

EDST5803

8Yj Y`cd]b['9ZYWj] Y'Dfc[fUa g'Zcf;]ZYX'Gh XYbhg

GYa YghYf'C bY`##`&\$%



GWXcc`cZ9XI Wjhjcb`##`I BGK ``5fhg`UbX`GcWJU`G`WYbW`g

7ci fgY`Cj Yfj JYk

`GHUZZ7cbhUWhi8YHU]`g`

`7cbj Ybcfg`

B Ua Y	9a U]`	5j U]UV]]m	@cWUhc b	D\cbY
DYHU`<Um	d"\Um# i bgk "YXi "Ui	6m5ddc]bta Ybh	>c\b'; ccXgY` %&\$	

GWXcc``7cbhUWhi`bZcfa Uh]cb

GWXcc``cZ9Xi WUhc b

5fng`UbX`GcWU`GWYbWg

@Yj Y`%ž>c\b'; ccXgY``6i]X]b[`fl &\$Ł

H. Ž*%f&Ł-' ,)`% ++

9. YXi WUhc b4 i bgk "YXi "Ui

K . YXi WUhc b"Ufngi bgk "YXi "Ui

5hYbXUbW`F Yei]fYa Ybhg

5XX]h]cbU`GWXcc``cZ9Xi WUhc b`UhYbXUbW`fYei]fYa Ybhg

h]g`YI dYWYX`h.UhUbmigh XYbhYbfc`YX`]b`Ub`98GH`Wci fgY`k]h`h`Y`GWXcc``cZ9Xi WUhc b`k]`a`U`_`Y`U`
Wc`a`a`]a`Ybhlc`h`Y]f`YUfb]b[`UbX`UhYbX`U`WUggYg`]b`Z`k`YfY`Wc`bh`bh]g`XY`]j`YfYX`]b`U`ZUW`!`h`!`ZUW`
a`cXY`YI`W`dh]b`W`fU]b`W`fW`a`ghUbW`g`k`YfY`UVgYbW`]g`Xi`Y`h`c`]`bYggža`]gUXj`Ybh`fY`cf`i`bZc`fYgYYb`
W`fW`a`ghUbW`g`VYmc`bX`h`Y`gh`XYbhg`Wc`b`f`c`"5`a`]b]a`i`a`UhYbXUbW`fYei`]fYa`YbhicZ`,`\$i`]g`fYei`]fYX`Zc`f`
YUW`Wc`i`fgY`"b`W`fU]b`W`fW`a`ghUbW`g`z`U`gh`XYbhia`Uma`]gg`i`d`h`c`&\$i`c`ZU`Wc`i`fgY`k`]h`ci`h`Zc`fa`U`
Udd`]WUhc b`UbX`i`d`h`c`"i`c`ZU`Wc`i`fgY`k`]h`Zc`fa`U`XcW`a`YbhUhc b`fgYbhj`]U`Ya`U]`h`c`Wc`i`fgY`Wc`bj`Ybc`f`Ł`
dfcj`]X]b[`U`h`Y`fYei`]fYa`Ybhg`XYHU]YX`VY`ck`UfY`a`Yh`G`h`XYbhg`bcha`YYh]b[`h`Y`UhYbXUbW`
fYei`]fYa`Ybhg`ci`h]bYX`UVcj`Y`k`]`VY`Uk`UfYX`Ub`i`bgUhgZUW`c`fm: `U]`fl` :`Ł`Zc`f`h`U`h`Wc`i`fgY`fY[`UfX`Ygg`c`Z`
h`Y]f`dYfZc`fa`UbW`]b`h`Y`UggYgga`YbhUg`_g`c`f`c`h`Y`f`fYei`]fYa`Ybhg`Zc`f`h`Y`Wc`i`fgY`"

7 ci fgY'8YHJ]`g

7 fYX]hDc]bHg`*`

Gi a a UfmicZ`hY'7 ci fgY

H\]g`Wci fgY`ZcW`gYg`cb`W`ffYbhFYgYUfW`cb`hY`Wca`dcbYbHg`cZUddfcdf]UH`dfc[fUa`XYj`Y`cda`YbhZcf
[]ZYX`UbX`hU`YbhYX`ghi`XYbHg`Dfc[fUa`a`cXY`g`W`ffYbhmi`gYX`]b`5i`ghfU`]U`UbX`]bHfYbUH]cbU`mk`]`VY
W]hW`mYj`U`i`UH`X`"Mci`k`]`VY`fYei`]fYX`hc`Wc`bXi`WibYXXg`UbU`mgYgZ`XYj`Y`cd`dfc[fUa`[`cU`g`UbX`XYg][`b
dfc[fUa`g`Uddfcdf]UH`Zcf[]ZYX`ghi`XYbHg`k`]h`]b`hY`UXa`]b]ghfUHj`Y`ghfi`W`fYg`UbX`YXi`WU]cb`gmghYa`g`cZ
hY]f`ghUH`cf`Wci`bfm`F`YgYUfW`cb`hY`YZZYW]j`YbYgg`cZYbf]W`Xa`Ybhz`UWW`YfUH]cb`UbX`j`Uf]ci`g`Zfa`g`cZ
UV`]mž`UWX`Yj`Ya`YbhUbX`]bHfYgh[fci`d]b[`k`]`VY`WcgY`mYI`Ua`]bYXZ`k`]h`dUfh]W`Uf`UHfYb]cb`hc`hY`YZZYW]g
cZ`hY`gY`ghfUH`[]Yg`cb`hY`ghi`XYbHg]fUW]XYa`]WUbX`gcW]U`XYj`Y`cda`Ybh`H\Y`bYXX`Zcf`Wci`bgY`]b[`UbX
a`Ybhc]b[`hc`VY`]bW`XYX`]b`dfc[fUa`g`Zcf[]ZYX`ghi`XYbHg`UbX`dfc[fUa`g`XYg][`bYX`hc`]bW`XY`a`]bcf]mž
h`]W`!YI`W`dh]cbU`UbX`i`bXYfUW]Yj`]b[`ghi`XYbHg`k`]`U`gc`VY`U`ZcW`g`

5 h`hY`Wc`bWi`g]cb`cZ`h`]g`Wci fgY`hY`ghi`XYbhk`]`VY`UV`Y`hc

- %` 7`f]h`ei`Y`hY`W`ffYbhYXi`WU]cbU`UbX`gcW]U`]ggi`Yg`UbX`UH]h`XYg`UZZYW]b[`hY`XYj`Y`cda`YbhicZ
gdYW]U`dfc[fUa`g`Zcf[]ZYX`ghi`XYbHg`]b`hY`5i`ghfU`]U`UbX`]bHfYbUH]cbU`Wc`bH]I`H`
- &` 8`]gW`gg`k`Umj`]b`k`]\]W`]bH`Y`W`U`m[]ZYX`ghi`XYbHg`X]ZZYf`Zca`U[`Y!`dY`Yfg`]b`Vc`h`hY]f`Wc[`b]h]`Y
UbX`gcW]cUZZYW]j`Y`XYj`Y`cda`Ybhz`UbX`hY`]a`d`]WU]cbg`cZ`h`]g`Zcf`UV`]m[fci`d]b[`UbX`UWW`YfUH]cb`
` 5`bU`mgY`hY`Uddfcdf]UH`bYgg`cZU`fUb[`Y`cZUV`]m[fci`d]b[`UbX`UWW`YfUH]`Y`dfc`WXi`fYg`Zcf[]ZYX
ghi`XYbHg`]b`hY]f`dUfh]W`Uf`gW]cc`Wc`bH]I`H`
- ("` 9`j`U`i`UH`hY`YZZYW]j`YbYgg`cZYXi`WU]c`ff]W`ffYbhg]W]cc`cf`↑`f]gX]W]cb`dc`]W]cb`hY`YXi`WU]cb`cZ
[]ZYX`UbX`hU`YbhYX`ghi`XYbHg`]b`hY`fa`g`cZ`ck`YZZYW]j`Y`U`d`Uh`Zca`]hdfcj`XYg`Zcf`dfc[fUa
XYj`Y`cda`Ybh`
-)` "A`U`_Y`dfc`ZYgg]cbU`XYW]g]cbgž`cb`hY`VUg]g`cZ`fYgYUfW`Z]bX]b[`gž`cb`hY`XYj`Y`cda`Ybhz`]b`YXi`WU]c`ff]g
gW]cc`gž`cZ`dfc[fUa`g`cZUV`]m[fci`d]b[`UbX`UWW`YfUH]cb`Zcf`UW]XYa`]W]m[]ZYX`ghi`XYbHg`

HYUW]b[`GhfUH] []Yg`

HYUW]b[`ghfUH] []Yg`h`hY`Wci fgY`]bW`XYg`U`j`Uf]YhmcZ`YUfb]b[`ghfUH] []Yg`h`UhZcW`g`cb`dfc]`X]b[`ZYI`]VY
UbX`dYfgcbU`YUfb]b[`h`fci [\`hY`i`gY`cZcb`]bY`Yggcbg`"H\Y`Wci fgY`Yb[U[`Yg`ghi`XYbHg`]b`YUfb]b[
h`fci [\`hY`i`gY`cZcb`]bY`YW`fYg`UbX`k`cf`g`cdg`dfYgYbhYX`VmU`j`Uf]YhmcZ`cW]`UbX`]bHfYbUH]cbU`YI`dYfh
YXi`WU]c`fg`]b`hY`Z]Y`cZ[]ZYX`YXi`WU]cb`"C`b`]bY`k`YY`_`mUW]j`]h]Yg`k`]`i`gY`U`fUb[`Y`cZ`HY`UW]b[`ghfUH] []Yg
hc`]bj`c`j`Y`ghi`XYbHg`]b`W]hW]z`WYUH]`Y`UbX`fYZYW]j`Y`h`]b_]b[`dfc`W]ggYg`"C`b`]bY`X]gW`gg]cb`Zcf`i`a`g`k`]`
U`ck`ghi`XYbHg`hc`W]U`Yb[`Y`UbX`fY`Z]bY`hY]f`]XYUg`k`]h`dY`Yfg`UbX`h`hc`fgž`UbX`hc`g`UfY`Zca`hY]f`dYfgcbU`
YI`dYf]YbW`"G`h`XYbHg`k`]`VY`YbWci`fU[`YX`hc`W]hW]mYj`U`i`UH`hY]f`W`ffYbhd]fUW]W]g`UbX`i`bXYfgh]bX]b[
cZ`dfc[fUa`a`]b[`Zcf[]ZYX`ghi`XYbHgž`UbX`hc`fYXYg][`b`dfUW]W]g`cb`hY`VUg]g`cZ`W`ffYbhFYgYUfW`"H\Y`gY`Z
X]fYW]X`fYUX]b[`dfc]`XYX`cb`]bY`k`]`Vfc`UXYb`ghi`XYbhi`bXYfgh]bX]b[`cZ`W`ffYbhFYgYUfW`UbX`dfUW]W]`]b
hY`UfYU`cZ`dfc[fUa`a`]b[`Zcf[]ZYX`ghi`XYbHg`"H\Y`dfYdUfUH]cb`cZ`k`f]hY`b`Ugg][`ba`YbHg`k`]`X`fUk`cb`ghi`XYbh
fYZYW]cb`cb`W`ffYbhd]fUW]W]Z`Ugg]ghk`]h`h`]b_]b[`Uvc`i`h`ck`hc`X]ggYa`]bUH`hY]f`YUfb]b[`]b`hY]f`k`cf`
Ybj`]f`cba`Ybhz`UbX`Wc`bg]XYf`k`Umj`hc`Yj`U`i`UH`UbX`Yb`UbW`W`ffYbhd]fUW]W]k`]h`]b`hY`WUggfcca`ž`UbX
UW]cgg]gW]cc`UbX`YXi`WU]cb`gmghYa`g`

F`UH]cbU`Y.`H\Y`Wc`bH]bhcZ`hY`Wci fgY`dfc]`]XYg`Ub`c`j`Yf`]Yk`cZ`hY`a`U`cf`]ggi`Yg`h`Uhia`UmVY`fY`Yj`Ubh`hc
YXi`WU]cbU`dfc[fUa`a`]b[`Zcf[]ZYX`UbX`hU`YbhYX`ghi`XYbHg`"C`b`]bY`YW`fYgž`k`cf`g`cdgž`UW]j`]h]Ygž`UbX
fYei`]fYX`fYUX]b[`g`YI`d`cfY`W`ffYbh`hY`cfm]UbX`dfUW]W]`cb`U`fUb[`Y`cZ`]ggi`Yg`]b`hY`[`fci`d]b[`UbX
UWW`YfUH]cb`cZ[]ZYX`UbX`hU`YbhYX`ghi`XYbHgž`U`ck`]b[`ghi`XYbHg`cZ`hY`Wci fgY`hc`YUfb`bYk`]bZ`fa`UH]cb`UbX

g_]`g""Gh XYbh]XYUg`k]`VY`fYZ]bYX`hfc i [\ `cb`]bY`dcghX]gW gg]cbg`UbX`YXi WU]cbU`UW]j]hYgžk \]W`k]`
Ugg]ghgh XYbhg`hc`VYW`a Y`a cfY`h.cfc i [\ `mZJa]]]Uf`k]h`dfUW]VW`g`k \]W`UfY`g\ck b`hc`VY`YZYW]j Y`]b
dfc [fUa a]b[`Zcf`[]ZHX`UbX`hUYbhYX`gh XYbhg"

H\YgY`UW]j]hYgž`UbX`hY`hk c`UggYgga Ybhgžk]`U`gc`Yb\UbW`gh XYbhg`UV]]]mihc`UggYgž`U`hYf`UbX`UXUdh
dfc [fUa a]b[`cdh]cbg`hUhUfY`W ffYbhmi gYX`]b`cfXYf`hc`fYZYW]hYgYUfW!VUgYX`dfUW]W`UbX`W`bhYI hi U`
bYYXg"

5ggYgga Ybh

Q-YfY'mci 'WUbi'ci h]bY'UbmiFY'Yj Ubh]bZcfa Uh]cb'hUhk Ug'ibch]bWl XYX'jb'5 #A G'Vi ha Umidfcj Y'\Y'dZ'`Zcf mci f'gh XYbhg": cfYI Ua d'Yžmci 'a][\hdfcj]XY'XYHJ]g'cb'hY'fYZfYbW]b['gmghYa ž'"]b_g'hc'dfYj]ci g gh XYbhYI Ya d'Ufg'cf'hY'XYg][bUH'X'k YY_]b'hY'Wci fgY'hUhmc i 'k]'X]gW gg'hY'UggYgga YbhUh'Yb[h" #a dcfUbhimž'h]g'gYW]cb'j]g'Ub'UFYU'Zcf'mci 'hc'dfcj]XY'jbZcfa Uh]cb'hUhXcYg'ibch[c'h'fci [\ 'hY'Uddfcj YX [cj YfbUbW'ghfi W'h fY"Q

5ggYgga YbhHUg_g'

5ggYgga YbhHUg_g'	K Y][\h	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX	5 #HG@DfcZYgg]cbU'; fUXi UH HYUW]b['GHJbXUfXg'5ggYggYX	8i Y 8UH
Dfc[fUa Yj U'i Uh]cb'	(\$i	%ž&ž ž(b#J	&' #)\$' #& \$% \$) .\$\$ DA
Dfc[fUa 'dfcdcgU'	* \$i	&ž ž(ž)	b#J	\$(, #)\$) #& \$% \$) .\$\$ DA

D'YUgY'fYZf'hc'3gefδ[S` BdaWwe[a` S^E fS` VSdVe XadFWSUZWde'cb'hY'dfYj]ci g'dU[Y

5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% 'Dfc[fUa 'Yj U'i Uh]cb

H\YfY'UfY'rk c'dUfhg'rc'h\]g'Ugg][ba Ybh'DUfh5'DfYgYbHh]cb'UbX'DUfh6'DUdYf''5XX]h]cbU'']bZcfa Uh]cb'cb
A ccX'Y"

Hi fb]hb'gYh]b[. H\]g'jg'bchiU'Hi fb]hb'Ugg][ba Ybh

f`G][b]Z]W]b]h]m]U]Z]Y]W]h]m]i] f`d`Y`f`Z`c`f`a` U`b`W`]b`U`g`g`Y`g`g`U`V`Y`k` c`f`_`z`V`Y`]h`U`Z`c`f`a` U`Y`b`X`!`c`Z`g`Y`a` Y`g`h`f`Y`I` U`a`]b`U`h`c`b`z`U`
W`U`g`g`h`Y`g`h`z`U`U`V`c`f`U`h`c`f`m`h`Y`g`h`z`U`g`Y`a`]b`U`f`d`f`Y`g`Y`b`h`U`h`c`b`c`f`U`b`m`c`h`Y`f`Z`c`f`a` c`Z`U`g`g`Y`g`g`a` Y`b`h`

:`c`f`Z` f`h`Y`f`X`Y`h`U`]`g`]b`f`Y`U`h`c`b`h`c`G`d`Y`W`U`7`c`b`g`]`X`Y`f`U`h`c`b`]b`W`i` X`]b`[`K` \`Y`b`h`c`5`d`d`m`z`<`c`k`h`c`5`d`d`m`U`b`X`
"G`i`d`d`c`f`h`]b`[`8`c`W`a` Y`b`h`U`h`c`b`"d`Y`U`g`Y`f`Y`Z`f`h`c`h`Y`G`d`Y`W`U`7`c`b`g`]`X`Y`f`U`h`c`b`k`Y`V`g`h`Y`.

[\`h`d`g`#`g`h`X`Y`b`h`i`b`g`k`"Y`X`i`"U`i`#`g`d`Y`W`U`!`W`c`b`g`\]`X`Y`f`U`h`c`b`](#)

5 WUXYa]W<c bYghmUbX '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 gž Zca`XY`]VYfUh`WXYU]b['h`UW]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`Z`ck]b[`WU]h[cf]Yg.

7cdm]b[.`i g]b['hY`gUa`Y`cf`j Yfmg]a]Uf`k cfXg`h`hY`cf][]bU`hY`hcf`]XYU`k]h`ci hUW`bck`YX[]b['hY`
gci fW`cf`i g]b[`ei ch]hcb`a Uf`g`"H`]g`U`gc`Udd`]Yg`h`]a U[Ygž`Ufh`UbX`XYg][b`dfc`YWgž`Ug`k`Y`"Ug
dfYgYbh]hcbg`k` \Yf`gca`YcbY`dfYgYbh]`Ubc`hY`f`g`]XYUg`cf`k`cfXg`k`]h`ci hW]YX]h`

hUddfcdf]U]h`dUfUd`fUg]b[.`W`Ub[]b[`U`Z`k`k`cfXg`UbX`d`fUgYg`k` \]Y`a`cghm`fY]U]b]b['hY`cf][]bU`
g]h`i`W`fY`UbX`]bZcfa`U]hcb`k`]h`ci hUW`bck`YX[Ya`Ybh`"H`]g`U`gc`Udd`]Yg`]b`dfYgYbh]hcbg`k` \Yf`gca`YcbY`
dUfUd`fUgYg`Ubc`hY`f`g`]XYUg`cf`k`cfXg`k`]h`ci hW]YX]h`" `hU`gc`Udd`]Yg`h`d`]YW]b[`h`[Y`hY`f`ei`chYg`UbX`
dUfUd`fUgYg`]bhc`U`bYk`k` \c`Yž`k`]h`ci hYfZYfYbW]b[`UbX`U`gh`XYbh`g`ck`b`UbU`mg]g`h`Vf]b['hY`a`U]h`f]U`
h`[Y`hY`f`"

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_]h`Ubc`hY`f`gh`XYbhVYZc`fY`hY`Xi`Y`XU]h`ž`cf`Zc`f`hY`di`fdcgY`cZ`hYa`
d`U[]Uf]g]b[`Uh`Ubmi]h`a`Yž`dUm]b[`Ubc`hY`f`dYfgcb`h`dYfZc`fa`Ub`UW]XYa`]W]Ug`ž`gh`U`]b[`cf`UW`ei`]f]b[
Ubc`hY`f`dYfgcb`g`UW]XYa`]Wk`cf_]UbX`W`dm]b[`]ž`cZ]f]b[`h`W`ca`d`Y`h`Ubc`hY`f`dYfgcb`g`k`cf_]cf`gY]Y_]b[
dUma`YbhZc`f`W`ca`d`Y]h]b[`UW]XYa`]Wk`cf_]`

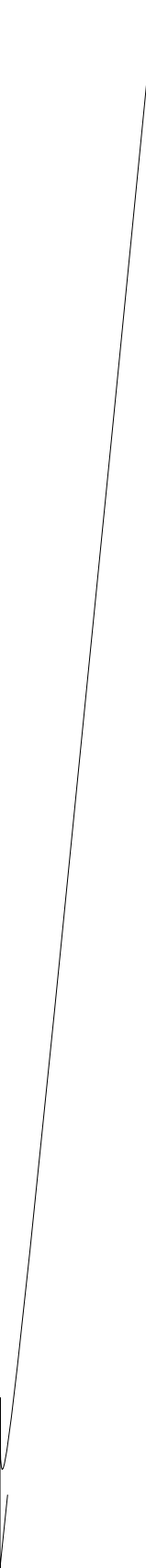
hUddfcdf]U]h`W]h]hcb.`7`]h]b[`gci`fW]g`k` \]W` \Uj`Y`bchVYYb`fYUXž`k`]h`ci hUW`bck`YX[]b['hY`"gYW`bXUfm`
gci`fW`Zca`k` \]W`_bck`YX[Y`cZ`hYa` \Ug`VYYb`cV]U]bYX"

8i`d`]W]hcb`ffgY`Zd`U[]Uf]ga` "E`gi`Va`]h]b[`mci`f`ck`b`k`cf_]ž]b`k` \c`Y`cf`]b`dUf]ž`k` \YfY`]h`Ug`dfYj`]ci`g`m`
VYYb`dfYdUfYX`cf`gi`Va`]hYX`Zc`f`Ubc`hY`f`UggYgga`Ybhcf`W`ei`fgY`U]h` BGK` `cf`Ubc`hY`f`i`b]j`Yfg]h`m`

7c`ffY`W]h`fY`ZY`fY`bW]b[`dfUW]W]g.

- DUFUd`fUg]b[žgi`a`a`Uf]g]b[žYggUmk`f]h]b[`UbX`h]a`Y`a`UbU[Ya`Ybh`
-

- VYhYf'a UbU[Y'mci f'hja Y
- i bXYfgHUbX'mci f'f][\hg'UbX'fYgdcbg]V]hYg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'W'dmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi WñUbX'5WwdfUV'Y'l gY'cZ
I BGK '⇒H'F Ygci fW'g'Dc`]Wñ



F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

BchiUj U]UVY

F YWca a YbXYX`F Ygci fWg

BchiUj U]UVY

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

⇒ U[Y`7 fYX]h

GmbYf[]Yg`]b`Gci bX`&\$%*`

7F ⇒ CG

7F ⇒ CG`Dfcj]XYf`7 cXY. '\$\$\$- , ;