



ARTS3991

5 fmg'UbX'GcWU'GWYbWg'7 UdghcbY

HYfa`CbY`#`&\$%

7ci fgY`Cj Yfj]Yk

`GHUZZ7cbhUWhi8YHU]`g`

`7cbj Ybcfg`

B Ua Y	9a U]`	5j U]`UV]`]m	@cWU]cb	D\cbY
DYHf`G`YnU_	d"g`YnU_4 i bgk "YXi "Ui	6mUddc]bħa Ybh	F cca ` ` %) ž A cfj Yb`6fck b	- ` ,) ! & (&&

GW\cc``7cbhUWhi`bZcfa U]cb

GW\cc``cZ<i a Ub]h]Yg`UbX`@Jb[i U[Yg

@cWU]cb. `GW\cc``C Z]WžA cfj Yb`6fck b`6i]X]b[ž`@Yj Y``&ž&),

CdYb]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]bmg *`

Gi a a UfmicZhY'7 ci fgY

H\Y'5ftg/`GcWU`GWYbWg'7UdgrcbY]g'U'a i`h!X]gWd]bUfmVei fgY`hUhdrcj`XYg'mci`k`h`Ub`cddcfh`b]m
rc`fYZYWhcb`mci`fX]gWd]bUfmigh`X]Yg'cj`Yf`hY`dfYj`ci`g`h`fY`Yj`Y`g`cZgh`Xm`b`d`UffW`Ufz`hY`Vei`fgY`k`j`
Vebg]XYf`WUgg]Vg`]b`hY`j]h`fU`fY`cZ`VYfU`YXi`W]hcb`rc`Ug`_`rc`k`U`hYI`h`bh`mci`f`gh`Xm`Ug`j]`YX`i`d`rc`hY`
j`Uf]ci`g`VebW`dhcbg`UbX`j]XYU`g`cZU`i`b]j`Yfg]mYXi`W]hcb`"Mci`Uj`Y`U`W`UbW`rc`h`]b`UVci`h`mci`f`ck`b`
X]gWd]bY`]b`Vebj`YfgU]hcb`k`]h`gh`XYbmg`Zca`c`hYf`X]gWd]bYgzk`\\j`XYj`Y`cd]b[`mci`f`ck`b`Uk`UfYbYgg`cZ`
hY`X]gWd]bUfm_bck`YX[`Y`UbX`i`bXYfghUbX]b[`mci`Uj`Y`UVei`]fYX"

H\Y`Vei`fgY`]g`U]a`YX`UhUgg]gh]b[`mci`k`]h`hY`fUbg]hcb`Zca`mci`f`W`ffYbhXY[`fY`rc`mci`f`fc`Y`]b`hY`k`cfX`
Ug`W]h`hYbg`]b`Ya`d`cma`Ybhc`f`Z`f`hYf`YXi`W]hcb`"

BchY.`H\Y`Vei`fgY`k`j`VY`a`UXY`Uj`U]UV`Y`Zcf`Gi`a`a`Yf`gYgg]cb`dfcj`X]b[`a`cfY`ZYI`j]`]mZcf`gh`XYbmg`
a`YY]b[`h`]g`fYei`]fYa`YbhcZhY]f`dfc[`fUa`#`U`cf`ghfYUa`":`cf`gh`XYbmg`Zcf`k`ca`gi`a`a`Yf`]g`bchmci`f`Ugh`
gYgg]cb`cZYbfc`a`Ybhc`mci`a`i`ghcVhU]b`Uddfcj`U`Zca`mci`f`a`U`cf`Vebj`Ybcf`rc`Ybfc`]b`hY`W]dgrcbY`
dfcj`j]YX`mci`Uj`Y`Vea`d`YhX`hY`bYW`ggUfmVei`fgYg`]b`mci`f`a`U`cf`ghfYUa`"9bfc`a`Ybh]b`hY`W]dgrcbY`
fYei`]fYg`ZUW`]mUddfcj`U`"D`YUgY`VebUWh`hY`[:UW`hmGh`XYbh7YbhfY`"](#)

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

%`5ftg`U`hY`Ub`i`bXYfghUbX]b[`cZ`hY`h`Yc`fY]W`UbX`a`Y`h`c`X`c`c[`]WU`df]bWd`Yg`cZ`hY`f`X]gWd]bY`
&"`8Ya`cbghfU`h`Vea`dfY`Ybg]cb`cZY`h`]WU`UbX`gcWU`fYgdcbg]V`]hYg`]b`hY`dfUW]W`cZ`hY`f`X]gWd]bY`
'`"5ftg`U`hY`hY`k`Um]g`]b`k`\\j`hY`f`X]gWd]bUfm]fU]b]b[`Vei`X`VY`i`gYX`]b`Z`f`hYf`gh`Xmcf`hY`k`cfX`
cZk`cf`
("7ftg]W`mYj`U`i`U`hY`UbX`fYZYWhcb`_YmUf[`i`a`Ybmg`UbX`XYVU`hYg`]b`hY`\\i`a`Ub]hYg`UbX`gcWU`
gWYbWg`"

HYUW]b[`GhfU]h[`]Yg`

H\Y'5ftg/`GcWU`GWYbWg'7UdgrcbY`dfcj`XYg`gh`XYbmg`k`]h`hY`cddcfh`b]mrc`fYZYWhcb`hY]f`
X]gWd]bUfmigh`X]Yg'cj`Yf`hY`dfYj`ci`g`h`fY`Yj`Y`g`cZgh`Xm`5g`k`Y`Ug`XYa`cbghfU]h[`hY]f`i`bXYfghUbX]b[`
cZ`hY`a`U`cf`hYc`fY]W`UbX`a`Y`h`c`X`c`c[`]WU`df]bWd`Yg`k`]h`]b`hY`f`X]gWd]bY`Z`gh`XYbmg`k`j`Vebg]XYf`hY`
Yh`]WU`UbX`gcWU`fYgdcbg]V`]hYg`UggcWU`hY`X`k`]h`hY`f`UfYU`cZgh`Xm`UbX`k`j`cc`_`rc`hY`Z`h`fY`rc`
i`bXYfghUbX`ck`hY]f`gh`X]Yg`Uj`Y`dfYdUfYX`hY`a`Zcf`U`WUfYf`cf`Z`f`hYf`gh`Xm`

H\Y`Vei`fgY`k`j`VY`gh`XYbhW`bhfYX`UbX`gYa`]bUf`Xf]j`Yb`"H\Y`a`U`cf`UggYgga`YbhUg`_k`j`VY`U`fYgYUfW`
YggUm`k`\\j`k`j`U`ck`gh`XYbmg`rc`XYa`cbghfU`h`hY]f`UW]Yj`Ya`YbhcZ`hY`";`fUXi`U`hY`5ftf]Vi`hYg`Zcf`hY]f`
UfYU`cZgh`Xm`5`ei`fbU`dcfZc`]c`k`j`VY`_Ydhi`h`fci`[`\\hY`Vei`fgY`k`\\j`k`j`U`ck`gh`XYbmg`rc`fYZYWhcb`
hY]f`YUfb]b[`cj`Yf`hY`h`fY`Yj`Y`g`cZ`hY`]f`a`U`cf`"

H\Y`Vei`fgY`k`j`]b]c]j`Y`gYa`]bUf]g]mY`]bh`fUW]j`Y`X]gW`gg]cb`VUgYX`cb`hY`]XYUg`UbX`gh]a`i`i`g`cZk`YY`_m`
fYUX]b[`g`"DUffW]dUbhg`k`j`VY`fYei`]fYX`rc`a`U`_Y`rk`c`dfYgYbU]hcbgZ`YUX]b[`X]gW`gg]cb`Vm[`]j`]b[`U`W]h]W`
UbU`mg]g`UbX`cj`Yf`]j`k`cZ`_Ym]XYUg`]b`hY`fYUX]b[`g`Ug`h`YgY`VYUf`cb`hY]f`ck`b`X]gWd]bY`UbX`j`]j`k`g`
7ftg]W`Z`UbU`m]h]W`h`]b`_b[`k`j`U`gc`VY`XYj`Y`cdYX`h`fci`[`\\Ub`YI`h`bXYX`Z`W]h]WU`UWXYa`]WYggUmcb`U`
rcd]Wrc`VY`W`cgYb`]b`Vebgi`fU]hcb`k`]h`hY`Y`W`i`fYf`"

5ggYgga Ybh

Gi [[YghYX`YggUmhcd]Wg`k]`VY`dfcj]XYX`cb`A ccXY"

5bmWt`bj Ybh`cbU`UWJXYa]WfYZfYbW]b[`gmghYa `]g`UWVY`dHUV`Y"

fYdcfg"

5ggYgga Ybh(. 'F YZYWnj Y'Ugg][ba Ybh

GhUfhXUHY. 'Bch5dd`]WVY

8YHU]`g.; \$\$`k cfXg" Gh XYbth`a i ghUfh]W `UHY`h`Y`k Umg`]b`k` \]Wk`h`Y]f`X]gW]d`]bUfmhfU]b]b[`Wti`X`VY`i`gYX
]b`Z` fh`Yf`gh`Xmcf`h`Y`k`cf`X`cZk`cf`_"

Hi`fb]h]b`gYH]b[.`H\]g`Ugg][ba Ybh]g`gi`Va`]hYX`h`fci`[\`Hi`fb]h]b`UbX`gh`XYbth`W]b`gY`Y`Hi`fb]h]b`g]a`]`Uf]m
fYdcfg"

5 hYbXUbW F Yei]fYa Ybhg

5 hYbXUbW cZ@YWi fYg#Hi hcf]U'g'ig'a UbXUhfmi]b'h]g'Wci fgY"i bYI W gYX'UVgYbW'Zca 'a cfY'h\Ub'&\$i cZ@YWi fYg#Hi hcf]U'g'k]'fYgi 'h]b'h\Y'Uk UfX'U'ZJ]'[fUXY"

h'YWi fYg'UbX'hi hcf]U'g'mci 'k]'UW]j Y'mYb[U[Y'k]h'WcfY'Wci fgY'WcbhYbhz'YbUV]b['mci 'hc'UhfU]b'7 @C '% UbX'7 @C '("

7 ci fgY'GWXYXi `Y

[J \]yk WUgg'ha YhUVY](#)

H]a YhUV`Y`

8 UhY	HmdY	7 cbhYbh
K YY_% '% : YVfi Ufm! '& : YVfi Ufm	GYa]bUf	C f][]bg'cZK YghYfb'GWYbW' / 'D\]'cgcd\m' ? "F "'DcddYfz'6UW_ 'hc'h\Y'DfYgcWUhf]Wg.'C f][]bg'cZ K YghYfb'gWYbW' / 'd\]'cgcd\m
K YY_ '&.'&) : YVfi Ufm! "' A UfW	GYa]bUf	8]ggYbh D`Uhc.'5dc`c[micZGcWUhf]g . . .
K YY_ ' . '('A UfW '! '%\$ A UfW	GYa]bUf	Di fdcgYg'cZ9Xi WUhf]cb %": "GWYZZYf.'F YZYW]cbg'cb'9Xi WUhf]cbU' F Y'Yj UbW' &"7 "D"'Gbck.'H\Y'Hk c'7i 'hi fYg . .
K YY_ '(. '%%A UfW '! '%+ A UfW	GYa]bUf	B Uhf]cbU`]ga žDfcdU[UbXUž'hXcWf]bUhf]cb %"; "C fk Y`. 'BchYg'cb'B Uhf]cbU`]ga &"5fi bX\Uhf]F cm'5 '[YVfU'cZ'hZ]b]hY'>i gh]W . .
K YY_) . '% 'A UfW '! '&(GYa]bUf	9j]XybW'ž>i gh]Z]WUhf]cbžF Uhf]cbU`'6Y`YZ

A UfVX		% "K "? "7`]Zc fX. H\Y`9H.]Wg`cZ6Y`JYZ &"K "">Ua Yg. H\Y`K]`hc`6Y`Jj Y .
K YY_*.) `A UfVX ! " % A UfVX	GYa]bUf	C f]YbHJ`]ga žHV]fX`K cf`X 9""GUEX. `C f]YbHJ`]ga DUc`c` : f]YfY. `DYXU[c[mcZH\Y`C ddfYggYX .
K YY_+. `%5df]`!`+`5df]`	GYa]bUf	H\Y`K YghYfb`7 Ubcb D""G`YnU_`GcW]c`c[mcZGW]YbW` / `9Xi WU]cb >c\b`GYUFY. H\Y`Ghcfa`C j Yf`h\Y`I b]j Yfg]hm
K YY_-. ; `5df]`!`%(`5df]`	GYa]bUf	F c`Y`cZI b]j Yfg]hm 7"" : YfbUbXYg. `K]X`A Ub`]b`h\Y`K]b[g B""7 \ca g_m`H\ci [\hg`cb`bH`Y`W` U`g`UbX`h\Y` GV\cc`g
K YY_-.)`5df]`!`&% 5df]`	GYa]bUf	: fYXXca`cZH\Y`DfYgg %"">"G" A]`. `C b`@]VYfmcZH\ci [\h/ `8]gW`gg]cb &"A Uf\U`Bi ggVUi a . ; YbXYf/ ; `cj YfbUbW`
K YY_%. `&&5df]`!`&, 5df]`	GYa]bUf	H\Y`XYU`cZU`I b]j Yfg]hm 7 UfX]bU`< YbfmBYk a Ub. H\Y`XYU`cZU`I b]j Yfg]hm . D`YUgY`BchY. H\Y`H\i fgXUm%(!%+`gYa]bUf`k]`bch hJ_Y`d`UW`Xi Y`hc`h\Y`5bnUW8 Umdi V`]W\c`]XUm`f`h \Ug`VYyb`fY!gYei YbW`X`Zc`f`K YY_`%%`cb`Hi YgXUm '`\$`5df]`%(!%+`]b`h\Y`fY[i`Uf`fcca`" .

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

7ci fgY`fYUX]b[g`k]`VY`Uj U]UV`Y`cb`]bY`]b`A ccX`Y"

F YWca a YbXYX`F Ygci fWg

BchiUj U]UV`Y

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

Gh XYbhZYXVUW`k]`VY`h`fci [\`h`Y`Ubcbmā ci g`cb`]bY`A m9I dYf]YbW`gmgf`a "

H\Y`dfYgYbhWci fgY`\Ug`VYYb`a cX]ZYX`hc`fYZYWh`Y`dZ``gh XYbhZYXVUW`fY[UfX]b[`fUb[Y`cZUi h`c`fg`hc`
]bWi XY`bchicb`mXYUX`k`\]h`a U`Yg`Zca`h`Y`K`Ygh`fb`7`Ubcb`

Gi Va]gg]cb`cZ5ggYgga YbhHUg_g

Gi Va]gg]cb`cZ5ggYgga YbhHUg_g

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

Ẓmci `YbWci bhYf`U`dfcV`Ya `k \Yb`U`H`Ya dh]b[`hc`gi Va]hmc i f`Ugg][ba YbhHfci [\`Hi fb]h]bžd`YUgY
H`Yd\cbY`9I H`fbU`Gi ddcfhcb`-` ,) `` `` ` %cf`Ya U]`H`Ya `cb`YI H`fbU`H`hgi 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`mYUfL` Ẓmci
UfY`i bUV`Y`hc`gi Va]hmc i f`Ugg][ba YbhXi Y`hc`U`ZU` `hk]H`Hi fb]h]b`mci `a UmiUdd`miZc`f`Ub`YI H`bg]cbžVi hmc i
a i ghfYH]b`mci f`h]W`Yhbi a VYf`Zca `9I H`fbU`Gi ddcfhfU`cb[`k]H`Ubmch`Yf`fY`Yj UbhXcW a YbHgE`hc
]bWi XY`Ug`Yj]XYbW`hc`gi ddcfhmci f`YI H`bg]cb`Udd`]W]h]cb" Ẓmci `Ya U]`9I H`fbU`Gi ddcfhmci `k]`

5 WUXYa]W<c bYghmiUbX`D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b[`hY`k cfXg`cf]XYUg`cZchYfg`UbX`dfYgYbh]b[`hYa `Ug`mci f`ck b" `hWUb`hU`Y`a Ubm
Zcfa gZ`Zca `XY`]VYfUHY`WXYU]b[`hc`UWV]XYbhU`mW`dm]b[`Zca `U`gci fW`k]h`ci hUW_bck`YX[Ya Ybh`

I BGK `[fci dg`d`U[]Uf]ga `]bhc`hY`Zc`ck]b[`WUHY`[cf]Yg.

7cdm]b[.`i g]b[`hY`gUa Y`cf`j Yfmg]a]Uf`k cfXg`hc`hY`cf][]bU`hYI hcf]XYU`k]h`ci hUW_bck`YX[]b[`hY`
gci fW`cf`i g]b[`ei chU]cb`a Uf_g" `H\]g`U`gc`Udd`]Yg`hc`]a U[YgZ`UfhUbX`XYg][b`dfc`YWgZ`Ug`k Y`Ug`
dfYgYbhU]cbg`k \YfY`gca YcbY`dfYgYbh]`UbchYf`g`]XYUg`cf`k cfXg`k]h`ci hWYX]h`

hUddfcdf]UHY`dUfUd`fUg]b[.`7`Ub[]b[`U`ZYk `k cfXg`UbX`d`fUgYg`k \]Y`a cghmiFYhU]b]b[`hY`cf][]bU`
ghfi W`i fY`UbX`#`f`dfc[fYgg]cb`cZ]XYUg`cZ`hY`cf][]bU`Z`UbX`]bZcfa U]cb`k]h`ci hUW_bck`YX[Ya Ybh`H\]g`U`gc`
Udd`]Yg`]b`dfYgYbhU]cbg`k \YfY`gca YcbY`dUfUd`fUgYg`UbchYf`g`]XYUg`cf`k cfXg`k]h`ci hWYX]hU`bX`hc`
d]YW]b[`hc[YhYf`ei chYg`UbX`dUfUd`fUgYg`]bhc`U`bYk `k \c`Yz`k]h`ci hUddfcdf]UHY`fYZYfYbW]b["

7c`i g]cb.`k cf_]b[`k]h`chYfg`Vi hdUgg]b[`cZ`hY`k cf_]Ug`U`dYfgcb`g`]bX]j]Xi U`k cf_]7c`i g]cb`U`gc`
]bWi XYg`dfcj]X]b[`mci f`k cf_]hc`UbchYf`gh`XYbhVYZc`fY`hY`Xi Y`XUHY`Zc`f`Zc`hY`di fdcgY`cZ`hY`a

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wc'dmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5W'W'dhUV'Y'I gY'cZ I BGK '⇒H'F'Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dY'W'X'cZYj Yfmcby`]b'h'Y'I BGK 'W'a a i b]m
- 'cW'W'h'gYfj]W'g'UbX']bZ'fa U]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k]''VY'ZJa]]Uf'hc'mci ž'c'h'Y'fg'k]''VY'bYk "'; U]b]b['U'gc`]X'i bXYfghUbx]b['cZU''h'Y fY'U'Y'X'UgdY'W'g'cZ9@-G9'k]''\Y'd'mci 'a U_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\h'hd.##gi V'Y'W'i \]X'Yg" \]VfUfm'i bgk "YXi "Ui #' \]gY#\]Vci h' \]gY](#)

5 WUXYa]W]bZcfa Uh]cb`

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

- fYei Yghg`ZcfYI hYbg]cb/
- `UhY`gi Va]gg]cbg`[i]XY`]bYg/
- fYj]Yk `cZa Uf_g/
- I B GK `<YU`h`UbX`GUZY`midc`]WYg/
- YI Ua]bUh]cb`dfcVWXi fYg/
- gdYW]U`Vc]bg]XYfUh]cb`]b`hY`Yj Ybhcz]`bYgg`cf`a]gUXj Ybh fY/
- ghi XYbhYei]hmUbX`X]gUV`]`]m/
- UbX`chYf`YggYbh]U`UWUXYa]W]bZcfa Uh]cbz`gYY

[\h\]dg.##k k k "Uf\]g"i bgk "YXi "Ui #W ffYbh\]ghi XYbh\]bZcfa Uh\]cb`dfc\]Vc`g!\[i \]XY`\]bYg#](#)

⇒ U[Y`7 fYX]h

CdYb`UWVWgg`Zca `A Yfcdc`]h]b`A i gYi a `cZ5f]z`BYk `Mcf_ž
`h]dg.##k k k "a Yha i gYi a "cf[#Uf]h`Vc`YW]cb#gYUfVX#(' *%\$)

7F ⇒ CG

7F ⇒ CG`Dfcj]XYf`7cXY.`\$\$\$- ;