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

!

! " #\$%&'() *

!

****-. /0) &+, *(+-. */010, *#2-3, 45-067*! "#\$%&\$'() * +,"* ! "#\$%#&'#(')*+,#-#.*/" ! 01#,2-\$23%|')#-%152\$#316&/4'631'7#8893+%/': +%2&6\$+2-')&#;&68' ! "+-2\%%#3<'=: 26\land 3+3; '\#'>26\\$*'?3; ,+*': 63; 96; 2'O\\%-'+3'@\land A63'B+11,2'5\\$*##,-<'O'79,\%\6,'631' C3%2&6\$%#36,')2&-.2\$%D2E' 7#88+%22<'F2#&; 2'G2H2,,'I7*6+&J4''' 6D+1'K,##824'B#,,+2'K,6\$LA9&34'M&63\$+-'>&#/63' ****-.//)) 8-20+4. 9*#2-3, 45-067*1 "23) 4,#()5"\$6+)! 78"#,97** ! B6-\%2\%'\#('\?19\\$6\%\#3'

79&&+\$9,98'631'C3-%9\$%#3'N'

Shanahan, E.'e'`+8]'B]'IUWUXJ]': ##L+3;'+3H6&1'631'#9%H6&1<'M#-%2&+3;'+3%#-. 2\$%D2'6&;9823%6\#3]' 9:;6*/"\$<-=1:>&|'XXWI0J4'XWW!XWP]'

- F&+\$24'`]'B]4'B9&.*/4'7]'?]4'Shanahan, E]'IUWXVJ]'>6L+3;'#9%%*2'%6-*<'7#8.,+\$6%3;'&9&6,'H#&L+3;!\$,6--' 36&&6%D2-'+3'/#93;'619,%,+%2&6%827!''#\$%&%' \$(#)*#+4'XS!bW]2'
- Shanahan, E]'e''' 6,,6\$_964'O]`]'IUWXVJ]'B#D+3; 'A2/#31'=6; &226A,2E'%2\%-'631'=A#&+3; E'%-L-<')6+&+3; 'aO: '631'\$&+%\$6,',+%2&6\$/'+3'%26\$*2&'219\$6%#3]*%.3*-: \$*: \$! #>. "#1\$95=.>3*-: 4'OWIXJ4'bV!TP]'
- K,##824''']4'K269\$*28+34'M]4'K&61/4'f]4'**Buescher, E.,'**` +84'B]4'e'5\$*2/4'Q]'IUWXVJ]'O3%*&#. #,#; /'#(' 219\$6%#34'63%*&#. #,#; /'+3'219\$6%#34'631'63%*&#. #,#; /'TC46O7. #,#. #,6%W

```
!
                                                                                                                       !
Shanahan, E.'IUWXS4'f6396&/J]'Q26$*+3; '$#8., 2\'%*+3L+3; '+3'6&; 9823%%D2'H&+%3; <'>*2'. +%(6,,-'#('$&26%3; '
                    M+*2&4'7]'e'Shanahan, E.'IUWXV4'O9; 9-%]'Y&4%3; '%#',26&3<'^32'%26$*2&'631'*2&'-%9123%d'i#9&32/]'I 1*3#1/$
                   I "-$J>1#8'6'&2(2&221'2,2$%#3+$'. 9A,+$6%#3]'
M...D^*; , 3-, Q^*
Shanahan, E. IUWXVJ]' (#)*#+$-$\sigma > \cdot 2'_9+$LH&+\begin{align*} 2' \cdot 631A##L<'XWW'823\#&'\begin{align*} 2' \begin{align*} 2' \b
                   %*+3L+3; '631'H&+%+3;]'K#:3=.G@$(#>5*:;$<-=1:>6|''
) . 2E; , N, 4, , L*! K, C04. 2-C*: BPK-C10-. 2*
Shanahan, E. IUWXVJ]'59&D+D6,'%. -'(#&'(+&-%/26&'. &#(2--#&-]'L1-+*:;$M."-6>1/$J"1-:*.6#\V4'. ]'0!T]''
J 12B5C4-90*#2L, 4*; , 3-, Q**
    +84'B]'e Shanahan, E. 19312&'&2D+2HJ]'>#H6&1'1+6,#; +$'6&; 9823%%#3<'O'\26$*2&d-'\&#,2'+3'\$\26\%3; '-. 6\$2'
                   631'(#-%2&+3; '&2,6%#3-]'9:;6*/''$! #>. ''*:;C$N1>.3*.#$>:5$\J1*3*0=#7$'
<u>I;%)&/</u>*
Shanahan, E.'IUWUXJ|'9KP$/3=5#:3/$-:$3"#$:>3*-:$6\3>;#$$%.3*-:$1#/#>1."$>:5$A1-\#//*-:>6\$;1-+3"7" 2. 6\8\823\#('
79&&+$9,98'631'C3-%9$%#3'F&63%'?6-%2&3'`23%9$L/'@3+D2&-+%/4'kXVWWJ'M93121]'
I 9$$6&#4'?]'e'Shanahan, E.'IUWUWJ|'K+;'?'1+D2&-2'%2\%',+%2&6$/'. &#i2$%''' 2. 6&%823%#('79&&+$9,98'631'
C3-%9$%#3'F&63%'?6-%2&3'`23%9$L/'@3+D2&-+%/4'kUS\W]'G#%(93121]'
Shanahan, E.'IUWXSJ]' (#>5*: ;$>: 5$+1*3*: ;$+*3"$*: 3#: 3*-: $$%: $*: 3#;1>3#5$>AA1->. "$3-$3"#$/3=5@$-$$;1>22>17'm96,+%/'
?3*63$2823%),63'F&63%'?6-%2&3'` 23%9$L/'@3+D2&-+%4'kZ\\\\|M93121|'
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Buescher, E. e'G2H2,,4'F]'?]'IUWXTJ]'

I 9\$\$6'?]

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Buescher, E. ' \ominus 'G2H2,,4'F]'IUWX04''' 2\$28A2&J'%1;=*: ;\$Z>26#3\$+*3''*: \$>: \$?: 3#1A1#3*)#\$J-22=: *3@\$M-=1.#/\$-0\$

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                                      !
F92-%: 2$%9&2&'B+11,2'7*+,1*##1'?19$6%#3'Q2(,2$%D2'528+36&4'=: +%2&6$/'+3': 2--#3'),633+3; E'N'^$\#A2&'
XS'631'UW4'UWXZ'
F92-%: 2$\%\&2&<\Q2-26\&$*'+3'C--92-'#(''' +D2\&-+\%'\631'?_9+\%'\N'\M2A\&96\&/'X4'U\WXZ''
F92-%: 2$%9&2&'B+11,2'7*+,1*##1'?19$6%#3'Q2(,2$%D2'528+36&4'=: +%2&6$/'+3': 2--#3'),633+3; E'N'^$\#A2&'
UV'631'US4'UWXT'
<u>;!/:()"!)&</u>*
IG#D28A2&4'UWXVJ]'O3396,'B22%3; '#('%*2'G6%#36,'7#93$+,'#('>26$*2&-'#('?3; ,+*4'[#9-%#34'>n]''
                                     /!:?'$!*
) %&'() %=*/! ; ?'$! *
                                                                      ''''''UWXT!UX'
?1+%#&+6,'K#6&1'B28A2&4'<u>!#>."#1/8$N1-0/8$N>1#:3/Q$I_1*3#1/$I_"-$J>1#</u>"' '
                                                                      '''''UWXT!XP'
),633+3; '7#88+%224'7#3(2&23$2'#3'?3; ,+*'?19$6%#3'K+!O3396,'7#3(2&23$2'
                                                                             ''''UWXP'
```

),633+3; '7#88+%224'" +\$#9&-2'O36,/-+'+3'?19\$6\; #3'Q2-26&\; *'7#3(2\; 23\; 23\)

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M6$9,%'C33#D6%#&'
                                                                                                                                                                                 UWUW!Ub'
                                                                                                                                                                  ......nMnMinp,
B28A2&4'F&6196%2'7#93$+,'
B28A2&4'O$6128+$'),633+3;'631'O--2--823%7#88+\22'
                                                                                                                                                                                 UWUW!UX'
B28A2&4'@3+D2&-+%': +A&6&/'7#88+%22' '
                                                                                                                                                                                 UWXV!UW'
B28A2M'B+$#319$%'+3'5$+23$2'7#88+%22'
                                                                                                                                                                                 UWXV!UW'
! 150, 42*A, 20BCD6*#2-3, 45-06*
J-66#;#$-1$B#A>132#:3$M#1)*.#$$
F&6196%2'7##&1+36\#&4'" 2. 6&\823\%#('79&&+$9,98'631'C3-\&9$\%#3''
                                                                                                                                                                                 UWXS!UX'
7##&1+36%#&4': +\Q&6$/'BO?" '631': +\Q&6$/'?31#&-2823%)&#;&68-"
                                                                                                                                                                                 UWXP!UX'
7*6+&'631'B28A2&4'5$*#,6&-*+. '7#88+\\22'
                                                                                                                                                                                 UWXV!UX'
                                                                                                                                                                                 ''''UWUX'
7*6+&4'526&$*'7#88+%224'79&&+$9,98'631'C3-%9$\(\pi\#3'\F232\\)6,+\(\pi\)#-+\(\pi\#3'\)
                                                                                                                                                                                 ''''UWUX'
7*644'?.2$\#3-'7#88+\\22'
M6$9.%'5.#3-#&4'`23%9$L/'?19$6%#3'O--#$+6%#3!!O-. +&+3:'?19$6\#&-'
                                                                                                                                                                                 UWXP!UX'
B23\#\&'\\#''' \&]'B6\&/'f\#'` \&+,2'
                                                                                                                                                                                 UWUW!Ub'
B28A2&4'>26$*2&'?19$6%#3'7#88+%22'''
                                                                                                                                                                                 UWUW!UX'
B28A2&4'O--2--823%'7#88+%22''
                                                                                                                                                                                 UWXS!UX'
B28A2&4') &#(2--+#36, '7#&2': 2612&-*+. '>268'
                                                                                                                                                                                 UWXP!UW''
B28A2&4'Q2$&9+\%823\%631'Q2\%23\\#3'7\#88+\%22'
                                                                                                                                                                                 UWXP!UW''
                                                                                                                                                                                 UWXP!UW'
B28A2&4'5#$+6,'7#88+%22'
B28A2&4') &#8#%#34'>239&24'631'?D6,96%#3'Q2D++#3'7#88+$\\22''
                                                                                                                                                                                 '''''UWUW'
B28A2&4'526&$*'7#88+%224'79&&+$9,98'631'C3-&9$\\#3'7*6+&')#-+\\#3'I'' ]')#&\\2&4'7*6+&J'
                                                                                                                                                                                 .....NMNM.
) &#(2--#&4'>H#'Y22L'5%91/'OA&#61'7#9&-2'+3': #31#34'?3; ,631' '
                                                                                                                                                                                 UWXV!XS'
M6$9,%'526&$*'7#88+\224': 26&3+3;'631'K2*6D+#&''' +#&12&-')#-+\#3'IB]'F&28.4'7*6+&J'
                                                                                                                                                                                 ''''UWXS'
M6$9,%'526&$*'7#88+%224': 26&3+3; '631'K2*6D+#&''' ++#&12&-')#-+\#3'I` |'O,\*69-2&4'7*6+\&|' '
                                                                                                                                                                                 ''''UWXV'
&+,*(+-.*/010,*#2-3,45-06**
),633+3;'7#88+%22'631')&#.#-6,'Q2D+2H2&4'>*2'^*+#'5%%2'@3+D2&-+%'5%9123%Q2-26&$*'M#&98'''''UWX0!XT'
                                                                                  1 1
5$*#,6&-*+. '52,2$%#3'7#88+%22''''''
                                                                                                                                                                                 ''''UWX0''
K[5]?1]'O...,+$6%#3'7#88+%22<'B+11,2'7*+,1*##1'?19$6%#3')&#;&68'
                                                                                                                                                                                 '''''UWX0'
B#$L'C3%2&D+2H')6&%$+. 63%'B+11,2'7*+,1*##1'?19$6%#3')&#;&68"''''
                                                                                                                                                                                 '''''UWX0'
:; ( <! //'( ) %=*%<<'='%&'( ) /*
O82&+$63'?19$6\#36,'Q2-26&$*'O--#$+6\#3'
O--#$+6%#3'#(': +%2&6$/'?19$6%#&-'631'Q2-26&$*2&-''
7#3(2&23$2'#3'?3;,+*'?19$6%#3''
   23%9$L/'7#93$+,'#('>26$*2&-'#('?3;,+*'
   23%9$L/'O261+3:'O--#$+6%#3'
: +\\(\alpha\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(\delta\)\(
G6\(\psi\)#36,'7\(\psi\)93\(\psi\,'\psi'\)'>26\(\psi\)2\(\psi\,'\psi'\)'?3;,\(\psi\)*1
$() /#=&') I *
K#9&A#3'7#93%/'5$*##,-4'O1#,2-$23%': +%2&6$/'
                                                                                                                                                                                 UWUW!Ub'
Q#$L$6-%2'7#93%'5$*##,-4'O1#,2-$23%: +22&6$/' '
                                                                                                                                                                                 UWUW!Ub'
) &#(2--#36,'" 2D2,#. 823%) &2-23%2&'Y2-%2&D+,,2'7+%'5$*##,-4'=7,#-2'Q261+3;E"
                                                                                                                                                                                 ''''UWX7''
  ! =%&! " *8(; A*
?19$6%#3'>26$*2&')2&(#&863$2'O--2--823%|21>)OJ'5$#&2&4'B+11,2'7*+,1*##1': 63;96;2'O&%'
                                                                                                                                                                                 UWXZ!XP'
```

: : (<! //' () %=*"!?! = (: J!) &*