



ARTS3093

A YX]U'Dck Yf

HYfa 'Hk c''##'&\$&\$



7ci fgY`Cj Yfj]Yk

GhJZZ'7cbhJWw'8YhU]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWjhcb	D\cbY
8f`>Ua Yg`8i hcb	^Xi hcb4 i bgk "YXi "Ui	6mUddc]bra Ybh		

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D\cbY. f\$&Ł- ' ,) '(,) *

9a U]: [gUa 4 i bgk "YXi "Ui](#)

K YVg]h: [k k k "Ufrg"i bgk "YXi "Ui #gUa](#)

H\Y`GWcc`cZhY`5frg`UbX`A YX]U`k ci `X`_Y`h`F YgdYWw`m5W_bck`YX[Y`hY`HfUX]hcbU`7i ghcX]Ubgž
hY`6YXY[U`fP Ybg]b[hcb`Wla di glž`6 X]hcbldbZ`7 H g %

7ci fgY'8YHJ`g

7fYX]hDc]bHg`*`

Gi a a UfmicZh\Y'7ci fgY

H\]g`Wci fgY`YI d`cfYg`h\Y`]\grcfmiUbX`WcbhYa dcfUfmbUhi fY`UbX`YI hYbhcZa YX]U`dck Yfzk]h`U`dUfh]W`Uf
ZcW`g`cb`a`YX]U`]bXi`gh]Yg`UbX`]bgh]h`h]cbg`-`cb`a`YX]U`Ug`U`Vi`g]bYgg`"H\Y`a`YX]U`g`]bZi`YbW`k`]h`]b`gcW]U`z
W`hi`fU`zYWcbca]WUbX`dc`]h]W`WcbhYI`hg`k`]`VY`YI`Ua`]bYX`"K`Y`k`]`YI`d`cfY`j`Uf]ci`g`Z]W`hg`UbX`UgdYW`hg`cZ
a`YX]U`dck`Yf`]b`fY`U]h]cbg`]\d`hc`W`Ub`[]b[`hY`W`bc`!`gcW]U`WcbhYI`hg`/k`Y`k`]`YI`Ua`]bY`]\ck`a`YX]U`]bXi`gh]Yg
UfY`Wca`]b[`hc`hY`fa`g`k`]h`bYk`a`YX]U`hY`W`bc`c`[]Yg`UbX`UggcW]U`hY`X`bYk`a`cXYg`cZgcW]U`]hmUbX
Wca`a`i`b]W]h]cb`"Ghi`XYbHg`UfY`Ug`YX`hc`XYj`Y`cd`U`W]h]W`dYfgdYW]j`Y`cb`]ggi`Yg`z`hc`[`Y`h`Y`f`k`]h`Ub
i`bXYfgh]UbX]b[`cZ`h`Y`k`Um`g`]b`k`]\W`WcbhYa dcfUfma`YX]U`Ug`Wca`Y`hc`k`]Y`X`g][`b]Z]W]bhdck`Yf`]b`gcW]Y`hm
UbX`W`hi`fY`"

7ci fgY`@YUfb]b[`Ci hWca Yg

%`8]gd`UmUb]b]!XYdH`i`bXYfgh]UbX]b[`cZ`U`fUb[`Y`cZ`_YmXYVUH`g`UbX`]ggi`Yg`fY`U]h]b[`hc`a`YX]U`dck`Yf`
&`8`Ya`cbgh]U`h`h`Y`UV]`]m]hc`h`W]h]W`m]b]j`Yg]h[`U`h`Z`c`fa`U`h]c`b`g`UbX`]b`g]h]h`h]c`b`g`c`Z`a`YX]U`dck`Yf`]b
fY`U]h]cb`hc`k`]XYf`]\]grcf]W]z`gcW]U`z`dc`]h]W]z`Y`Wcbca]WUbX`W`hi`fU`dfcW]ggYg`UbX`WcbhYI`hg
'`" `G`]\ck`g`_`]`g`]b`W]h]W`U`b`U`mg]g`UbX`h`Y`f][`c`f`c`i`g`U`dd`]W]h]cb`c`Z`h`Y`c`f`Y`h]W]W`WcbW`d`hg`hc`]b]j`Yg]h[`U`h`
Yj`Y`fm`X`Um]ggi`Yg`UbX`XYVUH`g`fY`U]h]b[`hc`a`YX]U`dck`Yf`
(`8]gd`UmUb`U`dd`fY`W]U]h]cb`c`Z`h`Y`Wcb]h]bi`]b[`]a`d`c`f`U`b`W`c`Z`W]h]W`m]Y`b[`U[]b[`k`]h`h`Y`WcbhYa dcfUfm
gh]U`h`c`Z`a`YX]U`dck`Yf`
)`8`Ya`cbgh]U`h`U`b`UV]`]m]hc`h`]b`_`]b`XY`d`Y`b`XY`b`h`m`z`W]h]W`m]UbX`W`Y`U]h]j`Y`m`UV`ci`ha`YX]U`dck`Yf`

HYUWX]b[`GhfUH[]Yg`

HYUWX]b[`UbX`@YUfb]b[`F`U]cbU`Y`

H\]g`]g`U`Yj`Y`" `Wci fgY`" `#Vi`]Xg`cb`g`_`]`g`XYj`Y`cd`YX`]b`Yj`Y`g`%`UbX`&`Wci fgYg`" `#k`]`U`ck`g`hi`XYbHg`hc`
XYj`Y`cd`g`_`]`g`]b`]\`[`Y`f`c`f`X`Y`f`U`b`U`mg]g`UbX`g`Y`Z`X`f`Y`W`X`Y`U`fb]b["`6`ch`Y`W`h`f`Y`g`UbX`hi`hc`f]U`g`k`]`VY`cd`Y`b
hc`X]U`c[`i`Y`k`]h`h`Y`U]a`c`ZYI`d`cf]b[`h`Y`f`Y`UX]b[`g`UbX`f`Y`U`h`X`ei`Yg]h]cbg`]b`U`Wc`U`V`c`f`U]h]j`Y`UbX`f][`c`f`c`i`g`
k`U`n`f`

H\]g`Wci fgY`]g`B`C`H`U`V`ci`h`f`c`h`Y`U`fb]b[`z`Vi`h`f`U`h`Y`f`]b]c`j`Yg`U`W]j`Y`m`h`]b`_`]b[`U`V`ci`h`UbX`Y`b[`U[]b[`k`]h`U`
bi`a`V`Y`f`c`Z`_`Y`m]ggi`Yg`z`XYj`Y`c`da`Y`b`hg`z`WcbW`d`hg`z`d`Y`fg`d`Y`W]j`Yg`z`UbX`XYVUH`g`" `Ghi`XYbHg`UfY`YI`d`Y`W`X`h`c`
h]U`_`Wcb]h]c`c`Z`h`Y`f`c`k`b`Y`U`fb]b[`z`f`U`h`Y`f`h`Ub`d`Ugg]j`Y`m`YI`d`Y`W`h]b]Z`c`fa`U`h]cb`hc`VY`XY`]j`Y`f`Y`X`hc`h`Y`a`"

HYUWX]b[`GhfUH[]Yg`

5`"gh`i`XYbHg`UfY`YI`d`Y`W`X`h`c`Wca`Y`Y`U`W`k`Y`Y`_`hc`V`ch`Y`W`h`f`Y`g`UbX`hi`hc`f]U`g`k`Y`"d`f`Y`d`U`f`Y`X`k`]h`b`ch`g`cb`
h`Y`f`Y`UX]b[`g`UbX`U`b`m]XY`U`g`c`f]ggi`Yg`h`Y`m`k`Ub`h`hc`di`f`gi`Y`"H\Y`f`Y`UX]b[`g`U`f`Y`]b`h`b`X`Y`X`hc`V`Y`h`ci`[`h`
d`f`c`j`c`_`]b[`U`b`X`m`ci`k`]`b`Y`Y`X`hc`XYj`ch`U`h`Y`U`gh`&!` \`f`g`d`Y`f`k`Y`Y`_`hc`d`f`Y`d`U`f`U]h]cb`" `Z`m`ci`X`c`b`ch`_`Y`Y`d`i`d`k`]h`
h`Y`f`Y`UX]b[`g`m`ci`k`]`Z`b`X`]h]j`Y`fm`X`]Z]W`h`hc`d`Ugg`h`Y`Wci fgY`"H\Y`Wci fgY`]g`U]a`YX`U`h`Vi`]X]b[`d`f`c`Xi`W]j`Y`
UbX`]j`Y`m`Wca`a`i`b]h]Yg`cZ]bei`]fm]b`V`ch`Y`W`h`f`Y`g`UbX`hi`hc`f]U`g`"

H\Y`Wci fgY`k`]`]\Uj`Y`U`I`B`G`K`A`c`c`X`Y`g]h`z`k`Y`f`Y`m`ci`W`U`b`Z]b`X`Y`W`h`f`Y`b`ch`g`UbX`U`f`U`b[`Y`c`Z`ch`Y`f`V`U`g]W`
Wci fgY`f`Y`g`ci`f`W`g`"

5ggYgga Ybh

Gh XYbhg UfY fYei fYX hc g\ck UWj Y YUfb]b[ghUHY[]Yg]b UddfcUWX]b[hY W]HYf]U cZhY UggYgga Ybh Hc gi ddcfh YUfbYfg]b h\g]bXYdYbXYbhW]h]W dfcW ggž fYgci fWg k] VY a UXY Uj U]UV Y cb A ccX Y Zc f gh XYbhg hc YI d c f Y H Y g Y f Y g c i f W g k] W U b j U g h Y V c f f Y W h i g Y c Z h Y < U f j U f X F Y Z f Y b W] b [g m g h Y a / \ c k h c k f] h Y Z Y W j Y U b X W] h] W m i b i U b W X Y g g U m g / g h U H Y [] Y g Z c f a U _] b [Z j Y a] b i h d f Y g Y b h U h c b g / U b X Z c f i a g Z c f X] g W g g] b [_ Y m e i Y g h c b g f Y [U f X] b [h Y g i V Y W W U g g Y g g a Y b h g " ð h Y Y U X i d h c U g g Y g g a Y b h g ž] [b] Z W b h h h c f] U h a Y k] V Y g d Y b h c b X Y j Y c d] b [W] h] W m] b Z c f a Y X Y g g U m g "

5ggYgga YbhHUg_g

5ggYgga YbhHUg_	K Y][\ h	8i Y'8UH	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
G\cfh9ggUm	&\$!	&*#\$*#&\$&\$%\$%) \$'DA	&ž ž(
Di V]W7ca a i b]W]h]cb	' \$!	Bch5dd]WUVY	&ž ž(ž)
F YgYUfW 9ggUm) \$!	\$+#\$, #&\$&\$%\$%) \$'DA	%ž&ž ž(ž)

5ggYgga Ybh8YHJ]g

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GHUfhXUH.

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H\]g]g hY ZfghUgg][ba Ybh": YYXVUW_k] VY d f c j] X Y X j] U @ A G "

5XX]h]cbU'XYHJ]g.

9ggUm ðia UmbchVY ZfZYhWYX hc fYa Uf_ hUhcXUmž hY a YX]U]g hY _YmXf]j Yf Zc f h Y YW bca mžgcWYmžW hi fYždc]h]Wg" 7 f]h]W mX]gW gg C B 9 dc]h]W YW bca micZhY a YX]U UddfcUWX hc gh Xn]b[a YX]UžUbX \ck]h]YbUV Yg U ghfc b[Yf i bXYfg hU b X] b [c Z W c b h Y a d c f U f m g c W c ! Y W bca] W d c k Y f g h i W h f Y g " : c f Z f h Y f] b Z c f a U h c b c b h] g Z f g h U g g Y g g a Y b h U b X h Y j U f c i g d c] h] W Y W bca micZhY a YX]U UddfcUWX Ygž d Y U g Y f Y Z f h c A c c X Y "

Hi fb]h]b'gYH]b[. H\]g Ugg][ba Ybh]g]gi Va]h]X h f c i [\ Hi fb]h]b'UbX'gh XYbhg W]b'gY Y Hi fb]h]b'g]a] U f] m f Y d c f g "

5ggYgga Ybh& Di V]W7ca a i b]W]h]cb

GHUfhXUH. Bch5dd]WUVY

8YHJ]g.

H\]g']g' Ub']bX]j]Xi U' UggYgga Ybh' Mci 'k]' VY' hUg_YX' hc' XY']j Yf' Ub']bg][\hZ' žYb[U[]b[žUbX' WYUf'mUf[i YX
hU' ž' fY' UH]b['hc' U' dUf]W' Uf' hcd]WUUbX' cZUb' , !a]bi hY' Xi fU]cbžXi f]b['h' hc f]U' h]a Y' Ug' U' cWU]hX' Vmimci f
h' hc f'": YYXVUW_ 'k]' VY' d'fcj]XYX' j]U' @A G"

5XX]h]cbU' XYHJ]g.

D'YUgY'gYY' A ccX'Y' ž'f'Z' fhYf']bž'fa Uh]cb'cb' h']g' UggYgga Ybh'

5ggYgga Ybh' . F YgYUfW' '9ggUm

GHUfhXUH' . Bch5dd']WV'Y

8YHJ]g.

&ž\$\$\$'hc' (&ž) \$\$'k' cfXg" H\]g']g' h'Y' Z]bU' Ugg][ba Ybh' A U_Y' d'fcXi W]j Y' i gY' cZ' h'Y' a UH'f]U'g' UbX' hcd]W]ž'fca
h'Y' W'ci fgY' Ug' U'k' \c' Yž'hc' WYU]h] Y' m'fY'ZYW'hi dcb' UbX' UbU' mgY' GD97 = ⇒ YI Ua d'Yg#Y' Ya Ybh' cZ
W'cb' h'Ya dcfUf'mia YX]U' d'ck Yf' "5g' d'Uf'hc'Z' h']g' Ugg][ba Ybh' ž' mci 'UfY' f'Yei]fYX' hc' XYg][b' Ub' YZYW]j Y' UbX
j]UV'Y' fYgYUfW' 'hcd]W'ei Ygh]cb" Mci 'k]' \Uj Y' h'Y' c'dd'cf' h' b]m'hc' gYY' _' ZYXVUW_ 'cb' mci f' hcd]W'ei Ygh]cb']b
h'Y' h' hc f]U'g' VYž'fY' gi Va]gg]cb": YYXVUW_ 'cb' mci f' F YgYUfW' '9ggUmik]' VY' d'fcj]XYX' j]U' @A G"

5XX]h]cbU' XYHJ]g.

D'YUgY'gYY' A ccX'Y' ž'f'Z' fhYf']bž'fa Uh]cb'cb' h']g' UggYgga Ybh'

Hi fb]h]b' gYH]b[. H\]g' Ugg][ba Ybh]g' gi Va]hYX' h'fci [\ 'Hi fb]h]b' UbX' ghi XYbh'g' WU' b' gYY' Hi fb]h]b' g]a]Uf]m
fYd'cf'g"

5 HbXUbW F Yei]fYa Ybhg

Gh XYbhg UfY gfcfb[mYbWci fU[YX hc UHbX U WUggYg UbX fYj]Yk YWfi fY fYWcfX]b[g"

7 ci fgY GWYXi Y

[J Yk WUgg ha YhUVY](#)

Hja YhUVY

8 UHr	HmdY	7 cbhYbh
K YY_\$.&) A Um! &- A Um	Hcd]W	H\Y [cVU Vi g]bYgg cZa YX]U dck Yf -k \]W k Y UfY]bfcXi W X hc hY _YmWcbWdh U UddfcUWYg cZ hY Wci fgYz UbX VY []b hc Yi d c f Y h Y k Umj WcbhYa dcfUfma YX]U ffYtdfcXi W gcWc! YWcbca]Wdck Yf g h fi W h fYg"
	; fci d 5Wvj]m	-h hc f]U g k Y k] g W Y X i Y mci f d f Y g Y b h U h c b Z c f 5ggYgga YbhHk c"
K YY_&. ; >i bY ! %& >i bY	Hcd]W	H\Y DfcdU[UbXU A cXY Ug U dc]h]W YWcbca m UddfcUW hc ghi Xm]b[a YX]U 5 W h]W Yi d c f U h c b c Z \ c k B c U a 7 \ c a g _ m U b X 9 X k U f X < Y f a U b f g] b Z i Y b h U k c f _ c b a U g g a Y X] U W U b V Y W c b g] X Y f Y X] b h Y W c b h Y I h c Z b Y t k c f _ Y X z X] [] h U] b Z U g h f i W h f Y g " 5 f Y b Y t k c f _ Y X a Y X] U f a U b i Z U W h f] b [W c b g Y b f i] b h Y W c b h Y I h c Z k Y V & " \$ 3
K YY_ " . % >i bY ! %& >i bY	Hcd]W	

		<p>XYghUV]jgYX`Ya d`cma YbhUbX`hY`fjgY`cZWUgi U`jgYX UbX`WcbfUWwVUgYX`k cf_`" `b`h`jg`Wca dYh]j Y`UbX dfYWf]ci g`k cf_`ZcfWzX]gWci fgYg`cb hY`YbhYdfYbYi f]U`di fgi]hg`cZ]bX]j]Xi U`g`UfY df]nYX" < ck `Xc`bYhk cf_YX`]bZUgffi Ww fYg ffYldfcXi W`hY`Wca a cX]Z]WU]cb`UbX`dYfZcfa Uhj]m cZ]XYbh]mUbX`gY`Z]b`Ub`U[Y`a Uf_YX`VmFY`YbhYgg WcbYW]j]mB`K `UhUfY`hY`dfYggi fYgZXYa UbXgZ XYg]fYgZ`UbX`Ubl]Yh]Yg`h`Uh`Uj Y`fYgi `hXzZca`h`jg fYei]fYa Ybhfc`gY`ci fgY`j Yg3`</p>
	5ggYgga Ybh	5GG9GGA 9BH`H<F 99.`8i Y`: f]XUm+h`5i [i ghZ %%) \$da

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

5`fYgci fWg`k]`VY`a UXY`Uj U]UV`Y`j]U`A ccX`Y"

F YWca a YbXYX`F Ygci fWg

6cbi g`fYgYUfW`gi ddcfha Uhf]U`k]`VY`a UXY`Uj U]UV`Y`j]U`A ccX`Y"

7ci fgY`9j U`i Uh]cb`UbX`8Yj Y`cda Ybh

F Y[i `Uf`gh XYbhZYXVUW`_]g`YbWci fU[YX`j]U`U`ZYXVUW`_Zcfi a `cb`A ccX`Y`Z`UbX`hY`hUW`_]b[`hUa`k`j`
fY[i `Uf`mX]gW`gg`\ck`_gh XYbtg`UfY`YI dYf]YbW]b[`hY`gi V`YW`hUg`hY`hf]a YghYfi bZ`Xg`"

Gi Va]gg]cb 'cZ5ggYgga YbhiHUg_g

Hi fb]h]b 'Gi Va]gg]cb

Ʒmci 'YbWci bHYf'U'dfcV'Ya 'k \Yb'UH'Ya dh]b['hc'gi Va]hmc i f'Ugg][ba YbhiH'fci [\ 'Hi fb]h]bž'd'YUgY
HY'Yd\cbY'9I HYfbU'Gi ddcfhcb'-',) " ' ' %cf'Ya U] 'H'Ya 'cb'YI HYfbU'HY'fgi ddcfh4 i bgk "YXi "Ui "'Gi ddcfh
\ci fg'UfY', .\$\$Ua '—%\$.\$\$da 'cb'k YY_XUmg'UbX'-. \$\$Ua '—) .\$\$da 'cb'k YY_YbXg'fI *) 'XUmg'U'mYUfI" Ʒmci
UfY'i bUV'Y'hc'gi Va]hmc i f'Ugg][ba YbhiXi Y'hc'U'Zi 'hk]H'Hi fb]h]b'mci 'a UmUdd'm'Zcf'Ub'YI HYbg]cbž'Vi hmc i
a i ghfYHU]b'mci f'h]W_Yhbi a VYf'Z'ca '9I HYfbU'Gi ddcfhfU'cb['k]H'UbmcH'Yf'fY'Yj UbhXcW a YbHgE'hc
]bWi XY'Ug'Yj]XYbVW'hc'gi ddcfhmc i f'YI HYbg]cb'Udd'jW]h]cb" Ʒmci 'Ya U] '9I HYfbU'Gi ddcfhmc i 'k]
Ui 'ca UH]WU'm'fYW]j Y'U'h]W_Yhbi a VYfž'Vi h]Zmci 'HY'Yd\cbY'mci 'k]'b'YX'hc'gdYW]Z]WU'mUg_ 'Zcf'cbY"
Hi fb]h]b'U'gc'dfcj]XYg'i dXUH'g'cb'H'Y]f'gmgh'Ya 'ghU'hi g'cb'Hk]HYf"

; YbYfU'mž'UggYgga YbhiHUg_g'a i ghVY'gi Va]HYX'Y'YW'fcb]WU'mj]U'Y]H'Yf'Hi fb]h]b'cf'U'A ccX'Y
Ugg][ba YbH' 'b]bg]UbVW'g'k \YfY'H'lg]g'bc]hdccg]V'Yž]hk]'VY'ghU'HYX'cb'mci f'Wci fgY'g'A ccX'Y'g]HY'k]H
U'HYfbUH] Y'gi Va]gg]cb'XYHU]g"

: cf]bZ'fa UH]cb'cb'\ck 'hc'gi Va]hUgg][ba YbHg'cb]bY j]U'A ccX'Y. \h'hdg.#gh XYbH'i bgk "YXi "Ui #ck!
gi Va]hUgg][ba YbH'a ccX'Y

5 WUXYa]W< cbYgmiUbX`D`U[]Uf]ga

D`U[]Uf]ga `]g`i`g]b[`h`Y`k`c`f`X`g`c`f`]X`Y`U`g`c`Z`c`h`Y`f`g`i`U`b`X`d`f`Y`g`Y`b`h]b[`h`Y`a` `U`g`m`c`i`f`c`k`b`" `#`W`U`b`h`U`_`Y`a` `U`b`m`
Z`c`f`a`g`Z`Z`c`a` `X`Y`]V`Y`f`U`h`Y` `W`X`Y`U`h]b[`h`c` `U`W`W`Y`X`Y`b`h`U` `m`i`W`c`d`m]b[`Z`c`a` `U`g`c`i`f`W` `k`]h`c`i`h`U`W`_`b`c`k` `Y`X[`Y`a` `Y`b`h`

I`B`G`K` `[`f`c`i`d`g`d`U[]Uf]ga `]b`h`c` `h`Y` `Z`c` `c`k`]b[`W`U`h`Y`[`c`f]Y`g.

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wcdmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5Ww'dhUV'Y'I gY'cZ I BGK '⇒H'F Ygci fW'g'Dc`]Wm
- VY'Uk UfY'cZh'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dYW'X'cZYj Yfmcby`]b'h'Y'I BGK 'Wca a i b]m
- `cWJh'gYfj]Wg'UbX'j]bZcfa Uhcb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh'YgY'UfYUg'k]`VY'ZJa]]Uf'hc'mci ž'ch'Yfg'k]`VY'byk "; U]b]b['U'gc`X'i bXYfghUbx]b['cZU`h'Y fY'UH'X'UgdYW'g'cZ9@G9'k]`Y'd'mci 'a U_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\hhd.##ji V'YWf i \]XYg" \]VfUfm'i bgk "YXi "Ui #' \]gY#JVci h' \]gY](#)

5 WUXYa]W=Zcfa Uh]cb

: cf`YggYbh]U`ghi XYbh]bZcfa Uh]cb`fY`Uh]b[`tc.

- fYei Yg]Zcf`YI H`bg]cb/
-