



MECH9325

: i bXUa YbHJ`g`cZ5Wti gh]Wg/ `B c]gY

HYfa `Hk c`##`&\$&%

GWcc`cZA YWUbjWU`UbX`A Ubi ZUW`f]b[`9b[]bYYf]b[`..##`I BGK `9b[]bYYf]b[

7ci fgY`Cj Yfj]Yk

GHJZZ'7cbHJW`8YHU]`g

7cbj Ybcfg

B Ua Y	9a U]	5j U]'UV]'m	@cWU]cb	D\cbY
B]W`Y`?Ygg]ggc[`ci	b"_Ygg]ggc[`ci 4 i bkg "YXi "Ui	HYUa g	Fcca `(\$, ; ž @Yj Y` (ž 5]bkg cfl Vi]X]b[`>%+	

8Ya cbghfU]c fg

B Ua Y	9a U]	5j U]'UV]'m	@cWU]cb	D\cbY
7]U]'@]b	W]_U]"]b4 i bkg "YXi "Ui			
F ca Ub`?]g`Yf	f"_]g`Yf4 i bkg "YXi "Ui			
; m]b]G\Ub_Uf G\Ufa U	[m]b]g\Ub_Uf" g\Ufa U4 i bkg "YX i "Ui			
>YZFYmDYb[YZFYmDYb[4 i bkg "YXi "Ui			

GWXcc`7cbHJW`bZcfa U]h]cb

@cWU]cb

I BGK `A YWUb]WU`UbX`A Ubi ZUW` f]b[`9b[]bYYf]b[

5]bkg cfl `Vi]X]b[`>%+ž@Yj Y`%

5Vcj Y`7cZY`cb`7Ua di g

<ci fg

-.\$\$-).\$\$da žA cbXUm±: f]XUm†

†7`cgYX`cb`di V`]W\c`]XUmžGWXcc`gWYXi `YX`Yj Ybfg`UbX`I b]j Yfg]mG\i hXck b

K YV

GWX [Cc`Za`YX`Ub\]WU`UbX`A Ubi ZUW` f\]b\[`9b\[\]bYYf\]b\[](#)

[9b\[\]bYYf\]b\[`Gh XYbhGi ddcfhGYfj \]Wg](#)

[9b\[\]bYYf\]b\[`bXi gfl\]U`HfU\]b\]b\[](#)

[I BGK `Gh Xm5VfcUX`UbX`9I WU\]b\]Y](#)

fZ *%&L-' ,) ;) \$\$-Bi WYi g'Gh XYbh<i V

fZ *%&L-' ,) '+**%-9b[]bYYf]b['Xh ghf]U'HfU]b]b[

fZ *%&L-' ,) " %+--'l BGK 'Gh Xm5VfcUX'UbX'l BGK '9l WUb[Y'fZcf']bVci bX'gh XYbhgk

fZ *%&L-' ,) '(\$- +'-GWcc`C ZWYt

H\]g'Wci fgY'k]''dfcj]XY'Uk UfYbYgg'cZbc]gY'UbX']hg' [YbYfUHcb" H\]g'Wci fgY']g'U'gc]bhYbXYX'hc' []j Y'mci
hY'g_]`g'hc'a YYh'hY'bYYXg'cZhcY'Ya VUf_]b['cb'U'WUfYf']b'UWci gh'Wg" H\Y'`YWfi fY'a UHf]U'zh hc f]U'
YI YfW]gYg'UbX'U'j Uf]YhmcZUggYgga YbhUW]j]hYg'k]''VY' []j Yb" :bj]hX']bXi gHfmUWci gh'Wwcbgi 'hUbg'k]`
[]j Y' [i Ygh`YWfi fYg'hc'XYa cbghUfY' hY'fY'Yj UbW'cZUWci gh'Wg'UbX'bc]gY']b'U'fUb[Y'cZUdd']W]hcbg"

GhUfhXUHy. Bch5dd]WUVY

@Yb[h. F YZf'hc'h\Y\UbXci hZcf'YUWk 'UV"

8YhU]g.

fUe'@UV'%k]'Wca dUFY'X]ZYfYbhXYgW]drcfg'Zcf'hja Y'j Ufm]b['bc]gY"@UV'&k]'WU'W'UH'h\Y'gci bX'dck Yf 'Yj Y'g'cZU'gci bX'gci fW'Zca 'gci bX'dfYggi fY'Yj Y'a YUgi fYa Ybhtg"

fV'e'H\YfY'UfY'tk c'UVg"

fW'e'H\Y'UVg'UfY'hc'VY'WcbXi WYX']bX]j]Xi U'm"

fX'e'5'a Uf_]b['fi Vf]Wk]'VY'dfcj]XYX'Zcf'YUWk 'UV"

fY'e'H\Y'XYUX']bY'Zcf'UVgc'i h'Z]']g'cbY'k YY_'UZf'f'h\Y'Xi Y'XUHy'Zcf'YUWk 'UV"

fZ'e'A Uf_g'Zcf'YUWk 'UV'k]'VY'fYh'fbYX'k]h]b'&k YY_g'cZ'h\Y'Xi Y'XUHy"

Hk c'UVg'k]'VY []j Yb]b'h]g'Wci fgY'"9UWk 'UV']g'k cftk '%\$i "'@UV'%]g'Xi Y'Hi YgXUm&->i bY') da "'@UV'&]g'Xi Y'Hi YgXUm&\$>i 'm) da "

Gi Va]gg]cb'bchYg. j]U'A ccXY

Hi fb]h]b'gYh]b[. H\]g'Ugg][ba Ybh]g'gi Va]hYX'h'fci [\ Hi fb]h]b'UbX'ghi XYbhtg'Xc'bchgYY'Hi fb]h]b'g]a]Uf]mifYdcftg"

5ggYgga Ybh' . 5gg][ba Ybh

GhUfhXUHy. Bch5dd]WUVY

8YhU]g.

fU'e'H\Y'Ugg][ba Ybh]g'h\Y'bi a Yf]WU'XYg][b'cZU'gcb]Wfmg]hU'bc]gY'VUff]Yf"

fV'e'H\Y'UggYgga Ybh\Ug'tk c'dUftg"'5'dfY'ja]bUfmdcghYf'k cftk ') i]g'Xi Y']b'k YY_+'H\Y'Z]bU'dcghYf'k cftk '%) i]g'Xi Y'k YY_ '%\$"

fW'e'H\Y'Ugg][ba Ybh]g'Ub']bX]j]Xi U'UggYgga Ybh'

fX'e'5'a Uf_]b['fi Vf]Wk]'VY'dfcj]XYX'Zcf'h\Y'Ugg][ba Ybh'

fY'e'H\Y'XYUX']bY'Zcf'UVgc'i h'Z]']g'cbY'k YY_'UZf'f'h\Y'Xi Y'XUHy'Zcf'YUWk 'dUfhcZ'h\Y'Ugg][ba Ybh'

fZ'e'A Uf_g'Zcf'h\Y'Ugg][ba Ybhk]'VY'fYh'fbYX'k]h]b'%k YY_'cZ'h\Y'Xi Y'XUHy"

Gi Va]gg]cb'bchYg. j]U'A ccXY

Hi fb]h]b'gYh]b[. H\]g']g'bchU'Hi fb]h]b'Ugg][ba Ybh

5ggYgga Ybh(. :]bU`9I Ua]bUḥcb

@Yb[h.

F Ygci fWg

F YWta a YbXYX`F Ygci fWg

F YWta a YbXYX`hI hg`Zcf`h`jg`Wci fgYzk` \jW`UfY`Uj Uj`UV`Y`]b`h`Y`I` BGK` `Vcc_g\cd`Ug`k`Y``Ug`h`Y`I` BGK`
`]VfUfmz`UfY``]ghYX`VY`ck .

Ga`]h`z`6`">"z`DYH`fgz`F`">"`UbX`C`k`Yb`z`G`"5`Wci`gh`Wg`UbX`bc]gY`Wc`bfc`z`&bX`YX]h`cbz`5XX]gcb`K`Yg`Ym`
@cb[a`Ub`z`%`-`*`"

Bcfrcb`z`A`"D`"UbX`?`UfW`i`V`z`8`":`i`bX`Ua`Yb`fU`g`c`Z`bc]gY`UbX`j`]VfU]h`cb`Ub`U`mg]g`Zcf`Yb[]b`YY`fgz`&bX`9X]h`cbz`
7`Ua`Vf]X[Y`I` b]j`Yfg]m`D`f`Y`ggz`7`Ua`Vf]X[Y`z`&`\$`\$`" `

6]Yg`z`8`"5`"UbX`<`Ub`g`Yb`7`" "<"`9`b[]b`YY`f]b[`]B`c]gY`7`cb`f`c`:`H`Y`c`f`m`UbX`D`f`U`W`]W`z`'`f`X`9`X]h`cbz`9`/`:`B`G`d`c`b`z`
&`\$`\$`" `

I`g`Y`Z` ``]b`_`g`.

I`BGK` `@]VfUfmk`YVg]hY` . [\`h`d`g`.#`k`k`k`"``\]VfUfm`i`bgk`"YXi`"Ui`#`](#)

A`cc`X`Y` . [\`h`d`g`.#`a`cc`X`Y`"h`i`h`i`bgk`"YXi`"Ui`#`c\[\]b`#`b`X`Y`I`"d`d`](#)

HYUa`g`:

[\`h`d`g`.#`Y`Ua`g`"a`\]W`c`g`c`Z`W`c`a`#`#`Y`Ua`#`%`i` `U`\\$`+`%`&`Z`U`\\$`\\$`W`X`\(`Y`+`\\$`\)`Z`*`Z`W`Y`%`\\$`-`Z`/`\(``\\$`h`f`Y`U`X`"h`U`W`&`#`W`c`b`j`Y`f`g`U`h`
\]c`b`g`3\[f`c`i`d`-`X`1`\(` `+`Y`\(`Z`%`d`Y`+`\\$`Y`!`\(` `.-`!`-`-`V`%`\(``\\$`V`%`+`V`\(``Z`V`/`h`Y`b`U`b`h`X`1`'`Z`*`W`U`\(`I`Y`+`%`\)!`\(` `X`V`I`
V` `Y`%`\\$` `*`+`V`-`Z`Z`U`'`](#)

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

:`Y`Y`X`V`U`W`_`c`b`h`Y`W`c`i`fgY`]g`[`U`h`Y`f`Y`X`d`Y`f]c`X]W`U`mi`g]b[`]`U`f]c`i`g`a`Y`U`b`g`z`]b`W`i`X]b[`h`Y`I`BGK`
a`m`9`I`d`Y`f]Y`b`W`d`f`c`W`g`g`z`]b`Z`c`f`a`U`X]g`W`g`g]c`b`]b`W`U`g`g`z`U`b`X`U`h`h`Y`G`W`c`c``g`h`X`Y`b`h`g`h`U`Z`a`Y`Y`h`b[g`"M`c`i`f`
Z`Y`X`V`U`W`_`]g`h`U`_`Y`b`g`Y`f]c`i`g`m`7`c`b`h]b`i`U`]a`d`f`c]Y`a`Y`b`h`g`U`f`Y`a`U`X`Y`h`c`h`Y`W`c`i`fgY`V`U`g`Y`X`z`]b`d`U`f`h`z`c`b`m`c`i`f`
Z`Y`X`V`U`W`_`"

Gi Va]gg]cb'cZ5ggYgga YbhiHUg_g

5ggYgga Ybhgi Va]gg]cb'UbX'a Uf_]b['Wf]hYf]U

G\ci 'X'h\Y'Wci fgY'\Uj Y'Ubmbcb!Y'YVWfcb]WUggYgga Ybhgi Va]gg]cbž'h\YgY'g\ci 'X'\Uj Y'U'ghUbxUfX
GWkcc'Wcj Yf'g\YYH'

5`gi Va]gg]cbg'UfY'YI dYVWYX'hc'VY'bYUhiUbX'WYUfmgYhici H'Mci f'fYgi 'hg'UfY'h\Y'd]bbUWY'cZU`mci f'\UfX
k cf_'UbX'g\ci 'X'VY'hYUhiX'k]h'Xi Y'fYgdYVW'DfYgYbh]b['fYgi 'hg'WYUfm[]j Yg'h\Y'a Uf_Yf'h\Y'VYghWUbxW
cZi bXYfgUbx]b['mci f'a Yh\cX/Yj Yb']Zh\Y'bi a Yf]WU'fYgi 'hg'UfY']bVc'fYVW'

A Uf_]b['[i]XY']bYg'Zcf'Ugg][ba Ybhgi Va]gg]cbg'k]`VY'dfcj]XYX'Uhih\Y'gUa Y'h]a Y'Ug'Ugg][ba YbhXYH]g
hc'Ugg]ghk]h'a YH]b['UggYggUV'Y'fYei]fYa Ybhg" Gi Va]gg]cbg'k]`VY'a Uf_YX'UWVc'fX]b['hc'h\Y'a Uf_]b[
[i]XY']bYg'dfcj]XYX"

@UHY'dc`]Wm

K cf_gi Va]hYX'`UHY'k]h\ci hUb'Uddfcj YX'YI hYbg]cb'Vmih\Y'Wci fgY'Wc'fX]bUhc'f'c'XY'Y[UHYX'Ui h\cf]hm]g
gi VYVWih'U'UHY'dYbU'micZ&\$'dYfW'bhf&\$i 'E'cZh\Y'a U]]a i a 'a Uf_'dcgg]V'Y'Zcf'hUhiUggYgga Ybh]hYa ž
dYf'WU'YbXUf'XUm'

H\Y'`UHY'dYbU'mi]g'Udd'YX'dYf'WU'YbXUf'XUm]bWi X]b['k YY_YbXg'UbX'di V]W\c`]XUmgE'hUhih\Y
UggYgga Ybh]g'c] YfXi Y'"H\YfY'g]bc'dfc!fUHU'cZh\Y'`UHY'dYbU'miZcf'gi Va]gg]cbg'a UXY'dUfhk Umih\ci ['\U
XUm'

K cf_gi Va]hYX'UZfY'h\Y'XYUX']bY'Zcf'UVgc'i hY'ZU]']g'bchUWVW'dhYX'UbX'U'a Uf_'cZnYfc'k]`VY'Uk UfXYX
Zcf'hUhiUggYgga Ybh]hYa "

: cf'gca Y'UggYgga Ybh]hYa gžU'`UHY'dYbU'mia UmibchVY'Uddfcdf]UHY'"H\YgY'UfY'WYUfm]bX]WUHYX']b'h\Y
Wci fgY'ci h]bYž'UbX'gi W'UggYgga Ybhg'fYVW'j Y'U'a Uf_'cZnYfc']ZbchWca d'YhYX'Vmih\Y'gdYVW]ZYX'XUHY"
9I Ua d'Yg']bWi XY.

% K YY_'micb']bY'hYghg'cf'UVcfUhc'fmik cf_'k cffh'U'ga U`dfc'dcf]cb'cZh\Y'gi VYVWia Uf_žcf
&" C b']bY'ei]nnYg'k \YfY'Ubgk Yfg'UfY'fY'YUgYX'hc'gfi XYbhg'cb'Wca d'Yh]cbžcf
' " DfcZYgg]cbU'UggYgga YbhHUg_gžk \YfY'h\Y']bhYbh]cb]g'hc'WYUHY'Ub'Ui h\Ybh]WUggYgga Ybh'hU
\Ug'Ub'UVgc'i hY'gi Va]gg]cb'XUHYžcf
(" DUgg# U]'UggYgga YbhHUg_g"

9I Ua]bUH]cbg

UggYgga YbhdYfZcfa UbWžmci 'UfY'Y'[]V'Y'hc'Udd'mZcf'GdYWU'7 cbg]XYfUhc'b'df]cf'hc'gi Va]h]b['Ub
UggYgga Ybhcf'g]h]b['Ub'YI Ua "

I BGK 'bck '\Ug'U': [\]h\]c'G\]h#Gi Va \]hfi_Yžk \\]](#)W'a YUbg'hUh]Zmci 'UfY'a dhUb'YI Ua 'cf'gi Va]hU'd]YW'cZ
UggYgga Ybhž'mci 'UfY'XYWUf]b['mci fgY'Z]hYbci ['\ 'hc'Xc'gc'UbX'WUbbch'UfY'Udd'mZcf'GdYWU'
7 cbg]XYfUhc'b"

: cf'XYfU]g'cZUdd'm]b['Zcf'GdYWU'7 cbg]XYfUhc'b'UbX'W'cbX]h]cbg'Zcf'hY'Uk UfX'cZgi dd'Ya YbhUfm
UggYgga Ybhž'd'YUg'gY'Y'hY'jbZcfa Uhc]b'cb'I BGK 'g'[GdYWU'7 cbg\]XYfUhc'b'dU\]Y"](#)

D'YUgY'bc'hY'hUhghi XYbhg'k]'bchVY'fYei]fYX'hc'dfcj]XY'UbmXcW a YbhUfmYj]XYbW'hc
gi ddcfhiUVgYbW'g'Zca 'UbmWUggYg'a]ggYX'VYWU]i gY'cZ7CJ -8!%- 'di V']W\YU'h'a YUgi fYg'gi W'Ug
]gc'Uh]cb" I BGK 'k]'bchVY']bg]gh]b['cb'a YX]W'W'f]Z]W'hYg'Zca 'UbmcbY'XYa YX'hc'VY'U'dcg]h]Y'WUgYž
cf'k \Yb'hYm\Uj Y'fYV'j YfYX" 'Gi W'W'f]Z]W'hYg'UfY'X]Z]W'h'hc'cVh]b'UbX'di hUb'i bbYW'ggUfmgfU]b'cb
ghi XYbhg'UbX'a YX]W'ghUZZ'

5dd']W]h]cbg'Zcf'gdYWU'W'cbg]XYfUhc'b'k]'VY'fYei]fYX'Zcf'UggYgga YbhUbX'dUf]h]W'dUhc'b'UVgYbW'g'—
Vi hbc'XcW a YbhUfmYj]XYbW'Zcf'7CJ -8 %-]'bYgg'cf']gc'Uh]cb'k]'VY'fYei]fYX"

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

I BGK `Ug`Ub`cb[c]b[`Wca a]ha Ybhlc`ZcghYf]b[`U`W`hi fY`cZ`YUfb]b[`]bZcfa YX`VmiUWUXYa]W]bhY[f]m`5`
I BGK `gh`XYbhg`Uj`Y`U`fYgdcbg]V`]mhc`UX`YfY`hc`h`g`df]bW]d`Y`cZUWUXYa]W]bhY[f]m`D`U[]Uf]ga
i bXYfa]bYg`UWUXYa]W]bhY[f]m]UbX`]g`bchlc`YfUHX`Uhl`BGK`"B`SY[Sde_`SfG@E|`[e VWX` VW`Se ge[`Y`
fZWi`ad/e`ad[VWSe`aXafZW`S`V`bSee[`Y`fZW_`aXSe`kagdai`ž`

D`U[]Uf]ga`]g`U`hmdY`cZ]bhY`YW`i`U`h`YZh`#`hW]b`hU`_Y`a`UbmiZcfa`gž`Zca`XY`]VYfUHX`WX`YU]b[`hc`UWUXYbH`m`
W`dm]b[`Zca`U`gci`fW`k`]h`ci`hUW`bck`YX[`Ya`Ybh`I`BGK` `Ug`dfcXi`WX`U`k`YVg]h`k`]h`U`k`YU`h`cZ`
fYgci`fW`g`hc`gi`ddcfhgh`XYbhg`hc`i`bXYfgHbX`UbX`Uj`c]X`d`U[]Uf]ga`ž`]g]h`[gh`XYbh`i`bgk`"YXi`"Ui`#`d`U\[\]Uf\]ga`"](#)
H`Y`@YUfb]b[`7`YbhY`Ugg]gh`gh`XYbhg`k`]h`i`bXYfgHbX]b[`UWUXYa]W]bhY[f]m]UbX`ck`bchlc`d`U[]Uf]gY`
H`YmiU`gc`lc`X`k`cf_g`cdg`UbX`W]b`Y`d`gh`XYbhg`cbY!cb!cbY`"

Mci`UfY`U`gc`fYa`]bXYX`h`UhWfYZ`h`ja`Y`a`UbU[`Ya`Ybh]g`Ub`ja`dcfHbhdUfhcZgh`XmiUbX`cbY`cZ`h`Y`
]XYbh]Z`YX`W]i`gYg`cZ`d`U[]Uf]ga`]g`d`ccf`h`ja`Y`a`UbU[`Ya`Ybh`G`h`XYbhg`g`lci`X`U`ck`gi`Z`W]Ybh]ja`Y`Z`c`f`
fYgYUfW`ž`XfU]h]b[`UbX`h`Y`dfcdYf`fY`Z`fY`bW]b[`cZ`gci`fW`g`]b`dfY`dUf]b[`U`UggYgga`Ybh]Ug_g`"

ž`d`U[]Uf]ga`]g`Zci`bX`]b`mci`f`k`cf`_`k`Y`b`mci`UfY`]b`Z`fghmY`Ufž`mci`f`YW`h`fYf`k`]`c`Z`Y`f`mci`Ugg]ghU`bW`hc`
]a`dfcj`Y`mci`f`UWUXYa]Wg_]`g`"H`Y`mia`Um]Ug`_`mci`hc`cc`_`Uhgca`Y`cb`]bY`fYgci`fW`gž`U`h`Y`bX`h`Y`@YUfb]b[`
7`YbhY`ž`cf`gca`Y`h`ja`Yg`fYgi`Va`]h`mci`f`k`cf`_`k`]h`h`Y`dfcV`Ya`Z]`YX`"<ck`Yj`Yf`a`cfY`gYf]ci`g`]bgHUbW`g`]b`Z`fgh`
mY`Ufž`gi`W`Ug`gh`U`]b[`Ubch`Yf`gh`XYbhg`k`cf`_`cf`dUm]b[`gca`YcbY`hc`Xc`mci`f`k`cf`_`ž`a`UmVY`]bj`Ygh[`U`h`X`h`Ug_g`"

5 WUXYa]W=Zcfa Uh]cb

7 fYX]hdc]bhg

7 ci fgY`WYX]hg`W`W`UH`X`]b`I` b]hg!C Z 7 fYX]hfl C 7 E`H`Y`bcfa U`k cf`cUX`YI dYWUh]cb`Zf`cbY`I C 7

- [AccXY](#)
- [@UV5WYgg](#)
- [7ca di hb\[: UW\]hYg](#)
-

