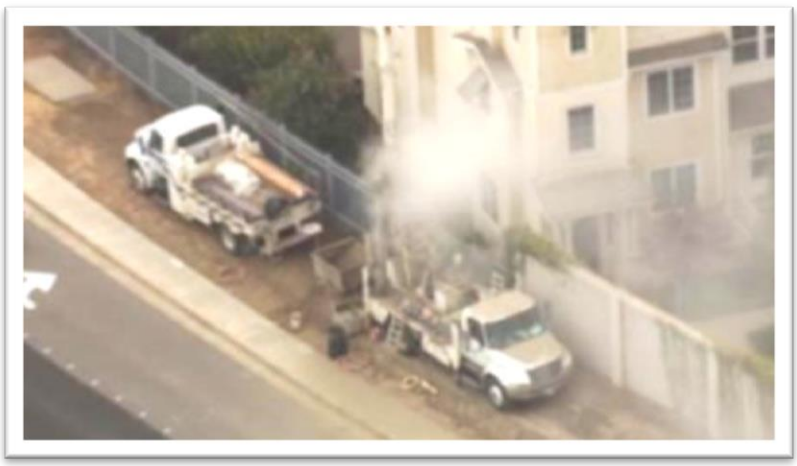
Public Health Investigation of Marina Bay Parkway Natural Gas Leak and Impact on the CDPH Staff at the Division of Environmental and Occupational Disease Control (DEODC)



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DEODC Emergency Preparedness Team (EPT)

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Background

On Friday, July 26, 2013, at about 9:45 AM, a high pressure gas main was ruptured near Pierson Avenue and Jetty Drive, on Marina Bay Parkway, approximately 0.09 miles south of Building P on the CDPH Richmond Campus. A visible plume could be seen shooting into the air until the leak was finally capped at approximately 11:30 AM. The Anchorage apartment complex was evacuated and the CDPH Richmond Campus was ordered to shelter-in-place (SIP).

Natural gas is comprised primarily of methane, an odorless, highly flammable and potentially explosive compound. Methane is not toxic but it displaces oxygen which can lead to asphyxiation in enclosed spaces. As a safety precaution, gas companies add an odorant to natural gas so that leaks can be detected by consumers. PG&E uses a 50/50 blend of Tetrahydrothiophene (THT) and Tertiary Butyl Mercaptan (TBM), each present at approximately 1 part per million volume.

Acute exposure to Tetrahydothiophen can cause headache, dizziness, weakness, palpitations, giddiness, nausea, abdominal pain and diarrhea. Chronic long term health effects are not known at this time [1-2].

Tertiary Butyl Mercaptan is an eye and respiratory irritant. Additional symptoms of exposure include cough, headache, dizziness, drowsiness and nausea [3].

The DEODC Emergency Preparedness Team (EPT) conducts public health investigations to understand workplace and community impacts from exposure to chemical hazards, and identifies methods to reduce similar incidents from occurring in the future. EPT carried out the following activities to characterize the incident that affected staff at the CDPH Richmond Campus:

- Administered a survey to DEODC staff present on Campus during the incident
- Constructed an event timeline
- Conducted interviews with emergency personnel from the Richmond Fire Department

The intent of this investigation is to better understand the impact of the gas leak on DEODC staff and to make recommendations that will serve to increase the safety of all Richmond Campus employees given existing hazards surrounding the location.

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[1] Hazardous Substances Data Base. Tetrahydothiophen. Toxnet: National Library of Medicine. Available online at: http://toxnet.nlm.nih.gov/cgi-bin/sis/search/f?./temp/~FB9dLf:1

[2] Hazardous Substances Fact Sheet: Tetrahydothiophen New Jersey Department of Health and Senior Services. Oct. 1999. Available online at: http://nj.gov/health/eoh/rtkweb/documents/fs/1827.pdf

[3] Hazardous Substances Data Base. Tertiary Butyl Mercaptan. Toxnet: National Library of Medicine. Available at online at: http://toxnet.nlm.nih.gov/cgi-in/sis/search/a?dbs+hsdb:@term+@DOCNO+1611

Event Timeline

We developed an incident timeline by reviewing the email messages from FMS to Richmond campus employees, times of events mentioned in the media reports, and times mentioned in email communications from DEODC staff to EPT members; and by conducting interviews with FMS, Richmond Fire Department, and DEODC personnel. Some of the times are exact based on timestamps in emails and others are approximate based on verbal communications. Bolded entries are to highlight communications from FMS to all staff.

Time	Who	Communication medium	Communication message or action
9:30-9:45	Building P staff	n/a	Began smelling gas (per survey responses)
9:40-9:42	Media	online	Gas line punctured (per media reports)
9:45	Building P 2nd floor supervisor	call	Called 911 from cell phone after smelling gas (per communication with DEODC EPT)
9:49	Building P 3rd floor employee	email	Notified FMS of gas smell in Building P (per communication with DEODC EPT)
9:52	Janis Thomas	email	Gas main hit, no evacuation ordered, more information when FMS gets it
9:58	Janis Thomas	email	Gas leak under control by FD, gas dissipating, "fans turned up in all buildings to allow the odor within the buildings to dissipate sooner"
9:59	Building P employee	call	911 call received by Richmond PD (per Richmond PD communication with DEODC EPT)
10:00	Terry Berger	email	No evacuation, "FMS H&S has decided we do not want to turn off any building's systems at this time"
10:14	Richmond Fire Department	FD dispatch	Shelter in place issued by Richmond FD Incident Commander to CDPH campus (per FD communication with DEODC EPT)
10:30 (approx)	FMS	PA announcement	Level 3 incident, expected to cause health effects, FD ordered SIP, entry gates closed, shuttle suspended (per DEODC employee communication with DEODC EPT)
10:30 - 11:30	FMS	PA announcement	Intermittent announcements with various messages: shelter-in-place; stay inside; do not smoke; vent intakes being closed down (per DEODC employees' communication with DEODC EPT)
10:30 (approx)	FMS	n/a	HVAC shut down after FD ordered SIP at ~10:30 (per FMS employee communication with DEODC EPT)
11:00	Media	online	"The gas is blowing about 30 to 40 feet into the air" (per http://www.contracostatimes.com/breaking-news/ci_23738533/richmond-gas-leak-forces-e); survey responses corroborated media reports
11:06	Building P 3rd floor employee	email	Reported gas smell in the office to DEODC EPT member

11:20	Greg Oliva	email	Indicated RLC communication provided over the building speaker system; wanted that to serve as the latest information for staff
11:30	FMS, media	online	Leak capped (per media reports and FMS employee communication with DEODC EPT)
11:33	Janis Thomas	email	Spoke to Richmond PD, building not being evacuated; have been told to continue following RPD and RFD direction and not what is on the news
12:20	FMS	n/a	HVAC turned on when SIP lifted at ~ 12:20 (per FMS employee communication with DEODC EPT)
12:21	Janis Thomas	email	Richmond PD informed her "all clear", SIP lifted
15:00	Media	online	Gas leak repaired (per media reports)

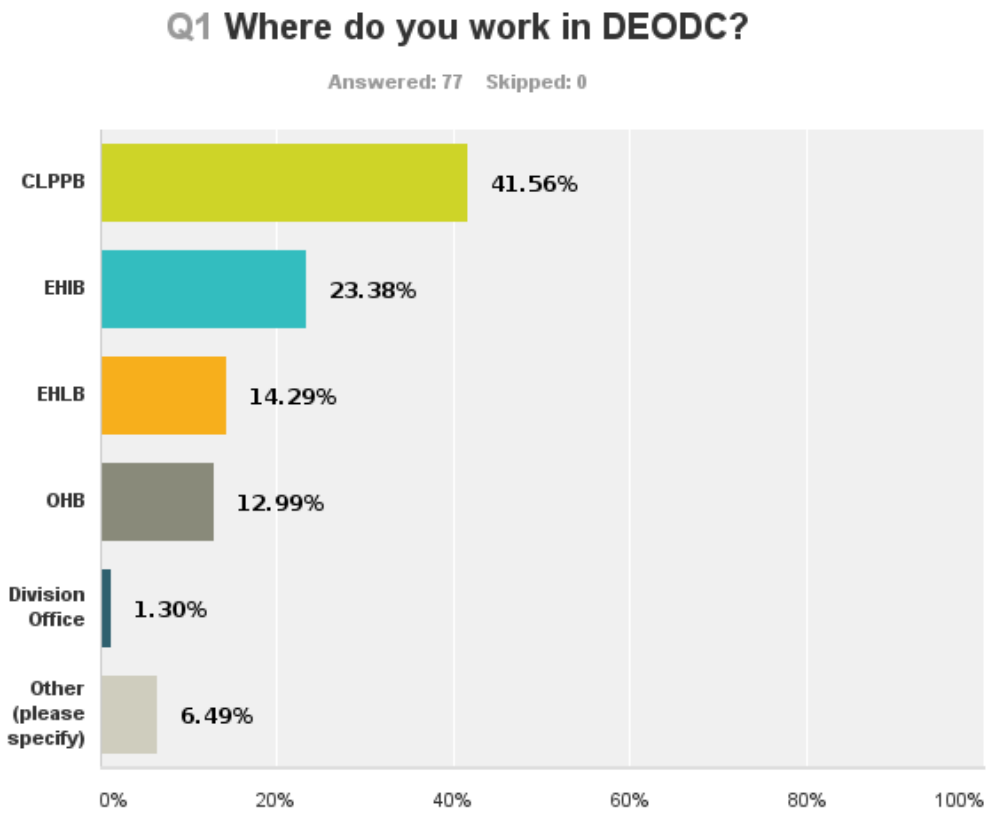
DEODC Survey

DEODC EPT conducted an online survey using Surveymonkey.com to capture health effects, staff perspectives, and experiences on the day of the gas release.

EPT developed the survey on Monday, July 29th. DEODC staff self-administered it between Tuesday, July 30th and Monday August 5th. The survey contained 26 questions, both quantitative and qualitative, including experience with gas inside the building, chain of events, areas of confusion during the incident, and health effects. Seventy five (32%) of DEODC's 236 employees completed the survey. Since a high percentage of employees work at home on Fridays, we consider the response rate to be adequate.

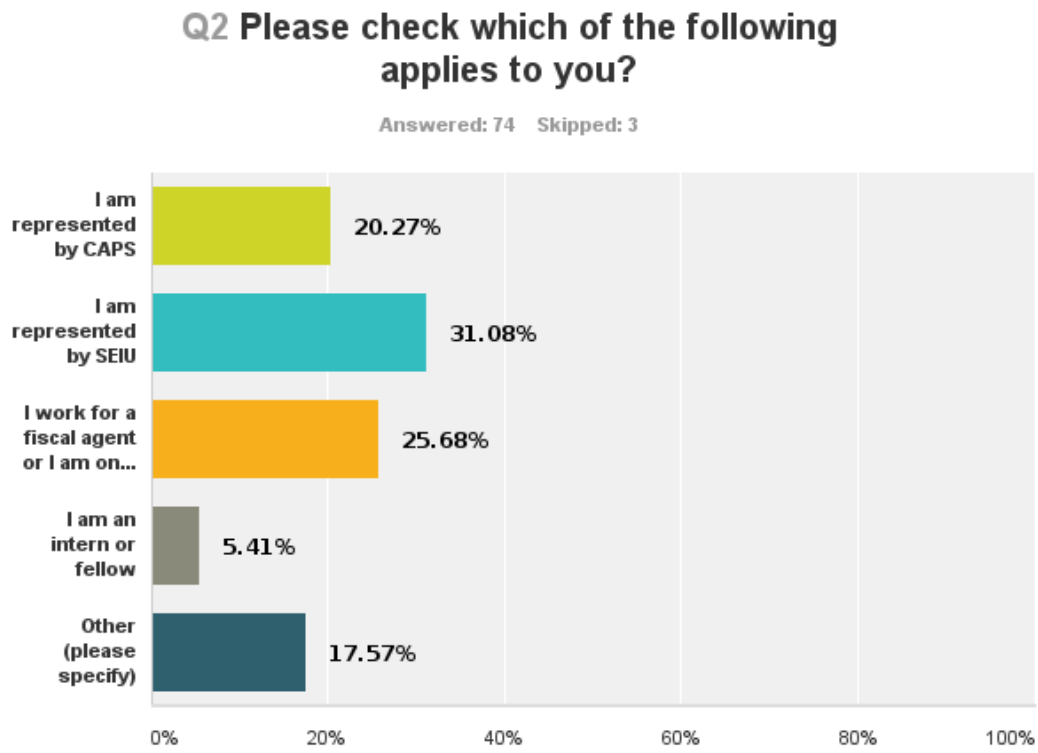
Given the quick turn-around of this report, we will allow graphs representing quantitative data to stand alone. We included additional information from the respondents' comments below the graphs, where appropriate. For qualitative data, we summarized major themes from the narratives and included select quotes from the respondents.

Q1. Place of work



The "Other" category included staff from DCDC and Office of Health Equity, housed near DEODC Division office space.

Q2. Representation



The "Other" category included BU16, ACSS, UAPD, CalPERS, managers and supervisors.

We asked the question about representation because we became aware that some employees contacted their unions to clarify leave questions.

Q3. Chain of events narrative

In Question 3, we asked respondents to "Please describe the chain of events as you experienced them last Friday. Include such information as the messages you received from FMS or others, when/if you smelled gas, when/if you left the building or reentered the building, if you felt ill, if you went home and any other pertinent detail".

Seventy four respondents answered this question. Several major themes emerged from their narratives (bolded in the descriptions below), with the preeminent themes being poor communication, confusion, and health symptoms.

Many respondents observed that there were **no clear and timely communications, directions, and instructions** of what to do during the event. Once people smelled the gas indoors between 9:30-9:45, they took immediate action themselves: contacted PG&E directly, sought information from other sources, called Poison Control, and self-evacuated (as would be expected if one smelled gas indoors). Some staff congregated in a "central area" to discuss appropriate course of action, given that the first email from FMS was not sent out until 9:52 and there were no PA announcements until an hour later.

Select quotes:

- …The person we initially spoke with at PG&E told us we should evacuate the building…
- …No clear communication whether to stay inside or outside until 10 AM…
- …There was no announcement made over the loud speaker to evacuate/no communication to staff about what was happening… It wasn't until later that we received any audible notifications from FMS about SIP (the first of which were really hard to understand) over the loud speaker or by email about what was going on; and it seemed like it took quite a while for the air handlers to be turned down & for FMS to notify us that this was occurring...

A lot of respondents also remarked that there were **conflicting messages** and instructions which caused quite a bit of **confusion**.

Select quotes:

- …By 10:30 it was becoming obvious that no one really knew what to do…
- ...Information from FMS came piecemeal and contradicted itself in some instances and no action steps or instructions were communicated promptly, so it was unclear what to do…
- …We were informed that the leak had been contained, that we should stay in the building, and that ventilation would be increased to disperse the gas…
- …Intermittent announcements were broadcast over the PA, emphasizing the shelter-in-place, but one announcement stated that, "The Richmond campus has been ordered to evacuate," followed by a long pause, and then, "The Richmond campus has NOT been ordered to evacuate." Needless to say, this did not instill a lot of confidence in me…

A large number of respondents reported **exacerbation of health symptoms** with time spent indoors and were concerned for their personal welfare when shelter-in-place was issued.

Select Quotes:

- …Several people with symptoms felt that sheltering in place would worsen their symptoms and decided to leave…
- …when told to shelter in place I re-entered the building. By then the nausea and headache I originally had worsened and I was getting short of breath…
- …I didn't feel safe at all when it first happened but I couldn't leave the bldg without an order from upper management…

Some respondents expressed **lack of trust in facilities management**. They substantiated it by concern over delay in communications, conflicting messages about increase in ventilation rate shortly before the SIP order, poor and unclear PA announcements, receiving no explanation of what a "Level 3" event meant, not receiving an explanation why Richmond Campus was being SIP rather than evacuated, and their health concerns because of the strong and lingering gas smell in the building. Additionally, several respondents mentioned an unknown man in a vest and hard hat, with unknown authority waving people back into Building P and stating "It's nothing" or "It's ok".

Select quotes:

- …A man came out and waved his arm to motion us back inside, and some of us shouted "Who are you?" to see what authority he had. We heard him say, "There's been a gas leak" and "Shelter in place" and "It's OK". FYI, we did not appreciate that last comment of "It's OK" -- it is not OK when there is a continuing smell of gas inside and outside. Some people distrusted the instruction and stayed back several more minutes before re-entering…
- …Eventually we were told by someone with hardhat that we should all go back inside - this made NO SENSE to me, since there was a lot of gas inside bldg…
- …I think the final straw was when the facilities said that they had increased the fans to blow out the gas smell - which did not seem to make any difference - and that the plume that we could see from the 3rd floor changed direction to go directly toward the building…
- …I did not trust the messages coming from FMS, which seemed to be contradicted by people I trusted…

Finally, the survey showed that many respondents did what they **personally thought was right**.

Select quotes:

- …Although we suspected the release was probably from the construction outside, we purposefully evacuated out the exit from the furthest location from the construction on/near campus because we recognized that it was really windy outside and the air was likely to be a bit better on the other side of the building than it was trapped inside the building…
- …Despite the order to shelter in place, I felt that my instincts, personal discretion, and common sense were better guides in this situation…
- …I personally could not see any benefit in staying exposed on site, when I could easily go home and be unexposed…

Q4. Areas of confusion narrative

In Question 4, we asked "Please comment on any areas of confusion during the gas leak."

Sixty nine respondents answered this question. Several major themes emerged from their narratives (bolded in the descriptions below), with the preeminent themes being contradictory messages, not understanding why the campus was sheltered-in-place when the gas smell was making staff sick indoors, and no confidence in facilities management handling the incident well.

Respondents commented that **contradictory messages** they received from a variety of sources contributed to the confusion and anxiety. Early on, FMS indicated that the leak has been controlled but later retracted that information. Some respondents indicated that the PA announcements were difficult to understand and that the person making the announcements provided conflicting information within the same message. Some respondents commented that those outside had no way of hearing the PA announcements and staff with smart phones were receiving emails and reading them out loud. Prompt and frequent communication by FMS via PA (with a redundant email) on what was happening, what decisions were being made by them or the Fire Department would have instilled more confidence in survey respondents. Some did not know what SIP meant exactly and the feelings of insecurity and confusion were exacerbated by conflicting reports from news sources and instructions by PG&E and Poison Control to evacuate if there is a smell of gas.

Select quotes:

- …Every announcement was more confusing than the last. Seemed a bit unorganized. No frame of reference, what does a level 2 versus a 3 gas leak mean?...
- …Loudspeaker hard to understand…
- …Employees were very anxious, didn't know what to do, and felt they were not receiving information or the information was confusing…
- …Delayed response by FMS provoked concern, anxiety, confusion, and distress, among other things; limiting announcements to the PA system meant that people who were outdoors were not well informed…
- …The notifications from FMS should have been quicker and more comprehensive…
- …FMS should have sent an email immediately and gone over the PA system immediately. Even if that email is, "there is a gas leak down the road, we will investigate and get back to you" -- that would have been more reassuring…

Respondents did not understand why Richmond campus was under SIP orders while other areas evacuated. Because the PA announcements and emails from FMS did not offer the reasons behind the SIP decision, it added to the confusion and fear of further risk of health effects. Respondents felt their **health symptoms were being ignored** and wondered whether facilities management was aware of staff getting sick indoors. Some respondents were confused about the decision to increase the ventilation when it seemed to bring more gas into building and also wished to know whether FMS assessed the building for gases prior to HVAC shut down when SIP got ordered.
Select quotes:

- …There seemed to be no concern that there might be adverse health effects to those stuck inside the building…

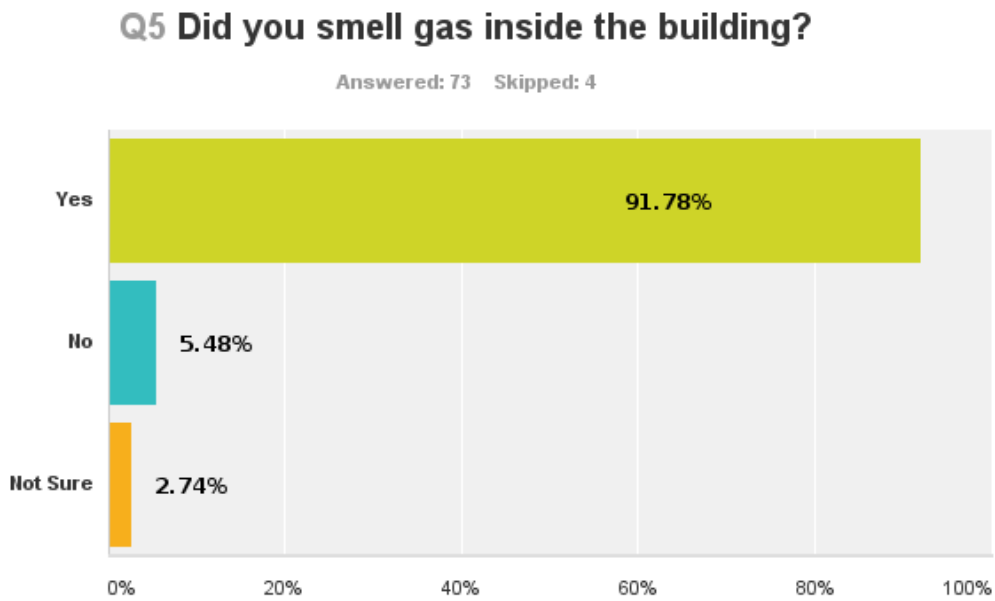
- …When the Richmond Fire Dept. wanted us to shelter in place they not even bother to come into building P to monitor the gas fumes in the building. People were told to go outside then told to come in. There was clearly a break down in communication…
- …Don't think Incident Command knew we were feeling sick inside…
- …Were the Richmond Fire and Police informed that fumes were within the facilites before they made the decision that we should not evacuate?...
- …Mostly, it was just confusing to be asked to SIP when the gas smell indoors seemed worse than outdoors…
- …A protocol needs to be in place regarding exposures in the building and area (note the ammonia company next door) such that in the event of acute and accidental exposures ensure employees are not unduly exposed, and also that we are not penalized for leaving (with the consent of our supervisors) due to the effects of the exposure…

Many respondents did not feel that the facilities management handled the incident well and indicated that they **did not have confidence in FMS**.

Select quotes:

- …It seemed like FMS had no idea how to handle the situation. They didn't shut down the ventilation system anywhere near soon enough. they were told that the leak was under control and so they turned on the fans, when you could clearly see the actual plume within a couple hundred yards of the building and that the leak was not under control…
- …I'm not sure how FMS verified what the emergency was but just looking out the window, you could see all of the police/fire truck activity and realize the release was coming from outside and fumes had entered and gotten trapped in our building. I'm concerned what will happen if there is a release at Dreisbach…
- …Why shelter in place during a gas leak? Why evacuate some buildings and not others? Were the FMS personel who were ordering shelt in place in the building? Did anyone monitor indoor air levels to determine the building was safe to enter? Was the HVAC on or off? Is the HVAC able to filter methane or natural gas? Why did it take FMS so much longer to respond to the leak than employees who were in the buildings? Why was an evacuation not ordered? How should we respond to different sets of instructions from different people? Who is FMS, where are they located, why should we trust them?...

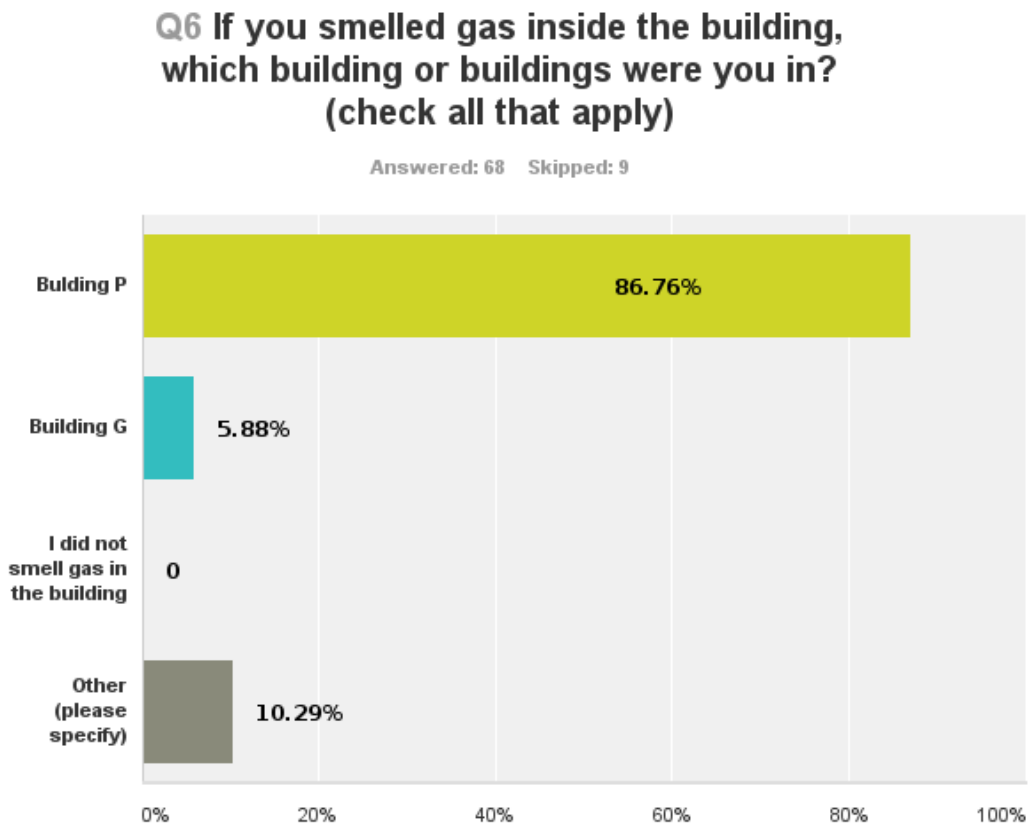
Q5. Smell of gas – inside



Of the surveyed respondents, 14 provided comments about the magnitude of the odor; nine said the odor was "very strong" and five said it was "strong".

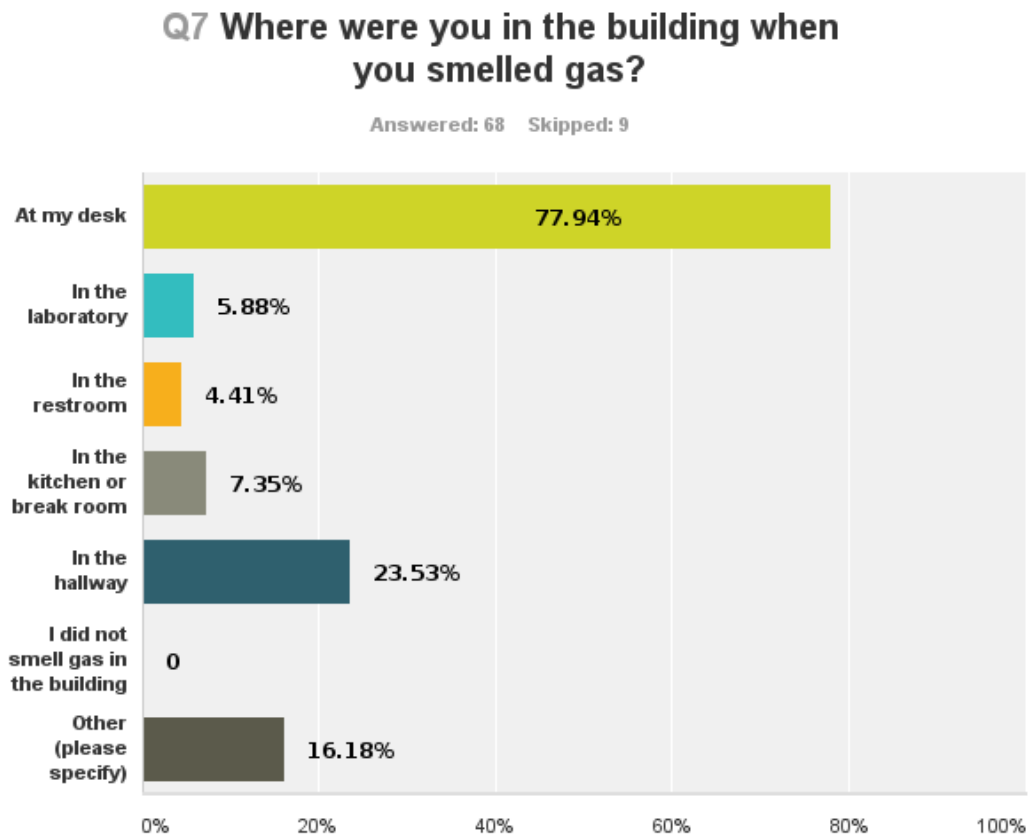
One respondent commented, "…very strong and it made me faint and nauseous…"

Q6. Smell of gas – which building



The building referred to in "other" generally reflect Building D, as indicated by the written comments (7).

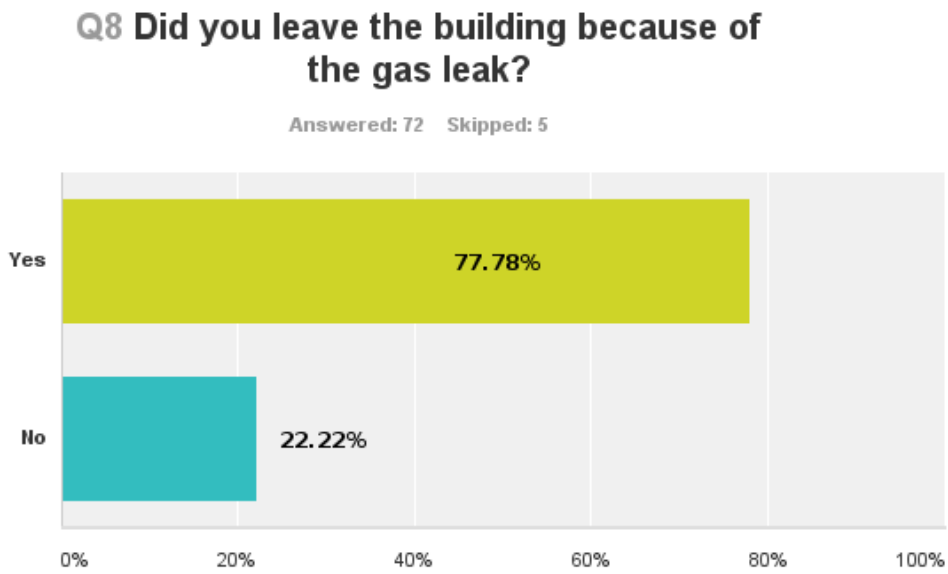
Q7. Smell of gas – where in the building



Results from the survey and respondent comments show that gas was pervasive throughout Building P.

One respondent commented, "…I arrived at work as people were evacuating and smelled gas in the parking lot as I waited to enter the building. As I entered the building, I smelled gas everywhere I went: in the entry way, in the stairwell, in the hallway, and at my cubicle…."

Q8. & Q9. Leaving the building

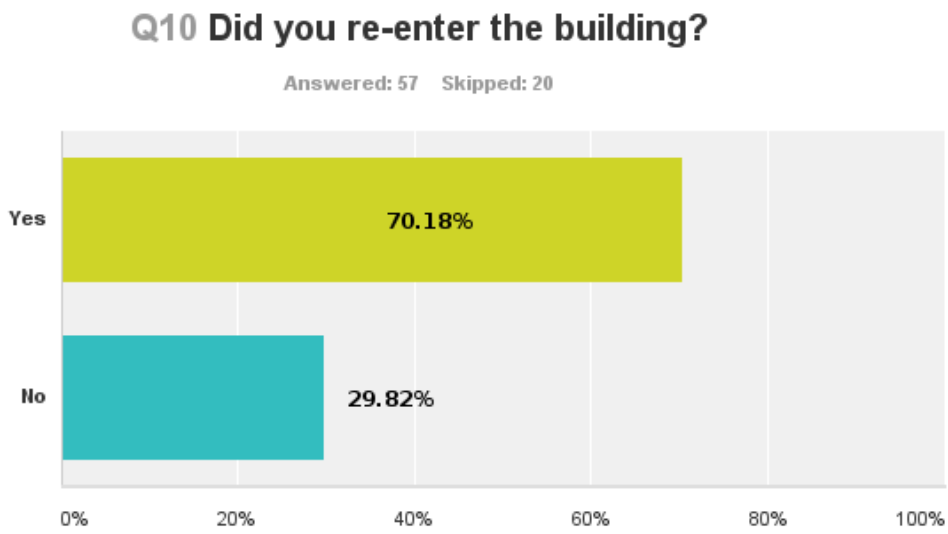


One respondent commented: "…I tried to comply with the shelter in place and felt conflicted about leaving, but I could smell the gas and I decided it wasn't healthy to stay…"

In Question 9, we asked those who left the building, "How long did you wait before leaving the building following the gas leak?"

Time	Number of respondents
5 minutes or less	6
6-15 minutes	17
16-60 minutes	15
more than 1 hour	13

Q10. & Q11. Re-entering the building

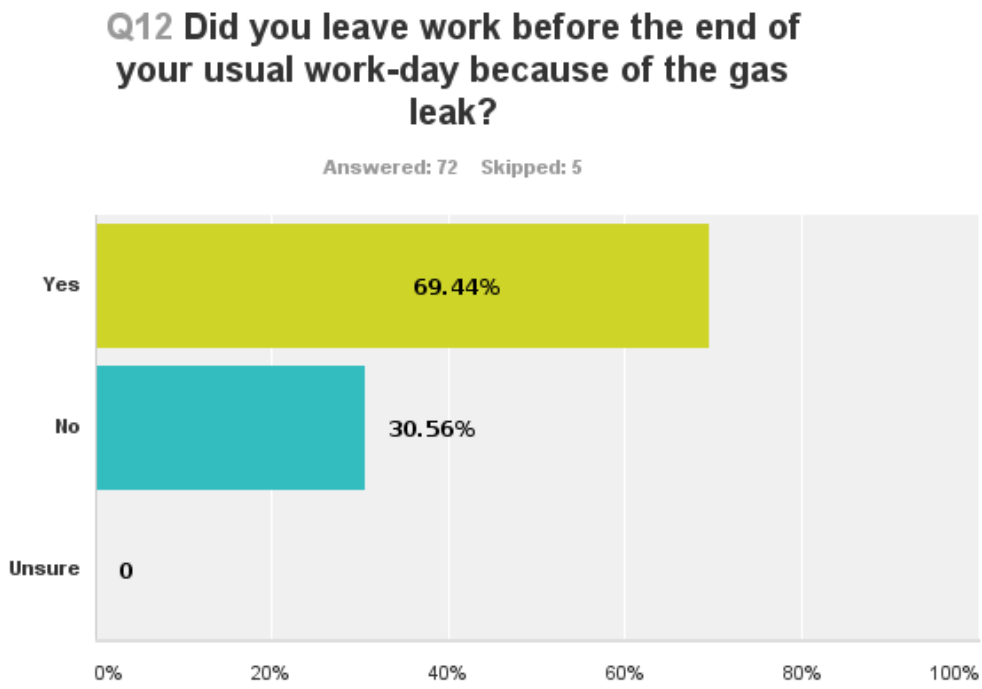


Several respondents commented that they returned to the building reluctantly.

In Question 11, we asked those who re-entered the building, "How long did you stay in the building before leaving for the day?"

Time	Number of respondents
30 minutes or less	12
31-60 minutes	9
1-2 hours	10
more than 2 hours	12

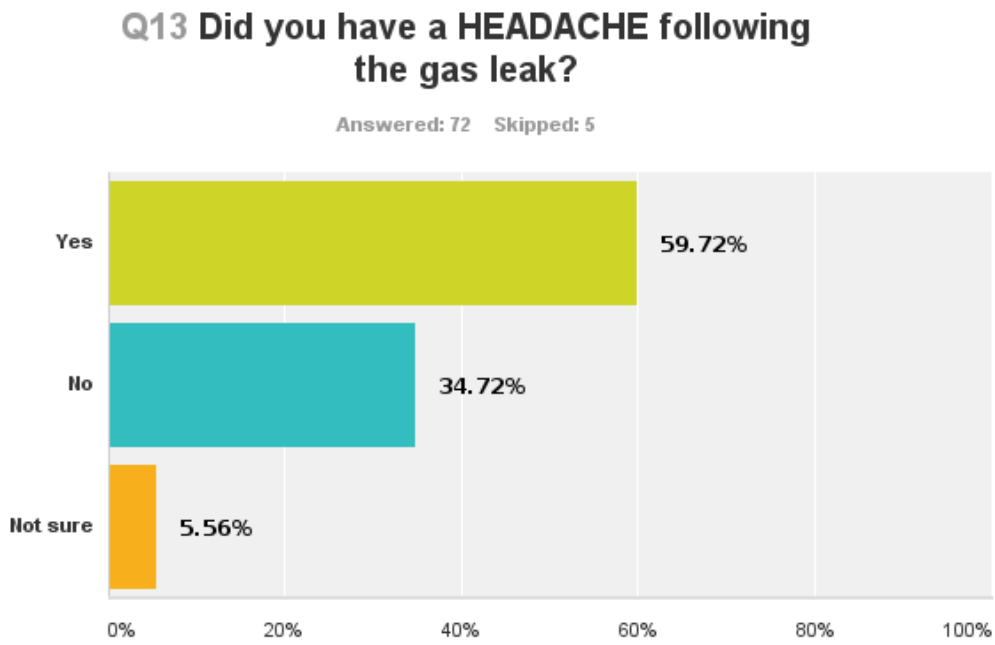
Q12. Leaving work



Several respondents commented that they left for the day because of their symptoms or because they did not feel safe.

One respondent remarked: "…I felt sick. It did not feel safe to stay in the building…"

Q13. & Q14. Headache

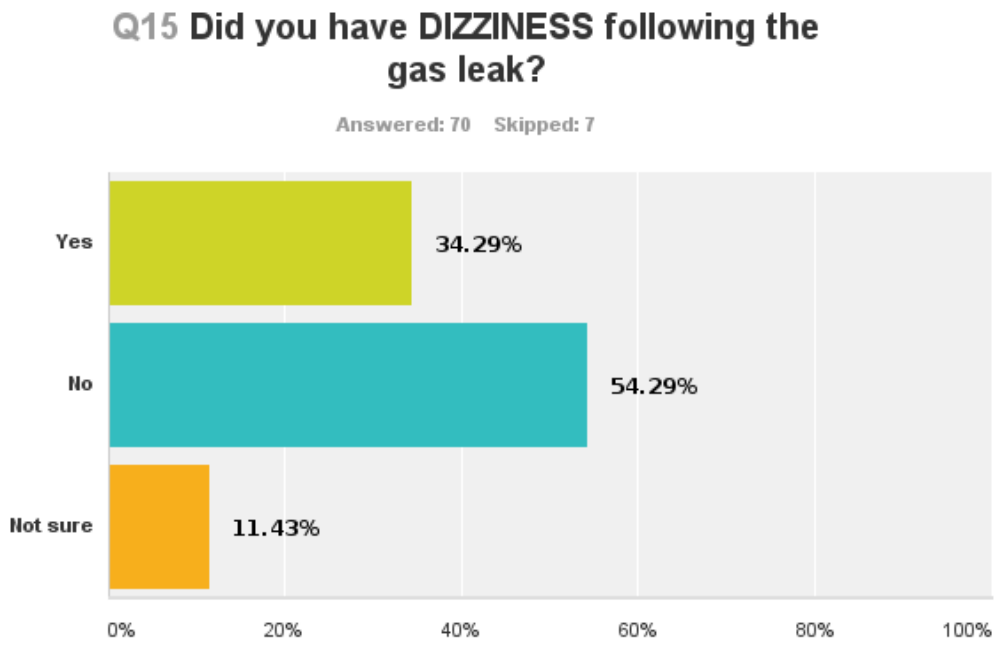


Q14. If you had a HEADACHE, how long did it last?

Forty three people developed headaches and indicated its duration. Seven respondents (16%) had a headache for 30 minutes or less, whereas 15 (35%) had a headache that lasted for more than four hours. Two participants had headaches for an extended period of time; one indicated that the headache lasted for 10-12 hours; and another had a headache until the next morning.

Duration of Sx	Number of respondents
30 minutes or less	7
31-60 minutes	6
1-2 hours	8
2 - 4 hours	7
more than 4 hours	15

Q15. & Q16. Dizziness

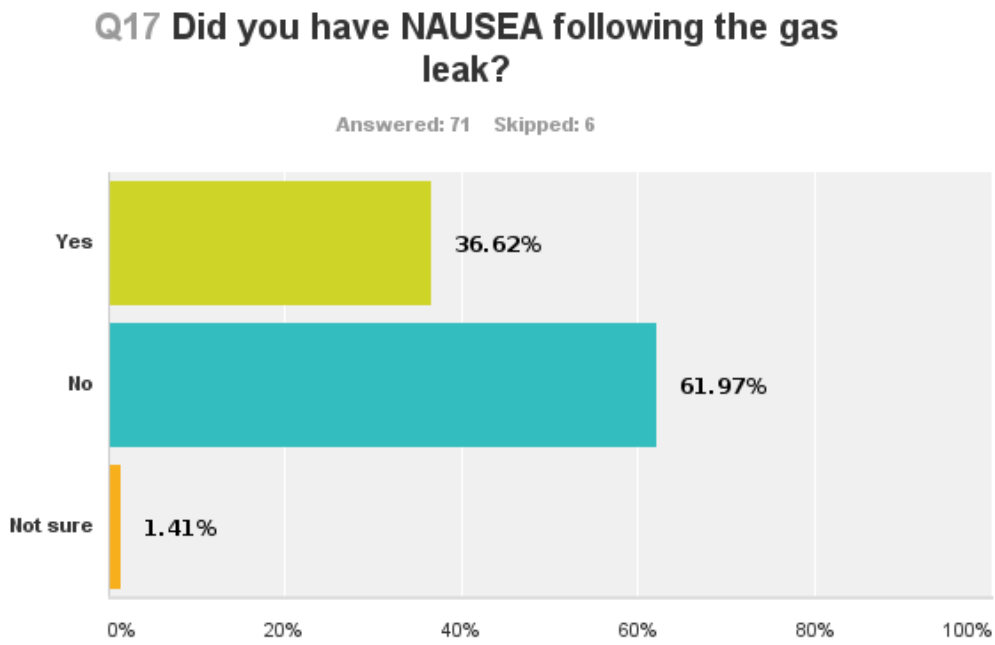


Q16. If you had DIZZINESS, how long did it last?

Twenty five respondents indicated the duration of feeling dizzy. Seven (28%) felt dizzy for 30 minutes or less, and another seven for 31 to 60 minutes. About one fifth of respondents had dizziness for more than four hours, with the symptom lasting for six hours for one respondent. Multiple respondents commented that the dizziness abated once leaving the building or leaving the campus.

Duration of Sx	Number of respondents
30 minutes or less	7
31-60 minutes	7
1-2 hours	5
2 – 4 hours	1
more than 4 hours	5

Q17. & Q18. Nausea



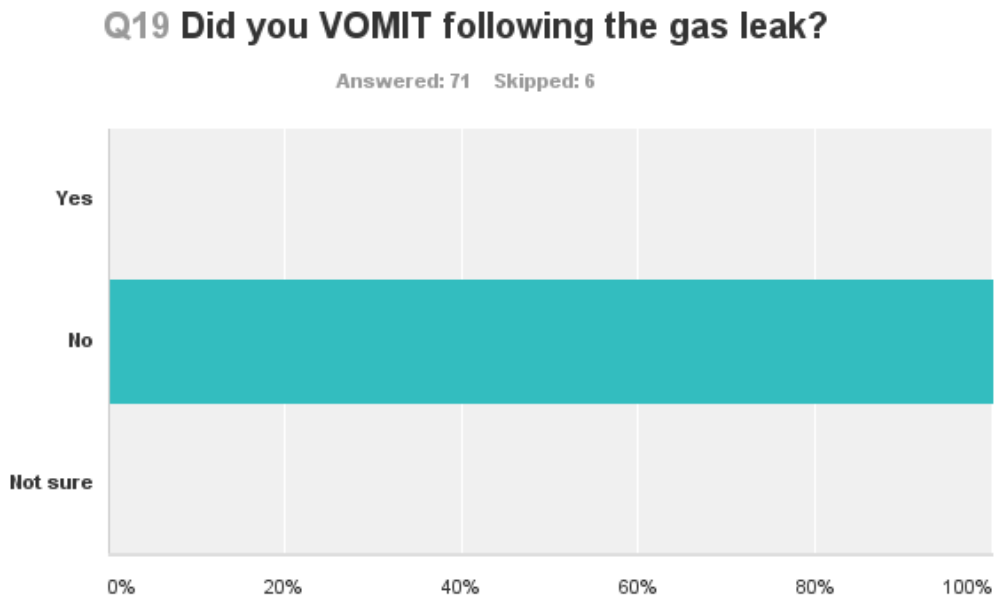
Q18. If you felt NAUSEOUS, how long did it last?

Of the 26 respondents who felt nauseous, nine (36%) felt so for 30 minutes or less. Seven (28%) felt nauseous for more than four hours.

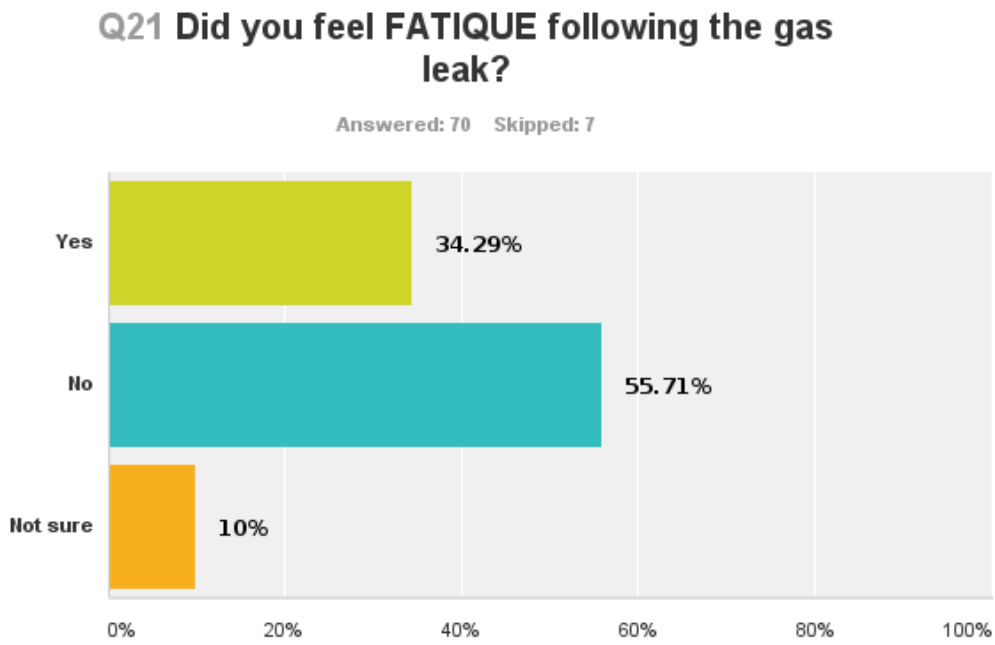
Duration of Sx	Number of respondents
30 minutes or less	9
31-60 minutes	3
1-2 hours	5
2 – 4 hours	2
more than 4 hours	7

Q19. & Q20. Vomiting

Fortunately, nobody vomited following the gas leak.



Q21. & Q22. Fatigue

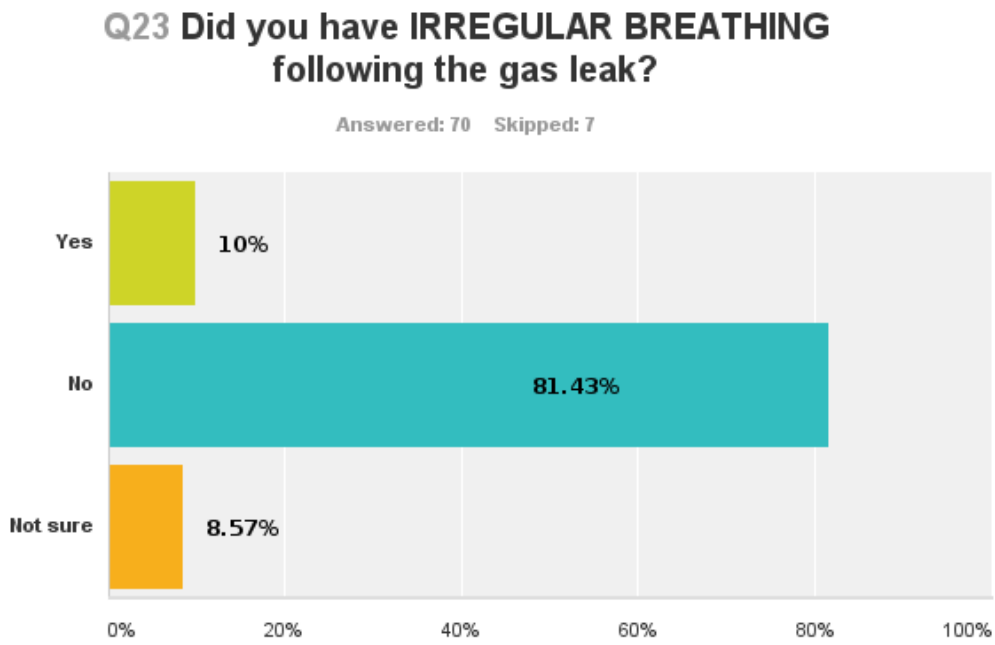


Q22. If you felt FATIGUE, how long did it last?

Twenty five respondents felt fatigue following the gas leak. Fourteen (56%) felt so for more than four hours. Many felt fatigue for the rest of the day and a few took naps when they got home.

Duration of Sx	Number of respondents
30 minutes or less	3
31-60 minutes	0
1-2 hours	4
2 – 4 hours	4
more than 4 hours	14

Q23. & Q24. Irregular breathing

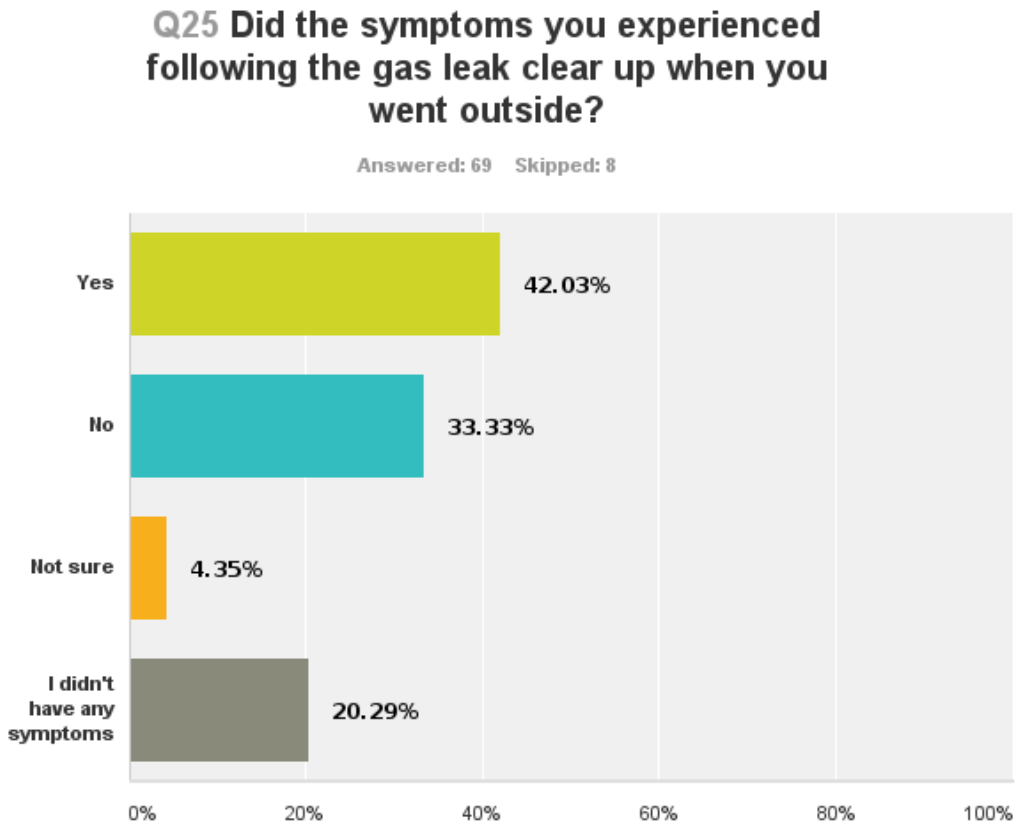


The irregular breathing was experienced in a variety ways, such as "felt like I couldn't take a full breath of air", "tightness when breathing", "heavy breathing because of coughing" and "more like a scratchy throat".

Q24. **If you had IRREGULAR BREATHING, how long did it last?**

Among the seven respondents who had irregular breathing, five people commented that it resolved immediately to 30 minutes after leaving campus. For one person the irregular breathing resolved two to three hours later and another respondent was unsure how long it lasted.

Q25. Symptom clearing up



Twenty six (38%) of respondents made comments related to this question. The comments broke down into three categories:

1. The duration of the symptoms, with many noting that symptoms didn't clear up entirely for hours
2. Feeling sick while on campus, with many commenting that they didn't begin to feel well until they got away from the Richmond Campus
3. Noting that the outside air also smelled strongly of gas

Select quotes:

- …At least outside, the wind was blowing fresh air in. We could still smell the gas, but we got a lot more fresh air…
- …Even in the first evacuation, I felt better outside, despite occasional strong wafts of odor…
- …During the incident outside at the building the smell of gas was strong, especially in pockets…
- …I didn't initially have symptoms when I left the building, but I still smelled gas outside at times when I evacuated. At least it was windy out there so the air 'seemed' a bit fresher than inside the building…

Q26. General comments narrative

In Question 26, we asked respondents to provide general comments.

The same themes came up in response to this question as did for Q3 and Q4 above. The majority of comments reflected desire for more prompt and detailed communications from facilities management, clear instructions on what to do and why such instructions were being issued, concerns for personal health and safety in the absence of such instructions, and concern of how greater emergencies might be handled. Some respondents suggested putting protocols in place on how to handle such situations. A number of respondents suggested better communications between facilities management and city authorities (Fire and Police Departments).

Select quotes:

- …I have no reason to believe that if a major catastrophe were to happen while I was at work that the city of Richmond or the Department would be prepared to handle it. I feel like employees are pretty much left to take care of themselves…
- …Concerned about fireball potential - inside or outside. Was not reassured by FMS…
- …what came into my mind was the explosion at san Bruno…
- …made me worry more about an ammonia leak from next door & how it would be responded to…
- …Were the Richmond Fire and Police informed that ventilation at Richmond campus was shut after gas fumes entered the facility? … Was the gas smell stronger in some buildings more than others? Did FMS do a walk through to ensure their decision to call a Shelter in place was the correct one, and did they conduct a walk through before consulting with Richmond Fire and Police before issuing a DO NOT evacuate? Lots of questions and ones which should be considered so that lessons learned can be implemented prior to future emergency situations...

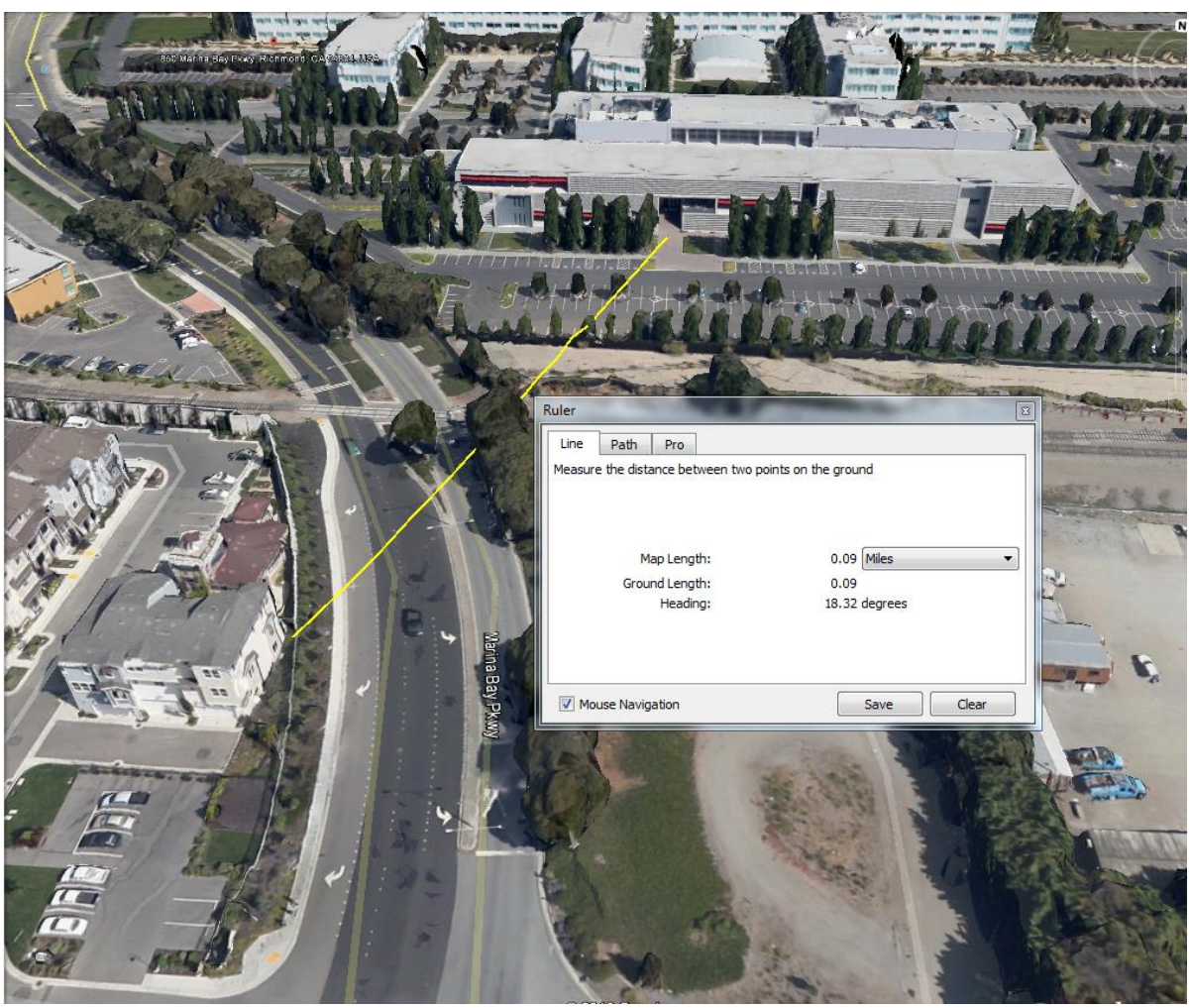
Reflections on the FMS After-Action-Report (AAR)

This section includes commentary on the "PSB hot wash of gas main rupture - 7.31.13" (see Appendix A.) prepared by FMS and referred to in this section as AAR, Our comments are based on the survey answers to the qualitative questions, interviews with Richmond Fire Department and the Timeline of Events above. This timeline provides a more comprehensive and alternative picture of the events that affected the Richmond Campus on July 26, 2013.

Commentary on FMS AAR section "Incident"

FMS mentions that the event occurred at "approximately 1/4 mile" from the Richmond Campus. However, the gas line rupture happened on Marina Bay Parkway in the vicinity of Pierson Avenue and Jetty Drive, which is approximately 0.09 miles from Building P, less than half the distance reported in the AAR (Figure 1 below).

Figure 1. Distance from Gas Release Location to Building P



Commentary on FMS AAR section "CDPH Action Taken"

- Despite acknowledging gas odors from staff, FMS did not evacuate the building.
- FMS stated that "the leak was under control and capped at approximately 10:15". This information led to a lot of confusion by DEODC staff, who could see from the Building P 3rd floor that the plume was still active and clearly not capped.
- From 9:58 to 10:30am, FMS communicated three messages about the Heating Ventilation and Air Conditioning (HVAC) system:
    - 9:58: "fans turned up in all buildings to allow the odor to dissipate sooner."
    - 10:00: "We do not want to turn off any building systems at this time."
    - 10:30: "Fire Department ordered a SIP." At which point FMS shut down the HVAC systems.
- In Building P, staff were more exposed as a result of the air handlers remaining in the open position and the HVAC system left on for approximately 45 minutes following the release. Increasing the fans brought more outside air and gas into the building, rather than diluting the gas inside, as intended.
- The use of SIP when there is already a fair amount of a chemical inside the building must be questioned. The usual point of SIP is to keep people inside to prevent exposure. The order was issued by the Fire Department because of the size of our Campus (number of people), proximity to the leak, and the prevailing wind direction. However, the Incident Commander was never informed by FMS that staff were experiencing health effects and felt better outside than inside.

Commentary on FMS AAR "Challenges"

The second paragraph indicates that staff left Campus but does not acknowledge that people were feeling ill from exposure to gas inside the building. There appears to have been no effort by FMS to determine how employees were being affected by the release and why they left Campus.

Commentary on FMS AAR "Key Elements"

- FMS acknowledged that there was a gas smell inside the building which they proceeded to look for. They conclude that despite complaints about the odor "there was nothing to communicate to staff". This lack of communication from FMS led to mounting anxiety and a flurry of staff calls to PG&E, 911 and Poison Control.
- When a gas leak is suspected and can be smelled indoors, the safest response is to get people out of the building (this is also advice survey respondents received from PG&E). Without direction from FMS, trained Evacuation Team Monitors in DEODC proceeded to clear the floor but were then told to come back in the building where they were becoming ill.
- FMS indicated that they provided updates every 15-20 minutes (sooner if needed) to staff. It is unclear which modes of communication this refers to as we were unable to corroborate that frequency of communication in our documentation of the Event Timeline.
- FMS never communicated to the Incident Commander at the Richmond Fire Department that there was gas intrusion inside the building and that staff were becoming ill as a result.

- Most people knew (from emergency training) that they cannot be kept inside during a SIP against their will; some people just left or told their supervisors they felt ill and wanted to go home. However, other staff felt that they had to stay in the building, even while experiencing health effects.

Commentary on the FMS AAR "Chart"

This chart is a self-evaluation by FMS of their actions during the event. Our discussion and recommendations will address our concerns with how the incident was handled.

Discussion and Recommendations

Health symptoms not being addressed during the event

The majority of DEODC staff experienced some type of transient health effects (headache, dizziness, nausea) from exposure to natural gas and its chemical odorants that infiltrated buildings (primarily Bldg. P) during the gas leak. Staff experienced these health effects to varying degrees, with some symptoms lasting into the evening hours or the next day. Despite symptoms that could have been dangerous while driving, many staff left the Campus instead of staying at work where they felt sick and unsafe.

FMS Communications

Staff expressed confusion about FMS communications and looked toward sources such as PG&E, 911, and Poison Control for guidance. Staff believed the communications to be too infrequent as the incident progressed. Public Address (PA) announcements were difficult to understand inside the building; sometimes emergency jargon was used (such as "Level 3 incident"), which many employees did not know how to interpret. Staff who evacuated the building because of gas fumes and illness, were left outside without the benefit of announcements or guidance from FMS. Some respondents expressed a lack of trust in FMS in their handling of this incident and wondered what this meant for them personally if one of the other nearby hazards were to affect Campus.

There was no effort by FMS to ascertain or take into account the fact that many people were experiencing health effects from gas exposure. Despite multiple reports to FMS that staff felt sick on the third floor of Building P, no action was taken to inform the Incident Commander, during (what we assume to be) multiple communications with the Richmond Fire Department. The DEODC Emergency Preparedness Team spoke with the Richmond Fire Department Chief and with the Battalion Chief who was the incident commander during the event. We asked if they had received information during the incident that staff at our facility were experiencing health symptoms and that the gas odor was pervasive indoors during SIP. Both indicated that nobody from the CDPH Richmond facility had informed them that there were health complaints. Had this information been conveyed, they may have dispatched an ambulance unit and a fire engine with personnel to conduct indoor air monitoring.

Handling of the HVAC and assessment of hazards

Before the activation of the SIP by the Richmond Fire Department, FMS made questionable decisions regarding the HVAC system. With knowledge of a gas release down the street, and reports of sick staff, FMS increased the HVAC circulation, which pulled in more air and gas vapors from the outside. Gas was then trapped inside the building when the SIP order triggered a shutdown of the HVAC system.

According to FMS in their AAR they monitored gas levels inside to ensure no health hazards. However, nobody from DEODC reported seeing FMS conducting monitoring and measurements are not provided for discussion. It is unclear if FMS is the most appropriate entity to make decisions as to the acceptable level of exposure for staff, especially in the absence of data and the recognition that people were already experiencing health effects.

FMS suggested in the AAR that if staff were more aware of emergency plans they would have followed the shelter in place order they issued. However, the response by Bldg. P DEODC employees who evacuated to appropriate locations on Campus when smelling gas demonstrates an awareness of emergency plans. The issues with this particular situation appear to be a result of confusing and contradictory communications.

Moving Forward

FMS' handling of this neighborhood gas leak raises serious concerns about their ability to take protective action in the event of a large ammonia release from the neighboring Dreisbach facility or a chemical release from a rail car on the adjacent railroad track.

Recommendations

- FMS should communicate quickly and frequently with staff indicating the reasons they are making certain decisions. Open communications will help staff comply with FMS instructions or make a more informed decision on next steps.

- FMS must make the Richmond Fire Department or Incident Commander aware of the situation as experienced by staff on Campus.

- FMS should prioritize communication with Incident Command to solicit and provide information rather than relying on passive receipt of information.

- Training on exactly what SIP means and the identification of safe zones (i.e., closets and rooms without ventilation) is necessary to ensure safety on a campus surrounded by hazards. This incident demonstrates that in spite of best efforts, gas intrusion is likely to happen if there is another event in the future.

- An after action meeting with FMS and staff should be set up to provide building occupants the opportunity to voice concerns and to hear reasoning from FMS for their actions and what will be done differently in the future.

- FMS should include air monitoring results and calibration records in the after action report and present these data in a meeting with staff concerning this incident.

- The PA system needs to be audible in offices, storage/filing rooms, conference rooms and outdoors.

- Training should be provided to anyone designated to make PA announcements. It is imperative that anyone making announcements speak slowly and clearly to ensure all staff are able to hear and understand the information. Detailed incident information should be provided to the announcer and security staff so they are able to respond to inquiries from building occupants.

- At the first sign of a gas leak, FMS should evacuate buildings immediately and assess the hazard once staff are in a safe location.

- A comprehensive assessment of FMS capabilities to provide adequate emergency response direction for the entire campus with current staffing and monitoring equipment should be conducted.

Appendix A: PSB hot wash of gas main rupture – 7.31.13

Richmond Campus Gas Pipe Incident July 26, 2013

INCIDENT

At approximately 9:45 am, a contractor working at Pierson and Marina Bay Parkway (approximately% mile) from the Richmond Campus punctured a 3" Pacific Gas and Electric (PG&E) high pressure gas line. The Richmond Fire Department (Fire) and Richmond Police Department (Police) responded to the incident.

CDPH ACTION TAKEN

At approximately 9:45, Richmond Campus and Facilities Management Section (FMS) staffs smelled gas odor throughout the buildings.

At approximately 9:55, FMS was notified of the incident by Police and FMS building manager Janis Thomas notified Program Support Branch Chief Timothy Bow.

At approximately 10:05 I sent out an email notice to notify CDPH Executives and Division Deputies with staff at the Richmond Campus of the incident. At the same time, Janis sent an email to Richmond Campus staff regarding the incident.

At approximately 10:10, FMS was notified that the leak was under control and was capped and at approximately 10:15, I sent out a notice that the incident was under control and ending.

At approximately 10:20, FMS was notified that it was not all clear and Richmond Fire Department notified FMS to implement a Shelter in Place (SIP) for the Richmond Campus. At the same time, Police also closed Marina Parkway south of the Richmond Campus entrance.

We immediately established a conference call line and a conference call was held every 15 minutes with FMS staff and PSB Chief to provide direction, updates and progress of SIP protocols.

FMS then implemented a SIP protocols which involved notifying all staff, shutting down the HVAC system and limited access to the Campus.

At approximately 10:30 I sent out a change in status email notifying CDPH executive of the SIP and also notified Campus staff of the SIP via the Public Address (PA) and email systems.

After each conference call, an update was provided to both the CDPH Executive Team and Richmond Campus staff approximately every 15 minutes,

During the SIP, PSB/FMS was also preparing the plan to fully evacuate the Richmond

Campus if necessary.

As part of the Richmond Campus evacuation plan, FMS notified the California Highway Patrol (CHP) of the status and if ordered, the Richmond Campus would be fully evacuated.

At approximately 11:45, it appeared that the gas leak was capped. FMS staff noticed that the gas plume was dissipating quickly and appeared that the fire trucks were wrapping up to leave the scene.

At approximately 12:00, we received an all clear from Richmond Fire which ended the Shelter-in-Place and Richmond Campus staff was notified.

A final update to the Executive team was provided at approximately 12:10.

CHALLENGES

Conflict between what was reported in the News and FMS's instructions from Fire and Police.

Although we implemented SIP, a lot of Richmond Campus Staff still wanted to (and some did) leave.

KEY ELEMENTS TO INCIDENT RESPONSE

Until notified by the Police, FMS staff did not know the cause of the gas odor, sowhen FMS staff smelled the gas and started receiving complaints about the gas smell, we were looking for a gas leak within the complex.

This lead to the perspective and criticism that FMS didn't know what was going on and did not communicate to Richmond Campus staff. However, until FMS staff could identify the cause of the odor, there was nothing to communicate.

Once notified, FMS staff was able to take the appropriate action and implement appropriate protocols.

We also activated a conference line and held conference calls between FMS staff and PSB Chief every 15 – 20 minutes to provide information and direction to FMS staff.

We provided updates every 15 to 20 minutes (sooner if needed) to both Richmond Campus staff and Executive Team.

In spite of the Shelter in Place order, approximately 50 CDPH employees left Richmond Campus.

RICHMOND CAMPUS SIP INCIDENT - JULY 26, 2013 - AFTER-ACTION MEETING NOTES

WHAT WE NEED TO DO (Lead person)	THINGS WE DID WELL	WHAT WE COULD DO BETTER
Review/update plan within FMS for initial communications with each other and to tenants (Janis) Test emergency power for PA system (Terry) Develop a plan for total evacuation of the campus – **how long** would take (Margaret) Labs need to create a shutdown plan and policy (Tim/Gary) Mandated training/improve training plans quarterly, etc. (Janis/Margaret/Eva)	Communicate with tenants and executive staff via PA and emails Implemented a conference call between Richmond staff and Sacramento to coordinate response. (chevron) Split resources/staff - Terry - Plant - Margaret - Security F - Russ and Charles - at site/eyes - Janis – Office/Security P Security - PA announcements - Waivers - Liaison to RPO/RFD - Gate closing Engineers - HVAC shutdown was reprogramed (after Chevron incident) for automatic shutdown of HVAC system for SIP. FMS Health & Safety team monitored gas levels inside to ensure no health hazard PG&E was also monitoring gas levels outside the campus. Everyone on FMS team remained calm	Conference call# corrected (this is dc/ne) Initial communication could be imprm1;ed: - PA announcement should include we are aware of problem; do not call Security or FMS; refer to Emergency Response Plan Lack of cell phone communication Everyone (tenants) calling FMS and Security, tying up resources & people came inti::> Security offices News conflict - internet news source stated that we were evacuating We could have notified Contra Costa County OES via Community Warning System No method of communicating with people who were outside. No PA system outside. Assistance needed from supervisors and managers to calm and direct staff Supervisors/Managers needed to account for their employees just in case of evacu;3tion Make sure labs have time to shut down before HVAC shutdown Tenants need to be aware of emergency plan