HazSim Pro 2.0 User Manual

12.18.2021 V2.2

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1. Overview

The HazSim Pro 2.0 system is made up of three main parts. The server, the LAN, and the Hazsim handheld. The system is contained with all accessory cords and a confined space probe in a Pelican case.

Figure 1: Components of the HazSim Pro 2.0 system. The Dual Pro 2.0 system will include two handhelds.

1.1 HazSim Server

Convertible laptop/tablet with touch screen is used by the instructor to control the HazSim handheld meter. The server can be used with the keyboard in laptop mode or flipped closed and used as a tablet for more portability. When turned on, the server should automatically boot up to the HazSim program. In instances where the server may have not been shut down properly after it's previous use, the program can always be reopened from the desktop icon. The server connects to the HazSim via the LAN.

1.2 HazSim LAN

The LAN creates the closed wireless network which connects the server with one or many HazSim handhelds. The LAN will work up to a one thousand foot range, about the length of three football fields, depending on obstructions (see Maximizing Range section 5). The SSID for the HazSim LAN is 'HazSim Extended'. It will NOT allow access to the internet, this network is for the training system only. Network setting should not be changed and are password protected. It is not recommended to attempt to connect to another network. Reach out to HazSim for advanced technical support.

1.3 HazSim Handheld

The HazSim device, once connected to the server via the LAN, can become any meter chosen by the instructor on the server. The HazSim has a power on/off button as well as A and B 'answer' buttons. The unit also has a touch screen which can be used in lieu of the buttons for answering questions as well as used to confirm power off of the unit. The HazSim also includes a confined space probe attachment point.

HazSim Handheld Screen (Figure 2)

- Off - Black screen / nothing.
- Charging - Battery icon shows when power pressed briefly.
- Starting Up - For up to 30 seconds when first turned on, the HazSim logo with white background will appear.
- On & waiting for connection - The small HazSim logo will appear on a black screen with 'waiting for connection' in the upper left corner.
- On & connected to server (waiting on instructor) - Client: 0 (or 1,2...)
- On & connected to server (instructor ready to go) - Meter will appear.

Figure 2: HazSim Handheld Screens

2. Powering Up the System

Included with each system is a laminated <u>Getting Started Guide</u> which is an abbreviated version of these instructions.

2.1 Startup Sequence

1. HazSim LAN: Connect included CAT5 Cable to POE (Power Over Ethernet) port on the POE Adapter (black box). DO NOT connect to LAN port. Connect power cord to POE adapter. Plug the power cord to a grounded outlet. A longer CAT5 cable can be used to extend the LAN from power source (rather than an extension power cord). For other ways to maximize range, see section 5 Maximizing Range.
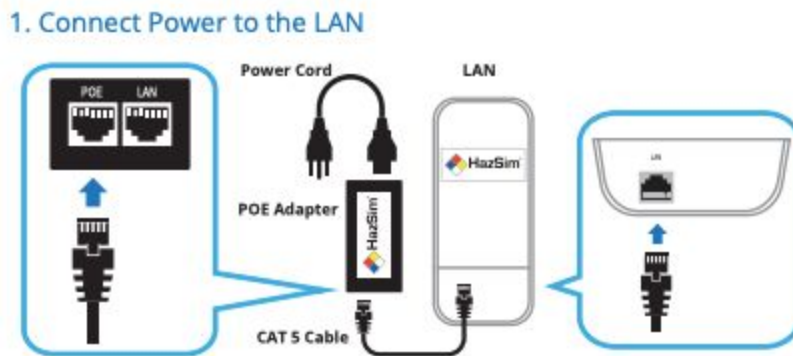
Figure 3: Setting up the LAN

2. HazSim Server: Open the laptop and press the power button on the side. The system will automatically log in and open the HazSim server software. If you were already using the system and had closed the program, simply re-open by clicking the desktop icon. The laptop can convert into a tablet for portability. The screen is a touch screen. The Hazsim server will automatically connect to the 'HazSim Extended' network.
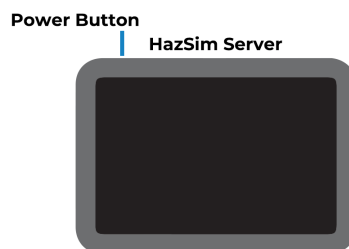
Figure 4: Power button for server.

3. HazSim Handheld: Press the power button (Figure 5) located on the right side of the HazSim for at least 2 seconds. Wait for the startup to complete, approximately 30 seconds. When the device has completed startup, it will automatically connect to the HazSim server. This connection will trigger a popup window on your HazSim server and you are ready to start training. The HazSim handheld client number will be shown on the server screen. If multiple HazSim handhelds are connecting you will have a popup window for each handheld on the server screen. To attach the confined space probe simply plug the hose end to the attachment port at the end of the HazSim. To detach pull sleeve back on hose end and gently pull.

Figure 5: Power button for HazSim handheld.

Figure 6: Confined Space Probe attachment point. Always remove probe for storage.

2.2 Turning Off the System

To turn the LAN off, carefully unplug the device. To turn the HazSim server off, press the windows logo on the lower left of the screen. Select the 'Power' icon then select 'Shut Down'. Wait until the server turns off before storing. To turn the HazSim handheld off, press and hold the power button for at least 2 seconds; a 'Power off' option will appear on the screen of the HazSim, select 'Power off' and the unit will power down. Detach the confined space probe before storing.

Figure 7: Powering off the HazSim handheld.

2.3 Charging the HazSim Handheld

When first plugged in there will be a charging icon displayed on the screen but then fades to save energy. If the power button is pressed briefly, the battery icon will appear again. If the power button is held for 2 seconds, the unit will turn on. When the HazSim is connected and in use, there is a battery life indicator in the upper right corner of the meter control screen. The icon on the meter control screen will display green when full or near full charge. Battery life after full charge is 4-8 hours depending on use.

3. Operating the System

3.1 Selecting a Meter

After powering up the system, once connected, the HazSim Server will show the **Meter Selection Window** (Figure 8). This is where you select which meter you will use for training. If the Meter Selection Window does not appear after start up, refer to the Troubleshooting (Section 7). If a second handheld is connected, it will appear beside the first meter. They will be labeled Client 0 and Client 1 (Figure 9).

Select by clicking the desired meter using either the cursor or touch screen. The window will then change to the **meter control window** (Figure 10) and the HazSim will reflect the chosen meter.

The HazSim Pro 2.0 is loaded with several meters from the factory including 4, 5 and 6 gas. The user can create custom meters via the server.

The green dot indicates that the server is broadcasting to the client/handheld/student. When the dot is red, the server is not broadcasting to the client. The meter icon in the top left corner allows you to change the meter type to send to the client. If you change the

meter type while the server is broadcasting to the client, the dot stays green and the new meter appears on the client. If you tap the green dot to stop broadcasting, the dot turns red. Then when you change the meter to a different type, the server will begin broadcasting again (and the dot turns green).
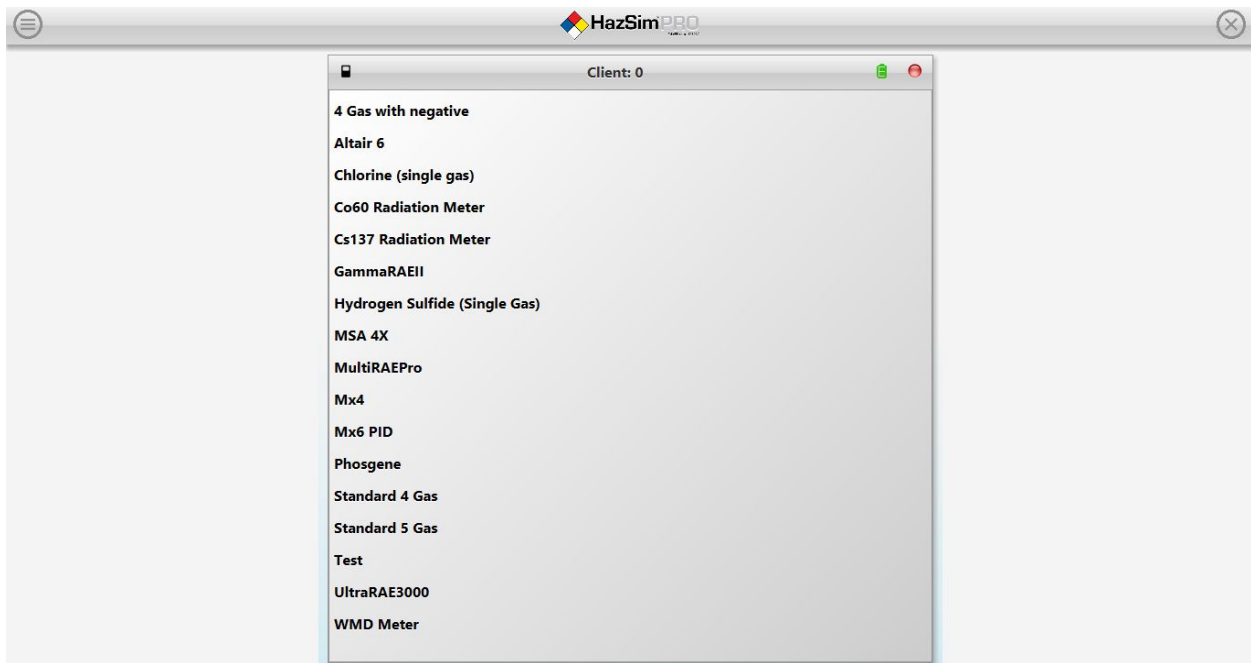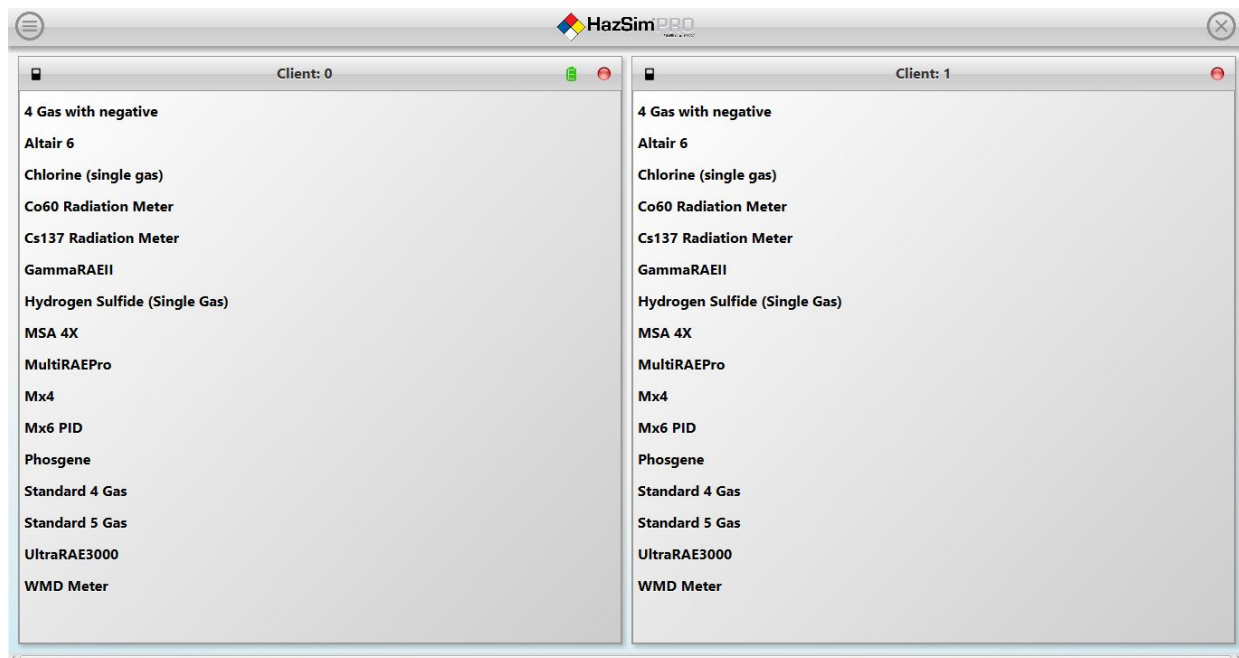

Figure 8: Meter Selection Window with meter options.

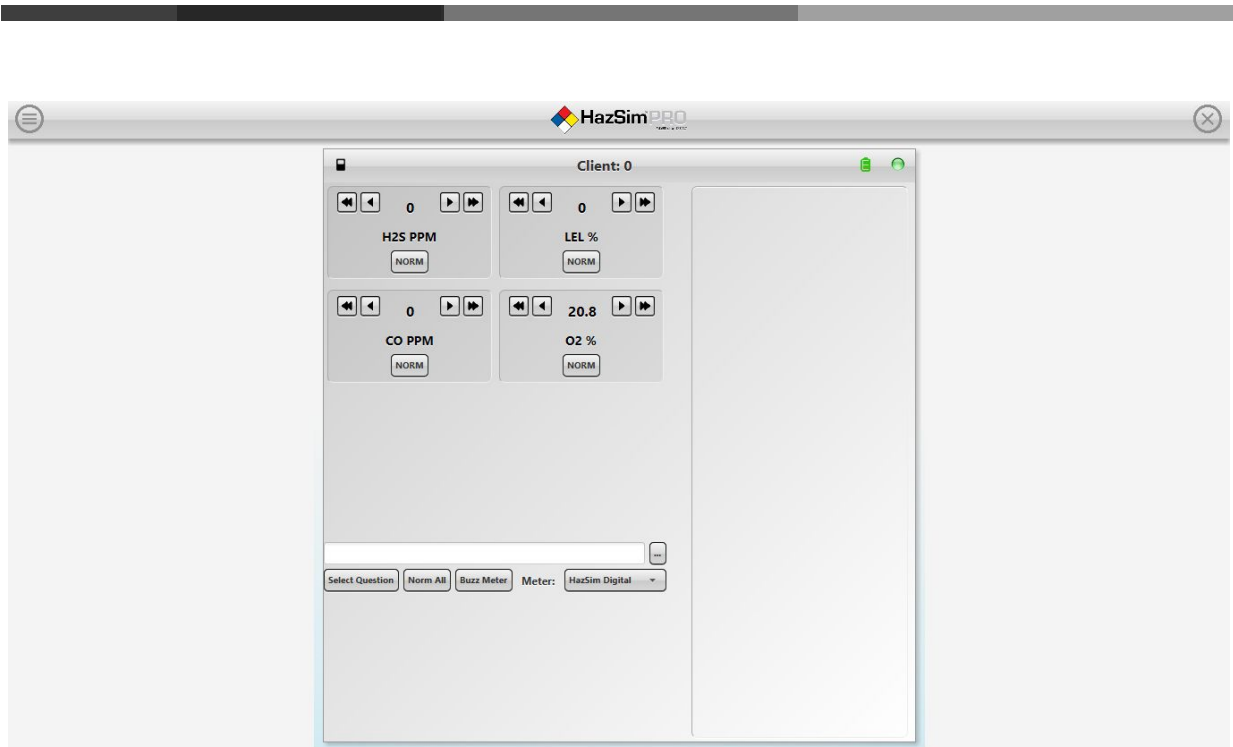**Figure 9:** Meter Selection Window with 2 handhelds connected.

Figure 10: Meter Control Window of Standard 4 Gas.

3.1 Controlling the Meter

To operate the HazSim, use the arrows to change the readings on the meter. Single arrow will increase/decrease by an increment value and the double arrow by a jump increment value. This is customizable when editing/creating a meter. (See section 4 Advanced Features.) 'Norm' returns the individual sensor to it's normal reading and "Norm all" returns all sensors to normal.

To change meters simply select the black meter icon in the top of the meter control screen and a previous list of meters will show. Select a new meter from the list and the HazSim will change to the selected meter.

Note to instructors: *Take care to change the meter appropriately and not to confuse the student during an evolution.*

Figure 11: Meter Control Window for a Standard 4 Gas.

Select Meter

Small Increment   Large Increment

Normal

Normalize All   Tag Comments
Gases

Change Meter Skins
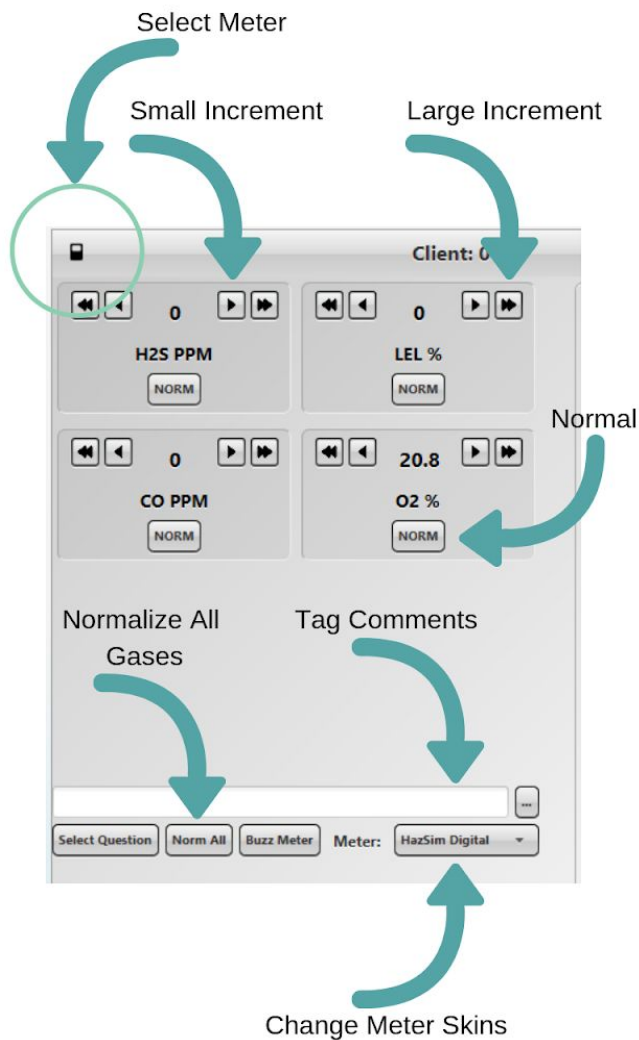
Meter Control Window buttons:

Single Arrow - Increase/decrease readings by a single increment value.

Double Arrow - Increase/decrease readings by a jump increment value.

Norm - Returns individual sensor readings to normal value.

Norm All - Returns all sensor readings to normal values.

Select Meter (small black icon in upper left) - Opens **Meter Selection Window** where you can change meters.

Buzz Meter - Press with cursor or touch and hold on screen to activate the alarm on the HazSim handheld. The alarm activation is direct from the button to be used to get the students attention back to the meter during training and is separate from alarm levels set for each gas.

Tag - The Tag feature allows the instructor to type any notes significant to a training event. Type in the box then click the three dots. The note will be saved and timestamped to the evolution.

Select Question - By pressing the Select Question button on the Meter Control Window you will be prompted to select a question to deliver to the student. To create or edit questions, see Section 4.5 Editing and Creating Questions.

Meter - Drop down list of different meter skins included in the HazSim Pro 2.0. HazSim Digital is the standard HazSim meter layout.

3.3 Asking Questions

Instructors are able to send questions to the student via the HazSim handheld in real time. Once received, the student can answer the question via touch screen or corresponding button on the HazSim handheld unit. The instructor can utilize standard questions pre-loaded on the HazSim Server or create custom questions and answers**.**

To do so, click 'Select Question' from the Meter Control Window, this will open the **Question Window** (Figure 12). You will have the option to select from different 'Question Sets' (Figure 13). Then select the desired question and correct answer. You are now ready to send the question to the student. Once answered, the question will be logged on the Question Status Window (Figure 14).
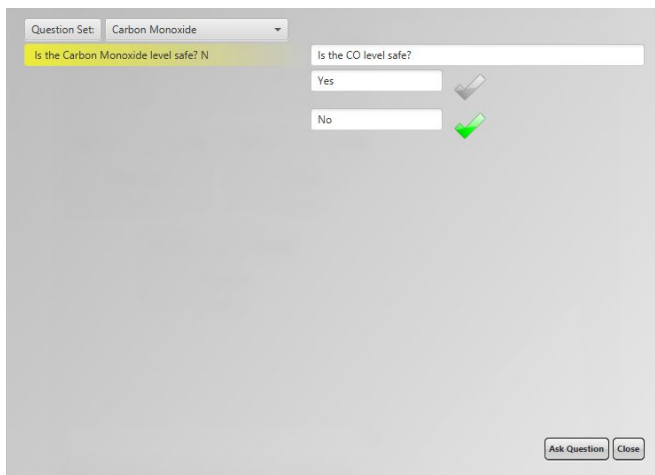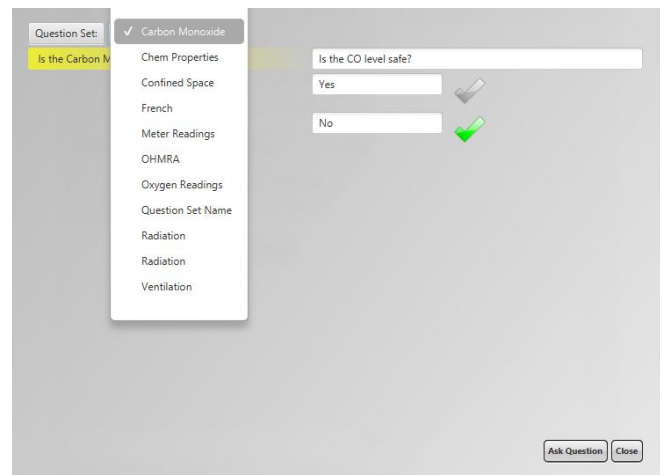

Figure 12: Question Window

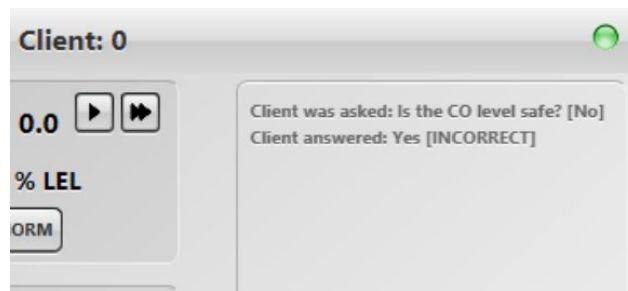**Figure 13:** Selecting Question Set

Figure 14: Question Status Window - Question and answer logged.

Note to instructors: *The HazSim Pro 2.0 is pre-loaded with standard questions and answer choices but can also be customized by the user (see Section 4 Advanced Features). Because the scenarios are dynamic, it is required the instructor 'know' the desired answer before giving the question. The system does not have the ability to know all of the variables in the scenario that would complete a correct answer. For example, a student may be asked, "Is the environment safe for your PPE?" while entering a toxic atmosphere. The correct answer would rely on what level of dress the student is wearing, thus the system cannot automatically know. Therefore each question is created with the desired answer in mind for the scenario. The same question, "Is your PPE correct?" may be used for a desired 'yes' answer when they are donning the correct PPE, as well as an incorrect answer if they are in the wrong PPE. The instructor must select the question that corresponds with the desired answer or intended plan for the drill. In short, whether or not the result of the answer is 'correct' or not is based on the instructor's intent of the question when given.*

4. Advanced Features

4.1 Editing Alarms

Your HazSim Pro 2.0 system has several factory preset alarms based on industry standards but may not be the same as your local protocol. To customize alarms, go to the drop down menu and select 'Edit Alarms' (Figure 15 below).

The Alarm Edit Window as shown in Figure 16 has a column for the meter/gas with minimum and maximum values. The minimum value is to be used for the oxygen sensor and the maximum values are for all other sensors.

The alarm will sound when the reading goes past the value entered. For example, if you want to have your device alarm at 10% LEL, you will be required to set the alarm at 9% LEL. The same applies for the oxygen sensor. If the desired minimum alarm is 19.5% O2, the alarm will have to be set at 19.6% O2.

To edit

1. Click on advanced features menu (see Figure 15)
2. Click on edit Alarm
3. Find the desired meter (sensor) (see Figure 16)
4. Edit the Alarm
5. Closing the window will save the changes
6. To add a new alarm after a new meter (sensor) was created select 'new'
7. The new meter will be added as O2 on the bottom of the list. Change the 'meter' value to the desired name and change alarm levels.
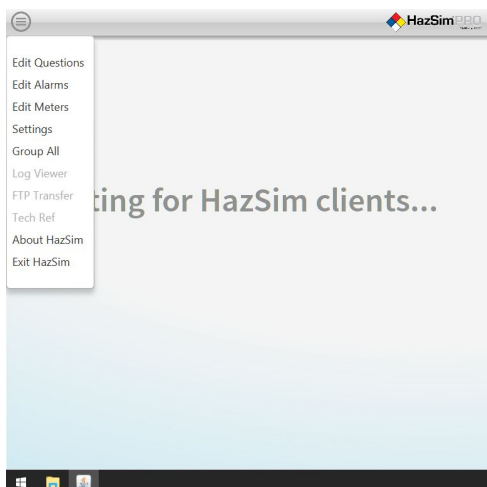

Figure 15: Advanced features menu.

Figure 16: Alarm Edit Window

Notes:

- The new 'meter' value must written exactly like the new 'meter'. Example: CL2 vs Cl2.
- If alarm level is set within your gas normal range the alarm will sound. Example: If you set your oxygen alarm to 20.9, it will alarm immediately
- Most alarms other than oxygen will have zero (0.0) as the minimum value.

4.2 Editing and Creating Meters

Your HazSim Pro 2.0 system is loaded with multiple gas monitors, radiation detectors, and CWA monitors. You can edit the existing meters or create new ones easily by following these simple steps:

4.2.1 To edit a meter

1. Click on the Advanced Features menu (see Figure 15)
2. Click on Edit Meters
3. Select a Meter Set (see Figure 17)
4. Select the Meter (sensor) to edit
5. Edit the Meter (see Figure 11 on page 9 for definitions)
6. To delete a meter (sensor), delete EVERY entry within the said meter (sensor). In other words, ensure all fields from Label to Max Value are EMPTY. Then, simply click on another meter (sensor) and it will prompt you to "save" the meter (sensor) you are trying to erase. ("Saving" will then delete that sensor.)
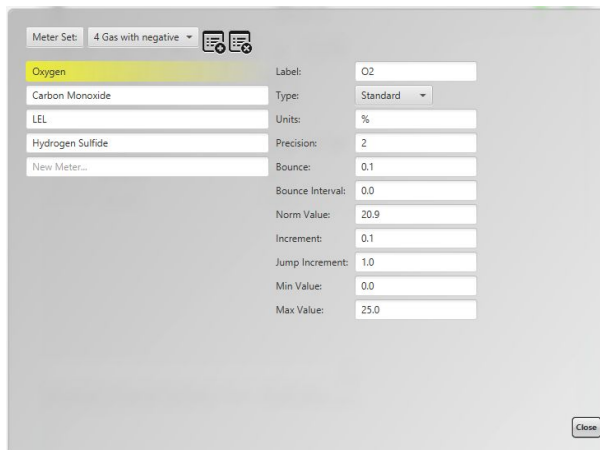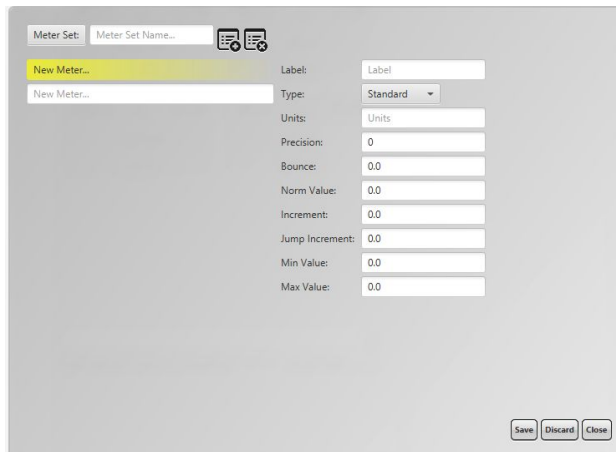

Figure 17: Edit Meter Window   **Figure 18:** Create a Meter window.

4.2.2 To create a meter

1. Click on Advanced Features menu (see Figure 15).
2. Click on Edit Meters.

3. Click on to add a Meter Set**.**
4. Name the new Meter Set in the New Meter Set name field on the left of the screen.
5. Name the meter (sensor) in the highlighted new meter field.
6. Fill the required fields on the right.
7. Repeat for each meter (sensor) to be added.
8. **Save** the newly created meter.

4.2.3 To delete an existing meter set, click on discard at the bottom of the window or the icon at the top.

Meter Set: Type of monitor such as 4 gas, 5 gas, rad, etc.
Meter: Individual sensors such as oxygen, carbon monoxide, etc.

 To **add** a Meter set.

 To **discard** a Meter set.

Label	How it will appear on the HazSim. Example: O2 for oxygen sensor.
Type	Describe the type of scale. Options: Standard, Exponential, Calculated, & Bar **Standard** for PPM, PPB and %, etc which changes in numerical increments as a regular gas. **Exponential** for radiation, raises in large increments and can 'auto scale' to change to larger units. Ex: uR/hr to mR/hr **Calculated** for radiation for both dose rate and cpm, calculated to specific isotope. **Bar** for CWA detector.
Unit	Unit that will appear on the HazSim. For example: % for oxygen, ppm for CO.
Precision	How many decimals will appear. 0 would show 1 ppm 1 would show 0.1 ppm 2 would show 0.01 ppm

Bounce	Will make the reading "bounce" by a number. For example: 0.1, O2 will bounce from 20.9 to 20.8 and 21. Set at 0 (zero) will have no bounce.
Bounce Interval	How often the reading will bounce. For example, 2 will bounce every 2 seconds. *Note: If Bounce is set to 0.0, Bounce Interval will not show up. You must first enter a Bounce number, save and close the meter set, then when you return to that meter set Bounce Interval will be available to customize.*
Norm Value	Normal value. Will go back to this value when "norm" button is selected.
Increment	Increment by which the readings will increase/decrease when $>$ is selected.
Jump Increment	Increment by which the readings will increase/decrease when $>>$ is selected.
Min Value	Minimum value that will appear on the HazSim. A negative reading can be programmed to demonstrate a bad zeroing / fresh air calculation.
Max Value	Maximum value that will appear on the HazSim.

Figure 19: Definitions for creating a meter.

Note to instructors: *You can use uneven increment/jump increment values to make your readings more realistic. For example, an increment of 6 ppm and a jump increment of 15 ppm for CO or an increment of 7 ppm and a jump increment of 75 ppm for a PID.*

4.2.4 Exponential Meter Edit

An exponential meter is used for radiation detector simulation and allows for auto scale units. When setting up an exponential meter, it should be established with multiple units, representing the threshold change every power of 10 (i.e.10^3 group). For instance, if these were for measuring distance, you would set the units up as mm, m, km for millimeters, meters, and kilometers. When you set the units, be sure to use a comma separated list with the smallest unit representing the minimum unit first (go from smallest to highest).

When setting up a radiation meter, set the units as uR, mR, R (can also edit for Sieverts as long as there is a comma between each unit). When the meter crosses the 10^3 threshold the units will change (i.e. auto scale) similar to an actual detector.

Label	Rad
Type	Exponential
Unit	uR,mR,R
Precision	1
Bounce	2
Bounce interval	2
Norm value	Background value
Increment	10
Jump Increment	100
Min Value	0
Max Value	1.0E8

4.2.5 Calculated Meter Edit

To Create a Calculated Meter Type:
1. From the main menu, select Edit Meters.
2. Select the appropriate meter set.
3. The calculated meter uses the value of another meter as it's input, so you will need to create at least one meter in this group that is "standard" or "exponential".
4. Next, create the meter name for the calculated meter.
5. Give it a label.
6. From the Type dropdown, select "Calculated".
7. In the Units, key in the appropriate units for the meter.
8. In the calculation box, key in the formula. When referencing the other meter (from step 4), place the name of the other meter in curly brackets. (e.g. {Radiation}.
9. Save.

For example, the current Cs137 meter is a function of the Radiation meter.

The Cesium meter is set as:

Label	Cs137
Type	Calculated
Units	kCPM
Calculation	0.0012 * {Radiation}

When you run the Cs137 Radiation meter in a session, the value of the Cs137 meter is 0.0012 times the Radiation value. The display for this meter will include both the rate and the cpm based on the calculation.

Figure 20: 'Calculated' meter displayed on HazSim for Cs137.

4.2.6 Chemical Weapons (Bar Graph) Meter Edit

The chemical weapons meter is already programmed in the system for G, B, and Vx. The bar graph changes from green to yellow to red, similar to front-line chemical weapons detectors. When editing this meter each bar represents an increment of 4. See the table below for basic WMD meter set up.

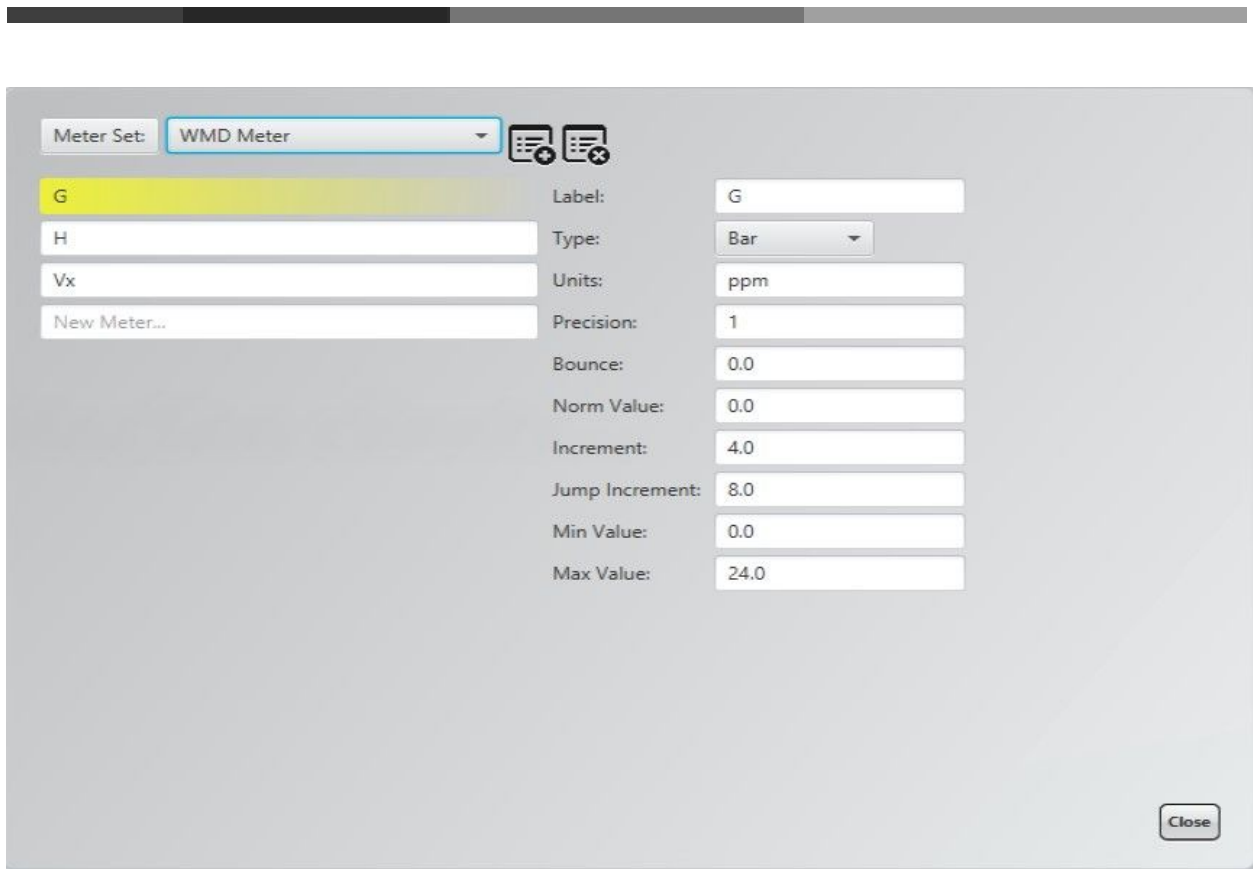**Figure 21**: WMD meter shown for G, B, and Vx.

Figure 22: Screen shot of WMD meter set up.

Label	G (need to save for each meter, i.e. B, Vx)
Type	Bar
Units	ppm
Precision	1
Bounce	0.0
Norm Value	0.0
Increment	4.0
Jump Increment	8.0
Min Value	0.0
Max Value	24.0

Figure 23: Set up for WMD meter as shown in Figure 21.

Label	PH3
Type	Standard
Units	ppm
Precision	1
Bounce	0.0
Norm Value	0.0

Increment	0.1
Jump Increment	1.0
Min Value	0.0
Max Value	20.0

Figure 24: Example set up for single gas: Phosphine.

Label	CO
Type	Standard
Units	ppm
Precision	0
Bounce	0.0
Norm Value	0.0
Increment	1.0
Jump Increment	17
Min Value	-5.0
Max Value	500.0

Figure 25: Example set up for Negative CO.

4.3 Editing and Creating Questions

HazSim recommends editing and/or creating new questions BEFORE commencing the training evolution. To do so, follow these steps:

1. Click on advanced features menu.
2. Click on edit questions.
3. Select or Add a **Question Set.**
4. Name the new question in the New Question field on the left of the screen. For editing, select a question in the list and it will appear highlighted in yellow.
5. Write the question in the top right field.
6. Write the answers in the fields below. Hazsim recommend a maximum of 2 answers.
7. Select the correct answer by clicking the check mark. The selected check mark will become green.
8. Save the new question or the edit by clicking save at the bottom right corner.
9. To delete the new question or the new edit, click Discard. This will undo your last change.
10. Close the Edit Questions Window.

Question Set: List of questions of the same subject

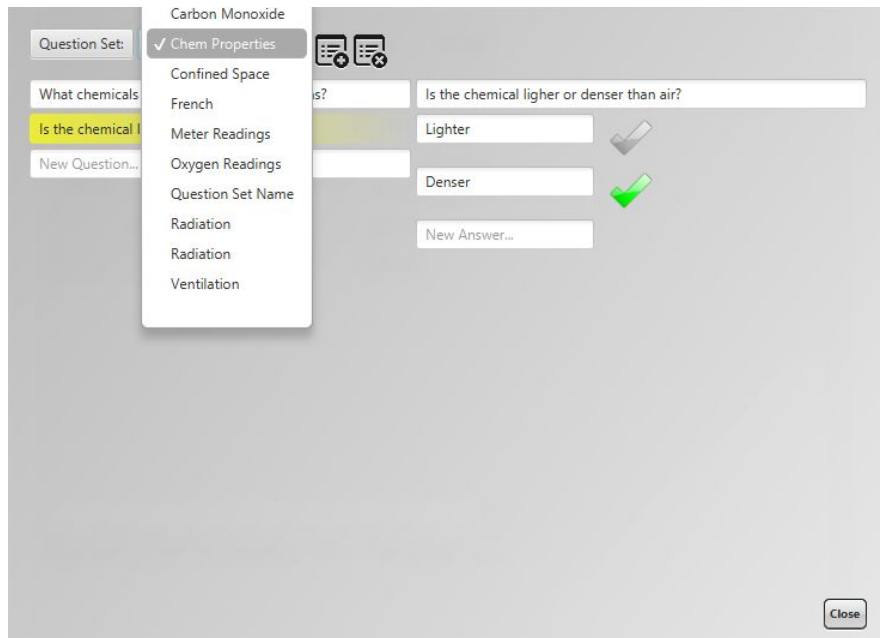 To add a question set

 To discard a question set
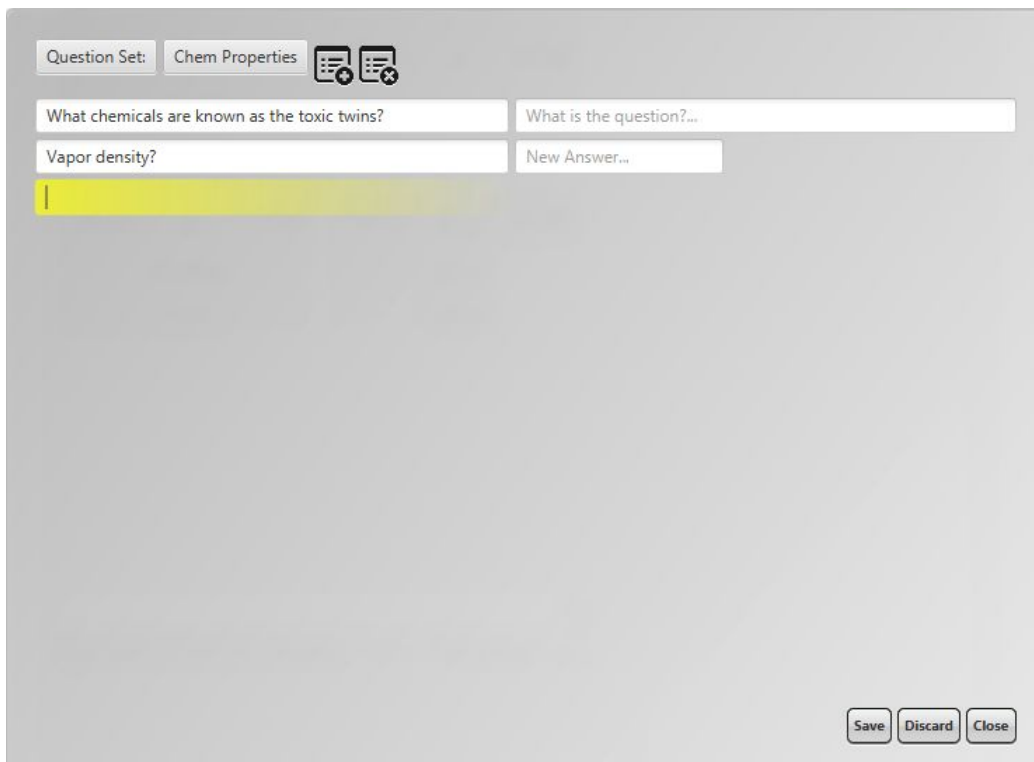

Figure 26: Selecting a question set.

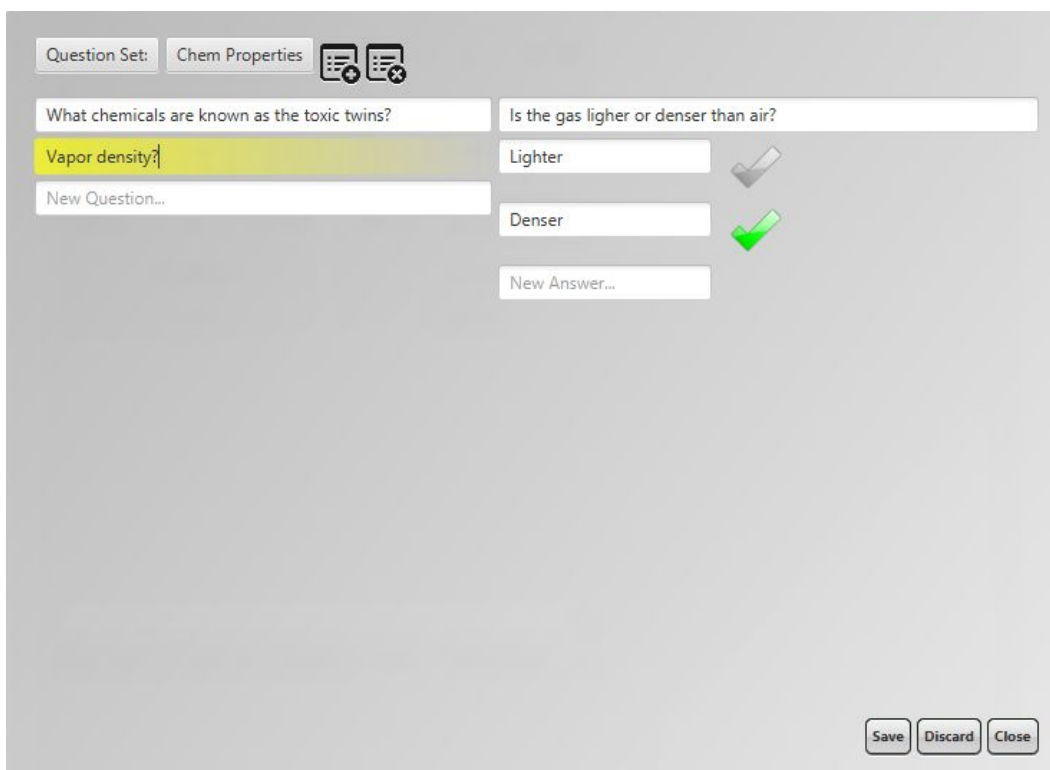**Figure 27:** Creating a new question.

Figure 28: Editing an existing question

4.4 Tag Feature

The HazSim tag function allows instructors to make notes during evolution so teachers can review with students later to reinforce what they learned or go back to review tricky concepts and encourage critical thinking. During the evolution a tag can be entered to mark a specific learning point.

To review the evolution use the drop down list and choose Log Viewer. The log viewer is saved for the date and time of the evolution and is specific to each meter if using more than one. Use the drop down menu to select date and client (student). The tags display as icons on the Log Viewer. On a laptop, open the Log Viewer, select the session, then hover over the icons at the top of the chart. On mouse hover, the text of the tag will display. The other icons include if the meter alarmed, as well as graphical representation of the readings on the meter during the evolution.
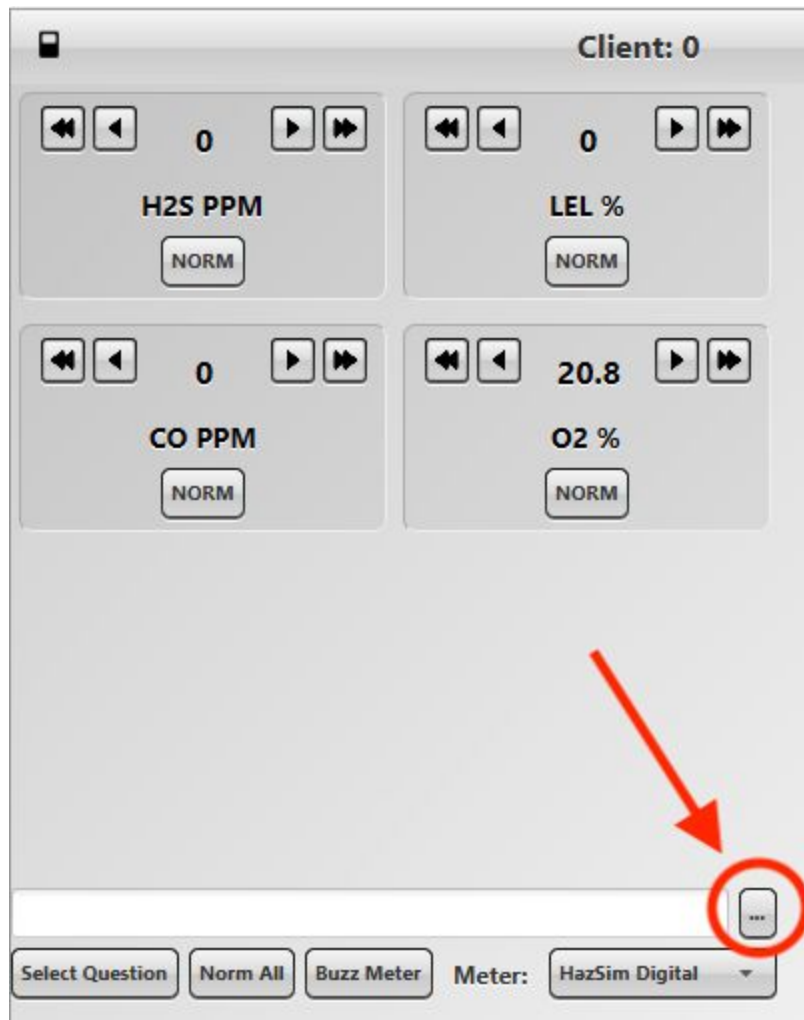
Figure 29: Tag field on the **Meter Control Window.**
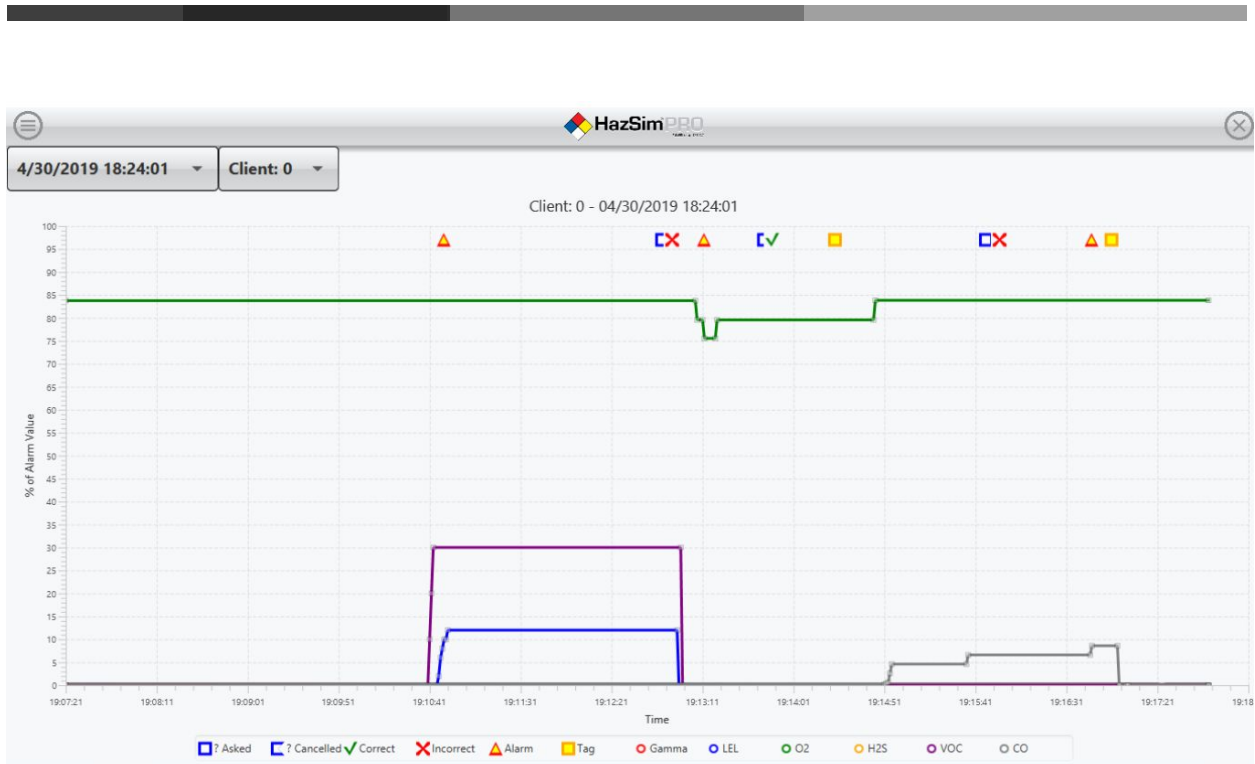
Figure 30: Log viewer screen includes graph of meter readings over time with each gas/sensor displayed as a different color.
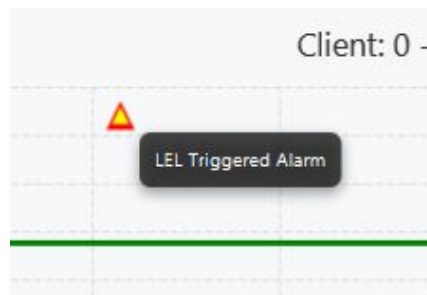

Figure 31: Icon for incorrect answer by student.

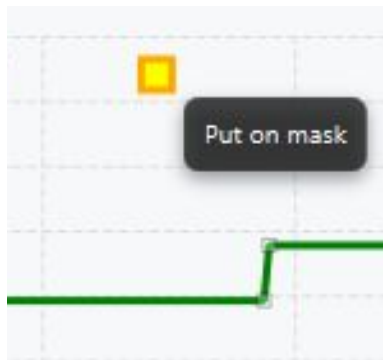**Figure 32:** Icon for when alarm is activated on Client 0.

Figure 33: Icon for when a 'tag' was placed. The exact readings on the meter as well as time will be captured.

4.5 Operating Multiple Handhelds (Grouping)

When using two or more HazSim handhelds by using 'group all' each HazSim that is currently connected will show the same meter/readings. When group all is activated the instructor server will only show one meter - which will be the same for every student. Group all is helpful in a classroom setting when the instructor is showing meter operations (e.g. demonstrating Oxygen displacement). When group all is off, each meter will appear in a separate meter control screen.

5. Maximizing Range

It is important to check your range obstacles prior to beginning your training session. In general if the instructor can see the LAN, and the LAN can 'see' the students holding the HazSim, the range should be good. If you are training in an area with thick concrete or steel, several feet below grade, reinforced vaults, or reinforced ships then additional equipment may be required. Consult a HazSim representative.

5.1 Positioning of LAN

Raising the LAN to a height which has an overview of the training ground can greatly extend the range of the HazSim system. If you can 'see' the LAN from both the HazSim position and the Server position this will maximize range. A longer CAT5 cable can be used to extend the height of the LAN being sure to plug in to the POE port on the LAN power adapter.

5.2 Training Area Obstacles

The signal is similar to any other radio device where lightweight constructed walls will not pose too much interference. Thick wall reinforced construction or thick metal walls as

found in some training props will restrict the signal. To overcome these obstacles set up the LAN near an entrance if possible, with the best view of both the HazSim and the Instructor. Consider the elevated approach as some construction will have thick walls but lightweight roofing enabling the signal to reach from above.

Note to instructors: *Always test the system ahead of the training session to ensure proper placement of the LAN in the training area.*

6. Training Scenarios

HazSim LLC recommends visiting www.hazmatnation.com for training scenario ideas, tips, and tricks.

7. Troubleshooting

Always test the system BEFORE your training session to ensure connectivity throughout the training site.

7.1 Connection Issues

If the system does not connect, review the quick set up section. If still no connection;
- Ensure the handheld and server are charged
- Ensure the CAT5 cable is connected to the POE connection on the LAN
- Reset the LAN by unplugging and repowering in the sequence recommended in the quick setup guide.
    1. Power the LAN
    2. Power on the Instructor Server
    3. Power on the HazSim handheld

7.2 HazSim Software Not Loading

If the HazSim software does not automatically start when the server is turned on, double click on HazSim icon on the desktop to manually start it.

7.3 Signal Loss & Interference

If the student handheld loses signal during a drill, the HazSim logo will appear on the handheld screen. Ask the student to return to an area where the signal is strong and re-select the desired meter from the meter list.

The standard LAN with each system is designed to be used without any other LANs.

Possible signal problems:

- Physical barriers may cause signal degradation or loss
- Server was connected to another network (wifi) and needs reconnected to LAN
- On rare occasions, large radio transmission towers may affect communication between components.

7.4 Battery Issues

7.4.1 Power Button Sticks - A sticky Power Button may cause inability to charge. On rare occasions, the ruggedized rubber casing interferes with the bower button causing it to depress and the handheld will not charge in this physical condition. Simply pulling the orange casing away from the power button will fix this issue.

7.4.2 Handheld Will Not Charge - First, see above regarding sticky power button. Second, ensure charging cable is properly plugged in. Third, ensure charging source has proper capabilities for the 12-watt USB and 2.5A charger provided.

7.4.3 Charging Time - HazSim recommends the student handhelds be charged overnight the night before any training for at least 8 hours.

Attempting to change the battery in HazSim Handheld VOIDS all warranty.

7.5 Possible Signal Issues

If you are experiencing problems with the signal, check the following possible reasons.

- CAT5 cable is plugged in LAN port and not POE port
- Physical barriers such as concrete or steel walls
- Poor LAN placement (place LAN as high up as possible)
- Insufficient power to LAN (ensure proper wattage)
- Server was accidentally connected to another network (Wifi)
- In very rare instances, strong radio frequencies can cause interference with LAN

HazSim Pro 2.0 Common Issues & Resolutions Quick Reference Guide

Issue	Resolution
HazSim handheld will not connect	Check LAN power, see connection issues section 7.1 Connection Issues
HazSim handheld will not charge	Ensure charging cord connected properly Ensure power supply is sufficient See section 7.4 Battery Issues
HazSim loses connection	See section 7.1 Connection Issues
Nothing on HazSim screen	HazSim is off Press and hold the power button located on the right side of the HazSim handheld for at least 2 seconds to start
HazSim screen shows Logo	HazSim is 'on' but not connected
Alarm sounds upon connection	Alarm value was set within normal range
Faint green and red light from housing	Handheld is plugged in and charging
HazSim A/B button unresponsive	The first instance of the button press upon start up might not be responsive, however, if pressed the second or any consecutive times after, the button should respond Alternatively, the handheld screen is touch screen and can also be used
Program loading time	Launching the program may take several seconds to load Please WAIT upon double-clicking the program to launch → Repeating the action might cause several programs to open. If so, close all other instances of the program until there is only one. There can only be one instance of the HazSim program running at a time whether it is the v1.0 or v2.0.
Custom meter will not save	Make sure the label you are trying to save it as has not already been used. The system will not save duplicates with the same name.