UCL

This paper may be downloaded for personal research purposes. However any additional reproduction dowufthr aurposes., in hard copy owuelectronically, requiese thr consent of thr author(s). If citd o), t]ional (o), t]io3), t]hr au1l3uiefi0ion

Image © UCL Media Services

!

!

! "#$%$&' ()*+,-' . ")-.)&/+)01 "&

!

!

(#$!&'(($%!2$3'2$!,' / !'!1%$'($%!,#'%$!*=!)+AO)1%'+(,!$+($%)+1!(#$!,$%C)3$!3&',,@!'+2!'&,*!'! 1%$'($%!,#'%$!*=!*5(AO)1%'+(,!%$-%$,$+($2!)+!(#$!,$%C)3$!3&',,!(#'+!(#$!$'%&)$%!2$3'2$@! 2$O*+,(%'()+1!(#'(!(#$!$,3'&'(*%!#'2!,(%$+1(#$+$2>!

<A*B)2ACD@5!99!M99!

!

!

!

!

@$9%+)'I)2'.&+.&")

GPH"!Q6!"XbGIH!XRa!6P^VFIH!»»»»9!

PR"FQaV0"PQR!»»»»!;!

GP"IFX"VFI!FIcPIJ!»»»»!]!

"#$!H*3)'&!S*.)&)(4!I,3'&'(*%!"#$*%4!»»»»!]!
IE($+2)+1!(#$!I,3'&'(*%!"#$*%4!»»»»!\!
"#$!W$%=*%0'+3$!*=!F$1)*+'&!I,3'&'(*%,!)+!I+1&'+2!'+2!J'&$,!»»»»K!
I,3'&'(*%!F$1)*+,!)+!P+($%+'()*+'&!O*+($E(,!»»»»!:!

bXOZ^FQVRa!"Q!"NI!;LLL,!»»»»9;!

I3*+*0)3!W%*3$,,$,!»»»»9;!
a$0*1%'-#)3!W%*3$,,$,!»»»»9[!
H*3)'&!W%*3$,,$,!»»»»9]!

aX"X!XRa!SI"NQaQGQ^d!»»»»9K!

a'('!»»»»9K!
S$(#*2*&*14!»»»»9:!

FIHVG"H!»»»»!;;!

I,3'&'(*%!F$1)*+,!)+!(#$!;LLL,!»»»»!;;!
H($--)+1!Q+!»»»»!;;!
H($--)+1!Q==!»»»»!;K!
O*0-'%)+1!(#$!G*+2*+AH*5(#$',(7,!I,3'&'(*%!)+!(#$!9::L,!'+2!(#$!;LLL,!»»»»![L!
H($--)+1!Q+!»»»»![L!
F)2)+1AV-!»»»»![9!
H($--)+1AQ==!»»»»![[!

aPHOVHHPQR!»»»»![]!

OQROGVHPQR!»»»»![:!

FI6IFIROI!GPH"!»»»»e9!

!

!

!

FJ?@)AK)@=>F!?)=DB)KJGC*!?))

)

6)15%$!9f!F$1)*+'&!+$(!O)1%'()*+!*=!9\A;e!4$'%!*&2,!)+!(#$!4$'%,!!
$+2)+1!_5+$!;LL;@!_5+$!;LL]!'+2!_5+$;L99»»»!;;!!

!

!

"'.&$!9!f!H#'%$!*=!%$1)*+'&!O)1%'+(,!'1$2!9\A;e!/#*!'%%)C$2!)+!!
$'3#!%$1)*+!)+!(#$!4$'%,!(*!_5+$!;LL;@!_5+$!;LL]!'+2!_5+$!;L99»»»»»»»»»»»»»»»»»»»»»»»»»!;[!!

!

!

6)15%$!;!f!W%*-*%()*+!*=!#)1#&4A$253'($2!%$1)*+'&!O)1%'+(,!'1$2!!
;LA;]!O*C)+1!(*!$'3#!%$1)*+!.$(/$$+!;LL9!'+2!;L99»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»»!;e!!

!

!

"'.&$!;!f!F$1)*+'&!(%'+,)()*+!%'($,!=*%!2)==$%$+(!O)1%'+(!1%*5-,!!
.$(/$$+!;LL9!'+2!;L99»»!;\!!

!

!

"'.&$![!A!O#'%'3($%),()3,!)+!;LL9!*=!(#*,$!O)1%'()+1!*5(!*=!$'3#!!
%$1)*+!.$(/$$+!;LL9!'+2!;L99!8g!/)(#)+!$'3#!3#'%'3($%),()3<»»»»»»»»»»»»»»»»»»»»»»»»!;MY;:!!

!

!

"'.&$!e!f!H#'%$!*=!O)1%'+(,!'1$2!9\A;]!=%*O!$'3#!%$1)*+!(#'(!!
$+($%$2!(#$!G*+2*+AH*5(#$',(!.$(/$$+!$'3#!)+($%3$+,'&!-$%)*2»»»»»»»»»»»»»»»»»»»»»»»![9!!

!

!

"'.&$!]!A!"%'+,)()*+!%'($,!*=!(#*,$!/#*!O)1%'($2!(*!(#$!G*+2*+AH*5(#$',(!!
=%*O!'&&!*(#$%!%$1)*+,!.$(/$$+!9::9!'+2!;LL9!'+2!;LL9!'+2!;L99»»»»»»»»»»»»»»»»»»»»»»![;!!

!

!

"'.&$!\!A!O#'%'3($%),()3,!*=!(#*,$!&$'C)+1!(#$!G*+2*+AH*5(#$',(!!
)+!$'3#!)+($%3$+,'&!-$%)*2!8g!*=!(#*,$!)+!$'3#!3#'%'3($%),()3<»»»»»»»»»»»»»»»»»»»»»»»![[!

!

!

JD@*ABC2@JAD)

! H*3)'&!0*.)&)(4@!'&(#*51#!'!3*0-&$E!3*+3$-(@!'--$'%,!(*!#'C$!3'-(5%$2!-*&)()3'&!)0'1)+'()*+,!)+!%$3$+(!()0$,>!I+($%)+1!-*&)()3'&!2),3*5%,$!(#%*51#!(#$!)+($%$,(,!*=!"*+4!b&')%7,! R$/!G'.*5%!1*C$%+0$+(!8^*&2(#*%-$@!;L9[<@!)(!/',!-%*35%$2!'+2!-%)*%)(),$2!.4!(#$!3*'&)()*+! 1*C$%+0$+(!/#*!-5.&),#$2!'!2$(')&$2!,(%'($14!/)(#)+!'!4$'%!*=!=*%0)+1!'!1*C$%+0$+(!8NS! ^*C$%+0$+(@!;L9L@!NS!^*C$%+0$+(@!;L99<>!"#),!#',!3*+()+5$2!)+(*!(#$!35%%$+(! 0*+,$%C'()C$!1*C$%+0$+(@!/#*!,$(!5-!(#$!H*3)'&!S*.)&)(4!0*00),,)*+!/)(#)+!0*+(#,!*=! 1')+)+1!-*/$%>!O&$'%&4@!(#$%$!),!,)1+)=)3'+(!)+($%$,(!)+!5+2$%,('+2)+1!#*/!(#$!&)=$!3#'+3$,!*=! -$*-&$!)+!b%)(')+!3'+!.$!)0-%*C$>!!!

! P+($%+'&!0)1%'()*+!#',!.$$+!3#'0-)*+$2!',!*+$!0$'+,>!IE($+,)C$!%$,$'%3#!#',! 5+3*C$%$2!'!&)+D!.$(/$$+!'!1%$'($%!-%*-$+,)(4!(*!$E-$%)$+3$!5-/'%2!,*3)'&!0*.)&)(4!'+2!)+($%+'&!0)1%'()*+>!"#),!%$&'()*+,#)-!#',!'!/$&&A2*350$+($2!#),(*%4@!$+3'-,5&'($2!.4!(#$! $,3'&'(*%!(#$*%4!3*+3$)C$2!.4!"*+4!6)$&2)+1!)+!(#$!$'%&4!9::L,!86)$&2)+1@!9::;<>!G)+D,! .$(/$$+!0)1%'()*+!'+2!5-/'%2!,*3)'&!0*.)&)(4!#'C$!,)+3$!.$$+!,#*/+!(*!*335%!)+!(#$!9:KL,! 86)$&2)+1@!9::;<@!(#$!9:ML,!86)$&2)+1@!9::]<@!'+2!(#$!9::L,!8O#'0-)*+!$(!'&>@!;L9e<>!N*/$C$%@! $C)2$+3$!=%*0!(#$!=)%,(!2$3'2$!*=!(#$!+$/!0)&&$++)50!#',!4$(!(*!.$!5+3*C$%$2>!a'('! 5+'C')&'.&)(4!#',!.$$+!(#$!-%)0'%4!%$',*+!=*%!(#),>!"$,()+1!%$1)*+'&!$,3'&'(*%,!'+2!'--&4)+1! (#$!$,3'&'(*%!(#$*%4!),!0*,(!3*00*+&4!'3#)$C$2!(#%*51#!'+!'+'&4,),!*=!(#$!Q==)3$!=*%! R'()*+'&!H('(),()3,!G*+1)(52)+'&!H(524!*=!I+1&'+2!'+2!J'&$,!8QRHAGH<@!'!2'(',$(!(#'(!5,$,! 0$+,5,!)+=*%0'()*+!(*!(%'3$!'!&'%1$!,'0-&$!*=!-$*-&$!$C$%4!($+!4$'%,>!Q+!a$3$0.$%!9!'#$!-%)0'%42!,*+1

!

!

"#$!,(524!/)&&!3*0-'%$!(#$!-$%=*%0'+3$!*=!(#$!G*+2*+AH*5(#$',(7,!$,3'&'(*%!)+!(#$!;LLL! /)(#!)(,!-$%=*%0'+3$!)+!(#$!9::L,>!"#$!G*+2*+AH*5(#$',(!#',!.$$+!(#$!2*0)+'+(!%$1)*+'&! $,3'&'(*%!)+!I+1&'+2!'+2!J'&$,!,)+3$!'(!&$',(!(#$!9:KL,@!'+2!),!(#$%$=*%$!/$&&!,5)($2!',!'! 0*+)(*%!*=!'+4!,)1+)=)3'+(!3#'+1$,>!S*%$!,-$3)=)3'&&4@!(#$!,(524!'(($0-(,!(*!'+,/$%!(#$! =*&&*/)+1!%$,$'%3#!B5$,()*+,?!

9> N*/!2)2!(#$!$,3'&'(*%!3*0-*+$+(,!)+!(#$!%$1)*+,!*=!I+1&'+2!'+2!J'&$,!-$%=*%0!)+!(#$!)+($%3$+,'&!-$%)*2!.$(/$$+!(#$!;LL9!'+2!;L99!O$+,5,$,h!

9>9> J#)3#!%$1)*+!%$3$)C$2!(#$!1%$'($,(!+50.$%!*=!4*5+1@!$253'($2!'25&(,!)+!(#$! ;LLL,h!

9>;> P,!(#$%$!$C)2$+3$!(#'(!(#*,$!/#*!0)1%'($2!25%)+1!(#$!2$3'2$!/$%$!0*%$!&)D$&4!(*! '3#)C!5-/'%2!,*3)'&!0*.)&)(4!3*0-'%$2!(*!(#*,$!(#'(!2)2!+*(h!

9>[> J#)3#!%$1)*+!/',!0*,(!,533$,,=5&!'(!'&&*/)+1!.*(#!)(,!0)1%'+(!'+2!+*+A0)1%'+(! -*-5&'()*+,!(*!$+1'1$!)+!5-/'%2!,*3)'&!0*.)&)(4!25%)+1!(#$!2$3'2$h!

9>e> P+!/#)3#!%$1)*+!2)2!(#$!3#'%'3($%),()3,!*=!(#*,$!/#*!*5(A0)1%'($2!.$,(!0'(3#!(#$!

!

!

(#$!'+'&4,),!'+2!'+, / $%,!(#$!B5$,()*+,!-*,$2!' . *C$@! / #)&$!(#$!=)=(#!2),35,,$,!(#$)%! ,)1+)=)3'+3$!'+2!) O -*%('+3$! /)(#)+!(#$! /)2$%!3*+($E(>!"#$!=)+'&!,$3()*+!-%*C)2$,!,* O $! 3*+3&52)+1!%$ O '%D,!'+2!-%*C)2$,!,511$,()*+,!=*%!=5%(#$%!%$,$'%3#>!!!

! !

!

!

FJ@ ! *=@C* !)* ! LJ ! <)

@ / +)? ' #-$%) H ' 9-%-&4) ! "#$%$& ' ()@ / + ' (4)

) "*+4!6)$&2)+1!*%)1)+ ' &&4! - %* - * ,$2@!i5 , ()=)$2! ' +2! ' - - &)$2!(#$! , *3) ' &! O * .)&)(4!$, 3 ' & ' (*%!
(#$*%4!)+!$E - & ')+)+1!(#$!%$& ' ()*+ , #) - ! . $(/ $$+!)+(% ' A1$+$% ' ()*+ ' &! , *3) ' &! O * .)&)(4! ' +2!)+($%+ ' &!
O)1% ' ()*+!)+!9 : : ; !86)$&2)+1@!9 : : ; <>!"#$!j$, 3 ' & ' (*%!(#$*%47@! ' , !)(! /)&&!#$+3$=*%(#! . $!%$=$%%$2!(*@!

!

!

O)1%'+(,!)+!G*+2*+›!X!,$3*+2!3%)()B5$!),!*+$!-*,$2!.4!6)$&2)+1!89::;<!)+!(#'(!(#$!(#$*%4!=')&,!

!

!

"#%*51#!$E($+,)C$!)+($%C)$/,!/)(#!R$/!k$'&'+2!5+)C$%,)(4!1%'25'($,!&)C)+1!)+!G*+2*+@!(#$4! /$%$!'.&$!(*!2$C$&*-!'!=*5%A-*)+(!(4-*&*14!.',$2!*+!/#'(!-5&&$2!)+2)C)25'&,!(*!G*+2*+>! J#)&$!(#$4!)+$C)('.&4!%$3*1+),$!(#$!-5&&!*=!(#$!G*+2*+!$,3'&'(*%!)+!3'%$$%!-%*1%$,,)*+@! 0)1%'()*+,!0*()C'($2!.4!35&(5%'&!2$($%0)+'($,!'%$!'&,*!5+3*C$%$2@!)+!&)+$!/)(#!0*%$!1$+$%'&! 0*C$,!'/'4!=%*0!-5%$&4!$3*+*0)3!$E-&'+'()*+,>!6*%!,*0$@!,*3)'&!0*.)&)(4!*--*%(5+)()$,!'%$! (%50-$2!.4!(#$!$E-$%)$+3$!*=!&)C)+1!'+2!/*%D)+1!'.%*'2!8).)2<>!F'(#$%!(#'+!.$)+1!2$$0$2! ='&)5%$,!(#%*51#!(#$)%!)+'.)&)(4!(*!$+1'1$!)+!,*3)'&!0*.)&)(4@!(#$,$!35&(5%'&A0*()C'($2! 0)1%'()*+,!)+,($'2!+$$2!(*!.$!$C'&5'($2!/)(#)+!)+2)C)25'&!3*+($E(,!(#'(!%$=&$3(!(#$!&)C$2! $E-$%)$+3$,!*=!(#$!0)1%'+(>!P(!),!#)1#&4!&)D$&4!(#'(!(#),!'--%$3)'()*+!*=!(#$!/'4,!)+!/#)3#! 0)1%'()*+!3'+!$+%)3#!'!-$%,*+!35&(5%'&&4!',!/$&&!',!$3*+*0)3'&&4!'+2!,*3)'&&4!),!(#$!.',),!*=! 0'+4!3*00$+('(*%,!%$=$%%)+1!(*!(#$,$!%$1)*+,!',!*"#$%&'$()*$+&$,3'&'(*%,!%'(#$%!(#'+! ,-')$+&#-.)+)*/!$,3'&'(*%,!8,$$!(#$!$E($+,)C$!/*%D!*+!$,3'&'(*%!%$1)*+,!.4!"*+4!O#'0-)*+<>!)

!

@/+)M+(I'(7$.#+)'I)*+,-'.$%)!"#$%$&'(")-.)!.,%$.;)$.;)<$%+")

! H)+3$!)(,!3*+3$-(5'&),'()*+!)+!(#$!$'%&4A9::L,!(#$!$,3'&'(*%!(#$*%4!#',!5+2$%1*+$! +$'%&4!;]!4$'%,!*=!$E($+,)C$!%$,$'%3#!'+2!%)1*%*5,!$E'0)+'()*+!)+!(#$!3*+($E(!*=!I+1&'+2! '+2!J'&$,>!6)$&2)+1!89::;<!/',!=)%,(!(*!-%*C)2$!$0-)%)3'&!$C)2$+3$>!V,)+1!2'('!('D$+!=%*0!(#$! QRHAGH!3*C$%)+1!(#$!9:KL,!'+2!(#$!RNH!O$+(%'&!F$1),($%!3*C$%)+1!(#$!9:ML,@!#$!/',!'.&$!(*! 2$0*+,(%'($!(#'(!(#$!G*+2*+AH*5(#$',(!0$(!(#$!3%)($%)'!=*%!'&&!(#%$$!3*0-*+$+(,!*=!(#$! $,3'&'(*%!(#$*%4>!N*/$C$%@!(#),!/',!*+&4!-*,,).&$!(#%*51#!(#$!',,50-()*+!(#'(!(#$!5-/'%2! ,*3)'&!0*.)&)(4!$E-$%)$+3$2!)+!(#$!9:KL,!3*5&2!.$!'--&)$2!(*!(#$!9:ML,@!'!%),D4!',,$%()*+! /#$+!'(($0-()+1!(*!)+(%*253$!'!+$/!(#$*%4>!R*(!3*+($+(!/)(#!,)0-&$!-%$2)3()*+,@!6)$&2)+1! /$+(!*+!(*!2$0*+,(%'($!(#'(!(#$!G*+2*+AH*5(#$',(!)+2$$2!#'2!i5,(!',!2*0)+'+(!'+! $,3'&'(*%!)+!(#$!9:ML,!',!)(!#'2!)+!(#$!9:KL,!

!

!

! PO-*%('+(&4@!#*/C%@!O#'0-)*+!$(!'&!8;L9e<!2*!+*(!='&&!)+(*!(#$!(%'-!*=!=$(),#)`)+1! G*+2*+!'+2!)(,!$,3'&'(*%@!%'(#$%!(#$4!#)1#&)1#(!)(,!2*0)+'+3$!%$&'()C$&(*!(#$!%$,(!*=!I+1&'+2! '+2! J '&$,>!"#$%$!$E),(,!'+!$E-&)3)(!',,$%()*+!(#'(!(#$!$,3'&'(*%!=5+3()*+!*335%,!*5(,)2$!*=!(#$! G*+2*+AH*5(#$',(@!'&.$)(!/)(#!&$,,!-%*0)+$+3$@!(#$!)0-&)3'()*+,!*=!/#)3#!/)&&!.$!2),35,,$2! &'($%>!P+!-'%()35&'%!(#$4!-*)+(!(*!S'+3#$,($%!j. 0)%1&,00%&$,&$&2#)%)&3-%4-%55!8O#'0-)*+!$(!'&>@! ;L9e?!->e[L<>!V+2$%,('+2)+1!/#4!0)1%'+(,@!.*(#!)+($%+'&!'+2!)+($%+'()*+'&@!3#**,$!%$1)*+,! &)D$!(#$!R*%(#! J $,(!'+2!3)()$,!&)D$!S'+3#$,($%!*C$%!(#$!2*0)+'+(!G*+2*+AH*5(#$',(!'1')+!)+C*&C$,!3*+,)2$%)+1!(#$!B5'&)(')()C$!&)($%'(5%$>!X,!/)(#!O*+%'2,*+!'+2!G'(#'0!8;LL]<@!a$C)+$! $(!'&7,!8;LL[<!=)+2)+1,!=%*0!)+A2$-(#!)+($%C)$/,!/)(#!#)1#A,D)&&$2!$0-&*4$$,!)+!S'+3#$,($%! #)1#&)1#(!(#$!+*+A$3*+*0)3!2$($%0)+'+(,!*=!0)1%'()*+!2$3),)*+,!'+2!*5(3*0$,>!"#$,$!)+3&52$!-$%,*+'&!()$,!/)(#!(#$!.%*'2&4A2$=)+$2!jR*%(#7@!'+2!2),,*&5()*+,!/)(#!&)C)+1!'+2! /*%D)+1!)+!G*+2*+@!#'C)+1!,-$+(!'!-$%)*2!*=!()0$!)+!(#$!3'-)('&>!"#$!3'&&!=*%!'!1%$'($%! '--%$3)'()*+!*=!+*+A$3*+*0)3!0*()C'()*+,!'%$!$3#*$2!=5%(#$%!)+($%+'()*+'&&4@!',!)+!FI%'(7,! 8;L9e<!$E-&'+'()*+,!*=!/#4!H/),,!1%'25'($,!%$(5%+!(*!(#$)%!%5%'&!#*0$>!!

! IE'0)+)+1!(#$!$E-$%)$+3$,!*=!(#*,$!*5(,)2$!(#$!G*+2*+AH*5(#$',(!#',!'&,*!('D$+!*+! 1%$'($%!)0-*%('+3$!=*&&*/)+1!(#$!%$A3*+=)15%'()*+!*=!(#$!,($--)+1A*==!3*0-*+$+(!*=!(#$! $,3'&'(*%!(#$*%4>!X!+50.$%!*=!,(52)$,!#'C$!3*+3&52$2!(#'(!)+2)C)25'&,!,-$+2!&$,,!()0$!*+!(#$! $,3'&'(*%!'+2!&$'C$!'(!4*5+1$%!'1$,!(#'+!',,50$2!.4!6)$&2)+1!89::;<>!O#)$=!'0*+1!(#$,$!),! O#'0-)*+!8;L9;<@!/#*!$E'0)+$,!(#$!,($--)+1A*==!-%*3$,,!=%*0!'!&)=$3*5%,$!-$%,-$3()C$! 3*C$%)+1!(#$!-$%)*2!=%*0!9:\\!(*!;LL9>!J#)&$!#),!3*+3&5,)*+,@!(#'(!(#*,$!$+($%)+1!(#$! $,3'&'(*%!%$1)*+!C+(5'&&4!&$'C$!)(!'1')+@!),!)+!&)+$!/)(#!(#$!$,3'&'(*%!(#$*%4@!)(!1*$,!'1')+,(! (#$!3%)($%)'!(#'(!(#*,$!&$'C)+1!'%$!3*0)+1!(*/'%2!(#$!$+2!*=!(#$)%!3'%$$%,>!P+,($'2@!#$! 2$($%0)+$,!(#'(!(*=!(#$!-$*-&$!/#*!&$=(!(#$!G*+2*+AH*5(#$',(!.4!;LL9@!#'C)+1!$+($%$2! .$(/$$+!9:\\!'+2!9:K9@!(#%$$AB5'%($%,!#'2!&$=(!.4!9:M9!'+2!,-$+(!&$,,!(#'+!9]!4$'%,!*+!(#$! $,3'&'(*%>!P+!'22)()*+@!&$'C$%,!)+!9::9!/$%$!0*,(&4!%$-%$,$+($2!)+!(#$!9\A;::!'1$!1%*5->! "#$,$!%$,5&(,!'%$!$3#*$2!$&,$/#$%$>!Q=!'&&!H3*(,!%$(5%+)+1!#*0$!=%*0!(#$!G*+2*+AH*5(#$',(!)+!;LL9@!(/*A(#)%2,!/$%$!'1$2!.$(/$$+!9]!'+2!ee@!/#)&$!*+&4!;Lg!/$%$!'1$2!.$(/$$+!e]! '+2!Ke!86)+2&'4!$(!'&>@!;LLM<>!"#$!%$-%$35,,)*+!=*%!(#$!'+'&4,),!3*+253($2!#$%$!),!(#'(!'! %$1)*+'&!$,3'&'(*%!3'++*(!.$!$E'0)+$2!)+!),*&'()*+!.5(!)+!%$&'()*+!(*!(#$!-$%=*%0'+3$!*=! *(#$%!%$1)*+,>!"#),!-%$,$+(,!'!=&'/!)+!(#$!$,3'&'(*%!(#$*%4>!"#$!/'4!)(!/',!*%)1)+'&&4! 3*+3$-(5'&),$2!.4!6)$&2)+1!89::;<!%$,5&(,!)+!'+'&4,),!(#'(!=*35,$,!*+!)+2)C)25'&!%$1)*+,>!d$(!'&&!

!

!

%$1)*+,!#'C$!)+A=&* / ,!*=!4*5+1@!$253'($2!'25&(,!'+2!)+2)C)25'&,! /)(#)+!$C$%4!%$1)*+! $E-$%)$+3$!5- / '%2!,*3)'&! O*.)&)(4>!"#5,!$C$%4!%$1)*+!#',!'+!$,3'&'(*%!=5+3()*+@!',!O'2$! 3&$'%!.4!O#'O-)*+!8;L9;<@!(#$!-$%=*%O'+3$!*=! / #)3#!.$3*O$,!%$&$C'+(!*+&4!)+!%$&'()*+!(*! *(#$%,>!P(!),!(#),!(#'(!,#*5&2!2%)C$!%$,$'%3#!(#'(!'--&)$,!(#$!(#$*%4>!"#$!+$$2!(*!$E'O)+$!(#$! %$&'()C$!-$%=*%O'+3$!*=!$,3'&'(*%!%$1)*+,!),!3*O-*5+2$2!.4!(#$!&'3D!*=!.',$&)+$,!=%*O! / #)3#! %$1)*+,!3'+!.$!($,($2>!

)

!"#$%$&'()*+,-'.")-.)J.&+(.$&-'.$%)2'.&+6&")

)　"#$!$,3'&'(*%!(#$*%4!#',!'&,*!.$$+!($,($2!)+($%+'()*+'&&4!(#%*51#!(#$!)+C$,()1'()*+,! *=!*335-'()*+'&!-'(# / '4,!'O*+1!)+($%+'()*+'&!O)1%'+(,!)+!(#$)%!2$,()+'()*+!3*5+(%4>!"#),! %$,$'%3#!#',!.$$+!)O-*%('+(>!P(!#',!.$$+!%$-$'($2&4!*.,$%C$2@!)+3&52)+1!.4!6)$&2)+17,!89::;<! *%)1)+'&!-'-$%@!(#'(!*335-'()*+'&!C'3'+3)$,!'%$!,*O$()O$,!=)&&$2!=%*O!'.%*'2@!'+2! 3*+,$B5$+(&4!)(!),!*=!)+($%$,(!(*!$E'O)+$!#* / !(#$!$,3'&'(*%!-$%=*%O,!=*%!)+($%+'()*+'&! O)1%'+(,>!6)%,(&4@!=*%!O'+4!-$*-&$!)+($%+'()*+'&!O)1%'()*+!O'4!)+C*&C$!2* / + / '%2!,*3)'&! O*.)&)(4!86)$&2)+1@!;LLK<>!"#),!),!O*,(!3*OO*+&4!3*+3$-(5'&),$2!',!*C$%AB5'&)=)3'()*+>!P+! I5%*-$!'+2!R*%(#!XO$%)3'@!5+%$3*1+),'.&$!*%!'!&'3D!*=!B5'&)=)3'()*+,!'+2!&'+15'1$!.'%%)$%,! 'O*+1!)OO)1%'+(,!*=($+!&$'2,!(*!(#$!*.(')+O$+(!*=!&* / !,('(5,!i*.,!.$&* / !(#$)%!,D)&&!&$C$&! 8W'-'2O(%)*5!$(!'&>@!;LL:<>!F$&'($2!(*!(#$!$,3'&'(*%!O$('-#*%@!(#),!3'+!.$!,$$+!',!'! 2* / + / '%2!O*CO+(! /)(#!$C)2$+3$!3*O)+1!=%*O!H*5(#$%+!I5%*-$'+!3*5+(%)$,!8c)2'&AO*,*! '+2!S)%$(A^'O5+2)@!;L9e@!W'%$&&'!$(!'&>@!;L9[@!H)Om+!$(!'&>@!;L9e<!',! / $&&!',!^$%O'+4@!(#$! VZ!'+2!'O*+1!F*O'+)'+!)OO)1%'+(,>!8^%'+'(*@!;L9e@!X&$D,4+,D'!'+2!"%)('#@!;L9[@! X&$E'+2%5@!;L9;<>!J#)&$!(#$!$C)2$+3$!-%$,$+($2!#$%$!),!*=!3*5+(%4A /)2$&2* / + / '%2!$,3'&'(*%! O*C$O$+(,@!$,3'&'(*%!%$1)*+A,-$3)=)3!'+'&4,),!#',!2%' / +!,)O)&'%&4!+$1'()C$!3*+3&5,)*+,!=*%!)+($%+'()*+'&!O)1%'+(,>!6)$&2)+1!8;LLK<!=)+2,!(#'(!O'+4!)OO)1%'+(,!,$&=A2$=)+$2!',!j.&'3D7!'+2! jX,)'+7! / #*!$+($%$2!(#$!G*+2*+AH*5(#$',(!)+!(#$!9:ML,!$E-$%)$+3$2!2* / + / '%2!O*.)&)(4!)+(*!.&5$!3*&&'%! / *%D!'+2!5+$O-&*4O$+(>!"#$%$!),@!(#$%$=*%$@!,*O$!,5.,('+3$!(*!(#$!3&')O! (#'(!$,3'&'(*%!%$1)*+,!2*!+*(!-$%=*%O! / $&&!=*%!3$%(')+!=*%$)1+A.*%+!)+2)C)25'&,! / #*!*=($+! $E-$%)$+3$!2* / + / '%2!%'(#$%!(#'+!5- / '%2!,*3)'&!O*.)&)(4!=*&&* /)+1!(#$)%!O)1%'()*+>)

!　Q=!3*5%,$@!O)1%'()*+!),!'!O53#!O*%$!3*O-&$E!-#$+*O$+*+!(#'+!(#),!1$+$%'&! 3*+3&5,)*+!-*%(%'4,>!S'+4!)OO)1%'+(,!2*!$+1'1$!)+!5- / '%2!,*3)'&!O*.)&)(4!=*&&* /)+1!'!

!

!

%$&*3'()*+!(*!'+!$,3'&'(*%!%$1)*+>!O*+%'2,*+!'+2!G'(#'O!8;LL]<

!

!

!

2*O)+'+3$!)+!(#$!9:KL,@!9:ML,!'+2!9::L,!(*!(#$!-*)+(!/#$%$!)(!'--$'%,!(*!.$!,(%53(5%'&&4!

$O.$22$2!)+(*!(#$!/*%D)+1,!*=!b%)(),#!,*3)$(4@!,5%$&4!/$!/*5&2!$E-$3(!(#$!,'O$!(*!*335%!)+!

(#$!;LLL,h!J#)&$!(#),!),!'+!5+2$%,('+2'.&$!*.i$3()*+@!,)O-&4!*$,,"#)%1&*(#'(!)(!/*5&2!.$!(#$!

,'O$!/*5&2!.$!(*!)1+*%$!(#$!3*+($E(!/)(#)+!/#)3#!(#$!;LLL,!/',!-&'4$2!*5(!'+2!(#$!

,)1+)=)3'+(!C+(,!'+2!-%*3$,,$,!(#'(!(**D!-&'3$>!"#$!=*&&*/)+1!,$3()*+!/)&&!(#$%$=*%$!*5(&)+$!

,*O$!*=!(#$,$!3*+($E(,!'+2!-%*3$,,$,!'+2!$E-&')+!#*/!$'3#!3*5&2!)O-'3(!*+!(#$!

-$%=*%O'+3$!*=!$,3'&'(*%!%$1)*+,>!

!   !

!

!

!

-$%3$+('1$A-*)+(!2)==$%$+3$!.$(/$$+!(#$!MLg!%),$!)+!5+$0-&*40$+(!$E-$%)$+3$2!)+! d*%D,#)%$!'+2!"#$!N50.$%!.$(/$$+!$'%&4!;LLM!'+2!$'%&4!;L9L!'+2!(#$![9g!%),$!,$$+!)+! G*+2*+p!'&(#*51#!'![;g!%),$!)+!(#$!R*%(#AJ$,(!2),0),,$,!'!R*%(#YH*5(#!%$1)*+'&!2)C)2$>!"#$! %$1)*+'&!2),-'%)()$,!3*+()+5$!/#$+!O'0-*,!$(!'&!8;L99<!&**D$2!'(!/'1$!'+2!,'&'%4!1%*/(#! *C$%!(#$!%3,,)*+!-$%)*2>!b$(/$$+!;LLKYLM!'+2!;LL:Y9L!(#$,$!1%$/!'(!'+!'++5'&!'C$%'1$! *=!]g!)+!(#$!I',(!*=!I+1&'+2@!#*/C%!(#$!R*%(#!I',(!'+2!(#$!I',(!S)2&'+2,!$E-$%)$+3$2!+*! 1%*/(#@!'+2!+$1'()C$!1%*/(#!/',!$E-$%)$+3$2!)+!(#$!J$,(!S)2&'+2,!'+2!)+!G*+2*+>!X&&!*=! (#),!,$%C$,!(*!#)1#&)1#(!#*/!C'%)'.&$!(#$!)0-'3(,!*=!(#$!%$3$,,)*+!/$%$!=*%!2)==$%$+(!%$1)*+,@! .5(!/#'(!2*$,!(#),!0$'+!=*%!(#$!-$%=*%0'+3$!*=!$,3'&'(*%,h!

! "#$!C'%)*5,!0'3%*$3*+*0)3!)0-'3(,!*=!(#$!%$3$,,)*+!#'C$!(#$!-*($+()'&!(*!)0-'3(!'&&! (#%$$!3*0-*+$+(,!*=!'!%$1)*+7,!$,3'&'(*%>!6)%,(&4@!'!%),$!)+!5+$0-&*40$+(!'+2!'!3*+(%'3()*+!)+!(#$!+50.$%!*=!i*.,!'C')&'.&$!&)0)(,!'!0'i*%!2$($%0)+'+(!*=!)+($%%$1)*+'&!0)1%'()*+!)+! ^%$'(!b%)(')+>!Q+$!$,()0'()*+!,511$,(,!(#'(!*C$%![Lg!*=!0*C$,!.$(/$$+!%$1)*+,!'%$! $0-&*40$+(A%$&'($2!8a)E*+@!;LL[<@!'+2!(#5,!(#$%$!),!(#$!-*,,).)&)(4!(#'(!)+($%%$1)*+'&! 0)1%'()*+!0'4!#'C$!,&*/$2!25%)+1!(#$!&',(!4$'%,!*=!(#$!;LLL,>!H$3*+2&4@!%$25+2'+3)$,@!&'4A *==,!'+2!,('1+'+(!/'1$!1%*/(#!25%)+1!(#$!%3,,)*+!/)&&!#'C$!)0-'3($2!*+!-$*-&$7,! *335-'()*+'&!0*.)&)(4>!"#),@!3*0.)+$2!/)(#!'!='&&!)+!#*5,$!,'&$,!25%)+1!(#$!%3,,)*+!8O'0-*,! $(!'&>@!;L99<@!3'+!,$%)*5,&4!)+#).)(!'!%$1)*+7,!'.)&)(4!(*!-%*C)2$!*--*%(5+)()$,!=*%!5-/'%2!,*3)'&! 0*.)&)(4@!'+2!&)0)(,!(#$!$E($+(!(*!/#)3#!-$*-&$!3'+!0*C$!5-!(#$!$,3'&'(*%>!6)+'&&4@!',!'!%$,5&(! *=!,('1+'()*+!)+!,*3)'&!0*.)&)(4@!'!-*($+()'&&*,,!*=!#50'+!3'-)('&!'+2!',$(,!'+2!(#$!2)==)35&(4!)+!+$1*()'()+1!(#$!#*5,)+1!0'%D$(@!(#$!'.)&)(4!(*!,($-!*==!(#$!$,3'&'(*%!0'4!#'C$!.$3*0$! 0*%$!2)==)35&(>!

!

B+7',($8/-#)M('#+""+")

! X!2$0*1%'-#)3!-%*3$,,!*=!)+3%$',)+1!-%*0)+$+3$!25%)+1!(#$!;LLL,!/',!(#$!%),$!)+!)00)1%'()*+>!b$(/$$+!;LLL!'+2!;LL:@!(#$!,(*3D!*=!=*%$)1+A.*%+!)+!(#$!VZ!)+3%$',$2!.4!*C$%!]Lg!(*!%$'3#!'--%*E)0'($&4!K!0)&&)*+!.4!(#$!$+2!*=!(#$!2$3'2$@!%$-%$,$+()+1!99>eg!*=!(#$! VZ!-*-5&'()*+!8F)$+`*!'+2!c'%1',AH)&C'@!;L9\<>!_5,(!',!(#$!$3*+*0)3!%3,,)*+!#'2!'!%$1)*+'&! 1$*1%'-#4@!,*!#',!VZ!)00)1%'()*+>!P(!),!3&$'%!(#'(!G*+2*+!),!'!=*3'&!-*)+(>!QC$%!eLg!*=! =*%$)1+A.*%+!0)1%'+(,!)+!(#$!VZ!)+!;LLL!/$%$!)+!G*+2*+@!'+2!/#)&$!(#),!#'2!2%*--$2!(*![Kg!

!

!

!

!

!

)+($%+'&! O)1%'()*+!' O *+1!(#*,$!'1$2!\ ]!'+2!*C$%!8HO)(#!'+2!H'1$@!;L9e<>!X!O *%$!2$(')&$2! -)3(5%$!*=!(#$!2$3&)+$!)+!(#$!VZ!)+($%+'&! O)1%'()*+!,4,($O!)+!(#$!;LLL,!),!-%*C)2$2!.4!G*O'E! $(!'&!8;L9e<>!6)%,(&4@!(#$4!=)+2!'!%C%,'&!)+!=&* / ,!.$(/ $$+!(#$!R*%(#!'+2!(#$!H*5(#!*=! I+1&'+2>! J #)&$!(#$!R*%(#!1')+$2!=%*O!(#$!H*5(#!)+!(#$!=)%,(!#'&=!*=!(#$!2$3'2$@!(#),!(%$+2! %$C$%,$2!)+!(#$!,$3*+2!#'&=!'+2! / ',!j

!

!

1%'25'($!/'1$,!(*/'%2!(#$!$+2!*=!(#$!2$3'2$>!^%'25'($,!'1$2!.$(/$$+!;9!'+2![L!)+!;L9]!
#'2!(#$!,'O$!O$2)'+!,'&'%)$,!)+!+*O)+'&!($%O,!8q;e@LLL<!',!(#$4!2)2!)+!;LLM!8bPH@!;L9\<>!"#$!
,5%-&5,!*=!,D)&&$2!&'.*5%!3'+!(#$%$=*%$!&)O)(!(#$!'.)&)(4!*=!'!%$1)*+!(*!'&&*/!5-/'%2!
335-'()+'&!-%*1%$,,)*++@!#$+3$!)(,!-*($+()'&!(*!2),%5-(!(#$!/*%D)+1,!*=!'+!$,3'&'(*%>!!

!	N'C)+1!2$C$&*-$2!'+!5+2$%,('+2)+1!*=!#*/!%$1)*+'&!$,3'&'(*%,!)+!I+1&'+2!'+2!J'&$,!
#'C$!-$%=*%O$2!)+!-%$C)*5,!2$3'2$,!'+2!(#$!3*+($E(!/)(#)+!/#)3#!$,3'&'(*%,!#'C$!
-$%=*%O$2!25%)+1!(#$!;LLL,@!)(!),!-*,,).&$!(*!2$C$&*-!,*O$!#4-*(#$,$,!(*!15)2$!(#$!
$O-)%)3'&!,$3()*+,!*=!(#),!-'-$%>!6)%,(&4@!)(!),!-%$2)3($2!(#'(!(#$!G*+2*+AH*5(#$',(!/)&&!
3*+()+5$!(*!.$!(#$!2*O)+'+(!$,3'&'(*%!%$1)*+!%$&'()C$!(*!*(#$%!%$1)*+,!)+!I+1&'+2!'+2!
J'&$,>!"#),!),!25$!(*!(#$!%$1)*+,!3*+()+5)+1!)O-*%('+3$!/)(#)+!(#$!VZ!$3*+*O4@!)(,!
)O-*%('+3$!)+!(#$!VZ7,!O)1%'()*+!,4,($O!8G*O'E!$(!'&>@!;L9e<@!'+2!)(,!1%*/)+1!%$-5('()*+!',!
'!1&*.'&!3)(4!(#'(!3'+!*==$%!*--*%(5+)()$,!+*(!'C')&'.&$!$&,$/#$%$>!H$3*+2&4@!(#$!'.)&)(4!=*%!
+*+AO)1%'+(,!'+2!O)1%'+(,!)+!(#$!G*+2*+AH*5(#$',(!(*!$+($%!(#$!,$%C)3$!3&',,!/)&&!.$!
1%$'($%!)+!(#$!9::L,!(#$+!=*%!(#$!;LLL,@!2%)C$+!-%)O'%)&4!.4!(#$!-%*3$,,$,!*5(&)+$2!'.*C$>!
"#)%2&4@!)(!),!-%$2)3($2!(#'(!(#$!,($--)+1A*==!-%*3$,,!)+!(#$!;LLL,!/)&&!3*+()+5$!(*!.$!
2*O)+'($2!.4!4*5+1$%!'1$A1%*5-,@!%'(#$%!(#'+!(#*,$!3*O)+1!(*!(#$!$+2!*=!(#$)%!/*%D)+1!
&)C$,!8O#'O-)*+@!;L9;<>!N*/$C$%@!)(),!&)D$&4!(#'(!(#*,$!,($--)+1A*==!/)&&!,()&&!.$!)+!(#$!
'2C'+3$2!,*3)*$3*+*O)3!-*,)()*+,>!

!

B=@=)=DB)H!@NABAFAGP)

B$&$)

! "#$!'+'&4,),!5+2$%('D$+!)+!(#),!,(524!0'D$,!5,$!*=!(/*!2'(',$(,>!"#$!=)%,(!),!(#$! '++5'&!-5.&)3'()*+!*=!VZ!)+($%+'&!0)1%'()*+!,('(),()3,!.4!(#$!Q==)3$!=*%!R'()*+'&!H('(),()3,! 8QRH<>!V+=*%(5+'($&4@!(#$%$!),!+*!3$+(%'&!%$1),($%!=*%!=*%0'&&4!%$3*%2)+1!)+($%+'&!0)1%'()*+,! /)(#)+!(#$!VZ>!P+,($'2@!(#$!=)15%$,!3*0.)+$!2'('!=%*0!(#$!W'()$+(!F$1),($%!a'('!H$%C)3$!8WF<@! (#$!RNH!O$+(%'&!F$1),($%!8RNHOF<!'+2!(#$!N)1#$%!I253'()*+!H('(),()3,!X5(#*%)(4!8NIHX<>!"#$! '++5'&!%$&$',$!*=!WF!2'('!'+2!(#$!/$$D&4!%$&$',$!*=!(#$!RNHOF!'&&*/,!'!0)1%'()*+!(*!.$! %$3*%2$2!.4!)2$+()=4)+1!/#$+!'+!)+2)C)25'&@!(%'3$2!.4!'!5+)B5$!RNH!R50.$%@!%$1),($%,!'! 3#'+1$!*=!^$+$%'&!W%'3()()*+$%!8^W<>!"#$!2'('@!(#$%$=*%$@!0$',5%$,!3#'+1$!*=!&*3'&!'5(#*%)(4! %'(#$%!(#'+!3#'+1$!*=!'22%$,,>!N*/$C$%@!)(!#',!.$$+!%$3*1+),$2!(#'(!0'+4!4*5+1!-$*-&$@!)+! -'%()35&'%!0'&$!,(52$+(,@!=')&!(*!%$1),($%!/)(#!(#$)%!&*3'&!^W!=*&&*/)+1!'!0*C$!(*!*%!=%*0! 5+)C$%,)(4>!"#$4!'%$!,5.,$B5$+(&4!*0)(($2!=%*0!)+($%+'&!0)1%'()*+!,('(),()3,!,*&$&4!%$&)'+(!*+! ^W!2'('>!"*!%$0$24!(#),@!0)1%'()*+!=&*/,!'%$!,5--&$0$+($2!.4!2'('!=%*0!NIHX@!/#)3#! -%*C)2$,!.*(#!($%0A()0$!'+2!#*0$!'22%$,,$,!'+2!$+'.&$,!(#$!QRH!(*!3'-(5%$!(#$! 0)1%'()*+,!*=!,(52$+(,@!/#)3#!'33*5+(!=*%!'!&'%1$!-%*-*%()*+!*=!)+($%+'&!0)1%'()*+!)+!(#$!VZ! 8QRH@!;L9]<>!J#)&$!(#$!,(52$+(!'2i5,(0$+(!0$(#*2!#',!+*/!.$$+!)+3&52$2!)+!'&&!)+($%+'&! 0)1%'()*+!,('(),()3,!%$&$',$2!,)+3$!_5+$!;L9L@!)(!#',!'&,*!.$$+!%$(%*,-$3()C$&4!'--&)$2!(*!2'('! 1*)+1!.'3D!(*!)+($%+'&!0)1%'()*+!)+!(#$!4$'%!(*!_5+$!;LL;>!!

! "#$!,$3*+2!2'(',$(!5,$2!)+!(#$!'+'&4,),!),!(#$!Q==)3$!=*%!R'()*+'&!H('(),()3,! G*+1)(52)+'&!H(524!*=!I+1&'+2!'+2!J'&$,!8QRHAGH<>!P+!($,()+1!(#$!$,3'&'(*%!(#$*%4!)+!(#$!VZ! 3*+($E(!)(!),!(#$!0*,(!-*-5&'%!'+2!5,$=5&!2'(',$(!'C')&'.&$>!V,)+1!O$+,5,!'+2!&)=$!$C$+(,! 2'('@!(#$!QRHAGH!-%*C)2$,!'!2$(')&$2@!&)+D$2!%$3*%2!=*%!'!,'0-&$!*=!)+2)C)25'&,!.*%+!*+!*+$!*=! =*5%!2'($,!,$&$3($2!)+!(#$!3'&$+2'%!4$'%>!"#),!3%$'($,!'!,'0-&$!*=!*C$%!#'&=!'!0)&&)*+!-$*-&$! '(!$'3#!O$+,5,@!$B5'&!(*!'%*5+2!9g!*=!(#$!-*-5&'()*+!*=!I+1&'+2!'+2!J'&$,>!H('%()+1!'(!(#$! 9:K9!O$+,5,@!2'('!#',!+*/!.$$+!3*&&$3($2!'+2!0'2$!'C')&'.&$!=*%!$'3#!*=!(#$!O$+,5,$,! 3*+253($2!,)+3$>!"#),!)+3&52$,!(#$!;L99!O$+,5,!=*&&*/)+1!(#$!%$&$',$!*=!(#$!;L99! G*+1)(52)+'&!H(524!2'('!*+!9'('a$3$0.$%!;L9[!8G4+3#!$(!'&>@!;L9]<>!b4!3*&&$3()+1!)+=*%0'()*+! *+!(#*,$!(#'(!$+($%!(#$!QRHAGH!8(#%*51#!.)%(#,!'+2!)00)1%'()*+<!'+2!%$(')+)+1!(#$!)+=*%0'()*+!*=!(#*,$!(#'(!&$'C$!8(#%*51#!2$'(#!'+2!$0)1%'()*+<@!(#$!2'(',$(!3*+(')+,!

!

)+=*%O'()*+!*+!*C$%!9!O)&&)*+!)+2)C)25'&,>!"#$!,'O-&$,!*=!)+($%$,(!#$%$!'%$!(#*,$!-%$,$+(!'(! (#$!9::9!'+2!;LL9!O$+,5,$,@!$B5'&!(*!e9M@;Le@!'+2!(#*,$!-%$,$+(!'(!(#$!;LL9!'+2!;L99! O$+,5,$,@!$B5'&!(*!e;9@K:]!8G4+3#!$(!'&>@!;L9]<>!!

!   "#$!.$+$=)(,!*=!5,)+1!(#),!2'(',$(!*C$%!*(#$%!&*+1)(52)+'&!,(52)$,!)+!I+1&'+2!'+2! J'&$,!,53#!',!(#$!9:KL!b%)(),#!O*#*%(!H(524!*%!(#$!b%)(),#!W'+$&!N*5,$#*&2!H5%C$4!'%$! +5O$%*5,>!"#$!=)%,(@!)(,!,)`$@!#',!'&%$'24!.$$+!O$+()*+$2>!"#$!,$3*+2!),!(#$!,3*-$!*=!)(,! 3*C$%'1$!'+2!(#$%$=*%$!)(,!'.)&)(4!(*!.$!%$-%$,$+('()C$!*=!(#$!/#*&$!b%)(),#!-*-5&'()*+>!"#),!),! 3*+=)%O$2!.*(#!.4!'!C$%4!#)1#!O$+,5,!%$,-*+,$!%'($!8:eg!)+!;LL9!'+2!;L99<!'+2!*.,$%C$2! ,'O-&)+1!=%'3()*+,!3*%%$,-*+2)+1!/)(#!/#'(!/*5&2!.$!$E-$3($2!*=!'!%$-%$,$+('()C$!,'O-&$! 8G4+3#!$(!'&>@!;L9]<>!"#$!(#)%2!.$+$=)(!),!)(,!&*/!'((%)()*+!%'($@!')2$2!.4!(#$!&$1'&!%$B5)%$O$+(,! *=!3*O-&$()+1!(#$!O$+,5,!'+2!%$-*%()+1!&)=$!C+(,>!6*5%(#!),!(#$!/$'&(#!*=!)+2)C)25'&!.5(! '+*+4O),$2!2'('!'C')&'.&$>!"#$!QRHAGH!3*+(')+,!)+=*%O'()*+!*+!3#'%'3($%),()3,!,53#!',!,*3)'&! 3&',,@!$O-&*4O$+(@!#$'&(#@!$253'()*+!'+2!O)1%'()*+!-'(($%+,@!',!/$&&!',!2$(')&$2!)+=*%O'()*+! *+!='O)&4!O$O.$%,>!"#$,$!)+2)C)25'&!3#'%'3($%),()3,!3'+!,5.,$B5$+(&4!.$!(%'3$2!(#%*51#!(#$! 2$3'2$,>!!

!   N*/C%@!(#$!2'(',$(!2*$,!#'C$!/$'D+$,,$,>!F$&'()C$&4!&*/!'((%)()*+!%'($,!2*!+*(! 15'%'+($$!3*O-&$($!(%'3D)+1!.$(/$$+!O$+,5,$,!',!'!3*+,$B5$+3$!*=!)+2)C)25'&,!$E),()+1!(#$! QRHAGH!/)(#!+*!%$3*%2!*=!2$'(#!*%!$O)1%'()*+>!X22)()*+'&&4@!3*C$%'1$!*+&4!$E($+2,!(*! %$,)2$+(,!*=!I+1&'+2!'+2!J'&$,@!/#)&,(!%$,)2$+(,!*=!H3*(&'+2!'+2!R*%(#$%+!P%$&'+2!'%$! %$3*%2$2!)+!(#$)%!%$,-$3()C$!&*+1)(52)+'&!,(52)$,>!J#)&$!)+3*%-*%'()+1!'&&!(#%$$!,(52)$,!),! -*,,).&$@!)(!/',!.$4*+2!(#$!()O)+1!'+2!,3*-$!*=!(#$!,(524>!"#)%2&4@!3$%(')+!B5$,()*+,!'+2! '+,/$%,!&'3D!3*+()+5)(4!.$(/$$+!O$+,5,$,>!6*%!$E'O-&$@!)+=*%O'()*+!*+!#)1#$,(! B5'&)=)3'()*+!),!3'($1*%),$2!2)==$%$+(&4!)+!9::9!(*!#*/!)(!),!)+!;LL9!'+2!;L99>!H)O)&'%&4@! 2)==$%$+(!(*-)3,!.$3*O$!)O-*%('+(!',!()O$!-',,$,>!a$(')&$2!B5$,()*+,!%$1'%2)+1!$(#+)3!,('(5,! '+2!%$&)1)*+@!=*%!)+,('+3$@!/$%$!=)%,(!',D$2!)+!;LL9!'+2!(#$%$=*%$!3'++*(!.$!3*O-'%$2!(*! -%$C)*5,!O$+,5,$,!8QRH@!;LLe<>!6*5%(#@!25$!(*!(#$!2$(')&$2!-$%,*+'&!)+=*%O'()*+!)+3&52$2@! +*+A2),3&*,5%$!*=!,$+,)()C$!)+=*%O'()*+!),!*=!5-O*,(!)O-*%('+(!(*!(#$!QRH>!H'O-&$!,)`$,!'%$! 3*+,$B5$+(&4!%$,(%)3($2!(*!9L@!/#)3#!)+!,*O$!3',$,!&)O)(,!*=!(#$!'+'&4,),!(#'(!3'+!.$! 3*+253($2>!Q(#$%!/$'D+$,,$,!*=!3$%(')+!C'%)'.&$,!'+2!2$=)+)()*+,!5,$2!)+!(#$!'+'&4,),!/)&&!.$! $E'O)+$2!)+!(#$!O$(#*2*&*14!,$3()*+!.$&*/>!!!

!

!

!

H+&/';'%',4)

! "#$!(/*!0')+!')0,!*=!(#),!-'-$%!'+2!(#$!3*%%$,-*+2)+1!%$,$'%3#!B5$,()*+,!5()&),$! 2)==$%$+(!%$,$'%3#!2$,)1+,>!O*0-'%)+1!(#$!=5+3()*+!*=!$'3#!%$1)*+7,!$,3'&'(*%!25%)+1!(#$! ;LLL,!('D$,!'!&*+1)(52)+'&!'--%*'3#@!/#)&$!3*0-'%)+1!(#$!-$%=*%0'+3$!*=!(#$!G*+2*+A H*5(#$',(!$,3'&'(*%!.$(/$$+!(#$!9::L,!'+2!(#$!;LLL,!)+C*&C$,!'!3%*,,A,$B5$+()'&!'--%*'3#>! R*+$(#$&$,,@!.*(#!)+C*&C$!($,()+1!(#$!(#%$$!3*0-*+$+(,!*=!(#$!$,3'&'(*%!(#$*%4!'+2! (#$%$=*%$!5,$!(#$!,'0$!0$(#*2*&*1)$,>!"#$4!'%$!'&,*!.*(#!3*+253($2!'(!(#$!,'0$!,-'()'&! ,3'&$@!/#)3#!),!%$1)*+'&>!"#$%$!'%$!9L!%$3*1+),$2!%$1)*+,!3*C$%)+1!I+1&'+2!'+2!J'&$,?!"#$!

!

!

9+$,,&:?!N)1#$%!S'+'1$%)'&@!X2O)+),(%'()C$!'+2!W%*=$,,)*+'&!Q335-'()*+,!8)+3&52)+1!

$O-&*4$%,!)+!&'%1$!*%1'+),'()*+,<p!

9+$,,&;?!G*/$%!S'+'1$%)'&@!X2O)+),(%'()C$!'+2!W%*=$,,)*+'&!Q335-'()*+,p!!

9+$,,&<?!P+($%O$2)'($!Q335-'()*+,p!

9+$,,&=?!HO'&&!IO-&*4$%,!'+2!Q/+!X33*5+(!J*%D$%,p!

9+$,,&>?!G*/$%!H5-$%C),*%4!'+2!"$3#+)3'&!Q335-'()*+,p!

9+$,,&\?!H$O)AF*5()+$!Q335-'()*+,p!

9+$,,&K?!F*5()+$!Q335-'()*+,p!

'+2?!

R$C$%!J*%D$2!'+2!G*+1A"$%O!V+$O-&*4$2p!

65&&A")O$!H(52$+(p!

Q335-'()*+!P+'2$B5'($&4!a$,3%).$2p!

R*(!O&',,)=)'.&$!=*%!Q(#$%!F$',*+,>!

!

! X!(%'+,)()*+!%'($!),!(#$+!5,$2!(*!O$',5%$!(#$!-%$C'&$+3$!*=!5-/'%2!,*3)'&!O*.)&)(4! 'O*+1!'!-*-5&'()*+!1%*5-!)+!,)O)&'%)(4!(*!O#'O-)*+!$(!'&!8;L9e<>!"#$!(%'+,)()*+!%'($!)+!(#$! 3*+($E(!*=!(#),!-'-$%!),!(#$!-%*-*%()*+!*=!'&&!(#*,$!)+!/*%D!.5(!+*(!)+!(#$!('%1$(!,*3)'&!3&',,!'(! (#$!.$1)++)+1!*=!(#$!-$%)*2!8)+3&52)+1!=5&&A()O$!,(52$+(,<!/#*!'%$!)+!(#$!('%1$(!,*3)'&!3&',,!'(! (#$!$+2!*=!(#$!-$%)*2>!"#$!('%1$(!,*3)'&!3&',,!)+!(#),!3*+($E(!'%$!RHHIO!O&',,$,!9!'+2!;@!/#)3#! /)&&!#$+3$=*%(#!.$!D+*/+!',!(#$!j,$%C)3$A3&',,7>!"#$!(%'+,)()*+!%'($!(#$%$=*%$!O$',5%$,!(#$! -%*-*%()*+!*=!(#*,$!)+!(#$!+*+A,$%C)3$!3&',,!'(!*+$!O$+,5,!/#*!'%$!)+!(#$!,$%C)3$!3&',,!'(!(#$! O$+,5,!($+!4$'%,!&'($%>!V+=*%(5+'($&4@!(#),!2$=)+)()*+!),!5+'.&$!(*!3'-(5%$!,O'&&!5-/'%2!,*3)'&! O*C$O$+(,!/)(#)+!*%!.$(/$$+!(#$!RHHIO!O&',,$,!3'($1*%),$2!',!,$%C)3$!'+2!+*+A,$%C)3$>! "#*51#!(#),!/*5&2!-%*C)2$!'!O*%$!+5'+3$2!'+2!2$(')&$2!'+'&4,),@!)(!),!&)D$&4!(#'(!(#$4!/*5&2! C)*&'($!QRH!2),3&*,5%$!%5&$,!'+2!(#$%$=*%$!'+!'11%$1'($2!O$',5%$!*=!,*3)'&!O*.)&)(4!),! '--&)$2!#$%$>!!!

! P+!3*OO*+!/)(#!*(#$%!-'-$%,!*+!(#$!(*-)3@!(#$!'+'&4,),!/)&&!3*O-'%$!(#$!(%'+,)()*+! %'($,!=*%!O)1%'+(,!'+2!+*+AO)1%'+(,!)+!*%2$%!(*!),*&'($!(#$!)O-'3(!*=!O)1%'()*+@!.5(!(#),! %$B5)%$,!3&'%)=)3'()*+>!"#$%$!),!&)((&$!3*+,$+,5,!*+!/#'(!(#$!($%O!jO)1%'+(7!$E-&)3)(&4!2$=)+$,@! '+2!),!)+,($'2!5,$2!',!'!*+$A,)`$A=)(,A'&&!($%O!3*C$%)+1!C'%4)+1!2$1%$$,!*=!2),('+3$!'+2!()O$!

!

!

!

8X+2$%,*+!'+2!b&)+2$%@!;L9]<>!P+!(#),!-'-$%@!'+!QRHAGH!0$0.$%!),!2$=)+$2!',!'!0)1%'+(!)=! (#$)%!%$1)*+!*=!5,5'&!'22%$,,!'(!*+$!0$+,5,!),!2)==$%$+(!(*!(#$)%!%$1)*+!*=!5,5'&!'22%$,,!'(!(#$! +$E(>!N$+3$!(#$4!'%$!)+($%+'&!%$1)*+'&!0)1%'+(,!/)(#)+!I+1&'+2!'+2!J'&$,>!X!+*+A0)1%'+(!),! '+!QRHAGH!0$0.$%!/#*,$!%$1)*+!*=!5,5'&!'22%$,,!),!(#$!,'0$!'(!.*(#!0$+,5,$,!($+!4$'%,! '-'%(>!Q.C)*5,&4!(#),!#',!,*0$!&)0)('()*+,>!6)%,(&4@!)(!',,50$,!(#'(!*+&4!*+$!0)1%'()*+!#',! *335%%$2!25%)+1!'!($+A4$'%!-$%)*2>!6*%!&$,,!,-'()'&&4A0*.)&$@!*&2$%!QRHAGH!0$0.$%,!(#),!0'4! .$!(#$!3',$@!.5(!=*%!(#*,$!/)(#!'!1%$'($%!-%*-$+,)(4!(*!0)1%'($@!,53#!',!4*5+1!'25&(,@!)(!/)&&! &)D$&4!$E3&52$!(#$!05&()(52$!*=!0*C$0$+(,!)+C*&C$2!)+!0*C)+1!(*!'+2!=%*0!5+)C$%,)(4!'+2!)+(*!(#$!&'.*5%!0'%D$(>!H$3*+2&4@!(#$!2$=)+)()*+!$E3&52$,!0*C$,!(#'(!*335%!/)(#)+!%$1)*+,! '+2!/)(#)+!&*3'&!'5(#*%)()$,>!N*/$C$%@!1)C$+!(#'(!*+&4!*+$AB5'%($%!*=)+(%'A%$1)*+'&!'+2!Mg! *=!)+(%'A'5(#*%)(4!0*C$,!/$%$!0*()C'($2!.4!$0-&*40$+(!*%!$253'()*+@!(#$4!'%$!5+&)D$&4!(*! #'C$!.$$+!%$&'($2!(*!'!3#'+1$!)+!*335-'()*+!'+2!'%$!(#$%$=*%$!+*(!%$&$C'+(!(*!(#$!,(524! 8a)E*+@!;LL[<>!Q+!(#$!*(#$%!#'+2@!$0-&*40$+(!'+2!$253'()*+!/$%$!0*()C'()*+,!=*%!*C$%!]Lg!*=!)+($%A%$1)*+'&!0*C$,!.$(/$$+!;LLL!'+2!;LL[!'+2!/)&&!(#$%$=*%$!0*%$!&)D$&4!(*!#'C$!)+C*&C$2!'!3#'+1$!*=!/*%D!-&'3$!8a)E*+@!;LL[<>!X!(#)%2!&)0)('()*+!*=!(#$!2$=)+)()*+!),!(#'(!)(! /)&&!'&,*!)1+*%$!*5(A0)1%'()*+,!'+2!,5..,$B5$+(!%$(5%+,!(#'(!*335%!.$(/$$+!0$+,5,$,@!2%)C$+! .4!-$%#'-,!'!=')&5%$!(*!1')+!$0-&*40$+(!'+2!'!%$(5%+!(*!(#$!-'%$+('&!#*0$!8H'1$!$(!'&>@! ;L9[<>!"#$!&)0)('()*+,!*=!(#$!2$=)+)()*+!*=!'!0)1%'+(!5+=*%(5+'($&4!3'++*(!.$!*C$%3*0$@! $,-$3)'&&4!',!.%$'D)+1!2*/+!0)1%'()*+!.$&*/!%$1)*+A(*A%$1)*+!/*5&2!%),D!.%$'D)+1!QRH!+*+A 2),3&*,5%$!%5&$,>!N*/$C$%@!(#$4!'%$!*5(/$)1#$2!.4!(#$!2$(')&,!)+!/#)3#!(#$!QRHAGH!),!'.&$!(*!)+=*%0!*+!)+2)C)25'&!*335-'()*+'&!'+2!,*3)'&!3&',,!-'(#/'4,>!a$=)+)+1!0)1%'+(,!)+!(#),!/'4! '&,*!0')+()+,!3*+()+5)(4!.$(/$$+!-%$C)*5,!%$,$'%3#!(#'(!#',!,(52)$2!(#$!%$&'()*+,#)-! .$(/$$+!,-'()'&!'+2!,*3)'&!0*.)&)(4>!!

! a5$!(*!,5..,$B5$+(!%$,$'%3#!3*5+($%)+1!6)$&2)+17,!89::;<!,($--)+1A*==!3*0-*+$+(@!)(!),!+*(!'--%*-%)'($!(*!&**D!,*&$&4!'(!(#$!0)1%'()*+!*=!*&2$%!-$*-&$>!F'(#$%@!(#$!'--%*'3#!('D$+! #$%$!),!(*!$E'0)+$!(#$!3#'%'3($%),()3,!*=!(#*,$!(#'(!0)1%'($2!*5(!*=!$'3#!%$1)*+!25%)+1!(#$!)+($%A3$+,5'&!-$%)*2!(*!2$($%0)+$!)=!(#$4!/$%$!)+!'2C'+3$2!,*3)'&!-*,)()*+,>!"#),!/)&&!.$! '3#)$C$2!5,)+1!(#$!QRHAGH>!

! !

!

!

!

*!?CF@?)

) X,!-$%!(#$!')O,!*=!(#),!-'-$%@!(#$!=)+2)+1,!2),35,,$2!)+!(#),!,$3()*+!'%$!,-&)(!)+(*!(/*>! "#$!=)%,(!,$3()*+!3*O-'%$,!(#$!-$%=*%O'+3$!*=!(#$!$,3'&'(*%!)+!$'3#!%$1)*+!25%)+1!(#$!;LLL,@! =*35,)+1!*+!'&&!(#%$$!*=!(#$!,($--)+1A*+@!%)2)+1A5-!'+2!,($--)+1A*==!3*O-*+$+(,>!"#$!,$3*+2! -'%(!/)&&!(#$+!3*O-'%$!(#$!-$%=*%O'+3$!*=!(#$!G*+2*+AH*5(#$',(7,!$,3'&'(*%!.$(/$$+!(#$! ;LLL,!'+2!9::L,>!!!)

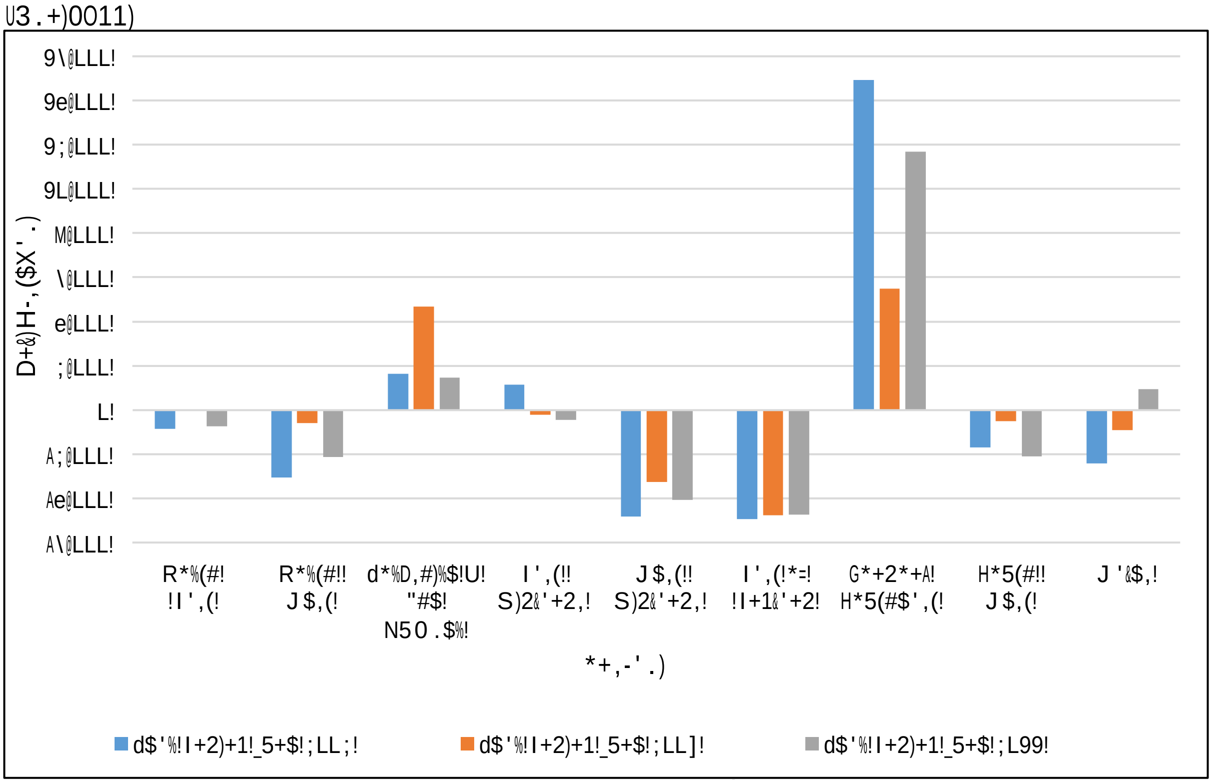
)

!"#$%$&'()*+,-'.")-.)&/+)0000")

*?*0(()%1&@%&*

& IE'O)+)+1!(#$!,($--)+1A*+!3*O-*+$+(!)+C*&C$,!3*O-'%)+1!(#$!%$1)*+'&!O)1%'()*+!*=! 4*5+1!'25&(,>!6)%,(&4@!/$!3'+!&**D!'(!+$(!O)1%'()*+!=*%!C'%)*5,!4$'%,!25%)+1!(#$!;LLL,>!*A)1"60&* *:!,#*/,!(#$!%$1)*+'&!+$(!O)1%'()*+!*=!9\A;e!4$'%!*&2,!)+!(#$!4$'%,!$+2)+1!_5+$!;LL;!@!_5+$!!

K-,3(+)1Q)*+,-'.$%).+&)7-,($&-'.)'I)1RSOT)4+$()'%;")-.)&/+)4+$(")+.;-.,)U3.+)0000V)U3.+)000W)$.;) U3.+)0011)



H*5%3$?!QRH@!;LL[@!;LL\@!;L9;!&QRH@!;LL[@!QRH@!;LL\@!QRH@!;L9;<!

!!

;!"#),!4$'%!),!3#*,$+!=*%!(/*!%$',*+,>!6)%,(&4@!)(!3*C$%,!O*,(!*=!(#$!-$%)*2!3*C$%$2!.4!(#$!)+($%3$+,'&!-$%)*2! .$(/$$+!(#$!;LL9!'+2!;L99!O$+,5,$,>!H$3*+2&4@!)(!),!(#$!$'%&)$,(!)+($%+'&!O)1%'()*+!2'('!'C')&'.&$!(#'(!#',! .$$+!'2i5,($2!=*%!(#$!O-%*C$2!$,()O'()*+!*=!,(52$+(!O)1%'()*+>!

!

!

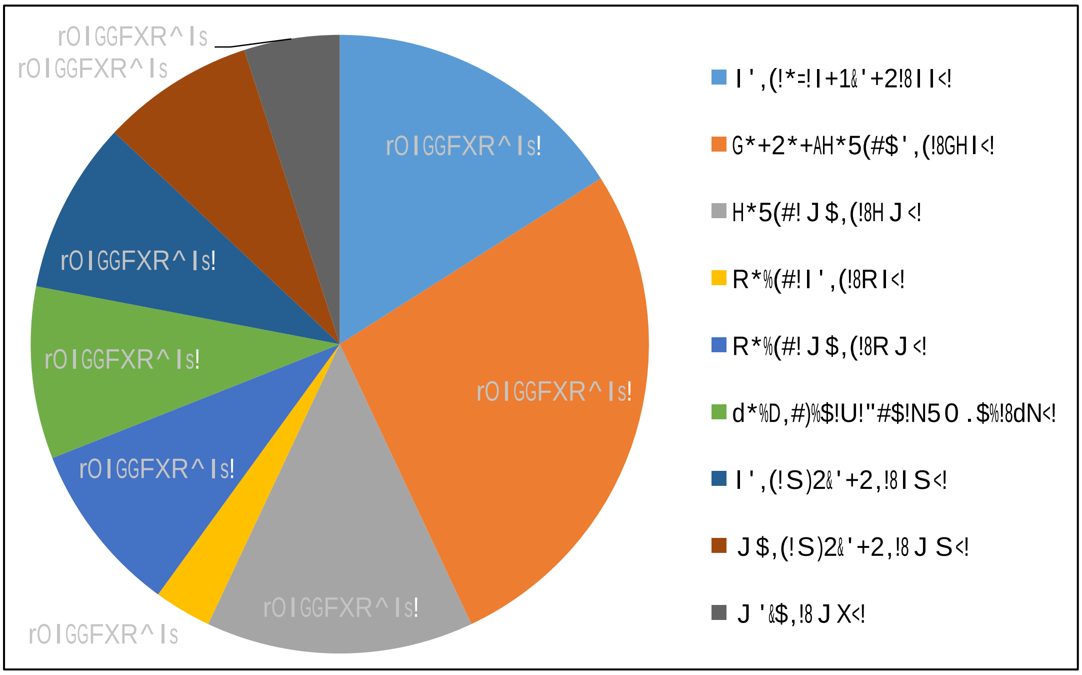
!

; [!

!

!

!


rOIGGFXR^Is
rOIGGFXR^Is
rOIGGFXR^Is!
rOIGGFXR^Is!
rOIGGFXR^Is!
rOIGGFXR^Is!
rOIGGFXR^Is!
rOIGGFXR^Is!
rOIGGFXR^Is
I',(!*=!I+1&'+2!8II<!
G*+2*+AH*5(#$',(!8GHI<!
H*5(#!J$,(!8HJ<!
R*%(#!I',(!8RI<!
R*%(#!J$,(!8RJ<!
d*%D,#)%$!U!"#$!N50.$%!8dN<!
I',(!S)2&'+2,!8IS<!
J$,(!S)2&'+2,!8JS<!
J'&$,!8JX<!

!

!

-*-5&'()*+,>!"#$!QRHAGH!),@!'1')+@!5+)B5$&4!-*,)()*+$2!(*!-%*C)2$!(#),!)+=*%O'()*+>!6)%,(&4@! (#$!(%'+,)()*+!%'($,!=*%!'&&!%$1)*+'&!O)1%'+(,!'+2!+*+AO)1%'+(,!3'+!.$!3*O-'%$2!(*! 2$($%O)+$!/#$(#$%!O)1%'()*+!-%*C)2$2!'+4!.$+$=)(>!b*(#!=)15%$,!/$%$!*.(')+$2!=%*O!'! ,'O-&$!*=!QRHAGH!O$O.$%,!/#*!/$%$!-%$,$+(!'(!.*(#!(#$!;LL9!'+2!;L99!O$+,5,$,@!/$%$! '1$2!9\A\]!)+!;LL9!8'+2!;\AK]!)+!;L99[<@!'+2!/$%$!)+!$O-&*4O$+(!*%!/$%$!=5&&A()O$!,(52$+(,! '(!.*(#!O$+,5,$,!',!O$',5%$2!.4!(#$)%!RHHIO!O&',,>!6*%!'&&!(#*,$!/#*!2)2!+*(!%$1)*+'&&4! O)1%'($!.$(/$$+!;LL9!'+2!;L99!(#$!(%'+,)()*+!%'($!/',!9M>Kg@!$B5'&!(*!;:@\;M>!"#),!)+2)3'($,!(#'(@!=*%!'&&!+*+AO)1%'+(,@!(#$!+5O.$%!*=!)+2)C)25'&,!)+!(#$!+*+A,$%C)3$!3&',,!)+! ;LL9!.5(!)+!(#$!,$%C)3$A3&',,!)+!;L99!/',!;:@\;M@!/#)3#!%$-%$,$+(,!9M>Kg!*=!'&&!(#*,$!)+!(#$! +*+A,$%C)3$!3&',,!)+!;LL9>!"#$!3*%%$,-*+2)+1!(%'+,)()*+!%'($!*=![\>Kg!=*%!'&&!(#*,$!/#*! O)1%'($2!.$(/$$+!;LL9!'+2!;L99!),!,)1+)=)3'+(&4!#)1#$%!'+2!)+2)3'()C$!*=!'!O)1%'()*+! -%$O)5O>!IB5'&!(*!e@LM;!-$*-&$@!)(!2$+*($,!(#'(!/$&&!*C$%!'!(#)%2!*=!(#*,$!+*(!)+!(#$!,$%C)3$! 3&',,!)+!;LL9!.$=*%$!(#$4!O)1%'($2!/$%$!)+!(#$!,$%C)3$!3&',,!)+!;L99>!O&$'%&4@!%$1)*+'&! O)1%'()*+!#',!'+!$==$3(@!.5(!2)2!(#),!O)1%'()*+!-%$O)5O!2)==$%!.4!%$1)*+!*=!2$,()+'()*+h!!!

& "#$!QRHAGH!'&&*/,!(#),!%$1)*+'&!3*O-'%),*+>!"#$!(%'+,)()*+!%'($,!'+2!O)1%'()*+! -%$O)5O,!=*%!+*+AO)1%'+(,@!)+AO)1%'+(,!'+2!*5(AO)1%'+(,!=*%!$'3#!*=!(#$!+)+$!%$1)*+,!)+!(#$! ;LLL,!'%$!1)C$+!)+!*B$.+O&;*@!'+2!'%$!.',$2!*+!(#$!,'O$!,'O-&$!3%)($%)'!',!'.*C$>!"#$!,$3*+2! 3*&5O+!&**D,!'(!(#$!+*+AO)1%'+(,!)+!$'3#!%$1)*+>!O&$'%&4@!'!+*+AO)1%'+(!#'2!(#$!1%$'($,(! 3#'+3$!*=!'3#)$C)+1!5-/'%2!,*3)'&!O*.)&)(4!)=!(#$4!&)C$2!)+!(#$!G*+2*+AH*5(#$',(!%$1)*+>!Q=! (#*,$!&)C)+1!)+!(#$!%$1)*+!'+2!+*(!)+!(#$!,$%C)3$!3&',,!)+!;LL9@!;;>[g!#'2!$+($%$2!(#$!,$%C)3$! 3&',,!.4!;L99>!"#$!,$3*+2!1%$'($,(!3#'+3$!/',!*==$%$2!)+!(#$!I',(!*=!I+1&'+2@!/#)&$!(#$! R*%(#AI',(!'+2!J'&$,!*==$%$2!(#$!i*)+(!&*/$,(!3#'+3$@!/)(#!*+&4!9]>:g!*=!+*+AO)1%'+(,! $+($%)+1!(#$!,$%C)3$!3&',,!25%)+1!(#$!2$3'2$>!!

! "#$!(#)%2!'+2!=*5%(#!3*&5O+,!)+!*B$.+O&;*!'%$!)O-*%('+(!)+!(#$!3*+($E(!*=!(#),!-'-$%>! "#$!(#)%2!3*&5O+!1)C$,!(#$!(%'+,)()*+!%'($,!=*%!'&&!/*%D)+1A'1$!O)1%'+(,!(#'(!$+($%$2!$'3#! %$1)*+!25%)+1!(#$!;LLL,@!/#)&$!(#$!=*5%(#!1)C$,!(#$!2)==$%$+3$!.$(/$$+!(#$!(%'+,)()*+!%'($! =*%!(#*,$!$+($%)+1!'!%$1)*+!'+2!(#$!+*+AO)1%'+(,!/)(#)+!'!%$1)*+>!"#$!=)%,(!(%$+2!(*!+*($!),! (#'(!'!O)1%'+(!-%$O)5O!$E),($2!=*%!'&&!%$1)*+,>!P+!*(#$%!/*%2,@!(#*,$!(#'(!O)1%'($2!(*!$'3#!!

[!X22)()*+'&!3%)($%)'!=*%!(#),!,'O-&$!'+2!'&&!,'O-&$,!2$%)C$2!=%*O!(#$!QRHAGH!/',!(#'(!(#$!'1$!*=!'+!QRHAGH! O$O.$%!'(!'!-'%()35&'%!O$+,5,!/',!9L!4$'%,!1%$'($%!(#'+!'(!(#$!O$+,5,!.$=*%$>!J#)&$!*+$!/*5&2!$E-$3(!9LLg! *=!(#*,$!'1$2!E!'(!O$+,5,!X!(*!.$!'1$2!Et9L!'(!O$+,5,!b@!3&*,$%!$E'O)+'()*+!*=!(#$!QRHAGH!%$C$'&$2!(#$!=)15%$! (*!.$!:KA::g>!P(!),!5+D+*/+!/#$(#$%!(#$!2),3%$-'+34!)+!'1$,!'%),$,!=%*O@!#*/C%!',!'!,'=$15'%2!'&&!(#*,$!/#*,$! '1$!'(!O$+,5,!b!/',!+*(!9L!4$'%,!1%$'($%!(#'+!'(!O$+,5,!X!/$%$!$E3&52$2!=%*O!(#$!,'O-&$,>!!

!

!

@$9%+)0)Q)*+,-' .$%)&($."-&-' .)($&+")I'();-II+(+.&)7-,($.&),('38")9+&:++.)0001)$.;)0011)

!

!

/ ' ,!(#$!%$1)*+!(#'(!*==$%$2!(#$!1%$'($,(!3#'+3$!*=!$E-$%)$+3)+1!5- / '%2!,*3)'&!O * .)&)(4!'+2! $+($%)+1!(#$!,$%C)3$!3&',,!25%)+1!(#$!;LLL,!=*%!.*(#!)(,!+*+A O)1%'+(!'+2! O)1%'+(!-*-5&'()*+,>!!

! "#$!=)+'&!(/ *!3*&5 O +,!*=!*B$.+O&;* !3* O -*5+2!(#$!$C)2$+3$!*=!'! O)1%'()*+!-%$ O)5 O >!P=! O)1%'()*+! / $%$!(*!#'C$!&)((&$!$==$3(!*+!,*3)'&!-%*1%$,,)*+@!(#$+! / $! / *5&2!$E-$3(!-$*-&$! *%)1)+'()+1!=%* O !'!%$1)*+!(*!#'C$!,) O)&'%!(%'+,)()*+!%'($,!(*!(#*,$! / #*!,('4$2! /)(#)+!'! %$1)*+>!"#$!='3(!(#'(! O)1%'+(,!=%* O !$'3#!%$1)*+!#'2!'!1%$'($%!3#'+3$!*=!$+($%)+1!(#$!,$%C)3$! 3&',,!2$ O *+,(%'($,!(#$!.$+$=)(!'33%5$2!=%* O ! O)1%'()*+>!"%'+,)()*+!%'($,!=*%!*5(A O)1%'+(,! / $%$!1%$'($%!(#'+!=*%!+*+A O)1%'+(,!)+!C%4!%$1)*+@!#* / C%!(#$!%'($!=*%! O)1%'+(,!&$'C)+1! G*+2*+AH*5(#$',(!,('+2,!*5(!',!'+!'+* O '&4>!"#),!),!&)D$&4!(*!2*! /)(#!(#$!3#'%'3($%),()3,!*=! (#*,$!&$'C)+1!%'(#$%!(#'+!'+!$E' O -&$!*=! O)1%'()*+!+*(!#'C)+1!'+!) O -'3(>!

! "#$,$!%$,5&(,!'%$!3&$'%>!P+!I+1&'+2!'+2! J '&$,@!(#$!G*+2*+AH*5(#$',(!%$1)*+! / ',!.$,(! '.&$!(*!='3)&)('($!(#$!5- / '%2!,*3)'&! O * .)&)(4!*=!.*(#!)(,! O)1%'+(!'+2!+*+A O)1%'+(!-*-5&'()*+,!)+(*!(#$!,$%C)3$!3&',,!3* O -'%$2!(*!'&&!*(#$%!%$1)*+,>!"#),!-#$+* O $+*+!#',!+* / !.$$+!,#* / +! (*!*335%!)+!(#$!9:KL,@!9:ML,@!9::L,!'+2!;LLL,>!

*?*0(()%1&@88&*

& "#$!=)+'&!$&$ O $+(!)+!$E' O)+)+1! / #)3#! / ',!(#$!-%)+3)-'&!$,3'&'(*%!%$1)*+!)+!I+1&'+2! '+2! J '&$,!)+!(#$!;LLL,!),!(*!)+C$,()1'($!(#*,$!,($--)+1A*==!(#$!$,3'&'(*%>!X!,$&$3()*+!*=! 3#'%'3($%),()3,!*=!QRHAGH!O$O .$%,! / #*! / $%$!'1$2!9\!'+2!*C$%!)+!;LL9@! / $%$!-%$,$+(!'(!(#$! ;LL9!'+2!;L99!O$+,5,$,@!'+2! / #*!*5(A O)1%'($2!=%* O !$'3#!%$1)*+!.$(/ $$+!;LL9!'+2!;L99! '%$!-%*C)2$2!)+!*B$.+O&<*>!"#$!=)%,(!3#'%'3($%),()3!(*!+*($!),!(#$!#$'C4!%$-%$,$+('()*+!*=!4*5+1! '25&(,!)+!(#*,$! / #*!2*!&$'C$!$'3#!%$1)*+@!#* / C%!2),-'%)()$,!$ O $%1$! / #$+!%$1)*+,!'%$!)+2)C)25'&&4!$E' O)+$2>!6*%!(#$!G*+2*+AH*5(#$',(@!'+2!(*!'!&$,,$%!$E($+(!(#$!I',(!*=!I+1&'+2@! (#*,$!(#'(!&$=(! / $%$!,&)1#(&4!*&2$%!(#'+!*5(A O)1%'+(,!=%* O !*(#$%!%$1)*+,>!6*%!'&&!%$1)*+,! $E3&52)+1!(#$,$!(/ *@!(#$!9\A;L!'+2!;9A;]!'1$!1%*5-,! O '2$!5-!.$(/ $$+![;g!'+2![\g!*=!'&&! (#*,$!&$'C)+1>!6*%!(#$!G*+2*+AH*5(#$',(!'+2!(#$!I',(!*=!I+1&'+2!)(! / ',!;9g!'+2!;:g! %$,-$3()C$&4>!P+!3*+(%',(@!(#$!;\A[L!'+2![9A[]!'1$!1%*5-,!'33*5+($2!=*%![Lg!'+2!;Mg!*=! (#*,$!&$'C)+1!(#$!G*+2*+AH*5(#$',(!'+2!I',(!*=!I+1&'+2!%$,-$3()C$&4>!P+!(#$!*(#$%!,$C$+! %$1)*+,!(#$4!'33*5+($2!=*%!.$(/ $$+![g!'+2!;\g!*=!&$'C$%,>!"#$!($+2$+34!=*%!*5(A O)1%'+(,! =%* O !(#$!G*+2*+AH*5(#$',(!(*!.$!*&2$%!'+2!=5%(#$%!'&*+1!)+!&)=$!),!3*+=)% O $2!.4!'!1%$'($%!!

!

!

!

!

@$9%+)_)S)2/$($#&+(-"&-#")-.)0001)'I)&/''"+)7-,($&-.,)'3&)'I)+$#/)(+,-'.)9+&:++.)0001)$.;)0011)Z[)
:-&/-.)+$#/)#/$($#&+(-"&-#\1)

2/$($#&+(-"&-#"))	D!^{0}) Z[\)	D<) Z[\)	PN) Z[\)	!H) Z[\)	<H) Z[\)	!!) Z[\)

!

@$9%+)_)Z#' .&-. 3+ ; \)

	D!)	D<)	PN)	!H)
2/$($#&+(-"&-#"))	Z[\!	Z[\!	Z[\!	

!

! "*!,5O O'%),$@!(#$!G*+2*+AH*5(#$',(! / ',!3&*,$,(!(*!O$$()+1!(#$!3%)($%)'!=*%!(#$! ,($--)+1A*==!3*O-*+$+(!*=!(#$!$,3'&'(*%!(#$*%4>!"#*,$!(#'(!&$=(!(#$!%$1)*+! / $%$!,&)1#(&4! *&2$%!(#'+!)+!*(#$%!%$1)*+,@!#* / C%@!',!-%$2)3($2@!(#$4! / $%$!2*O)+'($2!.4!(#*,$!)+!(#$! $'%&4!*%!O)22&$!-$%)*2,!*=!(#$)%!3'%$$%,@!%'(#$%!(#'+!.4!(#*,$!3*O)+1!(*!(#$!$+2!*=!(#$)%! / *%D)+1!&)C$,>!d$(@!3%53)'&&4@!(#*,$!&$'C)+1! / $%$!#$'C)&4!%$-%$,$+($2!.4!(#*,$!)+!(#$!,$%C)3$! 3&',,@! / #)3#!3*+=)%O,!'!,($--)+1A*==!-%*3$,,!#'2!('D$+!-&'3$!=*&&* /)+1!'!%)2$!5-!(#$!,*3)'&! O*.)&)(4!$,3'&'(*%>!"#$%$! / $%$!'&,*!(#*,$! / #*!3*O.)+$2!%$1)*+'&!O)1%'()*+! /)(#!%$()%O+(>! "#$!'.*C$!%$,5&(,!3*+=)%O!(#'(!(#$!G*+2*+AH*5(#$',(!%$1)*+! / ',!I+1&'+2!'+2!J'&$,7!O*,(! -%*O)+$+(!$,3'&'(*%!.$(/ $$+!;LL9!'+2!;L99>!

!

!

!

@$9%+)T)Q)?/$(+)'I)7-,($.&")$,+;)1RSOW)I('7)+$#/)(+,-'.)&/$&)+.&+(+;)&/+)F'.;'.S?'3&/+$"&) 9+&:++.)+$#/)-.&+(#+."$%)8+(-';)

*+,-'.)'I)A(-,-.)	1aa1)Q)0001) Z[\)	0001)Q)0011) Z[\)
D'(&/)!$"&)	[L!	[[!
D'(&/)<+"&)	[[!	[[!
P'(]"/-(+)$.;)@/+)N379+()	;\!	[;!
!$"&)H-;%$.;")	[\!	[[!
<+"&)H-;%$.;")	[e!	[\!

C)4)%1DE(&

& S'+4!*=!(#$!$C$+(,!'+2!-%*3$,,$,!25%)+1!(#$!;LLL,!2),35,,$2!)+!H$3()*+![!#'2!(#$! -*($+()'&!(*!)0-'3(!*+!,*3)'&!0*.)&)(4!0*%$!,*!(#'+!0)1%'()*+>!"#5,@!)(!),!)0-*%('+(!(*! 3*0-'%$!(#$!G*+2*+!H*5(#$',(!$,3'&'(*%!.$(/$$+!2$3'2$,!(*!2$($%0)+$!/#$(#$%!(#$!%$1)*+! /',!'.&$!(*!,*3)'&&4!0*.)&),$!-$*-&$!(*!'!&$,,$%!*%!1%$'($%!E($+(>!*B$.+0&>!-%$,$+(,!'+2! 3*+(%',(,!(#$!(%'+,)()*+!%'($,!=*%!-$*-&$!/#*!0*C$2!=%*0!$'3#!%$1)*+!(*!(#$!G*+2*+A H*5(#$',(!25%)+1!$'3#!)+($%3$+,'&!-$%)*2@!'&*+1!/)(#!(#$!%'($,!=*%!'&&!)+A0)1%'+(,!3*0.)+$2! '+2!+*+A0)1%'+(,>!P(!),!.',$2!*+!'!,'0-&$!*=!(#*,$!/#*!/$%$!-%$,$+(!'(!(#$!,('%(!'+2!$+2!*=! $'3#!%$=$%$+3$!-$%)*2@!/$%$!)+!'!/*%D)+1!RHHI0!0&',,!'+2!/$%$!'1$2!.$(/$$+!9\!'+2!\]!'(! (#$!.$1)++)+1!*=!$'3#!)+($%3$+,'&!-$%)*2>!!

& "#$!,$3*+2!'+2!(#)%2!3*&50+,!-%$,$+(!(#$!(%'+,)()*+!%'($,!=*%!$'3#!)+($%3$+,'&! -$%)*2>!P+!.*(#!)(!/',!(#*,$!0)1%'()+1!=%*0!(#$!R*%(#!I',(!(#'(!$E-$%)$+3$2!(#$!1%$'($,(! 3#'+3$!*=!$+($%)+1!(#$!,$%C)3$!3&',,>!P+!(#$!9::L,!(#$!&*/$,(!3#'+3$!/',!*==$%$2!(*!(#*,$! =%*0!J'&$,@!/#$%$',!)+!(#$!;LLL,!)(!/',!(#*,$!=%*0!(#$!I',(!*=!I+1&'+2>!N*/C%@!)(!),!(#$! &',(!3*&50+!(#'(!-%*C)2$,!(#$!C)('&!'+,/$%,>!"#),!2$-)3(,!(#$!2)==$%$+3$!)+!(%'+,)()*+!%'($! .$(/$$+!2$3'2$,>!X!-*,)()C$!C'&5$!)+2)3'($,!(#'(!(%'+,)()*+!%'($,!/$%$!#)1#$%!)+!(#$!;LLL,! (#'+!(#$!9::L,@!/#$%$',!'!+$1'()C$!C'&5$!0$'+,!(#$!*--*,)($>!X,!*.,$%C$2@!0)1%'+(,!=%*0! C%4!%$1)*+@!.'%!(#$!I',(!*=!I+1&'+2!/#$%$!(#$%$!/',!+*!3#'+1$@!$E-$%)$+3$2!'+!)+3%$',$2!!

!

!

@$9%+)W)S)@($."-&-'.)($&+")'I)&/'"+): /')7-,($&+;)&')&/+)F'.;'.S?'3&/+$"&)I('7)$%%)'&/+()(+,-'.")
9+&:++.)1aa1)$.;)0001)$.;)0001)$.;)0011)

!*+,-'.)'I)A(-,-.)	1aa1S0001) Z[\)	0001S0011) Z[\)	B-II+(+.#+)
D'(&/)!$"&)	]e!	\;!	M!
D'(&/)<+"&)	]9!	\L!	:!
P'(]"/-(+)^)@/+)N379+()	e\!	]K!	99!
!$"&)H-;%$.;")	e:!	]9!	;!
<+"&)H-;%$.;")	e\!	];!	\!
!$"&)'I)!.,%$.;)	eK!	eK!	L!
?'3&/)<+"&)	e;!	e:!	K!
<$%+")	e9!	eM!	K!
=%%)H-,($.&")&'))F'.;'.S?'3&/+$"&)	eK!	]9!	e!
=%%)D'.SH-,($.&")-.))F'.;'.S?'3&/+$"&)	;e!	;;!	A;!

!H*5%3$?!!Q==)3$!=*%!R'()*+'&!H('(),()3,!G*+1)(52)+'&!H(524!

&)D$&)#**2!*=!$+($%)+1!(#$!,$%C)3$!3&',,!25%)+1!(#$!;LLL,!(#'+!O)1%'+(,!)+!(#$!9::L,>!"#$!)O-*%('+3$!*=!(#),!3'++*(!.$!5+2$%,('($2>!P+!,-)($!*=!(#$!C'%)*5,!$C$+(,!'+2!-%*3$,,$,!(#'(! #'2!(#$!-*($+()'&!(*!2),%5-(!(#$!G*+2*+AH*5(#$',(7,!'.)&)(4!(*!'&&*/!5-/'%2!,*3)'&!O*.)&)(4@! %$1)*+'&!O)1%'+(,!%$&*3'()+1!(*!(#$!%$1)*+!/$%$!O*%$!&)D$&4!(*!$+($%!(#$!,$%C)3$!3&',,!25%)+1! (#$!;LLL,!(#'+!(#$4!/$%$!25%)+1!(#$!9::L,>!"#$!$,3'&'(*%!'--$'%,!(*!#'C$!,(%$+1(#$+$2>! N*/$C$%@!(#),!#',!+*(!.$$+!'!5+)C$%,'&!)O-%*C$O$+(>!X,!(#$!=)+'&!%*/!#)1#&)1#(,@!=*%!+*+A O)1%'+(,@!'!1%*5-!'&%$'24!2),'2C'+('1$2!3*O-'%$2!(*!O)1%'+(,@!(#$!-%*-*%()*+!*=!(#*,$! $+($%)+1!(#$!,$%C)3$!3&',,!=$&&!.4!(/*!-$%3$+('1$!-*)+(,>!

!

!

!

!

*?*0(()%1D@88&*

"#$!=)+'&!-'%(!*=!(#),!
%$,5&(,!,$3()*+!3*0-'%$,!
(#$!3#'%'3($%),()3,!*=!
(#*,$!&$'C)+1!(#$!
G*+2*+AH*5(#$',(!)+!
$'3#!)+($%3$+,'&!-$%)*2>!
"#$,$!'%$!,500'%),$2!)+!
*B$.+O&F*>!"#*,$!&$'C)+1!)+!
(#$!;LLL,!/$%$!,&)1#(&4!
*&2$%!(#'+!(#*,$!)+!(#$!
9::L,@!#*/$C$%!'1')+!
(#$4!/$%$!0*,(&4!
%$-%$,$+($2!.4!
1%'25'($,!'+2!(#*,$!
$'%&4!*+!)+!(#$)%!/*%D)+1!
&)C$,@!+*(!(#*,$!*=!
,(52$+(!'1$!+*%!(#*,$!
+$'%)+1!%$()%$0$+(>!
H)0)&'%!-%*-*%()*+,!*=!
*5(A0)1%'+(,!/$%$!'1$2!
.$(/$$+!;9!'+2![]!)+!
.*(#!-$%)*2,!0'D)+1!5-!
eeg!*=!(#*,$!&$'C)+1!)+!
(#$!9::L,!'+2!e[g!*=!
(#*,$!&$'C)+1!)+!(#$!
;LLL,>!G$'C$%,!)+!(#$!
&'(($%!)+($%3$+,'&!-$%)*2!
/$%$!&$,,!&)D$&4!(*!.$!
0'%%)$2!'+2!0*%$!&)D$&4!
(*!.$!,)+1&$!(#'+!(#*,$!

!

!

!

)+!(#$!9::L,>!N*/$C$%@!2$,-)($!(#$!'1$!,(%53(5%$,!*=!(#*,$!&$'C)+1!)+2)3'()+1!(#'(!(#$4!/$%$! 4*5+1!'25&(,@!(#$%$!),!$C)2$+3$!(#'(!-*)+(,!(*/'%2,!-$*-&$!&$'C)+1!(#$!G*+2*+AH*5(#$',(! '=($%!(#$4!#'2!%)22$+!5-!(#$!$,3'&'(*%@!'+2!(#'(!(#),!/',!'!O*%$!3*OO*+!-#$+*O$+*+!)+! (#$!;LLL,!(#'+!(#$!9::L,>!W%)O'%)&4@!*5(AO)1%'+(,!.$(/$$+!;LL9!'+2!;L99!#'2!'!1%$'($%! %$-%$,$+('()*+!'O*+1!(#*,$!/#*!#'2!%$'3#$2!(#$!,$%C)3$!3&',,>!X22)()*+'&&4@!/#)&$!(#$! -%*-*%()*+,!)+!=5&&A()O$!$O-&*4O$+(!'+2!%$()%O+(!/$%$!,)O)&'%!'(!(#$!,('%(!*=!.*(#!)+($%3$+,'&!-$%)*2,@!'!1%$'($%!,#'%$!*=!(#*,$!&$'C)+1!)+!(#$!;LLL,!/$%$!%$()%$2!.4!(#$!$+2!*=! (#$!%$=$%$+3$!-$%)*2>!P+!,5OO'%4@!(#*,$!,($--)+1A*==!(#$!G*+2*+AH*5(#$',(!$,3'&'(*%!)+!(#$! ;LLL,!/$%$!O*%$!%$-%$,$+('()C$!*=!(#*,$!2$,3%).$2!)+!(#$!$,3'&'(*%!(#$*%4!(#'+!&$'C$%,!)+! (#$!9::L,@!',!(#$4!/$%$!,&)1#(&4!*&2$%@!#$&2!O*%$!'2C'+3$2!,*3)*$3*+*O)3!-*,)()*+,!'+2! /$%$!O*%$!&)D$&4!(*!3*O.)+$!*5(AO)1%'()*+!'+2!%$()%O+(>!!

! !

!

!

BJ?2C??JAD))

! "#$!=)+2)+1,!3*+3&52$!(#'(!(#$!G*+2*+AH*5(#$',(! / ',!I+1&'+2!'+2! J '&$,7!2* O)+'+(! $,3'&'(*%!%$1)*+!25%)+1!(#$!;LLL,!'+2!(#'(!',!'+!$,3'&'(*%!)(!=5+3()*+$2!.$(($%!)+!(#$!;LLL,! (#'+!)+!(#$!9::L,>!S*%$!,-$3)=)3'&&4@!(#$!%$,5&(,!,#* / !=)%,(&4!(#'(!(#$!G*+2*+AH*5(#$',(! / ',! (#$!O*,(!-*-5&'%!2$,()+'()*+!=*%!.*(#!4*5+1!'25&(,!'+2!4*5+1!'25&(,!$253'($2!(*!'(!&$',(! 2$1%$$!&C&@! /)(#!(#$!%$1)*+!1')+)+1!='%!O*%$!(#'+!)(!&*,(!(#%*51#*5(!(#$!=)%,(!2$3'2$!*=!(#$! ;9'(!O$+(5%4>!H$3*+2&4@!)(! / ',!3*+=)%O$2!(#'(!(#$!'.)&)(4!(*!'3#)C!5- / '%2!O*.)&)(4!'+2! $+($%!,$%C)3$!3&',,!*335-'()*+,! / ',!1%$'($%!=*%!(#*,$!(#'(!O)1%'($2!(#'+!=*%!(#*,$!(#'(!2)2! +*(>!"#),! / ',!(%5$!.*(#!=*%!-$*-&$!O)1%'()+1!)+(*!$'3#!%$1)*+!'+2!(#*,$!O)1%'()+1!*5(!*=! $'3#!%$1)*+>!"#)%2&4@!(#$!=)+2)+1,!3*+3&52$2!(#'(!(#$!G*+2*+AH*5(#$',(! / ',!'&,*!(#$!%$1)*+! / #$%$.4!O)1%'+(,!'+2!+*+AO)1%'+(,!#'2!(#$!1%$'($,(!3#'+3$!*=!$E-$%)$+3)+1!5- / '%2!,*3)'&! O*.)&)(4!'+2!$+($%)+1!(#$!,$%C)3$!3&',,>!6*5%(#&4@!)(! / ',!2$O*+,(%'($2!(#'(!(#*,$!&$'C)+1!(#$! G*+2*+AH*5(#$',(! / $%$!,&)1#(&4!*&2$%!'+2!=5%(#$%!'&*+1!(#$!&)=$A3*5%,$!(#'+!*5(AO)1%'+(,! =%*O!*(#$%!%$1)*+,@!.5(! / $%$!*+&4!-'%()'&&4!%$-%$,$+($2!.4!(#*,$!3*O)+1!(* / '%2!(#$!$+2!*=! (#$)%! / *%D)+1!&)C$,>!6)+'&&4@!(#$!G*+2*+AH*5(#$',(! / ',!',!-*-5&'%!)+!(#$!;LLL,!',!)(! / ',!)+! (#$!9::L,!'O*+1!4*5+1!'25&(,>!N* / C%@!(#$!&'(($%!2$3'2$!,' / !'!1%$'($%!,#'%$!*=!)+A O)1%'+(,!$+($%)+1!(#$!,$%C)3$!3&',,@!'+2!'&,*!'!1%$'($%!,#'%$!*=!*5(AO)1%'+(,!%$-%$,$+($2!)+! (#$!,$%C)3$!3&',,!(#'+!(#$!$'%&)$%!2$3'2$@!2$O*+,(%'()+1!(#'(!(#$!$,3'&'(*%!#'2!,(%$+1(#$+$2! =*&&* /)+1!(#$!,('%(!*=!(#$!+$ / !O)&&$++)5O>!

! "#$,$!=)+2)+1,!#'C$!)O-*%('+(!)O-&)3'()*+,>!"#$4!1%*5+2!(#$!$,3'&'(*%!(#$*%4!=5%(#$%!)+!$O-)%)3'&!$C)2$+3$>!"#$!'.)&)(4!(*!$+($%!(#$!,$%C)3$!3&',,!#',!+* / !.$$+!,#* / +!(*!.$! 1%$'($%!=*%!(#*,$!(#'(!,($-!*+(*!(#$!$,3'&'(*%!8)>$>!(#*,$! / #*!O)1%'($<!3*O-'%$2!(*!(#*,$! / #*!2)2!+*(!O)1%'($!)+!(#$!9:KL,@!9:ML,@!9::L,!'+2!+* / !(#$!;LLL,>!"#$!G*+2*+AH*5(#$',(! #',!'&,*!.$$+!3*+=)%O$2!',!(#$!=*%$O*,(!$,3'&'(*%!%$1)*+!)+!$'3#!*=!(#$,$!=*5%!2$3'2$,@! '22)+1!(*!'+2!,(%$+1(#$+)+1!(#$!%$,$'%3#!3*+253($2!.4!6)$&2)+1!!89::;@!9::]@!;LLK<!'+2! O#'O-)*+!$(!'&!8;L9e<>!"#),!),!2$O*+,(%'()C$!*=!)(,!)O-*%('+3$!)+!.*(#!+'()*+'&!O)1%'()*+! '+2!$3*+*O)3!,4,($O,!'+2!)+2)3'($,!'!+'()*+'&!2)C)2$@! /)(#!-$*-&$!&)C)+1!)+!'+2!O)1%'()+1!(*! (#$!H*5(#!3*+()+5)+1!(*!#'C$!'+!'2C'+('1$!*C$%!(#*,$!O*C)+1!(*!'+2!&)C)+1!)+!(#$!R*%(#>! O*O.)+$2! /)(#!(#$!, /)(3#!)+!O)1%'()*+!,(%$'O,@! / #$%$.4!(#$!H*5(#!1')+$2!-$*-&$!=%*O!(#$! R*%(#!)+!(#$!,$3*+2!#'&=!*=!(#$!2$3'2$!8G*O'E!$(!'&>@!;L9e<@!(#$! / $&&!2*35O$+($2!R*%(#A H*5(#!2)C)2$! /)(#)+!(#$!VZ!),!&)D$&4!(*!#'C$!$E($+2$2!(*!(#$!,D)&&!&$C$&,!-%$C'&$+(!)+!$'3#!

!

!

%$1)*+>!"#$!2*0)+'+3$!*=!(#$!G*+2*+AH*5(#$',(!$E($+2,!=5%(#$%!(*!(#$!0)1%'()*+,!*=!4*5+1! '25&(,>!"#$!G*+2*+AH*5(#$',(7,!-*-5&'%)(4!25%)+1!(#$!;LLL,!'0*+1!(#*,$!'(!(#$!,('%(!*=!(#$)%! /*%D)+1!&)C$,!2%'/,!3*0-'%),*+,!/)(#!(#$!=)+2)+1,!*=!G*0'E!$(!'&!8;L9e<@!H0)(#!'+2!H'1$! 8;L9e<!'+2!H'1$!$(!'&!8;L9[<>!"#$!1%*/(#!)+!-*-5&'%)(4!=%*0!%$1)*+,!=5%(#$%!'/'4@!,53#!',! (#$!R*%(#!I',(!'+2!d*%D,#)%$!'+2!"#$!N50.$%!=5%(#$%!%$=&$3(,!(#$!)+3%$',)+1!-5&&!*=!(#$! %$1)*+!'+2!(#$!1%*/)+1!2)==$%$+3$!.$(/$$+!R*%(#!'+2!H*5(#>!"#$!=)+2)+1,!'&,*!#)1#&)1#(!(#$! &)0)('()*+!*=!(#$!,($--)+1A*==!3*0-*+$+(!*=!(#$!$,3'&'(*%!(#$*%4>!X,!/)(#!(#$!=)+2)+1,!*=! O#'0-)*+!8;L9;<!'+2!6)+2&'4!$(!'&!8;LLM<@!(#*,$!&$'C)+1!$'3#!%$1)*+!25%)+1!(#$!;LLL,!/$%$! 2*0)+'($2!.4!4*5+1$%!)+2)C)25'&,!3*+(%'%4!(*!/#'(!/*5&2!.$!$E-$3($2!)=!=*&&*/)+1!(#$! *%)1)+'&!$,3'&'(*%!(#$*%4>!R*+$(#$&$,,@!(#*,$!(#'(!&$=(!(#$!G*+2*+AH*5(#$',(!/$%$!#$'C)&4! %$-%$,$+($2!.4!(#*,$!)+!(#$!,$%C)3$!3&',,@!)+2)3'()+1!(#'(!(#$4!/$%$!,($--)+1A*==!(#$! $,3'&'(*%!#'C)+1!%)22$+!5-!)(>!Q=!-'%()35&'%!,)1+)=)3'+3$!),!(#$!&)0)($2!)0-'3(!#'2!.4!(#$! $E($%+'&!C+(,!'+2!-%*3$,,!(#'(!0'+)=$,($2!25%)+1!(#$!;LLL,>!P(!/',!-%$2)3($2!(#'(!(#$! 3*0.)+'()*+!*=!)+3%$',$2!)00)1%'()*+@!'!#51$!$3*+*0)3!%$3$,,)*+!'+2!'+!)+3%$',)+1&4!#)1#&4! $253'($2!/*%D)+1!-*-5&'()*+!/*5&2!2)0)+),#!(#$!G*+2*+AH*5(#$',(7,!'.)&)(4!(*!-%*0*($! .*(#!+*+A0)1%'+(,!'+2!0)1%'+(,!)+(*!(#$!,$%C)3$!3&',,>!J#)&$!(#),!/',!(#$!3',$!=*%!+*+A 0)1%'+(,@!)(,$&=!'+!)+($%$,()+1!%$,5&(@!0)1%'+(,!3*0)+1!=%*0!C%4!%$1)*+!/$%$!'3(5'&&4!0*%$! &)D$&4!(*!$+($%!(#$!,$%C)3$!3&',,!)+!(#$!;LLL,!(#'+!(#$!9::L,>!"#),!)+2)3'($,!(#'(!(#$!/*%D)+1,! *=!'+!$,3'&'(*%!'%$!,*0$/#'(!,#)$&2$2!=%*0!,*0$!*=!(#$!$E($%+'&!-%*3$,,$,!(#'(!*+$!/*5&2! $E-$3(!(*!)+=&5$+3$!)(>!

! N*/C%@!3'+!(#$,$!2)==$%$+3$,!)+!(#$!&)D$&)#**2!*=!$+($%)+1!(#$!,$%C)3$!3&',,!=*%! (#*,$!(#'(!0)1%'($!'+2!(#*,$!(#'(!2*!+*(!.$!,*&$&4!'((%).5($2!(*!(#$!-%*3$,,!*=!0)1%'()*+h!H*! ='%!(#$%$!#',!.$$+!'!2),%$1'%2!=*%!#*/!(#$!-$%,*+'&!3#'%'3($%),()3,!*=!(#*,$!(#'(!0)1%'($! 0'4!.$!)+=&5$+3$!()'&!)+!2$($%0)+)+1!(#$)%!,*3)'&!0*.)&)(4!-'(#/'4,!)+!(#$!%$1)*+!*=!2$,()+'()*+>! J#)&$!O#'0-)*+!$(!'&!8;L9e<!2),0),,!1$+$%'&!3#'%'3($%),()3,!,53#!',!'1$!'+2!1$+2$%@!^*%2*+! 8;L9]<!-%*-*,$,!(#'(!-$%,*+'&!'0.)()*+!(*!'3#)$C$!,533$,,!)+!(#$!i*.!0'%D$(!),!-'%()'&&4!/#'(! '&&*/,!-$*-&$!(*!%)2$!5-!(#$!$,3'&'(*%!=',($%>!S)1%'()*+@!C+!%$1)*+'&&4!/)(#)+!'!3*5+(%4@!)+C*&C$,!,*0$!D)+2!*=!%),D@!'!3*,(!(#'(!+$$2,!3*+,)2$%)+1!',!-$%!(#$!#50'+!3'-)('&!0)1%'()*+! (#$*%4>!6*%!0)1%'+(,!(*!,533$$2@!(#$4!(#$%$=*%$!+$$2!(*!#'C$!(#$!'0.)()*+!'+2!(#$!.$&)$=! (#'(!(#$4!3'+!*C$%3*0$!(#$,$!3*,(,@!/)(#!(#*,$!&'3D)+1!(#),!'0.)()*+!+*(!$+1'1)+1!)+! 0)1%'()*+!)+!(#$!=)%,(!-&'3$>!R*+$(#$&$,,!&*3'()*+!2*$,!0'(($%>!IC$+!)=!)+($%+'&!0)1%'+(,!

!

3*+=*%O!(*!(#$!#5O'+!3'-)('&!(#$*%4!*=!O)1%'()*+!.4!'33*5+()+1!=*%!(#$!3*,(,!'+2!.$+$=)(,!*=!O)1%'()+1!'+2!#'C)+1!(#$!'O.)()*+!(*!,533$$2@!(#),!,533$,,!),!,()&&!O*,(!&)D$&4!(*!*335%!)+!3)(4!%$1)*+,@!,53#!',!(#$!G*+2*+AH*5(#$',(!8Z*%-)!'+2!O&'%D@!;L9]<>!!

!   "#$!G*+2*+AH*5(#$',(!'.)&)(4!(*!,*3)'&&4!-%*O*($!)(,!-*-5&'()*+!O*%$!$==$3()C$&4!(#'+!*(#$%!%$1)*+,!O'4!'&,*!.$!$E-&')+$2!.4!,#)=(,!)+!$O-&*4O$+(!,(%53(5%$,>!"#$!,#'%$!*=!$O-&*4O$+(!'33*5+($2!=*%!.4!&*/A,D)&&$2!/*%D!)+!(#$!VZ!=$&&!.$(/$$+!9::K!'+2!;L9[@!',!2)2!(#$!-%*-*%()*+!*=!(#$!VZ!/*%D=*%3$!$O-&*4$2!)+!&*/A,D)&&$2!i*.,!8S)1%'()*+!X2C),*%4!O*OO)(($$@!;L9e<>!O*+C$%,$&4@!(#$!+5O.$%,!)+!#)1#A,D)&&$2!i*.,!)+3%$',$2>!"#),!,#)=(!(*/'%2!#)1#A,D)&&$2!$O-&*4O$+(!'O*+1!VZ!/*%D$%,!3*5&2!$E-&')+!(#$!5-/'%2!(%$+2!)+!(#*,$!$+($%)+1!(#$!,$%C)3$!3&',,>!H$3*+2&4@!G*+2*+!#',!$E-$%)$+3$2!1%$'($%!&'.*5%!O'%D$(!-*&'%),'()*+!(#'+!'+4!*(#$%!'%$'!)+!b%)(')+!,)+3$!(#$!9::L,@!O$'+)+1!(#'(!(#$!1%*/(#!)+!)(,!&*/A,D)&&$2!'+2!#)1#A,D)&&$2!i*.,!#'C$!*5(-'3$2!(#*,$!)+!(#$!O)22&$!8Z'-&'+),@!;LLK<>!Q+$!-%*O)+$+(!$E-&'+'()*+!=*%!(#),!#*&&*/)+1A*5(!-%*3$,,!),!(#$!*5(A,*5%3)+1!*=!O)22&$A,D)&&$2!i*.,!8Z'-&'+),@!;LLK@!S)1%'()*+!X2C),*%4!O*OO)(($$@!;L9e<>!"#$!&*,,!*=!(#$,$!i*.,@!(#$!)+3%$',$!)+!'C')&'.&$!#)1#A,D)&&$2!i*.,@!'+2!(#$!)+3%$',$!)+!(#$!,#'%$!*=!&*/A,D)&&$2!i*.,!#$&2!.4!(#$!+*+AVZ!.*%+@!%$,5&(,!)+!(#*,$!%$O')+)+1!*+!(#$!G*+2*+AH*5(#$',(!$,3'&'(*%!*+&4!'.&$!(*!$+($%!#)1#A,D)&&$2!i*.,!)=!(#$4!'%$!5-/'%2&4!O*.)&$>!"#),!3'+!$E-&')+!.*(#!/#4!(#$!G*+2*+AH*5(#$',(7,!$,3'&'(*%!*5(A-$%=*%O$2!*(#$%!%$1)*+,!)+!(#$!;LLL,!'+2!(#$!%$1)*+7,!$,3'&'(*%!)+!(#$!9::L,>!!

!   J#)&$!(#$%$!),!$C)2$+3$!(#'(!2*O)+'+(!$,3'&'(*%!%$1)*+,!.$3*O$!,*!,(%53(5%'&&4!$O.$22$2!)+!'!+'()*+7,!$3*+*O4!(#'(!$E($%+'&!-#$+*O$+'!#'C$!&)((&$!)O-'3(@!(#$!%$,5&(,!,511$,(!(#'(!)(!3'+!.$!'&($%$2!.4!&*+1$%A($%O!-%*3$,,$,!(#'(!.%)+1!'.*5(!,(%53(5%'&!*%!,*3)$('&!3#'+1$>!6*%!$E'O-&$@!(#$!&'3D!*=!*&2$%!-$*-&$!%$-%$,$+($2!)+!(#*,$!,($--)+1A*==!(#$!$,3'&'(*%@!/#)&$!,511$,()C$!*=!'!1$+$%'&!='&&!)+!(#$!)+($%+'&!O)1%'()*+!-%*-$+,)(4!*=!*&2$%!-$*-&$@!O'4!'&,*!.$!25$!(*!3#'+1$,!)+!(#$!&)=$A3*5%,$!*=!4*5+1$%!-$*-&$>!P(!),!%$3*1+),$2!(#'(!O)1%'()*+!),!+*(!,*&$&4!2%)C$+!.4!$3*+*O)3!O*()C$,!'+2!(#$!2$,)%$!(*!)O-%*C$!/'1$,!'.*C$!C%4(#)+1!$&,$>!F'(#$%@!)(!'33*5+(,!=*%!+*+A$3*+*O)3!2$($%O)+'+(,>!"#$%$!),!'+!)+3%$',)+1!(%$+2!(*/'%2!-$*-&$!*+&4!/'+()+1!(*!&)C$!)+!O$(%*-*&)('+!'%$',!=*%!',!&*+1!',!(#$4!#'C$!(*!*%!5+()&!(#$4!#'C$!'3#)$C$2!'!,-$3)=)3!1*'&@!/#)3#!5,5'&&4!)+C*&C$,!-%*1%$,,)+1!)+(*!'!#)1#!,('(5,!i*.>!Q+3$!(#),!),!'3#)$C$2@!+*+A$3*+*O)3!='3(*%,!('D$!*C$%>!"#$,$!O'4!)+C*&C$!(#$!2$,)%$!(*!,('%(!'+2!%'),$!'!='O)&4!)+!&$,,!.5)&(!5-!'+2!1%$$+$%!,5%%*5+2)+1,!(#'(!'&&*/,!=*%!'!1%$'($%!

!

!

B5'&)(4!*=!&)=$>!^)C$+!(#'(!(#$,$!&)=$!$C$+(,!*335%!)+!(#$!&'($A(/$+()$,!'+2!$'%&4A(#)%()$,!)(! /*5&2!$E-&')+!/#4!(#$!$E*25,!=%*O!(#$!G*+2*+AH*5(#$',(!),!O'2$!5-!*=!(#),!'1$!1%*5->! 6*&&*/)+1!(#),!&*1)3@!)(!3*5&2!.$!'%15$2!(#'(!(#$!$==$3(,!*=!*(#$%!,(%53(5%'&!3#'+1$,@!,53#!',! (#$!%),$!)+!#)1#$%!$253'()*+@!O'4!+*(!#'C$!.$15+!(*!'&($%!(#$!/*%D)+1,!*=!'+!$,3'&'(*%!1)C$+! (#'(!(#$4!'%$!%$&'()C$&4!+$/!-#$+*O$+'>!P(!/*5&2!.$!*=!)+($%$,(!(*!$E'O)+$!/#$(#$%!'!O*%$! #)1#&4A$253'($2!/*%D)+1!-*-5&'()*+!%$,5&(,!)+!,'(5%'($2!&'.*5%!O'%D$(,!'+2!(#$!'==$3(,!(#'(! (#),!O'4!#'C$!*+!,*3)'&!O*.)&)(4!)+!(#$!4$'%,!'+2!2$3'2$,!(*!3*O$>!

! a$,-)($!(#$!)+,)1#(,!-%*C)2$2!.4!(#),!,(524@!)(!2*$,!#'C$!&)O)('()*+,>!Q+$!*=!(#$,$!),! (#'(!(#$!%$&'()*+,#)-!.$(/$$+!,*3)'&!'+2!,-'()'&!O*.)&)(4!3'++*(!.$!,$-'%'($2@!O$'+)+1!)(!),! +*(!D+*/+!/#$+!,*3)'&!O*.)&)(4!*335%,!)+!%$&'()*+!(*!'!%$1)*+'&!O)1%'()*+>!J#)&$!(#$! (%'C$&&'(*%!'+2!$&$C'(*%!O*C$O$+(,!)+(%*253$2!.4!6)+2&'4!$(!'&!8;LL:<!-%*C)2$!'!O$'+,! (#%*51#!/#)3#!(#$!%$&'()*+,#)-!.$(/$$+!(#$!(/*!3'+!.$!$+C),)*+$2@!(#$,$!(4-$,!*=! O*C$O$+(,!3'++*(!.$!$E'O)+$2!5,)+1!(#$!QRHAGH>!"#),!-%*C)2$,!,*O$!),,5$,>!P=!'+!)+2)C)25'&!$E-$%)$+3$,!'+!$&$C'(*%!O*CO+(!8*335-'()*+!-%*1%$,,)*+!/)(#*5(!O)1%'()*+<! '+2!(#$+!O)1%'($,!/)(#*5(!=5%(#$%!3#'+1$,!)+!*335-'()*+@!(#$!5-/'%2!O*C$O$+(!),! '((%).5($2!(*!(#$!%$1)*+!*=!2$,()+'()*+!%'(#$%!(#'+!(#$!%$1)*+!*=!*%)1)+!/#$%$!)(!'3(5'&&4! *335%%$2>!H)O)&'%&4@!)=!'!,*3)'&!O*CO+(!*335%,!'=($%!'!O)1%'()*+!.5(!)+!'!,$-'%'($!)+($%3$+,'&!-$%)*2!(#$+!)(!/*5&2!+*(!.$!%$3*%2$2!',!'+!5-/'%2!O*CO+(>!X!,$3*+2! &)O)('()*+!),!(#'(!(#$!)O-'3(,!*=!3*O O5()+1!3*5&2!+*(!.$!'33*5+($2!=*%>!P(!),!C$%4!&)D$&4!(#'(!'! +5O.$%!*=!-$*-&$!3*5&2!&)C$!)+!*+$!%$1)*+!.5(!3*O O5($!(*!/*%D!)+!'+*(#$%!1)C$+!(#'(!9[g! *=!/*%D$%,!#'C$!'!3*O O5($!()O$!1%$'($%!(#'+!e]!O)+5($,!8QRH@!;L99<!"#),!),!$,-$3)'&&4!(#$! 3',$!=*%!(#*,$!/#*!,($-!*==!(#$!$,3'&'(*%!25%)+1!(#$)%!&'($A(/$+()$,!'+2!$'%&4A(#)%()$,!'+2! O)1%'($!(*!3*O O5($%!(*/+,!*5(,)2$!O'i*%!O$(%*-*&)('+!'%$',!#'C)+1!%$'3#$2!'!#)1#! ,*3)*$3*+*O)3!,('(5,>!P(!),!(#*,$!)+!(#$!#)1#$%!O'+'1$%)'&!'+2!-%*=$,,)*+'&!*335-'()*+,!/#*! '%$!O*,(!&)D$&4!(*!#'C$!(#$!&*+1$,(!3*O O5($!8QRH@!;L9e<!"#$!%'O)=)3'()*+!),!(#'(!-$*-&$!3'+! .$!'33%$2)($2!/)(#!%)2)+1!5-!'+!$,3'&'(*%!(#'(!(#$4!2)2!+*(@!25$!(*!(#$!='3(!(#'(!(#$4!/$%$! %)2)+1!(#$!$,3'&'(*%!)+!(#$!%$1)*+!/#$%$!(#$4!/*%D$2@!+*(!/#$%$!(#$4!&)C$2>!!

! !

!

!

2AD2FC?JAD)

! "#),!-'-$%!#'2!(/*!-%)0'%4!')0,>!"#$!=)%,(!/',!(*!$E'0)+$!(#$!=5+3()*+!*=!%$1)*+'&!

$,3'&'(*%,!)+!I+1&'+2!'+2!J'&$,!25%)+1!(#$!;LLL,>!"#$!,$3*+2!/',!(*!3*0-'%$!(#$!=5+3()*+!

!

!

! F$&'($2!.*(#!(*!(#$,$!%$,5&(,!'+2!(#$!&)0)('()*+,!*=!(#$!,(524!-%$,$+($2!)+!(#$!
-%$3$2)+1!,$3()*+@!(#$%$!'%$!'%$',!*=!$+B5)%4!(#'(!3*5&2!.$+$=)(!=%*0!=5%(#$%!%$,$'%3#>!"#$%$!
+$$2,!(*!.$!'(($0-(,!(*!),*&'($!(#$!$==$3(,!*=!0)1%'()*+!*+!,*3)'&!0*.)&)(4!)+!*%2$%!(*!
',3$%(')+!(#$!$E($+(!*=!(#$!3'5,'&)(4!)+!(#$!%$&'()*+,#)->!"#),!3'+!.$!2*+$!$)(#$%!.4!
,5--&$0$+()+1!'+'&4,),!*=!(#$!QRHAGH!/)(#!,$-'%'($!,5%C$4,!8',!3'%%)$2!*5(!.4!6)+2&'4!$(!'&!
8;LL:<<!*%!.4!$E'0)+)+1!(#$!,*3)'&!-'(#/'4,!)+!*+$!)+($%3$+,'&!-$%)*2!*=!(#*,$!/#*!0)1%'($2!
25%)+1!(#$!-%$C)*5,!)+($%3$+,'&!-$%)*2@!',!'2C*3'($2!.4!O#'0-)*+!$(!'&!8;L9e<>!H$3*+2&4@!
(#),!,(524!#',!*+&4!3*0-'%$2!(#$!-$%=*%0'+3$!*=!(#$!G*+2*+AH*5(#$',(!$,3'&'(*%!.$(/$$+!
2$3'2$,>!O*+,$B5$+(&4@!(#$%$!),!,3*-$!(*!$E'0)+$!#*/!*(#$%!%$1)*+,!3*0-'%$2!.$(/$$+!
2$3'2$,>!"#$%$!),!'&,*!(#$!-*,,).)&)(4!(*!$E'0)+$!(#$!$,3'&'(*%!(#$*%4!=%*0!'!&)=$!3*5%,$!
-$%,-$3()C$!1)C$+!(#'(!/$!+*/!#'C$!2'('!3*C$%)+1!=*5%!2$3'2$,>!"#),!/*5&2!'&&*/!'!=5&&!
)+C$,()1'()*+!)+(*!#*/!)+2)C)25'&!&)C$,!'%$!'==$3($2!.4!(#$!$E-$%)$+3$!*=!,($--)+1!*+@!%)2)+1!
5-!'+2!,($--)+1!*==!'!%$1)*+'&!$,3'&'(*%>!H*3)'&!0*.)&)(4!,!'!24+'0)3!3*+3$-(@!'+2!,-'()'&!
2)==$%$+3$,!)+!&)=$!3#'+3$,!%$B5)%$,!'+!)+A2$-(#!5+2$%,('+2)+1!)=!(#$,$!2)==$%$+3$,!'%$!(*!.$!
%$253$2>!P+($%+'&!0)1%'()*+!*==$%,!*+$!$E-&'+'()*+!'+2!*+$!%$0$24@!.5(!)(!%$B5)%$,!0*%$!
)+C$,()1'()*+!.$=*%$!(#$!%$&'()*+,#)-!),!=5&&4!5+2$%,(**2>!

! !

!

!

!K!!D2!)FJ?@)

!

X&$D,4+,D'@!S>!'+2!"%)('#@!X>!8;L9[<!nQ335-'()*+f$253'()*+!O),O'(3#!*=!)O O)1%'+(!/*%D$%,!)+!I5%*-$?!O*+($E(!'+2!-*&)3)$,n@!*G'-%-#)',&-8&G4"'$*)-%&C07)0HI*![\@!-->!;;:A;ee>!

X&$E'+2%5@!S>!8;L9;<!nH(*%)$,!*=!5-/'%2!,*3)'&!O*.)&)(4!'+2!O)1%'()*+!)+!*+$!F*O'+)'+! 3*O O5+$?!Q+!(#$!$O$%1$+3$!*=!u%5%.'+v!,-'3$,!)+!O)1%'+(A,$+2)+1!3*O O5+)()$,n@! *G$,*06%&J-"6%$+&-8&G"6-(0$%&?*"4)0,I*![8;<@!-->!9e9A9\L>!

X&&$+@!^>!8;L9L<!nF$3$,,)*+!'+2!F$3*C$%4n@!)+!S$&&*/,A6'3$%@!X>!8$2><!*K0/&L,,"0,&8-6&*!0&M0H&* *N$6+)$#0%*&;O:OP&Q-",0&-8&9-##-%,&3).6$6/&C0,0$6'!*>!G*+2*+?!N*5,$!*=!O*O O*+,! G).%'%4@!-->!;MA;:>!

X+2$%,*+@!b>!'+2!b&)+2$%@!H>!8;L9]<!*R6)08)%1P&S!-&9-"%*,&$,&$&T)16$%*,U&V08)%)*)-%,&$%4&*!0)6& 9-%,0W"0%'0,*@!QE=*%2?!"#$!S)1%'()*+!Q.,$%C'(*%4!'(!(#$!V+)C$%,)(4!*=!QE=*%2>!

X,#(*+@!a>!R>@!S'15)%$@!S>_>!'+2!H-)&,.5%4@!S>!89:MM<!nG*3'&!G'.*5%!S'%D$(,!'+2!(#$)%! PO-'3(!*+!(#$!G)=$!O#'+3$,!*=!d*5(#,n@!)+!O*&$,@!F>!8$2><!*X-"%1&9$6006,P&B!0&?0$6'!&8-6& J-.,&$%4&*!0&M0H&Y-'$*)-%$+),#>!S)&(*+!Z$4+$,?!Q-$+!V+)C$%,)(4!W%$,,@!-->!][A\]>!

b$'C$%,(*3D@!_>!c>!8;LL]<!n"%'+,+'()*+'&!$&)($,!)+!(#$!3)(4?!b%)(),#!#)1#&4A,D)&&$2!)+($%A3*O-'+4! (%'+,=$%$$,!)+!R$/!d*%D!3)(4n,!=)+'+3)'&!2),(%)3(n@!*J-"6%$+&-8&G*!%)'&$%4&T)16$*)-%& ?*"4)0,I*![98;<@!-->!;e]A;\M>!

bPH!8;L9\<!*Z6$4"$*0&3$.-"6&T$6[0*&?*$*),*)',P&;O:>@!G*+2*+?!a$-'%(O$+(!=*%!b5,)+$,,@! P++*C'()*+!'+2!HD)&&,>!

b*&(*+@!W>!8;L9;<!nI253'()*+?!N),(*%)3'&!,('(),()3,n@!*9-##-%,&R6)08)%1&N$(06,I*!HRYH^Ye;];>!

O'O-.$&&@!H>@!O**-$%@!_>!'+2!H)O O*+,@!_>!8;L9e<!*G#(+-/#0%*&$%4&-'''($*)-%$+&,[)++&+070+,& $#-%1&EK&$%4&8-60)1%&%$*)-%$+,@!G*+2*+?!N*O$!Q==)3$>!

O'O-*,@!O>@!a$+(@!X>@!6%4@!F>!'+2!F$)2@!X>!8;L99<!nPO-'3(!*=!(#$!%$3$,,)*+n@!*C01)-%$+&B60%4,&D& J"+/&;O::&G4)*)-%&\@M?]I*!e[>!

!

!

!

O#'O-)*+@!">!8;L9;<!n"$,()+1!(#$!%$(5%+!O)1%'()*+!$&O+(!*=!(#$!j!$,3'&'(*%!%$1)*+7!O*2$&?! '+!'+'&4,),!*=!O)1%'()*+!)+(*!'+2!*5(!*=!,*5(#A$',(!I+1&'+2@!9:\\f;LL9n@!*9$#.6)410& J-"6%$+&-8&C01)-%,I&G'-%-#/&$%4&?-')0*/I*!]8;<@!-->!;]]A;KL>!

O#'O-)*+@!">@!O**O.$,@!S>!'+2!^*%2*+@!P>!8;L9e<!nN*/!6'%!2*!I+1&'+2n,!H$3*+2AQ%2$%!O)()$,! IO5&'($!G*+2*+!',!N5O'+AO'-)('&!jI,3'&'(*%,7hn@!*N-("+$*)-%I&?($'O&$%4&N+$'OI*!;L8]<@! -->!e;9Ae[[>!

O#'O-)*+@!">!'+2!H#5((&$/*%(#@!P>!8;L9\<!nX%$!W$*-&$!O#'+1)+1!X22%$,,!G$,,h!X+!X+'&4,),!*=! S)1%'()*+!/)(#)+!I+1&'+2!'+2!J'&$,@!9:K9f;L99@!.4!a),('+3$!*=!S*C$n@!*N-("+$*)-%I& ?($'O&$%4&N+$'OI*!8-5.&),#$2!*+&)+$!.$=*%$!),!)+3&5,)*+!)+!'+!),,5$@!2*)?! 9L>9LL;Y-,->;L;\<>!

O*+%'2,*+@!a>!'+2!G'(#'O@!X>!8;LL]<!nI,3'&'(*%!G*+2*+h!X!O',$!H(524!*=!R$/!k$'&'+2! "$%()'%4!I253'($2!S)1%'+(,!)+!'!^&*.'&!O)(4n@!*J-"6%$+&-8&9-%*0#(-6$6/&G"6-(0$%& ?*"4)0,I*!9[8;<@!-->!9]:A9K;>!

a$C)+$@!6>@!b%)((*+@!R>!_>@!S$&&*%@!F>!'+2!N'&=-$++4@!W>!8;LL[<!nS*.)&)(4!'+2!(#$!S)22&$! O&',,$,?!X!O',$!H(524!*=!S'+3#$,($%!'+2!(#$!R*%(#!J$,(n@!*L%*06%$*)-%$+&J-"6%$+&-8& E6.$%&$%4&C01)-%$+&C0,0$6'!I*!;K8[<@!-->!e:]A]L:>!

a)E*+@!H>!8;LL[<!nS)1%'()*+!/)(#)+!b%)(')+!=*%!i*.!%$',*+,n@!*3$.-"6&T$6[0*&B60%4,I*!999e<@!-->! 9:9A;L9>!

6)$&2)+1@!X>!_>!89::;<!nS)1%'()*+!'+2!H*3)'&!S*.)&)(4?!H*5(#!I',(!I+1&'+2!',!'+!I,3'&'(*%! F$1)*+n@!*C01)-%$+&?*"4)0,I*!;\89<@!-->!9A9]>!

6)$&2)+1@!">!89::]<!nS)1%'()*+!'+2!O)22&$A3&',,!=*%O'()*+!)+!I+1&'+2!'+2!J'&$,@!9:M9A:9n@!)+! b5(&$%@!">!U!H'C'1$@!S>!8$2,><!*?-')$+&9!$%10&$%4&*!0&T)44+0&9+$,,0,*>!G*+2*+?!VOG! W%$,,@!-->!9\:!A!9MK>!

6)$&2)+1@!">!8;LLK<!nS)1%'()*+!'+2!,*3)'&!O*.)&)(4!)+!5%.'+!,4,($O,?!+'()*+'&!'+2!)+($%+'()*+'&! (%$+2,n@!)+!^$4$%@!N>H>!8$2><!*L%*06%$*)-%$+&Q$%4.--[&-8&E6.$%&N-+)'/I&Y-+"#0&:P& 9-%*0%*)-",&Z+-.$+&L,,"0,*>!O#$&($+#'O?!I2/'%2!I&1'%>!

!

6)+2&'4@!X>@!N*5,(*+@!a>@!S30*&&50@!a>@!S',*+@!O>!'+2!N'%%),*+@!F>!8;LLM<!n^$(()+1!*==!(#$! $,3'&'(*%h!X!,(524!*=!H3*(,!*5(A0)1%'()*+!=%*0!'!1&*.'&!3)(4!%$1)*+n@!*G%7)6-%#0%*&$%4& N+$%%)%1&*^/!eL8:<@!-->!;9\:A;9M]>!

6)+2&'4@!X>@!S',*+@!O>@!N*5,(*+@!a>@!S30*&&50@!a>!'+2!N'%%),*+@!F>!8;LL:<!nI,3'&'(*%,@! I&$C'(*%,!'+2!"%'C$&'(*%,?!"#$!Q335-'()*+'&!S*.)&)(4!*=!S)1%'+(,!(*!H*5(#AI',(! I+1&'+2n@!*J-"6%$+&-8&G*!%)'&$%4&T)16$*)-%&?*"4)0,/*![]8\<@!-->!M\9AMK:>!

^*&2(#*%-$@!_>!8;L9[<!nV+2$%,('+2)+1!A!'+2!S),5+2$%,('+2)+1!A!H*3)'&!S*.)&)(4!)+!b%)(')+?!"#$! I+(%4!*=!(#$!I3*+*0),(,@!(#$!O*+=5,)*+!*=!W*&)()3)'+,!'+2!(#$!G)0)(,!*=!I253'()*+'&! W*&)34n@!*J-"6%$+&-8&?-')$+&N-+)'/*!e;8[<@!-->!e[9Ae]L>!

^*%2*+@!P>!F>!8;L9]<!nX0.)()*+@!N50'+!O'-)('&!X3B5),)()*+!'+2!(#$!S$(%*-*&)('+!I,3'&'(*%n@! *C01)-%$+&?*"4)0,/*!e:8\<@!-->!9Le;A9L]]>!

^%'+'(*@!R>!8;L9e<!^*&S-6[&L%&N6-160,,P&N6-,(0'*,&8-6&E(H$64&T-.)+)*/&^#-%1&M0H& L##)16$%*,&)%&Z06#$%/*_!J',#)+1(*+!a>O?!S)1%'()*+!W*&)34!P+,()(5($@!P+($%+'()*+'&! G'.*5%!Q%1'+)`'()*+>!

NS!^*C$%+0$+(!8;L9L<!*B!0&9-$+)*)-%P&-"6&(6-16$##0&8-6&1-706%#0%*_*!G*+2*+?!O'.)+$(! Q==)3$>!

NS!^*C$%+0$+(!8;L99<!*@(0%)%1&V--6,I&R60$[)%1&R$66)06,P&^&?*6$*01/&8-6&?-')$+&T-.)+)*/_*! G*+2*+?!O'.)+$(!Q==)3$>!

Z'-&'+),@!P>!8;LLK<!*B!0&Z0-16$(!/&-8&G#(+-/#0%*&N-+$6),$*)-%&)%&R6)*$)%*@!Q+&)+$! 8///>)--%>*%1<?!P+,()(5($!=*%!W5.&)3!W*&)34!F$,$'%3#>!

Z*%-)@!S>!'+2!O&'%D@!J>!X>!c>!8;L9]<!nP+($%+'&!0)1%'()*+!'+2!#50'+!3'-)('&!(#$*%4?!"*!/#'(! $E($+(!),!)(!,$&$3()C$hn@!*G'-%-#)',&30**06,/*!9[\@!-->![9A[e>!

G)+@!^>!'+2!O#%),()'2)@!^>!8;LL\<!nIE'0)+)+1!1$*1%'-#)3!'+2!*335-'()*+'&!0*.)&)(4?!X!&*1&)+$'%! 0*2$&&)+1!'--%*'3#n@!*N$(06,&)%&C01)-%$+&?')0%'0/*!M]8e<@!-->!]L]A];;>!

!

!

QRH!8 ; L9e<! *; O : : &90%, " , &^%$+/ ,) , &D&V) , *$%'0&B6$70++04&* - & S - 6*[@!Q+&)+$!8 / / / >*+ , >1*C>5D<?!
Q==)3$!=*%!R'()*+'&!H('(),()3,>!

QRH!8 ; L9]<!*L%*06%$+& T)16$*) - %&G , *) # $*0 , & T 0* ! - 4 - + - 1/&V - ' " # 0%*P&J"%0& ; O : >&E (4$*0*@!Q+&)+$!
8 / / / >*+ , >1*C>5D<?!Q==)3$!=*%!R'()*+'&!H('(),()3,>!

W' - '2$ 0 $(%)*5@!a>@!H* 0 $%C)&&$@! J >!'+2!H5 0 - ()*+@! S >!8 ; LL : <!*B ! 0&? - ')$+& T - .)+)*/& - 8&*
L # #)16$%, &$%4&B ! 0)6&9 !)+460%*_! J ' ,#)+1(*+!a>O?!"%'+, '(&'+()3!O*5+3)&!*+! S)1%'()*+@!
S)1%'()*+!W*&)34!P+,()(5($>!

W'%$&&'@!H>@!W$(%*==@!X>!'+2!H*& I @!O>!8 ; L9 [<!n"#$!V - / '%2!Q335 - '()*+'&! S * .)&)(4!*=!P 0 0)1%'+(!
J * 0 $+!)+!H - ')+n@!*J - "6%$+& - 8&G* ! %) '&$%4& T)16$*) - %&?*"4)0, I*! [: 8 : <@! - - >!9 [\ ] A9 [M ; >!

F'$@!X>!8 ; L9 [<!n I +1&) ,#!5% . '+! - *&)34!'+2!(#$!%$(5%+!(*!(#$!3)(4?!X!2$3'2$!*=!1%* / (#@! ; LL9 f
; L99n@!*9)*)0, I*! [; @! - - >! : eA9L9>!

F)$+`*@!O>!'+2!c'%1' ,AH)&C'@!O>!8 ; L9 \<!*R6)08)%1&D& T)16$%*, &)%&* ! 0&EKP&^%&@7067)0H&\>* ! &*
C07),) - %]@!QE=*%2?!"#$! S)1%'()*+!Q . ,$%C'(*%4!'(!(#$!V+)C$%,)(4!*=!QE=*%2>!

F I %'(@!W>!8 ; L9e<!nN)1#&4!B5'&)=)$2!%5%'&!4*5(#?! / #4!2*!4*5+1!1%'25'($, !%$(5%+!(*!(#$)%!#* 0 $!
%$1)*+hn@!*9 !)+460%d, &Z0 - 16$ (!)0, I*!9 ; 89<@! - - >!KLAM \>!

H'1$@!_>@! I C'+2%*5@! S >!'+2!6'&D)+1#' 0 @!_>!8 ; L9 [<!nQ+ / '%2, !*%!N* 0 $ / '%2,h!O* 0 - &$E!
^%'25'($! S)1%'()*+!W'(# / '4,@! J $&&A . $)+1@!'+2!(#$!jW'%$+('&!H'=$(4!R$(7n@!*N - ("+$*) - %I&*
?($'0&$%4&N+$'0I!9 : 8 \<@! - - >!K [MAK]] >!

H) 0 m+@!N>@!F' 0 * ,@!F>!'+2!H'+%* 0 w@! I >!8 ; L9e<!nP 0 0)1%'+(!Q335 - '()*+'&! S * .)&)(4?!G*+1)(52)+'&!
I C)2$+3$!=%* 0 !H - ')+n@!*G"6 - (0$%&J - "6%$+& - 8&N - ("+$*) - %I*! [L8 ; <@! - - >! ; ; [A ;]] >!

H 0)(#@!a>!W>!'+2!H'1$@!_>!8 ; L9e<!n"#$!%$1)*+'&! 0)1%'()*+!*=!4*5+1!'25&(, !)+! I +1&'+2!'+2! J '&$, !
8 ; LL ; f ; LLM<?!'!j3*+C$4*%A . $&(7!*=! - * - 5&'()*+!%$2) , (%) . 5()*+hn@!*9 !)+460%d, &Z0 - 16$ (!)0, I*!
9 ; 89<@! - - >!9L ; A99K>!

c'%1' ,AH)&C'@!O>!8 ; L9]<!*R6)08)%1&D& T)16$%*, &$%4&Q - " ,)%1&)%&* ! 0&EKP&G` (06)0%'0, &$%4&L # ($'*, &*
\<64&C07),) - %]@!QE=*%2?!"#$! S)1%'()*+!Q . ,$%C'(*%4!'(!(#$!V+)C$%,)(4!*=!QE=*%2>!

!

!

!

c$%)3D@!H>!'+2!P,&'O@!P>!8;L9L<!n"#$!^%$'(!F$3$,,)*+!*=!;LLMA;LL:?!O'5,$,@!O*+,$B5$+3$,!'+2!
W*&)34!F$,-*+,$,n@!G#(+-/#0%*&?0'*-6&G#(+-/#0%*&S-6[)%1&N$(06&\L3@]I!R*>\9>!

c)2'&AO*,*@!I>!'+2!S)%$(A^'05+2)@!W>!8;L9e<!n"#$!&'.*5%!(%'i$3(*%)$,!*=!)00)1%'+(!/*0$+!)+!
H-')+?!X%$!(#$%$!,)1+,!*=!5-/'%2!,*3)'&!0*.)&)(4hn@!V0#-16$(!)'&C0,0$6'!I![989[<@!-->!
[[KA[K:>!

J#)($@!W>!8;LL[<!nR*(!i5,(!%51.4!3&5.,?!H3*((),#A!'+2!/$&,#A!.*%+!0)1%'+(,!)+!G*+2*+n@!
?'-**),!&Z0-16$(!)'$+&J-"6%$+I!99:8[<@!-->!;L:A;;K>!

)

!