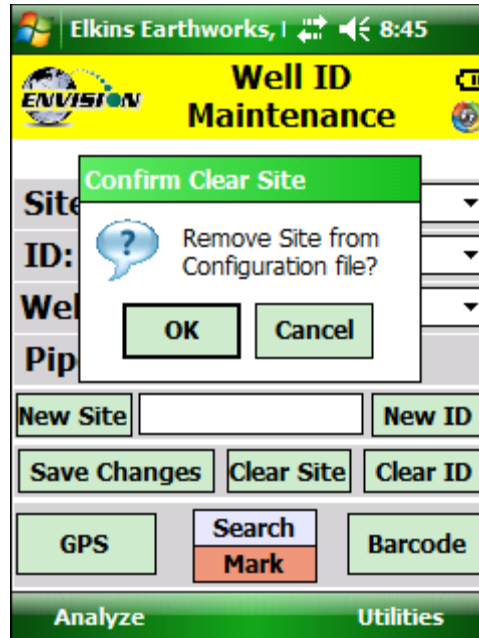
Analyze Utilities



3) Tap the "Clear Site" button

A screenshot of a mobile application interface titled "Well ID Maintenance". The screen has a yellow header bar with the "ENVISION" logo on the left and a close button on the right. Below the header, there are several dropdown menus: "Site:" with "Demo Landfill" selected, "ID:" with "DEMGW001" selected, "Wellhead Type:" with "Pitot Tube" selected, and "Pipe:" with "1.939" selected. Below these are four buttons: "New Site", "New ID", "Save Changes", and "Clear Site". The "Clear Site" button is highlighted with a red rectangular box. At the bottom of the screen, there is a green bar with three buttons: "GPS", "Search Mark", and "Barcode". The top of the screen shows a status bar with the text "Elkins Earthworks, I", signal strength, battery level, and the time "8:43".

- 4) The “Confirm Clear Site” message will appear. If the user is sure that they wish to delete that site, then they can tap the “OK” button. If the user does not want to delete this site, then tap “Cancel”.



- 5) The user may now return to the Analyze or Utilities menu by tapping the “Analyze” or “Utilities” button at the bottom of the touch screen.

6.9.1.5 Delete Well ID

The software on the handheld computer will let the user delete an ID from the ID set loaded on the handheld computer. Deleting the ID will NOT delete any data stored in the .csv data files.

1. Open the “Well ID Maintenance Screen”



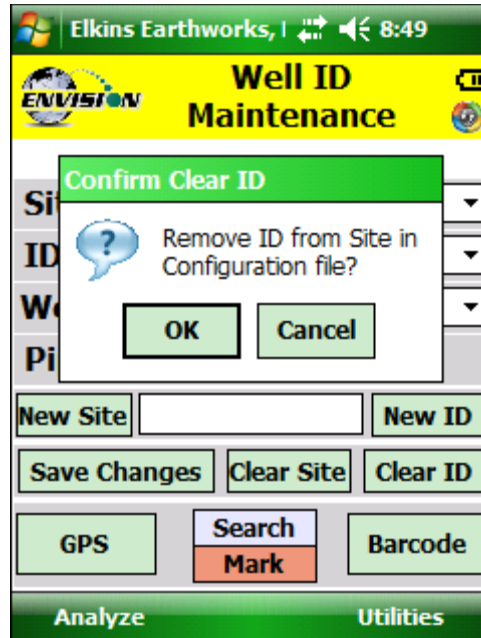
2. Select the ID that is to be deleted from the dropdown menu.

The screenshot shows the 'Well ID Maintenance' screen. The 'ID:' dropdown menu is open, displaying a list with 'ID 1' highlighted in green. Other visible options include 'GW1044'. The 'Site:' dropdown is set to 'Elkins', and the 'Pipe:' dropdown is set to '1.939'. Buttons for 'New Site', 'New ID', 'Save Changes', 'Clear Site', 'Clear ID', 'GPS', 'Search Mark', 'Barcode', 'Analyze', and 'Utilities' are visible at the bottom.

3. Tap the "Clear ID" button

The screenshot shows the 'Well ID Maintenance' screen. The 'ID:' dropdown menu is now closed and displays 'ID 1' in green. The 'Wellhead Type:' dropdown is set to 'Pitot Tube'. The 'Clear ID' button is highlighted with a red rectangle. All other UI elements remain the same as in the previous screenshot.

4. The “Remove ID from Site in Configuration file” message will appear. If the user is sure that they wish to delete that ID, then they can tap the “OK” button. If the user does not want to delete this ID, then tap “Cancel”.



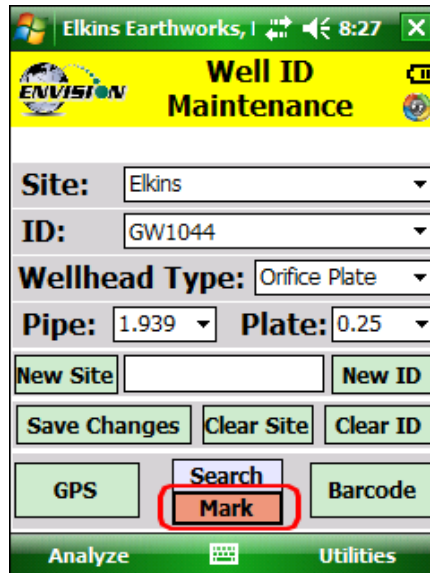
5. The user may now return to the Analyze or Utilities menu by tapping the “Analyze” or “Utilities” button at the bottom of the touch screen.

6.9.1.6 Mark Location

If the user is at the monitoring point, the GPS location or Well Barcode may now be recorded by using the mark feature. This feature is located in the “Well ID Maintenance” section of the program and may be accessed from the Utilities screen or the “Select ID” screen.

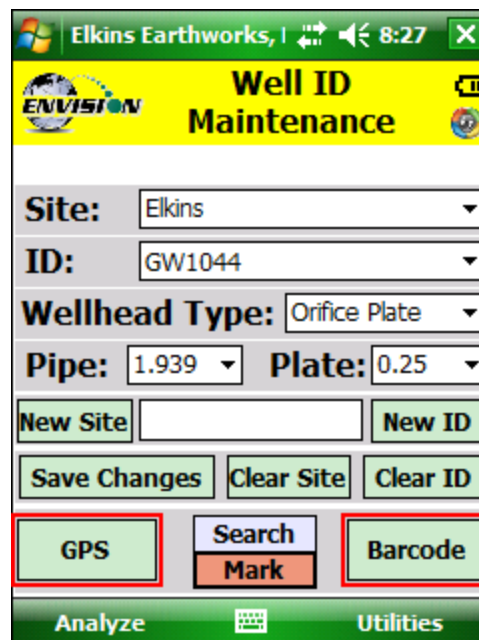
- 1) Using the dropdown menu for site and ID, select the ID that is to be marked.

- 2) Tap the “Mark” button so that it is highlighted in red



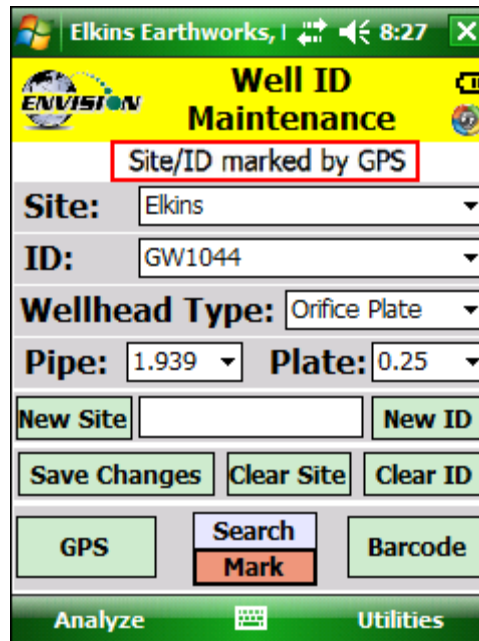
The screenshot shows the 'Well ID Maintenance' screen. The top status bar indicates 'Elkins Earthworks, I' and the time '8:27'. The title bar is yellow with the 'ENVISION' logo and the text 'Well ID Maintenance'. Below the title bar, there are several dropdown menus: 'Site:' with 'Elkins' selected, 'ID:' with 'GW1044' selected, 'Wellhead Type:' with 'Orifice Plate' selected, 'Pipe:' with '1.939' selected, and 'Plate:' with '0.25' selected. Below these are buttons for 'New Site', 'New ID', 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom, there are three buttons: 'GPS', 'Search Mark' (which is highlighted with a red border), and 'Barcode'. The bottom navigation bar has 'Analyze' and 'Utilities' buttons.

- 3) Tap the GPS button to mark the GPS coordinates or tap the Barcode button to mark the Barcode



The screenshot shows the 'Well ID Maintenance' screen, identical to the previous one. In this version, the 'GPS' and 'Barcode' buttons are highlighted with red borders, while the 'Search Mark' button is no longer highlighted. The rest of the interface, including the title bar, dropdown menus, and bottom navigation bar, remains the same.

- 4) Once the GPS location or Barcode has been recorded then a comment will appear at the top of the screen “Sit/ID marked by GPS” or “Site/ID marked by Barcode”. If the location failed to mark, then the message will read “GPS data not valid” or “Failed to find Barcode”



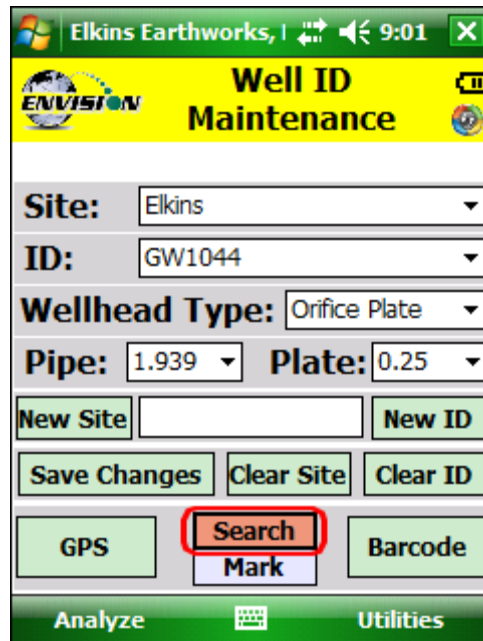
- 5) The ID is now updated and located on the handheld computer.

6.9.1.7 Search location

If the user is uncertain about the name of an ID that they want to modify then the user can use the search mode on the “Well ID Maintenance” screen.

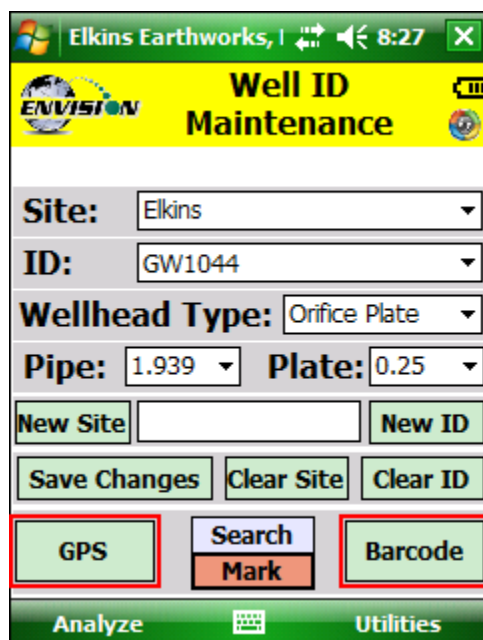
- If the user’s ID set contains stored GPS coordinates and/or Barcode information, then the user may use the search method to populate the Site and ID of their currently location.

- While at the monitoring location the user must tap the “Search” button.



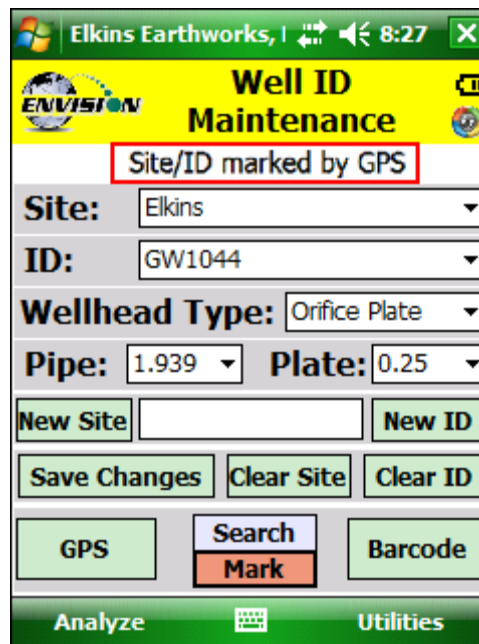
The screenshot shows the 'Well ID Maintenance' screen. At the top, the status bar indicates 'Elkins Earthworks, I' and the time '9:01'. The title bar is yellow with the 'ENVISION' logo and the text 'Well ID Maintenance'. Below the title bar, there are several dropdown menus: 'Site:' with 'Elkins' selected, 'ID:' with 'GW1044' selected, 'Wellhead Type:' with 'Orifice Plate' selected, 'Pipe:' with '1.939' selected, and 'Plate:' with '0.25' selected. Below these are buttons for 'New Site', 'New ID', 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom, there are three buttons: 'GPS', 'Search', and 'Barcode'. The 'Search' button is highlighted with a red box. Below the 'Search' button is a 'Mark' button. At the very bottom, there are buttons for 'Analyze' and 'Utilities'.

- The user may then select if the search will be performed by the use of the GPS or the Barcode. The user must tap one of the options.



The screenshot shows the 'Well ID Maintenance' screen. At the top, the status bar indicates 'Elkins Earthworks, I' and the time '8:27'. The title bar is yellow with the 'ENVISION' logo and the text 'Well ID Maintenance'. Below the title bar, there are several dropdown menus: 'Site:' with 'Elkins' selected, 'ID:' with 'GW1044' selected, 'Wellhead Type:' with 'Orifice Plate' selected, 'Pipe:' with '1.939' selected, and 'Plate:' with '0.25' selected. Below these are buttons for 'New Site', 'New ID', 'Save Changes', 'Clear Site', and 'Clear ID'. At the bottom, there are three buttons: 'GPS', 'Search', and 'Barcode'. The 'GPS' and 'Barcode' buttons are highlighted with red boxes. Below the 'Search' button is a 'Mark' button. At the very bottom, there are buttons for 'Analyze' and 'Utilities'.

- The software will then automatically populate the Site and ID with the correct information. The message “Site/ID selected by GPS” or “Site selected by Barcode” will appear. If there is no barcode or GPS location stored in the ID set, then the message will read “Failed to find GPS match” or “Failed to find Barcode match”.



- The user may now perform any ID maintenance desired.



6.9.1.8 Log Settings (ENVAUS only)

The ENVAUS model has the ability to log both gas concentration and borehole flow measurements. Press the “Log Settings” button in the lower right corner of the screen as shown below.

EEW Gas Analyzer BI 2:28

Well ID Maintenance

Site: Demo Landfill

ID: DEMGW002

Wellhead Type: BoreHole

New Site New ID

Save Changes Clear ID

GPS Search Mark Barcode

Analyze Log Settings



The following screen will appear. Tap in any of the boxes then tap the keyboard icon to set the parameters. “Interval” is the time between measurements in seconds. “Total Measurements” is the total number of measurements to be logged. Be sure to press “Save” when finished.

EEW Gas Analyzer BI 2:33

Well ID Maintenance

Gas Concentration Log

Interval (seconds) 30

Total Measurements 20

Borehole Flow Log

Interval (seconds) 30

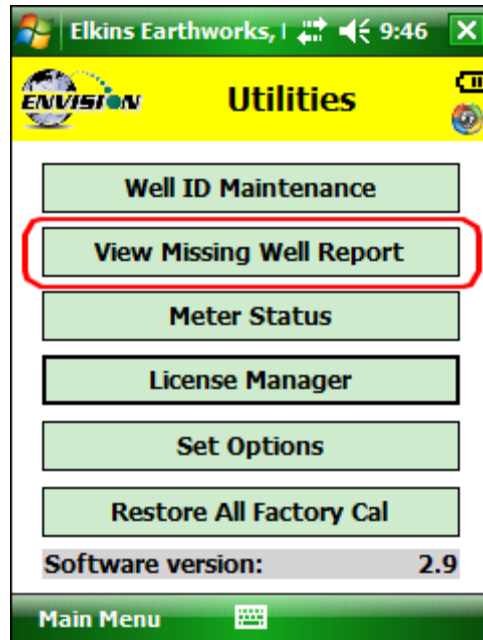
Total Measurements 20

Save Cancel

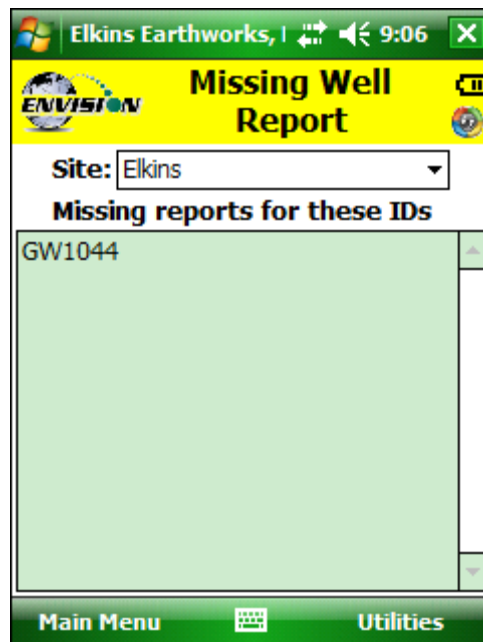
Analyze [Keyboard Icon] Log Settings

6.9.2 View Missing Well Report

The View Missing Well Report was designed so that the user may determine if there are any monitoring points that have not been measured during the current month.



The software compares the site monitoring points stored in the configuration file to the data that has been stored in the current month's .csv file.

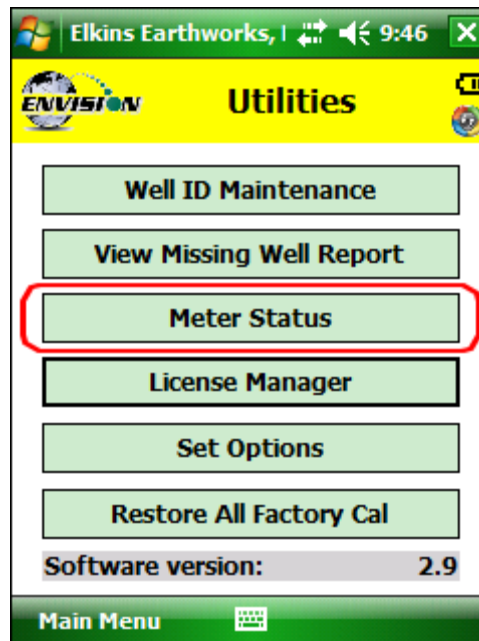


The user may return to the Main Menu or the Utilities screen by tapping one of the buttons at the bottom of the touch screen.

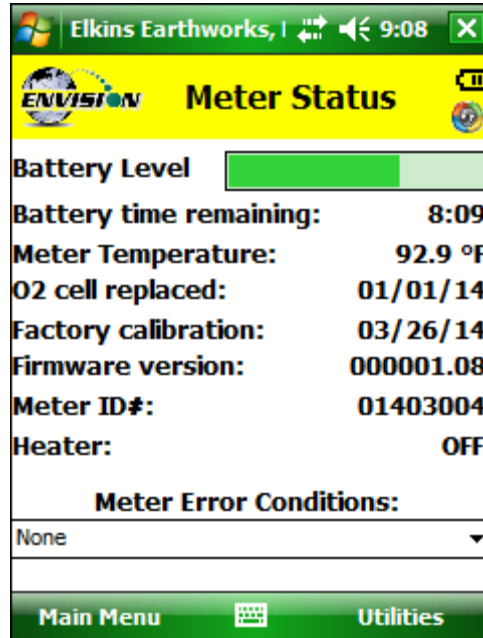


6.9.3 Meter Status

The meter status screen is accessible from the Utilities screen. This screen is intended to provide critical operational information to the user. This screen is accessible from the utilities screen.



The "Meter Status" screen gives the user useful information about the status of the Envision® meter.



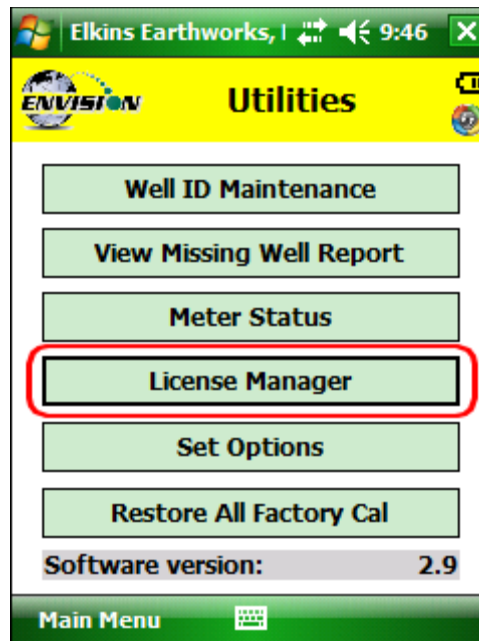
- Battery time remaining – Indicates approximately how much time the Envision® has until the battery needs charged.
- Meter Temperature – This displays the internal temperature of the Envision® gas analyzer.
- O₂ cell replacement – The date indicated is the date the O₂ cell was installed. Note: Newer versions of the gas analyzer software do not contain this field.
- Factory calibration – The date indicated is the last date the Envision® gas analyzer was last calibrated at the factory.
- Firmware version – Indicates the firmware version installed in the Envision® gas analyzer.
- Heater - Indicates when the heater inside the Envision® would turn on if the external heater battery pack is connected.
- Meter Error Conditions – Will display the last 10 meter error conditions. This is useful when talking to tech support staff at Elkins Earthworks®.



6.9.4 License Manager

The Elkins Gas Analyzer software will not run unless a license is activated. Licenses not yet activated will appear as “Unlicensed Options”. Once activated, licenses will show as “Licensed Options”. To activate your Elkins Gas Analyzer package, complete the following steps.

1. Select “License Manager” in the “Utilities” screen.





2. Enter your license key in the designated area. Call Elkins Earthworks (330-725-7766) to obtain license keys. Be prepared to provide the “Handheld ID: ” number shown on the screen.

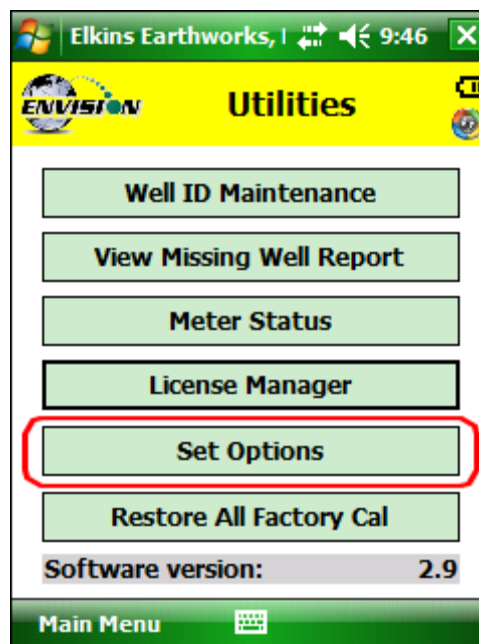
3. Once the license key is entered click “Activate Options”.



6.9.5 Set Options

The purpose of the set options screen is to allow the user to determine specific data reporting parameters.

1. Click “Set Options” on the “Utilities” page.





2. Set the decimal gas measurement precision to tenth or hundredths.

Elkins Earthworks, L

Set Options

Precision ☒ 0.X ☐ 0.XX

Save Changes

Main Menu Utilities

Below is the tablet version of the set options screen. GPS com port and baud rate settings are provided in addition to the precision setting above.

Elkins Earthworks, LLC

Set Options

Select desired options

Precision ☒ 0.X ☐ 0.XX

GPS Com Port

GPS Baud Rate

Test GPS

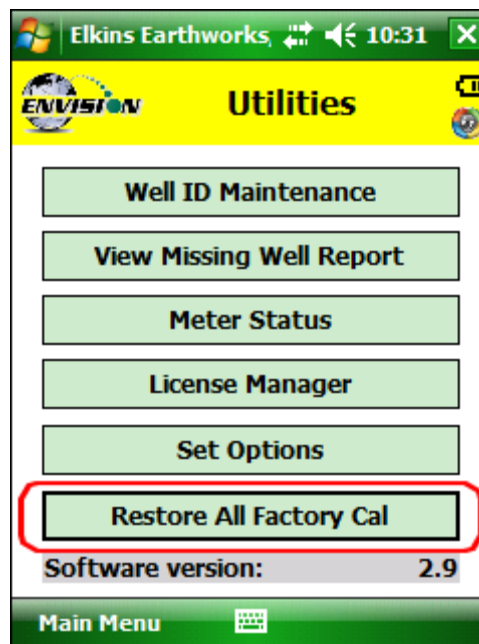
Save Changes

Main Menu Utilities



6.9.6 Restore All Factory Cal

Tapping “Restore all Factory Cal” will set all field calibration offsets to zero and restore the calibration values from the last factory service.

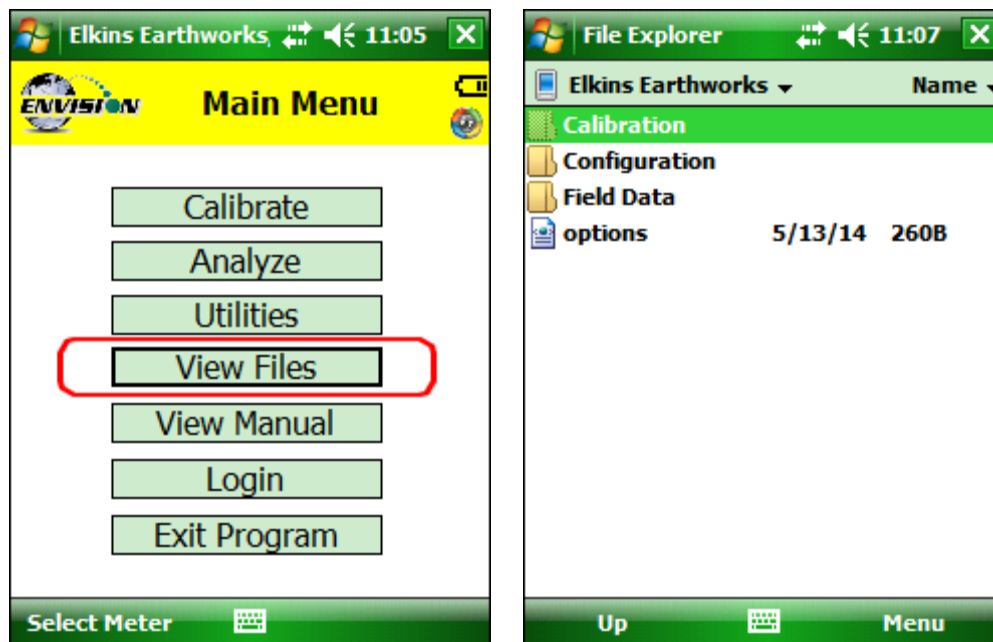


If a sensor has drifted significantly, a message indicating such may appear when the restore all factory cal button is pressed. If restoring factory calibration would adversely affect the ability of the user to calibrate the unit, the user will be notified and allowed to cancel the operation.



6.10 Stored Data

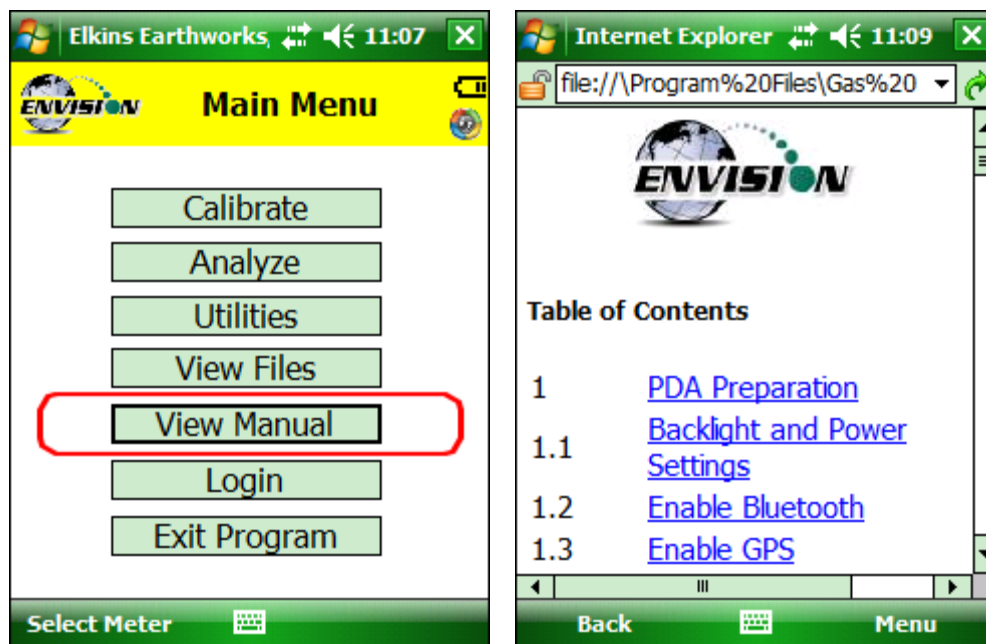
Return to the Elkins Gas Analyzer Main Menu and then click on “View Files”. A file explorer window will open to the directories used by the gas analyzer. The user can then locate the files that contain historical data from past monitoring events.





6.11 O&M Manual

Return again to the Main Menu, and then click on “View Manual”. The O&M manual button will take the user directly to an HTML or PDF version of the O&M manual. The blue texts are hyperlinks to the relevant sections of the manual. Tapping on the blue text will take the user directly to that section of the manual.





6.12 Exiting the Gas Analyzer Software

To exit the program, return to the Main Menu through the buttons on the bottom of the screen.

The screenshot shows the 'Analyze' screen of the Elkins Earthworks software. The title bar indicates 'Elkins Earthworks' and the time '11:43'. The site information is 'Demo Landfill' and 'ID: DEMGW001'. A table displays gas readings for CH4, CO2, O2, Balance, Balance/O2, CH4/CO2, and Well Temp. The 'Main Menu' button is highlighted with a red box at the bottom left.

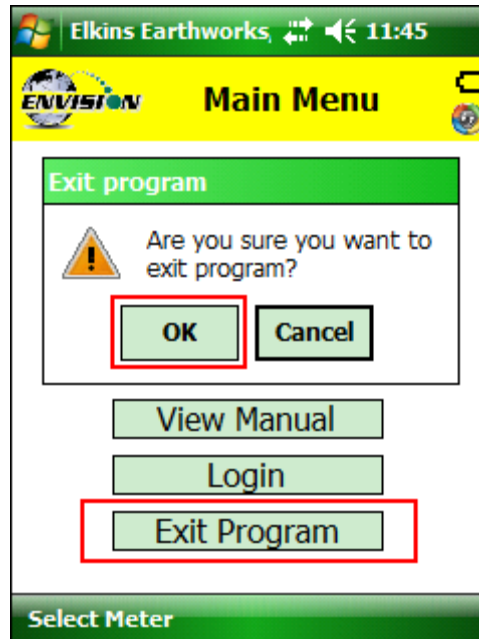
Gas	Reading
CH4	NA
CO2	NA
O2	NA
Balance	NA
Balance/O2	NA
CH4/CO2	NA
Well Temp.	NA °F

Buttons on the right side: Pump (600 secs.), Read Pressures, Previous Data, Enter Temperature, Browse File.

Buttons at the bottom: Main Menu, Next ID.



You may then click “Exit Program”, then “OK” to close the Elkins Gas Analyzer.



6.13 Software Options

Handheld

A screenshot of the Elkins Earthworks License Manager interface for a handheld device. The interface has a yellow header with the "ENVISION" logo and the text "License Manager". Below the header, there is a section for "Handheld ID: BBTNFPsBYV" and "Enter License Key:" with a text input field. Below this is a button labeled "Activate Options". At the bottom, there are two columns: "Licensed Options" and "Unlicensed Options". The "Licensed Options" column lists "Base Package - Full", "Encryption - Full", and "Latest Version - Full". The "Unlicensed Options" column is empty. At the very bottom is a blue bar with the text "Login" and a keyboard icon.

Tablet

A screenshot of the Elkins Earthworks License Manager interface for a tablet device. The interface has a yellow header with the "ENVISION" logo and the text "License Manager". Below the header, there is a section for "Tablet ID: 09D023513C" and "Enter License Key:" with a text input field. Below this is a button labeled "Activate Options". At the bottom, there are two columns: "Licensed Options" and "Unlicensed Options". The "Licensed Options" column is empty. The "Unlicensed Options" column lists "Encryption", "Latest Version", "WM Internal", and "WM Consultant".



The License Manager screen shows all of the software options available for purchase from Elkins Earthworks.

1. Base Package – This refers to the v3.03 software version. Envisions that have software versions less than v3.03 may be upgraded to v3.03 for free.
2. Latest Version – All new Envisions come standard with the latest version software.
3. Encryption – The encryption option provides features that ensure data integrity during and after monitoring operations.
 - a. GPS coordinates of user are logged and recorded when the reading was taken.
 - b. All field data is encrypted and unable to be modified by anyone other than the data processor. Free desktop software is provided with this option to allow for decryption and distance to well analysis utilizing Microsoft Excel.
4. WM Internal – When this option is enabled only Waste Management sites are displayed for selection. The gas analyzer operation is modified as follows:
 - a. ID sets and field data files are encrypted using a Waste Management proprietary algorithm and are used for downloading and uploading to the Waste Management database via Ecotec's LSGAM desktop software.
 - b. New prompts for well and site Questions which come from the Waste Management database.
 - c. Technician name selection is done via LSGAM.
 - d. Additions and changes to well configuration, location, and barcodes are not allowed.
5. WM Consultant – This option gives access to features from both item 2 (Latest Version) and item 4 (WM Internal). This allows the user to access both the traditional and the new Waste Management modes based on the type of ID set that is loaded.

For further information regarding the Waste Management option, please refer to the following documents/files:

- ENV Quick Start Guide V4-Mesa2.pdf
- WM Envision ENV-Mesa2 Guide V2 – Calibration.pptx
- WM Envision ENV-Mesa2 Guide V2 - Well Read.pptx
- Envision Calibration.mp4
- Envision Well Read.mp4



7 The Envision® Gas Analyzer Configuration Editor Software

The handheld computer software can utilize an ID set created by the user on a Windows based **desktop or laptop computer**. This configuration editor software is provided by Elkins Earthworks® and is included on the flash drive with your original purchase. This software allows the user to create, modify and merge data sets.

The instructions below describe the process of generating a new ID set to import into the handheld computer.

It is important to use the proper configure configuration editor that corresponds to the models of Envision and handheld computer that you are using. These are shown below.

Hardware Configuration

ENV100 & ENV200 – Handheld PC

ENV100 & ENV200 – Tablet PC

ENVAUS – Handheld PC

Name of Configuration Editor (shows in title bar)

Elkins Gas Analyzer Configuration Editor

Elkins Gas Analyzer Configuration Editor Tablet

Elkins Gas Analyzer Configuration Editor BH (BH = borehole)

Most of the screen shots below will show the ENV100/200 handheld PC version of the configuration editor.

7.1 Loading the application

The flash drive delivered with the Envision® gas analyzer contains a file named “Configuration Editor”. Insert the flash drive into an unused USB port on the user’s computer.

7.2 Opening the Gas Analyzer Configuration Editor for the first time

When the Gas Analyzer Configuration Editor is selected for the first time it will indicate “No Configuration File found”. The software will create sample data when the user presses the “OK” button. Newer versions of the ENV100/200 software will not automatically create a sample data file. They allow the user to create a new ID set using the “File -> New” menu. The user will then be asked whether the ID set should contain metric or English units. The sample file will then be created with the units specified.



See table below for metric and English units used.

Property	Metric Units	English Units
Elevation	Meters (m)	Feet (ft)
Wellhead & Orifice Plate Size	Centimeters (cm)	Inches (in)
Pressure	Millibars (mB)	Inches of Water ("H ₂ O)
Flow	Standard Cubic Meters per Hour (scmh)	Standard Cubic Feet per Minute (scfm)
Temperature	Degrees Centigrade (°C)	Degrees Fahrenheit (°F)

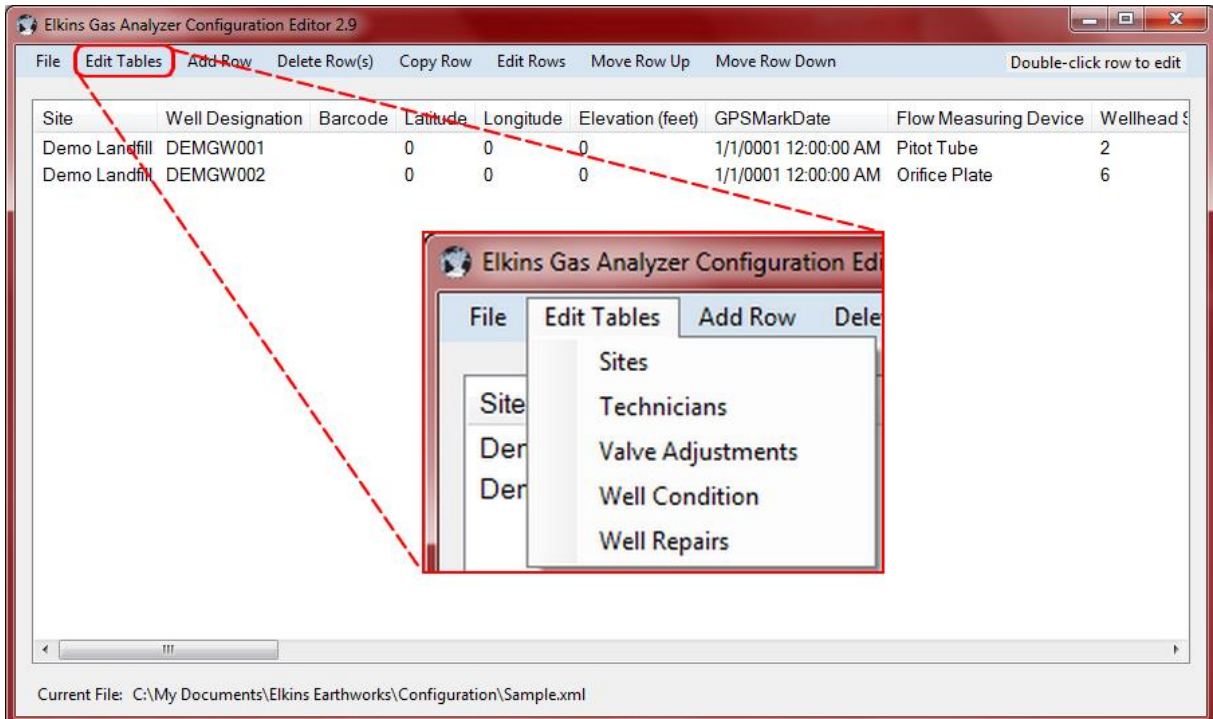
In addition to the metric units shown above, the ENVAUS version of the configuration editor also has the following differences from the ENV100/200 version.

Property	ENV100/200	ENVAUS
GPS Coordinates	Latitude and Longitude in decimal degrees	Latitude and Longitude in decimal degrees plus Easting and Northing in meters along with Zone
Gas Concentration Log Total Measurements	N/A	Number of total gas concentration measurements to accumulate in log file
Gas Concentration Log Interval	N/A	Time in seconds between gas concentration log measurements
Borehole Flow Log Total Measurements	N/A	Number of total borehole flow measurements to accumulate in log file
Borehole Flow Log Interval	N/A	Time in seconds between borehole flow log measurements

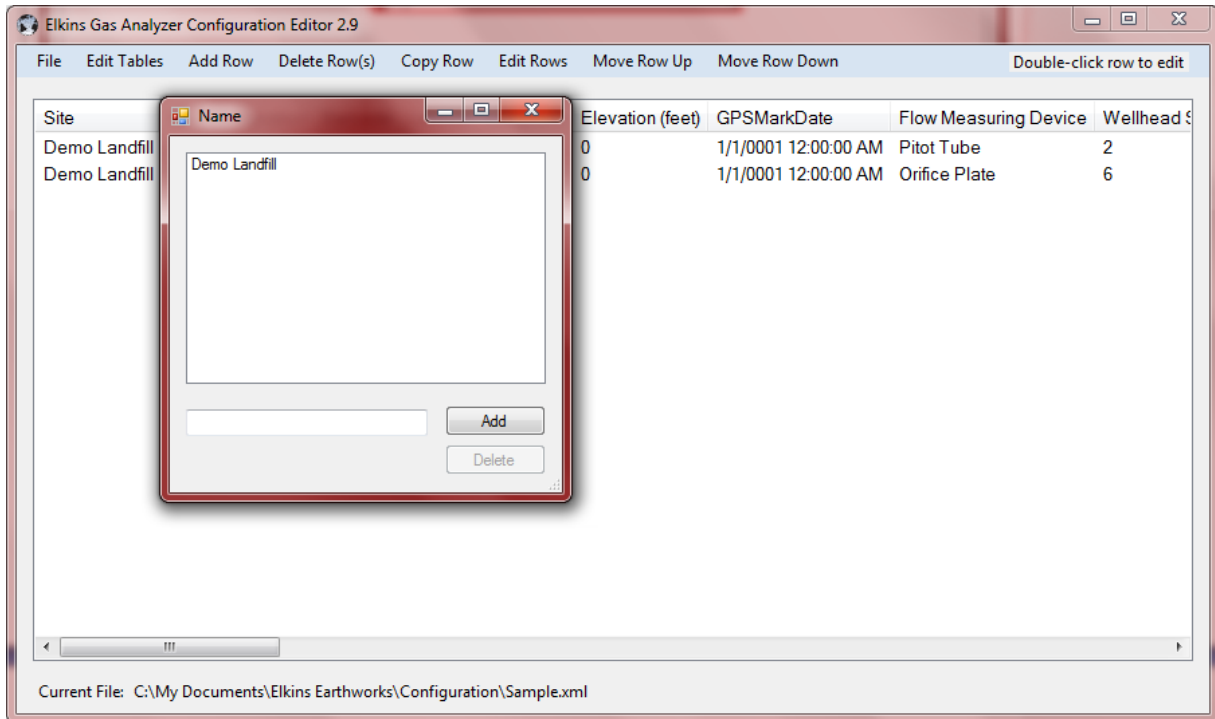


7.3 Add a Site, Technician, Valve Adjustment, Well Condition and/or Well Repair

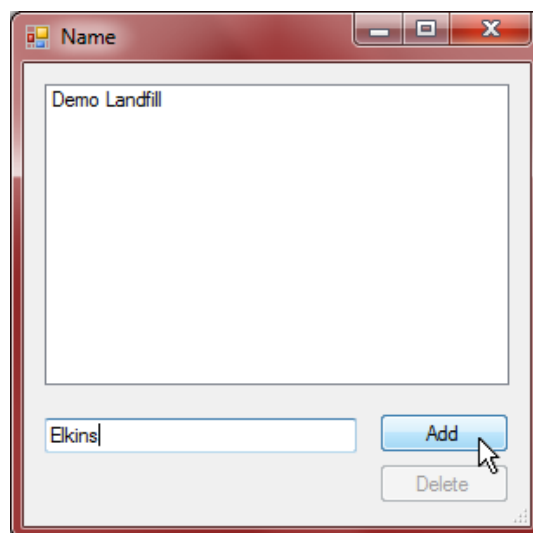
- 1) Click on the “Edit Tables” tab and select the desired category to add to.



- 2) A text box will open for the user to enter a new item within the selected category.

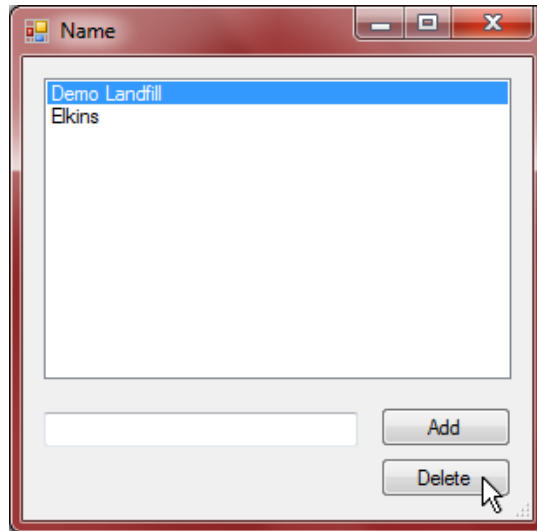


- 3) Click inside the text box, type in the new item, then tap the “Add” button.



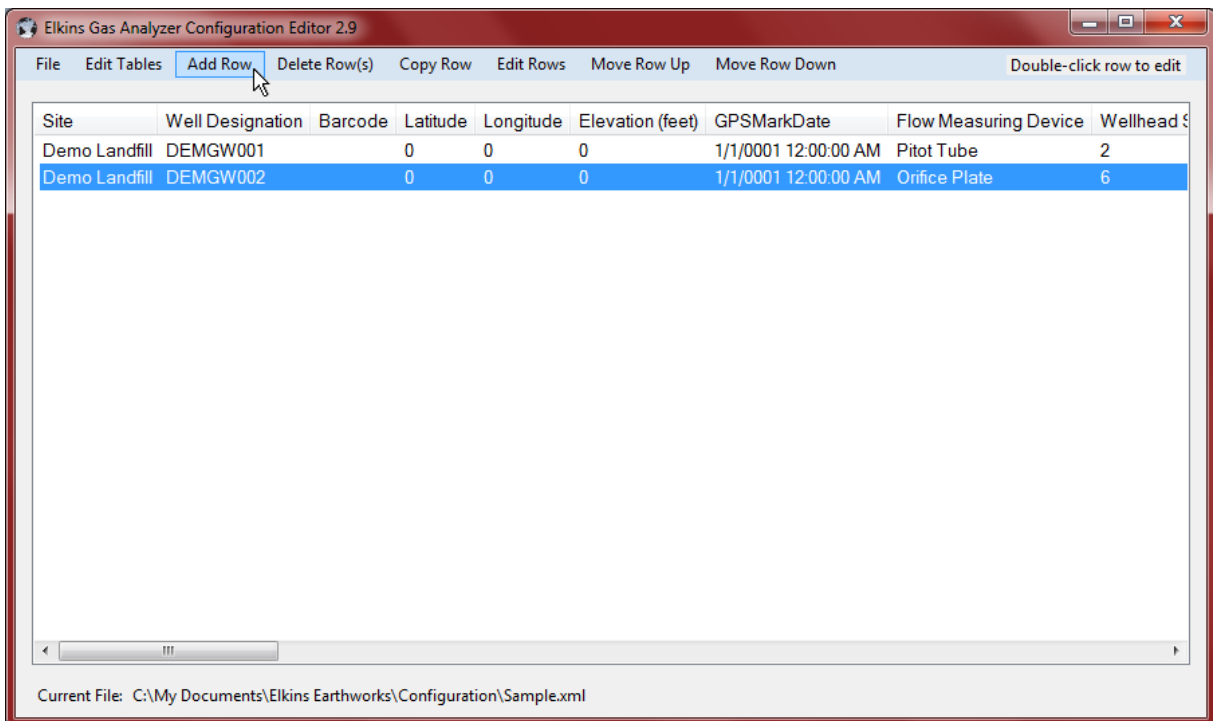


- 4) To delete an item, highlight the item and click on the “Delete” button.



7.4 Add a monitoring point

- 1) Click on the “Add Row” button on the upper left corner of the screen. A row must be selected where the new one is to appear.





- 2) Select the “Site”. If the user needs to make a new site, then the “Add Site” button can be used to make a new site.

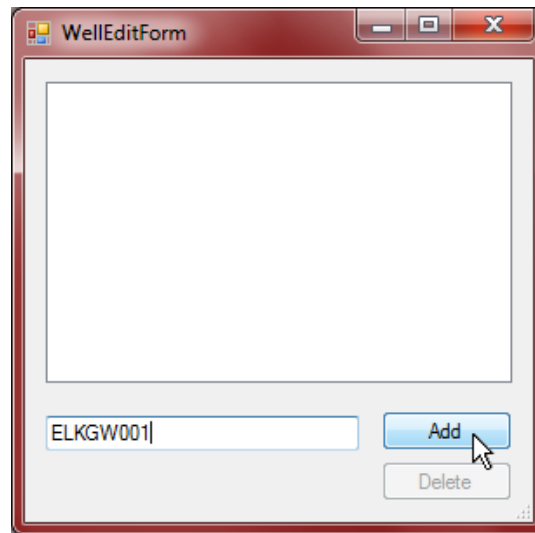
The 'Edit Configuration' dialog box contains the following fields and buttons:

- Site:** A dropdown menu with 'Elkins' and 'Demo Landfill' options.
- CH4 Range Min/Max:** Input fields for 0 and 100.
- CO2 Range Min/Max:** Input fields for 0 and 100.
- O2 Range Min/Max:** Input fields for 0 and 25.
- Balance Range Min/Max:** Input fields for 0 and 100.
- Applied Press Range Min/Max:** Input fields for -200 and 200.
- Available Press Range Min/Max:** Input fields for -200 and 200.
- Differential Press Range Min/Max:** Input fields for -130 and 130.
- Flow Range Min/Max:** Input fields for 0 and 12000.
- Temp Range Min/Max:** Input fields for -40 and 250.
- Pump Time:** Input field for 600.
- Flow Measuring Device:** A dropdown menu.
- Well Head Size:** A dropdown menu with '0.5' selected.
- Orifice Plate Size:** A dropdown menu with '0.25' selected.
- Buttons:** 'Update', 'Cancel', 'Add Site', 'Add Well', 'Add Well Head Size', and 'Add Plate Size'.

- 3) Next tap the “Add Well” button on the right side of the screen.

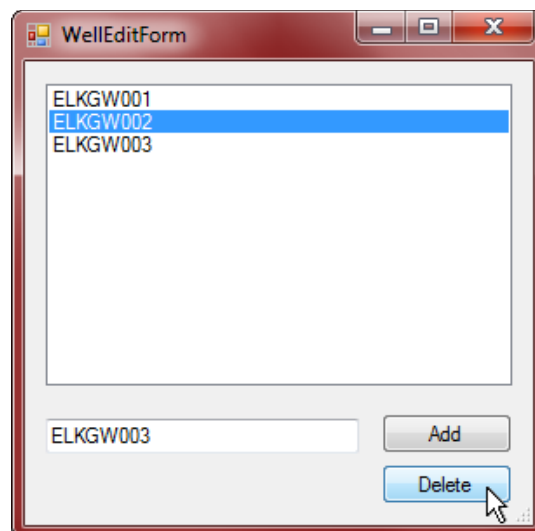
The 'WellEditForm' dialog box is open, showing a large empty text area and 'Add' and 'Delete' buttons. The 'Add Well' button in the 'Edit Configuration' dialog is highlighted.

- 4) Click inside the text box and type in the name of the new well.



The text in the box that the user just entered will stay once the ID is added. This is done so that the user does not have to retype the common characters to each new well.

- 5) To delete a well, select the well and click the delete button.





- 6) Once the well names have been added, the user may now configure each well. Click on the well that is to be configured.

A screenshot of the "Edit Configuration" dialog box. It contains several input fields and buttons. The "Site" dropdown is set to "Elkins". The "Well Designation" dropdown is open, showing a list of well names: "ELKGW001", "ELKGW002", and "ELKGW003". The "Well Head Size" dropdown is set to "0.5". The "Orifice Plate Size" dropdown is set to "0.25". There are several range input fields for "CH4 Range Min/Max", "CO2 Range Min/Max", "O2 Range Min/Max", "Balance Range Min/Max", "Applied Press Range Min/Max", "Available Press Range Min/Max", "Differential Press Range Min/Max", "Flow Range Min/Max", and "Temp Range Min/Max". There is also a "Pump Time" input field. At the bottom, there are "Update" and "Cancel" buttons. On the right side, there are four buttons: "Add Site", "Add Well", "Add Well Head Size", and "Add Plate Size".

- 7) The user may now select the wellhead type, wellhead size, and orifice plate size. If the user desires to type in the flow in the field they may use the "User defined" type under "Well Designation". If the default list of "Well Head Sizes" or "Orifice Plate Sizes" does not include the desired size, then the user may add a new size using the "Add Well Head Size" and "Add Plate Size" buttons.

A screenshot of the "WellHeadSize" dialog box. It features a list box containing the following values: "0.5", "1", "1.5", "2", "3", "4", "6", "8", and "2.86". Below the list box is a text input field containing the value "1.939". To the right of the input field are two buttons: "Add" and "Delete".



- 8) The user may now set acceptable ranges for use with the handheld user interface. The user may do this by clicking in the appropriate box and typing in the desired values. When a measurement is within these ranges it will turn green on the Trimble handheld. Otherwise it will turn red.

The 'Edit Configuration' dialog box contains the following settings:

Site	CH4 Range Min/Max	Applied Press Range Min/Max	Temp Range Min/Max
Elkins	48 52	-200 200	-40 250

Well Designation	CO2 Range Min/Max	Available Press Range Min/Max	Pump Time
ELKGW001	20 40	-200 200	600

Flow Measuring Device	O2 Range Min/Max	Differential Press Range Min/Max
Pitot Tube	0 25	-130 130

Well Head Size	Balance Range Min/Max	Flow Range Min/Max
0.5	0 100	0 12000

Buttons: Add Site, Add Well, Add Well Head Size, Add Plate Size, Update, Cancel

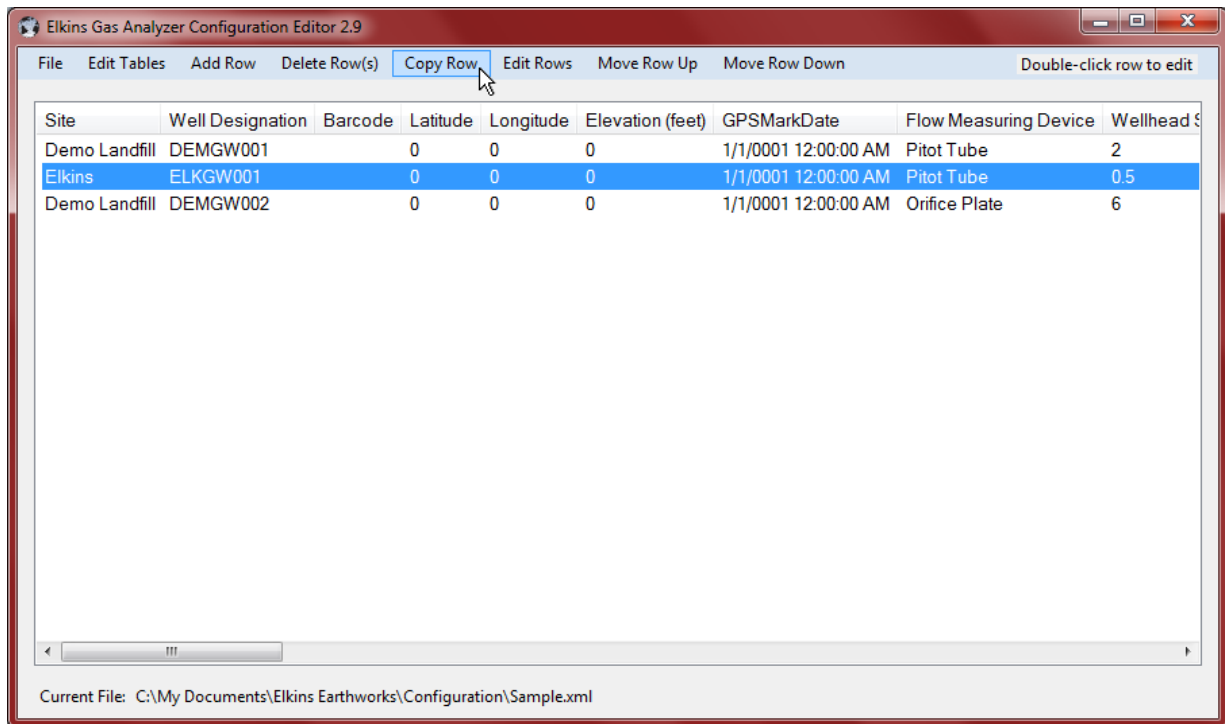
- 9) Once the well is configured the user should click on the "Update" button to save the changes and to return to the main screen.



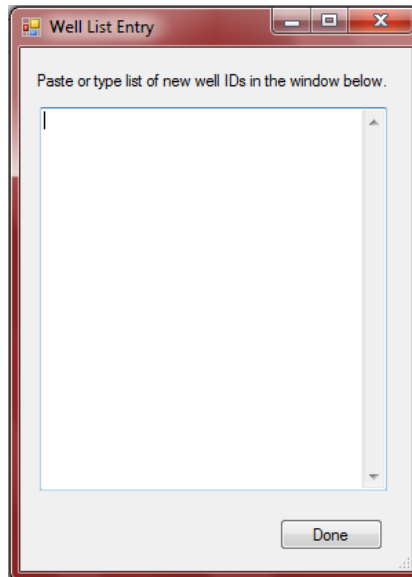
7.5 Cloning wells

To make it easier for the user to enter multiple wells that have the same configuration, the software was designed with a copy feature.

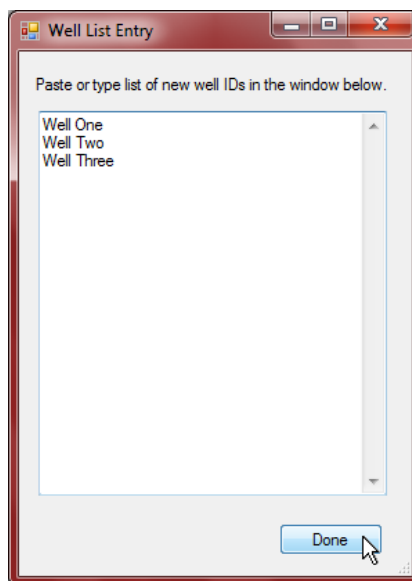
- 1) Highlight the well to clone and tap the “Copy Row” button.



- 2) Once the “Copy Row” button from the top of the screen is selected the Well Entry list will open.



- 3) Type (or cut and paste) a list of desired names for the new wells to be added (there should be a carriage return after each name as shown below). Select done when finished and the new IDs will populate into the ID set with the same well configuration settings as the originally highlighted well.





Elkins Gas Analyzer Configuration Editor 2.9

File Edit Tables Add Row Delete Row(s) Copy Row Edit Rows Move Row Up Move Row Down Double-click row to edit

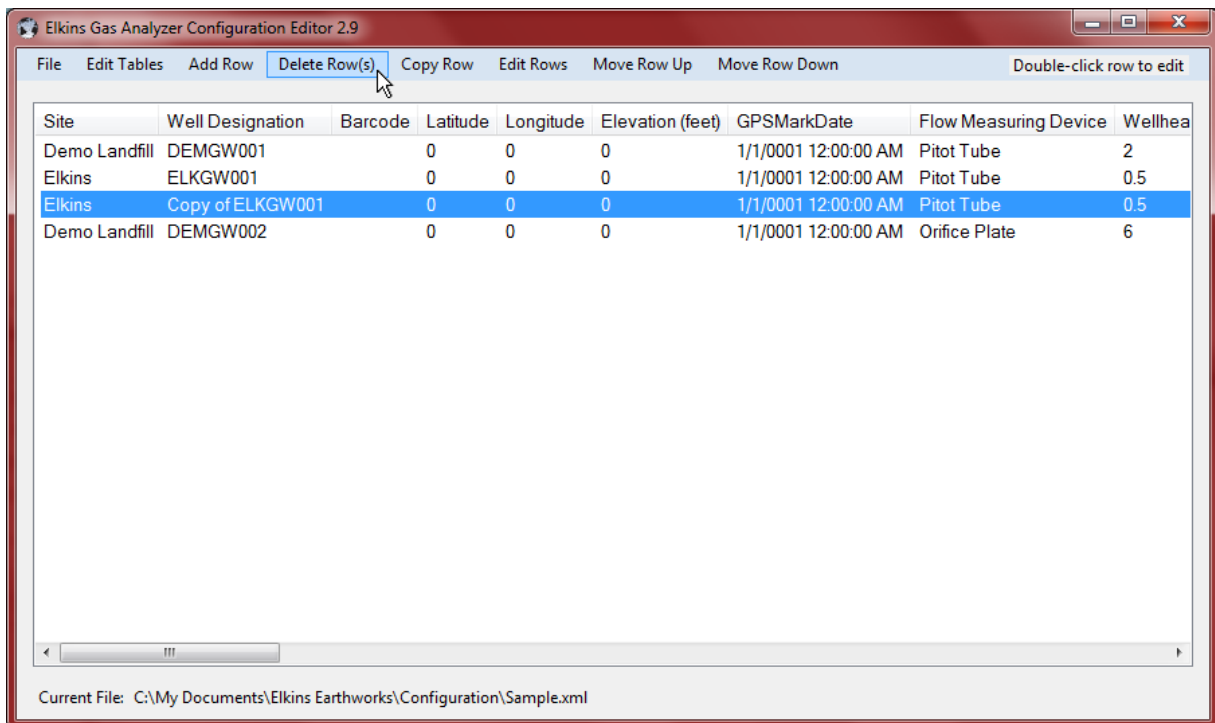
Site	Well Designation	Barcode	Latitude	Longitude	Elevation (feet)	GPSTime	GPSTime	Flow Measuring Device	Wellhead S
Demo Landfill	DEMGW001		0	0	0	1/1/0001	12:00:00 AM	Pitot Tube	2
Elkins	DEMGW001		0	0	0	1/1/0001	12:00:00 AM	Pitot Tube	0.5
Demo Landfill	DEMGW002		0	0	0	1/1/0001	12:00:00 AM	Orifice Plate	6
Elkins	Well One		0	0	0	1/1/0001	12:00:00 AM	Pitot Tube	0.5
Elkins	Well Two		0	0	0	1/1/0001	12:00:00 AM	Pitot Tube	0.5
Elkins	Well Three		0	0	0	1/1/0001	12:00:00 AM	Pitot Tube	0.5

Current File: C:\My Documents\Elkins Earthworks\Configuration\DataStore.xml



7.6 Delete Wells

The user may delete a well from the ID set by highlighting the Well and clicking on the “Delete Row(s)” button.





The user may also delete multiple rows at the same time by holding the CTRL key and clicking the desired rows.

Site	Well Designation	Barcode	Latitude	Longitude	Elevation (feet)	GPSMarkDate	Flow Measuring Device	Wellhe:
Demo Landfill	DEMGW001		0	0	0	1/1/0001 12:00:00 AM	Pitot Tube	2
Elkins	Copy of DEMGW001		0	0	0	1/1/0001 12:00:00 AM	Pitot Tube	0.5
Elkins	DEMGW001		0	0	0	1/1/0001 12:00:00 AM	Pitot Tube	0.5
Demo Landfill	DEMGW002		0	0	0	1/1/0001 12:00:00 AM	Orifice Plate	6

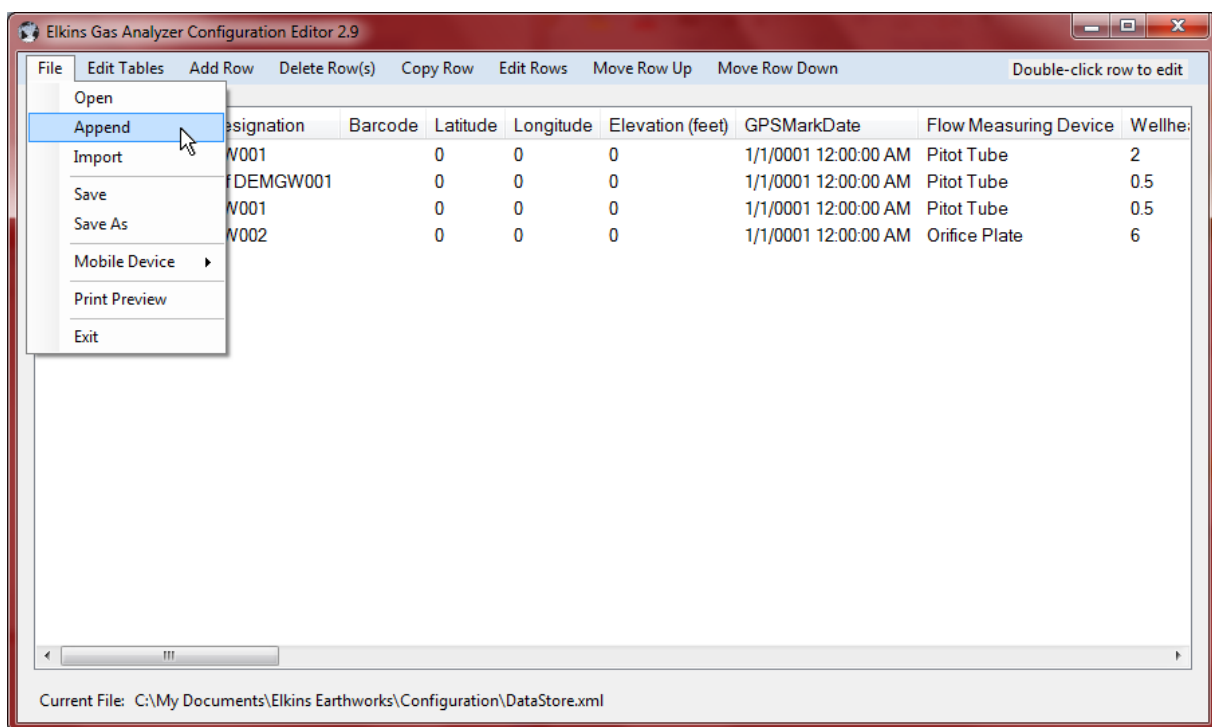
Current File: C:\My Documents\Elkins Earthworks\Configuration\DataStore.xml



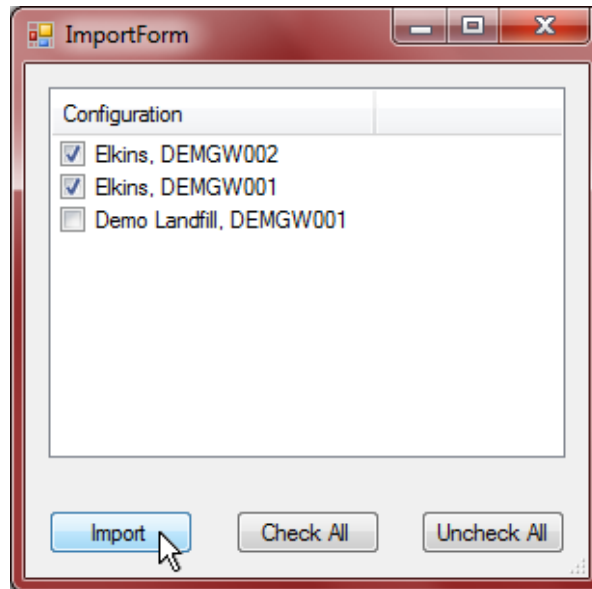
7.7 Combining wells from another ID set

The Gas Analyzer Configuration Editor will let the user find a second ID set and combine selected wells into the new ID set.

- 1) Click on the File tab, then the “Append” button.



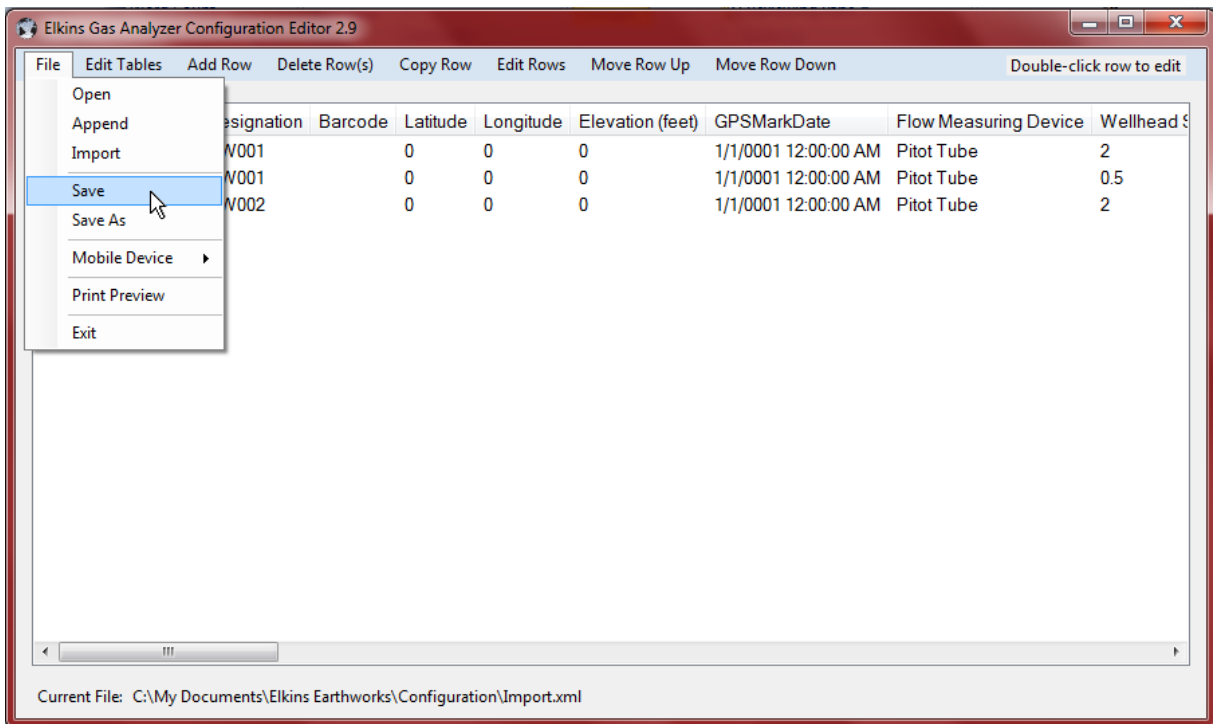
- 2) Browse for the second ID set which contains the well ID's that the user desires to add to the new ID set. Check the ID's that should be appended to the new ID set and then click the Import button.





7.8 Save File

The user must click on the save button to save the changes that have been made to the ID set. The user may use the “Save As” button to specify a custom name for the file. The program ensures that the file name has the proper “.xml” extension.

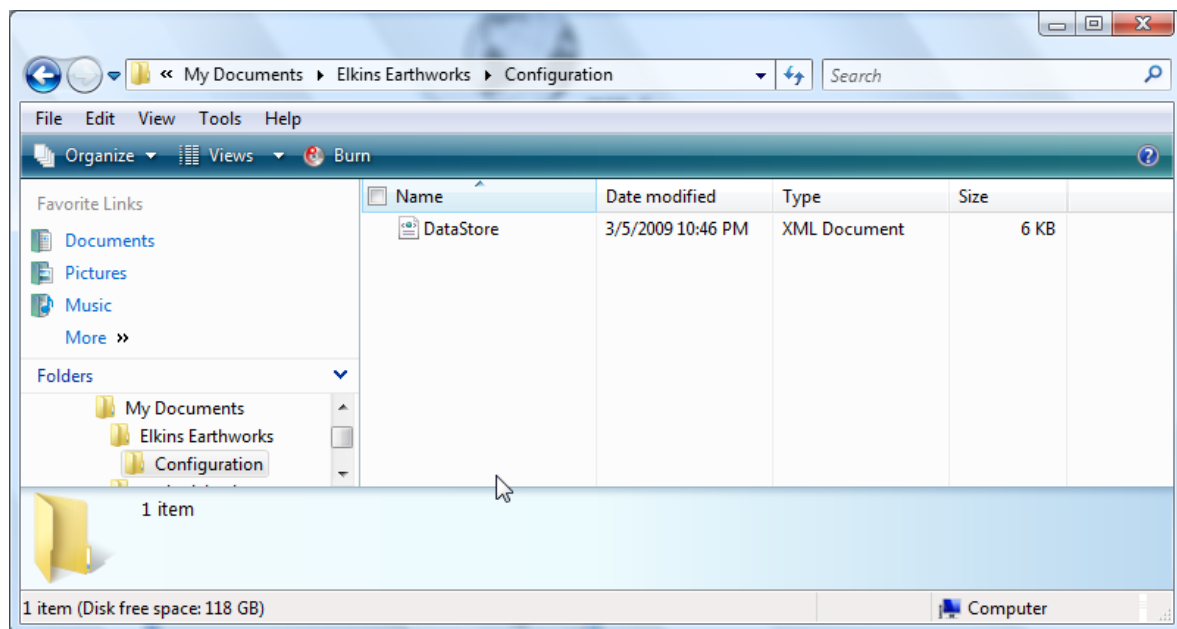




7.9 ID set stored location on PC

The ID set file is located in the c:/My Documents/Elkins Earthworks/Configuration directory. The user may have multiple ID set files referencing multiple sites that the instrument is used on.

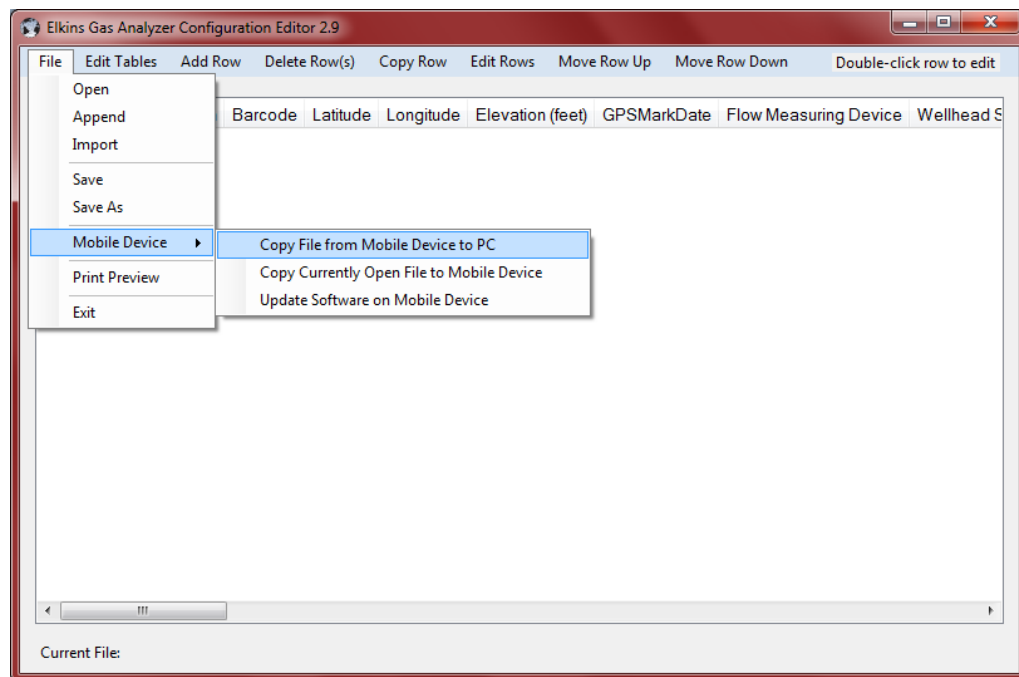
Note: Newer versions of the configuration editor store the ID sets in the c:/Elkins Earthworks/Configuration directory.





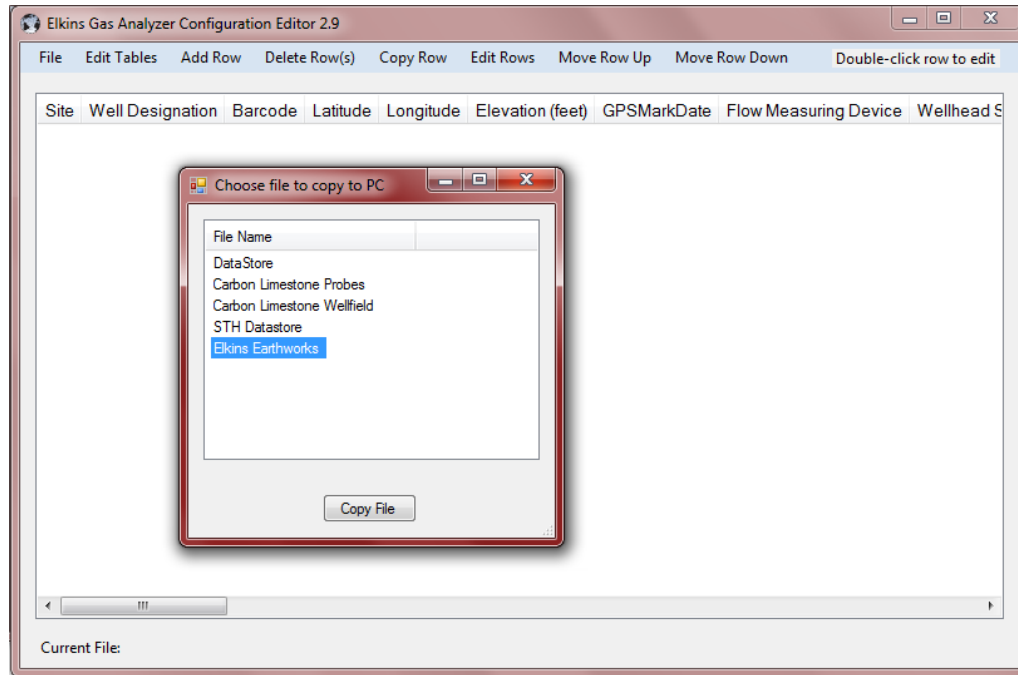
7.10 Transferring ID Sets between handheld and desktop PC

- 1) Attach the handheld to the PC and let the unit synchronize (see section 8 for instructions)
- 2) Open the Configuration Editor program
- 3) Select “File” then “Mobile Device” and finally “Copy file from mobile device to PC”.

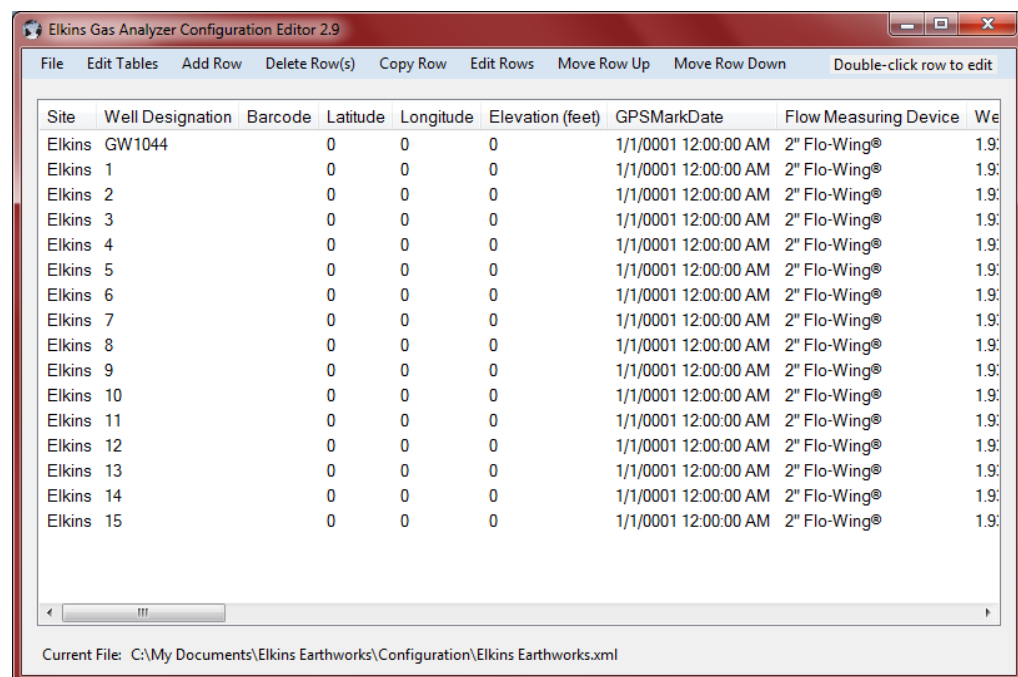




- 4) Select the file that contains the ID set that you want to manage and click on the “Copy File” button.

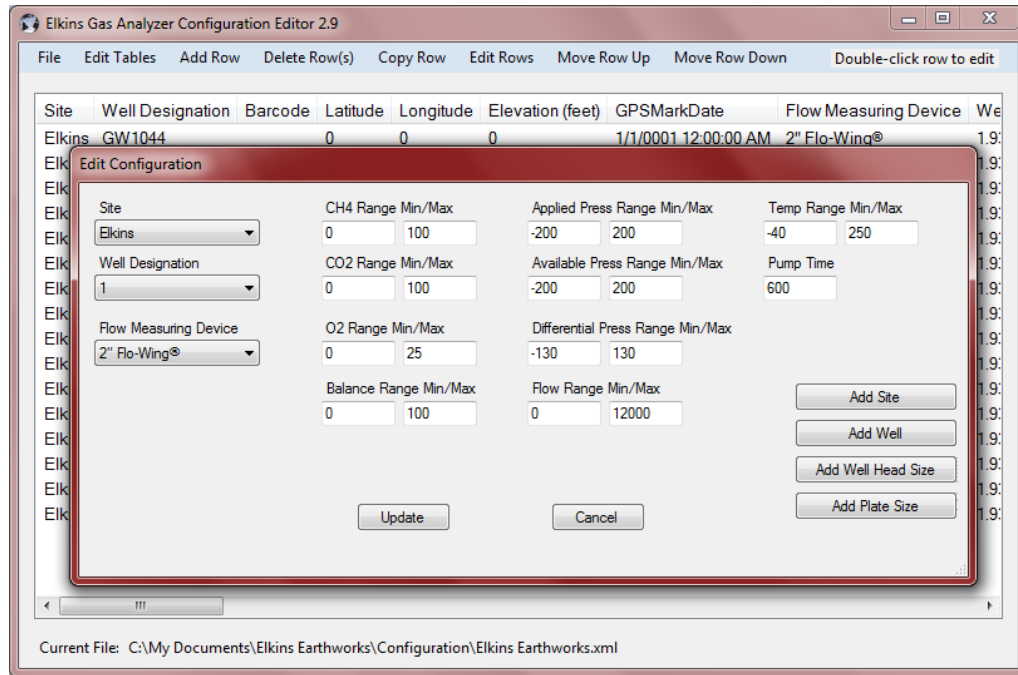


- 5) The selected ID set will then populate into the Configuration Editor.

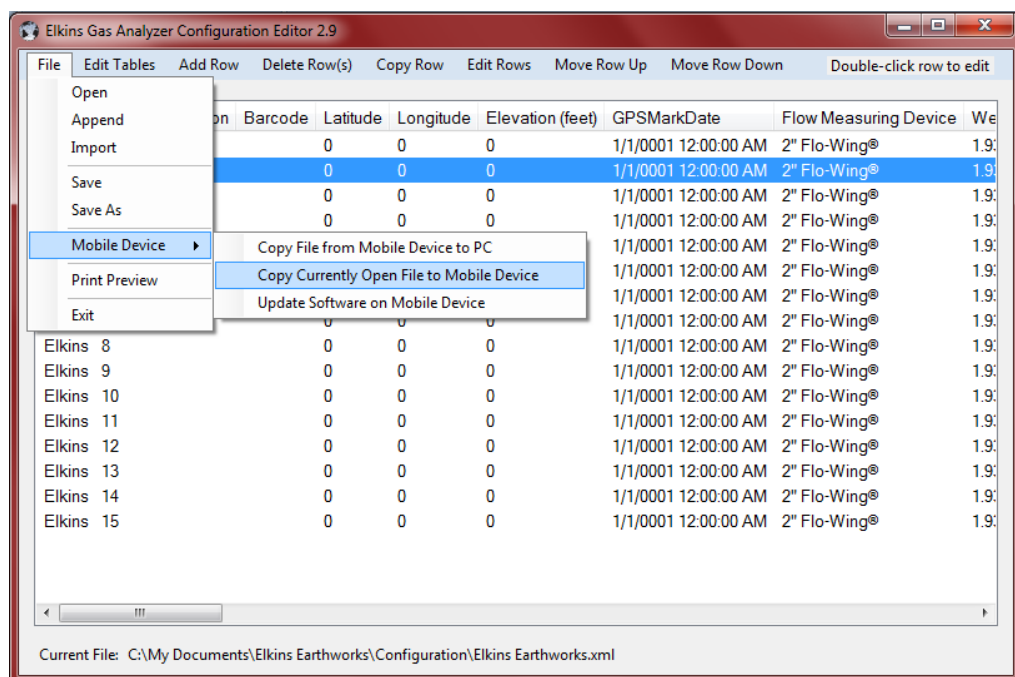




6) Make any desired changes to the selected ID set.

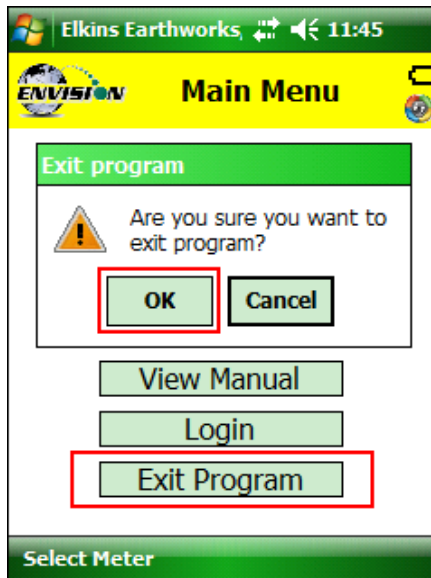


7) After all changes have been made the user should send updated ID set back to the handheld.





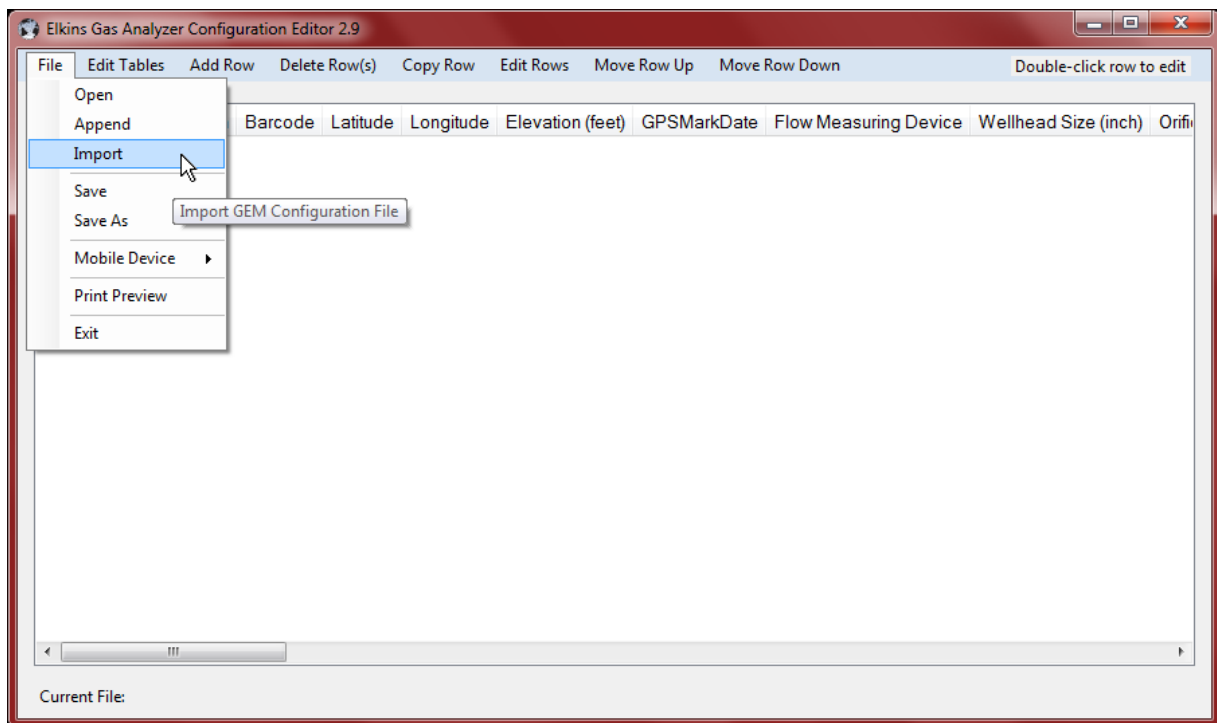
- 8) Updated ID set will be sent to mobile device and changes to the ID set will be viewable once Elkins Earthworks® Gas Analyzer program on the handheld has been exited and restarted.





7.11 Importing GEM Configuration Files

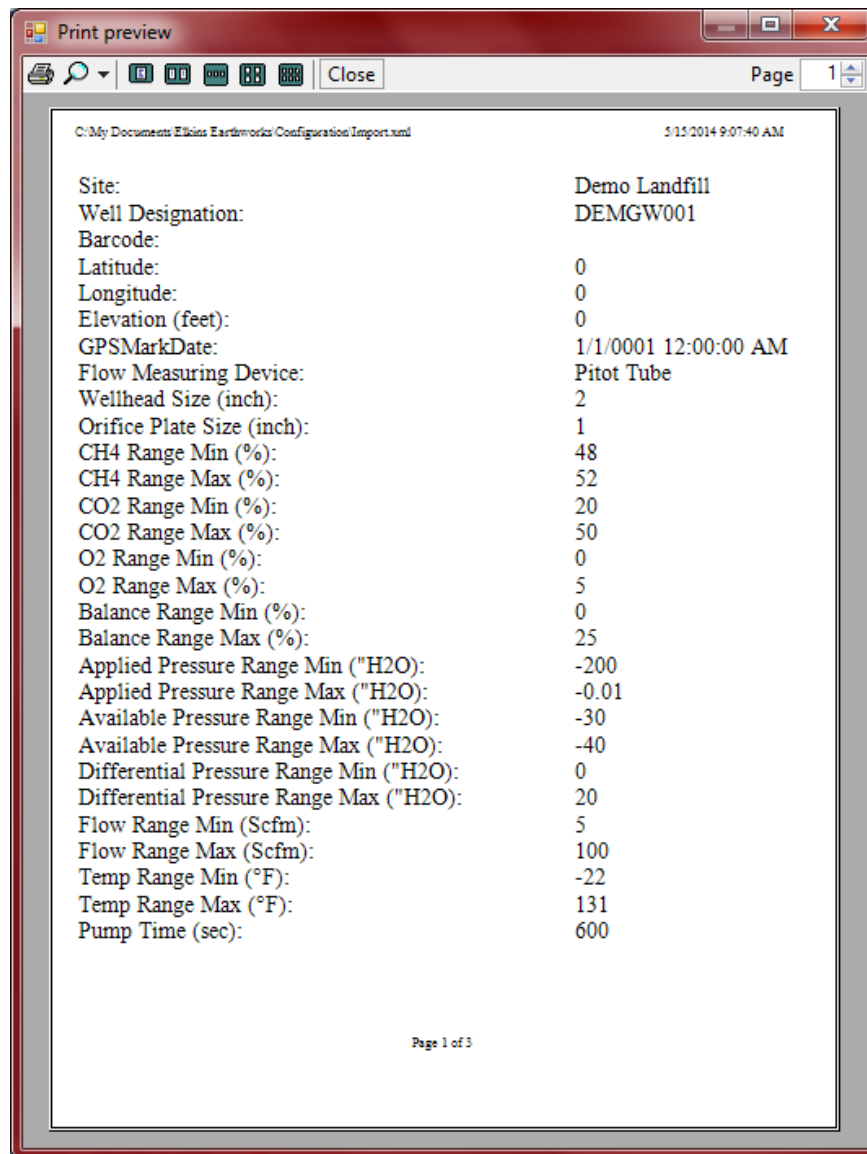
In order to import a GEM file, the user must find the location of an existing GEM .xml file on their hard drive. Press the import button and browse to the GEM file location. Note: Information imported into the Configuration Editor will be limited to well ID names and well configuration settings.





7.12 Print Preview

The “Print Preview” button allows the user to view the entire ID set and all of the configurations set for those wells. The user may print the ID set from this feature.





8 Connecting the Handheld Computer to a Desktop PC

8.1 Windows Mobile Device Center

Due to recent changes/updates to the Windows operating system, some PCs may no longer have permission to access the Windows Mobile Device Center program which is necessary to communicate with a Windows Mobile Handheld via a USB data cable. If your PC does not recognize the handheld when it is plugged into a USB port with the provided data cable, you will need to use the following work-around to add/remove files from the handheld.

- Use a USB flash drive inserted into the handheld to add or remove files by viewing them with file explorer and copying/pasting them in the desired directory.
 - If your handheld does not have a dedicated USB port, you may use the onboard storage card (SD/Micro SD) in the same manner.

Windows computers utilize Windows Mobile Device Center to connect and synchronize with mobile devices. Perform the following steps to synchronize files between the PC and handheld computer:

- 1) Connect the handheld unit to the desktop PC with the provided USB cord.
- 2) The Windows Mobile software should open. If it does not open automatically, it may be necessary to load and/or find the program on your PC and open it manually. This software is also available at ElkinsEarthworks.com.

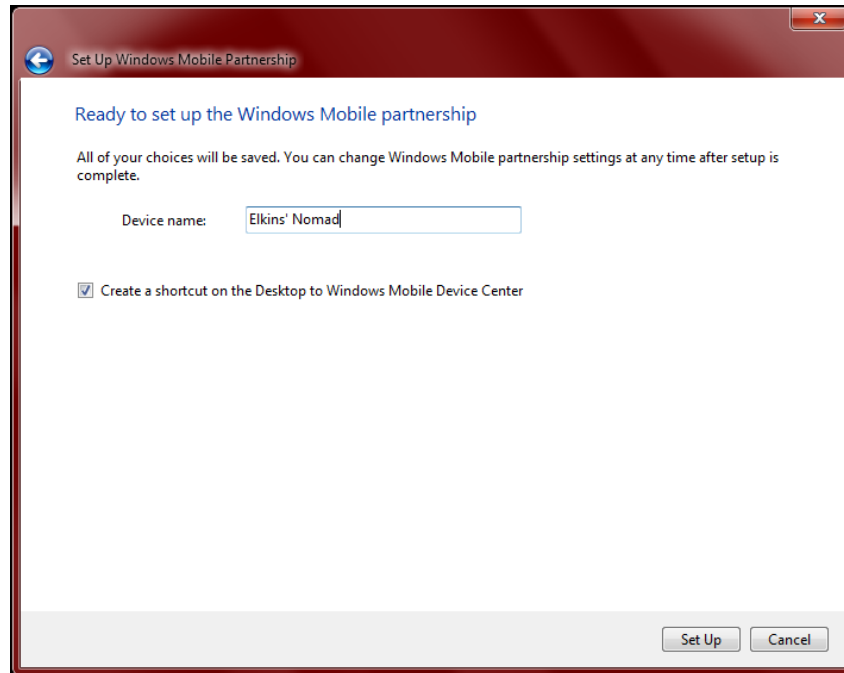


- 3) First click on Mobile Device Settings then “Set up your device”.



- 4) Check the items that you want to synchronize each time you connect to the handheld device. Then click on “Next”. We recommend not selecting any boxes since this will slow the synchronization time. Do not select the Files box as that may lead to contamination of the field data.

5) Name the handheld PC.



6) The handheld device will then Sync with the desktop PC

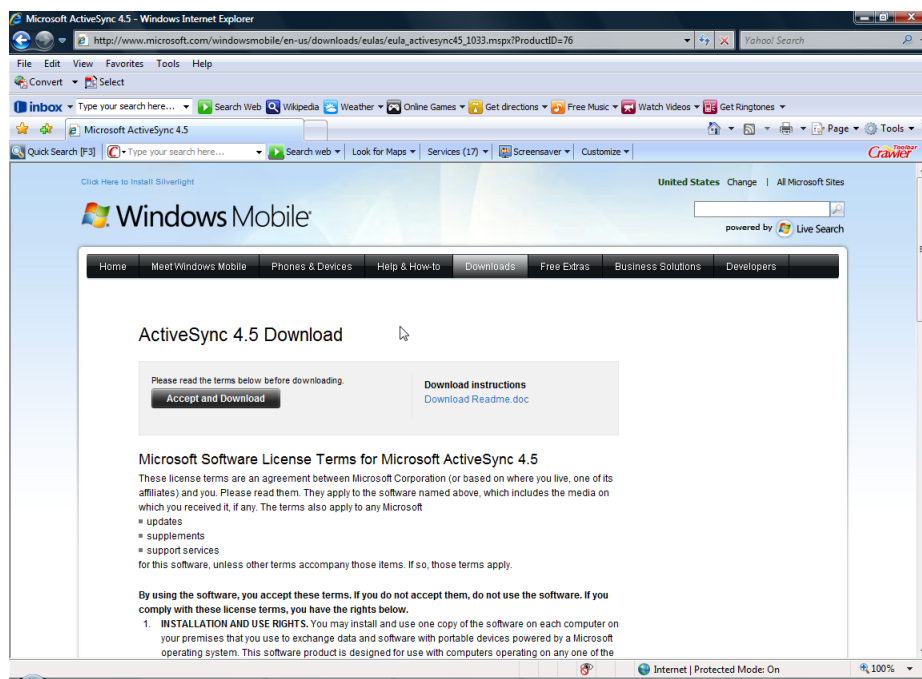




8.2 Windows XP Machines

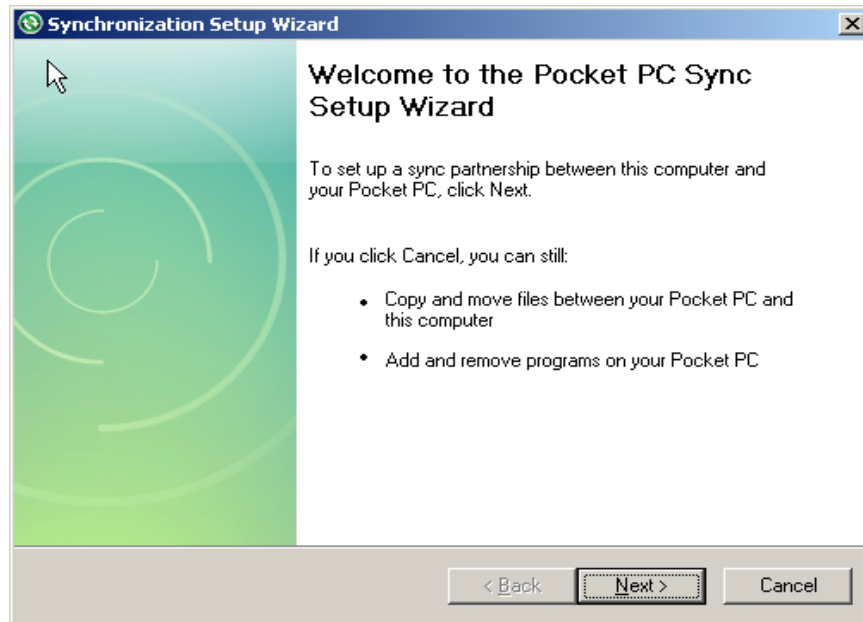
8.2.1 Download Active sync

- 1) Visit the following website: http://www.microsoft.com/windowsmobile/en-us/downloads/eulas/eula_activesync45_1033.msp?ProductID=76

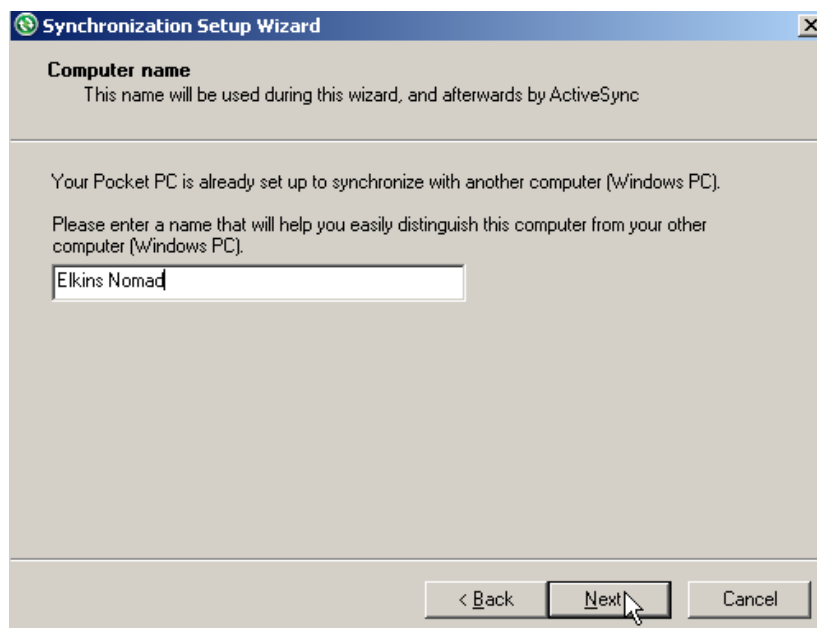


- 2) Click on Accept and Download
- 3) Follow the directions for the software installation
- 4) Connect the handheld computer by using the provided standard USB cable

5) The Synchronizing Wizard will open during the first connection. Click next.



6) Enter the name of what you want to call the handheld device that is being connected



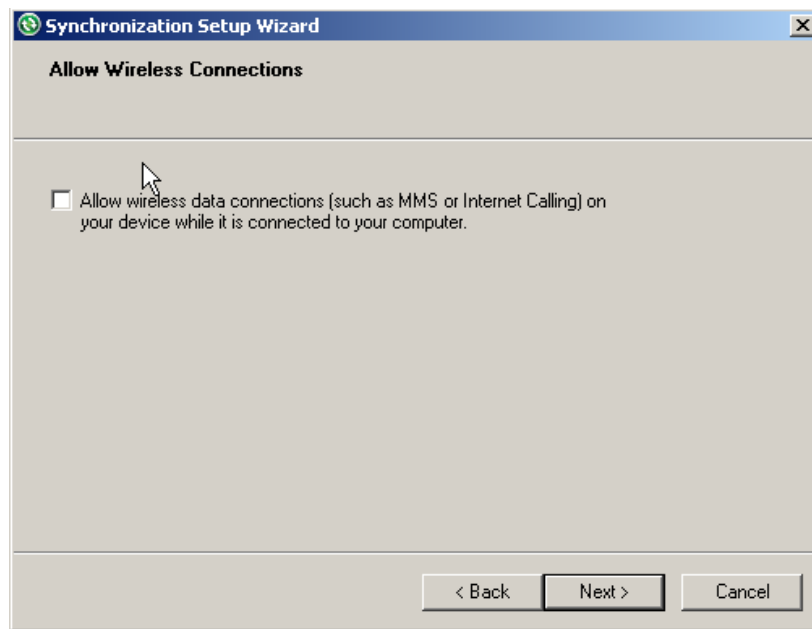
- a. Synchronization wizard will now open. Select the tasks that you wish to synchronize each time the handheld device is connected. We recommend not selecting any boxes since this



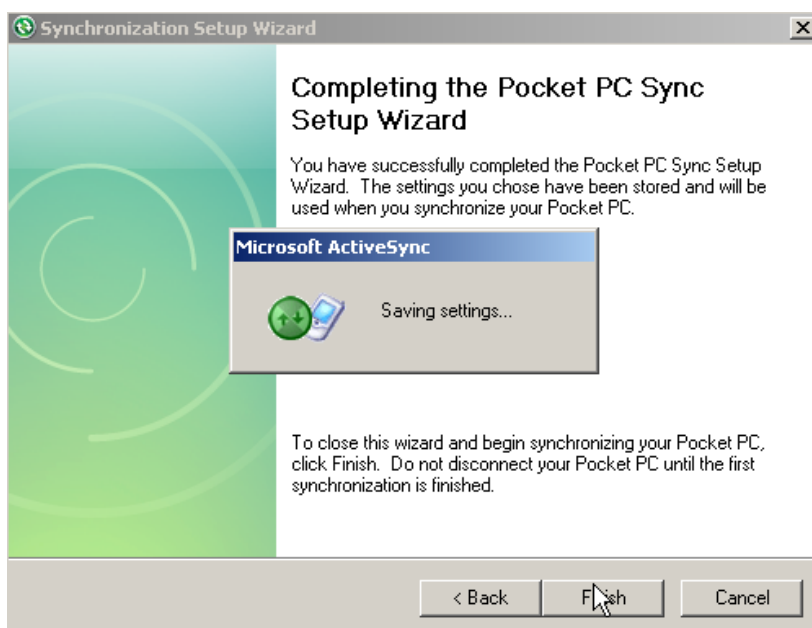
will slow the synchronization time. Do not select the Files box as that may lead to contamination of the field data.



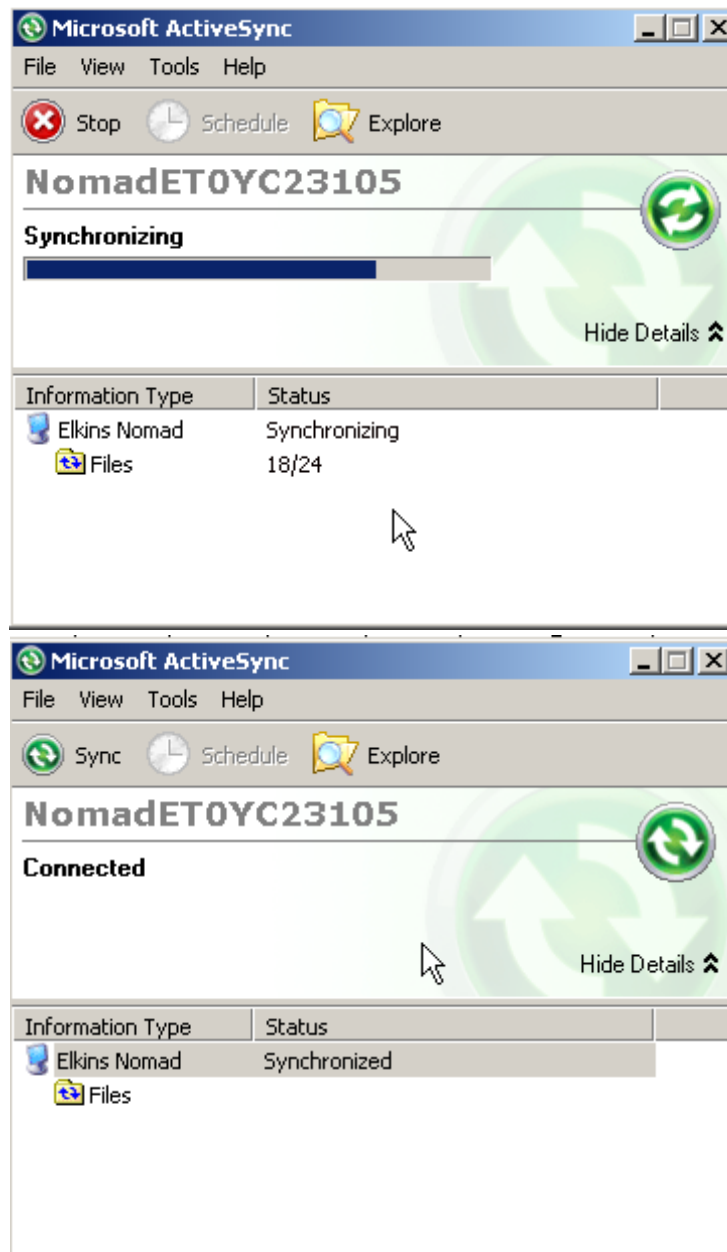
- 7) Allow wireless connections option screen. Make sure the check box for “Allow wireless connections” is unchecked. Click on next.



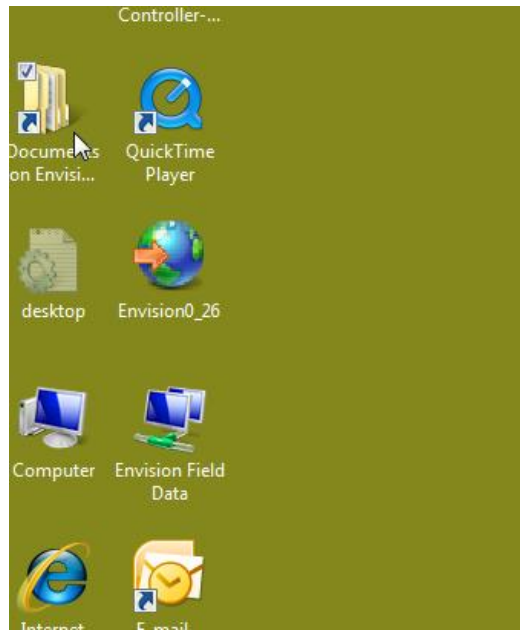
- 8) The connection wizard will now store the user’s settings once the “Finish” button is clicked.



- 9) ActiveSync will now open and sync with the handheld device. The handheld device will now perform this function each time it is connected to the user's PC.

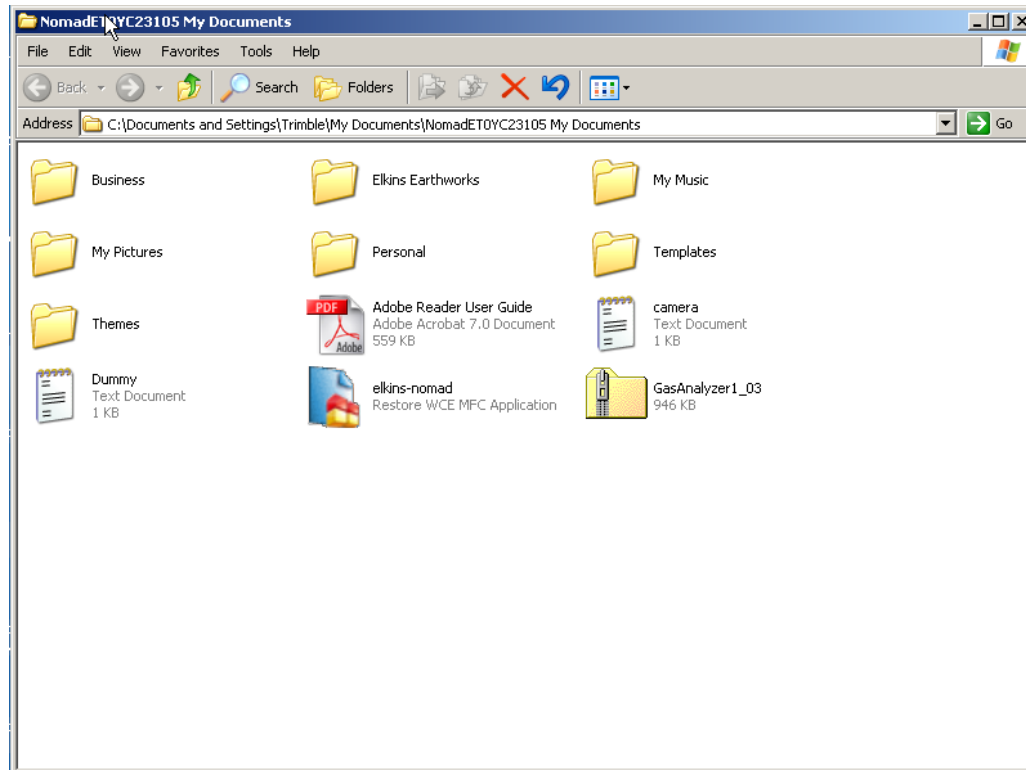


10) ActiveSync will automatically make a file on the desktop.



11) Once the handheld device has synchronized, the files in the desktop folder are now exactly what is on the handheld device. The user may now disconnect the handheld device.

12) By selecting the desktop folder, the user can view and modify any of the contents.



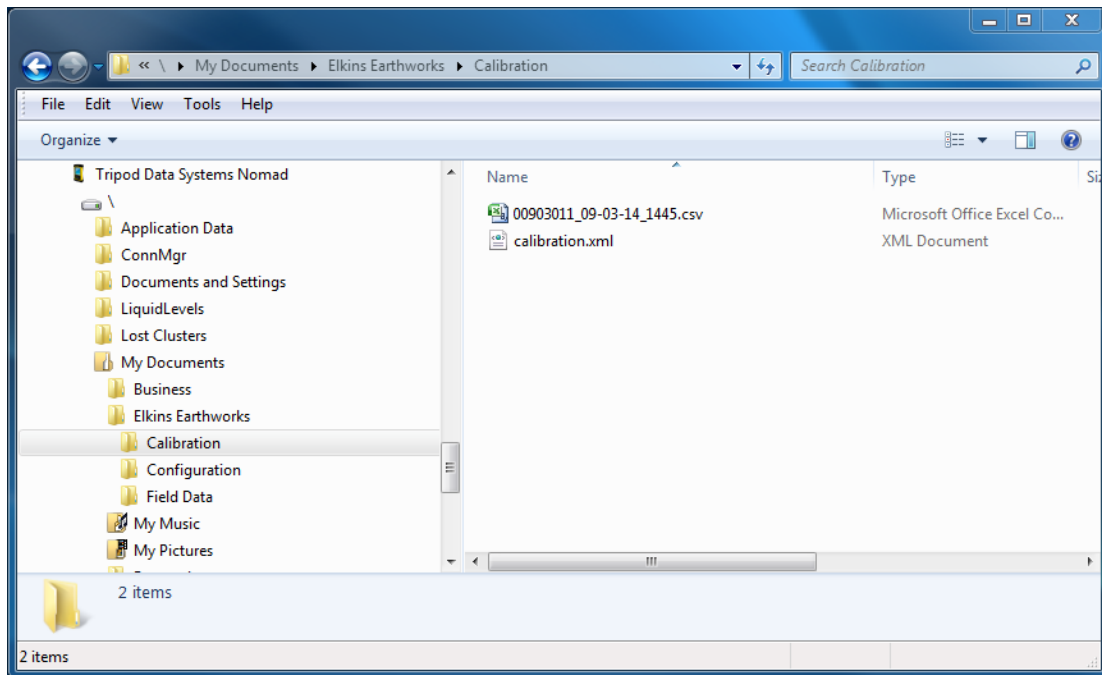
8.3 Transferring Files

8.3.1 Directory Structure

The files associated with the gas analyzer program may be found on the handheld device at C:\My Documents\Elkins Earthworks. This directory contains the following 3 directories:

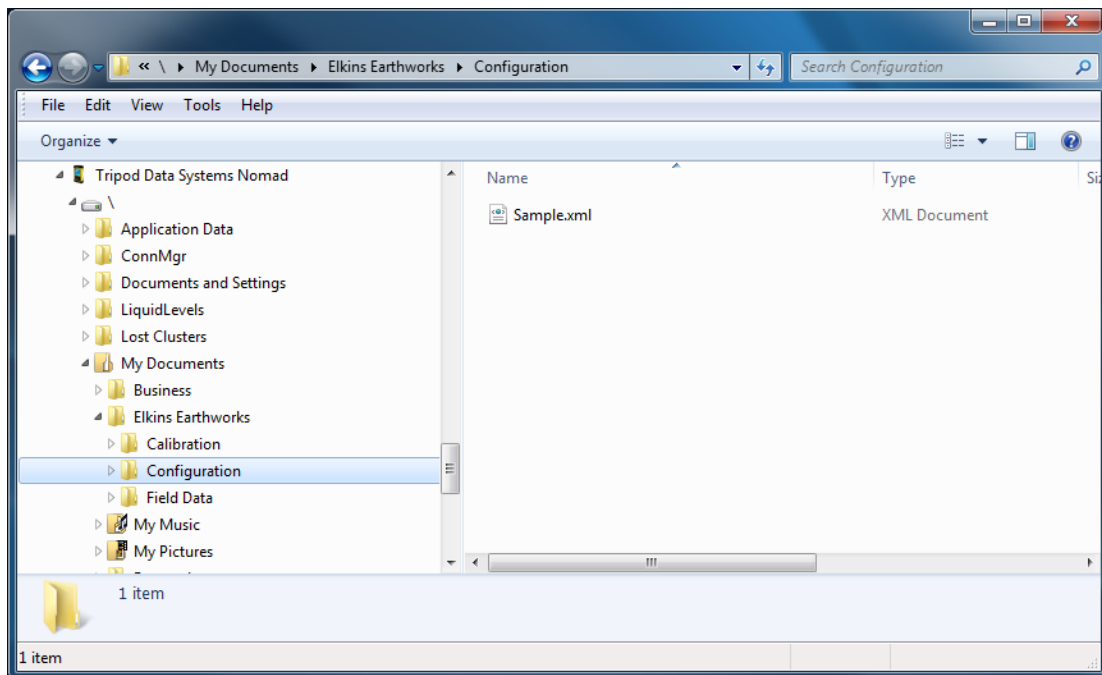


- 1) Calibration Directory – Where two types of calibration files are stored. A new .csv file is generated each time the user performs a field calibration. These files may be used to verify that a field calibration was performed on a certain date and time. The .xml file is used by the gas analyzer program. It contains information about the last field calibration for each Envision that has been calibrated with the handheld device.



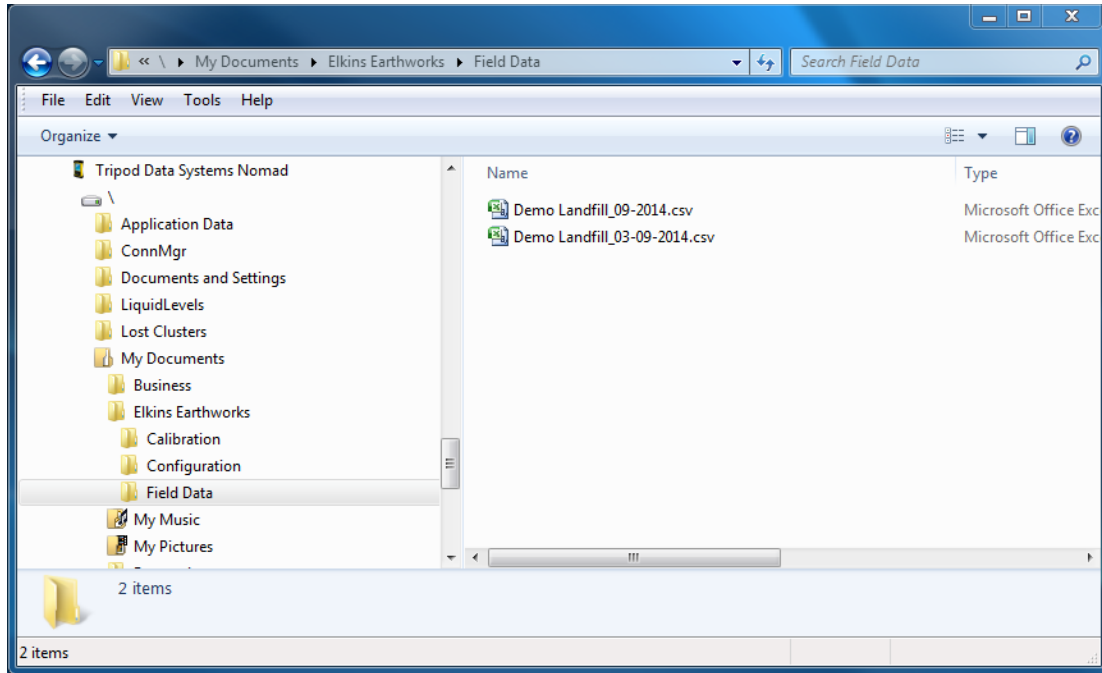


- 2) Configuration Directory – This is where all the well ID sets are stored. The files are in .xml format and may be edited by the configuration editor. The file must be copied to the user's PC before editing.



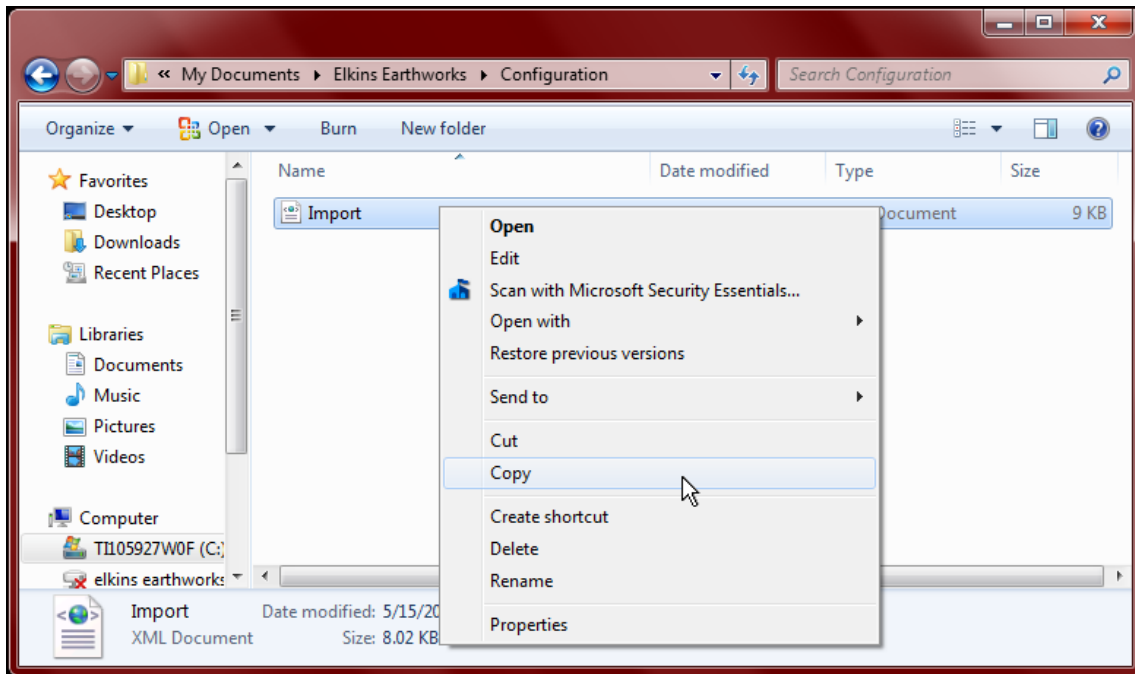


- 3) Field Data Directory – This is where all the .csv field data files reside. A new file is generated each day and each month that a measurement is taken. These files may be opened with Excel. If the encryption option is enabled, encrypted (.enc) files are also present.



8.3.2 Copy Files from PC to Handheld Device

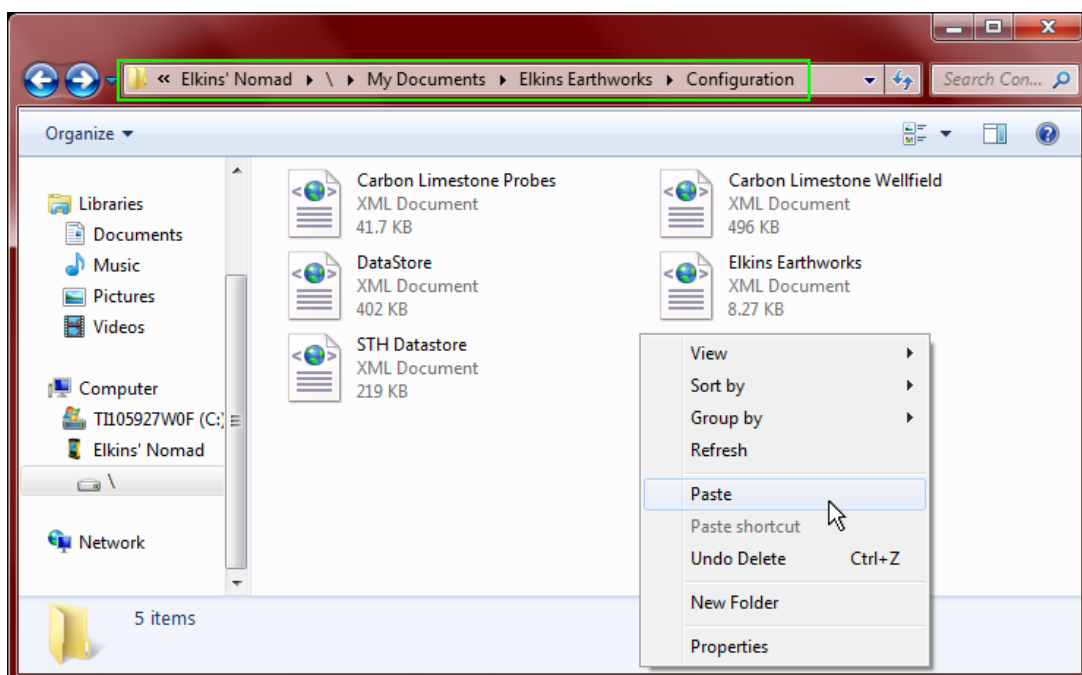
- 1) Right click on the file and click copy.



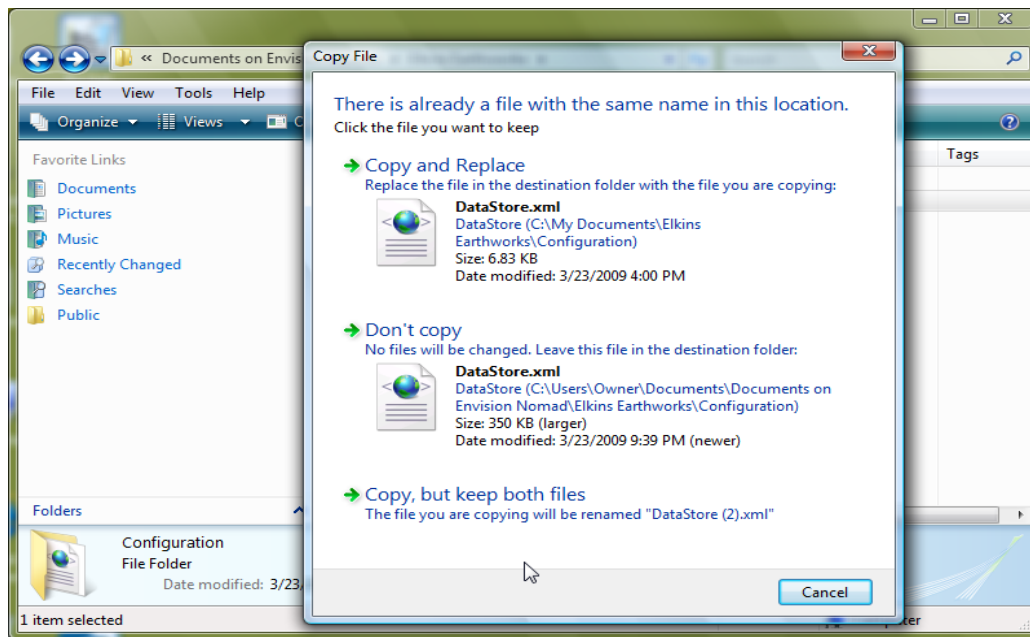
- 2) Open "File Management" from Windows Mobile Device Center.



- 3) Follow the path shown to the proper folder on the handheld device. Right click in an empty space and click paste.



- 4) If a file with the same name already exists, then a warning message may appear. If you are sure you want to replace the file, then click on “Copy and Replace”.



- 5) The file will now load onto the handheld device.

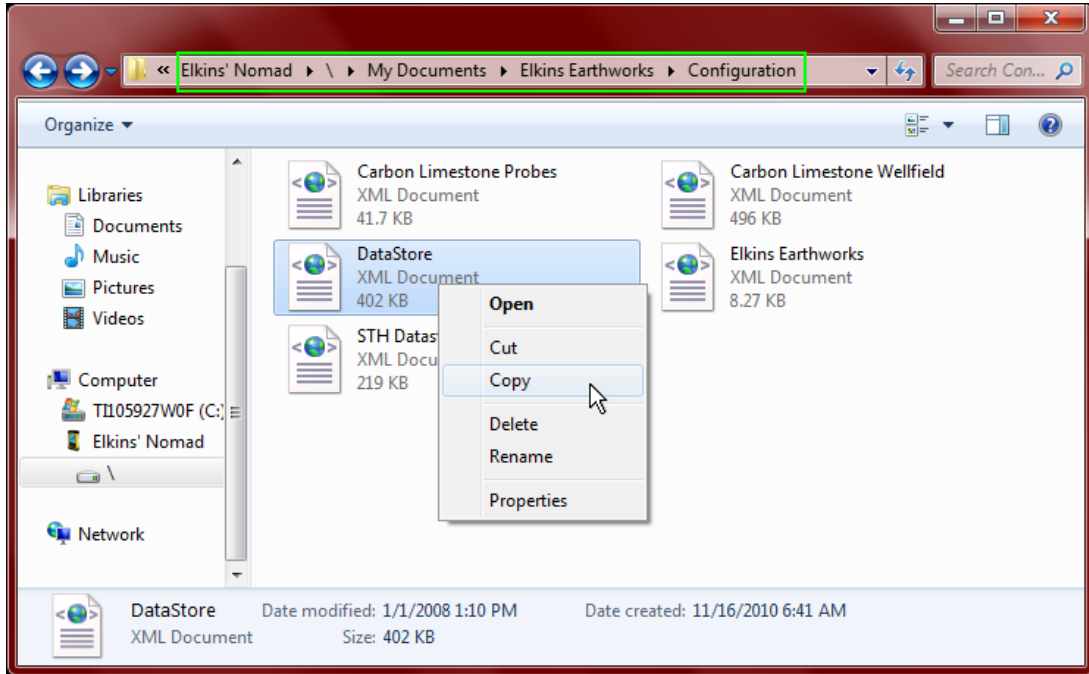
8.3.3 Copy File from Handheld Device to PC

If an ID set is modified in the field with the handheld device then the user will want to copy the modified file back onto the PC unit for backup and potential modification by the “Configuration Editor” software.

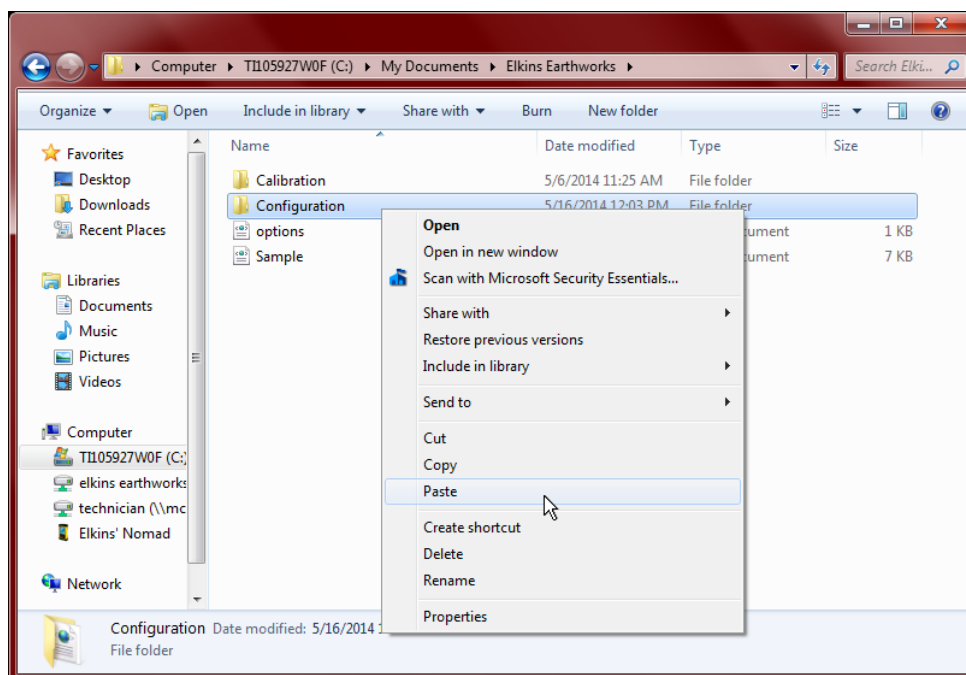
- 1) Synchronize the handheld device with the PC
- 2) Open “File Management” from Windows Mobile Device Center.



- 3) Open the handheld device’s “Configuration” folder which can be found by following the path shown. Right click and copy the ID set file.

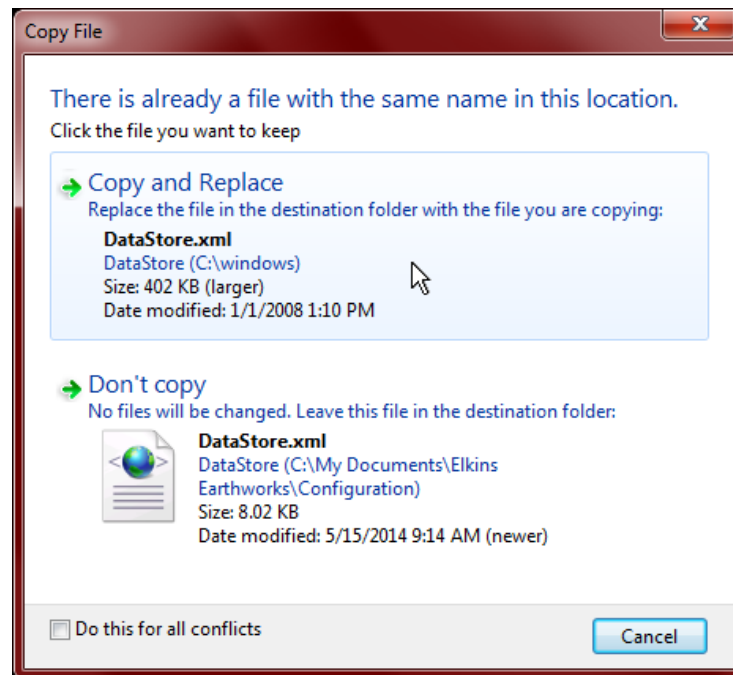


- 4) Locate the Configuration folder on the user's PC. This may be in any directory that the user desires. The default configuration editor locations are: **C:\My Document\Elkins Earthworks\Configuration** or **C:\ Elkins Earthworks\Configuration**





- 5) Click paste. If an ID set file with the same name already exists, then a warning message will appear. If you are sure you want to replace the file, then click on “Copy and Replace”



- 6) The file is now located on the user's computer.



9 Errors and Troubleshooting

9.1 Envision® Error Conditions:

Error conditions from meter are presented by a blinking red “!” next to the connect icon in the header of each screen. The description of the error will appear in the “Meter Status” screen under error conditions. The following are error conditions that may be displayed:

- 1) **“Component Failure -Error #1”**
 - a. Explanation - The battery gauge is displaying erroneous battery data, as a result of a charging chip failure. This will affect battery cut-offs and accurate monitoring.
 - b. Solution – Call technical support at Elkins Earthworks® 330-725-7766.
- 2) **“Component Failure -Error #2”**
 - a. Explanation- The charging chip is not shutting off the charging process.
 - b. Solution - Call technical support at Elkins Earthworks® 330-725-7766.
- 3) **“Component Failure -Error #3”**
 - a. Explanation - The Envision is charging too slowly.
 - b. Solution - Call technical support at Elkins Earthworks® 330-725-7766.
- 4) **“Component Failure -Error #4”**
 - a. Explanation- The pump, manifold pressure sensor, or either of the two IR sensors have stopped operating correctly and are not drawing any current.
 - b. Solution – Power down Envision® unit and reconnect to the handheld computer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.
- 5) **“Component Failure -Error #5”-**
 - a. Explanation- Excessive current draw. Any number of parts may have failed due to a short or component failure.
 - b. Solution – Power down Envision® unit and reconnect to the handheld computer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.
- 6) **“Component Failure -Error #6”**
 - a. Explanation- One of the pressure sensors is reading out of spec, likely due to an overpressure situation (blown sensor)
 - b. Solution – Try restoring the factory calibration on the pressure sensor calibration screen. If this does not solve the problem, then power down Envision® unit and reconnect to the handheld computer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.
- 7) **“Component Failure -Error #7”**
 - a. Explanation- Low flow condition
 - b. Solution – Check that the sample train hoses are not pinched. Check inline filters and make sure that they are clear and free from debris and liquids. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.
- 8) **“Component Failure -Error #8”**
 - a. Explanation- Oxygen sensor is out of spec. Potentially bad sensor.
 - b. Solution – Restore factory calibration on O₂ sensor and recalibrate. If recalibration does not



solve the error, then power down Envision® unit and reconnect to the handheld computer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

9) **“Low Flow Rate”**

- a. Explanation- Low Flow from clogged or pinched sample train.
- b. Solution – Check that the sample train hoses are not pinched. Check inline filters and make sure that they are clear and free from debris and liquids. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

10) **“Over Pressure”**

- a. Explanation- Pressure applied to pressure sensors are higher than sensors a specified for.
- b. Solution – Disconnect hoses from measurement location and recalibrate sensors. Verify that the pressure on the sample point is within the tolerance of the Envision® gas analyzer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

11) **“Battery low. Plug in charger”**

- a. Explanation- Pressure Low battery on Envision unit
- b. Solution – Plug meter in to charge. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

12) **“Battery level is critically low”**

- a. Explanation- Battery level is low.
- b. Solution – Charge Envision® gas analyzer. If the unit does not charge, then call technical support at Elkins Earthworks® 330-725-7766.

13) **“Unit over temperature. Cool unit”**

- a. Explanation- Measurement Unit over temperature.
- b. Solution – Move the Envision® unit into a cooler environment. If the error does not clear, then call technical support at Elkins Earthworks® 330-725-7766.

9.2 Other error codes

Listed below are additional error messages that may show up during operations:

1) **“Unable to connect to selected meter”**

- a. Explanation- Connection attempt failed during meter selection
- b. Solution – Make sure that the Envision® unit is on and the Bluetooth light is blinking before tapping search on the handheld computer. Also, verify that the handheld’s Bluetooth is turned on. If this does not solve the problem then power down Envision® unit, close and restart the Elkins Gas Analyzer software and try again to connect to the Envision. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

2) **“The Bluetooth connection to the meter has been lost”**

- a. Explanation- Bluetooth connection has been disrupted either due to interference or user has walked out of range from the Envision® gas analyzer.
- b. Solution – Walk back within range of the Envision® gas meter and let the Bluetooth attempt to reconnect. If this does not solve the problem then power down Envision® unit, return the Elkins



Gas Analyzer software to the “Select Meter” screen on the handheld. Reboot the Envision® unit and try to connect to the Envision® gas analyzer. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766.

3) “Unable to initialize scanner device”

- a. Explanation- The scanner function is not active on the handheld computer.
- b. Solution – Verify that the handheld unit has a barcode reader. If not the barcode feature will not be active. If the handheld has a barcode reader, then the user needs to verify that the correct driver is installed and the application is active. Call technical support at Elkins Earthworks® 330-725-7766 for help in verifying drivers.

4) “GPS data not valid”

- a. Explanation- the GPS has not yet connected with the satellites.
- b. Solution – Allow the handheld unit at least four minutes outside to connect to the satellites. If this does not correct the problem, call technical support at Elkins Earthworks® 330-725-7766 for help.

5) “Failed to find GPS/barcode match”

- a. Explanation- the GPS coordinates at the current location are not within 30 feet of the GPS coordinates of any well in the ID set.
- b. Solution – Wait one minute at the location and press the GPS button again. If this does not correct the problem, make sure that the current well has been previously marked by GPS. If it has not been marked, press the “Mark” and “GPS” buttons to mark the well. If this doesn’t fix the problem, call technical support at Elkins Earthworks® 330-725-7766 for help.



10 Envision® Maintenance

10.1 Factory Maintenance

The Envision® gas analyzer should be returned to the factory at a minimum once per year for inspection and factory calibration.

10.2 Field Maintenance

The Envision® gas monitor has two internal filters. Over time these filters may clog or become fowled and may need to be changed. In order to change the filters, locate the aluminum door on the back of the Envision® gas analyzer under the protective black boot.



Remove the aluminum filter door by loosening the screws and lifting the door off of the enclosure. Warning: do not remove the filter door in dusty or wet atmospheres as the internal components can get damaged.



The user may now remove and replace the filters by turning the Luer filter fittings. Make sure the seal is still in place and re-attach the filter door. Replacement Luer filters may be purchased from Elkins Earthworks®.



11 Warranty

11.1 Envision® Warranty

Elkins Earthworks®, LLC warrants its products to be free from defects in workmanship. This warranty shall be fulfilled by Elkins Earthworks® repairing or replacing its products, as necessary, to cure any such defect, which is reported to Elkins Earthworks® within 12 months of the ship date. All warranty work will be done at Elkins Earthworks® location.

- (a) This warranty shall not apply to products which have been abused, altered, misused in application, improperly maintained or repaired.
- (b) This warranty does not apply to components designed to be consumed or destroyed in normal operation.
- (c) No product or part shall be returned to Elkins Earthworks without its prior consent. Any products which Elkins Earthworks consents to have returned shall be shipped to Elkins Earthworks factory with a completed RMA form at the customers expense. Elkins Earthworks shall only be responsible for payment of return ground shipment to customer location. Elkins Earthworks shall not be obligated to provide a “loaner” Envision gas analyzer while performing warranty repairs. A rental unit may be obtained during the repair period if one is available from the rental department.
- (d) In the event the **BUYER** delays shipment, the warranty period commences on the date Elkins Earthworks® is prepared to make shipment.
- (e) **BUYER** shall give Elkins Earthworks® written notice of the defect promptly after discovery.
- (f) This warranty is exclusive and is expressly in lieu of any other express or implied warranties.

11.2 Trimble Handheld Warranty

The following wording is from the standard Trimble Warranty – For a full description please refer to the Trimble Warranty document included in the Trimble packet in the Storm case lid when purchased.

11.2.1 Hardware Warranty

Commencing on the Hardware Extended Limited Warranty Commencement Date and during the Hardware Extended Limited Warranty Term set forth on the Signature Page the Trimble Navigation Limited Hardware Products are warranted against defects in material and workmanship. Warranty service will be provided at a designated Trimble Service Center. Trimble will at its option either repair or replace products that prove to be defective. If Trimble is unable to replace the products, Trimble will refund the price paid for this agreement. The Customer shall pay all shipping charges for products returned to Trimble for warranty service. Trimble shall pay all shipping charges for the return of products to the Customer. These are your sole remedies, and Trimble’s sole liability, for any breach in this warranty.



11.2.2 Hardware Warranty Exclusions

The above warranty shall not apply to defects resulting from: (1) improper or inadequate maintenance by you; (2) Purchaser-supplied software or interfacing; (3) unauthorized modification or misuse; (4) operation outside of the environmental specifications of the product; (5) improper installation, where applicable; (6) lightning or other electrical discharge; (7) fresh or salt water immersion or spray; (8) normal wear and tear on consumable parts (for example, and without limitation, batteries).

11.2.3 Software/Firmware Extended Limited Warranty

Commencing on the Software/Firmware Extended Limited Warranty Commencement Date and during the Software/Firmware Extended Limited Warranty Term set forth on the Signature Page, Trimble Navigation Limited warrants that the Trimble Navigation Software and Firmware Products will substantially conform to the published specifications provided it is used with the Trimble products, computer products, and operating system for which it was designed. Trimble also warrants that the storage media on which Software and Firmware are distributed and the accompanying documentation are free from defects in materials and workmanship. Such warranty shall not apply in the event or to the extent that data supplied by you contains errors or is improperly or incorrectly installed. During the Software/Firmware Extended Limited Warranty period, Trimble will replace defective media or documentation, or correct substantial program errors at no charge. If Trimble is unable to replace defective media or documentation, or correct program errors, Trimble will refund the price paid for the Software or Firmware. These are your sole remedies for any breach in warranty.

11.2.4 Software/Firmware Warranty Exclusions

The above warranty shall not apply to Software and Firmware products that (1) have been altered or modified in any way without Trimble's authorization; (2) have problems resulting from interaction with software, firmware or hardware not supplied or supported by Trimble; (3) have problems caused by improper or inadequate maintenance by Purchaser.



12 Problems and Potential Solutions for Envision and Handheld Device

Problem	Potential Solution
Handheld device will not Connect to the Envision by Bluetooth	<ul style="list-style-type: none">-Check the home screen on the handheld to insure the WLAN is OFF-Check the Envision to make sure the blue light is flashing next to the Bluetooth button-Check the home screen on the handheld to insure the Bluetooth is ON
The Elkins Gas Analyzer software will not turn on	The synchronizing setting for the Nomad has the Files box is selected for Nomad to the Computer. Unselect the files box and remove all your Field Data files from the Nomad.
Handheld device will not read GPS	<ul style="list-style-type: none">-Make sure that Sat Viewer is turned off.-Check the settings on the handheld device to make sure they match the settings in section 5.5 of this document for GPS
The lighting on the Nomad is dull	Press the green power button for just a second
O ₂ reading seems high	<ul style="list-style-type: none">-Check the filters and make sure that they are tight-Change the O-ring's on the quick connect fittings-Make sure your hoses have no holes
The screen is dark	Adjust your backlight setting to match section 5.3 of this document. Also you can just hit the power button for a second.
CH ₄ is over 1000%	The reading may be set to CH ₄ LEL. Click the CH ₄ box to toggle from normal reading to LEL reading.

If you are experiences an issue that is not listed above, or the solution above did not solve the issue, please contact Elkins Earthworks® for further troubleshooting.



13 Specifications

13.1 ENV100 & ENV200 Specifications

Note: ENV200 does not have the low temperature heater option.

Envision™ Technical Specifications				
Operating Temperature Range				
Unit	Minimum	Maximum	Comments	
Envision	-4°F (-20°C)	122°F (50°C)	Heater option recommended below 14°F (-10°C)	
Gas Sensor Accuracy				
Sensor	Range	Linearity	Resolution	T90
CH ₄	0 - 100%	± < 2.0% absolute	0.1%	<30s
CO ₂	0 - 100%	± < 2.0% absolute	0.1%	<30s
O ₂	0 – 2% 2 – 25%	± < 0.1% absolute ± < 5% relative	0.1%	<5s
Pressure Sensors				
Static	Range -5 to +5 (" H2O)	Range -130 to +130 ("H ₂ O)	Comments	
Accuracy	±0.14"H ₂ O	±2% of reading	According to sensor manufacture specs.	
Resolution	0.01"H ₂ O	0.01"H ₂ O		
T90	<1 ms	<10 ms		
Differential	Range -5 to +5 (" H2O)	Range -30 to +30 ("H ₂ O)		
Accuracy	±0.14"H ₂ O	±0.6"H ₂ O	According to sensor manufacture specs.	
Resolution	0.001"H ₂ O	0.01"H ₂ O		
T90	<1 ms	<10 ms		
Available		Range -130 to +130 ("H ₂ O)		
Accuracy	NA	±2% of reading	According to sensor manufacture specs.	
Resolution	NA	0.01"H ₂ O		
T90	NA	<10 ms		
Barometric (Absolute Pressure Only)		Range 22 to 31 ("Hg)		
Accuracy	NA	±0.24"Hg (±8 mBar)	According to sensor manufacture specs.	
Resolution	NA	0.1"Hg		
Wired Thermistor Accuracy	±1.8°F (±1.0°C)	Wired Thermistor Range	-22 to +212°F (-30 to +100°C)	
Battery Life (cycles)	up to 1000 full charge cycles		Temperature (°F)	Battery Life (hours)
Battery Construction	NiMH (no memory)		77	10.6
Charge Time	4 hours from complete discharge		50	10.1
Pump Inches H ₂ O	-138		32	8.1
Flow (cc/min)	260		14	5.1



13.2 ENVAUS Specifications

Gas concentration and battery life specifications are the same as those for ENV100/200 shown above.

Operating Range			
Unit	Minimum	Maximum	Comments
Envision	0° C	60° C	
Pressure			
	Range		
Static	± 12 mBar	± 340 mBar	Comments
Accuracy	± 0.4 mbar	± 2% of reading	According to sensor manufacture specs.
Resolution	0.1 mbar	0.1 mbar	
T90	<1 ms	<10 ms	
Differential	± 12 mBar	± 75 mBar	
Accuracy	± 0.4 mbar	± 2% of reading	According to sensor manufacture specs.
Resolution	0.1 mbar	0.1 mbar	
T90	<1 ms	<10 ms	
Barometric 700 - 1100 mbar			
Accuracy	NA	± 8 mbar	
Resolution	NA	0.1 mbar	
Borehole Flow & Temperature			
	Range	Accuracy	Comments
Borehole Flow	-14.0 to +15.0 lph	± 0.3 lph	
Temperature	5 to 95° C	± 0.5° C	

Pump Specifications

Pressure (mB)	Flow (l/hr)
-344	15.6



14 Contact Information – Service and Sales

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