

**Q&A (rough notes from AB1900/R.13-02-008 Workshop at CPUC San Francisco, 3/27/13).**

Q1: Chuck White Waste Management: We don't want biomethane treated more harshly than conventional natural gas. Will you prepare a similar chart for ALL chemicals in conventional natural gas?

A1: Dan ARB: We will be working on a similar chart for acute and chronic risks for conventional natural gas. Technically the bill asked us to look at CoCs but we are providing analysis of overall risk as well.

A1: Andy OEHHA: The bill says CoCs but in reality we can look beyond that, yes. So we will be looking at general risk anyway.

Q1: Chuck: looks like pipeline gas variability varies even more than biomethane from landfills.

A1: Andy: Regarding consistency, individual biogas types seem to have consistent output except landfills. Having said that, the information we have might not be a statistically significant sample of what is out there. If anyone has more info we're interested.

Q2: Bill PG&E: If you need more data to get it statistically significant, are you getting more data or samples to get a better conclusion?

A2: Andy OEHHA: It's valid, we hope it's representative but we hope to get more data sources if anyone has any to share. We have to have SOMETHING, this is progress to date and not a finished work product.

Dan ARB: We are not doing more sampling, given the timeframe we have to accomplish this, we are going to use what is out there. We need enough time to analyze and people need to submit data ASAP if you want us to look at it.

Bill: 2 of your samples were from GTI reports?

Bonnie: 2009 and 2012 reports are available.

Q3: Carol Burke, PG&E: please show us exactly which reports you used... there are a number of them out there. If those are the GTI reports we think they are, it's dissimilar to PG&E gas. We'd like to give you our data.

A3: We'd love more data.

Carol: We have old data on constituents; we can give you some data right away if necessary.

Peg: We want trace constituents, not Btu.

Carol: OK, their Btus are higher than our systemwide average, especially Canadian gas supply because they treat the gas.

Dan ARB/OEHHA: please send us that data. We can show you what we took from the GTI data.

Q4: John Leslie, Shell Energy NA: Let's look at slide 24. 13 CoC's in biogas, 6 in treated biomethane. What "treatment" are you referring to?

A4: Andy OEHHA: biogas is raw biogas, biomethane is treated gas. "Treatment" refers to the data taken from GTI and their definition.

A4: Paul/Peg ARB: In the GTI reports, some are more specific about treatments. But they didn't want to specify which site and what treatment. But basically gas separation membrane and pressure treatment. The goal is to get to pipeline quality. But maybe not all goals are for that. It varies.

Q5: Bioenergy Association of CA Julia Levin: are you going to ID COCs by source, for wastewater, dairy, and landfills because not all COCs are found in each source right? Are you recommending different monitoring standards depending on source?

A5: Peg/ARB: too early to say. Maybe.

A5: Dan: probably so because different waste streams do vary in their CoC levels.

Julia: I'd strongly urge that. Identify which sources are producing what. For wastewater/dairy they aren't producing as much as landfills, so maybe should have different standards.

Q6: Marcel Hawiger TURN: I have a similar question as Julia. Comparing conventional gas to biogas, can you explain why existing natural gas has a higher risk assessment?

A6 Bonnie: Natural gas has its own drivers of risk like benzene. It's due to differences in composition. Some drivers overlap; benzene is everywhere including conventional.

Q6b: When you look at exposure levels, are you looking at end-use hazard?

A6b Dan: At this point in time, the takeaway message with this slide is that cleaned up biogas from these studies at least, isn't creating a greater potential risk outcome than conventional natural gas. That's our preliminary conclusion regarding cancer, but we need to look at acute and chronic

Q7 May Lew, SoCalGas: The CoC list includes some things like H2S in conventional gas.

A7 Peg and Dan: Yeah some overlap between conventional vs biogas, some of these CoCs may drop out depending on their final concentrations if lower than in conventional gas.

Q7 May Lew: We have our data we'd like to share with you.

A7 Paul/Peg: Please give us that data. Also, benzene and other compounds may drop off because conventional gas tends to have higher concentration than in biomethane.

A7 Andy: Legislation doesn't consider constituents in greater concentrations than in conventional natural gas, but maybe we can interpret that not so literally and also consider conventional natural gas constituents and thus the OVERALL risk profiles of biomethane vs conventional natural gas.

Q7: May Lew: what is your smell detection level?

A7: Peg: 0.2% of lower (???) limit.

Q7: That's a regulatory requirement and that's our MAX. We operate more conservatively, keep mercaptan.

A7: Ok let us know what you'd like to use.

Q8: Ron Goodman: Will you look at existing limits in gas quality standard limits for like constituents in both biomethane and conventional natgas.

A8: Andy and Peg (OEHHA and ARB): we're concentrating on health evaluation. There may be overlap. We understand that we'll fold it proceeding later, but our focus is on biomethane because that's what AB1900 said.

A8: Dan (ARB): we're looking at Rule 30 style standards and what you already have.

Q9: Jonathan Bromson DRA: There's a distinction between untreated biogas and treated biomethane. Similar potential cancer risk for both? Or did someone say untreated had a greater risk? Slide 11?

A9: Bonnie: I said raw acute is higher than for conventional natural gas.

Q10: Ira Pearl (sp?) AGL resources: largest natural gas distributor in US, we develop Central Valley Storage in CA. My question is on dilution for home. I think there will be significant dilution of biogas into the pipeline. Will your recommendation take that into account?

A10: Right now assume most conservative stance: no dilution at all. To do a hydraulic study, that's not what are doing.

Q10: You really need to account for this, potentially by 100s or 1000s of times.

A10 Dan: We're assuming no dilution, as we move forward we may have to address the uncertainties, and we will probably try to account for this. (FCC: sensitivity analysis?)

Q10: Maybe get util to tell you dilution ratios for their system.

A10 Peg: are you envisioning different standards? We're aware of some places they are getting 100% biomethane.

Q10: that's rare.

Q11: Norm Pedersen : slide 20. Biogas vs. conventional natural gas cancer risk. Why bother looking at dilution if there's a lower cancer risk from biomethane?

A11: Dan: legislature says CoC analysis. We are dealing with different metrics, not just cancer risk from dairy biogas. But landfill is different, acute/chronic may be different.

Q11: SCGC Norm Pedersen: Slide 21 acute hazard quotient, are you looking at that saying despite that, we're coming up with a set of standard tailored to biomethane and ignore slide 20?

A11 Dan: that's not accurate. We've not presented similar charts for acute/chronic yet. Cancer is only part of the story. Premature. We're presenting data, someone else do standards.

Q12: Chuck White: we're only putting biomethane into pipes, not biogas. Treatment can reduce CoCs by 95% or more. We're not here to set standards for fossil gas, but my concern is that we focus too much on biomethane-unique CoCs if conventional-natgas-unique components are even worse. We should look at OVERALL risk. I also agree that dilution should be considered. We'd like sensitivity analysis/tiering analysis to account for dilution.

Q12: Carol Burke: I didn't catch all the chemicals you talked about.

A12 Peg: 1-3 \_\_\_\_\_, acrylonitrile

Q13: Johannes Escudero, Coalition of Renewable Natural Gas: Please take into consideration for monitoring/testing that some CoCs can't be analyzed in real time.

A13: ok

Q14: \_\_\_\_\_ Coalition of Ren Nat gas. In the two GTI studies esp the 2012 one has 8 landfills, the 2009 had 3 landfills and some dairies. That is a significant fraction of all landfill biogas projects nationwide. (This wasn't really a question—FCC.)

Q15: Tony from CMUA: Thanks, esp. at monitoring. (This wasn't really a question—FCC.)

Q16 Patrick Griffith: CA Wastewater Management Group: Arsenic. Anything on arsenic in conventional gas or biogas? Arsenic gas is volatile. Surprised that wasn't talked about.

A16: Bonnie: We didn't see any of it. It was not reported.

Q16: Patrick: I agree with tiering. Dilution needs to be taken into account, especially for closed landfills which may not have variation in gas produced. Even for active landfill, it's got to be dwarfed by whatever is already in the landfill.

A16: Thanks.

SoCalGas/PG&E/SWG Presentation:

Q1: Norm Pedersen SCGC: what do you mean by expensive testing?

A1: Carol: can't give you numbers but the relative cost is higher because you need to do a mini-R&D project for each interconnection.

Q1: so this was a one-off R&D project and we shouldn't be expecting that level of cost going forward for other biomethane producers?

A1: Carol: I don't know about that. Not necessarily true because every site is unique in its production.

Q1: Fresno's project, PG&E's ratepayers was picking it up?

A1: Yes. Included in Gas transmission tariff.

Q2: Peg: Iris Environmental was doing your health investigation, SoCalGas?

A2: Ron Goodman: we have inventory of constituents derived from OSHA, Prop 65, and others. We provide them with trace constituents and ask them to analyze and they provide threshold values.. e.g., if expose X at Y level for Z time, you may get cancer or something else.

Q3: Melanie Marty OEHHA: SoCalGas, these analyses and trace constituents, how are you comparing conv natgas and biomethane.

A3: Some public, some confidential, we'll share as much as we can.

Q4: Peg ARB: You mentioned they are doing a biological evaluations?

A4: May Lew SoCalGas: We're waiting for it. Work in progress. She's done literature search e.g., for microorganisms.

Q4: Peg: will that be done in the next few weeks?

A4 May: Probably not.

A4 Ron: We're looking at general public, employees, we're doing similar assessment.

Q4 Peg: Your list of CoC was a little different than ours. Were you just looking at exposure at human safety or just pipeline?

A4: May: Those levels are based on action levels for pipeline, and we also looked at existing limits for humans in regulations, not necessarily just for natural gas but in general exposure levels to various chemicals.

A4: Ron: We have existing constituents as well as the "new" constituents from the sources we tested or received information about. We will be looking at new producers' chemical makeup and possibly see even newer chemicals. We may go to IRIS to ask them about those. IRIS has hundreds of chemicals in their inventory.

Q4: You weren't working from GTI dataset then.

A4: We looked at that too, but also our own sources.

Q4: How did you come up with this list?

A4: If it's unique to biogas we submitted it to our consultant.

A4: Ron: screening levels and action levels give a clue that something is awry.

A4 Carol: We found chlortetracycline and believe it's volatile and you wouldn't expect it to be in gas. Maybe we can micron filter it out.

Q5: Richard OEHHA: Do you do any indoor air scenarios?

A5: May: IRIS did.

Q5: What do you look at?

A5: Stove emissions, or leaks.

Q5: Can we get that report?

A5: We don't have that report yet.

Q6: Peg: Do you have any initial thoughts about our exposure scenarios? Are they realistic? Residential leak below smell detection limit, kitchen, and worker scenarios?

A6: Ron: We're not experts on this, we rely on consultants. We are concerned about what's happening inside the home, esp. if gas is not 100% combusted. We've done studies on how many homes demonstrate leaks. We went to 15 homes, indoor leak surveys, etc. 10% of homes demonstrated some cursory leakage, such as 70 year old homes with faulty equipment, or faulty igniters, etc.

A6: May Lew: I did have a problem with worker exposure levels. We don't run a biogas production facility. We have a meter near a biogas facility but out in the open.

A6: Carol: I know you didn't look at combustion products as they are too numerous, but I can't help but think about vinyl chloride, concern about that combustion product.

A6: Ron: we take odorization pretty seriously and have serious controls over odorant amounts and subsequent testing. We want people to smell and report.

Q7: Joe SoCalGas: We do a lot of work on this. We need a process to talk to ARB/OEHHA. If there is data of value to you, we can give it to you if confidential, if it is confidential maybe we can work it out.

A7: Thanks.

Q8: Norm Pedersen SCGC again: Thanks Joe, we would all like to expedite this information sharing process between the utilities and the CA agencies. Let's have official arrangement.

A8: Thanks.

Q9: Johannes Escudero CRNG: I can attest to OEHHA and SoCalGas being engaged and allowing us into their working group. Maybe we can get IOUs in a room with developers in a room to iron out a lot of this behind the scenes.

Q10: Chuck White worker scenarios: We have a lot of workers per LNG, it's totally outdoors, no indoors. It's at a landfill though. The plant is fully automated. OEHHA says that treated biomethane is no more of a health hazard than gas in pipeline already (at least for cancer risk). Does that make sense to you?

A10: Ron: These are data points. What were the data sources, how were they sampled? At the end of the day though we have Rule 30 and if it's met, producers get onto the system. Includes landfill gas once we revise the limits to account for biomethane. To the extent we can establish controls we will and we want to be inclusive.

Q10: Rule 30 applies to biomethane and conv natgas right?

A10: yes

A10 Carol: The producers we buy gas from in CA, they only remove water, we don't have a longer list of things for dairies. We already monitor for other things like H2S for everyone anyway.

Q10: I suggest you look at the Altamont refinery an hour drive from here. We monitor it continuously. We fuel trucks with it and feel that it's safe.

A10 Carol: Treatment systems fail so we have testing/monitoring just in case.

Q10 Chuck: we're willing to do what it takes to meet gas monitoring standards. We don't want unreasonable standards just because it's biomethane instead of conv natgas. What's the concern here?

Q11 from Ron to Chuck: how many plants do you operate?

A11: Chuck: high-Btu? 30.

Q11: how linear are the CoCs coming out of those?

A11 Chuck: we're not aware of any problems at any of them. And we'd be wasting biomethane if we flared it.

Q11: Ron: if you were looking at your plant outputs would you say that those concentrations are consistent with every test (low volatility)?

A11: we'd be happy to share our info with you.

Q12: Ira Pearl AGL: We test for standard suite of constituents, the common ones anyway like Wobbe, CO2 inerts, Oxy, H2S etc. We operate landfill plants and they are generally consistent within a certain band. We use activated carbon so once it gets too high we insert new carbon filters. I'm not aware of anyone doing continuous monitoring of landfill gas outputs. Also, we have 8 hour days for workers, running 24 hours a day, most of the time the landfill gas production plant doesn't have any workers inside. For us, 40 minute exposures for our workers.

A12: Carol: Two years in the life of equipment is short. 2 years is not enough data to make long-term determinations. I'd like to see more years of data. As far as trace constituents, there is a LONG list of

stuff in CA that we have to look at, regardless of what happens in other states. Sometimes the only way you get that analysis is via trace constituent analysis.

Q13: Peg: We'd like to get a group of folks together second week of April to talk about monitoring questions before the second workshop. If you have expertise, please contact Paul Milkey. Probably set up a conference call to talk through some of these questions about monitoring.

A13: Ron: Can we get those q's ASAP so we can figure out how to respond?

Q13: We'll get back to you, but we have to start soon.

A13: Melanie Marty OEHHA: we need data sooner than second week of April.

Q14: CMUA: I want to get clarification on worker exposure scenarios. CalOSHA related to this?

A14: Andy: Federal and Cal OSHA were considered to look at health protective values.

Q14: Did they provide monitoring data?

A14: No.

Q14: CMUA may be interested in the monitoring working group then.

Q15: Bonnie Soriano: I'd like to get your ideas on dilution. Is factoring in dilution reasonable?

A15: Ron: We use a scenario about a one-way feed about a customer that gets all the biomethane. That's our standard: no dilution taken into account. We can't guarantee dilution. It varies over time. We don't want to take that risk. If there is equipment out there that can be shown analytically that measurement can be done in real time for blending and flow rate, we'd look at it, but historically we do not factor in dilution.

Q16: Chuck White Waste Management: We don't understand why you do that. We have a Simi Valley landfill and we are possibly producing LNG fuel from there. No question that some trucks get 100% biomethane. But we have another landfill in San Fernando Valley 50' feet away from a major transmission line and the gas goes both ways in that pipeline... some people within a mile take gas directly off, but the point is that there is blending. Why can't you take a look at reasonable dilution factors to reduce the level of monitoring required? Especially if it's high-quality gas that lowers your cancer risk? Testing and monitoring is so expensive.

A16: May: We have this discussion with CA Gas producers already. A line can get cut off, or something else where a producer does go directly to customers. E.g., line shutoff for PIP (pipeline integrity program) disturbed customers. But you can do your own gas if you want.. buy gas from us, blend it, and push it back out.

Q16: That defeats the purpose of low carbon gas. Unnecessary burden of monitoring or blending program we oppose. We only want what is warranted.

A16: You say it doesn't happen, I'm telling you it does. Honestly. Blending is not something we can rely on.

Q16: Yeah but on annualized basis there is plenty of blending right?

A16: Ira Pearl: We've seen this discussion before. We've had situations where someone's average output is already off-spec and they argue blending will take care of it. We don't like that. But this situation is different; this situation is where ppm is so low that we don't even need to put in monitoring equipment. Assumption of no-dilution is unrealistic and means expensive unnecessary monitoring of trace constituents. So this question is: monitor or not?

A16 Ron Goodman: This has a LOT of implications for not just biogas but also CA natgas producers. Slippery slope of blending. If you can meet spec, that's good. If your gas is particularly good, you will get less monitoring equipment installed. This could be a nonissue.

Q16 Ira: We're more talking about ARB/OEHHA's recommendations. We want them to take into account dilution. Your policy is your own thing for your tariff, but developers are worried that you will influence CPUC unduly where you assume worst-case scenario across the board.

A16 Andy: We have hourly, not just annual exposure standards. Just to clarify.

Q17: Julia Levin Bioenergy Association of CA: are we conflating average dilution in pipeline vs. monitoring standards. You said dilution sometimes doesn't happen, but health standards are based on 30 year exposures. Are you really testing for risk from one hour exposure?

A17 Andy: Yes.

A17 May Lew: We can't factor in dilution, look at our matrix. High impact, high frequency CoCs get more monitoring. We want to be flexible and consistent