Q1. What is PG&E doing to inform the public of the "SIX INCH RULE" for people with pacemakers?

A1. The so-called “six inch rule” is not actually a “rule,” but a general recommendation published in 1997 regarding mobile phones. It provided this guidance on the basis that a mobile phone is small enough that a consumer might place it in a breast pocket, potentially bringing the mobile phone very close to a pacemaker device. However, the FCC later concluded that even this does not appear to be a serious problem:

> “The FDA requires pacemaker manufacturers to test their devices for susceptibility to electromagnetic interference (EMI) over a wide range of frequencies and to submit the results as a prerequisite for market approval. Electromagnetic shielding has been incorporated into the design of modern pacemakers to prevent RF signals from interfering with the electronic circuitry in the pacemaker. The potential for the "leads" of pacemakers to be susceptible to RF radiation has also been of some concern, but this does not appear to be a serious problem.” (FCC Office of Engineering & Technology Bulletin 56: "Questions and Answers About Biological Effects and Potential Hazards of Radiofrequency Electromagnetic Fields" (Fourth Edition, August 1999)

The US Food and Drug Administration (FDA) provides similarly on its website:

> “Radiofrequency energy (RF) from cell phones can interact with some electronic devices. This type of interference is called electromagnetic interference (EMI). For this reason, FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cell phones. This test method is now part of a standard sponsored by the Association for the Advancement of Medical Instrumentation (AAMI). This standard will allow manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cell phone EMI.”

The FDA’s website continues on to add that “based on current research, cell phones would not seem to pose a significant health problem for the vast majority of pacemaker wearers.”

While all of the foregoing applies to cellphones, the “six inch rule” is generally inapplicable to SmartMeters™ for two fundamental reasons: First, the SmartMeter™ is attached to a house or business and cannot, without great difficulty and a clear intention to do so, be placed next to a person’s chest (i.e., closer than six inches to the meter’s antenna, which is contained within the metal and glass of the meter, and thus already a distance from someone nearby). Second, the strength of the signal from a SmartMeter™ diminishes very rapidly with distance, so the inability to carry the meter in your pocket, coupled with an individual’s distance from the meter, limits one’s RF-exposure. It also is worth

noting that SmartMeters™ only communicate intermittently for between 2 and 20 milliseconds at a time, totaling on average approximately 45 seconds per day, so the weak RF fields that SmartMeters™ utilize are further limited by time.

Currently, medical device manufacturers advise patients to consult with their physicians when a patient has concerns about RF devices and interference. Although the so-called "six inch rule" was not intended for devices like SmartMeters™, where the typical RF exposure is weak, distant, and extremely brief, PG&E would nevertheless advise any customer with concerns related to a medical device to consult with his or her physician for personal medical advice to best address his or her concern.

Q2. Please show your safety and test results relating to this warning and what device was tested. Have you tested different brands of pacemakers? Have you tested other medical implants or devices (including deep brain stimulators and new wireless medical pendants)? Please show your real time data at 6 in., 12 in., 5 ft. and 10 ft. from a meter connected to activated mesh network (vs. power output from one meter).

A2. In an effort to avoid the potential for RF-interference, PG&E worked with Silver Spring Networks to develop a data transmission network that operates within the FCC's standards and does not interfere with other FCC-compliant devices. SmartMeters™ typically operate under Part 15 of the FCC Rules, and those rules specify power limitations of transmission devices to avoid interference, with which rules PG&E fully complies.

Additionally, the FDA generally reviews the capacity for interference during its approval of individual medical devices. However, as answered above in Answer 1, the scientific community has studied this issue in devices with much stronger RF fields held in closer proximity to medical devices for longer time-periods, and the FCC has found that this is not a health concern.

Before installing SmartMeters™, PG&E hired an independent evaluator to study the signal strength of SmartMeter™ devices and the studies are publicly available on our website at www.pge.com/rf. Of note, the independent report that PG&E commissioned found that once a person is about 10 feet from a SmartMeter™ device, the RF signal strength falls below the general level of background-level RF exposure found in most urban areas.

Q3 What is PG&E doing to inform the public about the risk of fires associated with smart meters? (Please see fire reports for Berkeley, Bakersfield & other areas)

A3. There is no risk of fire associated with SmartMeter™ devices. There has not been a single case of fire caused by a SmartMeter™ out of the more than 6 million SmartMeter™ devices that PG&E has installed to date. Electrical fires that have started elsewhere in a home's wiring have caused some

SmartMeters™ to burn, however the meter was not the cause. Other issues, such as a problem in the home's electrical panel, caused the fire to start.

Q4. What is the peak pulse RF power from one electric smart meter at six inches, 8 inches, and 1 foot? What is the peak pulse RF power from 3, 5 10 20 and 50 feet? (real time, not-time averaged).

A4. In an August 6, 2010 letter from Julius Knapp, the Chief of the FCC's Office of Engineering and Technology, to Cindy Sage, the FCC advised that it is the average power, not the peak power, of a device that is relevant for exposure evaluation.

> Since the purpose of these devices is to provide very infrequent information they transmit in occasional bursts. Thus, for exposure purposes ***the relevant power is maximum time-averaged power*** that takes into account the burst nature of transmission, and based on the typical time-averaged transmitter power for many of these devices, they would generally be compliant with the local [specific absorption rate] limit even if held directly against the body. [emphasis added]

Notwithstanding the FCC's view that peak transmissions are not the relevant measure of RF for purposes of evaluating exposure, it is important to note that the RF from SmartMeters™ is very weak and very brief. PG&E's independent evaluator found that the time-averaged power density at one foot from the meter is 8.8 $\mu W/cm^2$ (microwatts per square centimeter) when you conservatively assume a 4-percent duty cycle (a duty cycle is defined as the percentage of time the radio is in an 'active state,' or transmitting). But this very conservative calculation results in an overstatement of the time-averaged power density number, as a 4-percent duty cycle is equal to nearly one hour (57 minutes) of transmission time per day, when the actual transmission time for a SmartMeter™ device is on average *less than one minute per day* (45 seconds). If you adjust the calculations for the actual duty cycle, the RF from PG&E's SmartMeters™ is considerably lower, and well within the FCC exposure limits for time-averaged power density, which is 601 microwatts per square-centimeter.

Since our calculations are based on these longer-than-actual time exposures, and at different distances than you have requested, we do not have specific data with which to answer your question. However, given the vast difference between our conservative calculations and the FCC-standard, as well as the fact that the signal from a SmartMeter™ typically lasts between 2 and 20 milliseconds, we can definitively tell you that the peak pulses at these distances are well within FCC limits.

Q5. What is the peak RF power at these same distances from a meter connected to an activated mesh network? What is the peak pulse RF power from multiple electric smart meters at six inches, 8 inches, 1 foot, 3', 5' 10' 20' and 50 feet? (real time, not time averaged). Please calculate for an apartment building with 10, 15, 20 or more meters on one wall both before and after the mesh network is activated.

A5. It is important to note that the maximum power of the radio in a SmartMeter™ is only one watt, and any signal from the device cannot exceed the device's total transmission power whether operating alone or as part of a mesh network. Additionally, one meter's operation within a mesh network does not increase the amount of RF in an area. That PG&E's network is "mesh" means only that the data is transmitted from meter to meter on the way to an access point. It is not an 'always on' network, nor does that increase the level of RF; rather, that a network is "mesh" means that it always is available to pass information along. An analogy would be a human bucket brigade where one person passes a bucket of water down the line to the next person, and so on. Regardless of the meters' availability, each meter only transmits for an average of 45 seconds per day. For the other 23 hours and 59 minutes of the day, the meter is not transmitting any RF.

Although it is theoretically possible that two SmartMeters in close proximity could transmit at the same time, the very short duration of each signal means that there is little opportunity for overlap and therefore the signals from the meters can be regarded as essentially independent. The signal from a SmartMeter™ device typically lasts between 2 to 20 milliseconds and the cumulative signaling during a day would typically total, on average, 45 seconds.

The FCC recently wrote in detail on this subject, specifically about SmartMeter™ devices, and stated as follows:

> "With respect to multiple adjacent Smart Meter installations, since the antennas for each device are mounted individually on each utility meter, the separation distance from most people for most of the transmitting antennas is relatively large compared to 20 cm and the meters' contributions to the total potential exposure at any location are small, as only the nearest few transmitters can add meaningfully to the total. Further, as a practical design matter, when several of these meters are placed in a cluster, they have to communicate with a single controller. In order to ensure that the controller receives the information properly, ***only one transmitter can communicate with the controller at a time, eliminating the potential for exposure to multiple signals at the same time***. . .
>
> In addition, the exponential decrease in signal strength over distance and additional signal losses due to non line-of-sight conditions for distant sources ensures that only the contributions of nearby transmitters are significant. . . .

> ***Irrespective of duty cycle, based on the practical separation distance and the need for orderly communications among several devices, even multiple units or 'banks' of meters in the same location will be compliant with the public exposure limits***." [emphasis added]

As stated in response to Question 4 above, PG&E's calculations are based on longer-than-actual time exposures and at different distances than you have requested, and consequently we do not have specific data with which to answer your question. However, given the FCC's stated view on these issues, and the vast difference between our conservative calculations and the FCC-standard, we can definitively tell you that the peak pulses at these distances are well within FCC limits.

Q6. If a person is sick in bed for one day and they are lying adjacent to a smart meter with their back propped against the wall (6 inches or less away from meter), how many times will that person be exposed to the RF signal in one 24 hour period? Please show date and calculations for one meter and an activated meter, which is connected to activated mesh network).

A6. A meter may send or receive several signals of between 2 to 20 milliseconds each day (sometimes referred to as "chirping"), but the number of signals during a day depends on several factors, including the position of a meter in the mesh network. Since the average transmission time for a meter is 45 seconds (total) during a 24-hour period, the exposure will be 45 seconds. However, because the FCC's standard on RF-exposure considers not just RF-signal strength and the duration of the signal, but also distance, one needs to consider that any distance between the SmartMeter™ device and the person, and the intervening presence of the house-wall and the back plate of the meter, would significantly reduce the strength of the RF-signal in the scenario described above. Moreover, and as explained in the answer to Question 1, it is physically difficult to achieve closer distances than six inches to a meter's antenna, especially through a wall and other home construction materials.

Q7. What if that same person had three meters adjacent to where their bed is - or ten or more meters away from where there bed is? What would their RF exposure be, in uW/cm2 and how many times in one day?

A7. As described above, any distance between the SmartMeter™ device and the person, such as the presence of the wall and the back plate of the meter, would significantly reduce the signal strength in the scenario described. Further, multiple meters themselves would be spread apart, and the varying distances from the meters substantially limits the RF exposure. As the FCC has stated, "In order to ensure that the controller receives the information properly, ***only one transmitter can communicate with the controller at a time, eliminating the potential for exposure to multiple signals at the same time***. . . . In addition,

the exponential decrease in signal strength over distance and additional signal losses due to non line-of-sight conditions for distant sources ensures that only the contributions of nearby transmitters are significant. . . . ***Irrespective of duty cycle, based on the practical separation distance and the need for orderly communications among several devices, even multiple units or 'banks' of meters in the same location will be compliant with the public exposure limits***." [emphasis added]

Q8. Has PG&E studied the effects of an activated mesh network on electronics and other wireless devices?

A8. The FCC regulates all emissions of electronics to prevent one type of electronic equipment from interfering with other electronics and wireless devices that operate in the same frequency-band, and PG&E is in full compliance with the FCC's rules.

Under the FCC's rules, manufacturers of RF-based products all must comply with the rules; that is, the burden of preventing interference rests both with the makers of SmartMeters™ and other devices that utilize RF and operate in the 900 MHz frequency-band. Consequently, even though PG&E and its vendors are in full compliance with the FCC's regulations, there may be instances where manufacturers of other consumer products have not complied with the FCC's regulations, creating the potential for interference.

Regardless of which product causes the interference, PG&E will work with any customer to resolve his or her concerns about interference with electronic equipment. To date, PG&E has received very few claims of RF-interference alleged to be due from SmartMeters™, but has worked with these customers to determine the issue and help them to replace the product experiencing the interference. Customers who believe that a device in their residence is subject to interference from a SmartMeter™ should contact PG&E at 1-866-743-0263.

Q9. What has PG&E done to inform the public about possible interference from their smart meter (when the mesh network is activated) with electronics and other wireless devices such as emergency radio systems, cordless phones, DECT phones, wireless fans, garage door openers, baby monitors, etc.?

A9. Please see PG&E's response to Question 8 above. Consistent with that response, the FCC regulates all emissions of electronics to prevent one type of electronic equipment from interfering with other electronics and wireless devices that operate in the same frequency-band. PG&E is in full compliance with the FCC's rules.

Some PG&E-customers have stated that their SmartMeters™ caused interference with another device. In those instances, PG&E has worked directly with the customers to determine the issue and help them to replace the product

experiencing the interference. Customers who believe that a device in their residence is subject to interference from a SmartMeter™ should contact PG&E at 1-866-743-0263.

Q10. What is PG&E doing to compensate the public for interference that interrupts emergency situations or interference that contributes to lost business or communication breakdowns?

A10. PG&E has not had a single reported incident of such interference with emergency situations or business communications – rather, one of the benefits of smart grid technology is that it enables PG&E to respond more quickly to power outages, as the smart grid can pinpoint the location of the problem. However, if you believe that this has occurred, we want to know and we will investigate that situation. As we consistently have said with respect to customers' questions and claims about SmartMeters™, we will work with our customers and if there is an issue we will fix it and make it right.

Q11. What is the power output of a data collector and the frequency used?

A11. PG&E uses pole-top access points ("data collectors") that consist of a 1-watt radio in the 902-928 MHz band to collect data from the meter, and a second radio that then sends the data from the access point back to PG&E using a ¼ to 1 watt radio at the 801-900 MHz or 1.9 GHz band (depending upon location).

Q12. What is the power output of a data collector and the frequency used an electric repeater?

A12. Please see PG&E's response to Question 11.

Q13. I met with a solar installer friend of mine earlier in the summer and he told me he thought the reason why some people's bills were higher than average after their smart meters were installed might be because the wireless meters measure in "real time," and measure the extra energy used during the power surges when large appliances turn on such as air conditioners, refrigerators (especially so because they turn on and off all day long), washing machines, and dishwashers etc..

He said the old analog meters had a slight delay time that didn't read or pick up the energy usage from these types of appliance surges. He stated that the new meters were actually "too accurate." Is what he told me correct? If so, do you think it is fair for rate payers to be charged for energy usage that was never calculated and included on their bills before their Smart Meters were installed? Will the new rates being created reflect this change in meter reading and calculations?

A13. We disagree with the notion that PG&E's SmartMeters™ somehow are flawed because they are "too accurate." The purpose of a meter is to accurately measure usage in order to generate accurate billing. The fairest system is one in which all consumers pay for their actual and accurately-measured usage, rather than have some customers pay less than others for the same actual electric-usage.

With respect to your friend's theory about the accuracy of PG&E's SmartMeter™ technology, you may want to review the report that the California Public Utilities Commission's ("CPUC") independent third party evaluator, The Structure Group ("Structure"), recently issued regarding the accuracy of PG&E's SmartMeter™ technology. The report is available on PG&E's website as follows: http://www.pge.com/myhome/customerservice/smartmeter/programupdates/.

From April through August, Structure conducted an end-to-end (i.e., from the customer's meter to the customer's bill) evaluation of PG&E's SmartMeter™ system, which included laboratory-testing, field-testing, and a review of customer-complaints. Structure recently concluded its review, and on September 2, 2010, the CPUC released Structure's 400+ page report to the public. In its report, Structure announced that "all of the Smart Meters tested in Structure's independent laboratory passed the accuracy testing;" "100% of the SmartMeters™ tested passed Average Registration Accuracy (compared with 95.9% of the electromagnetic meters);" and "Structure observed no deviations during testing that indicated a systemic problem in the meter billing system's accuracy." Rather, Structure's independent analysis found that the primary reasons that some customers experienced higher bills coincident with their SmartMeter™ installation were hotter weather, rate increases in the higher usage tiers, the expiration of low-income rate subsidy eligibility for some customers, and in some cases the degradation of older-style analog meters over decades of use (in which case substituting a new and more-accurate SmartMeter™ device could result in a different (albeit more accurate) measurement. This is a topic PG&E has publicly discussed several times, including in testimony before the California Senate and the CPUC.

With that background, we continue to want to work with our customers to address any questions that they may have about their meters or their bills. We will work directly with customers to investigate their claims, test their meters, and provide all of the facts and information necessary to answer their questions.

Q.14. I was also curious to know if interference from other nearby wireless devices could cause jumps or dips in Smart Meter data and readings. Have you taken this into consideration in any or your preliminary studies or research?

A14. We have reviewed the potential for interference from other devices and have not seen any evidence of jumps or dips in SmartMeter™ data and/or readings. It is noteworthy, though, that Smartmeters™ use the wireless information only to communicate the collected readings/data, not to measure usage. As a result,

even if the nearby devices interfered with the SmartMeter™ communication, it would only slightly delay the communication of the read values, and would not interfere with the values themselves. This is much the same as if interference blocked a mobile or cordless telephone transmission. Once the interference is gone, the message can still be communicated accurately.

Q.15. Lastly, have you looked at and taken into account the Bioinitiative Report, www.bioinitiative.org , a compilation of over 2000 peer review studies that show biological effects of non-thermal RF radiation at much lower levels than the FCC standards? Many other countries in the world (including the entire European Union) are adopting safer exposure standards based on the research and recommendations in the Bioinitiative Report. At present the FCC standards are 1000x higher than the recommended exposure standard in this report.

A.15. Preliminarily, it is important to note that PG&E's SmartMeter™ equipment complies by many orders of magnitude with both the applicable federal standard that the FCC has issued, but also with international standards. Whereas the RF-exposure at 1 foot away from a PG&E electric SmartMeter™ is 8.8 microwatts per square-centimeter, the FCC has set its safety threshold at 601 µW/cm2 and the International Council on Non-Ionizing Radiation Protection (ICNIRP) has set its standard for this frequency at approximately 450 µW/cm2. In either case, PG&E's SmartMeters™ release a mere fraction of what the federal government and international community have deemed safe exposures.

PG&E is aware of the BioInitiative Report. PG&E also is aware of the vast criticism the BioInitiative Report has received within the scientific community. The consensus of the scientific community is that the BioInitiative Report is un-objective, self-selected research. It does not represent the consensus of the international scientific community regarding safe RF exposure, as reflected in the 2009 Technical Information Statement released by the Committee on Man and Radiation ("COMAR"), a technical committee of the Engineering in Medicine and Biology Society ("EMBS") of the Institute of Electrical and Electronics Engineers ("IEEE"):

> "The focus of this COMAR Technical Information Statement is to identify quality sources of scientific information on potential health risks from exposure to RF energy. This Statement provides readers with references to expert reports and other reliable sources of information about this topic, most of which are available on the Internet. This report summarizes the conclusions from several major reports and comments on the **markedly different conclusions in the BioInitiative Report** (abbreviated BIR below). Since appearing on the Internet in August 2007, the BIR has received much media attention but, more recently, **has been criticized by several health organizations** (see Section titled "Views of health agencies about BIR"). ***COMAR concludes that the weight of scientific evidence in the RF bioeffects***

literature does not support the safety limits recommended by the BioInitiative group. For this reason, COMAR recommends that public health officials continue to base their policies on RF safety limits recommended by established and sanctioned international organizations such as the Institute of Electrical and Electronics Engineers International Committee on Electromagnetic Safety and the International Commission on Non-Ionizing Radiation Protection, which is formally related to the World Health Organization." (Emphasis added.)

The IEEE is just one organization that has criticized the BioInitiative Report and instead followed the safety recommendations of the WHO and ICNIRP. The following reflect still more criticism of the BioInitiative Report:

- "Comments on the BioInitiative Working Group Report (BioInitiative Report)" (PDF). EMF-NET. 2007-10-30 http://web.jrc.ec.europa.eu/emf-net/doc/efrtdocuments/EMF-NET%20Comments%20on%20the%20BioInitiative%20Report%2030OCT2007.pdf.

- Committee on Man and Radiation (COMAR) (October 2009). "COMAR technical information statement: expert reviews on potential health effects of radiofrequency electromagnetic fields and comments on the bioinitiative report". *Health Physics* **97** (4): 348-356 http://www.ncbi.nlm.nih.gov/pubmed/19741364

- Rodney, Croft; Abramson, Michael; Cosic, Irena; Finnie, John; McKenzie, Ray; Wood, Andrew (2008-12-18). "ACRBR Position Statement on *BioInitiative Report*" (PDF). Australian Centre for Radiofrequency Bioeffects Research http://www.acrbr.org.au/FAQ/ACRBR%20Bioinitiative%20Report%2018%20Dec%202008.pdf

- "BioInitiative report (publication no. 2008/17E)". Health Council of the Netherlands. 2008-09-01 http://www.gezondheidsraad.nl/en/publications/bioinitiative-report-0

PG&E cannot disregard the overwhelming majority of scientific evidence, including that issued by the United States government and the international scientific community; rather, it must look to government, health, and regulatory agencies to determine the safe limits of RF exposure. We have done so, and we encourage our customers to do the same. The FCC's standard on safe RF exposure is based on input by a number of agencies, including the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and the

National Institute for Occupational Safety and Health (NIOSH). PG&E not only complies with this federal standard (601 μW/cm^2), but with ICNIRP's international standard, and does so in each case by a considerable margin. Regarding European Union standards, not only is PG&E's SmartMeter™ technology in compliance with ICNIRP, but the EU recently mandated that all energy consumers should be migrated to smart metering devices as part of the continent's conversion to a smarter grid. The expectation is that the majority of EU energy consumers will be measured by SmartMeter™-style devices within the next 20 years.

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