

# **MDIA3008**

∍ggi YgʻUbXʻ7 f]g]gʻ7 ca a i b]WUh]cb

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

# 7ci fgY'Cj Yfj ]Yk

## GHJZZ7cbHJWh8YHJ]`g

### 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]hm	@cWUhjcb	D\cbY
DYhYf'FcVYfhg	d"^fcVYfhg4 i bgk "YXi "Ui	6mUddc]bha Ybh	K YVghYf" ‰	

#### Hi hcfg

B Ua Y	9a U]`	5j U]`UV]`]lm	@cWJhjcb	D\cbY
B]X]U'F UmU'A Ufh]bYn	b"fUmUa Ufh]bYn4 i bgk "YXi "Ui	6m'Uddc]bha Ybh		

## GWXcc`7cbHJWhi±bZcfa Uh]cb

GWXcc``cZhXY`5fhg`UbX`AYX]U

Fcca " %&ž@YjY`" žFcVYfhK YVghYf'6i]`X]b[ 'f) %(Ł

D\cbY.'f\$&Ł'-',)'(,)\*

9a U]` gUa 4 i bgk "YXi "Ui

K YVg]hY. k k k "Ufhg"i bgk "YXi "Ui #gUa

 $\label{thm:constraint} $$HY'GWKcc``cZhY'5ftg`UbX'AYX]U'kci`X``]_Y'tc'FYgdYWZI``m'5W_bck`YX[Y'thY'HfUX]t]cbU``7igtcX]UbgZhY'6YXY[U``fPYbg]b[tcb'WJadigŁZ'; UX][U``fP]thmUbX'5fth/ '8Yg][b'7UadigYgŁ'UbX'thY'B[ibbUkU`dYcd'Y'f5igtfU`]Ub'8YZYbWY': cfWY'5WJXYam']b'7UbVYffUŁ'cZhY'`UbXg'k\YfY'YUWK'WJadig'cZIBGK']g`cWJhYX''$ 

## 7ci fgY 8YHJ] g

### 7 fYX]hDc]bhg \* \*

## Gi a a UfmcZh\Y 7ci fgY

 $\label{eq:localization} $$H\g'Wi fgY'YI Ua ]bYg'hY']bhYfX]gW]d`]bUfm'UbX'fY`Uh]cbU``bUhi fY'cZ]ggi Yg'UbX'Wf]g]g'Wca a i b]WUh]cbZfca 'WcbW'dhi U``UbX'dfUWf]WU``dYfgdYWf]i Yg''$ 

#ggi Ygʻa UbU[Ya Ybh]gʻUʻa UbU[Yf]UʻʻdfcWrggʻh\UhUWrgʻhcʻdfcj]XYʻUʻfYgdcbgYʻghfUhY[mUbXʻYUfʻmk Ufb]b[hccʻʻZcfʻ]ggi Ygʻh\Uh'\Uj Yʻh\YʻdchYbhJUʻhcʻ]a dUWrcf[Ub]gUh]cbg"ʻH\Yʻgi WWrggZi ʻʻa UbU[Ya YbhcZ]ggi YgfYXi Wrgʻh\Yʻʻ]\_Y`]\ccXʻcZWf]g]g"ʻ7f]g]gʻa UbU[Ya Ybh]gʻh\YʻfY`UhYXʻdfcWrggʻ]bj cʻj ]b['h\YʻXYj Yʻcda YbhUbX Uddʻ]WUh]cbʻcZghfUhY[]YgʻU]a YXʻUh\Yʻd]b['Ubʻcf[Ub]gUh]cbʻgi WWrggZi ʻʻmXYUʻk]h\'Uʻgi XXYbʻUbXʻbY[Uh]j YyjYbh'

=ggi Yg'UbX'Wf]g]g'Wca a i b]WUh]cb'fYZYfg'hc'h\Y'DF!gdYW]ZWdfUWf]WYg'h\UhYa Yf[Y'Zfca 'h\YgY'dfcWYggYg"

H\fci [\'U'fUb[Y'cZWUgY'ghi X]Ygž'h\]g'Wti fgY'k]``YI d`cfY'\ck ']ggi Yg'UbX'Wf]g]g']a dUWii dcb cf[Ub]gUh]cbg'UWfcgg'h\Y'Vi g]bYggž'Wta a i b]mž'[cj Yfba Ybhž'UbX'bch'Zcf!dfcZ]hgYWfcfgž'UbX'k]``Yb[U[Y']b XYdh\'k]h\'h\Y'fc'Y'cZ]ggi Yg'UbX'Wf]g]g'a UbU[Ya Ybh'UbX'Wta a i b]WUh]cb']b'ghfUhY[]Wd`Ubb]b["

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

- %" 7 cb\\\dh U`]gY`h\Y`g][ b]Z\\\b\\`UbX`Z b\\\f\cbg`cZ]ggi Yg`UbX`\\f\g]g]g`\\callea a i b]\\\\f\cb']b`Ub cf[ Ub]gUh\cbU``gYh\]b[ "
- $\& ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaaib] \\ @ `Uh'U'WcbWfdhU``UbX'gHfUHY[]W'YjY```UbX''gHfUHY[]W'YjY'``UbX''gHfUHY[]W'YjY'``UbX''gHfUHY[]W'YjY'``UbX'''' \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaaib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaaib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaaib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaabib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaabib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaabib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g]g'Wcaabib] \\ & ``Dfcj]XY'XYHJ]`YX'UbU`mgYg'cZ]ggiYg'UbX'Wf]g'UbX'Wff]g'UbX'Wf$
- '" | bXYfgHJbX'h\Y'\_Ymdf]bW]d`Yg`VY\]bX'XYg][b]b['UbX'XYj Y`cd]b['U'Wf]g]g`Wcaaib]WJh]cb'd`Ub" ("H\]b\_'gHfUhY[]WJ``mUVcih'h\Y'fc`Y#g`cZj Uf]cig'diV`]Wg`UbX'gHJ\_Y\c`XYfg`]b']ggiYg#Mf]g]g
- ("H\]b\_'ghfUhY[]WU``mUVci hh\Y`fc`Y#g`cZj Uf]ci g`di V`]Wg`UbX`ghU\_Y\c`XYfg`]b`]ggi Yg#Mf]g]g Wca a i b]WUh]cb`WUgYg"
- ) " 5ggYggʻUbXʻYj U`i UhYʻh\Y`]a dUWicZh\Y`a YX]U`]b`]ggi YgʻUbX`Wf]g]gʻWca a i b]WUh]cb`]bʻUb`]b!XYdh\ ZJg\]cb"

# HYUW ]b[ 'GhfUhY[ ]Yg'

H\]g`]g`U``Yj Y``f\fYY`Wci fgY"`±iVi ]`Xg`cb`g\_]``g`XYj Y`cdYX`]b``Yj Y``%UbX`&`Wci fgYg"`±ik ]```U``ck `ghi XYbhg`hc XYj Y`cd`X]j YfgY`WcbWYdhi U``UbX`ghfUhY[]Wq\_]``g`]b`DF `UbX`dfcZYgq]cbU``dfUWfWY"

6ch\"YWhifyg'UbX'hihcf]U'g'k]```VY'cdYb'hc'X]U'c[iY'UbX'Wc``UVcfUh]cb'k]h\'h\Y'U]a 'cZYld'cf]b['WUgYghiX]Yg'UbX'aUhYf]U`']b'U'dfcXiWhjY'UbX'f][cfcig'ZUg\]cb"

H\]g`Wci fgY`]g`BCH`UVci hfchY``YUfb]b[žVi hfUh\Yf`]bj c`j Yg`UW]j Y`mfh]b\_]b[`UVci hUbX`Yb[U[]b[`k]h\`Ubi a VYf`cZWcbWdh U``ZfUa Yk cf\_gždfcZygg]cbU``g\_]``gžWUgY`gh X]YgžUbU`mh]WU``a UhYf]U`ž'UbX`ghfUhY[]W d`Ubg"`Gh XYbhg`UfY`YI dYWh'X`hc`hU\_Y`Wcbhfc``cZh\Y]f`ck b``YUfb]b[žfUh\Yf`h\Ub`dUgg]j Y`mYI dYWh]bZcfa Uh]cb`hc`VY`XY`]j YfYX`hc`h\Ya"

# 5ggYgga Ybh

# ]bXi glfm"

 $\label{thm:condition} \mbox{Mci "UfY"UXj ]} gy x \mbox{"hc"WlccgY"mci f"ei Ygh]} cb \mbox{"k ]} \mbox{h' WUfY \'z' Ug "h' YmdcgY" X]} \mbox{ZZY fYbh'Wk U"Yb [ Yg" \mbox{"Yb [ Yg" \mbox{"Yb$ 

#### 5 gi [[YghYX Zcfa Uh]g Ug Zc``ck g.

- +b rfc Xi Which. Y WugY ghi Xm UbX k \mig ]h rf Yj Ubh Zcf ]ggi Yg #W ]g]g Wcaai b] Wuhcfg 3' < ck UfY 'mci 'Uddfc UWX]b[ 'th. Y 'hcd] WB 'K \Uh]g 'mci f'a Yth.cXc `c[ m8 '8 c 'mci '\Uj Y 'cbY z cf 'th c 'Y ZZY Whj Y fYgY UfWX 'ei Ygh]cbg z cf \mdch YgYg 'tc 'Udd `m3' =g 'th.Y fY 'U 'gdY W]Z Wh. Y cfYh] WU `Zci b X Uh] cb 'gi WX 'Ug # H z G 7 7 H 'th. Uh mci 'k ] `i q Y 3</li>
- Cj Yfj ]Yk . 'K \Uh'UfY'h\Y'\_YmWcbhYl hg3'K \Uh'UfY'h\Y'a cgh']a dcfhUbhXYj Y`cda Ybhg3'K \]WX'UfY h\Y'\_YmUgdYWhg'cZh\Y']gqi Y#Mfq]g'UbX'k \m3
- 5bU'mg]g#FYWca a YbXUhjcbg. K \UhiUfY'h\Y'\_Yma ]ghU\_Yg'UbX#cf'\_Ymigi WWggYg'k ]h\'fY[UfXg'hc h\Y'Wca a i b]WUhjcbg'ghfUhY[m3'K \Uhik ci 'X'mci 'fYWca a YbX3'K \UhiUfY'mci f']bg][\hg3'< ck 'WUb mci 'gi ddcfhmci f'dc]bhgž'k ]h\'fY'Yj UbhZUWgž'XUhU'UbX#cf'h\YcfYhJWU'ZfUa Yk cf\_g3
- 7cbWi g]cb. K \UhUfY h\Y \_YmhU\_YUk Umg3

cfih\Y'7f]h]WU``5bU`mg]gžmci ik]```VY`fYei]fYX`hc`UX\\YfY`hc`dfcdYf`UWUXYa]WWcbj\Ybh]cbg"`Mci 'UfY\YIdYWMYX`hc`XfUk`cb`fY`Yj\UbhfYUX]b[g`UbX`Wci fgY`a\Uh\f]U`g"`I\gY`cZYI\h\fbU``fYUX]b[g`UbX`gci fW\g`Ug\gi dd`Ya\YbhUfma\Uh\f]U``k]```VY`cZVYb\Z]h"`

#### 5ggYgga Ybh7f]hYf]U'f7f]h]WU`5bU`mg]gŁ

- 5V]`]hmihc`XYj Y`cd`U`WYUf`miUf[i YXž'k Y``!fYgYUfWXYX`UbX`WcbWYdhi U``migc`]X`dYfgdYWfji Y`cb`mci f WUgY`ghi Xm
- 5V]]|mihc`g\ck`ghfcb[`i bXYfghUbX]b[`cZfY`Yj Ubhdf]bW]d`Yg`UbX`h\YcfYh]WU``ZfUa Yk cf\_g`VY\]bX ]ggi Yg#Wf]g]g`Wca a i b]WUh]cbg
- 5V]]|milrc dfci ]XY a YUb]b[ Z `'UbX'dfcdYf'mgi ddcfhYX'UbU'mg]g UbX#cf'fYWca a YbXUhcbg
- : `i YbhUbX'Wc\YfYbhk f]hYb'Yl dfYgg]cb
- 5 WW fully 'UbX'dfcdYf'midfYgYblYX'fYZYfYbWb['
- DfcZYgg]cbU`ij ]gi U`dfYgYblUljcb UbX Zcfa Ultjb[

±0 'hYfa g'cZ'h\Y'gYWcbX'cdh]cbžmci 'UfY'fYei ]fYX'hc'WfYUhY'U'Wca dfY\Ybg]j YžYZZYWf]j Yž'UbX'WYUf'm bUj ][ UV`Y'7f]g]g'7ca a i b]WUh]cb'D`Ub'Zcf'U'Wca dUbmcf'cf[ Ub]gUh]cb"'fMci 'UfY'UXj ]gYX'hc'WkccgY'U qa U`'!hc!a YX]i a 'YbhYfdf]qY"b'B'WSeWdWWdfa fZWSeeWee\_ W f UdfWdS TWai "

ł '9UW\ 'dU]f'g\ci `X'gi Va ]hCB9'7f]g]g'7ca a i b]\W\dhcb'D`Ub'hc'Hi fb]h]b"'H\Y'ch\Yf'gh XYbhg\ci `X'g]a d`m gi Va ]hCB@\/IU'\\ch' yf'dU[Yžk]h\ 'VUg]\W]bZcfa Uh]cb'gi W\ 'Ug'mci f'bUa Yžgh XYbh'bi a VYfž'UbX'h\Y'XYhU]`g cZmci f'dUffbYf"

5ggYgga Ybh7f]hYf]U'f7f]g]g'7ca a i b]WUh]cb'D`UbŁ


# FYgci fWyg

## DfYgWf]VYX F Ygci fWfg

- K YVg]hY'-F Ygci fWg'k]``VY'Uj U]`UV'Y'cb'h\Y'7ci fgY'A ccX'Y'k YVg]hY"
- Cb`]bY'hi hcf]U'g'!'| ]U'h\Y'6`UW\_VcUfX'7c``UVcfUhY'@A G"

### FYWca a YbXYX FYgci fW/g

#### : i fh\Yf'FYUX]b[

 $5 \cdot dUg \cdot Ub \cdot 7 \cdot Yh U \cdot z' \cdot \&\$\$ - z' \cdot 7 \cdot cfdcfUhY \cdot; \quad cj \cdot Yfb Ub WY \cdot ]b \cdot h \cdot Y \cdot 7 \cdot cbhY I \cdot h \cdot cZ 7 \cdot f]g Yg \cdot H c k \cdot Uf Xg \cdot U \cdot G H U_Y \cdot c \cdot XYf \cdot H \cdot Y cfm cZ 7 \cdot f]g ]g \cdot A \cdot Ub U[ Ya \cdot Yb H z' \cdot eagd \cdot S^a X 5 a \cdot f[ \cdot YW \cdot U[We \cdot 5 \cdot d[e[e?S \cdot SYW_W \cdot Fz' \cdot f]W_L' \cdot dd' \cdot , \quad - \cdot (-"$ 

7 cca VgžK "H"/ '< c``UXUnžG">" 'f9 Xg"\z &\$\$%ž F Z W: S` VTaa] a X5 d[e[e 5 a \_ \_ g` [USf[a` ž Y X]hY X 'V m'A U`XY b ž A 5. '6`UW\_k Y``

- ; U``ck Umž7"/ ?k UbUg\!5]Xccž? "ž&\$\$-žBgT{UDWSf[a`e;eegWeS`V5q[e[e?S`SYW\_WfZAY`VcifbY.H\cagcb`GcW]U``GW]YbWYDfYgg
- ; ]'d]bž8"F"/ 'A i fd\mž'D">"ž&\$\$, ž5d[e[e?S`SYW\_W`f[`S5a\_b'W] | ad'VžC|ZcfX.'C|ZcfX'| b]j Yfg]hm DfYgg
- ; f]Z]bž'5"ž'&\$\$- ž'@Wi E fcSfWY [We Xad D WbgfSf[a`? S`SYW\_ W f, 9 S[`[`Y 5 a` fca^aX;eegWel 5 q[eWe S`V 5 acbacSfWE aU[S^D Weba`e[T [ffkz'@cbXcb.'?c[Ub'DU[Y
- < YUh\žF "'/ 'DU`YbW\UfžA ">"ž'&\$\$, žE fdSfWY[U;eegWe? S` SYW\_ W f, A dYS` [eSf[a` e S` V BgT f[U Ba f[Uk 5 ZS^W YWel &bX`YX]h]cbž7 U`]Zcfb]Už'H\ci gUbX`C U\_g. 'GU[ Y
- < YUh\žF "@"/ 'C'< U]fž'< "8 "'f9 Xg"tž'&\$\$- ž': S` VTaa] aXD[e] S` V 5 q[e[e 5 a\_ \_ g` [USf[a` ž'B Yk 'Mcf\_. F ci hYX[ Y
- <ck UfXž7"z"%, (z";eegWe? S`SYW\_Wf, A qY[eaXfZWXgfgdWzGHJaZcfXz7H.=ggiY'5WMjcb'DiV]g\Yfg</pre>

>Uei Ygž'H"ž'&\$%( ž';eegWS` V 5 d[e[e? S` SYW\_ W f, 7j b ad` Y ;eegWel 5 d[eWel D[e] S` V DWbgfSf[a` ž'Gci h\ A Y`Vci fbYž'J ]Wcf]U. 'C I ZcfX'I b]j Yfg]miDfYgg

Hch\ž9"@"'f9X"\ž&\$\$+žFZW8gfgdWaX7j UW'\W UW[\ BgT'{\UDWSf[a\earror} eS\V5a\_g\] [USf[a\?S\SYW\_Wf, 5ZS'\WYWe \adfZ\W@\Wf9\W\\Sf[a\\\ZBY\K'\SYfq\m'\@\Wf\9f\V\Ui\a '5qgc\\U\\Yg

 $\label{eq:localized-continuous} $$ Mcib[\check{z}?\check{z}.\&\$\%\check{z}'9b\ubW]b[ Ya d`cmYY`Wcaaib]WUh]cb`VY\Uj]cfg`Zcf`gYbgYaU_]b[``UbX`gYbgY[]j]b[`]b Wf]g]g`g]hi Uh]cbg'\check{z}>cifbU``cZ7caaib]WUh]cb`AUbU[YaYbb\check{z}.\&\&\check{z}f(E'dd()\%-(+)"$ 

#### FYWca a YbXYX'Di V'lWUhcba

 $3e[S BSU[X]U BgT^{U}DWSf[a]e < agd S^{$ 

<agd  $S^aX4ge[`Wee 5a_g] [USf[a`$ 

<agd S^aX4ge[ Wee 7fZ[Ue

<agd S^aX5a`ff`YW U[We S`V 5 de[e? S`SYW\_W f</pre>

<agd  $S^aX5a_g \ [USf[a] ? S`SYW_W f$ 

<agd S^aXBgT (U D WSf[a`e D WeWSdJZ

BgT (UDWSf[a`eDWh[W

 $$$ + H^2g^2g^2U^2g^2d^2Ya YbHUfmfYUX]b[ fYgci fWYgZk \]WX a UmVY^Y^dZ^2]b[ Z fthYf^fYgYUfWX"^Mci UfYZ^cZWci fgYZYbWci fU[ YX^hc^a cj Y^VYmcbX^thYgY^gi [ [ YgthYX^thYl fg"] ]$ 

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

Mci f'ZYYXVUW\_'[ Uh\YfYX'Zfca 'h\Y'gi fj Ymg'Uhh\Y'YbX'cZh\Y'gYgg]cb'cZZYfg'j U`i UV`Y']bdi h''Mci f Yl dYf]YbW'g'UbX'gi [ [ Ygh]cbg'UfY']a dcfhUbhz'UbX'h\YfY']g'U`k Umg'fcca 'Zcf']a dfcj Ya Ybh']b'hYfa g'cZ WcbhYbh'UbX'hYUW\]b[ 'ghfUhY[ ]Yg'''

# Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g Hi fb]h]b Gi Va ]gg]cb

-Zmci 'YbWci bhYf'U'dfcV`Ya 'k \Yb'UhhYa dh]b[ 'hc'gi Va ]hmci f'Ugg][ ba Ybhh\fci [ \'Hi fb]h]bž'd`YUgY hY`Yd\cbY'9I hYfbU``Gi ddcfhcb'-',)'''' %cf'Ya U]`'h\Ya 'cb'YI hYfbU`hY`hgi ddcfh4 i bgk "YXi "Ui '"'Gi ddcfh

# 5 WUXYa ]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b[ 'h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b[ 'h\Ya `Ug`mci f`ck b"`±hWJb`hU\_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b[ 'hc`UWW]XYbhJ``mWcdm]b[ 'Zfca `U`gci fWY`k ]h\ci hUW\_bck `YX[ Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga ]bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

 $7 \text{ cdm}b[...i g]b[...h\Y.gUa Y.cf.j Yfmig]a] \Uf'k cfXg'hc'h\Y.cf][]bU''hYl h'cf']XYU'k]h\ci h'U\V_bck `YX[]b[...h\Y.cf][]bU''hYl h'cf']XYU'k]h'cf']$ 

# 5WUXYa]W±bZcfaUhjcb

: cf'YggYbhJU`ghi XYbh]bZcfa UhJcb'fY`UhJb['hc.

• fYei Yghg Zcf Yl hYbg]cb/