

" \$%&& (&S) ( ",-. \$) / \$ &0"  
1/, , %%% \$2% 3\$ 4/ &\$ \$ & 5 / 6& 7"3  
8-9"& -\$ " -; & ") ( -&\$%9/  
7-& - -% -\$% %%\$ -\$ %&; (&\$  
?6" \$"%- \$ " -&' -&', -. \$)  
4"@- \$%%%

( ",-. \$) AABCDBCAE  
FG " G'; (- : DH DCAAI

. 1 . . . 41 . . . 1  
1 . . . . . 1  
1 . . . . . 7

8 KLK7 M4KNK8  
O PM8 457  
4": " % 7- "I ; -@I 8 " I R S % \$  
TTT AD<sup>80</sup> 8& ""& 8(&' ATCC  
- . -\$ I 15 EHUCV  
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G YWFTACJ HHBAAC  
KB, - W% ": " %, ": " %- "M@,

K N M OK78  
5- /\$%\$I @ " %\$I 1/0\$ R -\$ /\$"  
E E -( " 8& ""&  
8-\$ 1- /% 15 EHCVC  
?0/\$" WFUTCJ TE B AAV  
G YWFUTCJ U VBAHCA  
K, - W) (; "\$%- @M@,

5&& \$": 9/ &0" 1 N G 857 15 8

"@, ;" A I DCA

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( ", -. \$ ) AABCDBCAE  
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. 1 . . . 41 . . . 1  
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?( % - \$ & & ( " AHM / 9 &0" 1- 9/ \$- ?( ; @' % & 1/ , , %%%\$2% F1/ , , %%%\$J  
( "% / 9 ? - @ @ - \$ ? / @ ( " F1/ , , %%%\$ ( "% \$ 5 , \$ % & - & " - 3 ( ) " 4- ; " &0  
Q % 0": 2% F5 Q % 0": J ? / 6/ % " @ % \$ - &' " ; @ , U DCA I &0" 1& / 9 8- \$ 1- / % F8- \$  
1- / % / &0" 1& J % ; , % % @ , , "\$ % & 5 0": Q % ? / 6/ % " @ % \$ " % & ; % 0\$ )  
, - Y, ( , / 6" - &\$ ) 6 "% % " F4 ? J 9/ ? - @ @ - % - \$ " @ & @ 1/ , 6- \$: 2% F? RKJ \$ - & ( -  
) - % & - \$ % % \$ \$ " AHV \$ MAABCDBCAEM 86" @ @ : I 8- \$ 1- / % " ( "% % & 0- & &0"  
1/ , , %%%\$ / " &0- & &0" 45 ? 9/ \$ " AHV ; " , - \$ & - & DHC 6/ ( \$ % 6" % ( - " \$ @  
) - ) " F? 8 J ; - % / \$ 9" " - " ) ( - & \$ % - \$ \$ " @ & ; " 6 / & " 9/ " 6 - @ , "\$ \$ \$ &0"  
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<sup>A</sup> 1- M ?( ; M & M 1/ " a VCA - \$ , , .  
I DT 1- M EAI ECTBECV FAEVEJM

3&0 &0%,-&&' I / " -\$ \$ "6"\$ "\$& 4/\$& @ \$ \$ @&-66 /6 -&' 6(; @/(&"-@ &  
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1

" AHV &- " %'%'&0" 0"- &/9 8-\$ 1- /%)@9%&&\$% : 6/6( -&' -\$ ( ;-\$  
- "-%&-&\$@(" TI CCC 0/,"%& &/ 6- .%& @,9-(8&&'%& -\$ ;(%\$"%&&%"\$ ,( @ &0"  
%, " ,-\$ \$" -\$ &6/) -60: -%&0" - "- " -%&&0" 9;:( " /9 ? RK2%0)0 6 "%&(" )-%  
\$" A D \$ DCACM ? RK %@ " " \$ @& ;" DC&D &&%66" \$" "@ %9/ \$" AHV 3" "  
3 /\$)M 7-, " : &-& \$" AHV @\$%&&' /9 66" /9 "%&0" 8&,(, N' 8&"\$)&  
F84N8Jb &-& &0" 66" 3-%3" " I \$/&%'-, "%&0 && 3-%/6" -&\$) -&-\$ ") - /6" -&\$)  
6 "%&(" M 0/()0 &/6" -&'%&&)-%66" "\$%"\$ 8-\$ 1;: /%& " /9 - ,(\$@- 9 -\$@%  
-) "" ,"\$& 3&0 8-\$ 1- /%& ? RK F/ &0%1/,,%&&\$7KLK \$9/ ," &0" 1&I &&/99@% %&  
\$/ &0" "%"\$&&/9 8-\$ 1- /%/9 &0"%& RK@&&M"? %- \$ ,-\$-),"&\$ 3" " ,/ "  
@\$@ \$" -;/(& &0" @, \$) c3\$&' ,/\$&0%& 3&0 (\$'& % @\$@ \$" -;/(& %/ &)"%\$ @  
3"-&0" I &- \$ &0" %9"& /9 &0" "%"\$&&/9%8-\$ 1&0" (& (\$ " &0" ")( -&\$%&  
\$9/ , &0" 1/,,%&&\$ -\$ &0" 1&M 8-\$ 1- /% "%&&-\$ /99@ %;"@, " @\$@ \$"  
"\$/( )0 & "@- " -\$ ", " )"\$@ 30"\$ &@, " && 8/\$2 -&&'&&\$ &-&? RK 3-%/6" -&\$)  
\$" AHV ;-%' (6/\$ -%&6,6&\$% @\$@ \$\$) &0" %&&0"\$9 &0" 66" I &&3" %& "%& \$" -\$  
9-; @&\$ 30@ 3" " \$@ "@&- \$ @\$%&&'&&03 -@&- 9" %& ":I / c-%;( &  
\$9/ , -&\$M S0"\$ - ? RK ", - %&))"%&\$) c-\$/&0"8-\$ O (\$/d % 9-@ I 1& /99@ %&/.  
, " -&' ")- -@&\$ I 30@ "%& &' \$ -\$ /& "%0(& /3\$ \$" AHM

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<sup>D</sup> 9//&&/&'% BH  
9//&&/&'% BH

0" ? /6/% " @/\$ /"%\$/ &0\$) & - " -&"&0"\$&2 9"- %&0-& \$" AHV %  
%&@6& " & (6& "M ? RK2%6 /,%!%&0-& &0\$) (0 &066" \$" 9"-& "% %& %-  
c@\$&(/(% ,6 / " ,"\$& 6 / @%\$1 /"%\$/ & -%&(-)" &0" "%"\$&2 @\$@ \$%0&0-&-\$\$/ &  
O (\$/ "Y6 /%\$ @ ( /@@ \$ &0" ; -@:- %M9 K" -@@6& &0" @\$@(%\$%/9 &0"  
1/ , ,%&\$ &0-& \$" AHV %9&9/ % @I 6(; /@& " , -%M

& %" (- : & / ( ; \$) & &0" 1& /9 8-\$1- &0%1& 1/ (\$@ &0-& &0" ? /6/%  
"@/\$ 6" , &0? RK & /6" -& \$" AHV -& &0" "\$& 6 "%& " /9 C ?8 \$ )0&/9 &0"  
9- & &0-& ? RK %& /"%\$2& . \$/3 " " : &0\$% &0&0\$ ) / (\$ \$ 8-\$ 1- /%M ? RK2%"Y6" &  
3&0"%&8( , ""& 8\$)0 &0%&0" &0-& ? RK /"%\$/ &0& -@-; " " 9-; "I -\$ @, 6 "&  
%@"@&@\$ "@ %9/ " " : \$@ /9 \$^T AHVMS \$ )0&/9 &0" 9- & &0-& &0" " 3-%? RK  
%/ \$% " &0%& / \$: \$ &0" \$" AHV 6 /@" \$)%&0- &AHV @\$ ; " /6" -& %9" : -& C  
?8 I<sup>U</sup> 8-\$ 1- /%; " " "%&0-& &0" " - " %%-&0&0\$ /6" -& \$ /9 \$" AHV -& C  
?8 M 0" ? /6/% " @/\$ /"%\$/ & & . " -3; : &0"/9- & &0-& ? RK %/6" -&0\$) - \$"  
&0 /()0 "\$% : 6/6( -& \$" )0; / 0/ %30"\$ ? RK (%& - %/9 (\$ . \$/3\$ / )\$ &0-& /  
\$/ & , -&@ (& & "@ %M e/3" " I &0% @/@@/\$ \$ & ? RKM & %? RK2%/6\$/ \$ &0-&  
0: /&0\$) % )// "\$/()0 " "\$ 9 &0" @, 6-\$2&". \$/3 30-& %\$ &0" ) /Y\$ M

8-\$ 1- /%- % \$/ &0%&0-& &0% %&0%" 1& 2&0"6(; @\$& "%& -\$ @\$@ \$  
" -&0\$) & \$" AHV &0-& &0" /& / \$ &0%? " @/0\$ 3-%6 -@ / \$ &0" 1/ , ,%&\$2%  
@\$%\$&-)"\$ - F-%/9 "@, ;" ADI DCA JI , 0- &0& 1/ , ,%&\$" %-) "" & 5  
Q%0":2%? /6/% " @/\$ 3&0/ (& " "\$ " "3\$) /-\$- : \$) &0" 6- &0%2 @, , "\$&0& &0"

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H	- & DUHEI	\$"% A BDHM
T	- & DV DI	\$"% ACBATHM
U	- & D DDI	\$"% AHBAMM
V	- & D ADI	\$"% ATBDIM

? / 6/% " @ \$ & - & 3" " (" / \$ " @ , ; " A I M D C A & % , "%%) " & & " 1 & & - & & " "%  
@ , , "\$ % / \$ / & , - & " I \$ / 3 & " : ; " & @ \$ % \$ & - & \$ M

M 0" - 3 " ( "% & " 4/ " 1/\$% - & " L- (9' & " "% ) \$ 45 ?  
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HE 1G AEDMAE " ( "% & - & & " , - Y, ( , - / 3- / 6" - & \$) 6 "% & " F45 ? J ; "  
/ 3 "% & / 9 W F - J F A J & " "% ) \$ 6 "% & " / 9 & " 3 ; " \$ & & F - J F D J & " 6 "% & " / ; & \$ " ; :  
\$) & " & '% & 6 "% & " ; : A M T 9/ 1 - % % \$ % M @ & & & '% & 6 "% & " / 9 U C V 6 % % ; f " @ & &  
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- \$ HE 1G AEDMAATM 0" : " % & "% % & ; " & " \$ % ) \$ 45 ? % " & ' , \$ " \$ HE 1G  
AEDMACVM 5 . \$ / 3 \$ : " % & "% % / 9 . % 3 / ( - ) "% ) \$ 45 ? / 9 C 6 % M 9 & " : "  
% & " \$) & % \$ / & . \$ / 3 \$ I & " \$ & " @ " " ( & % & - & % & " \$) & % @ - \$) " & D H . % F 6" HE  
1G AEDMACVJ ) \$) - 45 ? / 9 D H C 6 % M & % 0 / ( ; " \$ / & ' & - & 9 / / 3 \$) - \$ % 9" & 9 - @ &  
," & / / / ) : ; - % / \$ - \$ " \$) \$ " \$) % & \$ - / 9 @ % - % - 45 ? / 9 D D D 6 % F & "  
," - Y, ( , & '% & 6 "% & " I U U V 6 % " ; : - % 9" & 9 / @ 9 / ( @ & " , - & ' - % 3 & g  
g - - - ; " f M

\$ & % @ % I & " - 3 , - \$ - & '% & - & & " "% ) % & ) / " \$ \$) 45 ? M 0"  
- & ' \$ - & " "% ) \$ @ @ - & \$ % - / 3" ; : HE D C A E / \$ : ; " (% 30" \$ @ & \$ 66"  
% " @ @ & \$ % - " . \$ / 3 \$ 6" HE 1G AEDMAADI 0" R K ? / "% \$ 2 & . \$ / 3 & " " (% & ' 66"

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0 & & % W h - M @ ( @ @ M / h - ) " \$ - / @ h D M 9

<sup>E</sup> 8 " " K Y 0 ; & 5 M  
<sup>AC</sup> 8 " " K Y 0 ; & O 9 / & " & ; " 0 ) 0 ) O & \$) ( @ & @ " - % b 4 - @ \$ " "% ) \$ I T & O  
K & \$ I ; : M M 7 / & \$ I ? "\$ & @ e - I D C A H M , " 0 % % " & 9 - @ & " @ , , "\$ - & \$ @ \$ ; "  
9 / ( \$ \$ \$ ( , " / ( % 4 " @ - \$ @ K \$) \$ " " "% ) \$ - \$ 4 - @ \$ " "% ) \$ & ' Y & / / . % - \$  
@ " % M 0" @ " " 9" "\$ @ 6 / "% / \$ " / 9 & & @ 6 - "% \$ & & \$ % M

%6"@@&\$%9/ \$" AHMM 0" "9/ "I &0"-&"&"\$) \$ @ @ -&\$% / \$/&-66 : & \$"

AHMM

M 0" 1/,,%8/\$ 1-\$\$/&" : 8/ " : /\$ - 0&&@? "%86 " "%& &  
"&" , \$" S0"&" &" \$" %8-9" & 6" -&?8& M

7/ &80%&\$ \$) -J &0" -3 -%/( &\$" -;/ "I ?J 6&0% " @%\$ "9" "\$@%& &0"  
" ( " , "\$&%/9 MAABCECCU 30@ " ( "% " 9I; &-@-; "I -\$ -@@ -& " @ %/9  
66" \$" %), "\$&%-\$ &0" %6"@@&\$%4 -\$? RK2% - -&\$ 6 / @%8%30@ " "%/\$ -  
66" \$" 9"-& "% %&F?G J 9/ "-@ @, 6/\$"8&60" \$" 9"-& "%;-%" (6/\$ c-@&- "%)\$  
6 -\$% -%B( & -3\$)% 6( @-% / " % &"88%"@ % @-&\$) \$9/ , -&\$I -%3" -%  
/&0" -- -; " /@, "\$&1&0%1/,,%8/\$ %", %& ;" %:\$) \$ &0" 9-,/(%3%/9 -  
- \$" I c\$" " , \$ d MMM 0" 1/,,%8/\$ 3 (6/\$ - 0: /%&&@6 "%86 " &"%&9 :/(I  
? RKI @\$2&9\$ :/( "@ %M

7/ 6- & & &0"% 6 /@" \$)% /(;&%&0" -99@&@\$/9 6 /6" : "Y"@&  
0: /%&&@&"%&\$) /9 \$-& - )-%66" \$"%M &0\$ "\$ /9 &0" -:I ? RK2%%%&, 3 ;"  
,- ." : %9" -\$ \$ @, 6 -\$@ 3&0 ?(; @ &&1/ " 8"@&\$ HIA 30"\$ " " : 66" \$"  
%), "\$&%0: /&"%&' M e/3" " I &0" ,6 @&\$ 33 9 /, &0" ? /6/% "@%\$%&-&  
6-%8\$) - 0: /&"%&%, / " ,6/ &\$&& &0"&"%(&-\$ .\$/3\$) 30-&2%-@&- : \$ &0"  
) /(\$ M &%-%9 :/( -( & , "@-\$@0-%6' /\$//(\$@@ /- 3/ &0:I ;(&0" \$2& @"@  
&0" / I @/ -\$&I -\$ 9 ( " " % \$/ &0)"%P6- -. '81 %0/ @%1 / &\$)M 8-:\$) &0-&  
? RK c, (%&;" 9( : -@@(\$&; " 9/ &0" 6 "%84\$ " -&8&&\$ &0-&&0" \$" @&\$ ;" %9"&

<sup>AA</sup> ? /6/% " @%\$ -& ACM  
<sup>AD</sup> ? /6/% " @%\$ -& AHM

F°@ /6" -&' M M M M "-&I ;(&% - % ,( %& ,: -( & , " @- \$ @ % \$ ' & 0" \$ ) ,: @ 9  
&0" ; -. "%- " 3/ \$ / (&M

5%? RK , 6 " , "\$&%&%6 - \$ % 9/ \$ 9 - % & ( @& " \$ / - & \$ I / " % \$ 2 & & \$ " " & . \$ / 3  
30- & % \$ &0" ) / ( \$ \$ / " & 6 / & " - \$ @ & ' &% " % ( @ % \$ - 6 ( " \$ & , - \$ \$ " i 5%  
"\$) \$ " " \$) . \$ / 3 " ) " - - \$ @ % % 0 / ( 3" 9 \$ & ( & / 3 &0- & &0" % \$ ) " % 0" " , " & - @  
3" " % - , / 9 5 8 , &0 AEDE \$ & ) " 66" % % ; f & @ & - & @ - 9- ( " % / 3 " - . " % % % % \$ / &  
@ " \$ & : . \$ / 3 \$ ; ( & % @ " " - & ' I . \$ / 3 ' 0 ) " " Y & \$ & / 9 % @ 66" ( % \$ ? RK 2 %  
% % & ' , % @ & @ M ? RK 2 % " \$ ) \$ " " 8 ( , " " & 8 \$ ) % & @ DIj / 9 &0" 66" - & 9/ \$ " AHV  
3- % \$ @ " @ & - % / 9 @ & ; " " UCAD M & % \$ / & - \$ \$ % \$ 9 @ \$ & - , / ( \$ & / 9 - & % & 0 % & ) /  
3 / \$ ) M ? RK 2 % 3 & \$ " % % % % 4 M / 0 \$ % \$ I L @ ? \$ & % / 9 ) - % / 6" - & \$ % 2 & . \$ / 3 &0"  
@ " \$ & 6" @ \$ & ) " / 9 \$ - @ @ - & ' - & ? RK 0- \$ % 9 / AHV M & % - - , \$ ) & 8- \$ 1- / % &0- &  
? RK % & @ ( ; " , % & \$ ) DIj / 9 &0" \$ " AHV M % % 9/ - \$ " Y 6 / % " \$ - & ( - ) - %  
& - \$ % % % \$ \$ " &0- & ( % f ( % & - 9" 3 9 " " & 9 % " \$ & 2 0 / , " % - \$ ; ( % \$ " % % % M

0" ; / & & , \$ " % % 6 : &0 % \$ / \$ & ) & , - , \$ - \$ & % % & ' , % 3/ &0 &0" 6-6" & %  
6 \$ & ' / \$ 3 &0 / ( & - @ & - . \$ / 3 " ) " I - & - @ " ; 9" I " I - \$ - @ @ - & ' " @ % / 9 30- & % \$  
&0" ) / ( \$ M 0" ? / 6 / % " @ % \$ 0-6% " % & 0 / ( / & % & \$ ) I ; ( & , % % % &0% . " : % % " M

M          \$ " AHV 80 / ( O' ? / & " 9/ " 6 - @ , \$ \$ AC N' - % M

0" ( \$ . \$ / 3 \$ 66" \$ \$ " AHV @ \$ ; " " 6 - @ 3 &0 \$ \$ 66" @ - - @ " " & , / " \$  
1G " ( " , "\$ & % 3 &0 45 ? % & ; : &0" , " &0 / % " % & 0 " \$ &0" @ " FHE 1G AEDMAEJM  
0" 66" @ \$ - % ; " 9( : @ - - @ " " % , & & & 0 % & " \$ ) &0% - \$ 6 / 6" & % / 9 &0"

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<sup>A</sup> ? / 6 / % " @ % \$ - & EM  
<sup>AH</sup> - & DUH I \$ " % AEBD M  
<sup>AT</sup> - & DV I \$ " % BAHM

"\$& " \$" - " .\$/3\$M (" & 6// "@ .!"\$SRKI &" , -&' - @- -@&' %&@%- " \$/ &  
. /3\$ 9/ &" 9( "\$)& /9 &" 66" \$"M

O'@(% /9 &" \$(, " /(%(\$.\$/3\$ %), "\$&%6 "%&& 66" \$"I 8-\$ 1- /%; " " %  
&0-&&, -: ;" %6 " I ,/ " @%&"99"@&"I(-\$\$ ""%& % 9 &" \$" % "6 -@ M 0%  
%/ ( ;" /\$" / &" 66" \$" "&'&' - \$ "388\$%&C :"- %M "\$ :"- %%&"  
, -Y, (, - /3-; " \$&' - - /3" ;: &" 5, " @&@& /9 4"@-\$@ KS)\$"" %@ "  
g4-\$-) \$) 8:%&', \$&') & /9 -%?6" \$"%g F584KM8JI 8"@&\$ TMU F -; " J 9/ &'&  
6 "%&6 "%(6 & AM/ & "%&" 45 ?M 0" @%&)\$&&& " ("%&' 45 ? - " 3&0\$ &0%  
@&' /\$M 584K O AM8 0-%; ""\$ \$@ 6/ -&' ;: "\$@&" \$& &" 1G FIG AEDMJM

LM 8-\$ 1- /%2 ?(; @8-9"& 1/\$@ \$%e- ")@""\$ M

? RK -\$ &0%1/, ,%&\$ @\$&("\$ & )\$/ " /@/ " \$,"\$&M 5%- @/ \$-&  
; -\$@ /9 )/ " \$,"\$& @- )" 3&0 &" , , -&'@&& /9 &" 6(; @0"- &OI %9"&I -\$  
3" 9- "I -\$ -%&" " : "\$&& 30@I ;: &&'9 /-\$@% -) "" , "\$&4 6" , &? RK &  
/6" -&' - )-%- \$ " "@& @%&' , I - , -%6""@&9/ ""& " %6/\$% &'%- \$ "9" "\$@  
&3- %&%@\$%&&"\$@ %3- -\$&' M ?(;&@&&0%\$%&&&\$ -\$ \$ &0" (&& @ ( \$/ &  
; " - \$: /3"<sup>AJ</sup> : "& &" " %\$/ " , " : \$ &0" ? /6/% " @%&030 ""%&%"&0%  
9(\$ -, "\$& %@\$ \$"@&M 0" 1/, ,%&\$ 0-%&" 6/3\$ &" (& & "@& &0%(&& & /  
; "&&' M S0"&" &2%&0 /()0 ; \$%& &%, - /"@&, " /&" 9/ (, I &" @& "\$%- "  
"\$&&" & ,/ " &0-\$ - 0: 6" &'@&\$@ &'%(@\$&&-\$)"\$ - /9 - " : /\$) , ""& \$ 8-\$  
G-\$@&@ f(%&; "9/ " &" 0/ - : %M

\$ % " - /@&%"\$%4 8-\$ 1- /% " ("%&' "/@ &0"/ " &" & -\$- : " 30"&0"  
\$" AHV %%9" -\$ %@\$&(\$ ) & &0% -!" && &" \$9/ , -&\$ -\$ -& &0-&& %

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<sup>AJ</sup> - & CDUB CDM



"@ \$) -;/(& \$" AHMM 8,6 : %& &' I &0%6 /@" \$) -\$ "@%\$ 0% M% \$%&- /9  
) \$) "9" "\$@ & &0" " : ,6/ &\$&6(; @%9%& \$%;: 8-\$ 1- /%- \$ &1& 1/(\$@I  
&0%1/,,%&\$ 9" & &0-&? RK2%"\$"" & "%&' " &56 6 "%86 " (" & (\$ " 9" c3\$&  
",-\$ %d -\$ ,-\$ (9-@& " "- \$"%9/ ? RK 6&%"&@,(6" &0" 1&2% ")&-&' 6(; @  
@\$@ \$%M

LM 8-\$ 1- /%2 "\$"3% &%" ("& & O' 1/ ,8"\$9/ &%"1/%&M

8-\$ 1- /%"Y6 "%%: -@\$ /3 " )" &0" @"- /-\$&0)" \$&' "\$/ 1/,6"\$%&\$  
( "%4 ;(& 3/( -)-\$ ." & 0)0 )0& &0" " \$0-\$'\$&\$" (& /9 &0" 1? 1 "@ " \$) &0  
c@%&d -@@(" ;: &0" 1/,,%&\$ %&99I %&99%4&&\$ &%"@%\$ &\$&9/ - "Y6"\$%%"\$  
&0" " & 80/3 1-(%' Fc 81dJ \$ MAAMDNCAIS :"& &0" @& /9 ? RK2%  
,%"6 "%\$&&\$%F- 1& 30@ \$" " %& "Y6"\$- &"- : %&-66" "%( @%- \$ &" /\$ &0"  
;"&&' "\$&/9 &0" 1&J %\$/ &"\$&&" & @0"\$%&,"-&\$M \$@ -)-\$I 8-\$ 1- /%%\$/ &  
%". \$) c \$&' "\$/ 1/,6"\$%&\$Id ;(&" (& ;/" " !@\$ @,6"\$%&\$ (\$ " ?(; @  
& &'%1/ " 8"@&\$ VCAM

8-\$ 1- /%3/( 6 "9" & "Y6"\$ &%"@ @@%%"\$ %' \$) &0" "%"\$&M9 &0"  
1/,,%&\$ @\$ ,6/% - kU VTI CCC , /\$ / - \$' / - kAM DTCI CCC , /\$ / - 9\$"I &  
0-%&0" \$0" "\$&" (& ; " -( &/ & & ) -\$& &0' /9 &0" 1& /9 8-\$ 1- /%M "\$ &0-&  
? RK 0-%; /()0& &0% ";-@" (6/\$ &0",%' "%0/&%\$ )// @%@\$@\$@ \$/&/66/% 8-\$  
1- /%2 , /&\$M

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<sup>AV</sup> @& ;" DAI DCA I 6MTII "\$%EBAHb 7/ ", ;DCAA II 66MDTD BDT b "\$%  
AEBD I "\$%ABDC  
<sup>A</sup> D CCBD CHM  
<sup>AE</sup> 4/ &\$ 9/ ? RK & ", ;( %' KY6"\$%%" \$@ " /0)0 &0" 1/,,%&\$2% " &  
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# EXHIBIT A

## MAOP by Design Pressure Calculation

$S = 33 \text{ ksi}$  Yield Strength if known (49 CFR 192.107)

$t = 0.25 \text{ in}$  Pipe Wall Thickness

$D = 20 \text{ in}$  Pipe Diameter

$F = 0.5$  Design Factor (49 CFR 192.111)

$E = 0.8$  Longitudinal Joint Factor (49 CFR 192.113)

$T = 1$  Temperature Factor (49 CFR 192.115)

$$\text{MAOP} = \frac{2 \cdot S \cdot t}{D} \cdot F \cdot E \cdot T$$
 Maximum Allowable Operating Pressure  
Per Design at known  $S = 33 \text{ ksi}$

$\text{MAOP} = 330 \text{ psi}$

$S = 24 \text{ ksi}$  Yield Strength if unknown (49 CFR 192.107)

$$\text{MAOP} = \frac{2 \cdot S \cdot t}{D} \cdot F \cdot E \cdot T$$
 Maximum Allowable Operating Pressure  
Per Design if  $S$  unknown

$\text{MAOP} = 240 \text{ psi}$

## MAOP by Hydrotest Pressure Calculation

$P_{\text{test}} = 607 \text{ psi}$  Hydrotest Pressure

$\text{Test\_Factor} = 1.5$  Test Factor (49 CFR 192.619)

$$\text{MAOP} = \frac{P_{\text{test}}}{\text{Test\_Factor}}$$
 Maximum Allowable Operating Pressure  
Per Test Pressure

$\text{MAOP} = 404.67 \text{ psi}$

# EXHIBIT B

Table 1-3 Factors Used to Determine a Safety Factor for Ductile Materials

Information	Quality of Information	Factor
		<u>F1</u>
Material-property data available from tests	The actual material used was tested	1.3
	Representative material test data are available	2
	Fairly representative material test data are available	3
	Poorly representative material test data are available	5+
		<u>F2</u>
Environmental conditions in which it will be used	Are identical to material test conditions	1.3
	Essentially room-ambient environment	2
	Moderately challenging environment	3
	Extremely challenging environment	5+
		<u>F3</u>
Analytical models for loading and stress	Models have been tested against experiments	1.3
	Models accurately represent system	2
	Models approximately represent system	3
	Models are crude approximations	5+

$$\text{Safety Factor} \equiv \text{MAX}(F1, F2, F3)$$