

Utilities and Transportation Industry Gas Detection Issues and Answers



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GfG Instrumentation



*World-wide manufacturer of fixed
and portable gas detection solutions*



Utilities and Transportation Industry Industry Gas Detection Issues and Answers

- Webinar goals:
 - Provide overview of gas detection issues and answers for the Utilities and Transportation Industry:
 - Workers
 - Employers
 - Contractors
 - Emergency responders.
 - Provide framework for assessing gas detection needs:
 - What questions should you ask and what issues should you consider?
 - What is the best gas detection solution?
 - Asking better questions leads to better solutions, and to better results for your company!



“Terrific 22”
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Gas detection issues and considerations

- “Utilities and Transportation” is a very broad category!
- Utilities and transportation industry managers deal with extremely wide range of atmospheric hazards, monitoring applications and activities.
- Hazards can be generally present or associated with specific activities (like CS entry).
- Managers need to anticipate critical requirements ahead of time.
- Dealing with atmospheric hazards is a constant concern!



Fixed or Portable solution?

- When hazards are generally present or associated with specific activities (like CS entry) gas detection solutions focus more on portable instruments.
- When hazards are chronically present, or present in specific areas, fixed gas detection should be considered as well.
- Optimal solution often includes both fixed and portable instruments!



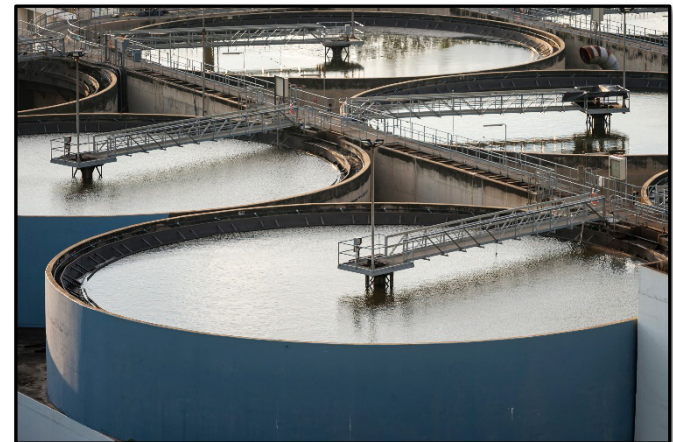
Utilities and transportation customers are involved with all types of safety and hygiene gas detection

- Personal exposure monitoring
- Confined space
- Construction
- Hazmat and emergency response
- Hot work
- Other activity-based monitoring



What kinds of companies are in the utilities category?

- Electric power: includes generation, transmission, and distribution.
- Natural gas: includes storage, transmission and distribution.
- Water supply: includes reservoirs, aqueducts, treatment and distribution.
- Water drainage: stormwater basins, storm drains, channels, rivers and flood response.
- Wastewater: sewage collection, treatment, and disposal of waste through sewer systems and sewage treatment facilities.
- Public utility departments: Involved in all the above at a state, city, county or regional level.



Utilities and transportation gas detection requirements can include



- Production (gas / power / water)
- Process
- Facilities
- Industrial hygiene
- Community (such as fence-line or nuisance odor)
- Regulatory (EPA)
- Disaster response
- Construction
- Tunnels
- Bus barns
- Depots / yards / terminals / airports
- Commercial aircraft maintenance



The presence of dangerous atmospheric conditions may be due to:

- Combustion / stack gas – CO / NO₂ / SO₂
- Materials being used at the site
 - Sealants (such as RTV silicone)
 - Solvents (such as alcohols and other VOCs)
 - Deicers (such as methanol)
 - Industrial gases: N₂ / Argon / SO₂ / Cl₂ / H₂ / CO₂ / NH₃ / etc.)
- Process chemicals being used at the site
 - Disinfecting chemicals
 - Water treatment chemicals
 - Odorants: mercaptans / other sulfides
 - Scrubber systems: NH₃



What are some of the primary concerns at water and wastewater treatment plants?

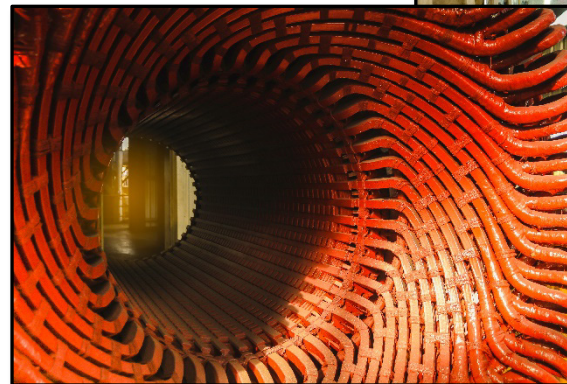
- Confined space entry!
 - Sewers
 - Digesters
 - Storm drains
 - Pits
 - Vaults
- H₂S – highly associated with hydrogen sulfide “sewer gas” produced by microbial action.
- LEL gas – produced by bacterial action.
- Oxygen deficiency – produced by bacterial action, rusting, displacement, or absorption.
- Carbon monoxide – usually from engine exhaust.
- Chemicals used to treat effluent or potable water – includes chlorine, ozone, chlorine dioxide, hydrogen fluoride (HF).
- Solvents and other chemicals illegally dumped into sanitary sewage or drainage systems.



What are some of the primary concerns at hydroelectric dams and power stations?



- Confined space entry!
- Hot work
- Shielding gases in dynamos and generators
 - H_2
- Displacing gases
 - N_2
 - CO_2
- Personal protection for specific gases associated with stack gas and / or power generation process:
 - CO
 - CO_2
 - SO_2
 - NO_2
 - O_3
- Sealants - RTV
- Stack gas scrubbing systems
 - NH_3



What are some of the primary concerns at gas storage, gas terminals and gas transmission plants?

- Confined space entry!
- Fixed detection systems!
- Combustible gas – methane / propane / butane / other combustible gases
- Odorant gases
 - Mercaptans and other reduced sulfides
- Inertion systems
 - CO₂
 - N₂
 - Ar



What are some of the primary concerns for aqueducts, storm-drainage systems and stormwater basins?

- Water mains and tunnels!
- Confined space entry!
 - LEL
 - O₂
 - CO
 - H₂S
- Diesel and heavy equipment exhaust:
 - CO
 - NO₂
 - CO₂
 - PID for ppm VOC



What kinds of hazards are in engine exhaust?

- Exhaust gas from diesel and gasoline engines primarily consists of nitrogen (N_2), water vapor (H_2O), and carbon dioxide (CO_2).
- A relatively small part of the exhaust consists of toxic materials such as:
 - Particulate contaminants (soot)
 - Carbon monoxide (CO) from incomplete combustion
 - Hydrocarbons from unburnt fuel
 - VOCs from incomplete combustion
 - Nitrogen oxides (NOx)



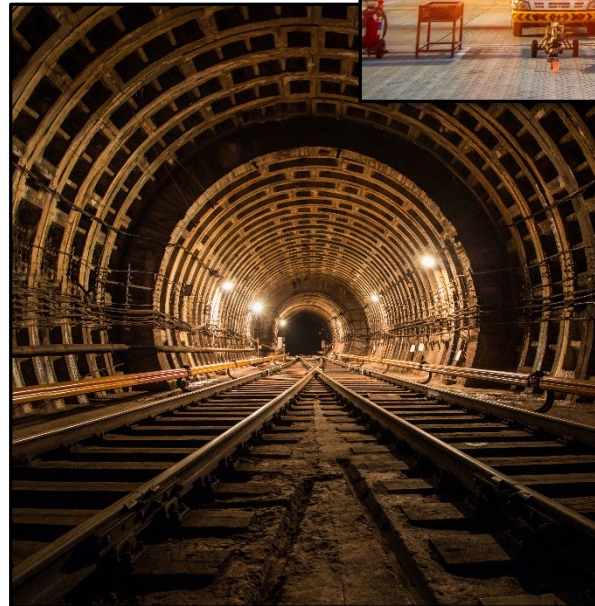
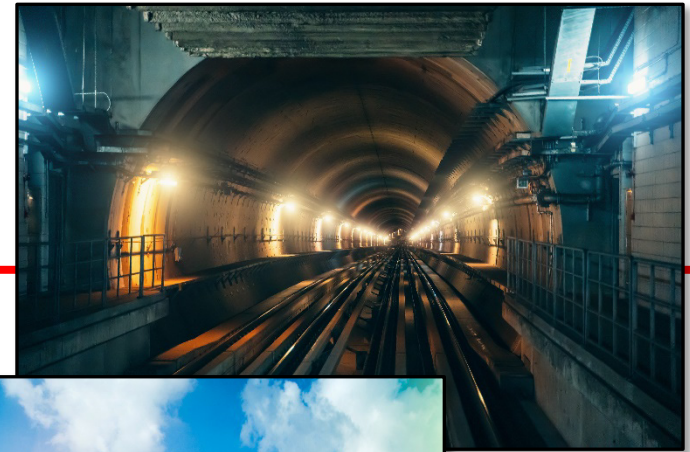
What atmospheric hazards are associated tunneling / underground construction?

- May fall under MSHA rather than OSHA:
 - Monitoring equipment may require additional MSHA certification
 - Hazards include:
 - CO
 - O₂ deficiencies
 - Combustible gas
 - NO₂
 - H₂S
 - VOC gases and vapors



What are some of the primary concerns for railroads, public transportation and at airports?

- Confined space entry!
 - LEL
 - O₂
 - CO
 - H₂S
- Tunnels!
- Fuel vapor / Jet exhaust
 - PID for ppm VOC
- Diesel exhaust
 - CO
 - NO₂
 - CO₂
- Solvents and deicers



What about commercial aircraft maintenance and jet fuel?



- Aircraft maintenance frequently involves multiple simultaneous CS entries!
 - Communication between team members critical
 - Consider wirelessly enabled instruments
- Jet fuel (JP-8) is very toxic
 - Contains benzene and other contaminants
 - Requires PID to take action at toxic exposure limit
 - TLV = 30 ppm
- Jet exhaust / diesel exhaust
 - CO
 - NO₂
 - CO₂



There are many new developments in gas detection!

- New products
- New sensors
- Wireless communication
- Integrated fixed and portable networks
- Third party support through call centers
 - Emergency response
 - Record keeping and notifications
 - Internet based maintenance programs



Do you have any plans to update, expand, replace or change the equipment you are currently using?

- If you intend to update or replace your current equipment, make sure to get input from everyone involved in the process of maintaining and using the equipment.
- Gas detection decisions are usually made by a buying team.
- Different individuals have different roles in the decision process, including process or facilities management, safety, hygiene, purchasing, and (often) union representatives.
 - Make sure you don't leave anyone out!
 - The same issue often looks considerably different to a manager with different responsibilities.
- If you have relationships with gas detection manufacturers and distributors you trust, get them involved!
 - Distributors generally have more than one manufacturer option.
 - Gas detection manufacturers are happy to discuss issues directly with end-user customers.
 - The Internet and social media are terrific tools for finding out what's new, and what customers have to say.
 - You have multiple sources of information!



What brand(s) and model(s) of gas detection equipment do you currently use?

- Before making a change or investigating new products, make sure you understand your current products and requirements
 - If you are not sure, make sure to find out the brands and models currently in service.
 - Make sure you understand the capabilities; the strong points as well as the weak points, of the products you are currently using.
- Ask the manufacturers or distributors of the products you work with (or are interested in) for help.
 - Download specifications and comparison charts if the manufacturer has them.
 - Discuss ways the manufacturer and distributor can help meeting your needs with regards to product, capabilities or support.



How well is your current equipment performing?

- This is a critical starting point in the conversation.
 - Are you generally happy?
 - Are you experiencing problems?
 - How old is your current equipment?
 - What features have you heard about that you are interested in?
 - What brand(s) and model(s) of gas detectors are you considering?
 - What are the alternatives?
- Distributors are a great source for product information!
- When in doubt, or with regards to advanced technical questions, ask the manufacturer!



Avoid being overly focused on price!

- Eventually, the decision of whether to proceed involves price and affordability.
- However, there is a difference between the initial purchase price and the true cost of ownership.
 - The questioning process is designed to uncover your needs, and what would provide the optimal solution.
 - Once you fully identify the problems and how the new product is going to help, it's easier to understand the costs.
 - Once you have clarified the tradeoff between benefits and costs is when to widen or restrict choices as a function of price.

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Identify “cost of ownership” issues

- Are you spending a fortune keeping your current equipment in service?
- Are you being charged a monthly fee for reports and factory support?
- Do you trust your gas detectors?
- Do you have many sensor failures?
 - If so, what kinds of sensors are failing?
- Do you have battery problems?
 - Do the instruments run long enough on a single charge or set of batteries?
- How often do you test and calibrate your instruments?
 - Do you do it yourself or use a service?
- Are there any special conditions or contaminants that are causing problems?
- Do you feel you are currently getting a good deal?



Who is currently looking after your instruments?

- Do you do it yourself, use a third-party service, or work directly with the factory?
- If you like the equipment you are currently using, and want to keep it in service, you might want to talk about maintenance agreements or refurbishment programs.
- Ask your local distributor whether they offer calibration or repair services.
- Ask your current manufacturer whether they have factory maintenance programs, or a loaner or replacement instrument policy.
- You should expect excellent after the sale support!



Don't overlook fixed detection system options

- Don't be afraid of fixed system solutions!
- Most common solution is often small standalone system with 1 to 4 points of detection.
- Larger systems can be complicated, but your manufacturer, integrator and distributor partners are there to help you through the specification process.
- Make sure you involve everyone who has a role in fixed and engineered gas detection decisions at the site
 - Don't overlook contractors involved in installation and maintenance
 - Don't overlook decision makers involved at the corporate level.
 - Good starting point is simple manufacturer questionnaire




Make sure you understand internal guidelines and procedures for fixed and process control gas detection systems



- Are fixed system decisions made by a third-party design firm or contractor?
- Are fixed system decisions made by managers at the site?
- Are there any open projects?
- Who is involved in the specification and evaluation process?
- Who is responsible for calibration and routine maintenance?

Example Fixed System Questionnaire

- Simple information but critical to know
- The questionnaire will help you to ask the right questions
- Vital to provide the best solution!



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CONTROLLERS

2-1 mA Modbus N/A

MA _____

door _____

dbus Two wire Three wire Other: _____

Inductive load Current required: _____ amp

Open Normally closed

Yes

Network, what interface is required? _____

_____ Threshold Ascending Descending


_____ Threshold Ascending Descending

_____ Threshold Ascending Descending

3 O₂ CH₄ Other: _____

_____ °F °C Humidity: _____%

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FIXED SYSTEMS APPLICATION QUESTIONNAIRE

Company: _____

Name and title: _____

Phone: _____

E-mail: _____

Address: _____

City/State/Zip: _____

Date: _____

Salesperson: _____

The information requested on this survey is for GFG Project Engineers.
 Exact specifications will help insure proper equipment for your application.

APPLICATION DATA

Describe your application: _____

Is the area considered Hazardous/Classified General purpose

Is the area currently being monitored? No Yes, list technology: _____

TRANSMITTERS

Output 4-20 mA Modbus Two wire Three wire Other: _____

Gas detecting CO NH₃ O₂ CH₄ Other: _____

Calibration gas Standard Special _____

Range required: _____ to _____ PPM %LEL %volume _____

Temperature range: _____ to _____ °F °C Humidity: _____%

Possible background gases / sensor poisons No Yes, please list: _____

Climate Indoor Outdoor

Voltage input: _____ VDC

Interfacing with PLC? No Yes, load: _____ ohms

Display required? No Yes

Modifications: (explain) _____

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In terms of units sold, single-gas personal protection is still the largest gas detection segment – but this is continuing to evolve

- A fundamental question is whether single or multi-gas personal instruments will do a better job of protecting your employees
- For personal protection instruments do you mostly use:
 - Single-gas H₂S?
 - 4-gas meters?
 - Other single-gas meters?
 - H₂S is still the most common single gas instrument, with CO a distant second, but don't overlook other toxic gases that may be present.
- Some of the other commonly used personal single-gas instruments include:
 - NO₂
 - SO₂
 - Ozone
 - HF
 - PID
 - As well as many others!



What sensor configurations do you currently use for confined space entry?

- Do you have the right configuration, or are you thinking about a change?
- How many / what kinds of sensors are installed in your instruments?
 - Traditional 4-gas (LEL / O₂ / CO / H₂S)?
 - 5-gas with PID?
 - Some other sensor configuration?
- What type of sensor are you using (or interested in using) for LEL?
 - Traditional CC LEL?
 - IR LEL?
 - MPS?
- Does the type of LEL sensor require changes in use or types of the other installed sensors?
 - Do you use different multi-sensor instruments for different activities or types of CS entry?
 - Confined spaces that contain VOC vapors?
 - CS entry into inerted vessels?



Multi-gas portable instrument considerations

- Do you have other gases of concern beyond the basic four most common atmospheric hazards (O₂, LEL, CO and H₂S)?
 - SO₂?
 - VOCs?
 - Benzene?
 - Hydrogen?
 - CO₂?
 - NO₂?
 - Other gases?
- Do you use pump equipped or diffusion for toxic gas measurement?
 - Is it possible to equip your single-gas meters with a pump?



Even more multi-gas questions

- Do you have alcohol, heavy fuels or VOCs on site?
 - VOC vapors are potentially explosive, but toxic at much lower concentrations.
 - Especially true for VOCs like benzene, toluene and xylenes.
 - Consider including a PID in multi-gas instruments used for fuel spills and other situations that involve VOC vapor.
- Do you run into VOCs during confined space entry?
 - If so, CS instruments should have PID sensor as well.



Further multi-gas considerations

- Do you have any other contaminants or toxic gas concerns?
 - Oil and chemical industry sites have a long list of potential contaminants.
 - Consider including additional sensors in the multi-gas instrument, or
 - Use specialty sensors in separate instrument.
 - Watch out for compatibility issues!



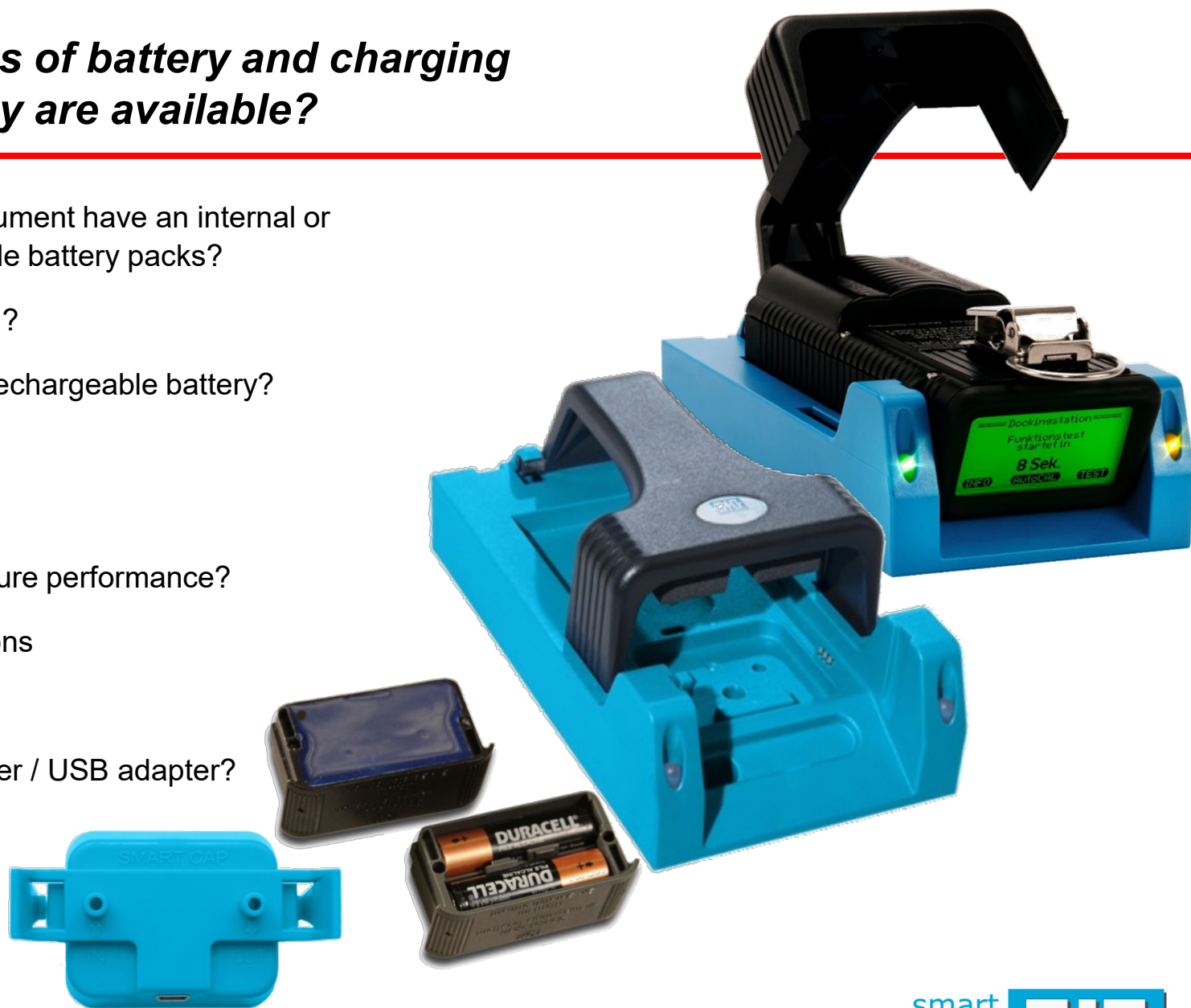
How do you sample the atmosphere from within the confined space?

- What instruments are you considering?
 - Is the instrument a diffusion only design?
 - Does the instrument have an attachable sample pump?
 - Does the instrument have a built-in pump?
 - Does the instrument have the option of switching from diffusion to sampling by means of the built-in pump?



What types of battery and charging technology are available?

- Does the instrument have an internal or interchangeable battery packs?
- Alkaline option?
- What type of rechargeable battery?
 - Li⁺ Ion?
 - NiMH?
- Cold temperature performance?
- Charging options
 - Cradle?
 - Wall power / USB adapter?



What about periodic testing and calibration?

- How often do you perform a bump test?
 - Before each day's use?
 - Do you keep bump test kits (with gas) with the instruments?
 - How do you prove your instruments have been bumped?
 - What do you do if you fail a bump test?
- How often do you perform a full calibration?
 - Do you use a docking station for bump tests and calibrations?
 - How do you prove your instruments are properly maintained and calibrated?
 - How do you retain maintenance and calibration records?
- Is your current strategy working?
 - Is it easy?



Are your gas detectors wirelessly enabled (or are you considering this option)?

- Most manufacturers now offer a “wireless” communication option.
 - Each manufacturer has its own strategy, with its own benefits and limitations.
 - Make sure you understand the wireless options and competitive benefits!
- Common communication methods:
 - Blue Tooth
 - Cellular
 - ISM RF
- Do you intend to use wireless communication during CS entry?
 - How do you get the information out of the space?



Have you addressed “third-party” issues?

- Do you intend to use a remote call center service to coordinate emergency response?
- Do you intend to use a third-party rescue service (such as a corporate emergency response team, or the local fire department)?
- How will you coordinate real-time emergency information with all involved parties?



What about after the sale support?

- Satisfaction is a function of ongoing support.
 - Atmospheric monitors and systems are life critical safety equipment.
 - You should expect excellent after the sale support!
- Don't forget to consider:
 - Warranty
 - Sensors
 - Instrument
- Technical support
 - Is your vendor there to provide help?
- Training
 - Videos?
 - In person?
 - Internet resources?



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 - Special kits and configurations for construction industry customers
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 - Find out if your Gas Detection Program is safe and compliant
 - Whatever your application, chances are your Safety Network Distributor experts have seen it and solved it!



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- Complete G450 ecoBump kit with G450 with O₂, LEL, CO and H₂S sensors, push-button regulator, cylinder of test gas and foam lined carrying case.
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Why sign up for a free assessment?

- Finding out ways to improve worker safety
- Recognizing what's needed to for regulatory compliance
- Special savings on the industry leading gas detectors from GfG Instrumentation
- Confidence you know the best solution!



Request a **FREE** gas detection safety assessment from the experts at your local AD – Safety Network Distributor

Find Out if Your Construction and Confined Space Gas Detection Program is Safe and Compliant.

Whatever your application, chances are your Safety Distributor experts have seen it and solved it. They are here to help.

What's in it for you?

- A yours-to-keep listing of recommendations
- Knowing what's needed to keep your workers safe
- Knowing what's needed to ensure compliance
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Questions?

Thank you!

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