



ARTS3664

? cfYUb`HfUbg`Uh]cb

HYfa`Cby`#`&\$&%

7ci fgY`Cj Yfj]Yk

GHJZZ7cbHJW`8YHU]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]UV]]m	@cW]h]cb	D\cbY
GYcb[!7\i`G\]b	g"g\]b4 i bgk "YXi "Ui	K YXbYgXUm%&!%/ : f]XUm%&da `cfVm Uddc]bha Ybh	cb`]bY`fA ccX`Y 7c``UVcfUHY/ A g`HYUa gŁ/ A 6&* &Ł	f\$&Ł- ' ,)!' + &(`fA g HYUa gŁ

GWcc``7cbHJW`bZcfa Uh]cb

GWcc``cZ<i a Ub]h]Yg`UbX`@Ub[i U[Yg

@cW]h]cb. GWcc``C Z]W]ŽA cfj Yb`6fck b`6i]X]b[Ž`@Yj Y``&ž&),

C dYb]b[`<ci fg. A cbXUm! : f]XUmž- Ua `!') da

D\cbY. Ž`*%&`- ' ,) `* , %

: U! . Ž`*%&`- ' ,) ; +\$)

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

7 ci fgY'8YHJ]`g

7 fYX]hDc]bHg '*`

Gi a a UfmicZ\hY'7 ci fgY

H\]g`Wci fgY`dfcj]XYg`U`dUfU!dfcZygg]cbU`Yj`Y`fUbg`U]cb`dfc[fUa`]b`? cfYUb`Zfca`U`fUg`!VUgYX`
UddfcUW`"H\Y`df]a`Ufma`YX]i`a`cZ]bgf]i`W]cb`]g`? cfYUb`UbX`9b[]g\`"H\Y`Wci fgY`]b]fcXi`VWg`fUbg`U]cb`
hYcf]Yg`UbX`dfUW]W]g`]b`? cfYUb`zYI`Ua`]bYg`hYVX]b]ei`Yg`Zcf`UbU`m]b[]UbX`fYbXYf]b[]hYI`hg`cZX]ZYfYbh`
g]m]Yg`UbX`Wca`d`YI`]m]z`UbX`UXXfYggYg`Wfcgg!]b[i`]gh]WUbX`Wfcgg!`W`hi`fU`dfcV`Ya`g`fY`Yj`Ub]h`
dfcZygg]cbU`fUbg`U]cb]z]bWi`X]b[]YI`]W]#`fUa`a`U]W]`dfcV`Ya`g`UbX`Yh\]W]`]a`d`]W]h]cbg`"H\Y`ZcW`g`cZ\hY`
Wci fgY`]g`hc`i`d[fUXY`mci`f`g_]`g`cZhfUbg`U]cb[]9b[]g\`]b]hc`? cfYUb`UbX`U]m]b[]Zci`bXU]cbg`Zcf`dfcZygg]cbU`
fUbg`U]cb`"Mci`k`]`VY`YI`d]cgYX`hc`U`fU]b[]Y`cZU]i`hYb]h]W]hYI`hg`UbX`U`j`Uf]YhmicZ]hcd]W]g`]bWi`X]b[]gcW]c!
W`hi`fU`zYXi`W]h]cbU`z]Wca`a`YfW]U`UbX`dc`]h]W]`hY`a`Yg`"

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

%`7`cbj`Yf]hWca`d`YI`k`]hY]b`gci`fW]`hYI`hg`]b`9b[]g\`]b]hc`? cfYUb`z]Wca`Ym]b[]XYHJ]YX`]b]z]fa`U]cb`
Zi`Yb]h]m]z`UW]W`fU]hY`m]z`UbX`Uddfcdf]U]hY`m]z`UbX`i`g]b[]U`g]m]Y`Uddfcdf]U]hY`hc`hY`Wca`b]hYI`h]UbX`hYI`h]m]dY`
&`5`f]h]W`U]hY`U`fU]b[]Y`cZ]hcd]W]g`]cb`dfcZygg]cbU`Yh\]W]g`]cf`gcW]c!`W`hi`fU`]g]gi`Yg`fY`U]h]b[]hc`fUbg`U]cb`
'`" `9I`d`U]b`fUbg`U]cb`a`Yh\cXg`UbX`hYVX]b]ei`Yg`UbX`]b[i`]gh]W]hYI`["]j`cW]Vi`Ufm]z`hY`fa`g]zYI`dfYgg]cbg]z`
Yh\]W]`UbX`gcW]c!`W`hi`fU`UgdYW]g`]cZdfcZygg]cbU`fUbg`U]cb`

HYUW]b[]G]hFU]hY[]Yg`

F U]h]cbU`Y.

H\]g`Wci fgY`]g`]bWi`XYX`hc`YbUV`Y`ghi`XYb]hg`hc`XYj`Y`cd`dUfU!dfcZygg]cbU`fUbg`U]cb`g_]`g`h`Uhk`]`
Yb\UbW]`mci`f`dfUW]W]`Ug`U`Wca`dY]hYb]h]fUbg`U]h]f`]b`? cfYUb`" `hYfZYW]g`U`d]cg]h]cb`h`Uhgh]`XYb]hg`dfUW]W]`
k`]h]b`hY`Z]Y`X`k`]`fYei`]fY`b]U]h]j`Y`cf`bYU]b]U]h]j`Y`Yj`Y`g`cZdfcZ]W]Yb]W]h]UbX`g_]`g`hc`YbUV`Y`cb[]c]b[]
XYj`Y`cda`Yb]h]b]j`Uf]ci`g`dfcZygg]cbU`UfYUg`]b]c`]b[]fUbg`U]cb`"

H\Y`hYUW]b[]k`]`VY`U`]`bYX`k`]h`hY`U]a`g]z`YUfb]b[]ci`hWca`Yg`UbX`UggYgga`Yb]h]Ug`g`cZ\h]g`Wci fgY`
XYgW]VYX`UVcj`Y`gc`Ug`hc`UW]Yj`Y`XYg]fYX`fYgi`hg`"H\Y`Ub[]i`U[]Y`cZ]bgf]i`W]cb`UbX`Wca`a`i`b]W]h]cb`]g`
a`U]b]m]?`cfYUb`"GdYU_]b[]z]fYUX]b[]UbX`k`f]h]b[]g_]`g`k`]`VY`]b]hY[]fU]hYX]z`k`]h`U`g]h]cb[]Ya`d\Ug]g]cb`fYUX]b[]
UbX`k`f]h]b[]g_]`g`h]fci`[]\`fUbg`U]cb`dfUW]W]g`"6`c`h`fUg`!VUgYX`UbX`[]fUa`a`Uf]fUbg`U]cb`UddfcUW]Yg`k`]`
VY`UXcd]hYX`"

HYUW]b[]G]hFU]hY[]Yg.

H\Y`Wci fgY`]bj`c`]Yg`YW]i`fYg`UbX`hi`hc]f]U`g`]b`hY`Z]W]!hc!]Z]W]`a`cXY`"@YW]i`fYg`UfY`k`\YfY`VUg]W]fUbg`U]cb`

5ggYgga Ybh

5ggYgga YbhHUg_g

5ggYgga YbhHUg_	K Y][\h	8i Y'8UHr	Gh XYbh@YUfb]b[Ci hWta Yg'5ggYggYX
J cWVi `Ufm6Ub_`	%)	& #\$(#&\$&%\$%\$\$'DA	&
<ca Yk cf_'5gg][ba Ybhg`	&)	K YX	

‰

5XX]h]cbU`XYHJ]`g.

D`YUgY`bchY`hUhY`bi a VYf`cZ\ca Yk cf_`Ugg][ba Ybtg`Ug`VYYb`UX↑ghYX`Zca`hYb`h`gYj`Yb": cf`a`cfY`]bZ`fa`Uh]cb`cb`hY`hfUbg`Uh]cb`\ca Yk cf_`d`YUgY`fYZf`h`A`ccX`Y`#@A`G"

Gi Va]gg]cb`bchYg. `9UWX`\ca Yk cf_`Ugg][ba Ybhia`i`ghVY`gi Va`]hYX`j`]U`A`ccX`Y`VmiH`Y`Xi`Y`XUH`Y"

Hi fb]h]b`gYH]b[.`H\]g`]g`bchU`Hi fb]h]b`Ugg][ba Ybh

5ggYgga`Ybh' .`HfUbg`Uh]cb`HYgHg

GHUfhXUH`Y. `%`#`\$`#&`\$&%`%&.`\$\$`DA

@Yb[`h. `Uddfcl`""`\$\$`k`cfXg`YUWX

8YHJ]`g.

Hk`c`hYgHg`cZW`"cbY`\ci`f`YUWX`fI`\$i` `YUWX`E`Xi`f]b[` `gdYW]ZYX`WUggYg`"9UWX`W`bg]gHg`cZhfUbg`Uh]cb`UbX`Yh`]Mg`W`ca`dcbYbtg`"K`f]hYb`W`ca`a`Ybtg`k`]"`VY`dfcj`]YX`"H\Y`gYW`bX`hYgh]g`hY`Z]bU`UggYgga`YbhZ`f`UH`bX`UbW`di`fdcgYg`"

5XX]h]cbU`XYHJ]`g.

9UWX`hYghW`bH]bg`%&`Yh`]Mg`ei`Ygh]cbgZ`gYyb`hYl`hg`UbX`i`bgYYb`hYl`hg`"

Gi Va]gg]cb`bchYg. `Mci`a`i`ghgi`Va`]hmi`f`hYgh`Ubgk`Yf`dUdYfg`j`]U`A`ccX`Y`VmiH`Y`gdYW]ZYX`XUH`Y`UbX`h]a`Y`"

Hi fb]h]b`gYH]b[.`H\]g`]g`bchU`Hi fb]h]b`Ugg][ba Ybh

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

⊕!\ci gY`gh XmdUW_`hc`VY`dfcj]XYX`Vmñ\Y`Wci fgY`Wcbj Ybcf`UbX`hYUW\]b[`ghUZZ`k` \]W`k`]`VY`Uj`U]`UV`Y`cb
@A G#A ccX`Y`"

F YWca a YbXYX`F Ygci fWg

6U_YfzA "f% - &L" ⊕`ch\Yf`k`cfXg.`U`Wci fgY`Vcc_`cb`hfUbg`U]cb`"@cbXcbžBM`F`ci`hYX[`Y`"8c`Yfi`dž7`"/`5`"

Gi Va]gg]cb`cZ5ggYgga YbhiHUg_g

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

Ʒmci`YbWci bHYf`U`dfcV`Ya`k` \Yb`UHYa` dh]b[`hc`gi`Va`]hmc`i`f`Ugg][`ba`YbhiHfci`[`\`Hi`fb]h]b`z`d`YUgY`
HY`Yd`cbY`9I`HYfbU`Gi`ddcfhcb`-`,`)`"``"``%cf`Ya`Uj`h`Ya`cb`YI`HYfbU`HY`hgi`ddcfh4`i`bgk`"YXi`"Ui`"Gi`ddcfh`
`ci`fg`UfY`,`.\$\$Ua`-`-%\$.\$\$da`cb`k`YY`XUmg`UbX`-`.\$\$Ua`-`).\$\$da`cb`k`YY`YbXg`f1`*)`XUmg`U`mY`Uf2`Ʒmci`
UfY`i`bUV`Y`hc`gi`Va`]hmc`i`f`Ugg][`ba`YbhiXi`Y`hc`U`ZU`ihk`]h`Hi`fb]h]b`mci`a`UmUdd`mZc`f`Ub`YI`HYbg]cb`z`Vi`hmc`i`
a`i`ghfYhU]b`mci`f`h]W`Yhbi`a`VYf`Zca`9I`HYfbU`Gi`ddcfhU`cb[`k`]h`Ubmc`h`Yf`fY`Yj`UbhXcW`a`Ybhtg`hc`
]bWi`XY`Ug`Yj`]XYbVW`hc`gi`ddcfhmc`i`f`YI`HYbg]cb`Udd`]W]h]cb`"Ʒmci`Ya`Uj`9I`HYfbU`Gi`ddcfhmc`i`k`j`
Ui`hca`UH]WU`mifYW]j`Y`U`h]W`Yhbi`a`VYf`z`Vi`h]Zmci`HY`Yd`cbY`mci`k`j`b`YYX`hc`gd`YW]Z]WU`mUg`Zc`f`cbY`
Hi`fb]h]b`U`gc`dfcj`]XYgi`dXUH`g`cb`h`Y]f`gmgh`Ya`ghU`h`g`cb`Hk`]HYf`"

;`YbYfU`mz`UggYgga`YbhiUg_g`a`i`ghVY`gi`Va`]hYX`Y`YWfcb]WU`mj`]U`Y]h`Yf`Hi`fb]h]b`cf`U`A`ccX`Y`
Ugg][`ba`Ybhi`h`]bghU`bVW`g`k` \YfY`h`g`]g`bchidcgg]V`Yz`]hk`j`VY`ghU`YX`cb`mci`f`Wci`fgY`g`A`ccX`Y`g]h`k`]h`
U`HYfbU]h]`Y`gi`Va`]gg]cb`XYhU]g`"

:`cf]bZcfa`Uh]cb`cb`\ck`hc`gi`Va`]hUgg][`ba`Ybhtg`cb]bY`j`]U`A`ccX`Y`.`h`hdg`#gh`XYbhi`bgk`"YXi`"Ui`Ack`!
gi`Va`]hUgg][`ba`Ybhta`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]]hYg'Ug'U'gh XYbhUhl BGK
-

5 WUXYa]WbZcfa Uh]cb

: cfYggYbh]U`gh XYbh]bZcfa Uh]cb`fY`Uh]b[`tc.

- fYei Yghg`Zcf`YI H`bg]cb/
- `UhY`gi Va]gg]cbg`[i]XY`]bYg/
- fYj]Yk `cZa Uf_g/
- I BGK `<YU`h`UbX`GUZY`mdc`]WYg/
- YI Ua]bUh]cb`dfcW`Xi fYg/
- gdYW]U`W`bg]XYfUH]cb`]b`hY`Yj Ybhcz]`bYgg`cf`a]gUXj Ybh fY/
- gh XYbhYei]mUbX`X]gUV`]m/
- UbX`c`hYf`YggYbh]U`UWUXYa]W]bZcfa Uh]cbz`gYY

[\ftdg.#k k k "Uftg"i bgk "YXi "Ui #W ffYbhgh XYbh\]UWUXYa \]W\]bZcfa Uh\]cb#dfchW`g`\[i \]XY`\]bYg#](#)

⇒ a U[Y`7 fYX]h

@ci fW. `F cmU`m]ZYY`]a U[Yg/
\ftdg.#k k k "]ghcW`d\chc"W`a #d\chc#g`_cfYU3d`fUgY1`_cfYU` gcfh]a cgtdcdi `UfQ

@YgW]dh]cb. `GYci `ZGci h`? cfYU`W]m]g_m]bY`b][\ft]a Y`g_m]bYQ

7F ⇒ CG

7F ⇒ CG`Dfcj]XYf`7cXY. `\$\$\$- , ;

5W_bck `YX[Ya Ybhcz]7ci b]fm

K Y`UW_bck `YX[Y`hY`6YXY[U`dYcd`Y`k` \c`UfY`hY`fUX]h]cbU``W`ghcX]Ubg`cZ`hY`UbXg`cb`k` \]W`I` BGK
? Ybg]b[hcb`W]a di g]g`cW]hYX"