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!

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

0) $#,1'!2%!0%1&*3&%&*#1+2%#4!52,+2&,2%2) +,!51#16'!#%.!-&4&7#%,&!12!18&!92.&*%!

-&$#*#1+2%'!927&) &%1!

!

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

.%/0),'1)23,%#%/"04%'

5,6+/'+/*'7/40,)/2%/-+$'8)$09&'

!3,0$':;'<=<>'

8,)?%""),'()*/&+/"@&'

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(, ; %2 < 4& . 3&) &%1 '!

! "#$%&' (&) ' *+%*+, &

!"#$%&'(#)%"*++*,'

-.(/0$%'"&*++*

M V0*',%*,%''''#+4%'+'$)/CM$+"-0/C'02 3+9-')/'-#%'")90)%9)/) 209'"-+-K"')?'D+3+/%"%'

! 2%,09+/"]''

M U)J'+,%',%3+,+-0)/"'?),'D+3+/%"%'! 2%,09+/"',%$%4+/-'-)'-#%'2)*%,/'?0C#-'?),'

,%3+,+-0)/"'?),'O$+9@'! 2%,09+/"]'

'

l'#&3)

409-02";'+"'0/'") 2%'0/"-+/9%";'-#%'409-02"_'*%"0,%"'+,%'/)-'3,0),0-0R%*H'A#%'?)$$) J0/C'%B+23$%"')?'

9)23$%-%*',%3+,+-0)/"'*0"'3$+&'"0C/0?09+/-'+33,)3,0+-0)/"')?'?K/*0/C'+/*'K/9%,-+0/-&'?,)2'

409-02"'0/'4+,0)K"'9+"%"H''

Historical Examples of Reparations

!

' (%3+,+-0)/"'#+4%"'K99%"'?K$$&'6%%/')??%,%*'0/'"%4%,+$')-#%,'9)K/-,0%";'-)'+--%23-'-)'

2+@%'+

bd;===;===;===';/'3+&2%/-"'-#,)KC#'-#%'I/*%3%/*%/-'!""%""2%/-'8,)9%"";'J#0$%'+'

C)4%,/2%/-',%"%+,9#')/'"&3#0$0"'

[K%"-0)/'-#%'4+$K%')?'-#%'2)/%-+,&'9)23%/"+-0)/'YI/*0+/'1$+02"'1)220"""0)/;'>EF=ZH'A#0"'

%B+23$%'#0C#$0C#-"'-#%'-%/"0)/'6%-J%%/'4009-02"'+/*'3%,3%-,+-),";'+"'J%$$'+"'-#%'J+&"'

,%3+,+-0)/"'9+/'6%'$%""'2%+/0/C?K$'J0-#)K-'C,)K3'3+,-0903+-0)/'+/*'"&26)$09'9)23)/%/-"'$0@%'

+/'+3)$)C&H''

' 'I/'/%+,$&'%4%,&'%B+23$%')?'9)23$%-%*',%3+,+-0)/";'-#%,%'0"'#%"0-+-0)/'+/*'*%$06%,+-0)/'

)/'-#%'"0*%')?'-#%'409-02";'+/*'+'?),2+$'+3)$)C&'?,)2'-#%'3%,3%-,+-),;'-#%'C)4%,/2%/-H'A#%"%'

%B+23$%"'#0C#$0C#-'-#%'*0??09K$-&')?'*%4%$)30/C',%3+,+-0)/"'-#+-'+,%'2%+/0/C?K$'-)'-#)"%'

02 3+9-%*'6&'-#%'0/WK"-09%',%"-0-K-0)/'0"'+02 0/C'-)'+**,%""H'!/)-#%,'3)-%/-0+$'0/"-+/9%')?'

,%3+,+-0)/"'0/'-#%'5/0-%*'.-+-%"'0"'-#%'6+--$%')4%,'UH(H'e='0/'-#%'U)K"%')?'(%3,%"%/-+-04%"H'A#%'

1)220"""0)/'-)'.-K*&'+/*'V%4%$)3'(%3+,+-0)/'8,)3)"+$"'?),'!?,09+/'!2%,09+/"'!9-;'+$")'@/)J/'

+"'UH(H'e=;'0"'+'60$$'-#+-'J)K$*'%"-+6$0"#'+'9)220"""0)/'-)'*%-%,20/%'-#%'/+-0)/_"',)$%'0/'"$+4%,&;'

0"9,020/+-0)/'+C+0/"-'?,%%'%/"$+4%*'3%)33$%'+/*'-#%0,'*%"9%/*+/-";'+/*'-#%'$0/C%,0/C'023+9-"'

)?'"$+4%,&H'N)-+6$&;'-#0"'60$$'0"'/)-'*%6+-0/C',%3+,+-0)/"'3,)3)"+$";'0-'0"')/$&'*%6+-0/C'-#%'

)33),-K/0-&'-)'0/4%"-0C+-%'C)4%,/2%/-'J,)/C*)0/C'+C+0/"-'O$+9@'!2%,09+/"'H'A#0"'60$$;'+-'-#%'

-02%')?'J,0-0/C;'J+"'0/-,)*K9%*'-)'-#%'>>c-#'1)/C,%"'6&'(%3,%"%/-+-04%'.#%0$+'D+9@")/'G%%;'

+?-%,'<F'&%+,"')?'(%3,%"%/-+-04%'D)#/'1)&/%,'0/-,)*K90/C'-#%'60$$'0/-)'1)/C,%"'-)'/)'+4+0$H'

(%3+,+-0)/"')?',"'$+4%,&'#+4%'#+*'-#%'$%+"-'"K99%"'0/'C)4%,/2%/-'*%"'30-%'%??),-"',)2'

),C+/0R+-0)/"'+/*'2%26%,")?'1)/C,%""H!

Japanese Incarceration and Redress

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' A#%'2)"-'2+0/"-,%+2'%B+23$%')?',%3+,+-0)/"'0/'!2%,09+

-)'+"',%$)9+-0)/;'%4+9K+-0)/;'+/*'0/9+,9%,+-0)/H'(%3+,+-0)/"'+,%'+$")',%?%,,%*'-)'+"',%*,%""'+/*'
,%"-0-K-0)/H'L#0$%'g0/-%,/2%/-h'0"'-#%'2)"-'9)22)/$&'@/)J/'J),*'-)'*%"9,06%'-#%'?),9%*'
,%2)4+$'+/*'0230")/2%/-')?'D+3+/%"%'3%)3$%'0/'!2%,09+'+?-%,'-#%'+--+9@')/'8%+,$'U+,6),;'0-'
*)%"'/)-'3,)3%,$&'*%"9,06%'J#+-'#+33%/%*H'X),'-#%',%2+0/*%,')?'-#0"'3+3%,;'g0/-%,/2%/-h'J0$$'
/)-'6%'K"%*'-)'*%"9,06%'-#%'0/9+,9%,+-0)/')?'D+3+/%"%'3%)3$%'0/'!2%,09+/'9)/9%/-,+-0)/'9+23"H'
A#0"'*09-0)/'0"',%"3%9-?K$')?'0/-%,40%J%%'J0"#%";',%?$%9-04%')?'$+/CK+C%'K"%*'6&'D+3+/%"%'
!2%,09+/'S,C+/0R+-0)/";'+/*'-#%'2)"-'?+9-K+$$&'+99K,+-%H'(%3+,+-0)/"')?),'D+3+/%"%'!2%,09+/"'
J%,%'2%+/-'-)'+**,%""'-#%'0/9+,9%,+-0)/')?'3%)3$%')?'D+3+/%"%'+/9%"-,&'0/'-#%'5.'*K,0/C'L),$*'
L+,'IIH'A#%'!2%,09+/'*%90"0)/'-)')??090+$$&'%/-%,'-#%'J+,'J+"""3K,,%*'6&'-#%'6)260/C')?'8%+,$'
U+,6),'6&'D+3+/%"%'+0,'?),9%"')/'V%9%26%,':;'>Ee>H'AJ)'$+,C%'"#03"'J%,%'*%"-,)&%*'+-'-#%'
8%+,$'U+,6),'/+4+$'6+"%'0/'U+J+00;'+/*'<;e=d'3%)3$%'J%,%'@0$$%*;'J#09#'3,)23-%*'-#%'5/0-%*'
.-+-%"'-)'%/-%,'-#%'J+,'+/*'8,%"0*%/-'())"%4%$-'-)'%/+9-'7B%9K-04%'S,*%,'E=cc')/'X%6,K+,&'>E;'
>Ee<'YD!NPH),CZH'7B%9K-04%'S,*%,'E=cc',%[K0,%*'-#+-'D+3+/%"%'+/*'!2%,09+/"')?'D+3+/%"%'
%"9%/-'6%',)K/%*'K3'+/*'#)K"%*'0/',%$)9+-0)/'9+23"H'L0-#'+/&J#%,%'6%-J%%/'?)K,'*+&"'-)'
-J)'J%%@"')?'/)-09%;'D+3+/%"%'!2%,09+/"'J%,%'?),9%*'-)'*0"3)"%')?'-#%0,'3%,")/+$'6%$)/C0/C"'
+/*'"%$$'-#%0,'3,)3%,-&H'A#%&'J%,%'0/"-,K9-%*'-)')/$&'6,0/C'J#+-'-#%&'9)K$*'9+,,&;',%"K$-0/C'0/'
$)"-'6K"0/%""%";'3,)3%,-&;'+/*'$+/*'*K%'-)'-#%0,'?),9%*'%4+9K+-0)/H'A#0"'J+"'#+33%/0/C'0/'+/'%,+'
)?'+/-0MD+3+/%"%',+90"2'+/*'")'J+"'+99%3-%*'6&'-#%'$+,C%,'!2%,09+/'3K6$09H'I-'J+"',%[K0,%*'-#+-'
3%)3$%'J0-#'+"'$0--$%'+">i>c-#'D+3

+/*',%2)4%*'?,)2'-#%0,'#)2%"H'!-'AK$%'G+@%;'+/)-#%,'2+/;'.#)09#0'D+2%"'S@+2)-);'J+"'"#)-'

-)'*%+-#'6&'+'CK+,*'YD!NPH),CZH'

I/9+,9%,+-0)/'%/*%*'0/'>Ee`;'+?-%,'-#%'.K3,%2%'1)K,-',K$%*'-#+-'-#%'L(!'*0*'/)-'#+4%'

-#%'+K-#),0-&'-)'*%-+0/'$)&+$'90-0R%/"'0/'7/*)'4H'A#%'5/0-%*'.-+-%"H'A#%'$+"-'9)/9%/-,+-0)/'9+23;'

AK$%'G+@%;'*0*'/)-'9$)"'%'K/-0$'>EecH''7B%9K-04%'S,*%,'E=cc'J+"'/)-')??090+$$&',%3%+$%*'K/-0$'>E:c'

6&'8,%"0*%/-'X),*H'I/'>EFF'8,%"0*%/-'(%+C+/'"0C/%*'UH(H'ee<;'-#%'1040$'G06%,-0%"'!9-')?'>EFF;'

J#09#'"-+-%"'-#+-'-#%'023,0")/2%/-')?'3%)3$%')?'D+3+/%"'%'+/9%"-,&'J+"'g$+,C%$&'2)-04+-%*'6&'

,+90+$'3,%WK*09%;'J+,-02%'#&"-%,0+;'+/*'+'?+0$K,%')?'3)$0-09+$'$%+*%,"#03h'+/*'$0"-"'0-"'C)+$"'+"'-)'

K/9)4%,%*'2+/&'%2)-0)/"'+/*'"-),0%"'-#+-'#+*'6%%/'6K,0%*'?),'&%+,"H"'X),'+'2),%'

9)23,%#%/"04%'%B3$+/+-0)/')?'-#%'C,+"",))-"'"-,KCC$%'+/*'3%,")/+$'+99)K/-"')?'-#%'3,)9%"'"'

?,)2'2%26%,"')?'-#%'G)"'!/C%$%"'9#+3-%,;'J#09#'J+,,+/-"'*%-+0$'-#+-'0"'

$)'"'%"'+,%'"0C/0?09+/-$&'$+,C%'9)/"0*%,0/C'J#+-'-#%0,'4+$K%'J)K$*'6%'0/'>EE="'*)$$+,";'J#%/'-#%'
?0,"-',%3+,+-0)/'3+&2%/-'J+"'2+*%;'+/*'0/'9)23+,0")/'-)'-#%'b<=;===='3+0*'+"',%*,%"'"?),'-#%"%'
$)'"'%"H'VK%'-)'-#%'#%9-09'+/*'+6K"04%'/+-K,%')?'D+3+/%"%'%4+9K+-0)/;'-#%,%'+,%'/)-'+99K,+-%'
,%9),*"'-)'*%-%,20/%'+'2),%'9%,-+0/'9+$9K$+-0)/')?'$)'"'%"H''

A#%')-#%,'2)/%-+,&'3,)C,+2'-#+-'J+"'+'3+,-')?'D+3+/%"%'(%*,%"'"J+"'-#%'1040$'G06%,-0%"'
8K6$09'7*K9+-0)/'XK/*H'A#%'C)+$"')?'-#0"'?K/*'J%,%'-)'%/"K,%'-#%',%2%26,+/9%')?'D+3+/%"%'
0/9+,9%,+-0)/'+/*'-)'K/*%,"-+/*'-#%'9+K"%"')?'%4%/-"'0/'-#0"'+/*'"02 0$+,'"0-K+-0)/"H'bd;d==;===='
?,)2'-#%'?K/*'J%,%'K"%*'-)'"3)/"),'>d`'3,)W%9-"'0/9$K*0/C'+,-;',%"%+,9#;'?%$$)J"#03";'
$+/*2+,@";'+/*'9K,,09K$K2'*%4%$)32%/-'YT+2+-);'<=>dZH'S-#%,'+J+,%/%"'"+9-0)/"'"3)/"),%*'
6&'-#%'3K6$09'%*K9+-0)/'?K/*'0/9$K*%'3K6$09'"%,409%'+//)K/9%2%/-";'-#%',%3K6$0"#0/C')?'-#%'
8%,")/+$'DK"-09%'V%/0%*',%3),-;'+/*'%*0-0/C'-#%'-,+/"9,03-"')?'-%"-02)/0%"'?,)2'1L(I1'#%+,0/C"'

+/*'

Economic Impacts

P)"-' J),@') /'-#%'%9) /) 209'0 2 3+9-')?'0/9+,9%,+-0) /'"#) J'"'"0C/0?09+/-'?0/+/90+$'$)'"'%"'?),'
D+3+/%"%'! 2%,09+/"' J#)' J%,%'0/9+,9%,+-%*H'79) /) 209'$)'"'%"'$+,C%$&'"-%2 2%*'?,) 2'#+40/C'-)'
"%$$'3%,") /+$'0-% 2 "'+/*'3,)3%,-&'+-'+'$)'"';'$)"0/C'6K"0/%'"'%";'+/*'$)"-')33),-K/0-&'?),' J+C%"H'
P),%"'3%90?09+$$&'$)'"'%"'9+2%'?,) 2'"%$$0/C'+K-) 2)60$%"'-)'0/*040*K+$"'),'-#%'C)4%,/2%/-'?),'
"0C/0?09+/-$&',%*K9%*'3,09%";'"%$$0/C'$+/*'-)')33),-K/0"-"'+$")'+-'"0C/0?09+/-$&',%*K9%*'3,09%";'
$)"0/C'" 2+$$'6K"0/%'"'%"'*K%'-)'-#%'0/+60$0-&'-)' 2+0/-+0/'-#% 2'*K,0/C'0/9+,9%,+-0) /;'+/*'
%/-,K"-0/C'0-% 2 "'),'3,)3%,-&'-)'9+,%-+@%,"' J#)')?-%/'+6+/*) /%*'3,)3%,-&'),'/%4%,',%-K,/%*'
0-% 2 "'YQ+"#0 2+;'>EE:ZH'A#%,%' J%,%'+$")'"0C/0?09+/-'$)'"'%"'0/'-#%'+C,09K$-K,%'0/*K"-,&;'+"'+6)K-'
-J)M-#0,*"')?'-#%'D+3+/%"%' J),@?),9%'0/'-#%' J%"-%,/'9)+"-+$'"-+-%"',%$0%*')/'-#%'+C,09K$-K,%'
0/*K"-,&'+/*'+6)K-'bF=;===;===' J),-#')?'?+,2$+/*'+/*'%[K032%/-'6%$)/C%*'-)'N0@@%0')/'-#%'
J%"-'9)+"-'YQ+"#0 2+;'>EE:ZH'
S-#%,"'0C/0?09+/-'$)'"'%"'9+2%'?,) 2'$)"-' J+C%"H'!$$'%"-0 2+-%";'0/9$K*0/C'9)/"%,4+-04%'
%"-0 2+-%";')/'#) J' 2K9#'0/9+,9%,+-%*'D+3+/%"%'! 2%,09+/"'$)"-'*K%'-)'3,)3%,-&'+/*' J+C%'$)'"'%"'
"#) J'"0C/0?09+/-$&'#0C#%,'$)'"'%"'-#+/' J#+-' J+"'3+0*'6&'-#%'C)4%,/2%/-')'+**,%"'-#)"%'$)'"'%"'
-#,)KC#'-#%'>EeF'D+3+/%"%'! 2%,09+/'74+9K+-0)/'1$+0 2"'!9-'+/*'-#%'>EFF'1040$'G06%,-0%"'!9-'H'I/'
-#%'74+9K+-0)/"'1$+0 2"'!9-;'-#%'5.'C)4%,/2%/-'3+0*'+6)K-'bd:;===;===''0/'-)-+$'-)'-#%' 2+W),0-&'
)?'-#%'<c;`cF'9$+0 2+/-";'+/*'-#%'>EFF'1040$'G06%,-0%"'!9-'3+0*'b<=;===')'+$$'"K,4040/C'
0/9+,9%,%%";' J#09#' J+"'+6)K-'b>;c==;===;===',) 2'-#%'C)4%,/2%/-'YQ+"#0 2+;'>EE:ZH'U) J%4%,;'
+'"-K*&'6&'O,)) 2'+/*'(0% 2%,'0/'>EeE'?)K/*'-#+-'6+"%*')/'9)/"%,4+-04%' 2%+"K,%"')?'0/9) 2%'
+/*'3,)3%,-&'$)"';'-#%,%' J+"'+6)K-'b::;===;===' J),-#')?'$)"'"%"'-)'9$+0 2'?,) 2'-#%'74+9K+-0)/"'

0/'-#%'9)/C,%""0)/+$'*%$06%,+-0)/'?),'-#%'>EFF'1040$'G06%,-0%"'!9-'?),'/)-'+99)K/-0/C'?),'-#%'$)"""

)?'?0/+/90+$'*)9K2%/-"'*K%'-)'0/9+,9%,+-0)/'-#+-'J%,%'/%%*%*'-)'3,)4%'?0/+/90+$'$)"""%"H'O,))2'

+/*'(0%2%,'?)9K"%*')/'G)"'!/C%$%"'+"'+'"+23$%'+/*'K"%*'9)/"%,4+-04%'2%+"K,%"'$0@%'6+"0/C'

9+$9K$+-0)/"')/'>Ee>'9)"-"'+$-#)KC#'-#%0,"'0""'-0$$'9)/"0*%,%*'-#%'2)"-'-#),)KC#'+/+$&"0"')?'

%9)/)209'0234+9-"')?'%4+9K+-0)/'YQ+"#02+;'>EE:ZH''

A#%,%'0"'+'"0C/0?09+/-'$+9@')?',%"%+,9#')/'-#%'%9)/)209'0234+9-"'?,)2'-#%'<>"-'9%/-K,&'

+/*'-#%'C%/%,+-0)/+$'0234+9-')?'0/9+,9%,+-0)/'?,)2'+/'%9)/)209'3%,"3%9-04%H'1#0/'Y<==eZ'0"'-#%'

2)"-',%9%/-'%9)/)209'"-K*&'+/*'")$%'"-K*&')/'-#%'%B-%/-')?'$)"""%"""3%90?09+$$&'*K%'-)'J+C%'$)"""

+/*'$+6),'2+,@%-'J0-#*,+J+$'+/*'0-"'$)/CM-%,2'%??%9-"'+?-%,'0/9+,9%,+-0)/H'A)'K/*%,"-+/*'#)J'

2+$%'J),@0/CM+C%'D+3+/%"%'!2%,09+/"'J)K$*'#+4%'?+,%*'0?'0/9+,9%,+-0)/'#+*'/)-'#+33%/%*;'

1#0/'K"%*'-#%'D+3+/%"%'3)3K$+-0)/')?'U+J+00;'J#09#'J+"'/)-'"'K6W%9-'-)'0/9+,9%,+-0)/;'+"'+'

9)/-,)$'C,)K3H'1#0/'?)K/*'%40*%/9%')?'%+,/0/C"'$)"""%"'K3'-)'<`'&%+,"'+?-%,'0/9+,9%,+-0)/H'A#%'

C,%+-%"-'%+,/0/C'$)"""%"'J%,%'?),'-#%'&)K/C%"-'C,)K3')?'2+$%'0/9+,9%,%%"'+/*'J+"'*%-%,20/%*'

0/9+,9%,+-%*H'(%"%+,9#'9)/*K9-%*')/'-#%'%9)/)209'02 3+9-"')?'0/9+,9%,+-0)/'$+,C%$&'?)9K"%"')/'

-#%'$)""%"'?,)2'3,)3%,-&'+/*'%+,/0/C"')/'-#)"%'0/9+,9%,+-%*'+/*'"#)K$*'6%'%B3+/*%*'-)'

0/9$K*%'-#%'02 3+9-"')/'-#%'9#0$*,%/')?'0/9+,9%,+-%*'D+3+/%"%'!2%,09+/"H''

Socioeconomic Status of Japanese Americans

! A#%'*0"9K""0)/')?'-#%'02 3+9-"')?'0/9+,9%,+-0)/'2K"-'6%'9)/-%B-K+$0R%*'6&'-#%'

")90)%9)/)209'"-+-K"')?'D+3+/%"%'!2%,09+/"'-#,)KC#)K-'-#%'<=-#'9%/-K,&H'V+-+')/'-#%'

%*K9+-0)/+$'+--+0/2%/-'+/*')99K3+-0)/')?'D+3+/%"%'!2%,09+/"'J+"',%9),*%*'6&'-#%'5/0-%*'

.-+-%"'L+,'(%$)9+-0)/'!K-#),0-&'6%?),%'0/9+,9%,+-0)/;'#)J%4%,;'+"'2%/-0)/%*'0/'

'-#%'I(.'*%"-,)&%*'0/9)2%'-+B',%9),*"')?'-#%'0/9+,9%,+-%*'?,)2'>EdE'-)'>Ee<'

YQ+"#02+;'>EE:ZH'A#0""'-K*&'+$")'?)K/*'-#+-'D+3+/%"%'!2%,09+/"'J%,%'+$")'"K99%""?K$'6%?),%'-#%'

J+,;'J0-#'3+,-09K$+,'"-,%/C-#'0/'-#%'+C,09K$-K,+$'0/*K"-,&H'X),'%B+23$%;'D+3+/%"%'?$),0"-"'

+99)K/-%*'?),'>c')K-')?'<`'20$$0)/'*)$$+,"'0/'?$)J%,'2+,@%-'6K"0/%""'0/'G)"'!/C%$%"'YQ+"#02+;'

>EE:ZH'!'>E:d'"-K*&')/'-#%'")90)%9)/)209'2)60$0-&')?'D+3+/%"%'!2%,09+/"')@%*'+-'-#,%%'

C%/%,+-0)/"'+/*'?)K/*'K/"K,3,0"0/C$&'-#+-'-#%'%*K9+-0)/+$'+--+0/2%/-'$%4%$')?'-#%'>"-'

C%/%,+-0)/'J+"'#0C#$&'9),,%$+-%*'J0-#'-#%'%*K9+-0)/+$'+--+0/2%/-'$%4%$'0/'-#%'?)$$)J0/C'

C%/%,+-0)/"'6K-'?)9K"%*')/'-#%'02 3+9-')?'+""02 0$+-0)/'"-&$%"',+-#%,'-#+/'-#%'02 3+9-')?'

0/9+,9%,+-0)/'YG%40/%;'>E:dZH''

' !/)-#%,'"-K*&'6&'1+K*0$$'+/*'P0B)/'Y<=><Z'$))@%*'+-'-#%'02 3+9-"')?'0/9+,9%,+-0)/')/'

#K2+/'+/*'3#&"09+$'9+30-+$H'1+K*0$$'+/*'P0B)/

$0@%'#0C#%,'%*K9+-0)/;'0/"-%+*')?'3#&"09+$'9+30-+$'$0@%'$+/*;'J#09#'#+*'3,)4%/'-)'6%'+',0"@&'
0/4%"-2%/-'?),'-#0"'%-#/09'C,)K3'6%9+K"%')?'-#%'$)""%"'?,)2'0/9+,9%,+-0)/'Y1+K*0$$'+/*'P0B)/;'
<=><ZH'A#0"',%"%+,9#'J+"'9)23$%-%*'K"0/C'-#%'*+-+'?,)2'-#%'D+3+/%"%'!2%,09+/'(%"%+,9#'
8,)W%9-'+/*'?)K/*'-#+-'6%#+40),'?,)2'D+3+/%"%'!2%,09+/"'3)"-M0/9+,9%,+-0)/'+$0C/%*'J0-#'
%9)/)209'-#%),&;'#)J%4%,;'-#0"',%"%+,9#'*0*'/)-'0/9$K*%'+'-#),)KC#'+/+$&"0"')/'-#%'0231+9-')/'
9#+/C0/C'?,)2'0/4%"-0/C'0/'3#&"09+$'9+30-+$'-)'#K2+/'9+30-+$')/'")90)%9)/)209'"-+-K"H'!/+$&"0"'
)?'-#%'$+,C%,'")90)%9)/)209'+/*'J%+$-#'0231+9-")/'0/4%"-0/C'0/'#K2+/'9+30-+$'0/"-%+*')?'
3#&"09+$'9+30-+$'J)K$*'6%',%$%4+/-')'-#%'*0"9K""0)/')?'%??%9-04%',%3+,+-0)/"'+/*'0/?),2+-0)/')/'

C%/%,+$$&'3)"0-04%'6K-'J%,%'0/?$K%/9%*'6&')/%_"'J),$*40%JH'I23),-+/-$&'-#0"',%"%+,9#'+$")'

%-%,20/%'-#+-',%3+,+-0)/"'*)'/)-'9)23$%-%$&'#%+$'-,+K2+'+$-#)KC#'409-02"'*)'40%J'-#%2'+"'

C%/%,+$$&'3)"0-04%$&'023+9-?K$H'A#%'<=>E'N+C+-+'"-K*&')/',+90+$'-,+K2+'?,)2'J+,-02%'

0/9+,9%,+-0)/'*%-+0$"'-#%'"-,%"")," '-#+-'D+3+/%"'%'3%)3$%'?+9%*'*K%'-)'0/9+,9%,+-0)/'+/*'-#%'

0/-%,C%/%,+-0)/+$'023+9-"')?'"K9#'-,+K2+'J#0$%'-#%'>EE='N+C+-+'"-K*&'?)K/*'-#+-'6%#+40),')?'

' A#%'%B0''-0/C'$0-%,+-K,%')/'-#%'"K6W%9-')?'D+3+/%"%',%3+,+-0)/"'*)%"'/)-'0/9$K*%'+'?)$$)JM K3')/'-#%'")90)%9)/)209'0234+9-"')?',%3+,+-0)/"'+/*'$+,C%$&'*%/0%"'+'9)//%9-0)/'6%-J%%/' D+3+/%"%',%3+,+-0)/"'+/*'-#%'2)4%2%/-'?),',%3+,+-0)/"'?),'O$+9@'!2%,09+/"H'(%"%+,9#'/%%*"' -)'6%'%B3+/*%*'-)'0/9$K*%'2),%'2)*%,/")90)%9)/)209'0234+9-"')?',%3+,+-0)/";'+/*' C%/%,+-0)/+$'0234+9-"')?',%3+,+-0)/"H'A#0"',%"%+,9#'J)K$*'6%'%"3%90+$$&',%$%4+/-'-)'-#%'2)*%,/' ?0C#-'?),',%3+,+-0)/"'?),')-#%,'C,)K3"'0/'!2%,09+;'/+2%$&;'O$+9@'!2%,09+/"'+/*'*%"9%/*+/-"')?' %/"$+4%*'3%)3$%H'P&',%"%+,9#'+02%*'-)'%B3+/*')/'-#%'%B0''-0/C',%"%+,9#'6&'%B+20/0/C'-#%' C%/%,+-0)/+$'0234+9-')/")90)%9)/)209'"-+-K"',%3+,+-0)/"'#+*'?),'D+3+/%"%'!2%,09+/"'+/*' ,%$+-0/

[K+/-0-+-04%',%"%+,9#'2%-#)*"'J%,%'9)/"0*%,%*;'-#%,%'J+"'/)-'+*%[K+-%'*+-+')/'

")90)%9)/)209'"-+-K"'+/*'J%+$-#'?),'D+3+/%"%'!2%,09+/""'3%90?09+$$&'?),'+'$)/C'%/)KC#'-02%'

3%,0)*H'I/?),2+-0)/'C+0/%*'?,)2'[K+/-0-+-04%'*+-+'$0@%$&'J)K$*'/)-'#+4%'02 3+9-%*'+$-%,%*'

9)/9$K"0)/"'6K-',+-#%,'+**%*'+'[K+/-0-+-04%'3%,"3%9-04%'-)'-#%'+/+$&"0"'-#+-'20,,),"'-#%'?0/*0/C"'

?,)2'[K+$0-+-04%'+/+$&"0"H'jK+/-0-+-04%'2%-#)*"'+$")'J)K$*'#+4%'3,)40*%*'*+-+'?),'*0??%,%/-'

,%"%+,9#'[K%"-0)/";'"3%90?09+$$&')/'-#%'3+--%,/"'+/*'9#+/C%"')?'D+3+/%"%'!2%,09+/'%9)/)209'

"-+-K";'J#09#'+,%'/)-'%B3$),%*'0/'-#0""-K*&H!

!!!!!!!!! 'I'0/-%,40%J%*'-#%'"K,404),"')?'0/9+,9%,+-0)/;'-#%'9#0$*,%/')?'"K,404),"')?'0/9+,9%,+-0)/;'

+/*'-#%'C,+/*9#0$*,%/')?'"K,404),"')?'0/9+,9%,+-0)/'-)'C+-#%,'-%"-02)/&')/'%9)/)209'$)"";'-)'

#%+,'0/*040*K+$'+/*'"3%90?09'+99)K/-"')/'#)J'(%*,%""'2)/%&'J+"'K"%*;'+/*'-)'$%+,/'2),%'

+6)K-'-#%'0/*040*K+$'"0C/0?09+/9%')?',%*,%""H'P+/&'+99)K/-"'%B0"-')?'-#%'%2)-0)/+$"0C/0?09+/9%'

)?'-#%'C)4%,/2%/-',%9)C/0-0)/')?'?+K$-'+/*'J,)/C*)0/C;")'+/+$&"0"'J+"'+$")'9)/*K9-%*'K"0/C

+/"J%,'J+"'eH>;'J0-#'-#%'$)J%"-'+/"J%,'6%0/C'R%,)'+/*'-#%'#0C#%"-'6%0/C'FH`'YA#0"'0"'6+"%*')/'F'

,%"3)/"%";'+"'<',%"3)/*%/-"'9)K$*'/)-'+/"J%,'-#0"'[K%"-0)/ZH'A#%'-J)',%"3)/*%/-"'J#)',+-%*'

-#%0,'@/)J$%*C%'-#%'#0C#%"-;')/%'+-'FH`'+/*'-#%')-#%,'+-'c;'#+*',%[K%"-%*'+/*',%9%04%*'-#%0,'

N)-+6$&;'-#%,%'J%,%'`'3%)3$%'J#)'J%,%'%23$)&%*'0/'+C,09K$-K,%;'J#09#'0/9$K*%"'C+,*%/0/C'+/*'

?+,20/C;'J#%-#%,'),'/)-'-#%&')J/%*'-#%'?+,2$+/*H'X),'-#%'C%/%,+-0)/'6),/'+,)K/*'-#%'>Ee='';'

>@"#*'@(&$*#@%C#*$@/*0&/E;/2'B*%0*$@/*7"00/&/2$*C(B#*&/.(&($"%2#*0&% - *$@/*L"?")*M"D/&$"/#*<'$*%0*98==*
C/&/*;#/73* I %$/*$@($*$@/*'@(&$*#@%C#* - %&/*7($(*.%"2$#*%2*@%C*&/.(&($"%2#*C/&/*#./2$*D/'(;#/*$@/*
./%.)/*"2$/&?"/C/7*C/&/*(D)/*$%*&/.%&$*%2*@%C*$@/"&*.(&/2$#*#"D)"2F#*(27*#/)0*C@/2*&/)/?(2$*;#/7*
$@/"&*/7&/##*(27*D/'(;#/*-%#$*./%.)/*;#/7*$@/*-%2/B*0%&*-;)$".)/*.;&.%#/#3*O%&*/,(-.)/*"0*(*./&#%2*
&/.%&$/7*$@/B*#./2$*$@/"&*/7&/##*%2*(*'(&*(27*(*7%2($"%2*$%*(*'@(&"$B*$@($*C%;)7*'%;2$*(#*%2/*&/.%&$*
0%&*HP%2($"%2#QR"0$#J*(27*%2/*&/.%&$*0%&*HS"F*+,./2#/#J3*<)#%*2%$/*$@($*$C%*./%.)/*&/.%&$/7*$@/B*C/&/*
;2#;&/*%0*@%C*&/.(&($"%2#*C/&/*#./2$*(27*$@/&/*"#*2%*'%);-2*%2*$@/*'@(&$*$@($*7"#.)(B#*$@($3*>@/*
HP%2($"%2#QR"0$#TT*F&%;."2F*&/.&/#/2$#*7%2($"%2#*$%*2%2.&%0"$*%&F(2"G($"%2#*('(7/-"'*"2#$"$;$"%2#*(27*
7"&/'$*-%2/$(&B*F"0$#*$%*0(-")B*-/-D/&#3*>@/*HU&('$"'()*V#/#J*F&%;."2F*&/.&/#/2$#*;#/#*$@($*$@/*
&/#.%27/2$*C%;)7*@(?/*-(7/*C@/$@/&*%&*2%$*$@/B*@(7*&/7&/##*-%2/B*"2');7"2F*)%(2*.(B-/2$#*(27*
%$@/&*D"))#*'%-D"2"2F*$@/*.(B-/2$*C"$@*$@/"&*&/F;)(&*"2'%-/*7(")B*#./27"2F*0%&*'@")7&/2*%&*F/2/&()*
2//7#3*>@/*HS"F*+,./2#/#TT*F&%;."2F*&/.&/#/2$#*)(&F/&*/,./27"$;&/#*$@($*C/&/*/2(D)/7*DB*$@/*
&/.(&($"%2#*"2');7"2F*.(B"2F*0%&*(*-%&/*/,$&(?(F(2$*C/77"2F*(*2/C*'(&*2/C*0;&2"$;&/*%&*@%-/*
"-.&%?/-/2$#3*>@/*HW$@/&QR/2/&()*:./27"2FJ*F&%;."2F*&/.&/#/2$#*$@/*;#/#*$@($*7"7*2%$*0"$*"2$%*$@/*
%$@/&*'($/F%&"/#*C@"'@*C/&/*"2?/#$"2F*(27*2%2K/##/2$"()*#./27"2F3**
!
*

*0??09K$-&',%6K0$*0/C;'K/0-0/C;'+/*'%/C+C0/C'+'9)2 2K/0-&'-#+-'J+"'+99K"-)2%*'-)'@%%30/C'0-"'

#%+*'*)J/H!

=#:4&!C?!!

5&4&,1!*&'$2%'&'!12! 18&!D6&'1+2%/! ! ! EF#'!18&!GCHIHHH! '6AA+,+&%1JK!	gS?'9)K,"%'/)-h'Y"-+-%*'6&'<'*0??%,%/-',%"3)/*%/-"Z!
	IN);'I'-#0/@'0-'J+"'-)@%/H'I'-#0/@'-#+-'-#%'$)""")?')K,'&%+,"')?'J),@' %*K9+-0)/'+/*'&)K,'$0?%'+/*'-#%'$)""")?'3,)3%,-&'+/*'%4%,&-#0/C'&)K')J/%*'$+/*'?+,2'"-),%"'6K"0/%""%"'&)K'@/)J'3,%90)K"'?+20$&' #%0,$))2"H'&)K'@/)J'-#%'"#+2%;'#K20$0+-0)/;'-#%'?%+,;'-#%'+/C%,'+/*' &)K'@/)J'6%0/C')"-,+90R%*'+"'+'3%)3$%;'I'*)/k-'-#0/@'-#%,%k"'+/&-#0/C' -#+-'9)K$*'9)23%/"+-%'?),'-#+-I''
	g L %$$;'0-'J+"'/k-'"K??09 0%/-'?),'J#+-'-#%&'$)"-')?'9)K,"%H'I-'J+"' 2%+/0/C?K$'%/)KC#'-#+-'3%)3$%'?%$-'40/*09+-%*h!

!

=#:4&!L?!!

!M,,6$#1+2%!:N!O&%&*#1+2%I!5&4&,1!PQ#)$4&'!			
0@R!	0(!M,,6$#1+2%!	B0(!M,,6$#1+2%!	O0(!M,,6$#1+2%!
>'	a+,*%/%,'	A%+9#%,'+/*'!*20/0"-,+-),'	V)9-),;'A%+9#%,'
c'	X+,2%,"'	(%-+0$%,'	G+J&%,;'5/0)/'S,C+/0R%,'

>(D)/*X*7"#.)(B#*%''; .($"%2#*@/)7*DB*7"00/&/2$*F/2/&($"%2#*%0*./%.)/*"2*$@/*#(-/*0(-")B3*>&/27*7"#.)(B#*
$@/*$&(2#"$"%2*0&%-*C%&Y"2F*')(##*$%*.&%0/##"%2()*')(##*'(&//&#3*I%$/*%''; .($"%2#*#/.(&($/7*DB*(*'%--(*
"2*$@/*R6<*'%);-2*&/.&/#/2$*%''; .($"%2#*@/)7*DB*7"00/&/2$*#"D)"2F#3**

'

=#:4&!S?!!

5&4&,1!T621&'!#:261! B2))6%+1N!U&#4+%3!18*2638! -&.*&''!V*2,&''!#%.!W+,12*N! !	II-'m-#%'#%+,0/C"n'J+"',%+$$&'@0/*')?'+'4%,&'-,+/"?),2+-04%' 2)2%/-'?),'-#%'D+3+/%"%'!2%,09+/'9)22K/0-&'I'
	g L #%/'3%)3$%'*0*'C%-'-#%'+3)$)C&;'0-'*0*'2%+/'+'J#)$%'$)-H' T)K'9)K$*'?%%$'+',%+$'"%/"%')?',%*%23-0)/'+/*'-#%'J#)$%' -#0/C'+6)K-'6%0/C',%$0%4%*')?'-#+-'6K,*%/')?'CK0$-h'
	gI-'m,%*,%""n'9#+/C%*'+$$')?'K"'6%9+K"%'0-'$0?-%*'-#+-'@0/*')?' 2+&6%'0/?%,0),0-&'),'"#+2%h'
	gI'?%%$'3,)K*%,H'T)K'@/)J;'I'-#0/@')K,'9)22K/0-&'?%%$"' 9%,-+0/'3,0*%H'T)K'@/)J'&)K'9)K$*'#)$*'&)K,'#%+*'K3'6%--%,h'

"-+-K"'9+K"%*'6&',%*,%"""2)/%&H'A#%,%'J%,%'#)J%4%,'$)/CM$+"-0/C'02 3+9-"')/'9)2 2K/0-&'-#+-'

9+/'6%'+--,06K-%*'-)'-#%',%*,%"""2)4%2%/-'+/*'J0//0/C',%*,%"""H'P+/&'0/-%,40%J%%"'

9)2 2%/-%*')/'-#%'*+2+C%'-)'-#%'D+3+/%"%'!2%,09+/'9)2 2K/0-&'+"'+',%"K$-')?'0/9+,9%,+-0)/'

+/*'"K6"%[K%/-$&'9)2 2%/-%*')/'-#%',%$0%?'-#%'9)2 2K/0-&'%B3%,0%/9%*'-#,)KC#'-#%',%*,%"""'

3,)9%"""'+/*'409-),&H'jK)-%"'?,)2'0/-%,40%J"'-#+-'%B3,%"""'-#0"',%$0%?'),'40/*09+-0)/'9+/'6%'?)K/*'

0/'A+6$%'eH'!$-#)KC#'-#%,%'J+"'+',%9)C/0-0)/')?'-#%'409-),&'-#%,%'J+"'+$")'%B3$090-'2%/-0)/')?'

-#%'9)/-0/K+-0)/')?'")90+$'WK"-09%'J),@'?,)2'2)"-')?'-#%'0/-%,40%J%%"H'8,%40)K"'J),@'+C+0/"-'

+/-0M02 20C,+/-'0/WK"-09%";'0/9$K*0/C'+/-0MPK"$02'"%/-02%/-"'+?-%,'Ei>>'+/*'0/'-#%'A,K23'

!*20/0"-,+-0)/;'02 20C,+/-'*%-%/-0)/'9%/-%,"'+-'-#%'5.")K-#%,/'6),*%,;'),'C%/%,+$',%9)C/0-0)/'

)?'C)4%,/2%/-',+90"2'J+"'2%/-0)/%*'6&')K,'3%)3$%H'N)-+6$&;'N1((+"'+/'),C+/0R+-0)/'4)-%*'

-)'"K33),-'U(e='+-'-#%'?%*%,+$'$%4%$'+/*'!O'd><>'0/'1+$0?),/0+H'A#0"""%/-02%/-')?'9)/-0/K0/C'

")90+$'WK"-09%'J),@'0/'9)2 2K/0-0%"')-#%,'-#+/'D+3+/%"%'!2%,09+/"'0"'+$")',%?$%9-%*'0/')-#%,'

%B0"-0/C'-%"-02)/&'+6)K-'-#%',%*,%"""2)4%2%/-;'0/9$K*0/C'+'>EE:'.K"+/'U+&+"0'0/-%,40%J'?,)2'

-#%'^)09%"')?'D+3+/%"%'!2%,09+/'(%*,%"""1)/?%,%/9%'0/'J#09#'P"H'U+&+"0"'+&"'-#+-'-#%'g$%C+9&'

)?'-#%',%*,%"""2)4%2%/-'C)%"'6%&)/*'D+3+/%"%'!2%,09+/"h'+/*'90-%"'+'-02%'G+-0/'!2%,09+/'

),C+/0R%,"'90-%*'-#%',%*,%"""2)4%2%/-'+"'3,%9%*%/-'0/'.+/'D)"%H"'

L#%/'+"@%*'J#+-'9)K$*'#+4%'2+*%',%3+,+-0)/"'2),%'2%+/0/C?K$;""%4%,+$',%"3)/*%/-"'

2%/-0)/%*'-#%'*%$+&'0/',%*,%"""H'.3%90?09'9)/9%,/"'J%,%'-#+-'-#%'C%/%,+-0)/'J#)'J+"'

-#%,%?),%'/)-',%9%04Q/C',%*,%""H''.%4%,+$'Q/-%,4Q%J%%"'+$")'2%/-Q)/%*'-#%'C,)K3"'-#+-'J%,%'

%B9$K*%*'?,)2',%9%04Q/C',%*,%"";'"3%9Q?Q9+$$&'-#%'D+3+/%"%'G+-Q/'!2%,Q9+/";'J#%/'+"@%*'+6)K-'

J#+-'J)K$*'#+4%'2+*%',%*,%"""2),%'2%+/Q/C?K$H'A#%'?)$$)JQ/C'[K)-%"'?,)2'Q/-%,4Q%J%%'o>='

%B3,%""%*',%9)C/Q-Q)/')?'-#%'3"&9#)$)CQ9+$'*+2+C%'-#+-'3%,2%+-%*'-#%'D+3+/%"%'!2%,Q9+/'

! 2%,09+/'I/9+,9%,+-0)/'+/*'"-,K9-K,+$'+/*'"&"-%209'+/-0MO$+9@',+90" 2'*+-0/C'6+9@'-)'9#+--%$'

N)-+6$%'*0??%,%/9%"'0/9$K*%'"9+$%'+/*'-02%H'L#0$%'-#%'>EFF'1040$'G06%,-0%"'!9-'*0*'
+2)K/-'-)')4%,'+'60$$0)/'*)$$+,"'?),'0-"'%*K9+-0)/'?K/*'+/*')4%,'>H`'60$$0)/'0/'*0,%9-'
3+&2%/-";'*0,%9-'3+&2%/-"')/$&',%+9#%*'"K,4040/C'0/9+,9%,%%";'+6)K-'F=;===='3%)3$%;'
J#09#'0""'0C/0?09+/-$&'$%"'"-#+/'-#%'/K26%,')?'3%)3$%'*%"9%/*%*'?,)2'%/"$+4%*'3%)3$%'
),'-#%'/K26%,')?'O$+9@'!2%,09+/"'J#)'$04%*'-#,)KC#'D02'1,)J'$+J";'),'-#%'/K26%,')?'
O$+9@'!2%,09+/"'$040/C'-)*+&H''!**0-0)/+$$&;'-#%'3+""0/C')?'-#%'>EFF'60$$'9+2%')4%,'e='
&%+,"'+?-%,'0/9+,9%,+-0)/;'J#0$%'UH(He='0"'9)/"0*%,0/C'023+9-"'+99K2K$+-%*'"0/9%'>c>EH'
A#%'*0??%,%/9%"'0/'"'9+$%'),'-02%'9+//)-'6%'+**,%""%*'0/'-#0"'3+3%,;'#)J%4%,;'3)"0-04%'
023+9-"'?,)2'-#%'1L(I1'#%+,0/C"'+,%'K/*0"'3K-%*'+/*'"K33),-'-#%'*%4%$)32%/-')?'+'
9)22""0)/'?),'"'-,K9-K,+$'+/-0M6$+9@/%""'0/'!2%,09+'+/*'0-"'?)K/*+-0)/;',%C+,*$%""')?'
3)-%/-0+$'9)"-'),'*0??09K$-&H''

A#%')-#%,',%9)22%/*+-0)/'C$%+/%*'?,)2'0/-%,40%J%%"'0/'-#0""'-K*&'0"'-)'%,,')/'
-#%'"0*%')?')4%,9)23%/"+-0)/;'J#09#'0"'+,CK+6$&'023)""06$%H'P+/&'0/-%,40%J%%"'
%B3,%""%*'6%$0%?'0/'20""%*'6%/%?0-"'-#+-'J)K$*'#+4%'9)2%'?,)2',%3+,+-0)/"'6%0/C'2),%'
0/9$K"04%'+/*'C%/%,)K"H'!$$'0/-%,40%J%%"'#%$*'-#%')30/0)/'-#+-'-#%'3+&2%/-"'C04%/'J%,%'
/)-'"'K??090%/-'-)'9)4%,'+9-K+$'$)""%";'/)-'0/9$K*0/C'%2)-0)/+$'-,+K2+;'+/*'/)'
0/-%,40%J%%"'-#+-'?%$-'3+&2%/-"'J%,%'-))'C%/%,)K"'),'%4%/'+*%[K+-%H'I/-%,40%J%%'
"%/-02%/-'023$0%"'-#+-'0/9,%+"0/C'2%+/0/C'+/*'%??%9-04%/%""',%[K0,%"'2),%'?K/*0/CH'
L#%/'9)/"0*%,0/C'%9)/)209',%3+,+-0)/"'?),'O$+9@'!2%,09+/"'0-'0"'023),-+/-'-)'@/)J'
-#+-'2+/&'D+3+/%"'%'!2%,09+/"'#+*'$+,C%$&',%9)4%,%*'?0/+/90+$$&'6&'-#%'-02%'-#%'>EFF'
1040$'G06%,-0%"'!9-'3+""%*;'-#0"'0"'9)/?0,2%*'6&'0/-%,40%J','%"3)/"%"H'I-'0"'/)-'-#%""+2%'
C%/%,+$""0-K+-0)/'?),'O$+9@'!2%,09+/"'C04%/'-#%'3%,"0"-0/C',+90+$'J%+$-#'C+3H'A#0"'2%+/"'

-#+-'2)/%-+,&',%3+,+-0)/'';'+"0*%'?,)2'+/'+3)$)C&;'?),'O$+9@'!2%,09+/'"'/%%*'-)'6%'

0''9K''"%'0/'2),%'*%3-#'?),'3)-%/-0+$'0234+9-'+/*'+2)K/-H'

!/)-#%,'0234),-+/-',%9)22%/*+-0)/'0"'-)'9%/-%,'+??%9-%*'9)22K/0-&'2%26%,"'

0/'-#%',%3+,+-0)/"'3,)9%""H'!"'%B3,%""%*'6&'0/-%,40%J%%";'-#%',%*,%"""'3,)9%""'#+*'+/'

%234)J%,0/C'+/*'#%+$0/C'0234+9-')/'9)22K/0-&;'+"0*%'?,)2'+/&'?0/+/90+$'),'%2)-0)/+$'

#%+$0/C'?,)2'-#%',%3+,+-0)/"'+/*'+3)$)C&'0-"%$?H''A)'3)-%/-0+$$&'#+4%'+'"02 0$+,'#%+$0/C'

%??%9-'?),'O$+9@'!2%,09+/'"'0/'-#%'?0C#-'?),'UH(H'e='+/*',%3+,+-0)/'';'O$+9@'9)22K/0-&'

),C+/0R+-0)/"'+/*'0/*040*K+$"'/%%*'-)'6%'9%/-%,%*'(%)0.4(/)-0.4(-%)0+9-(-%)0+-0.1((1Tf[(e-0)-0.534(0)-0(-%

$0-%,+-K,%'+/*'-%"-02)/&')/'0/9+,9%,+-0)/H'I23),-+/-'-#%2%"'0/9$K*%*'-#%'#%+$0/C'3)J%,')?'

),C+/0R0/C'?),',%*,%"'"'+/*'-#%'9)2 20"'"0)/'#%+,0/C";'3,0*%'0/'-#%',%*,%"'"'409-),&;'+/*'

2+0/-+0/%*'0/4%"-2%/-'0/'")90+$'WK"-09%'0"'"K%"H'A)'+/"J%,'-#%',%"%+,9#'[K%"-0)/;

;'/)H'N)'*+-+'

?0/*0/C"'"KCC%"-'-#%,%'J+"'+'$)/CM-%,2'023+9-')/'-#%'")90)%9)/)209'"-+-K"')?'D+3+/%"%'

!2%,09+/"'J#)',%9%04%*',%*,%"'"'+/*'-#%0,'*%"9%/*+/-"H'V+-+'+$")'"KCC%"-"'-#+-'-#%,%'J+"'/)'

"#),-M-%,2'9#+/C%'0/'")90)%9)/)209'"-+-K"'6%9+K"%',%*,%"'"2)/%&'J+"'2)"-$&'K"%*'?),'C0?-"'),'

%4%,&*+&'3K,3)"%"H'O%/%?0-"'?,)2',%*,%"'"J%,%'$+,C%$&')/'3%,")/+$'+/*'9)2 2K/0-&'$%4%$"H'

8%,")/+$'6%/%?0-"'0/9$K*%*'$0?-0/C'?%%$0/C"')?'"#+2%'+2)/C'-#%'0/9+,9%,+-%*'+/*'-#%0,'9#0$*,%/'

+/*'9)2 2K/0-&'$%4%$'6%/%?0-"'0/9$K*%*'"%--0/C'+'3,%9%*%/-'?),'"3%+@0/C')K-'0/'-#%'D+3+/%"%'

!2%,09+/'9)2 2K/0-&'+/*'?),'+9#0%40/C',%*,%"'"0/'!2%,09+/'#0"-),&H'A)'+/"J%,'-#%',%"%+,9#'

[K%"-0)/;'

'-#%'3)J%,')?'-#%'9)2 20"'"0)/'#%+,0/C'3,)9%"'"?),'9)2 2K/0-&'

,%6K0$*0/C'+/*'-#%'"KCC%"-0)/"'?),'023,)4%2%/-'-)'-#%'"0C/0?09+/9%')?',%3+,+-0)/"'+,%',%$%4+/-'

?),'-#%'2)*%,/',%3+,+-0)/"'2)4%2%/-H'.3%90?09+$$&;'0/-%,40%J%%"'"+0*',%3+,+-0)/"'J)K$*'#+4%'

6%%/'2),%'3)J%,?K$'0?'-#%&'#+*'9)2%'")))/%,;'0/9$K*%*'G+-0/'!2%,09+/'D+3+/%"%;'+/*'#+*'2),%'

?K/*0/CH'a04%/'0/-%,40%J',%"3)/"%"'+/*',%?$%90-0)/"')/',%*,%"";'9K,,%/-'3,)3)"+$'UH(He='"#)K$*'

6%'3+""%*'02 2%*0+-%$&'+/*'+-'-#%',%3+,+-0)/"'*%$06%,+-0)/"'"-+C%;'#0C#%,'9)23%/"+-0)/"'#)K$*'

6%'0/9$K*%*H''

"K,404),"'#+4%'3+""%*'+J+&'+/*'#+4%'/)-'6%%/'+6$%'-)'3,)40*%',%-,)"3%9-04%'0/3K-')/'-#%'

02 3+9-')?'-#%'!9-'+/*',%3+,+-0)/"""3%90?09+$$&H'A#%'*+-+'"#)K$*'+$")'6%'3,0),0-0R%*'6%9+K"%')?'

-#%'/)4%$-&')?'-#%',%*,%"""'409-),&'+/*'-#%'20/02+$'"K99%""?K$'%B+23$%"')?',%3+,+-0)/"'0/'5.'

#0"-),&H'!$")'"KCC%"-%*'0"'?K-K,%',%"%+,9#')/'-#%'")90+$'WK"-09%'%/C+C%2%/-'+9,)"""'+$$'!"0+/'

!2%,09+/'C,)K3";'-)'K/*%,"-+/*'0?',%*,%"""'#+*'+'2%+"K,+

Bibliography

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S&%% - ℕ*M3ℕ*1"/ - /&ℕ*13*Z98[8\3**1/ - %?()*(27*1/$;&2]*>@/*:%'"%K+'%2% - "'*+00/'$#*%0**
$@/*^(&*%2*5(.(2/#/*< - /&"'(2#ℕ*S/&Y/)/B*(27*M%#*<2F/)/#]*V2"?/&#"$B*%0*L()"0%&2"(*U&/##3**
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S&B(2$KP(?"#ℕ*>3*Z_``a\3*H!/()"2F*1/E;"&/#*1/'%F2"$"%2]*>@/*L(#/*0%&*1('/K

CCC3"27"(2(00("&#3F%?Q(#K"(Q%.(Q%2)"2/K.&/##K&/)/(#/Q"27"(2K')(" - #K'% - - "##"%2KF&(2$/7K - %&/K X4K - K7;&"2FK984=3**

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627"(2*1/#"7/2$"()*:'@%%)#3**R%?/&2 - /2$*%0*%*3(383B$1(8+,#(&')$3(8$C&20"#2($6553+2)$%3(383N** R%?/&2 - /2$*%0*L(2(7(g*627"F/2%;#*(27*I %&$@/&2*<00("&#*L(2(7(3*M(#$*;.7($/7N*_9*O/D&;(&B* _`9=N*@$$.#]QQCCC3&'((2'K'"&2('3F'3'(Q/2FQ99``9```9bba4Q9ba9b=94=a`a[3**

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5('Y#%2*M//N*:3*Z_``_`N*d(B*__\3*H!313*[`*6#*I%$*(*:B - D%)"'*<'$3*6$m#*(*U($@*$%*1/#$%&($"?/*5;#$"'/3J** <-/&"'(2*L"?")*M"D/&$"/#*V2"%2N*CCC3(');3%&FQ2/C#Q&('"()KA;#$"'/Q@K&K[`K"#K2%$K(K#B - D%)"'K('$K "$#K(K.($@K$%K&/#$%&($"?/KA;#$"'/Q*3**

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5(.(2/#/*<-/&"'(2*I($"%2()*d;#/;-3*

CCC3(. (3%&FQ$% . "'#Q#%'"%/'%2% - "'K#$($;#3****

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98*S3L3*>@"&7* ^ %&)7*M353*[aaN*@$$.]QQ)(C7"F"$()'% - - %2#3D'3/7;Q$C)AQ?%)98Q"##9Q9X*

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p(- ($%N*:3*Z_`9XN* d (&'@*98\3*L"?")*M"D/&$"/#*U;D)"'*+7;'($"%2*O;2733*D#()"&$9(/./*&7#8+33**
@$$.#]QQ/2'B')%./7"(37/2#@%3%&FQL"?") f_`M"D/&$"/# f_`U;D)"' f_`+7;'($"%2 f_`O;2733*

*

H9`$@*<22"?/&#(&B*%0*$@/*<.%)%FB*$%*O%& - /&*:$;7/2$#*%0*1/#"7/2$"()*:'@%%)#3J*Z_`9=N*5;2/*99\3**
*L&G#2(: #(0$&5$%3(383B$1(8+,#(&')$3(8$C&20"#2($6553+2)$%3(383N*R%?/&2 - /2$*%0*L(2(7(g*
627"F/2%;#*(27*I %&$@/&2*<00("&#*L(2(7(N*CCC3&'((2'K
'"&2('3F'3'(Q/2FQ9b_=[=b984aa=Q9bb8=_=84bba`3***

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Appendix

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A#%'*+-+'?) ,'-#0"'C,+3#'0"'") K,9%*'?,) 2 '-#%'<==F'T%+,6)) @') ?'I 2 20C,+-0) / '. -+-0"-09";'9) $$%9-%*' 6&'-#%'V%3+,-

($$&%.+Q![?!O6+.+%3!0%1&*7+&<!T6&'1+2%'!

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O+9@C,)K/*'V%2)C,+3#09"'+/*'8+,%/-'U0"-),&'

>H S/'+'"9+$%')?')/%'-)'-%/;'-%/'6%0/C'-#%'2)"-;'#)J'2K9#'*)'&)K'@/)J'+6)K-'&)K,'3+,%/-_"'%B3%,0%/9%'0/'-#%'0/-%,/2%/-'9+23"]'

+H 7B3$+0/'#)J'2K9#'0/?),2+-0)/'-#%&'"#+,%*'J0-#'&)K'+/*'J#+-'-#+-'J+"'$0@%H'

<H I?'&)K'*)'/)-'20/*'2%'+"@0/C;'J#+-'&%+,'J%,%'&)K'6),/]'

dH L#+-'0"'-#%'/+2%')?'&)K,'3+,%/-Y"Z'J#)'J%,%'3$+9%*'0/'0/-%,/2%/-'9+23"]'!/*'J#+-'9+23'J%,%'-#%&'#%$*'0/]'

eH L#+-'J+"'-#%0,')99K3+-0)/'+/*'#0C#%"-'%*K9+-0)/+$'+--+0/2%/-]'

+H 7B3+/*')/'-#0"'0/?),2+-0)/'6%?),%'+/*'+?-%,'0/-%,/2%/-'J#%/',%$%4+/-'

`H L#+-'0"'&)K,')99K3+-0)/'+/*'#0C#%"-'%*K9+-0)/+$'+--+0/2%/-]'

cH V)'&)K'#+4%'+/&'9#0$*,%/;'+/*'0?'");'J#+-'0"'-#%0,')99K3+-0)/'+/*'#0C#%"-'%*K9+-0)/+$'+--+0/2%/-]'

:H V0*'&)K,'?+20$&'2%26%,'%4%,'+33$&'?),'+'9$+02'?,)2'-#%'74+9K+-0)/'1$+02"'!9-')?'>EeF]''

+H I?'&%";'3$%+"%'%B3$+0/'+/&'9$+02"'+33,)4%*'+/*'+/&'0/?),2+-0)/'&)K'20C#-'@/)J'+6)K-'-#%'3,)9%"""

FH I?'&)K'@/)J;'#)J'J'+"'-#%'2)/%&'?,)2',%*,%"""K"%*'6&'&)K,'3+,%/-Y"Z]'

+H U)J'*0*'-#%'<=;===9#+/C%'&)K,'?+20$&'"3%/*0/C'#+60-"'*K,0/C'-#%',%$%4+/-'-02%'3%,0)*]'

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.)90)%9)/)209'I23+9-"'+/*'8%,")/+$'S30/0)/"'

>H U)J'#+"'&)K,'")90)%9)/)209'"-+-K"'9#+/C%*'-#,)KC#)K-'&)K,'$0?%'YX,)2'9#0$*#))*'-)'+*K$-#))*'-)'3+,%/-#))*'),'+/&')-#%,'$0?%'9#+/C%Z]'

<H V)'&)K'?%%$'3%,")/+$$&'023+9-%*'&)K,'3+,%/-Y"Z'%B3%,0%/9%"'0/',%C+,*'-)'0/-%,/2%/-]'

%B3$+0/H''

dH V)'&)K'-#0/@'&)K'+,%'g6%--%,h')??;'+6)K-'-#%'"+2%;'),'gJ),"%h')??'%9)/)209+$$&'-#+/'&)K,'3+,%/-"_'C%/%,+-0)/]'L#&]'

eH V)'&)K'-#0/@'2)/%-+,&',%3+,+-0)/"'C04%/'-)'&)K,'3+,%/-Y"Z'+/*'-#%')-#%,'"K,404),"')?'0/-%,/2%/-'J%,%'"K??090%/-]'L#&'),'J#&'/)-]''

`H V)'&)K'-#0/@',%*,%"",%3+,+-0)/"'+/*'+3)$)C&'J%,%'2%+/0/C?K$'-)'&)K,'?+20$&]'U)J'")]''

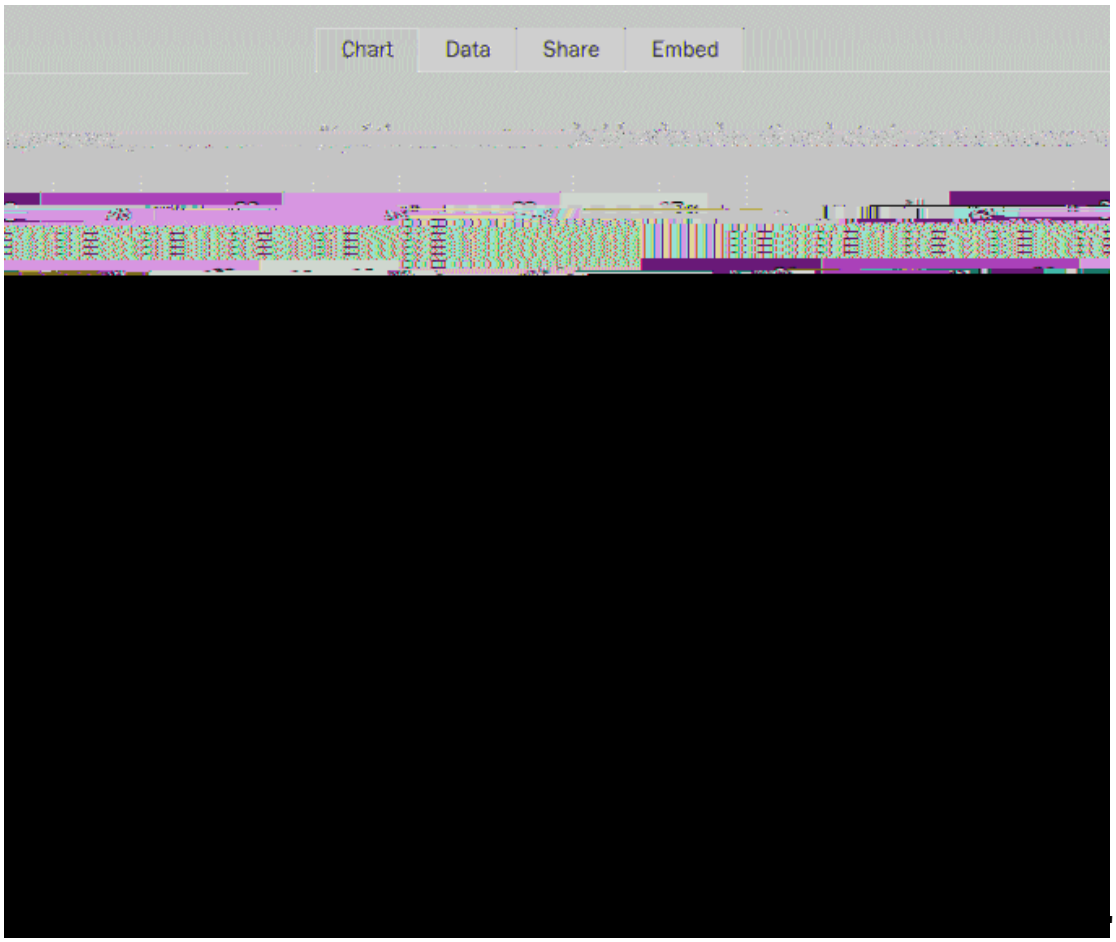
cH V)'&)K'?%%$'3%,")/+$$&'023+9-%*'6&'-#%'3,)C,+2 20/C'?K/*%*'6&'-#%'1040$'G06%,-0%"'7*K9+-0)/'XK/*]'L#&'),'J#&'/)-H'

:H V)'&)K'?%%$'2),%'),'$%""'9)//%9-%*'-)'&)K,'D+3+/%"%'#%,0-+C%'+/*'9K$-K,%'-#+/'&)K,'3+,%/-"]''

FH L#+-'+,%'&)K,'#)3%"'?),'?K-K,%'C%/%,+-0)/"')?'D+3+/%"%'!2%,09+/"]'

EH I"'-#%,%'+/&-#0/C'%$"%'&)K'J)K$*'$0@%'-)'"+&'),'+/&'0/"0C#-'-#+-'&)K'-#0/@'J)K$*'6%',%$%4+/-'),'0230),-+/-')'+**'-)'-#%'9)/4%,"+-0)/'+6)K-'D+3+/%"%'0/-%,/2%/-]'

($$&%.+Q!B?!"#$#%&'&!V2$6#1+2%!+%!( ) &*+,#!P.6,#1+2%#!(11#+%) &%1!\CH>]^!



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