



ARTS3660

5Xj UbWX? cFYUb'5

HYfa `C bY`#`&\$&%

7 ci fgY'8YHJ]`g

7 fYX]hDc]bHg`*`

Gi a a UfmicZ`h`Y'7 ci fgY

H\]g'7 ci fgY`dfcj]XYg`Ub`5Xj UbW`X`Yj Y`dfc[fUa`]b`? cfYUb`Ub[i U[Y`gh XmiZ`ca` U`W`a a i b]WU]j Y`UbX
hUg`!VUgYX`UddfcUW`"H\Y`df]a Ufma YX]i a`cZ]bghfi W]cb`]g`? cfYUb`"Gh`XYbHg`W`cb]bi Y`hc`XYj Y`cd`UbX
Yi hYbX`h`Y]fi bXYfghUbX]b[`UbX`i gY`cZ? cfYUb`a`cfd`c`c[m`z`Yi]g`UbX`gmb]U`i`h`fci [\`fYUX]b[`z`UbX
X]gW`gg]cb`]b`? cfYUb`z`cZUi`h`Yb]W? cfYUb`h`Yi`hg`Vmi`h`]g]b[`j`Uf]ci`g`fYUX]b[`ghfU]Y[]Yg`"D`Uf]W]d`U]cb`]b`U
j`Uf]YhmcZk`f]h]b[`z`gi`W`Ug`W`a`d`Yi`"Y`h`Yfgz`"h`fU]h`fY`fYgdcbgYg`z`b`c`h`Y`h`U`]b[`z`UbX`YggUm`k`f]h]b[`"
gmg]h`a`U]h`WdfUW]W`"cZgY`a`]b`Uf`d`fYgYb]h]cbg`]b`U`k`]XY`f`U`b[Y`cZ`W`a`a`i`b]WU]j`Y`g]h`U]h]cbg`gi`W`Ug
Vi`g]b`Ygg`UbX`]b`h`Yj`]Yk`"

Hcd]Wg`]bWi`XYg`]b]h`fdYfgcbU`fY`U]h]cbg`z`Yb]h`fU]ba`Yb]h]bXi`g]f`m`z`W`h`fU`"Y`f]hU[Y`UbX`Vi`g]b`Ygg`d`fUW]W`g"

7 ci fgY`@YUfb]b[`Ci`h`W`a`Yg

%`HfUbg`U]h`W`a`d`Yi`?`cfYUb`X]U`c[i`Yg`cf`d`UggU[Yg`]b`h`c`9`b[`]g\
&`GdYU`_`?`cfYUb`i`g]b[`W`a`d`Yi`g`Yb]h]bW`g`z`Uddfcdf]U]h`j`c`W]Vi`U`f`m`z`fY[]g]h`f`UbX`g]h`m`Yg`z`UbX`U
j`Uf]YhmcZgmb]cbma`g
" `F`YUX`W`a`d`Yi`h`Yi`hg`h`c`V]h]b`]b]Z`c`fa`U]h]cb`UbX`]XYUg`z`UbX`h`Yb`i`g`Y`h`Y`]b]Z`c`fa`U]h]cb`]b`U`j`Uf]YhmcZ
W`c`b]h`Y`hg
(`" `K`f]h`Z`c`fa`U`UbX`W`a`d`Yi`h`Yi`hg`h`c`XYgW]VY`UW]j`]h]Yg`z`Yj`Yb]h]UbX`h`cd]Wg`h`U]h]fY`U]h`h`c`h`Y`"Z`Y`UbX
k`c`f`_`c`Z?`cfYUb`g
)`" `9i`d`U]b`h`Y`?`cfYUb`W`h`fU`"Y[UW]h]Z`ca`]b]h]fb]h]cbU`d`YfgdYW]j`Yg

HYUW]b[`G]h`fU]h`[]Yg`

F`U]h]cbU`Y.

H\]g`W`ci`fgY`]g`]bWi`XYX`h`c`YbUV`Y`m`ci`h`c`XYj`Y`cd`UXj`UbW`X`W`a`a`i`b]WU]h]cb`g`_`]g`h`U]h]k`]`Yb`U`UbW`m`ci`f`
d`fUW]W`Ug`U`W`a`d`Yi`h`b]h]W`a`a`i`b]WU]h]cb`]b`?`cfYUb`"h`fYZYW]g`U`d`cg]h]cb`h`U]h]m`ci`f`d`fUW]W`k`]h]b`h`Y`Z]Y`X`
k`]`f`Y`ei`]fY`UXj`UbW`X`Yj`Y`g`c`Z`W`a`a`i`b]WU]h]cb`h`c`YbUV`Y`cb[c]b[`XYj`Y`c`da`Yb]h]b`j`Uf]ci`g`d`f`c`Z]g]cbU`
UfYUg"

H\Y`h`Y`UW]b[`k`]`VY`U`][bYX`k`]h`h`Y`U]a`g`z`Y`Ufb]b[`ci`h`W`a`Yg`UbX`UggYgga`Yb]h]Ug`_`g`c`Z`h]g`W`ci`fgY
XYgW]VYX`UVcj`Y`gc`Ug`h`c`UW]j`Yj`Y`XYg]fYX`fYgi`hg`"H\Y`Ub[i U[Y`cZ]bghfi W]cb`UbX`W`a`a`i`b]WU]h]cb`]g
?`cfYUb`gc`h`U]h]m`ci`W]b`XYj`Y`cd`m`ci`f`"gh]b]b[`UV`]h]Yg`"5`h`Y`Z`ci`f`Ub[i U[Y`g_]`g`f]gh]b]b[`z`gdYU_]b[`z`
fYUX]b[`UbX`k`f]h]b[`L`k`]`VY`]b]h]f`fU]h]X`h`fci`[\`ci`h`h]g`W`ci`fgY`UbX`V`c`h`W`a`a`i`b]WU]j`Y`UbX`[fUa`a`Uf]
h`Ubg`U]h]cb`UddfcUW`Yg`k`]`VY`UX`cd`h`Y`X"

HYUW]b[`G]h`fU]h`[]Yg.

H\Y`W`ci`fgY`]b]c]j`Yg`ZUW]h`c!ZUW`"YW]h`fYg`UbX`h`h`c]f]U`g`UbX`cb`]b]Y`cf`Ub[i U[Y`UV`Yi`YfW]gYg`"h`h`Y
Y`W]h`fYg`z`fUa`a`U]h]W`U`UbX`W`h`fU`h`cd]Wg`h`c`VY`W`c]j`YfYX`Xi`f]b[`h`Y`k`YY`_`k`]`VY`d`fYgYb]h]X`UbX`Yi`d`]WU]h]X`
h`h`Y`h`h`c]f]U`g`z`m`ci`k`]`VY`Ugg][bYX`W`a`d`Yi`h`Ug`_`]b`h`Y`Z`ci`f`Ub[i U[Y`g_]`"UfYUg`"H\YgY`h`Ug`_`k`]`
]bWi`XY`fYUX]b[`UbX`UbU`mg]b[`U`j`Uf]YhmcZ`h`Yi`hg`z`XY`]j`Yf]b[`c`fU`d`fYgYb]h]cbg`UV`ci`h`h`Y`h`cd]Wg`VY]b[
W`c]j`YfYX`]b`h`Y`k`YY`_`z]j`]Yk`]b[`UbX`X]gW`gg]b[`Z]a`g`UbX`c`h`Y`f]j`gi`U`a`U]h]f]U`g`UbX`k`f]h]b[`j`Uf]ci`g`h`m`d`Yg`c`Z`
h`Yi`hg`cb`?`cfYUb`h`cd]Wg`"G`ca`Y`fYUX]b[`UbX`k`f]h]b[`UW]j`]h]Yg`k`]`VY`g`Y`h`c`"Y`d`m`ci`X`c]b[`m`ci`f`YggUm

Ugg][ba Ybhcib' hcd]Wg' fY' UHYX' hc' U''b[i]gh]WUbX' gcV]c!W' h' fU''UgdYWhcZ? cfYU''H\Y' cb']bY' a' UHYf]U'g'k]''
dfcj]XY' mci' 'k]h' YI d']W]hj cWUvi 'Ufmž'gYbhYbVW' dUHY'fbg'UbX' c'h\Yf'k f]hYb'YI YfW]gYg'Zcf'k \]WX' mci' 'k]''VY
dfcj]YX']a' a' YX]UHY'ZYXVUW_"

H\Y' Wēi fgY' i' gYg' U'fUb[Y' cZHYUWX]b['ghfUHY[]Ygž']bWī X]b['hUg_]cf]YbhYX' UW]j]h]Yg']b' dU]fg' UbX']' fci dgž
UbX' WUgg' UbX' ga' U'' [fci d' X]gW' gg]cbg" ≠ h\]g' dfcW' ggž' mci' 'k]''VY' UV'Y' hc' Wēa' a' i' b]WUHY' Zcf']bZcfa' U]cbž
]XYUg' UbX' Uf[i' a' Ybhg' Vc'h' cfU''mUbX']b' k' f]h]b[" 'Mci' 'k]'' [Uh\Yf' UbX' cf[Ub]gY']bZcfa' U]cb' Zca' 'h\Y
hYI hVcc_ 'UbX' U'k]XY' fUb[Y' cZk f]hYb' a' UHYf]U'gž' U' X]c!j]gi' U' fBJ 8 ž J]XYcžYH\U' UbX' Y' YW'fcb]Wf]bhYfbYhž
YH\U' gci fW'g" H\]g' dfcW' gg'k]''U'gc' YbUV'Y' mci' 'hc' i' gY' H'fP' cfYUb' k' cfX' dfcW' ggc'fž? cfYUb' k' YV'']b_gžYH\U'
YZYW]j Y' mUg' U' a' YUbg' cZVēa' a' i' b]WU]cb' UbX' Ug' Ub' U]X' hc' 'Ub[i' U[Y' Y'Ufb]b['Ug' k' Y''Ug']bXYdYbXYbh
'YUfb]b["

5ggYgga Ybh

5ggYgga Ybh% J cWUvi `Ufmei]nnYg

K Y][\h &") i `YUWX `I ; `1&\$! `]b`hcU`"9UWX`ei]n`jg`VUgYX`cb`YUWX `I b]hcZ`hY`W`ei fgY`Vcc_`W`ej YfYX`]b`hY`dUfh]W`Uf`k`YY`_"

5ggYgga Ybh&. `Gdc_`Yb`hYgh

Dcgg]V`Y`h`cd]W`g`UbX`ei Ygh]cbg`k`j`VY`i`d`c`UXYX`cb`h`Y`I` b]j`Yfg]m]g`@`A`G`]b`K`_`%`"I`gi`U`m`Xci`V`Y`!`a`Uf`_`YX`" H`Y`a`U]b`↑`X`[]b[`W]hYf]U`]bW`i`XY. `W`ebY`b`h`Z`i`Y`b`W`m`#`U`W`W`f`U`W`m`UbX`d`f`Y`g`Y`b`h`U`h`c`b`g`_`]"`g`"

5ggYgga Ybh' . `K`f]hYb`hYghg

Hk`c`k`f]hYb`hYghg`"9UWX`hYghWUff]Yg`a`U`i`&\$!`" `H`Y`Z`c`f`a`U`h`c`Z`h`Y`h`Y`g`h`j`c`W`U`V`i` `U`f`m`W`c`a`d`Y`h`c`b`z`[`f`U`a`a`U`f`W`c`a`d`Y`h`c`b`z`g`l`c`f`h`U`b`g`k`Y`f`e`i`Y`g`h`c`b`g`U`b`X`U`Z`F`Y`k`f]h]b[`]"8YhU]`g`]bW`i`X]b[`]d`c`g`g]V`Y`Z`F`Y`k`f]h]b[`]h`c`d]W`g`U`f`Y`U`j`U]UV`Y`c`b`h`Y`I` b]j`Yfg]m]g`@`A`G`c`b`Y`k`YY`_`V`Y`Z`c`f`Y`Y`U`W`X`h`Y`g`h`"

5ggYgga Ybh(. `7`Ugg`W`c`a`d`c`g]h`c`b`g

:`ci`f`W`U`g`g`W`c`a`d`c`g]h`c`b`g`"9UWX`k`YY`_`h`Y`f`Y`k`j`V`Y`W`U`g`g`W`c`a`d`c`g]h`c`b`g`Y`g`g]c`b`z`U`b`X`Y`j`Y`f`m`k`c`k`YY`_`g`h`Y`W`c`a`d`c`g]h`c`b`g`k`j`V`Y`W`c`"Y`W`h`X`Z`c`f`a`U`f`_`]b[`]"7`c`a`d`c`g]h`c`b`h`c`d]W`g`U`f`Y`V`U`g`Y`X`c`b`h`Y`h`Y`a`Y`V`Y]b[`]W`c`j`Y`f`Y`X`]b`h`Y`d`U`f`h]W`U`f`k`YY`_`f`g`l`9UWX`W`c`a`d`c`g]h`c`b`W`U`f`f]Y`g`a`U`i`"*`&)" `H`Y`[`Y`b`Y`f`U`↑`X`[]b[`W]hYf]U`]bW`i`XY`g. `W`ebY`b`h`Z`i`Y`b`W`m`#`Z`i`Y`b`W`m`UbX`c`f]`[]bU`]m`"

5ggYgga YbhHUg_g

5ggYgga YbhHUg_	K Y][\h	8i Y`8UH`	Ghi XYbh@YUfb]b[Ci hW`c`a`Yg`5ggYggYX
J cWUvi `Ufmei]nnYg`	&\$!`	K`_`g`&`z`" `z`(`z`+`z`, `z`-`z`%\$`@`Y`W`h`f`Y`h`j`a`Y`U`h`%`\$`U`a`" `	'`z`(`
Gdc_`Yb`hYgh	%)`i`	%`*`#`\$`(`#`&`\$`&`%`\$`'`.\$`\$`D`A`	&`z`)
K`f]hYb`hYgh`	(`\$!`	H`Y`g`h`%`'`%`#`\$`'`#`&`\$`&`%`%`\$`.\$`\$`5`A`/`H`Y`g`h`&`.'`&`'`#`\$`(`#`&`\$`&`%`%`\$`.\$`\$`'`5`A`	%`z`" `z`(`
7`Ugg`7`c`a`d`c`g]h`c`b`	&)`i`	&`*`":`Y`V`/`%`&`'`A`U`f`W`X`/`&`'`5`d`f`]`/`%`*`5`d`f`]`H`i`h`c`f]U`h`j`a`Y`"!`)`da`	%`z`(`z`)

5ggYgga Ybh8YhU]`g

5ggYgga Ybh% J cWUvi `Ufmei]nnYg

GhUfhXUH`Y`.'`&`*`#`\$`&`#`/`%`\$`%`&`.\$`\$`'`5`A`

@Yb[`h`.'`I`'`%`\$`'`e`i`Y`g`h`c`b`g`

8YhU]`g`.

K YY_mihYb!a]bi hY'ei]nnYg'fK YY_g'&! - E'UXa]b]ghYfYX']b'WUgg" 'H\Y'ei]n'']ghk]''VY'dfcj]YX'UhH'Y
W'ca a YbW'a YbhcZH'Y W'ci fgY'cf'Uj U]'UV'Y'cb'h'Y'i b]j Yfg]mf' @A G" K f]hYb'a Uf_g'k]''VY'fYh' fbYX']b
WUgg"

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

K YY_mihYb!a]bi hY'j cWUVi `Ufmei]nnYg']b'WUgg" 'D`YUgY'bcH'Y' h'UhK YY_+` \Ug'k c'ei]nnYgZ'E i]n' (`UbX
E i]n') " : cf'a cfY']bZ'fa U]h]cbZ'd`YUgY'fYZ'f'hc' h'Y'W'ci fgY'gWXYXi `Y"

Gi Va]gg]cb'bcH'g. 'Mci `a i ghgi Va]hmc i f'ei]n#Ubgk Yf'dUdYfg'j]U'A ccX'Y'VmH'Y'gdYW]ZYX'h]a Y"

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

5ggYgga Ybh&. 'Gdc_Yb'HYgh

GHUfhXUH'Y. '%* #\$(#&\$&%\$' . \$ \$ DA

@Yb[h. '%l ') 'ei Ygh]cbg

8YHJ]`g.

5b']bX]j]Xi U`hU`_]b['gYgg]cb'k]h' h'Y'h'YUW']b['g]hZZ'Zcf'%\$'a]bi h'g'cb'dfY!UffUb[YX'h'cd]Wg" 'Gdc_Yb'UbX
k f]hYb'ZYXVUW_k]h'a Uf_g"

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

5b']bX]j]Xi U`hU`_]b['gYgg]cb'Zcf'%\$'a]bi h'g"

Gi Va]gg]cb'bcH'g. 'Mci `a i ghU'hYbX'h'Y']bX]j]Xi U`hU`_]b['gYgg]cb'cb'h'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

5ggYgga Ybh' . 'K f]hYb'HYgh

GHUfhXUH'Y. 'HYgh% '%- #' #&\$&%%'\$. '\$ \$ 5A /HYgh&. '&' #\$(#&\$&%%'\$. '\$ \$ 5A

@Yb[h. '&l ' ' \$'ei Ygh]cbg

8YHJ]`g.

<Y`X'hk]W'Zcf'cbY'\ci f'YUW'Xi f]b['gdYW]ZYX'WUggYg" '9UW'W'cbg]ghg'cZ[fUa a Uf'dU'hY'fb'hUg_gZ'fYUX]b[
UbX'k f]h]b['hUg_g'Ug'W'ca V]bYX'W'ca dcbYb'g'VUgYX'cb'k \Uh'g'W'c] YfYX']b'WUgg" 'h'Y[fUH'g'U`h'Y'i b]h
hU[[\hUbX'YUfbYX'i d'hc'h'Y'dUfh]W'Uf'dc]bhcZ'ghi Xm'K f]hYb'ZYXVUW_k]h'W'ca a Yb'g'UbX'a Uf_g" H\]g
]g'h'Y'Z]bU`UggYgga YbhZcf'U'hYbXUbW'`di fdcgYg"

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

Hk c'k f]hYb'h'Ygh" 'D`YUgY'bcH'Y' h'UhHYgh&'k]''VY'\Y'X'cb': f]XUm'&' fX'5df]']b'K YY_ '%\$"

	Hi hcf]U'	l b]h(!%HUG_g'%d&'gdYU_]b[ž'fYUX]b[/ 'k f]h]b[
K YY_-' : %& '5df]'! '%* 5df]`	@YWhi fY	? cfYUb`W`h`fY`&`fl`b]h(!(`L`J`cWUV`E`i`n`+'`cb`l`b]h` (!%`
	Hi hcf]U'	E / 5`gYgg]cb`cb`gdYU_]b[`ei`Ygh]cbg"``Gdc_Yb`hYgh`
K YY_`%\$.`%`'5df]'!`&` 5df]`	@YWhi fY	J`cWUV`E`i`n` ; `cb`l`b]h(!(`"``E`/`5`gYgg]cb"``K`f]hYb` hYgh&`fl`b]hg"``!%ž`!`ž`(!%ž`(!(`L`
	Hi hcf]U'	l b]h(!(`HUG_g'%d&'gdYU_]b[ž'fYUX]b[/ 'k f]h]b[/ 7`ca`dcg]h]cb`(`cb`l`b]h(!%hcd]Vg`frc`VY`Wc`Y`WY`X`L`

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

McbgY]? cfYUb`6cc_`(!%/5i h\cfg. `McbgY]I b]j Yfg]m? cfYUb`@Ub[i U[Y`#gh]h hY/Di V`]g\Yf. `McbgY]
I b]j Yfg]mDfYgg" `C b`bY`j Yfg]cb`Uj U]UV`Y`fgYUfW`cb`; cc[`YE`

F YWca a YbXYX`F Ygci fWg

=adMS` 9 dS`_ SdXd;` fWd Sf[a` S^>Wsd Wd/5i h\cfg. `a ž<cb[`UbX`7\Ub[/Di V`]g\Yf. `McbgY]
I b]j Yfg]mDfYgg"

G` VWefS` V[Y >\$ =adMS` >Wsd Wd7 ddae, 6 WeUd]bfa` t 7j b`S` Sf[a` S` V;_ b[USf[a` e/5i h\cfg. `G\]bžG!7/
Di V`]g\Yf. `Gchcb[`Di V`]g\]b[`7c`fGYci `E`5j U]UV`Y`Uhl BGK `6cc_g\cd

McbgY]? cfYUb`@Ub[i U[Y`#gh]h hY/[k k k "ng `\]"Wca](#)

?]b[`GY`cb[`#gh]h hY/[k k k "gY`cb\[\U XU\]b\["cf\]](#)

B U]cbU`#gh]h hY`cZhY`? cfYUb`@Ub[i U[Y. [k k k "?cfYUb\]"c" _f](#)

I BGK `@]VfUfm [k k k "\]"VfUfm"i bgk "YXi "Ui](#)

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

7ci fgYg`UFY`dYf]cX]W]m]fYj]Yk YX`UbX`gh XYbhg`ZrYXVUW`]g`i gYX`hc`]a dfcj Y`hYa`""; YYXVUW`]g
[U]hYfYX`Zca`gh XYbhg`i g]b[`a m]l dYf]YbW`" #]g`YbW`i fU[YX`gh XYbhg`Wca d`Yh`hY]f]gi fj Ymg`Vm
UW]gg]b[`hY`dYfgcbU]gYX`k YV`]b`_j]U`hY`A ccX`Y`W`i fgY`g]hY"

Gi Va]gg]cb 'cZ5ggYgga YbhiHUg_g

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

≠mci 'YbWci bHYf'U'dfcV'Ya 'k \Yb'UH'Ya dh]b['hc'gi Va]hirci f'Ugg][ba Ybhi'fci [\ 'Hi fb]h]bž'd'YUgY
HY'Yd\cbY'9I HYfbU'Gi ddcfhcb'- ' ,) " ' ' %cf'Ya U] 'h'Ya 'cb'YI HYfbU'HY'hgi ddcfh i bgk "YXi "Ui "'Gi ddcfh

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]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
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wcdmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi WñUbX'5WwdfUV'Y'I gY'cZ
I BGK '⇒H'F Ygci fW'g'Dc`]Wñ
-

5 WUXYa]W=Zcfa Uh]cb

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

- fYeI Ygh]Zc`f`YI h`bg]cb/
- `Uh`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/
-