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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 1
POLICY AND PROGRAM OVERVIEW

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In Decisions (D.) 06-07-027 and 09-03-026, the California Public Utilities Commission (CPUC or Commission) authorized Pacific Gas and Electric Company (PG&E) to deploy Advanced Metering Infrastructure (AMI), known as SmartMeters™, to all of PG&E's electric and gas customers in order to achieve California's energy policy goals relating to improved reliability, customer energy efficiency and demand response, and reduced environmental emissions.

On March 10, 2011, Commission President Peevey noted that certain customers have "concerns about wireless radio frequency [RF] emissions from [SmartMeters™]" and directed PG&E to "bring to [the] Commission a proposal or a series of proposals that will allow customers with an aversion to wireless devices the option of being metered without the use of wireless technology."

Accordingly, PG&E proposes to modify the operation of selected SmartMeter™ devices to address concerns about RF for this specific population of residential electric and gas customers. If approved, PG&E would offer to residential customers the option to have PG&E turn off the radio(s) in their electric and/or gas meters (radio-off option), thus maintaining the benefits and efficiencies of continued deployment of SmartMeters™ while specifically addressing those customers' concerns about the RF signals from the radios in their meters. These customers would pay an up-front and monthly fixed or volumetric fees, as well as an "exit" fee, to support this customized option.

Although these customers could no longer obtain certain SmartMeter™-related benefits, the PG&E SmartMeters™ will remain on their premises so that they and future owners of their premises will have the opportunity to benefit from the SmartMeters™ in the event that they subsequently either opt for the full functionality of the meter or move away from the residence.

Alternatively, for those electric customers who wish to maintain most of the SmartMeter™ functionality and benefits but nevertheless want the RF-communications from their SmartMeters™ physically farther from the current

location of the SmartMeters™ (i.e., either away from their home or a specific part of their home), PG&E's existing Rule 16, Section F.2.b already provides an opportunity for those customers to request that PG&E relocate the electric meter to a different location on their property at the customer's expense (meter relocation option).

The following are the key program elements for customers who choose the radio-off option:

ffi Residential customers may choose to have PG&E turn off the radio(s) in their electric and/or gas SmartMeters™, thus disabling the RF-communications. PG&E will read the meter(s) manually.

ffi Residential customers who exercise their choice to turn off the radio(s) in their electric and/or gas SmartMeters™ will pay to cover the customer-specific costs of implementation. These customers will have the following fee-structure choices, with the ability to pay the up-front fee over a reasonable financing period, and a 20 percent discount for California Alternate Rates for Energy (CARE)-enrolled customers, all as set forth in the Tables 1-1 and 1-2 below.[!⊥"]

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Line No.	One-Time Up Front Charge ($)	Monthly Fixed Charge ($/Month)	Monthly Volumetric Rate Adder Applicable to Gas Only Customers ($/Therm)	Monthly Volumetric Rate Adder Applicable to Electric Only Customers and Combined Electric and Gas Customers ($/kWh)
1	$135.00	$20.00	N/A	N/A
2	$135.00	n/a	$0.532	$0.036
3	$270.00	$14.00	N/A	N/A
4	$270.00	N/A	$0.387	$0.026

[!⊥"] Both CARE and non-CARE customers may pay their monthly charges either on a flat-fee basis or based on their energy consumption (a volumetric rate adder dependent on customer type).

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Line No	One-Time Up Front Charge ($)	Monthly Fixed Charge ($/Month)	Monthly Volumetric Rate Adder Applicable to Gas Only Customers ($/Therm)	Monthly Volumetric Rate Adder Applicable to Electric Only Customers and Combined Electric and Gas Customers ($/kWh)
1	$105.00	$16.00	N/A	N/A
2	$105.00	N/A	$0.426	$0.029
3	$215.00	$11.00	N/A	N/A
4	$215.00	N/A	$0.310	$0.021

Based on an initial approximation of roughly 145,800 customers who may choose alternative metering during the period preceding PG&E's next General Rate Case (GRC), PG&E forecasts that the cost of this program will be $38.3 million of capital cost, and $75.1 million of expenses. The capital and expense costs reflect the following program-related costs: (1) manually turning off the radios contained in PG&E's electric and gas SmartMeters™; (2) Information Technology (IT) modification costs; (3) reinforcing PG&E's RF-mesh communications network to address any degradation that the program may cause; (4) manually reading the customers' gas and/or electric SmartMeters™ on a monthly basis; and (5) funding other operating costs for the program, including communications with customers interested in the option.

PG&E proposes new two-way electric and gas Modified SmartMeter™ Balancing Accounts (MSMBA) in which to record the actual electrical and gas revenue requirements, and actual fees/revenue collected from the program. In addition, PG&E is requesting to recover the costs of offering the option subject to annual true-up of the costs and forecasted revenue requirements.

Additional details on the program, the program costs, and the ratemaking and cost recovery mechanisms for the program are provided in the following chapters of this testimony:

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This chapter describes the cost recovery and revenue requirement proposal for recovery of the incremental costs of the modifications to the SmartMeter™ program through the MSMBAs. In addition, the per customer up-front fee, the monthly fixed or volumetric fees, and the exit fees will be recorded to the MSMBAs.

The remainder of this policy and program overview chapter will summarize the program policy context; PG&E's evaluation of alternatives; a description of the recommended "radio-off" option; incremental cost components; and the customer fees/rates and eligibility requirements.

PG&E Remains Committed to SmartMeter™ Technology

PG&E remains fully committed to SmartMeter™ technology as a positive change for customers. PG&E's existing SmartMeter™ Program represents a significant, unprecedented shift in metering technology. After more than 100 years of electro-mechanical metering, PG&E and other utilities are able to offer cost-effective digital meters with automated two-way communication capability. And rather than manually read its customers' 10 million meters once per month, PG&E now can obtain hourly and quarter-hourly interval reads of customers' energy usage to provide them with substantially more information about practices they previously could monitor and adjust only monthly. This new technology is the foundational element of the Smart Grid, and provides the platform necessary to optimize Demand Response (DR), energy conservation, and renewable energy use. PG&E's SmartMeter™ technology supports California's energy and environmental policies, including providing customers with more information, Dynamic Pricing, development of Home Area Network (HAN) compatible appliances such as programmable thermostats, smart air conditioners, rooftop solar photovoltaic, and smart charging of Electric Vehicles (EV). In short, SmartMeters™ are a critical tool in California's energy future.

Moreover, the Commission and other independent California advisory groups have recognized that SmartMeters™ comply with all known standards, including those of the Federal Communications Commission (FCC) and the

International Commission on Non-Ionizing Radiation Protection (ICNIRP).[!&"] Nonetheless, PG&E understands that some of its customers are concerned about the RF signals from their SmartMeters™ and that they therefore want the opportunity to choose an alternative metering option that does not utilize wireless RF communications. It is through the proposed modifications to the SmartMeter™ Program that PG&E seeks to address these customers' RF concerns while concurrently seeking to maintain the overall benefits, integrity and reliability of the SmartMeter™ system for the rest of its customers. PG&E has attempted to balance these interests by proposing a radio-off SmartMeter™ alternative at a reasonable customer cost.

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PG&E has evaluated several alternatives to the wireless, RF-communications on which its SmartMeters™ currently rely. PG&E undertook this assessment of the technical and economic feasibility of available alternatives to RF-based technology in an effort to respond to customers' concerns.

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This proposed solution reduces the benefits that communicating SmartMeter™ devices offer, but this alternative is the most practical solution available because it optimizes use of the SmartMeters™ that PG&E already has deployed (approximately 7.7 million meters as of March 1, 2011) and PG&E has already purchased the additional meters with ratepayer funds for current and future customers, while addressing

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!&" The FCC derived the national standard based on the recommendations of two expert organizations┐ the National Council on Radiation Protection and Measurements (NCRP) and the Institute of Electrical and Electronics Engineers (IEEE)┐ and based on consultation with the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH).

the population of customers concerned about RF. PG&E notes that while SmartMeters™ with their radios turned-off ffl cannot provide interval energy-consumption data, there may be future technologies available that would allow manual retrieval of such interval data.

9 This is an existing tariffed option that is currently available for customers. PG&E's existing tariff (Rule 16) allows customers to relocate PG&E's electric service facilities, including metering equipment, to another acceptable location on their property. This relocation work is typically performed at the request of customers to accommodate building additions or remodeling. The tariff provides that the customer pay PG&E its total estimated costs. Under this existing option, each customer has the ability to request that PG&E move the electric SmartMeter™ to a different location on the exterior of his or her home, or away from the home to another location on the customer's property.

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There are two predominant wired solutions available in the market today: power line carrier (PLC), which relies on the transmission of data to and from the meter over electricity lines, and those that leverage a traditional phone line. PG&E has assessed both of these potential solutions and found them infeasible.

- There are no proven solutions in the marketplace that can effectively integrate PLC technologies with PG&E's existing RF-mesh backhaul network.
- Some utilities have deployed PLC technologies as an alternative to RF-mesh technologies, but creating a hybrid RF-mesh/PLC solution would require a significant investment in infrastructure that is not economically viable at the relatively small scale projected here.
- PLC solutions do not exist for gas meters since they are not connected to an electric supply.

Similarly, traditional telephone-line wired solutions are technologically and economically infeasible as follows:

- PG&E currently has in place approximately 19,000 MV-90 meters and is not aware of any existing MV-90 system that scales beyond 30,000 meters. To effectively offer this option to PG&E's customer base would necessitate making it available to more than 100,000 customers, thus requiring a technological solution that does not presently exist. If doing so is even possible, the cost would be prohibitively high, and the operational complexities are unknown.
- Offering a telephone-line wired meter is substantially more expensive than the radio-off option. Notwithstanding that commercial customers have used commercial-grade, wired MV-90 modem-based meters for years, they are expensive, and PG&E is not aware of any existing residential-grade meters that are wired for a telephone connection.
- Moreover, connecting a residential meter to a phone service connection will require an additional cost.
- This alternative does not support HAN or the smart-charging of electric vehicles, and therefore provides less functionality than, for example, the meter relocation alternative.

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PG&E evaluated this alternative, but found this option is infeasible for multiple reasons:

ffi Non-communicating SmartMeters™ (i.e., a SmartMeter™ with its radio off as proposed here by PG&E) can serve the same function as a non-smart meter. As PG&E has already installed and/or purchased virtually all of the meters that it will need to complete its planned SmartMeter deployment, it is more efficient and logical to complete PG&E's deployment and turn off the radios as opposed to introducing a new meter.

ffi Legacy electromechanical meters do not have the ability to track interval energy-consumption, such as the hourly and quarter-hourly reads that SmartMeters™ can provide. Since California has based its energy policy on time-of-use based rates, installing meters capable of providing interval data is foundational to achieving this goal. Installing SmartMeters™ with their radios turned off is far more consistent with California's energy policy than leaving legacy electromechanical meters in place. Moreover, completing PG&E's current installation will provide customers with greater prospective flexibility: when current residents who choose the radio-off solution move or sell their homes, subsequent residents will already have their SmartMeters™, just as current customers will have the option to have PG&E re-activate their meters so that they may participate in energy programs that rely on SmartMeters™, such as HAN and smart-charging of electric vehicles.

Based on its evaluation, PG&E has concluded that turning off the radios in the electric and/or gas SmartMeters™ or relocating the electric SmartMeters™ under existing Rule 16 are feasible alternatives, and proposes that the Commission approve the use of the radio-off alternative for those residential customers who choose to disable the

RF-communications functions of their meter, and approve the costs associated with this modification to PG&E's SmartMeter™ Program.

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PG&E's SmartMeter™ radio-off option will be available to residential rate class customers, as well as those commercial accounts which have been designated as serving residential properties (including, but not limited to multi-unit dwelling common area accounts, agricultural class accounts which may include a residence, or assisted living facilities served by a master-meter on a commercial rate).

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Table 1-3 provides a summary of the estimated costs for the proposed SmartMeter™ radio-off option. As described in more detail in Chapter 2, these estimated costs are incremental (i.e., in addition) to the costs already funded for SmartMeter™ deployment and programs authorized in the Commission's two prior SmartMeter™ decisions.

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Line No.	Cost Category	Total
1	Field Deployment	$92,736(a)
2	Information Technology	2,318
3	Customer Communications and Operations Support	18,379
4	Total	$113,433

(a) Includes ongoing meter reading costs incurred in 2012 and 2013.

Customers requesting that PG&E relocate their electric SmartMeter™ pursuant to existing Electric Rule 16 will pay PG&E's total estimated costs, per the tariff authorizing rearrangement of service. PG&E anticipates that relocations will differ significantly based on the physical requirements of the work. As such, the tariff treats these relocations as "custom." The cost of such "custom" meter relocations will vary depending on such factors as the physical location of the meter and whether the customer receives underground or overhead service. PG&E anticipates that meter relocation costs generally will

range from approximately $2,500 to $4,500 for overhead customers and $6,000 to $11,000 for underground customers. Rare cases could fall outside of these estimated ranges.

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The projected customer-specific fees/rates for selecting the radio-off alternative to PG&E's existing SmartMeter™ Program are not insubstantial and reflect the higher cost of delivering electric and gas service to those customers who choose not to participate in the SmartMeter™ Program. As the Commission recognized in approving PG&E's existing SmartMeter™ Program, building a Smart Grid and enabling new functions offers customers significant economic efficiencies. For example, it enables PG&E not only to close meter-reading offices and save those costs,[!3"] but also remotely validate and "ping" meters to ensure that they are working correctly, and respond more quickly to outages and customer relocation requests than ever before. As it is more expensive to serve customers who are /+ part of the Smart Grid than it is to serve those customers who participate in the Smart Grid, PG&E submits that it is appropriate for non-Smart Grid customers to bear the costs of the modifications to the SmartMeter™ Program on a self-funded basis.

PG&E's proposed rates and fees, as set forth in the fee/rates Tables 1-1 and 1-2 in Section A above, reflect the incremental costs of PG&E's modifications to the SmartMeter™ Program, including labor costs associated with turning off the SmartMeter™ radios, manual meter-reading, costs to reinforce the communications network to the extent that it is diminished as customers choose the radio-off option, IT costs, communication costs, and operational costs. In addition, PG&E will charge an "exit" fee at the time that a radio-off customer either terminates service or decides to re-enable the SmartMeter™ radio. PG&E's fees/rates are reasonable and PG&E has proposed various fee structure options, including the ability to pay the up-front fee over a reasonable financing period, for the convenience of its customers.

!3" Although the use of SmartMeters™ has eliminated meter-reader positions, PG&E has proved displaced meter readers with new jobs or has assisted them in retiring when those personnel elected not to accept these new positions.

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2 The issue before the Commission┐ how to balance the enormous benefits
3 that SmartMeters™ and the Smart Grid offer while addressing the concerns of
4 those customers who have an aversion to RF-based devices┐ is significant. Not
5 only does this issue affect California energy policy, but potentially national and
6 international energy policy, as well. Utilities across the world have begun to roll
7 out advanced metering technology to ensure the increased energy conservation,
8 DR, renewable energy and reduced greenhouse gas emissions that
9 SmartMeters™ enable, and thus policymakers undoubtedly will be observing
10 this proceeding closely.

11 PG&E's proposed modifications to the SmartMeter™ Program strike the
12 right balance between these subjects: it allows the majority of customers and
13 the state to continue to receive the benefits of SmartMeter™ technology, while
14 also addressing the concerns of those customers who do not want an
15 RF-communicating meter on their premise. PG&E's proposed modifications to
16 the SmartMeter™ Program balance these interests by providing a non-RF
17 communications option to those customers who so strongly desire a choice,
18 while ensuring the continued integrity and reliability of PG&E's overall
19 SmartMeter™ system.

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Bffi ├ ↑ffi | ● -●ffi◘♂5ffi6◘#ffi 7 -♂6ffi-#ffi◘ffG◘5-♬;-Hffi+ 7◘ ¶ 2 ffi ↑◘ ffi 9-|ffi♂ ffi 7 –ffi

Dffi ◘5-ffi● 7 7%♂-●◘ -♂#ffi◘; ffi–ffi↑◘#ffi├ ♂ffi5-#◘├| 5-ffiffi& * F┬ffi 9-|ffi├ 6-♂ffi ffi;; ffi ↑ ffi

Cffi ◘5-♬;ffi◘| ♂◘ -8 ffi 7 -♂6ffi┘ -♂ffi◘; ffi ↑ ffi ' ◘├; ♂-◘ffi&%├ ├●ffi↕ ┼— #ffi

‼ffi ' 7 7 -##-♂ffi◀' &↕ ' ffi ffi ' 7 7 -##-♂┴ffi◘┘┘ 8 #ffi ↑-#ffi◘┘┘ ├●◘ -♂-ffi

✲ffi **#↑● 2 (↔◀ *↠*↔¶ ◖ffi← 1↔(2 ◖ffi← 1↔* , , ●**

ffi & * F┬ ffi●7 7 ♂● 5ffi-♂# ◘ |├♂6ffi+ 7◘ ¶ 2 ffi 7 -♂6ffi◘♂5ffi♂ 9 @ffi5 8-● #ffi-♂ffi

ffi ✲✲B-ffiffi& * F┬ ffi↑◘#ffi#%7 7◘ -I 5ffi–#ffi┘ 6 ##ffi-♂ffi–#ffi+ 7-♬fl♂♂%◘ |ffiffl## ##7 ♂ ffi

┼ffi . ┘ #!ffi 9↑-●↑ffi◘ ffi#%├ 7 – 5ffi ffi ↑ ffi ' &↕ ' !ffi ↑ ffi ' ◘├; ♂-◘ffi┬♂ 64ffi ' 7 7 -##-♂!ffi

ffi ◘♂5ffi ↑ ffi-♂ # 5ffi┘◘ – #-ffi

Affi **┴↑● 2 (↔◀ *↠*↔¶ ●*→8 ↔>●♂ *)7 5 2 * ├→●**

Bffi -↑ ffi5 #-6♂ffi; ffi ↑ ffi | ● -●ffi◘♂5ffi6◘#ffi+ 7◘ ¶ 2 ffi ●↑♂ |6– #ffi-#ffi; ffi

Dffi ◘●↑ffi 7 ffi ffi ◘♂#7 –ffi●%# 7 ff%#◘6 ffi◘♂5ffi ↑ ffi5◘ ◘ffi ffi #┘ ● -8 ffi | ● -●ffi

Cffi ffi6◘#ffi● || ● #ffi# 8 ◘ |ffi –7 #ffi┘ ffi5◘4-ffiffi - ↑ ffi+ 7◘ ¶ 2 ffi | ● -●ffi◘♂5ffi6◘#ffi

‼ffi ● || ● ffi5 8-● #ffi◘ ffi5 ┘ |4 5ffi ↑ %6↑% ffi ↑ ffi# 8-● ffi◘ ◘!ffi◘♂5ffi ↑ ffi

┼✲ffi -♂# ◘ |◘ -♂ffi;ffi ↑ # ffi● || ● #ffi-#ffi♂ ◘ |4ffi● 7┘ | -ffiffiffl#ffi#↑ 9♂ffi-♂ffi - ◘├| ffi ffl♬ffi

┼ffi ◘┘┘ ┤–7◘ |4ffiDffi┘ ● ♂ ffi;ffi ↑ ffi ┤┘ ● 5ffi | ● -●ffi ●↑♂ |64ffi● || ● ffi

┼ ffi ♂ 9 @ffi◀ ◘ |ffi♂5 #┴ffi-#ffi●% ♂|4ffi-♂#◘ || 5!ffi◘♂5ffi‼ffi┘ ● ♂ ffi;ffi ↑ ffi6◘#ffi

ffi •↑♂|64ffi•|| • ffi♂ 9@ffi↑◘#ffi├ ♂ffi♂#◘|| 5ffi◘♂5ffi#ffi♂ffi# 8• ffiffi

ffi)♂◘|ffi5 8• ffi%♂ #ffi;ffi ◘•↑ffi;ffi ↑ ffi•|| • ffi♂ 9@#ffi◘ ffi#%├J • ffi ffi;♂◘|ffi

┼ffi ♂6♂ ♂6ffi◘♂5ffi5 #6♂ffi• − ◘ffi ffi#%┘ ffi◘||ffi ♂5┘♂ ffi5 8• #ffiffi

ffi **&↑• 2 (↔◀ *→*←¶ •□├) ├→•|├,→(77(→ ├•**

Affi & * F┬ ffi↑◘#ffi├ ♂ffi♂#◘||♂6ffi♂ 9ffi | • •ffi7 #ffi9−↑ff%┘6 ◘5 ffi;‰♂• ♂◘├4ffi

Bffi ┘%#%◘♂ ffi ffi ' &↕ ' ffi •#♂ffi♫‼♫┼♫ Bffi#♂• ffi ♫♫C!ffi◘♂5ffi↑◘#ffi├ ♂ffi♂#◘||♂6ffi

Dffi ◘┘┘ 8 5ffi6◘#ffi7 5%| #ffi♂ ffi ┤#♂6ffi6◘#ffi7 #ffi#♂• ffi ♫♫B←ffiffi-↑ ffi┘ 6 ##ffi

Cffi ;ffi ↑ ffi5 ┘|47 ♂ ffi#ffi#↑9♂ffi├ |9ffi♂ffi-◘├| ffi ffl♬ffi

♬ffl#□•&ffl$┴•
ffiffl┘ ├╽ •◘ ffl •ffl♂•□□┘♬♫ ╽ •╽ ┼◀ ffiffl↕•
◀ ffl♫♬◀ □♬□♫♬◀ •ffi♫┼◘♫ffl◀• ♬ffl♬% •ffl •┼ −•−□#♫%ffl♫↕•&7@&A┴┴•

,♂ ffi →•ffi	+7◘ ¶ 2 ffi- •↑♂|64ffi┬| 7 ♂ ffi	- ◘|ffi& J • ffi &◘♂ffi	ffl•%◘|ffi ' 7┘| 5ffi ffi ◘ ffi	K ffi ' 7┘| 5ffi ;ffi& J • ffi &◘♂ffi
ffi	┬| • •ffi→ 9@ffiLffi→ 9@ffiLffiffl&#ffi	!AA┼ffi	!┼A♫ffi	CDK ffi
ffi	┬| • •ffi→ 9@ffiLffi→ 9@ffiLffi. ◘4#ffi	! Dffi	C! ‼♫ffi	B‼ K ffi
┼ffi	┬| • •ffi→ 9@ffiLffi→ 9@ffiLffi-◘|ffi→5 #ffi	┼!C♫♫ffi	‼!C ♫ffi	DK ffi
ffi	*◘#ffi→ 9@ffi ' || • #ffi	A!♫♫♫ffi	!D♫Affi	‼ K ffi
Affi	┬| • •ffi¶ ♬| 5%| #!ffi◘ ffi ' 7┘| →M'% ♂ |4ffi	A! B♫!┼‼ffi	┼!‼A‼!AB┼ffi	DAK ffi
Bffi	*◘#ffi¶ ♬| 5%| #!ffi◘ ffi ' 7┘| →M'% ♂ |4ffi	! ‼!♫ ♫ffi	┼!DC!BB┼ffi	C K ffi
ffi				

‼ffi ┘ ↑•\|2)7* 2 *├→├1•→' *•ffl7→*←┼(→4*•♬* ' ├ 7 15•◀ *→*←├1•┼)→ ├•

♫ffi & * F┬ ffi9−\|ffi;; ffi◘♂ffi◘\| ♂◘ −8 ffi ffi ↑ ffi#◘♂5◘ 5ffi | • •ffi◘♂5ffi6◘#ffi+7◘ ¶ 2 ffi

ffi •↑♂|64←ffiffi-↑ ffi75−;− 5ffi | • •ffi7 ffi •↑♂|64ffi9−\|ffi├ ffi;◘•┼◘ 5ffi├4ffi7◘@♂6ffi

ffi ◘5⁉# 7 ♂ #ffi ffi ↑ ffi | • •ffi7 ffi ♂5┘♂ #←ffiffi(♂ffi ;; • !ffi ↑ ffi ◘5−♬┼◘# 5ffi♂ 9@ffi

┼ffi ♂ ;◘• ffi•◘ 5ffi9−\|ffi├ ff⁉♂◘├| ffi ffi7◘@ ffi◘♂4ffi ◘5−ffi ◘♂#7 −##♂ffi◘; ffi ↑ ffi

ffi 75−;−•◘ ♂←ffiffi-↑ ffi7 #ffi9−\|ffi├ ffi5−#◘├| 5ffi├4ffi& * F┬ ffi •↑♂−•−◘♂#ffi5% ♂6ffi◘ffi8#−ffi ffi

Affi ↑ ffi•%# 7 #Effi7 5ffi|•◘ ♂#←ffiffi-↑ ffi6◘#ffi7 ffi ◘♂#7−♂6ffi75%| #ffi9−\|ffi◘ #ffi

Bffi ├ ffi5−#◘├| 5ffi├4ffi ↑ ffi#◘7 ffi& * F┬ ffi •↑♂−•−◘♂←ffiffiffl\|ffi #−5 ♂ −◘ \|ffi•%# 7 #ffi9−\|ffi├ ffi

Dffi |6┼| ffi ffi# | • ffi ↑ ffi◘\| ♂◘ −8 ffi7 ♂6ffi┘ ♂←ffi

Cffi **┴↑• ffi← *,,•→ •♂ ,(97*•♫($#(,* •┘ 2 2 ├ (→ ├,•**

‼ffi & * F┬ ffi •↑♂−•−◘♂#ffi9−\|ffi├ ffi┘ 8−#♂ 5ffi◘♂5ffi ◘♂ 5ffi ff⁉# ffi↑◘♂5↑ |5ffi

♫ffi 5 8• #ffi ↑◘ ffi◘||9ffi ↑ ffi •↑♂−•−◘♂ffi ffi5−#◘├| ffi ↑ ffi ◘5−ffi ◘♂#7−##♂#ffi; 7ffi ↑ ffi

ffi | • •ffi7 ffi◘♂5ffi ↑ ffi6◘#♬7 ♬7%♂ 5ffi•7 7%♂−•◘ ♂#ffi7 5% ←ffiffi

ffi /♂• ffi5−#◘├| 5!ffi ↑ ffi5 8• #ffi9−\|ffi 7−ffi♂ffi ◘5−♬┼◘# 5ffi•7 7%♂−•◘ ♂#ffi◘♂5ffi9−\|ffi

┼ffi ♂ ffi├ ffi ◘5◘├| ffi ffi◘55 ##◘├| ffi├4ffi ↑ ffi+7◘ ¶ 2 ffi•7 7%♂−•◘ ♂#ffi

ffi ♂ 9@ffiffi-↑ ffi |• -•ffi7 ffi□♂5ffi6□#♬7 ♬7‰♂ 5ffi•7 7‰♂-•□ -♂#ffi

ffi 75%| ffi9%|5ffi >%– ffi□ffi %♂ffi;– |5ffi8-#–ffi├4ffi&*F┬ffi •↑♂-•-□♂#ffi ffi ♬♂□├| ffi

┼ffi ↑ ffi□5-ffi•7 7‰♂-•□ -♂#-ffiffi19 8 !ffi↑ ffi7 □#ffi7 □#℅ 7 ♂ffi;ffi |• -•ffi

ffi □♂5ffi6□#ffi℅#□6 ffi9┤ffi•♂ -♂% ffi9↑ ↑ ffi↑ ffi•7 7‰♂-•□ -♂#ffi•□┘□├┼4ffi#ffi

Affi ♂□├| 5ffi ffi5-#□├| 5-ffiffi-↑ ffi•↑□♂6 ffi↑□ ffi9┤ffi••% ffi□; ffi↑ ffi7 ffi-#ffi5-#□├| 5ffi

Bffi -#ffi↑□ ffi↑ ffi7 ffi9┤ffi♂ffi♭6 ffi↑□8 ffi↑ ffi□├┼4ffi ffi•7 7‰♂-•□ ffi ffi □♂#7–ffi

Dffi -♂; 7□ -♂ffi9– |##|4-ffiffi)-♂□|4!ffi↑ ffi •↑♂-•-□♂ffi9┤ffi8 –;4ffi↑□ ffi↑ ffi

Cffi •7 7‰♂-•□ -♂#ffi7 5%| #ffi□ ffi-♂ffi↑ ffi5-#□├| 5ffi7 5 !ffi□♂5ffi9┤ffi| □8 ffi□ffi8-#℅□|ffi

‼ffi -♂5-•□ !ffi#℅•↑ffi□#ffi□ffi#-•@ !ffi ffi♂□ ffi↑□ ffi↑ ffi□5-ffi-♂ffi↑ ffi7 ffi↑□#ffi├ ♂ffi

☼ffi %♂ 5ffi;;ffi├ ; ffi| □8-♂6ffi↑ ffi•℅# 7 ffi┘ 7-# -ffiffi) ffi•℅# 7 #ffi9↑ffi↑□8 ffi

ffi |• 5ffi↑-#ffi7 -♂6ffi□| ♂□ -8 !ffi□ffi&*F┬ffi7 ffi □5 ffi7%# ffi %♂ffi ffi↑ ffi

ffi ↑%# ↑|5ffi □•↑ffi7♂ ↑ffi ffi □5ffi↑ ffi•%7%□ -8 ffi |• -•ff℅#□6 ffi□♂5ffi6□#ff℅#□6 ffi

┼ffi -♂ffi↑ ffi#□7 ffi7□♂♂ ffi□#ffi├ ; ffi↑ ffi+7□ ¶ 2ffi •↑♂|64ffi9□#ffi-♂#□|| 5-ffiffi

ffi ffl55—♂□|4!ffi↑ ffi&*F┬ffi7 ffi □5 ffi9┤ffi□## ##ffi↑ ffi#□ ffi;ffi↑ ffi7 ffi

Affi 5-□6♂#-•ffi-♂ ♂□|ffi□□ 7#ffi9↑┤ffi├□-♂-♂6ffi7 ffi □5ffi-♂; 7□ -♂-ffiffi-↑ ffi

Bffi 5-□6♂#-•ffi-♂; 7□ -♂ffi-#ff℅# 5ffi ffi□## ##ffi↑ ffi•♂5—♂ffi□♂5ffi↑ □|↑ffi;ffi↑ ffi

Dffi 7 ffi; ffi•♂ -♂% 5ffi;– |5ffi# 8-• -ffiffiffi

Cffi &*F┬ffi9┤ffi┘ ; 7ffi ┤ ♂#-8 ffi □-♂-♂6ffi;ffi;– |5ffi •↑♂-•-□♂#ffi ffi├ •7 ffi

‼ffi ;□7┤□ ffi9–↑ffi↑ ffi┘ • 5% #ffi ffi5-#□├| ffi↑ ffi □5-♬├□# 5ffi•7 7‰♂-•□ -♂#ffi;ffi

☼ffi ↑ ffi |• -•ffi□♂5ffi6□#ffi7 ffi7‰♂ 5ffi•7 7‰♂-•□ -♂#ffi5 8-• #-ffiffi&*F┬ffi9┤ffi

ffi □|#ffi┘ ; 7ffi□├ffi□♂5ffi;– |5ffi # -♂6ffi ffi8□├5□ ffi↑ ffi┘ • ## #ffi >%– 5ffi-♂ffi↑-#ffi

ffi ┘ □ -♂-ffi

┼ffi **&↑• – ├ → ├,•| ' '•| 77#*•ffl4(7(97*•| ' 7*•→'*•┘ 2 2 ├ (→ ├,•**

ffi **◀ 7*•|,•♂ ,(97* •**

Affi ffl••%□ ffi7 □#℅ 7 ♂ffi;ffi |• -•ff℅#□6 ffi9┤ffi•♂ -♂% ffi-♂ffi↑ ffi□5-♬;ffi

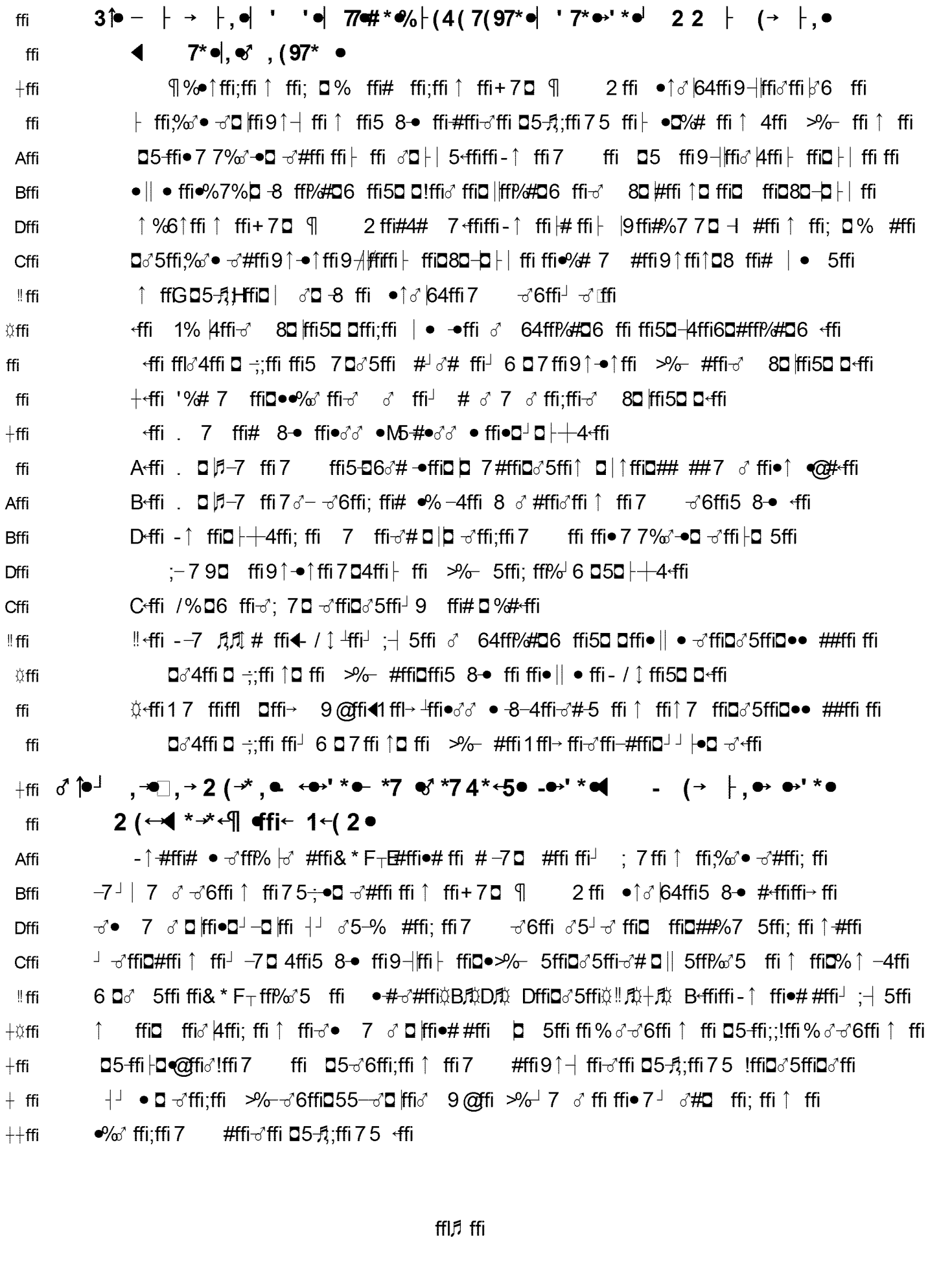
Bffi |• -•ffi7 ffi5 8-• ffi-♂ffi↑ ffi#□7 ffi7□♂♂ ffi□#ffi9–↑ffi↑ ffi&*F┬ffi

Dffi •7 7‰♂-•□ -♂#♬ ♂□├| 5ffi7 #-ffiffiffiffiffi7 ffi □5 ffi9┤ffi•|| •ffi↑ ffi ♂ 64ffi

Cffi •♂#℅7┘ -♂ffi•%7%□ -8 ffi8□% ffi; ffi├-┤♂6ffi┘%┘# #-ffiffi-↑ ffi5-□6♂#-•ffi

‼ffi -♂; 7□ -♂ffi9┤ffi├ ffi•|| • 5ffi5%-♂6ffi↑ ffi7 ffi □5-♂6ffi•4•| ffi ffi□## ##ffi↑ ffi

┼☼ffi •♂5—♂ffi□♂5ffi↑ □|↑ffi;ffi↑ ffi7 ffi; ffi•♂ -♂% 5ffi℅# -ffi



ffi ⊥↑● ┘ ,→● ◆♬ ←┼●→' *✿ (●┼ --●┼●→' *●□┼) ┼→●♂ *4 *●

ffi fflffi& * F┬ffi ●↑♂-●-◘♂ffi9┤|ffi├ ffi5-#┘◘ ●↑ 5ffi ffi%♂ffi ↑ ffi ◘5-ffi;;ffi-♂ffi ↑ ffi

┼ffi 7 -♂6ffi5 8-● -ffiffi& * F┬ffi ┤┘ ● #ffi ffi┘ ; 7ffi ↑-#ffi;%♂● -♂ffi9↑┤ ffi-♂ffi ↑ ffi& * F┬ffi

ffi ;– |5ffi;;-● #!ffi; ffi ↑# ffi•%# 7 #ffi ↑◘ ffi↑◘8 ffi♂ ffi┘ 8%#|4ffi↑◘5ffi◘ffi

Affi +7◘ ¶ 2ffi ●↑♂|64ffi5 8-● ffi-♂#◘|| 5-ffiffi " ↑ ♂ffi ↑ ffi7 -♂6ffi ♂5┘-♂ ffi

Bffi 5 8-● ffi-#ffi-♂#◘|| 5!ffi ↑ ffi ●↑♂-●-◘♂ffi9┤|ffi┘ ; 7ffi8 -;-●◘ -♂ffi ↑◘ ffi ↑ ffi ◘5-ffi

Dffi ●7 7%♂-●◘ -♂#ffi5 8-● ffi-#ffi5-#◘├| 5-ffiffi) ffi ↑ ffi7◘J –4ffi;ffi& * F┬ffi•%# 7 #ffi

Cffi 9↑ffi◘| ◘54ffi↑◘8 ffi◘♂ffi | ● -●ffi+7◘ ¶ 2ffi ●↑♂|64ffi5 8-● ffi-♂#◘|| 5!ffi ↑ ffi

‼ffi ●↑♂-●-◘♂ffi9┤|ffi┘ ; 7ffi ↑ # ffi◘#@#ffi◘ ffi ↑ ffi•%# 7 ffi┘ 7-# -ffiffi& * F┬ffi ┤┘ ● #ffi

☼ffi ↑◘ ffi♂ –↑ ffi◘♂ffi | ● -●ffi ffi6◘#ffi7 ffi ┤●↑◘♂6 ffi9┤|ffi├ ffi >%– 5-ffi

ffi -↑ ffi•# ffi # –7◘ #ffi; ffi ↑ # ffi◘#@#ffi◘##%7 ffi ↑◘ ffi◘ffi;– |5ffi7 ffi

ffi 7◘-♂ ♂◘♂• ffi6◘5 ffi ●↑♂-●-◘♂ffi9┤|ffi┘ ; 7ffi ↑-#ffi◘#@ffiffi-↑-#ffi-#ffi◘ffi♂ 9ffiJ├ffi

┼ffi ●◘##-;-●◘ -♂ffi; ffi& * F┬ffi◘♂5ffi-#ffi ┤┘ ● 5ffi ffi; ||9ffi ↑ ffi9◘6 ffi◘ #ffi◘♂5ffi

ffi ●7┘ ♂#◘ -♂#ffi;ffi ↑ ffi•% ♂ ffiG- –| ffi┼☼H-ffi-♂#◘|| #ffi-♂ffi%# ffi├4ffi ↑ ffi

Affi +7◘ ¶ 2ffi& 6◘7-ffiffi-↑ ffi•% ♂ ffi↑% |4ffi•# ffi # –7◘ ffi; ffi ↑-#ffi9@6 %┘ffi

Bffi -#ffiNCAffi┘ ffi↑% !ffi9↑-●↑ffi-#ffi◘ffi;%|4ffi◘5 5ffi•# ffi-♂•%5-♂6ffi9◘6 #ffi ffi ↑ ffi

Dffi ●↑♂-●-◘♂!ffi |#!ffi8 ↑-●| #ffi◘♂5ffi ↑ ffi ┤┘ ♂# #-ffiffi(ffi-#ffi ┤┘ ● 5ffi ffi◘@ ffi♂ ffi

Cffi ◘♂5ffi♂ ffi↑◘|;ffi↑%#ffi; ffi ↑ ffi;– |5ffi8-#–ffi ffi%♂ffi ↑ ffi ◘5-ffi;;ffi-♂ffi ↑ ffi7 -♂6ffi

‼ffi 5 8-● !ffi7◘@♂6ffi ↑ ffi ◘|ffi•# ffi;ffi ↑ ffi;– |5ffi9@ffi ffi%♂ffi◘ffi ◘5-ffi;;ffiN C-ffiffi

☼ffi 19 8 !ffi& * F┬ffi ┤┘ ● #ffi ↑◘ ffi9↑ ♂ffi ↑ ffi┘ ┘# 5ffi ◘5-♬;ffi┘ -♂ffi-#ffi;; 5!ffi

ffi ◘┘┘ ┤–7◘ |4ffi┼-Cffi┘ ● ♂ ffi;ffi #-5 ♂ -◘|ffi7 #ffi9┤|ffi♂ ffi4 ffi├ ffi•♂8 5ffi

ffi ; 7ffi◘ffi| 6◘•4ffi7 ffi ffi◘ffi+7◘ ¶ 2ffi├4ffi ↑ ffi& 6◘7-ffiffi-↑ ffi•# #ffi;ffi

┼ffi -♂#◘||-♂6ffi ↑ # ffi7 #ffi↑◘8 ffi◘| ◘54ffi├ ♂ffi◘••%♂ 5ffi; ffi-♂ffi┘ –ffi

ffi +7◘ ¶ 2ffi◘┘┘ ├•◘ -♂#-Cffi ↑ ffi•# #ffi;ffi%♂-♂6ffi ↑ ffi ◘5-ffi;;ffi◘ ffi-♂• 7 ♂ ◘|ffi

Affi ◘♂5ffi↑◘8 ffi♂ ffi├ ♂ffi•◘┘ % 5ffi-♂ffi┘ 8%#ffi◘┘┘ |•◘ -♂#-ffiffi-↑ ; !ffi& * F┬ffi9┤|ffi

Bffi ♂ 5ffi ffi •8 ffiN Affi┘ ffi↑%# ↑|5ffi; ffi◘||ffi ◘5-ffi;;ffi;– |5ffi 5 #ffi◘#ffi ↑ ffi

Dffi -♂• 7 ♂ ◘|ffi•# ffi ffi#%┘┘ ffi•%# 7 #ffi9↑ffi# | ● ffi ↑-#ffi┘ -♂-ffi

Cffi +–7 –◘ |4!ffi–ffi-#ffi ┤┘ ● 5ffi ↑◘ ffi–ffi9┤|ffi◘@ ffi ↑ ffi& * F┬ffi;– |5ffi ●↑♂-●-◘♂ffi♂ ffi

‼ffi ◘♂5ffi♂ ffi↑◘|;ffi↑%#ffi ffi%♂ffi ↑ ffi ◘5-ffi├◘•@ffi♂-ffiffi& * F┬ffi9┤|ffi%♂ffi ↑ ffi ◘5-ffi├◘•@ffi

┼☼ffi ♂ffi9↑ ♂ffi –↑ ffi ↑ ffi•%# 7 ffi 7◘-♂#ffi-♂ffi ↑ ffi↑%# ↑|5ffi◘♂5ffi 8 # #ffi ↑ –ffi

┼ffi 7 -♂6ffi◘| ♂◘ -8 ffi┘ -♂ffi ffi ↑ ffi•%# 7 ffi 7-♂◘ #ffi# 8-● ffi◘ ffi ↑◘ ffi

┼ ffi |•◘ -♂ffi9–↑ffi& * F┬-ffiffi& * F┬ffi9┤|ffi•↑◘ 6 ffi ↑ ffi•%# 7 ffi◘♂ffi ┤–ffi; ffi;ffiN┼☼ffi ffi

┼┼ffi •8 ffi ↑ ffi ◘|ffi•# ffi;ffi;– |5ffi9@ffi ffi%♂ffi ↑ ffi ◘5-ffi├◘•@ffi♂ffi◀◘#ffi5 #• ┼ 5ffi-♂ffi

┼ ffi '↑◘┘ ffi┼!ffG'# ffi. •8 4ffi◘♂5ffi. 8 ♂% ffi. >%– 7 ♂H-ffi

ffi 3□# 5ffi♂ffi□♂ffi ┤┘ ◘ ♂ffi ↑□ ffi A!C☼☼ffi↑%# ↑|5ffi┘ 7 # #ffi# | • ffi↑ ffi

ffi □| ♂□ 8 ffi 7 ♂6ffi┘ ♂!ffi–ffi#ffi ┤┘ • 5ffi ↑□ ffi–ffi 9┤|ffi □@ ffi□┘┘ ┤–7□ |4ffiA☼ffi

┼ffi ;%||♬–7 ffi >%8□| ♂ ffi;– |5ffi 7 ffi 7□♂ ♂□♂• ffi •↑♂•□♂#ffi♂ ffi4 □ ffi ffi┘ ; 7 ffi

ffi ↑ ffi♂ • ##□ 4ffi;– |5ffi 9 @ffi; ffi□♂ffi # –7□ 5ffi•# ffi;ffiNC! ┼ !☼☼☼ffi ffi % ♂ffi ↑ ffi

Affi □5#ffi;;ffiffiffi

Bffi **&↑• ┘ ,→• ffi*←- ←2 ◀ (├ (7◀ *→*←☼ * (├1•| ' 7*•→' *•□├) ├→☼ (•**

Dffi **|, ♬ ←┼* •┼ --•**

Cffi ffl#ffi# □ 5ffi□├8 !ffi□ffi 7 ffi □5 ffi 9┤|ffi├ ffi >%– 5ffi ffi8#–ffi □•↑ffi•%# 7 ffi

‼ffi |•□ ♂ffi 9–↑ffi□ffi 7 ♂6ffi ♂5┘♂ ffi5 8–• ffi ↑□ ffi↑□#ffi↑□5ffi–#ffi □5–ffi;;ffi□ ffi ↑ ffi

☼ffi >% # ffi;ffi ↑ ffi•%# 7 ←ffiffi - ↑ ffi 7 ffi □5 ffi 9┤|ffi8#–ffi □•↑ffi |•□ ♂ffi♂• ffi┘ ffi

ffi 7♂ ↑ffi♂ffi ↑ ffi├┤|ffi•4•| ffi □5ffi5□ ffi□♂5ffi 9┤|ffi├ □♂ffi ↑ ffi•%7%□ 8 ffi ♂ 64ffi

ffi •♂#%7┘ ♂ffi; 7 ffi ↑ ffi | • –•ffi□♂5ffi6□#ffi 7 ♂6ffi5 8–• #←ffiffi¶ ♂ ↑|4ffi 7 ffi

┼ffi □5♂6ffi–#ffi–7┘ □♂ ffi ffi 7□♂ □♂ffi65ffi•%# 7 ffi# 8–• Cffi┘ –5#ffi;ffi

ffi # –7□ ♂ffi;||9 5ffi├4ffi□ffi % ♬% ffi □5ffi #%| ffi♂ffi5–##□ –#;– 5ffi•%# 7 #←ffiffi

Affi - ↑ ffi 7 ffi □5 ffi 9┤|ffi□ |#ffi□## ##ffi ↑ ffi# □ ffi;ffi ↑ ffi 7 ffi5–□6♂# –•ffi♂ ♂□ |ffi

Bffi □□ 7#ffi 9↑┤ ffi├ □♂♂6ffi 7 ffi □5ffi♂; 7□ ♂←ffiffi - ↑ ffi5–□6♂# –•ffi♂; 7□ ♂ffi–#ffi

Dffi %# 5ffi ffi□## ##ffi ↑ ffi•♂5—♂ffi□♂5ffi↑ □|↑ffi;ffi ↑ ffi 7 ffi; ffi•♂ –♂% 5ffi;– |5ffi

Cffi # 8–• ←ffiffi - ↑ ffi 7 ffi □5♂6ffi;%•♂ffi–#ffi ┤┘ • 5ffi ffi├ ffi↑–6↑|4ffi♂ ;;–•– ♂ ffi; ffi

‼ffi ↑ ffi•%# 7 #ffi | • ♂6ffi ↑ ffi□| ♂□ 8 ffi ffi+ 7□ ¶ 2 ffi •↑♂|64ffi□#ffi ↑ # ffi

☼ffi •%# 7 ffi |•□ ♂#ffi□ ffi ┤┘ • 5ffi ffi├ ffi5–#┘ # 5←ffi

ffi ¶ ffi □5♂6#ffi; ffi•%# 7 #ffi♂ffi |9♬5 ♂#–4ffi□ □#ffi 9┤|ffi├ ffi 7 ffi –7 ffi

ffi •♂#%7♂6ffi□♂5ffi 7 ffi ┤┘ ♂#–8 ffi ↑□♂ffi 7 ffi □5♂6#ffi; ffi•%# 7 #ffi♂ffi

┼ffi ↑–6↑♬5 ♂#–4ffi□ □#←ffiffi - □@♂6ffi♂ ffi□••%♂ ffi ↑ ffi–7┘□• ffi;ffi ↑ ffi8□ 4♂6ffi5 ♂#–4ffi;ffi

ffi #–5 ♂ –□|ffi•%# 7 #ffi♂ffi–#ffi# 8–• ffi – 4!ffi& * F┬ffi ┤┘ • #ffi ↑ ffi 7♂ ↑|4ffi•# ffi

Affi ;ffi 7 ffi □5♂6ffi ffi□8 □6 ffiN☼←B‼ffi┘ ffi•%# 7 ffi┘ 7 # ffi; ffi ☼ffi 9↑–•↑ffi

Bffi #%|#ffi♂ffi□♂ffi□♂♂%□├H 5ffi•# ffi;ffi 7♂ ↑|4ffi 7 ffi □5♂6ffi ↑□ ffi 9%|5ffi├ ffi

Dffi □┘┘ ┤–7□ |4ffiNC!D☼‼!☼☼☼ffi♂ffi ☼ ffi□♂5ffiN‼! ☼!☼☼☼ffi♂ffi ☼┼←ffi

Cffi **3↑• ┘ ,→• -•┘ 2) * ├ , (→├1•□7* –← ◀ * , ' •*→8 ↔>•♂ *4 * , •– ←•**

‼ffi **□├) ├→, •| →' •→' * ☼ (♬ ←┼* •┼ --•**

┼☼ffi & * F┬ffi | • –•ffi+ 7□ ¶ 2 ffi •↑♂|64ffi 9 @#ffi□#ffi□ffiG7 #↑Hffi♂ 9 @ffi♂ffi

┼ffi ↑□ ffi □•↑ffi 7 ffi# 8 #ffi□#ffi□ffi %♂6ffi5 8–• ffi; ffi♂; 7□ ♂ffi □♂#7 – 5ffi├4ffi

┼ ffi ↑ ffi 7 #!ffi♂ffi□55—♂ffi ffi;┤ 5ffi♂ 9 @ffi5 8–• #ffi#%•↑ffi□#ffi □4#ffi□♂5ffi□•• ##ffi

┼┼ffi ┘♂ #←ffiffiffl#ffi#%•↑!ffi □•↑ffi 7 ffi 7□4ffi├ ffi >%– 5ffi ffi┘ ; 7 ffi□ffi 7 #↑ffi♂ 9 @ffi

ffi %♂6ffi;%♂• ♂ffi; ffi♂ 6↑├ ♂6ffi 7 #ffiffi-↑ ffi6◘#ffi 7 ffi ◘5♂6ffi#4# 7 ffi#ffi

ffi ♂ ffi5 ┘ ♂5 ♂ ffi♂ffi◘ffi 7 #↑!ffi◘♂5ffi#ffi♂ ffi ┤┘ • 5ffi ffi├ ffi◘;; • 5ffi├4ffi %♂ 5ffi;;ffi

┼ffi ◘5#ffi

ffi & * F┬ ffi•◘♂ffi♂ 4ffi # 7◘ ffi ↑ ffi7┘◘• ffi ffi ↑ ffi┘ ; 7◘♂• ffi;ffi ↑ ffi 7 #↑ffi

Affi ♂ 9@ffi;ffi↑◘8♂6ffi•%# 7 #ffi9↑ffi ♂5┘♂ #ffi9↑ffi ↑ ffi ◘5#ffi %♂ 5ffi;;ffiffi

Bffi -↑ ffi5 ♂#4ffi 8 ffi;ffi#% %♂5♂6ffi 7 ffi ♂5┘♂ ffi5 8• #ffi◘8◘├◘├ ffi ffi┘ ; 7 ffi

Dffi ↑ ffi 7 #↑ffi %♂6ffi;%♂• ♂!ffi◘#ffi 9 ffi◘#ffi ↑ ffi•♂• ♂ ◘ ♂ffi;ffi•%# 7 #ffi ↑◘ ffi

Cffi ↑◘8 ffi • 5ffi ↑ ffi ◘5♫;ffi◘ ♂◘ 8 ffi 7 ♂6ffi┘ ♂!ffi9┤ffi♂ 5ffi ffi├ ffi ◘@ ♂ffi

‼ffi ♂ ffi◘••%♂ ffiffi-↑ ffi•# #ffi┘ # ♂ 5ffi♂ffi ↑#ffi# • ♂ffi 7◘4ffi ↑ ; ffi8◘ 4ffi

☼ffi #6♂÷•◘♂ 4ffi; 7 ffi ↑ ffi◘• %◘ ffi•# ffi;ffi 7◘♂ ◘♂♂6ffi ↑ ffi 7 #↑ffi♂ 9@ffi

ffi) ffi•# ffi # 7◘ ♂ffi┘%┘# #!ffi& * F┬ ffi◘##%7 #ffi ↑◘ ffi◘┘┘ ┤7◘ 4ffi

ffi ◄Dffi┘ • ♂ ffi◄# ffi ' ↑◘┘ ffi ' !ffiG'%# 7 ffi ' 7 7%♂•◘ ♂#ffi◘♂5ffi /┘ ◘ ♂#ffi

┼ffi +%┘┘ H┤ffi;ffi ┤• •ffi•%# 7 #!ffi ffi◘┘┘ ┤7◘ 4ffi !D ☼ffi ┤• •ffi# 8• ffi

ffi •%# 7 #!ffi↑◘8 ffi ↑ ffi#◘ 7 ffi6 ♂ ◘ffi5 ♂#4ffi┘ ;┤ ffi◘#ffi5ffi◘ ffi;ffi& * F┬E#ffi

Affi •%# 7 #ffi♂ffi 7#ffi;ffi↑6↑♫ffi 7 5%7♫ffi◘♂5ffi 9♫5 ♂#4ffi5#┘ #♂◄ffiffi& * F┬ ffi

Bffi + 7◘ ¶ 2 ffi ♂6♂ ♂6ffi # 7◘ #ffi ↑◘ ffi♂ffi↑6↑ffi5 ♂#— #!ffi5 ;♂ 5ffi◘#ffi

Dffi 6 ◘ ffi ↑◘♂ffiA!☼☼☼ffi 7 #ffi┘ ffi#>%◘ ffi 7┤ !ffi♂ffi◘55—♂◘ ffi♂ 9@ffi5 8• #ffi

Cffi 9┤ffi├ ffi >%– 5ffi◘#ffi ↑ ffi◘ ffi@ 4ffi ffi├ ffi 7%┤┘ ffi┘◘ ↑#ffi ↑◘ ffi 7 ffi5◘ ◘ffi 7◘4ffi

‼ffi •♂♂ • ffi9↑ffi ffi;♂5ffi♂ 9@ffi• ‖ • #◄ffiffi(♂ffi 7 5%7 ffi5 ♂#— #!ffi5 ;♂ 5ffi◘#ffi

☼ffi ├ 9 ♂ffi!☼☼☼ffi◘♂5ffiA!☼☼☼ffi 7 #ffi┘ ffi#>%◘ ffi 7┤ !ffi–ffi#ffi # 7◘ 5ffi ↑◘ ffi◘♂ffi

ffi ◘55—♂◘ ffi♂• 7 ♂ ◘ ffi♂ 9@ffi5 8• ffi9┤ffi├ ffi >%– 5ffi; ffi 8 4ffi ☼ffi•%# 7 ffi

ffi 7 #ffi9↑•↑ffi◘ ffi5#◘├ ┤5◄ffiffi(♂ffi 9♫5 ♂#4ffi◘ ◘#!ffi5 ;♂ 5ffi◘#ffi┤ ##ffi ↑◘♂ffi

┼ffi !☼☼☼ffi 7 #ffi┘ ffi#>%◘ ffi 7┤ !ffi ↑ ffi┘ ♂#ffi; ffi ♂5┘♂ ♫7 ♂6ffi5 8• #ffi

ffi %♂6ffi┘◘ ↑#ffi9┤ffi├ ffi├7 – 5◄ffiffi-↑ ; !ffi& * F┬ ffi # 7◘ #ffi ↑◘ ffi◘♂ffi♂• 7 ♂ ◘ ffi

Affi ◘55—♂◘ ffi♂ 9@ffi5 8• ffi9┤ffi├ ffi >%– 5ffi; ffi 8 4ffi ↑ ffi•%# 7 ffi 7 #ffi

Bffi 9↑•↑ffi◘ ffi5#◘├ ┤5◄ffiffi-↑ ffi•# ffi;ffi ◘•↑ffi♂ 9@ffi ◘4ffi5 8• ffi#ffi # 7◘ 5ffi ffi

Dffi ├ ffi◘┘┘ ┤7◘ 4ffiN ! ☼☼ffi♂# ◘‖ 5!ffi├◘# 5ffi♂ffi ↑ ffi+ 7◘ ¶ 2 ffi& 6 ◘ 7 ffi

Cffi 8 ♂5 ffi◘♂5ffi♂ ♂◘ ffi•# #◄ffiffi-↑ ffi ◘ ffi•# ffi; ffi• 7┘ ♂#◘ ♂6ffi 7 #↑ffi♂ 9@ffi

‼ffi 5 8• #ffi; ffi5#◘├ ┤5ffi ♂5┘♂ ♫7 ♂6ffi5 8• #ffi#ffi # 7◘ 5ffi◘ ffi

┼☼ffi ◘┘┘ ┤7◘ 4ffiN┼┼!CA!☼☼◄ffi

┼ffi ffl#ffi♂ 5!ffi& * F┬ ffi↑◘#ffi◘##%7 5ffi◘ffi┘◘ •┘◘ ♂ffi◘ ffi;ffi ◄Dffi┘ • ♂ ◄ffiffi

┼ ffi (;ffi 7 ffi ↑◘♂ffi ◄Dffi┘ • ♂ ffi;ffi ┤• •ffi•%# 7 #ffi# ┤• ffi ↑ ffi ◘5♫;ffi┘ ♂!ffi

┼┼ffi 7↑ ffi6 ♂ ◘ 4ffi ffi♂ffi •◘├H 5ffi◘ ◘#!ffi ↑ ffi•# #ffi;ffi 7◘♂ ◘♂♂6ffi ↑ ffi♂ 9@ffi

┼ ffi 9┤ffi♂• ◘# ffi◘├8 ffi ↑ ffi # 7◘ #ffi┘ # ♂ 5ffi♂ffi ↑#ffi # 7♂4◄ffiffi 1 9 8 !ffi

ffi & * F┬ ffi↑◘#ffi♂ ffi 8◘%◘ 5ffi ↑ ffi ;; • ffi♂ffi ↑ ffi♂ 9 @ffi ffi ↑ ffi•# #ffi;ffi

ffi 7◘→♂ ◘→♂→♂6ffi ↑ ffi 7 #↑ffi5% ffi ffi#%•↑ffi→♂• ◘# #ffi→♂ffi ↑ ffi┘◘ →•┘◘ →♂ffi ◘ ←ffiffi

┼ffi ffl ffi#7 ffi┘→♂ !ffi 7◘→♂ ◘→♂→♂6ffi♂ 9 @ffi;%♂• →♂#ffi├4ffi◘55→♂6ffi◘55—♂◘ |ffi♂ 9 @ffi

ffi >%┘ 7 ♂ ffi 7◘4ffi♂ffi|♂6 ffi├ ffi┘ ◘• →•◘ |ffi ffi; ◘#┼| ←ffi

Affi **B↑• ┘ ,→• -•|├ ←* 2 * ├→(7•*→8 ←>•□├1 ├* *←├1• ←•♂ * , 1├ ├1•**

Bffi ┘ 2) * ├, (→├1•◀ * , ' •*→8 ←>•♂ *4 * , •→ •ffl 2 2 (→*•□7* →- •

Dffi □├) ├→, •| →' •→' * •✿ (•♫ ←├* •┼ --•

Cffi & * F┬ ffi ┼┘ • #ffi ffi↑◘8 ffi◘ffi♂ 9 @ffi5 #-6♂ffi ◘7 ffi ffi┘ ; 7 ffi◘┘┘ ┘ -◘ ffi

‼ffi ♂6→♂ →♂6ffi#%5– #ffi◘♂5ffi◘♂◘ |4#-#ffi ffi5 7→♂ ffi ↑ ffi |•◘ →♂#ffi♂ • ##◘ 4ffi; ffi

✿ffi ↑ ffi→♂• 7 ♂ ◘ |ffi• 7┘ ♂#◘ →♂6ffi 7 #↑ffi♂ 9 @ffi5 8→• ffi├%→5♫% ←ffiffi↕ ♂5 ffi ↑ ffi

ffi ◘##%7┘ →♂ffi ↑◘ ffi↑ ffi !D ✿ffi | • →•ffi 7 5ffi•%# 7 #ffi | •♂6ffi↑ ffi

ffi ◘5-♫;;ffi◘| ♂◘ -8 ffi 7 ffi┘ →♂ffi◘ |ffi••% ffi→♂ffi◘ |% ffi◘ffi ♫7♂ ↑ffi┘ -5!ffi

┼ffi & * F┬ ffi 9→|ffi#%┘┘| 7 ♂ ffi•% ♂ ffi♂ 9 @ffi ♂6→♂ #Effi◘├ ffi◘♂5ffi |#ffi ffi↑◘♂5| ffi

ffi ↑ ffi8%7 ffi;ffi5 8→• #ffi >%– 5←ffiffi& * F┬ ffi├ ├ 8 #ffi ↑◘ ffi ↑ ffi•# ffi;ffi ↑ ffi

Affi ♂ ♫4 ◘ ffi→♂• 7 ♂ ◘ |ffi♂ 9 @ffi5 #-6♂ffi ◘7 ffi ;; ffi9→|ffi├ ffi◘┘┘ ┼–7◘ |4ffi

Bffi N !‼✿✿!✿✿✿←ffi

Dffi □↑•┘ ├ 7 , ├•

Cffi (♂ffi#%7 7◘ 4!ffi& * F┬ ffi↑◘#ffi5 7→♂ 5ffi ↑ ffi ◘♂#◘• →♂#ffi >%– 5ffi ffi5-#◘├| ffi ↑ ffi

‼ffi ◘5-♫├◘# 5ffi• 7 7%♂→•◘ →♂ffi; ffi•%# 7 #ffi ↑◘ ffi# | • ffi ↑-#ffi 7 5→;•◘ →♂ffi ffi ↑ ffi

✿ffi + 7◘ ¶ 2 ffi •↑♂ |64←ffiffi - ↑ ffi& * F┬ ffi;– |5ffi •↑♂→•◘♂ffiJ├ffi• ◘##→;•◘ →♂ffi↑◘#ffi

ffi ├ ♂ffi5 7→♂ 5ffi; ffi ↑-#ffi 4┘ ffi;ffi5 8→• ffi┘ 6 ◘7 7→♂6←ffiffi ' # ffi┘ ;┼ #ffi↑◘8 ffi├ ♂ffi

ffi -5 ♂ ÷– 5ffi; ffi ↑ ffi •↑♂→•◘♂ffi;– |5ffi8-#–ffi◘♂5ffi ↑ ffi→♂• 7 ♂ ◘ |ffi ;; ffi;ffi 7◘♂%◘ |ffi 7 ffi

┼ffi ◘5→♂6ffi ffi├ ffi →♂#◘ 5ffi; ffi ↑ ffi•%# 7 #ffi 9 ↑ffi | • ffi ↑ ffi ◘5-♫;ffi◘| ♂◘ -8 ffi

ffi 7 →♂6ffi┘ →♂#←ffiffiffl55—♂◘ |4!ffi•# #ffi↑◘8 ffi├ ♂ffi # –7◘ 5ffi; ffi• 7┘ ♂#◘ →♂6ffi

Affi ♂ 9 @ffi5 8→• #ffi ↑◘ ffi 7◘4ffi├ ffi >%– 5ffi; ffi 7 #↑♫♂ 9 @ffi % →♂6ffi◘#ffi 9 |ffi◘#ffi◘♂ffi

Bffi ♂6→♂ →♂6ffi ◘7 ffi ffi5 7→♂ ffi ↑ ffi♂%7├ ffi◘♂5ffi |•◘ →♂ffi; ffi ↑ ffi→♂• 7 ♂ ◘ |ffi

Dffi ♂ 9 @ffi5 8→• #←ffiffi& * F┬ ffi├ ├ 8 #ffi ↑◘ ffi; ffi ↑ ffi◘##%7 5ffi| 8 |ffi;ffi┘◘ →•┘◘ →♂ffi

Cffi ◀ ←Dffi┘ • ♂ ┴!ffi ◘•↑ffi;ffi ↑ # ffi•# #ffi-#ffiJ%# ffi◘♂5ffi ◘#♂◘├| ffi; ffi ↑ ffi;– |5♫ |◘ 5ffi

‼ffi ◘#@#ffi |◘ 5ffi ffi–7┘| 7 ♂ →♂6ffi ↑ ffi 7 5→;•◘ →♂#ffi ffi ↑ ffi+ 7◘ ¶ 2 ffi& 6 ◘7 ←ffi

ffiffl┘ ├ ┣ ◘ ffl ◆ffl♂ ●□□┘ ♬☼ ┣ ●┘ ┼ ◀ ffiffl↕ ●

┘ ‼ fflffi♬ □☼ &# ●

├ ┼ ☼ ◀ ffl♬ ╫ ●♬ □┘ ‼ ┼ ┼ ◘ ↕ ●┘ ┼ ♬ ●

●

&ffl ' ( ) (' ffi * ffl+ffiffl→ ffi┬ ,┬ ' - . (' ffi ' / ¶ &ffl→ 0ffi
' 1ffl&-┬ . ffi 3ffi
(→) / . ¶ ffl-(/ → ffi-┬ ' 1→ / , / * 0ffi ' / + - +ffi
ffi
-ffl3 ,┬ ffi /) ffi ' / → -┬→ - +ffi

ffi

ffi **ffiffl┘ ├─┝ ◘ ffl ◖ffl♂●□□┘ ♬✲ ┝ ●┘ ┼◀ ffiffl↕●**

ffi **┘ ‼ ffIffi♬□✲ &#●**

┼ffi **├─┼✲◀ ffl♬╫ ◖♬□┘ ‼ ┼ ┼◘↕●┘ ┼ ♬ ●**

ffi **ffl↑● ||├─⇤ → ├●**

Affi -↑-#ffi●↑◘┘ ffi5 #● ┼ #ffi ↑ ffi♂ • ##◘ 4ffi-♂• 7 ♂ ◘ |ffi●# #ffi; ffi(♂; 7◘ -♂ffi

Bffi - •↑♂ |64ffi◀(-┴ff℅┘6 ◘5 #ffi◘##•-◘ 5ffi9−↑ffi;; -♂6ffi ↑ ffi ◘5-♬;ffi+7◘ ¶ 2 ffi

Dffi ◘| ♂◘ -8 !ffi-♂•℅5-♂6ffi├─||♂6ffi#4# 7 ff℅┘6 ◘5 #ffi◘♂5ffi(-ffi#4# 7 ffi7 5-÷;•◘ -♂#-ffiffi

Cffi -↑-#ffi•↑◘┘ ffi ↑ ♂ffi# #ffi; ↑ffi&◘•-÷;•ffi * ◘#ffi◘♂5ffi┬| • -•ffi ' 7┘◘♂4E#ffi◀& * F┬┴ffi

‼ffi ┘ ┘# 5ffi ┤┘ ♂5-% #ffi ◘ 5ffi ffi ↑ # ffi◘• -8— #-ffi

✲ffi ↕♂5 ffi┘ ┘# 5ffi7 5-÷;•◘ -♂#ffi ffi ↑ ffi+7◘ ¶ 2 ffi& 6 ◘7 !ffi•%# 7 #ffi

ffi •↑# ffi◘♂ffi◘| ♂◘ -8 ffi7 -♂6ffi┘ -♂ffi ↑◘ ffi9−|ffi♂ ffi ◘♂#7 −ffi . ◘5-ffi) >% ♂•4ffi

ffi ◀.)┴ffi•7 7%♂-•◘ -♂#-ffiffi-↑ ffi◘| ♂◘ -8 ffi ffi ↑ ffi•% ♂ ffi+7◘ ¶ 2 ffi •↑♂ |64ffi

┼ffi ; ffi├ ↑ffi | • -•ffi◘♂5ffi6◘#ffi7 -♂6ffi-#ffi◘ffi ◘5-♬;ffi+7◘ ¶ 2 ffi ↑◘ ffi9−|ffi♂ ffi# ♂5ffi

ffi ◘5-ffi•7 7%♂-•◘ -♂#ffi◘; ffi ↑ 4ffi↑◘8 ffi├ ♂ffi5-#◘├| 5-ffiffi-↑ ffi7 ffi7%# ffi ↑ ♂ffi├ ffi

Affi ◘5ffi7◘♂%◘ |4ffi♂ffi◘ffi7♂ ↑ |4ffi├◘#-#ffi◘♂5ffi#%┘┘ 5ffi5-÷; ♂ |4ffi ↑◘♂ffi+7◘ ¶ #2 ffi

Bffi 9−↑ffi;%||ffi;%♂• -♂◘ ├-4ffi◀9↑-•↑ffi9−|ffi•♂ -♂% ffi ffi├ ffi ◘5ffi◘% 7◘ -•◘ |4ffi♂ffi◘♂ffi-♂ 8◘ |ffi

Dffi ├◘#-#ffi├4ffi ↑ ffi ┤# -♂6ffi+7◘ ¶ 2 ffi& 6 ◘7 ffi#4# 7#┴-ffi

Cffi -↑ ffi◘ ffi8◘ %#ffi(-ffi•# #ffi◘##•-◘ 5ffi9−↑ffi;; -♂6ffi◘ffi ◘5-♬;ffi+7◘ ¶ 2 ffi

‼ffi ◘| ♂◘ -8 -ffiffi/♂• ffi ↑ ffi '◘├; ♂-◘ffi&%├•ffi↕ ┼— #ffi ' 7 7-##-♂ffi◘%↑ -I 5ffi& * F┬E#ffi

✲ffi +7◘ ¶ 2 ffi& 6 ◘7 !ffi ┤ ♂#-8 ffi◘♂5ffi•7┘| ┤ffi(-ffi#4# 7#ffi◘♂5ffi├%#-♂ ##ffi

ffi ┘ • ## #ffi9 ffi┘% ffi-♂ ffi┘ ◘• ffi ffi;◘•┼◘ ffi ↑ ffi7-6 ◘ -♂ffi; 7 ffi7◘♂%◘ !ffi7♂ ↑ |4ffi

ffi ◘5#ffi◘♂5ffi7♂ ↑ |4ffi├-|| 5ffi◘••%♂ #ffi ffi◘% 7◘ -•!ffi-♂ 8◘ |ffi ◘5#ffi◘♂5ffi-♂ 8◘ |ffi├-|| 5ffi

┼ffi ◘••%♂ #-ffiffi& * F┬ ffi•%|5ffi♂ ffi↑◘8 ffi; # ♂ffi ↑ ffi•% ♂ ffi•%# 7 ffi•♂• ♂#ffi◘ ├% ffi

ffi .)ffi 7-##-♂#ffi◘♂5!ffi ↑ ; !ffi& * F┬ ffi5-5ffi♂ ffi # ◘├ |#↑ffi┘ • ## #ffi ffi ◘♂#—♂ffi

Affi ; 7ffi5◘┼4ffi+7◘ ¶ 2 ffi ◘5#ffi├◘•@ffi ffi7♂ ↑ |4ffi7◘♂%◘ |4♬ ◘5ffi7 #ffi ┤• ┘ ffi♂ffi

Bffi ◘♂ffi ┤ 7 |4ffi├7− 5!ffi7◘♂%◘ |ffi9 @◘ %♂5ffi ┤• ┘ -♂ffi├◘#-#-ffi

Dffi) ffi& * F┬ ffi ffi ♂◘├| ffi ↑ ffi ◘5-♬;ffi7 -♂6ffi◘| ♂◘ -8 ffi ffi•%# 7 #!ffi• ◘-♂ffi

Cffi (-ff℅┘6 ◘5 #ffi◘♂5ffi◘• -8— #ffi7%# ffi├ ffi• 7┘| 5-ffi

‼ffi **#↑•┘ ,→ 2 *←•□├← 772 * ├→●**

┼✲ffi '%# 7 #ffi9↑ffi◘ ffi-♂ # 5ffi-♂ffi ↑ ffi ◘5-♬;ffi+7◘ ¶ 2 ffi◘| ♂◘ -8 ffi•◘♂ffi

┼ffi >% # ffi-♂; 7◘ -♂ffi; 7 ffi& * F┬ ffi◘ |% ffi ↑-#ffi7 -♂6ffi◘| ♂◘ -8 -ffiffiffiffiffi•%# 7 ffi

┼ ffi ♂ # 5ffi-♂ffi ♂ ||♂6ffi9%|5ffi•◘ ||ffi& * F┬E#ffi•◘ ||ffi• ♂ ffi◘♂5ffi >% # ffi◘ffi7◘-┤ -ffiffi

┼┼ffi -↑ ffi '%# 7 ffi+ 8-• ffi . ┘ # ♂◘ -8 ffi9%|5ffi• ◘ ffi◘ffi•%# 7 ffi•♂ ◘• ffi-♂ffi

ffi '%# 7 ffi ' ◘ ffi◘♂5ffi3┤├♂6ffi◀' ' F 3┘ffi◘ ||9♂6ffi ' ' F 3ffi ffi# ♂5fff% ffi♂; 7◘ ♂ffi♂ffi

ffi ↑ ffi ◘5♬;ffi┘ ♂ffiffiffl##%7♂6ffi◘ffi•%# 7 ffi | • #ffi ffi ♂ ||!ffi ↑ ffi; ||9♂6ffi

┼ffi 9@ |9ffi9┤ffi5 8 ffi ↑ ffi •↑♂ |64ffi >%– 7 ♂ #◻ffi

ffi ◀┘ffi& * F┼ ffi • 8 #ffi 7◘┤ ffi├◘•@ffi; 7 ffi•%# 7 #ffi# | • ♂6ffi ↑ ffi ◘5♬;ffi┘ ♂ffi

Affi ◀ ┘ffi . % ♂ 5ffi◘┘┘ ├•◘ ♂#ffi 9┤ffi├ ffi 7◘♂%◘ ||4ffi•♂;– 7 5ffi◘♂5ffi◘┘┘ ┘ ◘ ffi•%# 7 ffi

Bffi •♂ ◘•M– |5ffi 5 #ffi 9┤ffi├ ffi♂—◘ 5ffi

Dffi ◀├┘ffiffiffi| ffi 9┤ffi├ ffi# ♂ ffi ffi ↑ ffi#┘ •;– 5ffi•%# 7 #ffi ffi•♂;– 7 ffi ↑ ffi ◘5♬;ffi

Cffi ◘| ♂◘ 8 !ffi◘♂5ffi ffi•♂;– 7 ffi ↑◘ ffi◘ffi;– |5ffi 5 ffi↑◘#ffi├ ♂ffi♂—◘ 5ffi

‼ffi ◀ ┘ffi)– |5ffi 5 #ffi 9┤ffi├ ffi6 ♂ ◘5!ffi#•↑ 5%| 5ffi◘♂5ffi5#┘◘ 5ffi

☼ffi **┴↑• ffl ├→%) (→*,•(├ •# 77├1↵ '(├1*,•**

ffi ◀◘┘ffi " ↑ ♂ffi ↑ ffi;– |5ffi 9@ffi↑◘#ffi├ ♂ffi• 7┘| 5!ffi♂┘%#ffi ffi)– |5ffiffl% 7◘ ♂ffi

ffi +4# 7 ffi◀) ffl+┘ffi 9┤ffl%┘ 5◘ ffi ↑ ffi•%# 7 ffi◘••‰♂ ffi┘ ;┤ ffi ffi ;| • ffi ↑ ffi

┼ffi ◘♂#; ffi; 7 ffi ↑ ffi+ 7◘ ¶ 2 ffi#4# 7#ffi ffi ↑ ffi 7◘♂%◘ ||4ffi ◘5ffi

ffi ┘ • ## #!ffi#┘ •;–•◘ ||4ffi◘#ffi◘ffi #%| ffi;ffi ↑ ffi•%# 7 ⊟#ffi•↑– • ┤ffi

Affi ◀ffi(;ffi ↑ ffi◘••‰♂ ffi┤#ffi◘♂ffi ┤# ♂6ffiffl♂•↑ ffi3┤| 5ffi◘••‰♂ ◻ffi

Bffi •ffi ' ' F 3ffi 9┤ffi├ ffi 7 5–; 5ffi◘#ffi; ||9#ffi ffi • 8 ffi ↑ ffi• 7┘| ♂ffi;ffi

Dffi ↑ ffi 5 ◻ffi

Cffi ◀┘ffi ' ' F 3ffi 9┤ffi•↑◘♂6 ffi ↑ ffi 7 ffi ◘5♂6ffi % ┤ffi

‼ffi ◀┤ffi ' ' F 3ffi 9┤ffi# ffi ↑ ffi ◘5♬;ffi;◘6┤ffi

☼ffi ◀┤ffi ' ' F 3ffi 9┤ffi◘┘┘ |4ffi ↑ fff%┘♬ ♂ ffi 7 ffi•↑◘ 6 ffi; ffi ffi ↑ ffi

ffi •%# 7 ⊟#ffi◘••‰♂ ┤ffiffi-↑ ffi 7 ffi•↑◘ 6 ffi 9┤ffi◘┘┘ ◘ ffi♂ffi ↑ ffi

ffi •%# 7 ⊟#ffi♂ ┤ ffi├┤ffi

┼ffi ◀8┘ffi ' ' F 3ffi 9┤ffi♂ 5ffi ffi8◘ ├5◘ ffi ↑ ffi♂%7 ├ ffi;ffi 7 #ffi◘##•◘ 5ffi

ffi 9–↑ffi ↑ ffi•%# 7 ffi◘♂5ffi♂ |4ffi•↑◘ 6 ffi ↑ ffi#% •↑◘ 6 ffi♂ ffi –7 ┤ffi

Affi ◀ ┘ffi(;ffi ↑ ffiffl••‰♂ ffi┤#ffi◘♂ffi ┤# ♂6ffi(♂ 8◘ |ffi3┤| 5ffi◘••‰♂ ◻ffi

Bffi •ffi ' ' F 3ffi 9┤ffi├ ffi 7 5–; 5ffi◘#ffi; ||9#ffi ffi • 8 ffi ↑ ffi• 7┘| ♂ffi;ffi

Dffi ↑ ffi 5 ◻ffi

Cffi ◀┘ffi ' ' F 3ffi 9┤ffi•↑◘♂6 ffi ↑ ffi 7 ffi ◘5♂6ffi % ┤ffi

‼ffi ◀┤ffi ' ' F 3ffi 9┤ffi♂—◘ ffi◘♂ffi ┤• ┘ ♂ffi┘ • ##ffi ffi↑◘8 ffi ↑ ffi

┼☼ffi 3┤├♂6ffi /┘ ◘ ♂#ffi ◘ 7 ffi┘ ; 7 ffi◘ffi+ ┘M+ ◘ ffi┘ • ##ffi ffi

┼ffi •↑◘♂6 ffi ↑ ffi◘••‰♂ ffi; 7 ffi♂ 8◘ |ffi├┤| 5ffi ffi◘ffi 7♂ ↑ |4ffi ◘5ffi

┼ ffi ◘••‰♂ ┤ffi

ffi •ffi 3–|♂6ffi /┘ □ ♂#ffi9–|ffi┘ ; 7ffi♂ 7□|ffi□••‰♂ ffi

ffi 7□♂ ♂□♂• ffi ff℅┘5□ ffi↑ ffi+ 8–• ffiffl6 7 ♂ ffi□♂5ffi ffi

┼ffi # %┘ffi↑ ffi┬| • ♂–•ffi¶ ffi. □5♂6ffi◀┬¶ .┴ffi□••‰♂ ‹ffi

ffi ◀─┴ffi↕┘♂ffi•7┘| ♂ffi;ffi↑ ffi ┤• ┘♂!ffi' 'F3ffi9–|ffi# ffi↑ ffi

Affi □5♬;ffi;|□6‹ffi

Bffi ◀8┴ffi' 'F3ffi9–|ffi□┘┘|4ffi↑ ff℅┘♬♂ffi7 ffi•↑□6 ffi; ffiffi↑ ffi

Dffi •%# 7 E#ffi□••‰♂ ‹ffiffi-↑ ffi7 ffi•↑□6 ffi9–|ffi□┘┘ □ ffi♂ffi↑ ffi

Cffi •%# 7 E#ffi♂ ┤ffi├─┤‹ffi

‼ffi **&↑• 5,→* 2,◀ - (→ ├,•**

☼ffi &*F┬E#ffi↑ □5ffi ♂5ffi#4# 7#ffi# 8 ffi□#ffi□ffi•7 7□♂5ffi□♂5ffi•♂ |ffi#4# 7ffi; ffi

ffi &*F┬E#ffiffl58□♂• 5ffi¶ ♂6ffi(♂; □# %•% ffi◀ffl¶ (┴ffi♂ 9@ffi┘ –7□ ─|4ffi•|| • ♂6ffi

ffi ♂ 8□|ffi □5#ffi; 7ffi5 ┘|4 5ffi7 #ffi8-□ffi↑ ffi.)ffi♂ 9@ffiffi3 •□%# ffi↑ ffi↑ □5ffi

┼ffi ♂5ffi#4# 7#ffi□ ffi•% ♂ |4ffi•♂;-6% 5ffi ffi-5 ♂ ÷4ffi7 #ffi↑□ ffi5ffi♂ ffi♂—□ ffi

ffi □% 7□ –•ffi.)ffi•7 7%♂-•□ ♂#ffi#-6♂□|#ffi□#ffi ┤• ┘♂ffi ffi┘ ├| 7ffi7 #!ffi↑ ffi

Affi #4# 7ffi9–|ffi♂ 5ffi ffi├ ffi7 5÷— 5ffi ffi •6♂┤ ffi↑□ ffi□ffi┘┘%□ ♂ffi;ffi7 #ffi

Bffi ◀← ‹!ffi↑ ffi □5♬;ffi7 #┴ffi9–|ffi♂ ffi•7 7%♂-•□ !ffi□♂5ffi↑□ ffi#℅•↑ffi

Dffi ♂♂♫7 7%♂-•□ ♂ffi5 #ffi♂ ffi♂5-•□ ffi7 ffi7□|%♂• ♂‹ffiffi-ffi□55 ##ffi↑#ffi

Cffi ♂ 9ffi•□ 6 4ffi;ffi □5♬;ffi7 #!ffi↑ ffi↑ □5ffi ♂5ffi#4# 7#ffi9–|ffi♂ 5ffi ffi├ ffi

‼ffi ♂ ÷— 5ffi↑ %6↑ffi□ffi5□ □ffi#4♂•↑ ♂┤□ ♂ffi♂ ;□• ffi↑□ ffi↑ ffi#↑%|5ffi♂ ffi├ ffi

☼ffi □♂4ffi♂ 8□|ffi □5#ffi ┤┘ • 5ffi; ffi↑#ffi♂ 9ffi┘┘%□ ♂ffi;ffi □5♬;ffi7 #‹ffi

ffi ffl ffi#–7–□ ffi7 5÷—•□ ♂ffi9–|ffi♂ 5ffi ffi├ ffi7□5 ffi♂ffi& *F┬E#ffi¶ ffi □□ffi

ffi ¶□♂□6 7 ♂ffi+4# 7ffi◀¶ ¶+┴ffiffi-↑ ffi¶ ¶+ffi□•• ┘#ffi □5#ffi; 7ffi↑ ffi↑ □5ffi

┼ffi ♂5ffi#4# 7#ffi□♂5ffi┘ ; 7#ffi□ffi# –#ffi;ffi$□|5□ ♂!ffi┬5—♂6!ffi□♂5ffi┬#–7□ ♂ffi

ffi %| #ffi9↑ ffi >℅– 5!ffi♂ffi5 ffi ffi; □7 ffi♂ 8□|ff℅#□6 ffi; ffi├─┤♂6ffi□♂5ffi

Affi •%# 7 ffi9 ├ffi┘ # ♂7 ♂‹ffiffi(♂ffi↑ ffi 8 ♂ffi↑□ ffi↑ ffi¶ ¶+ffi •6♂┤#ffi□♂ffi

Bffi □••‰♂ ffi□#ffH+7□ ¶ 2ffi├─|| 5H-ffi5% ffi ffi□ffi┘ 8%#ffi5 ┘|47 ♂ffi;ffi□ffi

Dffi +7□ ¶ 2!ffi↑ ffi¶ ¶+ffi9–|ffi6 ♂ □ ffi□♂ffi ┤• ┘♂ffi♂ffi↑ ffi 8 ♂ffi↑□ ffi–ffi

Cffi 5 #ffi♂ ffi • –8 ffi□♂ffi♂ 8□|ffi □5ffi; 7ffi↑ ffi↑ □5ffi ♂5ffi#4# 7#‹ffiffi-ffi□55 ##ffi

‼ffi ↑#ffi♂ 9ffi•□ 6 4ffi;ffi □5♬;ffi7 #!ffi↑ ffi¶ ¶+ffi9–|ffi♂ 5ffi ffi├ ffi♂ ÷— 5ffi

┼☼ffi ↑%6↑ffi□ffi5□ □ffi#4♂•↑ ♂┤□ ♂ffi♂ ;□• ffi↑□ ffi–ffi#↑%|5ffi♂ ffi├ ffi ┤┘ • ♂6ffi

┼ffi ♂ 8□|ffi □5#ffi; ffi↑#ffi♂ 9ffi┘┘%□ ♂ffi;ffi □5♬;ffi7 #‹ffi

┼ ffi +–7–□ ffi ffi↑ ff℅┘5□ #ffi ffi↑ ffi+7□ ¶ 2ffi#4# 7#ffi┘ 8%#|4ffi

┼┼ffi 5 #• ┼ 5!ffi↑ ffi7□♂%□|ffi7 ffi □5♂6ffi#4# 7#ffi7%# ffi♂9ffi├ ffi♂ ÷— 5ffi□♂5ffi

ffi • -8 ff℗⁄ 5□ #ffi□ ⊢% ffi□••%♂ #ffi# | • ♂6ffi□ffi □5-♬;ffi 7 ffi-♂ffi 5 ffi ffi

ffi ┘ –7□ |4ffi#•↑ 5%| ffi;%% ffi 7□♂%□ |ffi 7 ffi □5-♂6#ffi⊢□# 5ffi♂ffi ↑ ffi |•□ -♂-ffi

┼ffi " –↑-♂ffi ' ' F3!ffi□ ||ffi ┤-# -♂6ffi┬¶ . ffi □ #ffi ↑□ ffi□ ffi |6-┤ ffi; ffi ↑ ffi □5-♬;ffi

ffi ┘ -♂ffi9-┤|ffi⊢ ffi 7 5-;— 5ffi ffi –↑ □ffiffi◀□┘ffi•↑□ 6 ffi⊢□# 5ffi♂ffi ↑ ff℗⁄#□6 ffi◀ ffi

Affi @⊣9□ ♬% ffi@" ↑┘ffi ffi┘ ffi ↑ 7┘ffi□ 7%♂ ffi-;ffi ↑ ffi □5-♬;ffi; □6ffi-#ffi# ffi♂ffi ↑ ffi

Bffi •%# 7 ⊟#ffi□••%♂ !ffi ffi◀⊢┘ffi•↑□ 6 ffi ffi□ffi 7♂ ↑ |4ffi•↑□ 6 ffi-;ffi ↑ ffi □5-♬;ffi; □6ffi-#ffi

Dffi # ffi♂ffi ↑ ffi•%# 7 ⊟#ffi□••%♂ -ffiffi ' ' F3ffi9-┤|ffi♂ 5ffi ffi5 -8 ffi⊢-┤|-♂6ffi;%♂• -♂□ ⊢4ffi

Cffi ;;ffi;ffi ↑ ffi □5-♬;ffi; □6ffi ffi5 -8 ffi ↑ ff℗⁄#□6 ffi◀ ff@" ↑ffi ffi┘ ffi ↑ 7┘ffi•↑□ 6 ffi ffi

‼ffi ffi5 -8 ffi ↑ ffi 7♂ ↑ |4ffi•↑□ 6 ffi♂ |4ffi; ffi ↑# ffi•%# 7 #ffi9↑ffi↑□8 ffi# | • 5ffi□ffi

☼ffi □5-♬;ffi 7 !ffi ⊢% ffi♂ ffi; ffi ↑# ffi•%# 7 #ffi9↑ffi& * F┬ ffi 7□4ffi♂ ffi4 ffi↑□8 ffi

ffi □♂#—♂ 5ffi; 7 ffi□ffi | 6□•4ffi┬¶ . ffi 7 ffi ffi□ffi+ 7□ ¶ 2 -ffiffi - ↑ ffi•↑-• ffi

ffi ⊢ 9 ♂ffi□ffi 7♂ ↑ |4ffi•↑□ 6 ffi ffi□ff℗⁄#□6 ffi◀ ff@" ↑ffi ffi┘ ffi ↑ 7┘ffi•↑□ 6 ffi9-┤|ffi⊢ ffi

┼ffi 7□5 ffi⊢4ffi ↑ ffi•%# 7 ffi5%-♂6ffi ↑ ffi ♂ ||7 ♂ ffi┘ • ##-ffi

ffi ffl#ffi•□♂ffi⊢ ffi# ♂ffi; 7 ffi ↑-#ffi↑-6↑♬ 8 |ffi⊢ □@59♂ffi;ffi ↑ ffi9 @ffi-♂8 |8 5!ffi

Affi 8□ %#ffi•↑□♂6 #ffi ffi ↑ ffi;||9-♂6ffi(- ffi#4# 7#ffi9-┤|ffi⊢ ffi♂ • ##□ 4□ffi

Bffi ◀┘ffi) ffl+ffi-#ffi ↑ ffi9 @ffi 7□♂□6 7 ♂ ffi□┘┘⊢•□ -♂ffi; ffi '%# 7 ffi) – |5ffi+ 8-• #!ffi

Dffi □•• ┘ -♂6ffi9 @ffi 5 #ffi; 7 ffi ' ' F3ffi□♂5ffi;□•┼□ -♂6ffi ↑ ffi5-#┘□ •↑ffi□♂5ffi

Cffi #•↑ 5%⊢♂6ffi;ffi ↑□ ffi9 @ffi

‼ffi •ffi → 9ffi;– |5ffi□• -8–4ffi 4┘ ffi• □ 5ffi ffi-♂—□ ffi;– |5ffi9 @ffi >%– 5ffi□ ffi ↑ ffi

☼ffi •%# 7 ⊟#ffi┘ 7-# -ffi

ffi •ffi . 6 ##-♂ffi # ffi ┤-# -♂6ffi;%♂• -♂□ ⊢4-ffi

ffi ◀ ┘ffi+ - ffl . +ffi◀6□#ffi 7 #↑ffi♂ 9 @┘ffi-#ffi ↑ ffi↑ □5ffi ♂5ffi#4# 7 ffi; ffi& * F┬⊟#ffi6□#ffi

┼ffi ffl¶ (ffi♂ 9 @ffi

ffi •ffi . 78 ffi ♂5┘-♂ ffi; 7 ffi+ - ffl . ffi8-□ffi□ffi5□ □ffi#4♂•↑ ♂-ł□ -♂ffi-♂ ;□• ffi

Affi #ffi ↑□ ffi ┤• ┘ -♂#ffi□ ffi♂ ffi• □ 5ffi9↑ ♂ffi-♂ 8□ |ffi □5#ffi□ ffi♂ ffi

Bffi • -8 5-ffi

Dffi •ffi . 6 ##-♂ffi # ffi ┤-# -♂6ffi;%♂• -♂□ ⊢4-ffi

Cffi ◀⊢┘ffi↕ ┼4ffi(? ffi◀ (? ┘ffi-#ffi ↑ ffi↑ □5ffi ♂5ffi#4# 7 ffi; ffi& * F┬⊟#ffi | • -•ffiffl¶ (ffi♂ 9 @ffi

‼ffi •ffi . 78 ffi ♂5┘-♂ ffi; 7 ffi↕ (? ffi8-□ffi□ffi5□ □ffi#4♂•↑ ♂-ł□ -♂ffi-♂ ;□• ffi#ffi

┼☼ffi ↑□ ffi ┤• ┘ -♂#ffi□ ffi♂ ffi• □ 5ffi9↑ ♂ffi-♂ 8□ |ffi □5#ffi□ ffi♂ ffi

┼ffi • -8 5-ffi

┼ ffi •ffi . 6 ##-♂ffi # ffi ┤-# -♂6ffi;%♂• -♂□ ⊢4-ffi

ffi ◀ ffi(- . /→ ffi& 7– ffi&%#ffi#ffi ↑ ffi#4# 7 ff%# 5ffi ffi□•• ffi 7 □♂%□ ffi 7 ffi □5#ffi

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 2C
CUSTOMER COMMUNICATIONS AND OPERATIONS SUPPORT COSTS

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The purpose of this chapter is to describe the basis for Pacific Gas and Electric Company's (PG&E) forecasted participation rate and the activities that PG&E will undertake to notify and educate customers so that they may make an informed choice on their alternatives to the existing SmartMeter™ Program. This chapter also describes the business operations work needed to execute the meter transition and keep the customer informed during the transition. To date, the SmartMeter™ Program team has focused on the many aspects of program delivery without having to manage a complex and variable set of "meter product" options. With the introduction of these additional choices, not only will PG&E need to ensure that customers understand each choice and its distinctions, but PG&E's Program team will also need to be equipped to manage a set of "meter product" options. PG&E proposes a communications and information plan that will identify and describe the available options, including features and costs; the plan will also explain the process and actions required once a customer has chosen an alternative metering option to the standard SmartMeter™ technology.

PG&E's current SmartMeter™ communications plan only addresses standard SmartMeter™ installation. As a result, PG&E will need to develop additional collateral that describes each available option. PG&E will need to ensure that communications to customers provide an easily understandable description of the available choices and costs and educate customers on how each option would impact his/her meter functionality.

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PG&E conducted a telephone survey of a randomly selected group of customers during the period of February 11 through February 21, 2011. This survey was conducted in order to forecast the number of customers who might choose an alternative to their existing SmartMeter™. The survey addressed a representative and statistically-significant sample (300 completed interviews) of PG&E's customer base (i.e., distributed throughout PG&E's service territory).

The key objective of the survey was to determine the proportion of customers who would consider selecting an alternative meter option if they had to pay a one-time installation cost and monthly fee. The survey used two different pricing scenarios (installation plus monthly fee and monthly fee only). Because the survey was conducted prior to PG&E's complete analysis of the forecasted costs to offer an alternative to SmartMeters™, the survey questions did not include the specific, cost-based up-front and monthly fee or energy usage charge that PG&E proposes in this application. However, the survey results did provide quantitative data on the percentage of customers who would consider an alternative metering option if required to pay an up-front installation fee and a recurring monthly charge.[!⊥"] Of the total residential customers surveyed, 2.7 percent said that they would pay both a $100 one-time installation fee and a $15 monthly fee, which is approximately 145,800 customers. Because the study involved taking a sample of customers (as opposed to surveying the entire population), the sampling error of the 2.7 percent forecast at the 95 percent confidence interval is +/-1.9 percent. Therefore, the forecasted participation rate could range between 0.8 percent and 4.6 percent.

Notwithstanding these survey-findings, there are numerous factors that could impact the number of customers who actually choose an alternative to PG&E's existing wireless SmartMeters™. These include the following:

- The survey assumes 100 percent awareness and comprehension of PG&E's existing SmartMeter™ program and the alternative technology metering option that the California Public Utilities Commission (CPUC or Commission) may approve.
- Changing the price of the monthly fee ($15/month) or the installation fee ($100) presented to customers will likely impact the number of customers who choose the alternative metering option.
- The survey further assumes that customers' current awareness, knowledge, and attitudes toward the SmartMeter™ program stay constant, i.e., that

[!⊥"] The survey question posed to customers was: "Would you still select [an alternative meter] over the existing wireless SmartMeter™ if you were required to pay a $15 monthly service fee and a…$100 one-time installation fee"?

customers do not subsequently change their mind as a result of future communications by PG&E or external parties such as the media.

ffi Survey-respondents often overstate their willingness to take action. However, given the intensity of emotion over these issues and the unprecedented nature of offering multiple infrastructure options to utility-customers, it is difficult to accurately estimate whether that will occur in this case.

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Customers will have two primary SmartMeter™ options, as described in Chapter 1, "Policy and Program Overview."

These two options are:

A. Continue standard SmartMeter™ installation (both gas and electric meters).

B. Select a "Radio-Off" SmartMeter™ with no wireless RF communication (both gas and electric meters).

These options are presented in a Table 2C-1 below, illustrating each option's available features, required customer actions, and which types of customers are eligible for each option.

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	Alternatives	A: Continue SM Installations	B: Turn Off the Radio(s)
	Actions Required	None	Send in "order" request
	AVAILABLE FEATURES		
Electric Meter Functions	Manual Meter Reading Required – PG&E Rep Visits Premise Monthly	N	Y
	Automated Meter Reading – No Need for PG&E Rep Visit	Y	N
	Can Participate in Time-Varying Pricing Programs	Y	N
	Remote Connect/Disconnect of Service	Y	N
	Outage Alarms – Allow PG&E to More Quickly Identify Outages	Y	N
	Ability to View Monthly Usage Information Online	Y	Y
	Ability to View Weekly/Daily/ Hourly Usage Information Online	Y	N
	Ability to Receive Energy Alerts When Usage Crosses Next Tier	Y	N
	Home Area Network with Smart Appliances	Y	N
	Smart Charging of Electric Vehicles	Y	N
Gas Meter Functions	Manual Meter Reading Required – PG&E Rep Visits Premise Monthly	N	Y
	Automated Meter Reading – No Need for PG&E Rep Visit	Y	N
	Ability to View Monthly Usage Information Online	Y	Y
	Ability to View Weekly/Daily Usage Information Online	Y	N

As noted in Table 2C-1, while there are two primary options for residential customers, there are also some secondary options/choices for customers who choose the radio-off option:

1. Customers who are enrolled in PG&E's California Alternate Rates for Energy (CARE) program will receive a discount on the upfront fee and monthly charges.
2. Customers have the opportunity to decide how both the upfront fee and the ongoing cost will be integrated into their bill. They can pay more upfront in return for reduced monthly payments, or pay a reduced upfront payment and pay more on a monthly basis. Also, the monthly fee can be billed either as a fixed monthly charge or an incremental per kilowatt-hour usage charge (or per therm usage charge for gas-only customers).
3. Customers can choose to pay the upfront charge in a single payment or in installments over a reasonable financing period.

All of the specific prices that support these options can be found in Chapter 3, "Cost Recovery and Revenue Requirements."

Finally, customers with electric SmartMeters™ may also choose to relocate their meters to another location on their property, at their expense, under Tariff Rule 16, as described in testimony, Chapter 1, "Policy and Program Overview."

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PG&E plans to notify customers of their alternative technology metering options through a bill insert. Customers may call PG&E's call center to request more information and to request a radio-off selection form. Customers will also be able to visit PGE.com for more information and to download the forms. PG&E proposes that customers who want to select a proposed alternative to the standard SmartMeter™ installation will be required to return a signed declaration to the PG&E Records Center so that PG&E has an affirmative record of the customer's choice and customer acknowledgment that the choice may not enable the same functionality or benefits as the standard SmartMeter™ installation. As a part of that declaration, customers will indicate their choices for secondary options—CARE-enrollment discount and which method of upfront and monthly

charges they prefer. Once the document is received and registered in our Customer Care and Billing System (CC&B), the customer will be notified that PG&E has received the "order" and will be given an estimated timeframe for the meter change to occur (e.g., in 10-30 days or an alternative timeframe depending on the volume of requests). The SmartMeter™ operations team will manage the meter change work and contact the customer at the time of installation using the existing SmartMeter™ process, tools and communications strategy. The customer operations team will also verify customers who are CARE-enrolled and eligible for the discount. As part of the communication process during the meter transition, customers could receive door hanger materials and other literature once the meter changes are completed. This communication strategy has proven to be successful in PG&E's most recent SmartMeter™ deployments, and we look to leverage our experience here. Once the meter radio is turned off, the monthly charges will be included on the customer's bill through the fixed charge or incremental energy charge.

At the time when the customer disconnects their service due to a move or other reasons, PG&E will charge the customer a fee for turning the radio back on in the SmartMeter™.

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PG&E's proposed communications strategy is an effective way to inform interested customers about the modifications to the SmartMeter™ Program. PG&E is focused on achieving the following results with customers based on the proposed communication strategy:

ffi Customers receive sufficient notification about the options available to them.

ffi Customers are able to obtain clear and useful information about the options through multiple channels (i.e., phone, website, mailed letter) to best educate them for their selection process.

ffi Customers who choose an alternative technology metering option understand how to communicate their selection to PG&E and feel sufficiently informed about the process for the implementation of their selection.

ffi Customers value the opportunity to select an alternative metering option through modifications to the SmartMeter™ Program.

Overall, PG&E has envisioned a process that leverages existing workflows to manage a customer's choice when it is made. By leveraging the changes made to the Information Technology systems described in Chapter 2B, "Information Technology Costs," PG&E has identified the most cost-effective way to manage this process on behalf of all customers. Table 2C-2 below outlines the cost for the overall communication and planning efforts as described in the list above.

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Line No.	Expense Description	Cost (000s)
1	Notification	
2	Customer Request Forms	$175
3	Information Delivery	
4	Online Updates	152
5	Customer Inquiry	2,756
6	Employee Training and Change Management	100
7	Management of Choice Selection	
8	Billing Operations Staffing	14,637
9	Customer Communication and Planning	560
10	Total	$18,379(a)

(a) Minor variances due to rounding.

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The costs for this section will support the development and production of customer request forms for customers who choose an alternative metering option. The costs include:

ffi Production of letters, envelopes, and brochures

ffi Postage

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As stated at the beginning of this section, it is critical that customers understand their options and the costs and benefits associated with

each choice. These details will be communicated as part of the requested information package and selection form, but that alone is not sufficient to support our customers should questions arise. Additional costs to support that information delivery are:

- Online content at www.pge.com
- Customer Inquiries

PG&E's experience is that any mail-out to this size group of customers will generate incoming calls to our contact centers and inquiries at our local offices. In addition, because of previous customer concerns regarding SmartMeters™, PG&E anticipates that there will be customers wanting to discuss their alternative metering options with a customer service representative before making a decision. PG&E forecasts approximately 100,000 inquiries with a forecast talk time of over 9 minutes each. The talk time is based on current SmartMeter™ related call durations. The estimate of $2.756 million is based on the 2010 average cost per call of $8.23 and an average handle time of just over 5 minutes. An additional $0.02 million will be required for training and modifications to internal support systems (GenRef).

[illegible]

Customers who choose a technology metering alternative will be asked to send a signed, pre-paid postage declaration letter to PG&E Records Center in Stockton, California. CC&B will be modified to enable the Records staff to:

- Record Customer Choice
- Update SmartMeter™ billing systems to return them to non-interval billed
- Generate literature to acknowledge customers choice in a mailing

Additional staffing is required to process the letters and input a customer's choice into the CC&B system.

Once a customer has made a choice, PG&E will also need to notify customers several times. First, PG&E will need to notify a customer when his/her request for a SmartMeter™ alternative has been received.

Second, PG&E will need to notify a customer when the installation/modification will occur. Third and finally, when the work has been completed, PG&E will notify the customer. These communications will be through a combination of letters, postcards, door hangers, and Interactive Voice Response (IVR) calls. Finally, PG&E will likely follow up with customers for additional planning and measurement of performance in this process. Costs for these activities will include:

- Production of mailers
- IVR call costs
- Postage
- Post-implementation communication/validation

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PG&E has sought to find the most efficient, effective, and informative method to support our customers as they learn about and determine the best way for them to participate in the introduction of SmartMeters™ and their associated benefits. As noted throughout the testimony, there are many factors that could impact the adoption forecast and subsequently, these cost estimates. In addition, with this plan, PG&E is prepared to respond as quickly as possible to coordinate operations for customers that request the radio-off alternative meter option and the costs described reflect our recognition of the need to respond to customers in an efficient manner. Should customers decide that they do not want the benefits of radio-enabled meters, the approach described above should enable them to understand their options and to be appropriately informed as their meter changes are made.

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PACIFIC GAS AND ELECTRIC COMPANY
CHAPTER 3
COST RECOVERY AND REVENUE REQUIREMENTS

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This chapter describes Pacific Gas and Electric Company's (PG&E) cost recovery proposal for incremental capital and operating expenses needed to implement PG&E's modifications to the SmartMeter™ Program. PG&E understands the urgency of implementing the approved modifications and will begin offering the alternative metering option to customers as soon as reasonably possible after a California Public Utilities Commission (Commission or CPUC) decision is issued in this proceeding. For ratemaking purposes, PG&E has assumed the program will begin January 1, 2012.

PG&E's proposal in this application will offer residential electric and gas customers the opportunity to choose to have their electricity and gas metered using a radio-off SmartMeter™ that has no radio frequency (RF) communications. PG&E proposes to recover the actual revenue requirements associated with this alternative metering option in new two-way electric and gas Modified SmartMeter™ Balancing Accounts (MSMBA). All revenues collected from individual customers participating will be credited to the MSMBA-E and MSMBA-G. Any resulting overcollection or undercollection of the MSMBAs will be trued-up annually through the Modified SmartMeter™ Program rates via PG&E's Annual Electric True-Up (AET) and Annual Gas True-Up (AGT) filings.

The cost recovery proposal and forecasted revenue requirements are presented for the period 2012 through 2013. The cost forecast for this program assumes that PG&E will implement the modifications beginning January 1, 2012. If the Commission modifies the implementation of this proposal, PG&E may incur additional costs and reserves the right to seek recovery of any such costs through its Modified SmartMeter™ Program rates.

Additionally, PG&E may file an advice letter proposing to establish gas and electric memorandum accounts to track the revenue requirements associated with actual costs that may be incurred before a decision is issued in this proceeding. Upon Commission approval of PG&E's proposed balancing accounts in this proceeding, PG&E will transfer the recorded balance from the

memorandum accounts to the MSMBAs for rate recovery as presented in this chapter.

PG&E believes this proposal allows the modifications to the SmartMeter™ Program to proceed in a timely manner, consistent with CPUC direction.

Cost recovery and associated revenue requirements for the period after December 2013 shall be addressed in PG&E's 2014 General Rate Case (GRC) Phase 1 and subsequent GRCs.

The remainder of this chapter is organized as follows:

- Section B – Summary of Costs
- Section C – Incremental Nature of Costs
- Section D – Cost Recovery Proposal
- Section E – Customer Charge Proposals
- Section F – Revenue Requirements
- Section G – Conclusion

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PG&E requests authorization to recover approximately $113.4 million in total costs expected to be incurred from 2012 through 2013, to implement and operate the modifications to the SmartMeter™ Program presented in this application. These costs include incremental capital and expense costs related to manually turning off the radios in the electric and gas SmartMeters™, manual meter-reading, Information Technology (IT) modifications, strengthening PG&E's RF-mesh communications network, and other operating costs, including communications with customers interested in the option. Since PG&E cannot predict exit rates for participants, costs associated with re-enabling the meter radio are not currently included in the 2012 and 2013 cost forecasts. However, these costs are proposed to be recorded to the MSMBAs. PG&E currently estimates the total cost to re-enable the meters to be approximately $128 per unit, as described in Chapter 2A, "Field Deployment Costs."

The total incremental costs are shown in Table 3-1 and described in detail in Chapters 2A, 2B, and 2C of the testimony.

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Line No.	Description	2012	2013	Total(a)
1	Incremental Expense Costs	$55,725	$19,410	$75,136
2	Incremental Capital Costs	38,297	–	38,297
3	Total Incremental Implementation Costs	$94,022	$19,410	$113,433

(a) Minor variances due to rounding.

The total incremental expenses of $75.1 million are shown in Table 3-2 and described in detail in Chapters 2A, 2B, and 2C, of the testimony.

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Line No.	Description	2012	2013	Total(a)
1	Field Deployment	$36,940	$19,410	$56,351
2	Information Technology	406		406
3	Customer Communications and Operations Support	18,379		18,379
4	Total Incremental Expense Costs	$55,725	$19,410	$75,136

(a) Minor variances due to rounding.

The total incremental capital costs of $38.3 million are shown in Table 3-3 and described in Chapters 2A and 2B, of the testimony.

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Line No.	Description	2012	2013	Total(a)
1	Field Deployment	$36,385	–	$36,385
2	Information Technology	1,912	–	1,912
3	Total Incremental Capital Costs	$38,297	–	$38,297

(a) Minor variances due to rounding.

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2 Within the context of this application, PG&E considered incremental costs
3 associated with modifications to the SmartMeter™ Program to be those labor,
4 equipment, material, and contract costs that would have not otherwise been
5 incurred had it not been for the Modified SmartMeter™ Program, as described in
6 Chapters 2A, 2B and 2C.

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8 PG&E is seeking authority to record the actual revenue requirements and
9 revenues collected from individual customers benefiting from the program in the
10 new two-way MSMBAs (MSMBA-E and MSMBA-G). Any resulting
11 overcollection or undercollection of the MSMBAs will be trued-up annually
12 through modifications to the SmartMeter™ Program rates via PG&E's AET and
13 AGT filings.

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15 For purposes of cost recovery, PG&E will record, on a monthly basis,
16 the revenue requirements associated with the actual costs incurred and
17 revenues collected from participating customers in the new two-way
18 balancing accounts, as described earlier in this chapter.

19 Two-way balancing accounts are appropriate as revenues and costs
20 specific to this program are difficult to estimate accurately. This is due to the
21 uncertainty of the number of customers choosing to participate, the rate
22 option chosen by individual customers, and the difficulty of forecasting
23 whether such customers will be located in low-, medium-, or high-density
24 meter areas. Meter readings for customers in low-density meter areas will

be more time consuming and more expensive than meter readings for customers in high-density areas. The actual costs of compensating electric RF-mesh communications network devices may vary significantly from forecast costs as described in Chapter 2A, "Field Deployment Costs." Given the high level of uncertainty surrounding the participation rate, population density, and certain cost forecasts, PG&E proposes to record the actual revenue requirements associated with recorded costs in new two-way balancing accounts.

This cost recovery proposal assumes that PG&E will implement the program beginning January 1, 2012. If the Commission modifies the implementation of this proposal, PG&E reserves the right to seek recovery of any additional costs incurred. Additionally, PG&E may file an advice letter proposing to establish gas and electric memorandum accounts to track the revenue requirements associated with actual costs that may be incurred before a decision is issued in this proceeding. Upon Commission approval of PG&E's proposed balancing accounts in this proceeding, PG&E will transfer the recorded balance from the memorandum accounts to the MSMBAs for rate recovery as presented in this chapter.

Also described in Chapter 1, "Policy and Program Overview," customers may alternatively request that PG&E physically relocate the SmartMeter™ at the customer's expense, which is governed by PG&E's existing Rule 16, Section F.2.b. These customers would not pay any other charges proposed in this chapter.

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Total costs forecasted for modifications to the SmartMeter™ Program were used to develop gas and electric revenue requirements. PG&E requests that the Commission find the costs and associated revenue requirements to be reasonable. PG&E's total cost forecast is based on an initial estimation of approximately 145,800 customers who may choose to participate in the radio-off metering option during the 2012-2013 period. Actual customer participation may vary significantly, resulting in significantly higher or lower costs and associated revenue requirements.

Additionally, if actual revenue requirements vary from the revenues recorded in the MSMBAs, PG&E requests any resulting overcollection or

undercollection to be trued-up annually through the Modified SmartMeter™ Program rates via PG&E's AET and AGT filings.

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PG&E proposes that customers choosing an alternative metering option will pay reasonable charges to cover the costs of implementing the program. Customers will pay an up-front fee covering all or a portion of PG&E's immediate costs of implementing the program, monthly fees covering its ongoing monthly expenses and capital revenue requirements, and an exit fee upon no longer participating.

PG&E proposes two customer charge proposals.

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PG&E proposes a $135 up-front fee for non-California Alternate Rates for Energy (CARE) customers, and a 20 percent discounted up-front fee of $105 for CARE customers. Customers will be given the choice of paying the up-front fee at once or in installments over a reasonable financing period.

For monthly fees, PG&E proposes giving customers the choice of:

ffi Paying a fixed monthly fee of $20 per month for non-CARE customers and $16 per month for CARE customers (Option 1); or

ffi Paying monthly rate adder per kilowatt-hour (kWh) (for electric only and electric and gas combined customers) or per therm rates (for gas only customers) (Option 2) of:

- 3.6¢ per kWh or 53.2¢ per therm for non-CARE customers
- 2.9¢ per kWh or 42.6¢ per therm for CARE customers

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PG&E proposes a $270 up-front fee for non-CARE customers, and a 20 percent discounted up-front fee of $215 for CARE customers. Customers will be given the choice of paying the up-front fee at once or in installments over a reasonable financing period.

For monthly fees, PG&E proposes giving customers the choice of:

ffi Paying a fixed monthly fee of $14 per month for non-CARE customers and $11 per month for CARE customers (Option 1); or

ffi Paying monthly rate adder per kWh (for electric only and electric and gas combined customers) or per therm rates (for gas only customers) (Option 2) of:

– 2.6¢ per kWh or 38.7¢ per therm for non-CARE customers

– 2.1¢ per kWh or 31.0¢ per therm for CARE customers

For exit fees, PG&E proposes a rate of $130 (includes franchise fees and uncollectibles) to cover the costs of re-enabling the radio. The costs associated with re-enabling the meter radio are not included in the revenue requirement.

These rate options are summarized in Tables 3-4 and 3-5 below:

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Line No.	Customer Choice	Option	One-Time Up-Front Charge ($)	Monthly Fixed Charge ($/Month)	Monthly Volumetric Rate Adder Applicable to Electric Only and Combined Electric and Gas Customers ($/kWh)	Monthly Volumetric Rate Adder Applicable to Gas Only Customers ($/Therm)
1	Proposal A	Option 1	$135	$20	N/A	N/A
2	Proposal A	Option 2	$135	N/A	$0.036	$0.532
3	Proposal B	Option 1	$270	$14	N/A	N/A
4	Proposal B	Option 2	$270	N/A	$0.026	$0.387

(a) Customers will have the option to pay the one-time, up-front fee once or in installments over a reasonable financing period.

[illegible]

Line No.	Customer Choice	Option	One-Time Up-Front Charge ($)	Monthly Fixed Charge ($/Month)	Monthly Volumetric Rate Adder Applicable to Electric Only and Combined Electric and Gas Customers ($/kWh)	Monthly Volumetric Rate Adder Applicable to Gas Only Customers ($/Therm)
1	Proposal A	Option 1	$105	$16	N/A	N/A
2	Proposal A	Option 2	$105	N/A	$0.029	$0.426
3	Proposal B	Option 1	$215	$11	N/A	N/A
4	Proposal B	Option 2	$215	N/A	$0.021	$0.310

(a) Customers will have the option to pay the one-time, up-front fee once or in installments over a reasonable financing period.

The up-front fee, the monthly fees, and the exit fees will be recorded to the MSMBA-E and MSMBA-G. Upon Commission approval, PG&E will file an advice letter to implement a new tariff to charge customers, who voluntarily request the alternative metering option, the up-front fee, the monthly fixed or volumetric fees, and the exit fee.

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PG&E has estimated incremental annual revenue requirements based on the incremental costs described in this chapter. Based on when the expenses are incurred, and when capital expenditures are put into rate base, PG&E derived associated revenue requirements for the years 2012 and 2013, as shown in Table 3-6 below. PG&E requests that the Commission adopt the forecasted revenue requirements of approximately $84.4 million for the 2012 through 2013 period for modifications to the SmartMeter™ Program.

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This section describes the capital costs related to the implementation of the modifications to the SmartMeter™ Program. Capital costs requested in this application are for upgrading PG&E's RF-mesh communications network to address any degradation caused by the alternative metering option and for IT upgrades supporting customer services.

Revenue requirements have been determined based on the depreciation methods, and asset life information included in PG&E's 2011 GRC Settlement Agreement currently pending approval by the Commission. The calculation also uses the authorized rate of return, and capital ratios adopted in PG&E's 2008 Cost of Capital (COC) decision, Decision 07-12-049.[!⊥"] Subsequent calculations of capital-related revenue requirements recorded to the applicable balancing accounts, will incorporate the then-authorized asset parameters.

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The majority of these expenses are operating expenses related to turning off the radios from installed electric and gas SmartMeters™, manually reading the radio-off meters on a monthly basis, and other

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[!⊥"] Decisions 08-05-035 and 09-10-016 maintained the 2008 COC factors for 2009, 2010 and 2011, respectively.

operating costs for the program, including customer outreach and communications. Other expense-related costs include property, business, other taxes, and franchise fees and uncollectible accounts expense.

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Annual revenue requirements are estimated based on the incremental capital-related costs and operating expenses presented in this application, which are not included in any other PG&E cost recovery filing. PG&E is presenting these forecasted revenue requirements for several reasons:

- ffi To show how the incremental costs presented in this application translate into revenue increases.
- ffi To support PG&E's request that the Results of Operations model assumptions and methods used to calculate the capital revenue requirements discussed herein be approved for calculating monthly capital.
- ffi To provide forecasted revenue requirements for the calculation and evaluation of rate impacts.

PG&E is requesting that the revenue requirement recovery be split between gas and electric departments. This revenue requirement is allocated between gas and electric based on the number of gas and electric customers, as shown in Table 3-6 below.

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Line No.	Year	Total(a)	Gas	Electric
1	2012	$58,596	$26,368	$32,228
2	2013	25,789	11,605	14,184
3	Total	$84,384	$37,973	$46,411

(a) Minor variances due to rounding.

For illustrative purposes, PG&E's revenue requirement for 2014 would be $26.3 million, based on the assumptions presented in this chapter.

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PG&E is proposing cost recovery for modifications to the SmartMeter™ Program through new balancing accounts. Only incremental costs and/or associated revenue requirements to implement the modifications to the SmartMeter™ Program will be recorded into these accounts. A full review of forecast costs will take place as part of this application process, and once these forecasts have been reviewed and adopted, no further reasonableness review should occur.

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Q 1 Please state your name and business address.

A 1 My name is Jana R. Corey, and my business address is Pacific Gas and Electric Company, 77 Beale Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 I am the director of PG&E's Energy Information Network Department; previously, I was responsible for the Advanced Metering Infrastructure™ (AMI) Project and the SmartMeter™ Upgrade Program. My responsibilities now are to monitor and test emerging technologies for potential application to PG&E's AMI Project.

Q 3 Please summarize your educational and professional background.

A 3 I received my bachelor of science degree in systems engineering and a master of science degree in electrical engineering from the University of California, Los Angeles. I also received my master of business administration degree from the Stanford Graduate School of Business. I joined PG&E in 1991. From 1991-2000, I held various positions including manager in field operations and director of Regulatory Relations. From 2000-2001, I was director of Strategic Planning. From 2001-2003, I was director of PG&E Restructuring. From 2003-2009, I managed PG&E's AMI Project and SmartMeter™ Upgrade Program. I am currently the director of PG&E's Energy Information Network Department.

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

ffi Chapter 1, "Policy and Program Overview."

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.

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Q 1 Please state your name and business address.

A 1 My name is Teresa J. Hoglund, and my business address is Pacific Gas and Electric Company, 77 Beale Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 I am a manager in Regulatory Analysis and Forecasting, which is a group within the Analysis and Rates Department, in the Regulation and Rates organization. I do governance work related to balancing accounts and monthly revenue requirement and rate forecasting.

Q 3 Please summarize your educational and professional background.

A 3 I received a bachelor of business administration degree with an accounting concentration from the Pacific Lutheran University in 1983. After my undergraduate studies, I worked in the Tacoma office of Ernst & Whinney as a consultant in the Tacoma Telecommunications Practice. I received a CPA certificate in the state of Washington in 1986. I moved to the state of California in 1987 where I joined CPNational/Alltel as manager of Cost Separations and Settlements. At CPNational/Alltel, over the next five years, I held various positions, including Western Region budget director, Western Region controller and Southwest Region controller.

In 1992, I joined PG&E as a senior analyst in the Plant and Depreciation Accounting group within the Capital Accounting Department. Subsequently, I held the position of the plant and depreciation manager. In 1995, I moved to the Corporate Accounting Department and held various positions or combinations of such positions over nine years including energy accounting manager, technical accounting manager, and external financial reporting manager.

In 2004, I left PG&E for personal reasons. In 2009, I returned to PG&E as a senior regulatory specialist in the Analysis and Rates Department.

I am also sponsoring cost recovery testimony in various California Public Utilities Commission proceedings, including PG&E's 2009 Market Redesign and Technology Upgrade (A.10-02-012), General Rate Case – Phase 3 (A.10-03-014), Default Residential Rate Programs (A.10-08-005), and 2010 Market Redesign and Technology Upgrade (A.11-02-011).

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

- Chapter 3, "Cost Recovery and Revenue Requirements," with the exception of Section E, "Revenue Requirements," sponsored by Nielson D. Jones.

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.

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Q 1 Please state your name and business address.

A 1 My name is Redacted and my business address is Pacific Gas and Electric Company, 77 Beale Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 I am a principal regulatory specialist in the Revenue Forecasting and Analysis section of the Analysis and Rates Department, where I am responsible for producing and supervising the preparation of revenue requirement models, and developing related testimony.

Q 3 Please summarize your educational and professional background.

A 3 I received a bachelor of science degree in nuclear and power engineering from the University of Cincinnati in 1985. I received a master of business administration degree from Golden Gate University in 1995. From 1985 to 1987, I worked as an engineer for Westinghouse Electric Corporation.

I joined PG&E in 1987 as an engineer in the Nuclear Power Generation Department. My responsibilities included nuclear fuel utilization analysis and reactor physics calculations. I was promoted in 1995 to supervisor, responsible for fuel and core technical analysis. In 1997, I was promoted to acting director of Nuclear Technical Services. My responsibilities included managing technical projects and programs supporting the Diablo Canyon Power Plant.

In late 1998, I left PG&E to join Altran Corporation, a management and engineering consulting company. As a senior consultant, I supported utilities throughout the United States on projects such as Y2K auditing, plant licensing review and probabilistic reliability studies.

I rejoined PG&E as a senior rates analyst in late 2000 and was promoted to the position of team lead of the Operations and Maintenance (O&M) expense group in August 2003. In this position, I was the working cash expert witness in the 2003 and 2007 General Rate Cases (GRC) as well as the O&M expense witness in Federal Energy Regulatory Commission filings. In June 2006, I became the supervisor of the Results of

Operations group. In this position, I continued to be the PG&E expert witness for working cash in addition to being an expert witness for revenue requirement calculations and being a case manager for the cost of capital regulatory filing. In October 2010, I was promoted to my current position, principal regulatory specialist. In this position, I continue to be focused on the production of revenue requirement calculations for regulatory filings. Most recently, I was the revenue requirement witness in PG&E's SmartMeter™ Upgrade Program (A.07-012-009), the 2009 Rate Design Window (A.09-02-022), the 2009 Nuclear Decommissioning Cost Triennial Proceeding (A.09-04-007), the 2011 GRC (A.09-12-020), and the Market Redesign and Technology Upgrade filing (A.09-06-001).

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

- Chapter 3, "Cost Recovery and Revenue Requirements":
  - Section E, "Revenue Requirements."

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.

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Q 1 Please state your name and business address.

A 1 My name is James L. Meadows, and my business address is Pacific Gas and Electric Company, 77 Beale Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 I am a project director for the PG&E SmartMeter™ Program.

Q 3 Please summarize your educational and professional background.

A 3 I received my bachelor of business administration degree from the University of Texas, Austin in 1986, and my master of management degree from the JL Kellogg Graduate School of Management at Northwestern University in 1992, with majors in finance and strategy. I have been a licensed California Certified Public Accountant since 1991. I held management consulting positions with consulting firms Deloitte & Touche and PriceWaterhouseCoopers. I have been on the Advanced Metering Infrastructure (AMI)/SmartMeter™ Program team for PG&E since 2002. I have held several roles in the project team, including positions in risk analysis, project controls, financial management, prior to my current role as project director. In addition, I was responsible for the economic and financial analysis and cost/benefit justifications in the original AMI Application in 2005 (A.05-06-028). I testified before the California Public Utilities Commission regarding PG&E's AMI Application. I founded Financial Strategies Group (FSG), a consulting firm, in 1993.

Since starting FSG, I have provided consultant services for dozens of corporations in the practice areas of business planning, strategic planning, project evaluations, cost of service studies, implementation plans, information services cost studies, and rate of return analyses. Projects that I have been responsible for have been primarily in the areas of technology, communications, and utility industries.

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

ffi Chapter 2A, “Field Deployment Costs.”

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.

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Q 1 Please state your name and business address.

A 1 My name is Brian F. Rich and my business address is Pacific Gas and Electric Company, 77 Beale Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 I am the director of Customer Care Strategic Planning and Architecture in the Information Systems and Technology Services Department.

Q 3 Please summarize your educational and professional background.

A 3 I received a bachelor of business administration degree from George Washington University in 1996.

I have an extensive background in Information Technology project management. Prior to joining PG&E, I held positions with a large consulting firm, working on process and technology projects within their utilities practice. I have been responsible for managing and implementing multiple technology projects, including Customer Information Systems, Workforce Management, and Enterprise Resource Planning systems and have over 15 years of project implementation and program management experience.

Since joining PG&E in March 2010, I have managed PG&E's Customer Care technology portfolio, with a heavy concentration in the SmartMeter™, Meter to Cash, Dynamic Pricing, and Mobile Workforce Management programs.

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

ffi Chapter 2B, "Information Technology Costs."

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.

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Q 1 Please state your name and business address.

A 1 My name is Karen J. Zelmar, and my business address is Pacific Gas and Electric Company, 245 Market Street, San Francisco, California.

Q 2 Briefly describe your responsibilities at Pacific Gas and Electric Company (PG&E).

A 2 As director of Pricing Products, I am responsible for defining and implementing how customers experience our pricing programs (such as Dynamic Pricing, CARE and the Winter Gas Program) as well as other Advanced Metering Infrastructure-enabled pricing services.

Q 3 Please summarize your educational and professional background.

A 3 I received a bachelor of arts in economics from Northwestern University in 1993. Upon graduation, I worked as a systems integration analyst and manager for Price Waterhouse Consulting (now owned by IBM.) From 1997-1999, I attended University of California at Berkeley and graduated from the Haas School of Business with a masters in business administration in spring 1999. I joined Netscape Communications as a product manager in Online Shopping Services. America Online (AOL) acquired Netscape Communications in 1999, and I worked for AOL first in San Francisco, California in the online media division, then as a director of product management for AOL Europe in London, United Kingdom and finally in Dulles, Virginia as Vice President of Operations and Program Management. In 2007, I joined NAVTEQ as Vice President, Map Network, managing the strategic direction, planning and business operations for online acquisition. In 2008, I joined SunPower Corporation as an independent consultant in marketing, focusing on their commercial business lead generation.

In 2010, I joined PG&E in the Customer Care Division. The Integrated Demand Side Management Products group performs all activities that encompass taking a new offering in areas of rate programs, energy efficiency, demand response, and other emerging energy management technologies from idea to customer deployment and successive stages of

improvement. My first role was in Product Lifecycle Development, and I was subsequently promoted to director, Pricing Products, in October 2010.

Q 4 What is the purpose of your testimony?

A 4 I am sponsoring the following testimony in PG&E's Modifications to the SmartMeter™ Program:

- Chapter 2C, "Customer Communications and Operations Support Costs."

Q 5 Does this conclude your statement of qualifications?

A 5 Yes, it does.