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Title: Self-assembled porphyrazine-nucleoside on DNA templates: highly fluorescent chromophore arrays and sizing forensic tandem repeat sequences

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! "#$"%&'%() *+,-$. "/[0]1%2 3$45%6 '%75##8/[091]%6 : * " . " *% ; +)) "$. /[041]%<3="%>'%?*535@$. "/A[0"1]%>$+3$" . :%B3="#C$/[041]% D+=5 .%B,+3EA[091]

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8) '9.&59:% F*5% G:#H",$:.% :G% 4*#:H:I*:#5% "##"8)% +)$.=% "% JK2% ,5HI3",$.=% "II#:"4*% 35"C)% ,:% ,*5% 4#5",$:.% :G%)+I#"H:354+3"#% "))5H93$5)/%L*5#5%,*5%:I,$4"3%I#:I5#,$5)%:G%,*5%:@5#"33%)8),5H%4".%95% G$.5M,+.5C%,:%"%3"#=5%5N,5.,'%(.%I"#,$4+3"#%I:#I*8#$.%C5#$@",$@5)%*"@5%)*:L.%,:%95%@5#)",$35%9+$3C$.=%93:4-)0%H:),38%4:@"35.,%4*5H$),#8%L")% +)5C%G:#%5H95CC$.=%,*5%+.$,)%$.,:%JK2%),#".C)'%B53GM"))5H938%:G% I:#I*8#$.%H:C$G$5C%.+435:)$C5)/%:.%,*5%:,*5#%*".C/%*")%.:,%955.% $.@5),$=",5C%")%"%)$HI3$G$5C%"II#:"4*'%P5%#5I:#,%:.%,*5%)8.,*5)$)%:G% "%H"=.5)$+HQ((R% ,5,#""E"%I:#I*$.5% Q!=F2SR% 4:+I35C% ,:% C5:N8M +#C.5/%".C%"##"8%G:#H",$:.%:.%JK2%,5HI3",5)%L*$4*%4:.,"$.%L533M C5G$.5C% :3$=:QC2R%)5=H5.,)%)*:L$.=%),#:.=% G3+:#5)45.45% 5.*".45H5.,%L*$4*%$)%)$=.$G$4".,3813"#=5#%,*".%L$,*%"%T.MI:#I*8#$.'% F*5%+)5% :G% ,*5% C55IM5+,54,$4%):3@5.,%=384*:3$.5%$)%5))5.,$"3% G:#%)+445))G+3%"))5H938%G:#H",$:.'%F*5%)8),5H%"33:L)%G:#%)E.=%:G%)*:#,% ,".C5H%#5I5",%H"#-5#)%L$,*%H+3,$I35%"C5.:)$.5)/%,*+)%,*5%4:.45I,% 4:+3C%95%"C"I,"935%,:%/"#$/%&'%G:#5.)$4%JK2%I#:G$3.=%L$,*%"%)+$,"935%)5,% :G%C$G5#5.,%4*#:H:I*:#5)%:.%"33%.+435:)$C5)'%

JK2% *")% 5H5#=5C% ,:% 95% "% H:),% @5#)",$35% ,5HI3",5% $.%)+I#"H:354+3"#% 4*5H$),#8% C+5% ,:%G:#H",$:.% :G% "% I#5C$4,"935%),#+4,+#5% $.% G:#H% :G% ,*5% 7MJK2% ,*#:+=*%)5U+5.45%)I54G4% #54:=.$,$:.%:G%,*5%4:HI35H5.,"#8%),#".C'%F*5%"@"$3"9$3$,8%:G%,"$3:#M H"C5%.+435:)$C5)%G:#%"+,:H",5C%):3C%)+II:#,%)8.,*5)$)%QBSBR%:G% JK2%*")%"33:L5C%,:%4#5",5%L533MC5G$.5C%.5L%G+.4,$:."3%H:354+35)/% ".C%I"#,$4+3"#38%,*5%G:#H",$:.%:G%H+3,$M4*#:H:I*:#5%"##"8)%4".%95% "4*$5@5C%$.%"%I#:=#"HH"935%H"..5#'0V%F*$)%4:.451,%$)%5))5.,$"3% G:#%,*5% G+.C"H5.,"3%+.C5#),".C$.=% :G%,*5% $.,5#I3"8% :G%,*5% 4*#:H:I*:#5)% L*5.% I3"45C% $.% "% I#5MC5,5#H$.5C% ,*#55M C$H5.)$:."3%"##".=5H5./%L*$4*%+)+"338%$)%$.%,*5%H"W:#%=#::@5%:G% ,*5%C:+935%),#".C5C%JK2%QC)JK2R'%F*5%H$.:#%=#::@5%*")%"3):% 955.%+)5C%,:%"##".=5%:I,$4"338%"4,$@5%)+9),$,+5.,)'0X%2%.+H95#%:G%

0"1% ! '%&'%() *+,-$."/%S#:G'%<'%>'%?*535@$."%
J5I"#,H5.,%:G%<#="$4%e*5H$),#8%
(@".:@:%B,",5%f.$@5#)$,8%:G%e*5H$),#8%".C%F54*.:3:=8%
B*5#5H5,5@%2@'%]/%6gWV[Y``%(@".:@:/%6+))$"%
DWH"$a%*5%5@$."h8".C5N'#+%

091% 2'%75##8/%S#:G'%D'%B,+3E%
B4*:3%:G%e*5H$),#8%i%(.),$,+,5%G:#%j$%5%B4$5.45)%
f.$@5#)$,8%:G%B:+,*"HI,:.%
;$=*G$53C/%B:+,*"HI,:.%B<V]%V7d/%f?%
DWH"$a%5),h):,:.'"4'+-%%
,,I)akkLLL')':+,"HI,:.'"4'+-k4*5H$),#8k"9:+,k),"G$k5),'I"=5I%%

041% J#'%6'%;+))"$./%S#:G'%>'%B$3$="#C$%
J$"H:.C%j$=*,%B:+#45/%;"#L533%B4$5.45%".C%(..:@",$:.%e"HI+)/% J$C4:,/%<N G:#C)*$#5%<mVV%`JD/%f?%

% B+II:#,$.=%$.G:#H",$:.%".C%,*5%<6e(J%C5.,$G$4",$:.%.+H95#)%G:#%,*5% "+,*:#)%:G%,*$)%"#,$435%4".%95%G:+.C%+.C5#a% *,,I)akkC:$':#=kV`'V``Xk".$5'NNNNN%

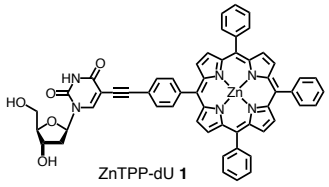
)+9),$,+5.,)%)+4*% ")% I8#5.5)/[0Y1]% I5#835.5)/[0Z1]% I:#I*8#$.)/[0X9/%[1]% H5,"3%4:HI35N5)/[0\1]%".C%.":I"#,$435)[0]1]%*"@5%955.%$.@5),$="5C'% F*5%G:#H",$:.%:G%*53$4"3%4*#:H:I*:#5%),"4-)%*")%#5@5"35C%,*",%),#:.=%5354,#:.$4%4:+I3$.=/%35"C$.=%,:%5GG$4$5.,%5.5#=8%,#".)G5#%)8),5H)/%4".%95%,+.5C%+)$.=%9:,*%,*5%."+#5%:G%,*5%)+9),$,+5.,%".C%,*5%+.C5#38$.=%JK2%)5U+5.45/%L*$4*%4:.,#:3)%,*5%C$),".45% 95,L55.%,*5%+.$,)%".C%35"C)%,:%G+.4,$:."3%:I,:5354,#:.$4%)8),5H)/% G:#%5N"HI35%G:#%3$=*,%*"#@5),$.=/%+IM4:.@5#)$:./% *89#$C$E",$:.% I#:95)/%:#%I*:,:M#5)I:.)$@5%)8),5H)'0^1]%(,%4".%,*5#5G:#5%95% 5NI54,5C%,*",%L5%L$33%)55%".%$.4#5")$.=%+)5%:.%JK2% H+3,$4*#:H:I*:#5%"##"8)%$.%9$:3:=8/% H5C4.5%".C%H",5#$"3)%)4$5.45'0–%

P*$35%,*:)5%)8),5H)%"#5%I5#G54,38%L533%)+$,5C%G:#%,*5%)8.,*5)$)%:G% C$@5#)5%"##"8)%C+5%,:%,*5%I#:=#"HH"9$3$,8%:G%,*5%)5U+5.45%$.% BSB/%,*5%.545))$,8%,:%I#5I"#5%"%C$H5,*:N8%,#$,83%QJ!FR%I#:,54,5C% I*:)I*:#"HC,5% 9+$3C$.=%93:4-%"3):%3H,)%,*5%"@"$3"9$3$,8%:G% G+.4,$:."3$,$5)%,:%)H5%5N,5.,%")%,*58%.55C%,:%95%4:HI",$935%L$,*% ,*5%4*5H$),#8%:G%BSB/%".C%$))+5)%L$,*%4:+I3$.=%5GG$4$5.48%".C% I+#G4",$:.%H"8%35"C%,:%3:L%8$53C)'%F*5%+)5%:G%)53GM"))5H938%:G% .+435:)$C5)%:.%JK2%,5HI3",5)/%:.%,*5%:,*5#%*".C/%$)%".%",,#"4,$@5% H5,*:C%,:%"))5H935%3:.=5#%"##"8)%$.%"%)$HI3G5C%"II#:"4*%")%$,% #53$5)%):3538%:.%,*5%#54:=.$,$:.%:G%,*5%4:HI35H5.,"#8%9")5%G#:H%"%)$.=35%),#".C5C%JK2%,5HI3",5'0V`%

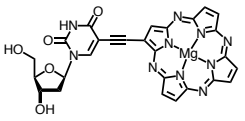
!".8%$.@5),$=",$:.)%#5I:#,5C%:.%,*5%$.,5#"4,$:.)%:G%L",5#%):3+935% I:#I*8#$.)%L$,*%)$.=35%".C%C:+935%),#".C5C%JK2/%".C%.:.M 4".:4$"3%JK2%),#+4,+#5)%)+4*%")%>MU+"C#+I35N5)/%35"C$.=%,:% 5$,*5#%$.,5#4"3",5C%:#%),"4-5C%"##"8)/%".C%,*5%3$,5#",+#5%I#:@$C5)% =+$C".45%:)5354,$@538%:9,"$.%:.5%:@5#%,*5%:,*5#%G:#H%:G%"##"8)'0VV1% F*5)5%"#5%.:,%,*5%G:4+)%I:$.,%:G%:+#%$.@5),$="$:.)%")%L5%)55-%,:% 4#5",5%"##"8)%:G%C5G$.5C%35.=,*/%),#+4,+#5%".C%4:HI:)$,$:./%L*$4*% #5U+$#5)%H"-$.=%+)5%:G%,*5%*8C#:=5.%9:.C$.=%I",,5#.%:G%,*5% .+435:9")5)'%(.%,*$)%#5)I54,/%()*)+%".C%4:L:#-5#)%*"@5%#5I:#,5C% "%C$"H$.:I+#$.5%G+.4,$:."3$)5C%I:#I*8#$./%L*$4*%$)%"935%,:% #54:=.$E5%",*8H$C$.5%9")5%,*#:+=*%4:HI35H5.,"#8%*8C#:=5.% 9:.C$.='0VX1%(.,5#5),$.=38/%*5#5%,*5%*53$4$,8%:G%,*5%G$."3%"##"8% C5I5.C5C%),#:.=38%:.%,*5%"..5"3$.=%#"%,5%$.%,*5%)8),5H%L*5#5%"% I:38QFR%),#".C%:G%@"#$"935%35.=,*%)5#8C%")%,5HI3",5a%)3:L%4::3$.=% 35C%I#5G5#5.,$"338%,:%#$=*,b*".C5C%*53$45)/%9+,%G"),%".."5"3$.=%="@5% 35G,b*".C5C%"##"8)'%

2.:,*5#%#53",5C%)8),5H%C5)4#$95C%98%,-./""!"O%5,%"3%$.4$+C5)% ."I*,*"35.5%".C%cM4:.W+="5C%:3$=:QIMI*5.835.5RM@$.835.5/[0VY1]% L*5#5%"*1;MC5I5.C5.,%)L$,4*%95,L55.%35G,b%".C%#$=*,b*".C5C% "))5H938%L")%:9)5#@5C'[0VZ1]%

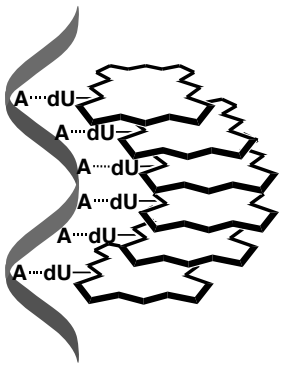
BH3"#38/%".$35%#5C%H:C$G$5C%.+435:)$C5%#5I:#,5C%98%*2)&0./3/% ".C%*4)0/"5"/-.%%)*:L5C%)53GM"))5H938%,:%G:#H%35G,b*".C5C% *53$4"338%,L$),5C%;M,8I5%Q"U+5:+)%):3+,$:.R%:#%dM,8I5%Q,:3+5.5R% I"4-$.=%$.%.":@5)$435)/%L*$4*%$)%C$GG5#5.,%,:*,*%#$=*,b*".C5C%



ZnTPP-dU **1**



MgTAP-dU **2**



Template sequences:

dA_5	AAAAA	ODN-1	TTTTAATTTT
dA_{10}	AAAAAAAAAA	ODN-2	GCTCGGTAATCCGGC
dA_{15}	AAAAAAAAAAAAAAA	ODN-3	TTAATTAATTT
T_{10}	TTTTTTTTTT	ODN-4	TTTAAAATTT

,*5%9$.C$.=%,:%C2[/%".C%:G%"9:+,%V'Y%G:#%,*5%9$.C$.=%,:%C2v·%".C%C2v[/%.C$4",$.=%G:#H",$:.%:G%"%H+3,$4*#:H:I*:#5%"))5H938%:.%,*5%,5HI3",5%),#".C)%Qg$='%X/%BX0%F"935%BXR'%P*$35%L5%.:#H"338%:9)5#@5%U+5.4*$.=%:G%I:#I*8#$.%5H$))$:.%L*5.%",,"4*5C%,:%JK2%$.%H+3,$4*#:H:I*:#5%)8),5H/^[5/%X^]%,*5%L5"-%5.*".45H5.,%4:+3C%95%5NI3"$.5C%98%)*$53C$.=%:G%,*5%I:#I*8#$.)%G#:H%,*5%*$=*38%I:3"#%):3@5.,%,*#:+=*%cM),"4-$.=%"3:.=%,*5%))JK2%,5HI3",5'%(.%)*"#I%4:.,#"),/%,*5%I:#I*8#"E$.5%>%)*:L5C%)$=.G4".,38%$.4#5")5C%G3+:#5)45.45%L$,*%$.4#5")$.=%35.=,*%:G%,*5%,5HI3",5%Qg$='%X/%BZ0%F"935%BZR'%F*5%G3+:#5)45.45%$.4#5")5%$)%QVX'^±``'^RMG:3C%G:#%C2[/%QXZ'\±X'XRMG:3C%G:#%C2v·/%".C%QY``X±V'^RMG:3C%G:#%C2v[%'%F*5%@"3+5%G:#%C2v[%$)%"9:+,%V[s%3:L5#%,*".%L:+3C%95%5NI54,5C%L*5.%4:.)$C5#$.=%"%3$.5"#%$.4#5")5/%".C%,*5%)8),5H%,*5#5G:#5%H$=*,%)*:L%)",+#",$:.%L*5.%+)$.=%3:.=5#%,5HI3",5)'%P*5.%4:##54,5C%G:#%,*5%$.4#5")5%$.%G3+:#5)45.45%:G%>%$,)53G/%,*5%@"3+5)%"#5%_'V/%V]'[%".C%XV'Z%s/%#5)I54,$@538%2CC$,$:.%:G%Fv·%"),5HI3",5%C$C%.:,%*"@5%".8%5GG54,%:.%,*5%G3+:#5)45.45%:G%>/%)+II:#,$.=%,*",9$.C$.=%$)%=:@5#.5C%98%,*5%4:HI35H5.,"#8%*8C#:=5.%9:.C$.=%95,L55.%C2%".C%Cf'%

F*5%"##"8%G:#H",$:.%L")%"3):%4:.G$#H5C%+)$.=%)8.4*#:,#:.%#"C$",$:.%eJ%)I54,#:)4:I8%QB6eJ/%g$='%YR'[0X_-¾2%4:.,#:3%!=F2S%3"4-$.=%,*5%.+435:)$C5%H:$5,8%Q5'='%!=F2SM7#R%C$C%.:,%)*:L%".8%eJ%)$=."3)0%"CC$,$:.%:G%<JKMX%C$C%.:,%4*".=5%,*5%)I54,#+H/%,*+)%,*5%I:#I*8#"E$.5%$,)53G%C:5)%.:,%$.,5#"4,%L$,*%JK2'%!=F2SMCf%>%:.%,*5%:,*5#%*".C%*")%,L:9#:"C%.5=",$@5%$.C+45C%eJ%)$=."3)%",%[_[%.H%".C%",%YY`.H/%"#$)$.=%G#:H%4*$#"3$,8%,#".)G5#%:G%,*5%",,"4*5C%.+435:)$C5'%2CC$,$:.%:G%Fv·%,:%>%C$C%.:,%"3,5#%,*5%eJ%)I54,#+H/%L*5#5")%C2v·%".C%C2v[%$.C+45C%"%)$=.$G$4".,%)*"#I5.$.=%".C%$.4#5")5C%$.,5.)$,8%:G%,*5%.5=",$@5%)$=."3%",%[_[%.H/%".C%"3):%85C%,:%"%H:#5%I#:.:+.45C%.5=",$@5%)$=."3%",%YY`%.H'%F*$)%$.C$4",5)%*$=*38%:#C5#5C%I:#I*8#"E$.5%"##"8%G:#H",$:.%"3:.=%,*5%:3$=:QC2R%,5HI3",5%L$,*%),#:.=%$.C+4,$:.%:G%4*$#"3$,8%".C%5N,5.C5C%cM),"4-$.='%F*$)%"##"8%G:#H",$:.%L:+3C%5NI3"$.%,*5%$.4#5")5%$.%G3+:#5)45.45%C+5%,:%$):3",$:.%:G%,*5%4*#:H:I*:#5%G#:H%,*5%*$=*38%I:3"#%):3@5.,'%

**?2;4."+A@%eJ%)I54,#"%:G%I:#I*8#"E$.5%>%C5H:.),#",$.=%,*5%G:#H",$:.%:G%*$=*38%:#C5#5C%"##"8)%+I:.%9$.C$.=%,:"C5.:)$.5%4:.,"$.$.=%,5HI3",5%<JK)'%

P5%.5N,%I#:95C%,*5%#5)I:.)5%:G%>%,:%<JK%,5HI3",5)%L*5#5%C$M"C5.:)$.5%+.$,)%L5#5%I3"45C%$.%C$GG5#5.,%)5U+5.45%4:.,5N,%Qg$='%X/%BY/%BZ0%F"935%BY/%BZR'%(.)5#,$.=%".%2x%+.$,%L$,*$.%5$,*5#%".%:3$=:MF%Q**B67%**=R/%:#%L$,*$.%"%#".C:H%V[MH5#%)5U+5.45%Q**B67%>**R%="@5%#$)5%,:%"%4:##54,5C%X']MG:3C%".C%X'\MG:3C%$.4#5")5%$.%G3+:#5)45.45/%#5)I54,$@538'%F*5%)$H3"#$,8%:G%,*5%9$)M>%"CC+4,%$.%**B67%=**%".C%**B67%>**%$)%"3):%)55.%$.%,*5%eJ%)I54,#"%L*$4*%)*:L%$C5.,$4"3%I5"-%I:)$,$:.%".C%$.,5.)$,8%",%[_[%.H%Qg$='%YR'%S3"4$.=%,L:%)5I"#",5C%C2x%+.$,)%L$,*%".%:3$=:MF%Q**B67%A**R%$.4#5")5)%G3+:#5)45.45%98%"%G"4,:#%:G%\'X/%L*$35%".%C2z%+.$,%Q$'5'%,L:%"C%"45.,%C2x%+.$,)R%$.4#5")5)%$,%98%"%G"4,:#%:G%]'Y'%F*5%#5)I:.)5%,:%**B67%A**%$)%)3$=*,38%3:L5#%,*".%5NI54,5C'%<@5#"33/%,*$)%)*:L)%,*",%>%#5)I:.C)%)5354,$@538%,:%,*5%)I54$G$4%.+H95#%:G%#5I5",$.=%"C5.:)$.5)%L$,*$.%"%=$@5.%)5U+5.45%4:.,5N,O%*"@$.=%,*5%)"H5%.+H95#%:G%#5I5",$.=%"C5.:)$.5)%"C%"45.,%,:%5"4*%:,*5#%=$@5)%"%*$=*5#%#5)I:.)5%,*".%L*5.%,*58%"#5%)5I"#",5C'%%

F*5%),5IML$)5%$.4#5")5%:G%,*5%G3+:#5)45.45%L$,*%$.4#5")$.=%C2x%+.$,)%4:+3C%,*5#5G:#5%95%+)5C%,:%I#:95%,*5%.+H95#%:G%C2.%#5I5",%)5U+5.45)'%F*$)%I#:)I54,%$)%I"#,$4+3"#38%$.,#$=+$.=%G:#%G:#5.)$4%JK2%I#:G$$.=/%L*$4*%#5335)%:.,%,*5%".3 8)$)%:G%)*:#,%,".C5H%#5I5",%QBF6R%)5U+5.45)%$.%)I54$G$4%3:4$%:.%,*5%=5.:H5%".C%,*+)%"))$=.H5.,%:G%)I54$G$4%"33535)'%>5.5#"338/%BF6%,8I$.=%)%I5#G:#H5C%+)$.=%Se6%L$,*%G3+:#5)45.,38%3"95335C%I#$H5#)/%G:33:L5C%985354,#:I*:#5,$4%)5I"#",$:.:G%,*5%BF6%"33535%".C%)E.=%"="$.),%".%BF6%3"CC5#'%Y`¾B$.45%,*$)%#5U+$#5)%H+3,$I35%),5I)%$.%")I54$"3E5C%5.@$#:.H5./%L5%)+#H$)5C%,*",%:+#%)8),5H%4:+3C%#5I:#,%:.%,*5%5.=,*%:G%)I54G4%BF6)%+)$.=%)$HI35%"))4$",$:.%".C%G3+:#5)45.45%#5"C:+,'%F:%,5),%,*$)%*8I:,*5)$)/%L5%)53545,5C%)5@5#"3%#5I#5)5.,",$@5%3:4$%G#:H%,*5%D+#:I5".%B,".C"#C%B5,%:G%4:#5%BF6%3:4$'%".C%+)5C%H:C53%<JK%)5U+5.45)%G:#%9$.C$.=%L$,*%>'

**?2;4."+C@%BE.=%:G%G:#5.)$4%BF6)%98%)53545,$@5%9$.C$.=%:G%!=F2SMCf%>%,:%,*5%,"#=5,%)5U+5.45)'%F*5%.+H95#%:G%#5I5",%)5U+5.45)%4".%C#54,38%95%4:##53",5C%,:%,*5#53",$@5%$.4#5")5%$.%G3+:#5)45.45%$.,5.)$,8'%g:#%)5U+5.45)%)55%F"935%V'%

F:%C$),$.=+$)*%C$GG5#5.,%)5U+5.45%4:.,5N,)%".C%)53545,$@$,8%,:L"#C)%#5I5",$.=%C2.%+.$,)/%L5%4*:)5%,*53:4$%g>2%QeFFF%#5I5",R%")%.5=",$@5%4:.,#:3/%JVBV\[\%QF2>2%#5I5",R/%F;`V%Q22F>%#5I5",R/%".C%JV^B[V%Q>222%#5I5",R%QF"935%VR'%g:#%5"4*%BF6%3:4+)%L5%)53545,5C%C$GG5#5.,%"335535)/%$'5'%$.4#5")$.=%.+H95#%:G%BF6)/%L*$4*%)I".%H:),%:G%,*5%9$:3:=$4"338%#535@".,%35.=,*)%:G%,*5%"335535)'%2CC$,$:.%:G%>%,:%,*5%)"HI35%<JK)%)*:L5C%,*",%,*5#5%$)%5N45335.,%)53545,$@$,8%,:L"#C)%BF6%H"#-5#)%,*",%4:.,"$.%"C%"45.,%

"C5. :)$. 5)%Qg$='%Z/%B[0%F"9355%B[R'%g : #%,*5%4 : . ,# : 3%g > 2/%L*5#5%. : % "C5. :)$. 5)%"#5%I#5)5. ,%$. %,*5%BF6/%. : %)$= . "3%5. *" . 45H5. ,%L")% C5,54,5C'%B$H33"#38/%,*5%C$G5#5. ,%"3535)%: G%JVBV\ [\/%L*$4*%C : 5)% . :,%4 : . ,"$. %"C‖"45. ,%"C5. :)$. 5)/%C$C%. :,%=$@5%#$)5%, : %"% I :)$,$@5%)$= . "3'%g : #%9 : ,*%g > 2%" . C%JVBV\ [\/%,*5%)$= . "3%5. *" . 45H5. ,%L")% 5U+"3%, : %,*5%93" . -%)" HI35%Q. : %JK2%I#5)5. ,R'%(. %4 : . ,#"),/%" . "38)$)% : G%, *5%"3535)%: G%9 : ,*%F ; `V%" . C%JV^B[V%="@5%)$= . $G$4" . ,%)$= . "3% 5. *" . 45H5. ,/% L$,*% $. 4#5")$. =% "HI3G$4",$: . % 4 : ##5)I : . C$. =% , : % $. 4#5")$. =%35. =,*% : G%,*5%"3535'% (. %,*5%4")5% : G%F ; `V/%,*5%. +H95#% : G%BF6)%Q. R%#" . =5)%G#: H%. %t%Y%, : % VZ%$. %G : #5.)$4%)"HI35)'%g : #%)* : #,5#%"3535)%Q. %t%Y%, : %\/%F"9355%VR/% ,*5%$. 4#5")5%$. %)$= . "3%L")%3$. 5"#/%" . C%,*5%. +H95#% : G%BF6)%4" . % C$#54,38%95%#5"C% : +,%G#: H%,*5%G3+ : #5)45. 45%$. ,5.)$,8%Qg$='%ZR'%g : #%"% 3 : . =5#% "3535%Q. %t%V`R/%,*5%)8),5H%)55H)%, : %#5"4*%"%)",+#",$: . % I : $. ,'%F*5#5G : #5/%,*5%3 : . =5#%"3535)%+)5C%$. %I#: G$3$. =%Q. %t%V`%, : %VZR% H"8%. : ,%95%#5"C$8%C$),$. =+$)*"935%+. C5#%,*5%4+##5. ,%4 : . C$,$: .)'% F*5%3 : 4+)%JV^B[V%4 : . ,"$.)%"3535)%L$,*%"%H+4*%3"#=5#%@"#$"9$3$,8% $. %. +H95#)a%,*5%BF6)%#" . =5%G#: H%. %t%]%, : %Y_%" . C%#5I#5)5. ,)%"% 4*"335. =$. =% BF6%3 : 4+)'% <@5#"33/%,*5%)$= . "3% 5. *" . 45H5. ,%L")% 954 : H$. =%3$. 5"#%L$,*%#5)I54,%, : %*$=*5#%BF6%. +H95#)%Q. %u%V`R'% K5@5#,*535))/%"%435"#%$. 4#5")5%L")%C5,54,"935% : @5#%"%#" . =5% : G% BF6)%L$,*%)5354,5C%#5I5",)%#" . =$. =%G#: H%^%, : %V^/%" . C%,*5%3 : . =5#% C2%#5I5",%+. $,%QC2y%$3=%C2x%$. %F ; `V%)55H)%, : %I#5@5. ,%"%)",+#",$: . % +I%, : %, *$)%35@53'% ; 5#5/%,*5% . +H95#% : G% BF6)%4" . % C$#54,38% 95% C5,5#H$. 5C%: @5#%,*5%5. ,$#5%#" . =5%: G%"3535)'%

%

D&)#"+=@%B5U+5.45)%: G%,*5%)*: #,%," . C5H%#5I5",%I#: 95)%+)5C%G: #%)E. =%,*5% . +H95#% : G%#5I5",%+. $,)%98%G3+ : #5)45. 45%5. *" . 45H5. ,'0"'1%

BF6%. "H5%	#5I5",%+. $,%	B5U+5. 45%[n%b%Yn% 2335)5)%Q. R%
JVBV\ [\%	0F2 > 21. 0F > 21`uv% 0F2 > 21. 0F2 > > 1`uv% 0F > 1[%	e22eF%0F2 > 21. %0F > 1[%eFeFF% . %t%V`/%VX%
F ; `V%	22F > %	2FF2F%022F > 1. %F22 > F% . %t%Y/%Z/%[/%\/%V`%
JV^B[V%	> 222%	> e2%2e%02 > 221↵%222 > %2% . %t%^/%_/%V`/%VV/%V^%
g > 2%	eFFF%	2eFe2%0FFFe1v%FFFF%FFeF% 0eFFF1[%eFee%0FFee1x%2eF2F% 2335)5%V[%

0"1%B5U+5.45)%"#5%"-5. %G#: H%!(BF%BF6%JK2%(. ,5#. 5,%J","%7")5%

,. Iakk). #9")5'. $). '= : @k4 : #5BF6)'. H%0Y`1%

%

<@5#"33/%,*5% I : #I*8#"E$. 5% $)% G"#% 95,,5#%)+$,5C% , : % 4#5",5%)53GM "))5H935C%G3+ : #5)45. ,%4*#: H : I*: #5%"##"8)%: . %"%JK2%,5HI3",5%, *"". %,*5%I : #I*8#$. 0%,*5%I : #I*8#$. %$,)53G%"3)% : %G : #H)%"##"8)%9+,%C : 5)% . : ,%35"C%, : %"%)$= . G4" . ,%4*" . =5%$. %: I,$4"3%I#: I5#,$5)'%F*5%5+,54,$4%) : 3@5. ,%=384*: 3$. 5%C : 5)% . : ,%$. ,5#G5#5% L$,*%)$HI35%9")5MI"$#$. =/%)*: L. % 98%,*5%)5354,$@5%G : #H",$: . % : G% I : #I*8#"E$. 5%),"4-)% : . % 4 : HI35H5. ,"#8%"C5. :)$. 5)%$. %,*5%,5HI3",5'% 2)%G5L=%")%,L : %"C‖"45. ,%"C5. :)$. 5)%"#5%)+GG$4$5. ,%, : %$. C+45%"%)$= . G4" . ,%$. 4#5")5%$. %G3+ : #5)45. 45%+G : %,*5%I : #I*8#"E$. 5'% F*5%),5I L$)5%$. 4#5")5%$. %G3+ : #5)45. 45%+I : . %$. 4#5")$. =%,*5%. +H95#% : G% "C‖"45. ,%"C5. :)$. 5)%"33 : L)%G : #%)$E$. =%,*5% : @5#"33%35. =,*% : G%". % : 3$= : QC2R%)5U+5. 45%,*#: +=*%,*5%#5"C : +,% : G%,*5%G3+ : #5)45. 45% $. ,5.)$,8'%F*$)%4 : . 45I,%$)%I"#,$4+3"#38%$. ,#$=+$. =%G : #%"I I3$4",$: .)%$. % ". "38E$. =%JK2%)5U+5. 45)%L*$4*%4 : . ,"$. %H+3,$I35%#5I5",)%: G%)*: #,%, #$M%: #%,5,#". +435 : ,$C5%+. $,)/%L*$4*%$)%+)5C%$. %"3535%$C5. ,$G$4",$: . '% F*$)%G : #H)%,*5%9")$)%: G%G : #5.)$4%JK2%". "38)$)/%". C%*5#5%L5% C5H : .),#",5%,*",%L$,*%: +#%)8),5H%,*5%. +H95#% : G%)*: #,%,". C5H% #5I5",%)5U+5. 45)%$. %)5354,5C%4 : #5%3 : 4$%4". %C$#54,38%95%")))5))5C'% F*$)%"II#: "4*%L : +3C%. 55C%, : %95%,"$3 : #5C%, : %: ,*5#%BF6%)5U+5. 45)% 98%@"#8$. =%,*5%I#: 95%. +435 : 9")5%". C%,*5%4*#: H : I*: #5)/%L*5#5%$,% 4 : +3C%I : ,5. ,$"38%95%"II3$5C%, : %H$4#: 4*$I%,54*. : 3 : =8%L*5#5%,*5% ,"#=5,%JK2%4 : +3C%95%". "38)5C%: . %)+#G"45)%98%)$HI35%". . 5"3$. =% ". C%G3+ : #5)45. 45%#5"C : +,'%

EF,". 2 ("3 9&#+!"5 9 2 - 3+

g+33%C5,"$3)%G : #%)8. ,*5))$)%". C%". "38)$)%4". %95%G : +. C%$. %,*5%5354,#: . $4%)+II : #,$. =%$. G : #H",$: . '%

g : #%,*5%9$. C$. =%5NI5#$H5. ,)%+)$. =% C2. b4 : . ,"$. $. =% +. $,)/% H$N,+#5)%$. % =384*: 3$. 5%QY``%µjR%L5#5%I#5I"#5C%, : %=$@5%"%G$. "3%4 : . 45. ,#",$: . % : G%V[%µ!% $. %=% : #%>/%". C%". %<JK%4 : . 45. ,#",$: . % : G%5U+"3%H : 3"#$,8%$. %"C5. :)$. 5'%F*5%)"HI35)%L5#5%*5",5C%, : %Z`%ve%+. C5#%@"4++H%G : #%)5@5#"3%*: +#)%, : %#5H : @5% ,*5%I8#$C$. 5%". C%L",5#/%". C%,*5. %,#". )G5##5C%, : %"%G3+ : #5)45. 45%4+@5,,5%",% Z`%ve'%&"#$"935%,5HI5#",+#5%"9) : #9". 45%". C%G3+ : #5)45. 45%#54 : #C$. =)% L5#5%,"-5. %5%,*5#%G#: H%]`%ve%, : %V`%ve%",%V`%ve%$. ,5#@"3)%L$,*%V`%H$. % 5U+$39#",$: . %,$H5/%: #%",%]`%ve%". C%V`%ve%L$,*%4 : : 3$. =% : @5#%Y%*'%F*5% 5. *" . 45H5. ,%L")%C5,5#H$. 5C%")%"#",$: : %G%)$= . "3%$. ,5.)$,8%(QV`%veRk(Q]`% veR'%233%H5")+#5H5. ,)%L5#5%I5#G : #H5C%$. %,#$I3$4",5%"I"#,%G#: H%=%$,)53G'% g : #%". "38)$)%: G%BF6%)5U+5. 45)/%)"H135)%L5#5%I#5I"#5C%". C%". "38)5C% ". "3 : =: +)38%L$,*%"%G$. "3%4 : . 45. ,#",$: . %: G%X%µ!%: G%>%". C%``X%µ!%: G%<JK%$. % "%G$. "3%@ : 3+H5%: G%X``%µj%=384*: 3$. 5'%F*5%)"H135)%L5#5%". 5"35C%G#: H%]`% ve%,: %X`%ve%: @5#%,*5%4 : +#)5%: G%Y%*: +#)/%". C%,*5%G3+ : #5)45. 45%)I54,#"% #54 : #C5C%",%9 : ,*%,5HI5#",+#5)'% 233% 5NI5#$H5. ,)% L5#5% I5#G : #H5C%$. % ,#$I3$4",5'%

85G3 - H#"*;" ("39'

g$. ". 4$"3%)+II : #,%98%"%wB4*: 3"#)*$I%: G%,*5%S#5)$C5. ,% : G%,*5% 6+))$". %g5C5#",$: . %G : #%B,+C5. ,)%". C%S*J%B,+C5. ,)%F#"$. $. =% 29#: "Cx/%"L"#C5C%,: %!&(/%". C%w>#". ,%: G%S#5)$C5. ,%: G%6+))$". % g5C5#",$: . x%!?MX\^]'X`VZ'Y%$)%=#5",38%"4-. : L35C=5C'%F*5%eJ% )I54,#: )4 : I8%H5")+#5H5. ,)%L5#5%)+II : #,5C%98%J$"H : . C%j$=*,% B : +#45%QJ$C4 : ,/%f?R%L$,*%=#". ,%B!VYV[^'%F*5%"+,*: +#)%,*". -%,*5% DSB6e%G : #%+. C$. =%,*#: +=*%=#". ,%#5©5#5. 45%DSk?`Y_Z\\kV'%

I"0H - . *':%)+I#"H : 354+3"#%"##"8)%y%G3+ : #5)45. 45%5. *" . 45H5. ,% y%I : #I*8#$. %y%I : #I*8#"E$. 5%y%BF6%". "38)$)%

o% <. %")$C5%. : ,5/%,*5%)+445))G+3%, '"'0)3. !&)%4 : +I3$. =%: . %,*5%!=F2S%7#% "3) : %I#: @5)%,*",%,*5%4"#9 : . %4"##8$. =%,*5%9#: H$C5%$)%)I X%*89#$C$)5C/%L*5#% L")%. : ,%5. ,#5%38%435"#%95G : #5'0X\%

q% (,%)*: +3C%95%. : ,5C%,*",%=384*: 3$. 5%*")%"),#: . =%f&M@$)%"9) : #9". 45%953 : L% Y``%. H%,*5#5G : #5%,*5%#535@"". ,%JK2%I"#,%$. %,*5%f&M@$)%". C%eJ%)I54,#"% 4 : +3C%. : ,%95%". "38)5C%. %,*$)%) : 3@5. /%". C%,*5%C","%#538%: . %,*5%I : #I*8#$. % ". C%I : #I*8#"E$. 5%I"#,)%$. %,*5%)I54,#"'%

%

0V1% "R%D'%B,+3E/#8--#>./9=#?/3=#**>J=K/%@A/%^XYM^YV0%9R%S'%D.))35./%;'%2'% P"=5. -. 54*,/#8--#>./9=#?/3=#**>J=L/%BC/%X]XZM%]YY0%4R%z'%K'%F5 : /%D'% F'%?: : 3/#>./9=#?/$=#**>J=>/%DDE/%ZXXV%ZXZ[0%CR%D'%B,+3E/#>./9=FG;&=#H=#

>J=>/% DC/% ZZ[\MZZ_0% 5R% 6'% &"#=*5)5/% ; '% 2'% P "=5.-.54*,/# >./9=# >'99;"=#>JJM/%DI/%X\V[MX\XZ'%

0X1% "R% 2'% P '%('%B,5I*5.):./%2'%e'%S"#,#$C=5/%&'%&'%g$$4*5@/#>./9=FG;&=#H=# >J==/%DJ/%\XX]M\XY^0%9R% !'%D.C:/%!'%g+I$,)+-"/%F'%!"I$H"/#H=#K&O=#>./9=# >JJN/%JL/%VV`\MVVVX0%4R% !'%?"35-/%2'%B'% !"C)5./%d'% P5.=53/#H=#89=# >./9=#,'-=#>JJK/%DEI/%_Y_XM_Z``0%CR% ?'%e'%;".."*/%6'%6'%>$3/%7'%2'% 2#H$,"=5/#(!'-./9!3%&M#>JJL/%BB/%V[_XZMV[_X_'%

0Y1% !'%D'%{),5#=""#C/%S'%d'%;#C3$4-"/#>./9=#,'-=#?/$=#>J==/%BA/%[]]VM[]^^'%

0Z1% g'%!5."4*5#/%;'%2'%P"=5.-.54*,/#G;&=#H=#K&O=#>./9=#>J==/%Z[\ZMZ[]`'%

0[1% "R% >'%e3"@5/%>'%e*",53"$./%2'%g$3:#"H:/%J'%>")I"#+,,:/%e'%B"$.,M$$5##5/% D'%j5%e"H/%<'%S$5,#5H5.,/%&'%>+5#$.5"+/%B'%e"HI$C533$/#K&O=#(!'9'*=# >./9=#>J=C/%DE/%X]]^MX]^Y0%9R% !'%&89:#.8$/%2'%j'%K+))9"+H5#/%B'% !'% j".=5.5==5#/%6'%;|.5#/#(!'-'"N;0)%/#>./9=#>J=C/%E@/%V]^[MV]_Y0%4R%d'% >'%P:335#/%?'%7:#I5)):./%B'%B@5C*5H/%7'%239$.)):./#O)"09;!&#>J=>/%EC/% V_ZZMV_[Y0%CR%J'%>'%B$.=35,:./%6'%;+))"$./%>'%B$$$="#C$/%S'%?+H"#/%S'%d'% ;#C3$4-"/%K'%75#:@"/%D'%B,+3E/#K&O=#(!'9'*=#>./9=#>J=O/%DB/%VZ_MV[]0%5R% F'%K=+85./%2'%7#5L5#/%D'%B,+3E/#8"0/7=#>./9=#6"%=#G<=#>JJM/%BC/%V_]ZM V_]]0%GR%('%7:+"H"$5C/%j'%2'%g5.C,/%J'%;|+))$.=5#/%!'%P$5).5#/%B'%F*}.$/% K'%2H$:,/%D'%B,+3E/#P;-*/'3#P;-*/'%#P;-*#>JJK/%EQ/%V[YYMV[Y^0%=R%e'% P533.5#/%;'%2'%P"=5.-.54*,/#K&O=#O/%%=#>J=C/%DQ/%V\_XMV\_[0%*R%;'%z+/% J'%F'%j'%235N".C5#/%f'%2)4*"+5#/%6'%;".5#/#8"0/7=#>./9=F6"%=#G<%=# >J=K/%@Q/%[`Z`M[`ZZ0%$R%>'%e*",53"$./%>'%e3"@5/%e'%B"$.,M$$5##5/%J'% >")I"#+,,:/%B'%e"HI$C533$/#K&O=#(!'9'*=#>./9=#>J=K/%D@/%\X[]M\X\Y'%

0\1% !'%&#"953/%S'%;:#"-:@"/%;'%S$@:.-:@"/%j'%?"3"4*:@"/%;'%e5#.:4-"/%;'% e"*:@"/%6'%S:*3/%S'%B595),/%j'%;"@#"./%!'%;:45-/%!'%g:M,"/#>./9=FG;&=# H=#>JJM/%D@/%VVZZMVV[Z'%

0]1% "R% 2'%B"H".,"/%('%j'%!5C$.,E/#P)"'3-)*/#>J=O/%C/%_`Y]M_`_[0%9R% 6'% B4*#5$95#/%d'%J:/%D'%!'%6:335#/%F'%T*".=/%&'%d'%B4*+335#/%S'%e'%K$4-53)/%d'% g53CH"../%F'%j$5C3/#P)%=#P)"'%/-."'*=#>J=C/%I/%Z]M]^'%

0^1% "R% !'%S#:9),/%B'%!'%j".=5.5==5#/%6'%;|.5#/#>./9=#>'99;"=#>J=C/%@A/% V[_MV\V0%9R%B'%S'%B"+/%S'%d'%;#C3$4-"/#H=#K&O=#>./9=#>J=>/%JJ/%[MV\0%4R%B'% !+,)"HL$#"/%D'%P'%2$.)4:+=*/%2'%e'%S"#,#$C=5/%S'%d'%J5##$4-/%&'%&'% g$$4*5@/#>./9=FG;&=#H=#>J=O/%EE/%V`Y]\MV`Y^V0%CR%B'%!+,)"HL$#"/%D'%P'% 2$.)4:+=*/%2'%e'%S"#,#$C=5/%S'%d'%J5##$4-/%&'%&'%g$$4*5@/#H=#R.M3=#>./9=# (#>J=L/%DDI/%VZ`Z[MVZ`[X0%5R%d'%>'%P:335#/%d'%?'%;"..5),"C/%7'% 239$.)):./#H=#89=#>./9=#,'-=#>J=A/%DL@/%X][_MX]\^0%GR%6'%&"#=*5)5/%;'% 2'%P"=5.-.54*,/#K&O=#(!'9'*=#>./9=#>J=J/%C/%X\M[X^0%=R%2'%B'%j+995/% P'%BE8H".)-$/%7'%j'%g5#$.="/#>./9=#,'-=#?/$=#>J=K/%BQ/%V`[XMV`]_'%

0_1% "R% D'%B,+3E/%>'%e35@5#/%!'%B*$::8"/%e'%J'%!":/#>./9=#,'-=#?/$=#>J==/% BA/%[\YYM[\Y[0%9R%D'%B,+3E/%>'%;'%e35@5#/%d:*.%P$58%i%B:.)/%(.4'/%>J=L'%

0V`1% !'%7'3"E/%B'%F"..$#/%?'%&"#="/#>''&<=#>./9=#?/$=#>J=K/%LBI/%\M^Y'%

0VV1% "R% j'%!"#,$.:/%7'%S"=".:/%('%g:,,$44*$"/%B'%K5$C35/%e'%>$".4:3"/#H=#R.M3=# >./9=#(#>JJM/%DDL/%VZ]]_MVZ]^\0%9R%2'%J-f#):/%2'%!"HH"."/%!'%7"3"E/% 2'%D'%;:3H5)/%K'%75#:@"/%6'%j"+45#$/%6'%S+##53:/#H=#89=#>./9=#,'-=# >JJM/%DLD/%X`Z\MX`Z]0%4R%g'%J-B:+E"/%j'%!'%6:=5#)/%J'%!'%B'%()3"H/%z'% 2#"-$/%<'%(,:/%F'%P"C"/#>./9=#O/%%=#>JJN/%LJ/%Z\'MZ\V0%CR%D'%7$#:./%K'% &:85#/#K&O=#(!'9'*=#>./9=#>JJN/%Q/%X[`]MX[V[0%5R%z'%K$,,"/%6'%?+#:C"/# (!'1'*M9/&3#>JJO/%CD/%Y]\MY_V0%GR%F'%<*8"H"/%;'%!$,"/%z'%z"H"H:,:/# (!'1.M3=#>./9=#>JJL/%DDL/%[YM[_0%=R%B'%2'%75I+.5/%2'%;'%B*53,:./%J'%6'% !4!3./#6"'&O=#>./9=#>JJA/%BE/%^Z\[M^Z][0%*R%B'%j55/%z'%2'%j55/%;'%!'% j55/%d'%z'%j55/%J'%;'%?$H/%B'%?'%?$H/#(!'1.M3=#H=#>JJ>/%CL/%Y]VMY^V0%$R%<'% z'%g5C:#:GG/%2'%6".=".%&'%&'%e*5H5#$)/%j'%;'%;+#358/#(!'-./9!3%&M#>JJJ/% LI/%V[`^YMV[`_`0%MR% 2'% J-f#):/% !'% D'% g#"="3"/% 6'% S+##53:/#>./9=# >'99;"=#>J=>/%BC/%^V\[M^V]\'%

0VX1% >'%B"#=)8"./%7'%!'%j5:."#C/%d'%?+953-"/%!'%7"3"E/#>./9=FG;&=#H=#>J=C/% EA/%V^]MV^_X'%

0VY1% "R%S'%>'%d".))5./%B'%d"99"#$Mg"#:+I$/%!'%B+#$./%m'%&$3"/%d'%e'%>$535./%F'%g'% C5%>#55G/%!'%6'%&:)/%S'%;'%7:H".)/%K'%2'%B:HH5H5#C$I-/%S'%e'%e*#$),$".5./% S'%j5435#5/%6'%j"EE"#:.$/%S'%@".%C5#%B4*::,/%D'%P'%!5$15#/%2'%S'% B4*5..$.=/#H=#89=#>./9=#,'-=#>JJM/%DLD/%VXXXMVXYV0%9R%S'%>'%d".))5./% d'%&".C5.95#=*/%d'%j'%@".%J:.=5./%D'%P'%!5$15#/%2'%S'%B4*5..$.=/#H=#89=# >./9=#,'-=#>JJK/%DEI/%\`]^M\`]_0%4R%6'%(L"+#"/%g'%d'%!'%;:595./%!'% !")+C"/%2'%B4*5..$.=/%D'%P'%!5$15#/%F'%B*HE+/#H=#89=#>./9=#,'-=# >JJO/%DEC/%VYX_^MVYY`Z'%

0VZ1% S'%>'%d".))5./%2'%6+$EMe"##5,5#:/%J'%>:.E"35EM6:C#$=+5E/%D'%P'%!5$15#/% 2'%S'%B4*5..$.=/#8"0/7=#>./9=#6"%=#G<=#>JJM/%BC/%^V`YM^V`\'%

0V[1% 6'%&"#=*5)5/%;'%2'%P"=5.-.54*,/#>./9=FG;&=#H=#>J=J/%DQ/%_`Z`M_`Z\'%

0V\1% B'%B5E$/%;'%2'%P"=5.-.54*,/#>./9=#>'99;"=#>J=A/%BI/%_X[]M_X[_'%

0V]1% "R% S'%D.))35./%z'%g#$,E/%;'%2'%P"=5.-.54*,/#K&O=#(!'9'*=#>./9=#>J=L/% DL/%Z^]MZ_X0%9R%S'%D.))35./%B'%>"#,.5#/%?'%>3")5#/%2'%e:3)H"../%;'%2'% P"=5.-.54*,/#8"0/7=#>./9=F6"%=#G<%=#>J=O/%@@/%V_`ZMV_`^'%

0V^1% 6'%(L"+#"/%!'%<*.$)*M?"H58"H"/%F'%($E"L"/#>./9=FG;&=#H=#>JJM/%D@/% Y]X_MY]Y['%

0V_1% "R% d'%S'%S+#)58/%z'%e*5./%D'%B,+3E/%!'%?'%S"#-/%S'%?:.=)+I*:3/#,/"3'&# 8-%;)%#(F>./9=#>J=K/%E@D/%YZMY_0%9R%?'%>}IG#$4*/%e'Mz'%j$/%('%!"H5)/%B'% S'%7*"HCH"##$/%!'%6$44$/%d'%z::/%2'%!"H5)/%2'%<*H"../%!'% P$.,5#*"3,5#/%D'%B,+3E/%2'%2-)$H5.,$5@/%f'%g'%?58)5#/#P)"'#O/%%=#>J=O/%DQ/% Z\\[MZ\\_0%4R%F'%K=+85./%S'%;"-".)):./%6'%DC=5/%J'%e:3$)/%7'%2'% >::CH"./%d'%6'%7+#.)/%D'%B,+3E/#P/7#H=#>./9=#>J=C/%LC/%X[ZM[X[_0%CR% d'%6'%7+#.)/%?'%>:IG#$4*/%d'%P'%P::C/%&'%&'%F*"4-5#/%D'%B,+3E/%f'%g'% ?58)5#/%B'%;:L:#-"/#8"0/7=#>./9=#6"%=#G<=#>J=A/%@E/%VX`\MVX`]X'%

0X`1% "R%d'%g5#.C5E2#$E"/%!'%f#9".$/%!'%>#",E53/%!'%B'%6:C#$=+5E/%!:#="C5/% !'%?'%K"E55#+CC$./%F'%F:##5)/#>./9R.'%'>./9#>J=K/%D/%V\ZMV\\0%9R%;'% !:#$/%D'%!$8"E"-$/%('<)"-"/%?'%F"-$H$8"/#K&O=#G*/-%&''"=#>J=>/%DL/%V_][M V_^`'%

0XV1% S'%B-+I$.M!#+="3)-"/%j'%B:9:,,"/%2'%P"#:L$4-"/%7'%P5#5)E4E8.)-"/%F'% T"35L)-$/%S'%>$5#$4*/%!'%d"#5-/%>'%K:L"4E8-/%!'%?5HI-"/%d'%>"I$.)-$/% B'%d+#="/%d'%!$534"#5-/#H=#6"'&O=#(!'-./9=#>J=N/%DCA/%VMVZ'%

0XX1% 6'%('%z"-+9:@)-"8"/%K'%7'%!:#:E:@"/%2'%2'%S".-#",:@/%K'%('%?"E"4*-$."/% 2'%J'%S38+,$.)-"8"/%F'%2'%?"#H"-:@"/%F'%K'%2.C#55@"/%z'%7'%&5.5C$-,:@"/% D'%2'%S3:,.$-:@"/%D'%6'%K5H,):@"/%&'%&'%B:-3:@/%D'%&'%g$3:.5.-:/%&'%('% e*$)):@/%7'%z'%?:=".%2'%&'%7+,5.$./%2'%&'%g5:G":@/%!'%>'% B,#"-*:@)-"8"/#?;33=#H=#S/"=#>./9=#>J=L/%C@/%XV]MXY_'%

0XY1% &'%?:@"3)-"/%B'%e*5#.$$/%!'%j:)8,)-88/%d'%<),"I-:/%('%F#5,8"-:@"/%2'% >:#)-$/%&'%e*5#.$$/%z'%"#H:3+-/#H=#T'*=#?/-'0"%=#>J=N/%LD/%]'%

0XZ1% g'%P'%;:99)/#H=#K&O=#>./9=#=MNM/%@B/%YZX`MYZXX'%

0X[1% B'%B5:/%?'%<.$E+-"/%e'%K$)*$:-"/%D'%F"-"*")*/%B'%F)+.5C"/%;'%295/%z'% (,:/#K&O=#(!'9'*=#>./9=#>J=L/%DL/%Z[^MZ[_['%

0X\1% !'%&'%()+,-$."/%<'%>'%?*5$@$.)-"/%D'%K'%?#83:@/%&'%&'%235-)".C$$)-$/%<'%(' ?:$H"./#?;33=#H=#K&O)"=#>./9=#>J=L/%@D/%V\[XMV\[^'%

0X]1% ('%>"35=:/%!'%2'%>#:@5#/%K'%&'%;+C/#8"0/7=#>./9=#6"%=#G<=#>J=L/%@B/% \]\[M\]_'%

0X^1% j'%2'%g5.C,/%('%7:+"H"$5C/%B'%F*}.$/%K'%2H$:,/%D'%B,+3E/#H=#89=#>./9=# ,'-=#>JJK/%DEI/%V[YV_MV[YX_'%

0X_1% "R% 6'%;+))"$./%F'%B'%d*@:#G$/%>'%B$$$="#C$/#H=#,M"-.&'%=#?)<!)%=#>J=>/%DI/% VYXMVYY[0%9R% 6'%;+))"$./%F'%B'%d*@:#G$/%>'%B$$$="#C$/%$.%>'91&/./"3!$/# >.!&)*MU#2'*=#C/%D3)5@$5#/%>J=>/%II'%ZY^MZZ^'%

0Y`1% "R% d'%!'%7+,35#/#H=#V'&/"3!-#,-!=#>JJO/%@D/%X[YMX\[0%9R%d'%!'%7+,35#/# (!'W/-."!X;/3#>JJK/%BL/%B$$MB@'%

0YV1% d'%!'%7+,35#/%J'%d'%655C5#/%*,,I)akk),#9")5'.$),'=:@kk%

%