

!"#\$%&'()*+, -'*. /- *0+123- *+4*# +0.*
1' 3-2. "&' .5*&' *'' "%563"%*# - "012-# -' .0!

"#\$%&'()*+,!- .!/ *O1+2!

3()\$\$,!\$%4'%+!3('+5(+16!

75'8+#1'92!\$%3: 11+; 6!<#'=)9\$56!7>!

O.)#*O1+2? 1: 11+; .* (: @!

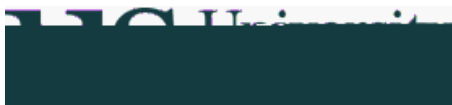
!

!"#\$%&'()*+, \$!' -./0 '\$1(0\$23425\$

67*+89- *+\$: ' ;' *0-&\$< (0/=5\$

>#?@A7BC' 0; B.8\$(1\$D' 0E(0, ;&B0' 5\$

F.&\$G/+8\$234H\$



78-28&-9*

: ' 3-2. "&' .5)*&' -8&. " ; %-<*

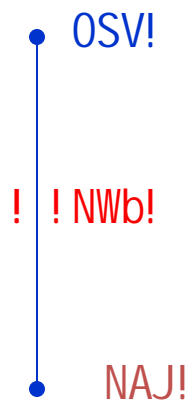
=*"' ' >* -8"%1 " 6+' !; -' -?3&"%<*

- ! B9!'1!R+,,,!+19*F,'1)+L!9) *9!*52!*5*,2H(*,!O+*1: #+O+59!
 #+1: ,9!'1!\$5,2!*5!+1HO*9+!\$%9) +!9#: +!8*, : +!\$%9) +!
 5,29+!(\$5(+59#*H\$5.!
- ! &+*1: #+O+59!#+1: ,9!6!9) +#+%\$#+6!'5+8'9*F,2!(\$59*'5!
 : 5(+9*'592.!!
- ! >5\$R'5=!9) +!/YZ4B3[BX!8*, : +!\$%9)'1!: 5(+9*'592!='8+1!
 8'9*,!F+5+! 91!9\$!: 1+#1!R)\$!'59+#M#+9!9) +!O+*1: #+O+591!
 +.=!
 -! 9\$!9+19!*!1('+5HI (!)2M\$9)+1+1!c+.=!-_A\!(\$59*O'5*H\$5!)*1!L+(',5+LD!
 -! 9\$!O*@+!*!O*5* =+O+59!L+('1'\$51!CM#\$F*F',!1H(*,,2D!
 •! ' "N"\$*-9(7\$0' J/BO' , \$\$

: ' 3-2. "&' .5*+4*# - "012-# - ' .*@: A*

RZ5!+1HO*9+!*] * () +L!9\$!*!9+19!#+1: ,9!R)'()!() ** (9+#'1+1!9) +!#*5=+!\$%8* ,: +1!!
R'9)'5!R)'()!9) +!9#: +!8* ,: +!1!*11+#9+L!9\$!, '+!CB3_!NQNOTA!N.JQ6!AWWN` D!!

- ! ' "N"\$AS\$T\$23U\$(7\$=' *;/0' = ' 7.\$(1\$HV3\$=N@WN\$X)\$B7\$; (B+\$
-! : *7N' \$(1\$AS\$T\$HV3Y23U\$TZ[F\$=N@WN\$
\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$. (\$\$\$\$\$\$\$\$\$HV3P23U\$TH42\$=N@WN\$
- ! K +!(*5!5+8+#!@5\$R!9) +!9#: +!8* ,: +!M- (/+, \$)' \$Z[3\$=N@WN0\$
- ! Ya+(9!\$5!(\$OM*#'1\$5!R'9)!9)#+1)\$,L!8* ,: +!\$%0Qb!O=c@=!
B"" "\$\$\ ' *;/0' , \$C*+/' \$HV3\$=N@WN\$B;\$)' +(K\$.&' \$.&0' ;&(+, \$C*+/' \$
\$ \$%0/' \$C*+/' \$Z[3\$=N@WN\$B;\$*) (C' \$.&' \$.&0' ;&(+, \$C*+/' \$
\$\$\$\$\$\$\$\$ \ ' *;/0' , \$C*+/' \$NBC' ;\$ 1*+; ' \$7' N*9C' \$-+*;;B] - *9(7\$
- ! Z,,!R+!5++L!9\$!@5\$R!'1!) \$R!%*#!%#\$O!9) +!9#: 9)!R+!O'=)9!F+!!
-! ' "N"\$KB.&\$4V@23\$-&*7-' \$B1\$)' B7N\$OBN&.\$T\$V^U\$-(7], ' 7-' \$
- ! -\$R!(*5!R+!+1HO*9+!: 5(+ #9*'592!\$%O+*1: #+O+591!E!'5(, : L'5=!9) *9!%#\$O!
1*OM,'5=G!l , ' ; -OB)' , \$)' +(K\$



d! : ' -' 7.\$, ']7B9(7\$(1\$A\$=(0' \$-08_9-`\$\$

e" *#*O+9+#! *11\$(' *9+L!R'9)!9) +!#+1: ,9!\$%!*!O+*1: #+O+596!9) *9!() ** (9+#'f+1!9) +!L'1M+#1'\$5!\$%9) +!8* ,: +1!9) *9!
(\$: ,L!#+*1\$5*F,2!F+!*] #F: 9+L!9\$!9) +!O+*1: #*5L!C>A\ agb> \ a4335\$233F0\$

B�*4+2*: *&' *B' "%563"%C/ - #&0.25**

- ! Z5* ,2H(*,!()) +O'191! = +5+#* ,,2!*'O!9\$\T!
 - ! #+L: (+!7!\$%O+*1: #+O+5916!F2!!
 - ! 'OM#\$8'5=!9) +!M#+ ('1'\$56!*5L!#+L: ('5=!F'*1!'5!*5* ,2H(*,!O+9) \$L1!
- ! [) '1!*'O!) *1!9R\$!M#\$F, +O1\!'9!*11: O+1\T!
 - ! 5\$!\$9) +#!1'=5'I (*59!1\$: #(+1!\$%7!!
 - ! *!O'5'O: O!,+8+,!\$%: 5(+9*'592!'1* ,R*21!L+1'#*F,+!
 - T! +8+5!R)+5!(\$19!\$%M: #1: '9!O*2!F+!L'1M#\$M\$#H\$5*9+!9\$!F+5+!91!M#\$L: (+L!!
 - T! 0' CB' K\$.&' ; '\$*;; / = _9(7;\$



D / - 2 - * > + - 0 * . / - * # - " 0 1 2 - # - ' . * \$ 2 + 3 - 0 0 * 0 . " 2 . <

! " # \$ % & ' (* " 0 * \$ " 2 . * + 4 * . / - * E - " 0 1 2 - # - ' . * F 2 + 3 - 0 0 *

Sampling

Physical sample
preparation

D / + * & 0 * 2 - 0 \$ + ' 0 & ; % - * 4 + 2 * \$ 2 & # " 25 * 0 " # \$ % & ' (< *

P \$ & (K \$ B ; \$ J / * + B . 8 \$ (1 \$; * = _ + B 7 N \$ ' 7 ; / 0 ' , c \$

•!

! + 123 - 0* + 4*1' 3 - 2. "&' .5)*

) + 9 + # \$ = + 5 + '92!* 5L!* OF' =: '92!!*

- Z,,!1* OM,'5=!9*#=+9! *#+!) + 9 + # \$ = + 5 + \$: 1!9\$!1\$O+!+; 9+5%!!
- Z,,!O+*1: #+O+59!M#\$ (+L: #+1!) *8+!1\$O+!,+8+,\$%* OF' =: '92!!
 -! +.=.!+; *(9,2!R) + #+!9\$!9* @+!*!1* OM,+!!



Pb heterogeneity by X-ray
Micro-Probe = 51%

- - + 9 + # \$ = + 5 + '92!* 5L!* OF' =: '92!(\$ OF'5+!* 5L!'59+ #* (9!9\$!(\$59#'F: 9+!7!'5!
 | 5* ,!O+*1: #+O+59!#+1: ,9.!!
 -! +.=.!*5*,\$=2!R'9)!=#++5!=#*'516!9)+5!R'9)!,+]: (+6!1\$',6!F:] +#!

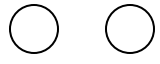
- p'1: *,!*5*,\$=2!\$%9)+!+a+(91!\$%B7\$;B./\$)+9+#\$=+5+'92!!
 -! R)'9+!=#*'51!(\$59*O'5*9+L!R'9)!=#++5!=#*'51!!
 -! R)*9!'1!9)+!(\$5(+59#*H\$5!\$%=#++5!=#*'51G!!
 •! +;M#+11+L!*1!q!\$%*,!=#*'51!

- !R)*9!'1!9)+!: 5(+9*'592!\$%1'5=,+!O+*1: #+O+59!G!









N06#"6' (*1' 3-2."&' .5C#*5L\$O!(\$OM\$5+59D!!\$

39*5L*#L!: 5(+9*'592!C: !r!1_.*;D!r!0.QSq!\$%=#*'51!

Y;M*5L+L!: 5(+9*'592!C76!J1!%\$#!WQq!(\$5%D!r!W.Aq!\$%=#*'51!

/+,*H8+!+;M*5L+L!!r!WAq!\$%O+*1: #+O+59!

!

7!l #19!O+*1: #+O+59!r!AQ!scT!W.A!q!\$%=#*'51!

!

!

!

!

!

!

7!r!#*5=+!R'9)'5!R)'()!9)+!9#: +!8*, : +!Cabd!,'+1!r!Q.W!9\$!J0.Aq!

T!b*7\$)'\$';9=*.' , \$10(=\$e/;. \$2\$();' 0C*9(7;\$M10(=\$' *-&\$ (1\$F\$. *0N' .;0\$

!

!_5,2!'5(, : L+1!2"" >+#!(\$OM\$5+59!!

E!5\$9!2+9!050. -#" 63!(\$OM\$5+59!+. =.!%#\$O!1*OM,'5=!F'*1!!

E!+. =.!=#*'51!5\$9!#*5L\$O,2!L'19#F: 9+L6!1\$!1*OM,+: 5L+#T#+M#+1+591!=#++5!

=*'51!C+. =.!, \$R+#!L\$R5!'5!(\$59*'5+#D!

|

• !(!s!7!!r!J0.Aq!

• !!(!r!AQq!\$%=#*'51!

' !![#: +!8*, : +!r!Abq!

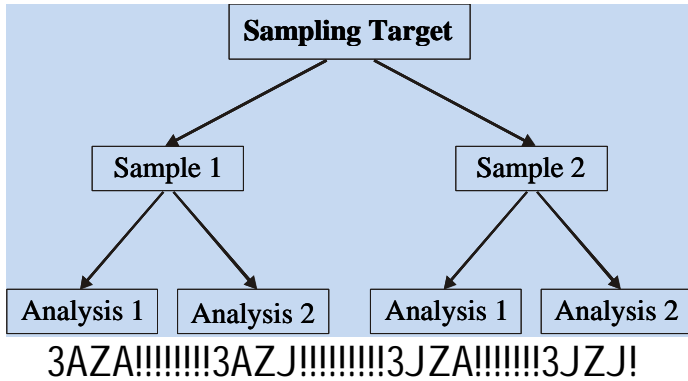
• (!E!7!!r!Q.Wq!



Q/-*R1\$%&3".-*E-./+>*

d! | +l 5+!2\$: #!1*OM,'5=!9*#=#+9!*5L!
1*OM,'5=!M#\$9\$(\$,

d! 71+!*!F*,*5(+L!L+1'=5!!



!



d! [*@+!*!1*OM,+!*9!9)+!5\$O'5*,!1*OM,'5=!9*#=#+9.!

d! [*@+!*!1+(\$5L!1*OM,+!L'1M,* (+L!%#\$O!\$#='5*,!C'5!
1M* (+!\$#!HO+D!9\$!#+u+(9!*OF'=: '92!'5!1*OM,'5=!

M#\$9\$(\$,!CP!#+u+(9!*5*,29+^!B7\$;B./)\$)+9+#\$=#+5+'92D!

d!X*##2!\$: 9!L: M,'(*9+!*5*,21+1!\$5!F\$9)!9)+!1*OM,+!

L: M,'(*9+1!!

d! [*@+!L: M,'(*9+!1*OM,+!1!%#\$O!Abq!cv!VD!\$%&9*#=#+91!!

d!Y1HO*9+!: 5(+#9*'592!(\$OM\$5+591!: 1'5=!Zn_pZ!
CZ5*,21'1!\$%p*#'*5(+D!E!: 1: *,2!/\$F: 19!

: #4, ()30. ' (04-" &(. 0+-\$-1#3, (* , 39%. (S&.2" .- *C+ ' 3- ' .2"6+ ' *&' *T-U13-*

d! n'9#*9+!*!M\$9+5H* ,!#'1@!9\$!): O*5!) +* ,9)!

d! Y7!9)#+1)\$,L!0Qbb!O=c@=!%\$#!F*9()!(\$5(+59#*H\$5!

d! X: ##+59!1*OM,'5=!M#\$9\$(\$,!1M+('I +1!9* '@'5=!Ab!) +*L1!9\$!

O*@+!*!1'5=,+!(\$OM\$1'9+!1*OM,+!%#\$O!+* ()!F*9()!MB7\$

f \$(0\$;. *0 \$, ' ;BN70\$d/0(_' *7\$gB0' -9C' \$hV@h33@ddb"i G\$!\$23h5\$4^"F"4VhV5\$ _2["\$\$

d! 71: *,!*OF'=: '92!'5!9)+!M#\$9\$(\$,!!

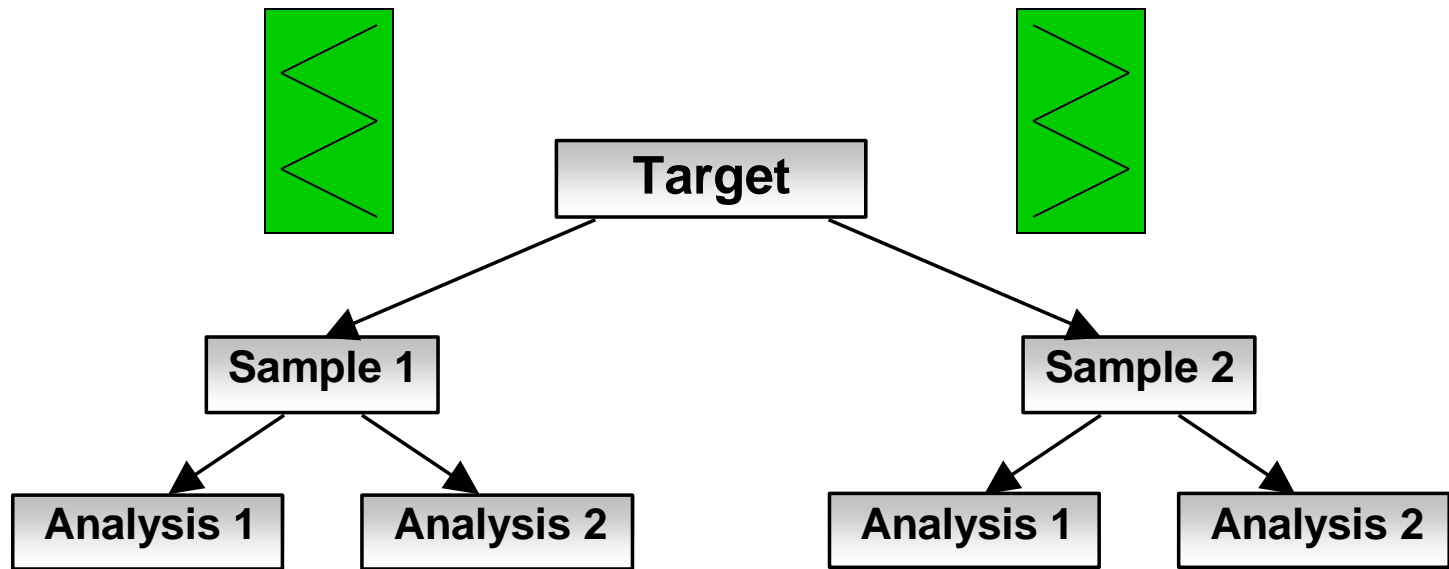
E! ' "N"\$K&' 0' \$. (\$; . *0.\$*7, \$(0B' 7. *9(7\$

d! K) *9!'1!9)+!: 5(+9*'592!'5!O+*1: #+O+591G!

d!

Y1HO*H5=!7!R'9)*R1\$%3".-*E-./+>*

: 1'5=*H''%' 3->*R-0&(' *



At 10% of Sampling targets in whole survey $n \geq 8$

BS7VB*+1.\$1.*****

4+2*: ' 3-2."&' .5*-06#"6+' *

: ' 3-2.'"&' .5*-06#".- *4+2*T-U13-*

d! 71'5=!Z5*,21'1!\$%p*#'*5(+!CZn_pZD!!

d! \$5!L: M,'(*9+!O+*1: #+O+591!

d! /\$F: 19!19*H1H(1!9\$!* ((\$OO\$L*9+!\$: 9,2'5=!8*, : +1!

d! m'8+1!#+M+ *9*F', '92!M#+ ('1'\$5!1_ = , * , !r!: !r!NSA!O=c@=!,!

d! Y;M*5L+L!7^!r!ASq!!

d! 7!%#\$O!*5*,2H(* ,!F'*1!C%#\$O!X/ &c!\$#!1M'@+D!!

d! (*5!F+!*LL+L!E!5\$9!19*H1H(* ,,2!1'=5'I (*59!'5!9)'1!(*1+!

d! I \$+1!5\$9!'5(, : L+!7!%#\$O!*52!1*OM,'5=!F'*1!!

E! X*5!F+!'5(, : L+L!: 1'5=!8*, : +1!%#\$O!3*OM,'5=!"# \$I ('+5(2![+19!

C3" [D!E!R'9)!yV!\$#=*5'1*H\$51!

: * -06#". -0*4+2*2"" (-*+4*4++>0W"" "%5. -0*

X' 3%1 >&' (*! "#\$%&' (*H&"0*&' *N06#".-^+4*: ' 3-2.'"&' .5*
*: 1'5=!3*OM,'5=!"# \$I ('+5(2![+1H5=!

! : Y*+' *3+' 3-' .2"6+' *42+#*!FQ*+' *
+&0.12-^&' *KZ.*42-0/*; 1U-2)=**

[*R1\$%3".-^E-./+>*: Y*G*Z0L\Y**

!FQ*X' 3%1 >-0*; &"0*; -.9--' =0" # \$%-20*@ G\A**
: Y*G*Z0] ^Y* ;(\$#2&, 2(<(<=>=)

Q9+*0" # \$%-20*/">\$+.-' 6"%5*' +' =
\$2+?3&-' .*_ =03+2-0* @_*` *LA*

!" # \$%-20a*X* @_*G*=L0KA*b*c* @_*G*dL0eA*

X4*+' %5*\$2+?3&-' .*0" # \$%-20f*: Y*G*Z0g\Y*

=*: *06%%%"2(-2*h*J0]*

!" # \$%&' (*F2+?3&-' 35*Q-0..!/*O1+2!' .\$.
+6!Z5,21%JbAA6!ANS6!ANANTANJA!



H- ' -?.0*+4*i ' +9&' (*: ' 3-2.'"&' .5*\$

H- ' -?.*I J)=X# \$2+8&' (*2-%&" ; &%&.5*+4*>-3&0&+' 0*

E! ' "N"\$1(0\$_ (. ' 79*+8\$- (7.* =B7*.' , \$+' k/- '\$

E! /'1@!*11+11O+59\T!

d! - *f*#L!y!9)#+1)\$,LG6!!

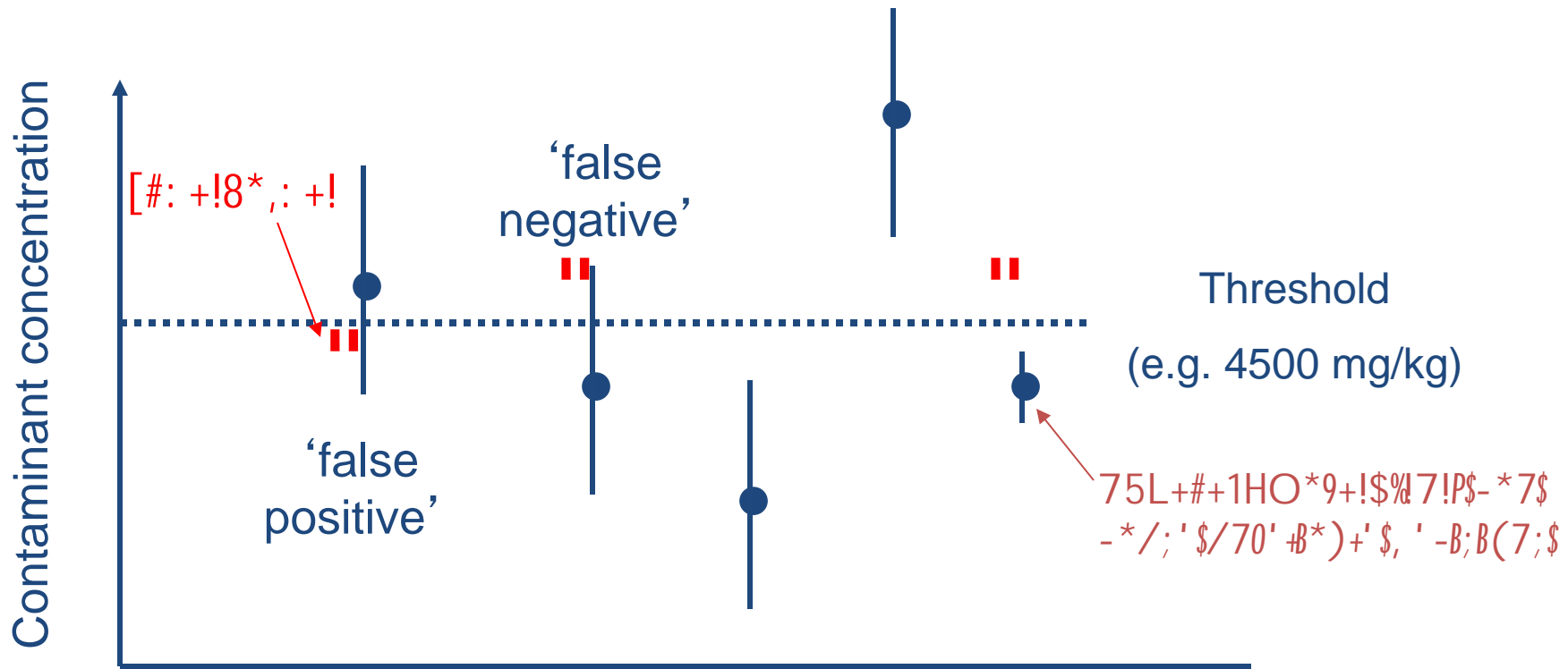
d! Y;M\$1:#+!y[\$,+*F,+!l *',2!B59*@+G!

E! 3*8+1!O\$5+2!\$5!(\$51+g: +5(+1!\$%&\T!

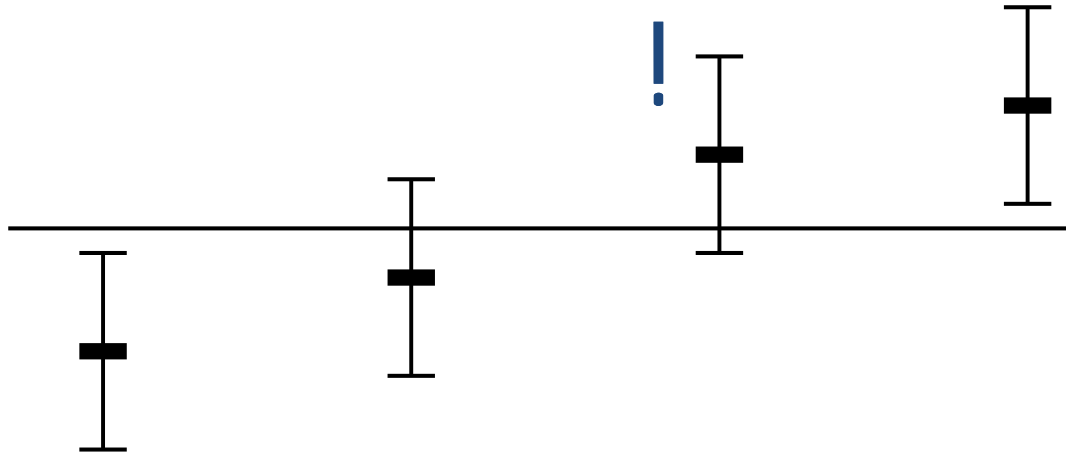
d! : 55+(+11*#2!L+19#: (H\$5!\$%&F*9())\$T\$1*+;' \$ _ (;B9C' \$

d! : 5L+9+(9+L!(\$59*O'5*H\$5!C+.=.!, 'H=*H\$5D!T\$1*+;' \$7' N

$i' + 9^* ./ -^* :^* \rightarrow^* \# " j -^* \# + 2 -^* 2 - \% " ; \% -^* > - 3 \& 0 \& + ' 0^*$



Nk-3.*+4*: *+'*&' .-2\$2-."6+'*

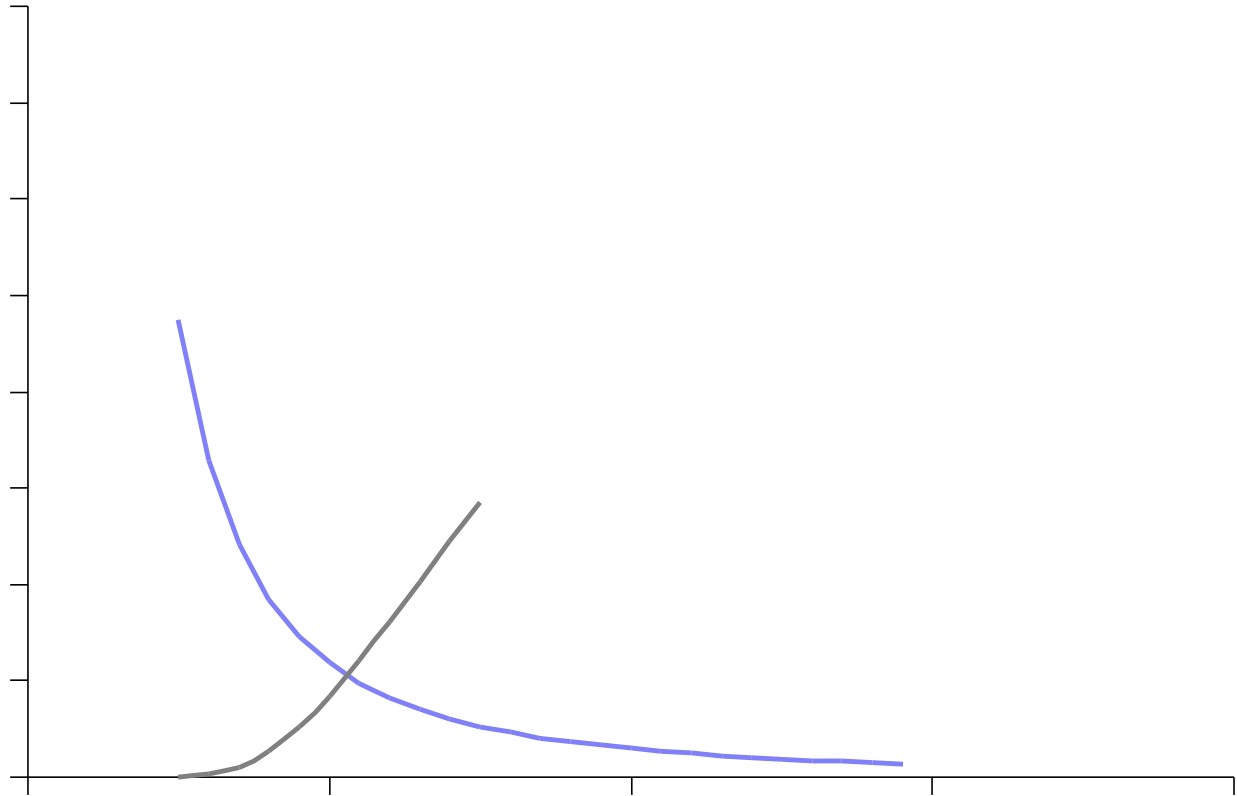


H-' -?.*IK*|1> (&' (*?. ' -00=4+2=\$12\$+0-*&' *
8''%&>'6+' *

- ! Yg: '8*,+59!*1!*1@'5=!mn+9*#13/*: *&0*"33-\$." ; %-<0*
- ! _5+!\$MH\$5!T: 1+!9) +!\$MHO'1+L!: 5(+#9*'592!C_7D!O+9)\$L`!
- ! <*,*5(+!9) +!(\$19!\$%O+*1: #+O+59!!

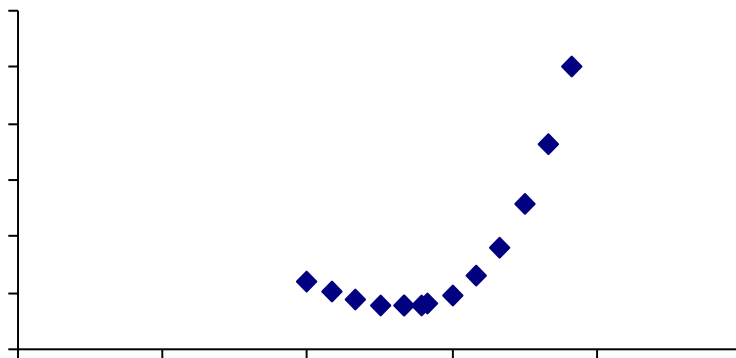
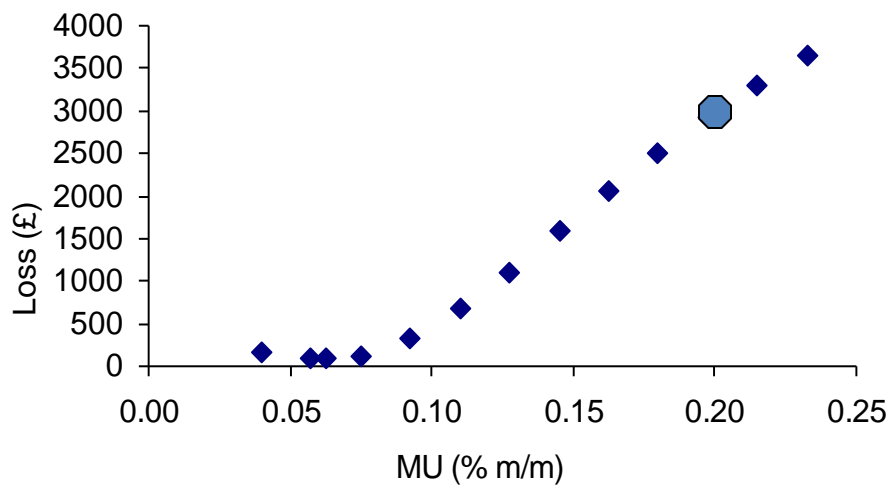
T

B33-\$." ; %- *%-8-%+4*: ' 3-2.'"&' .5<*



I1 > (&' (*PPF*4+2*2''' (-*+4*4++>0*

d! ZMM,'+L!l : M,'(*9+!&+9)\$L!9\$!1*OM,'5=!Ab!L'a+#+59!%\$\$L1c*5*,29+16!#*5=+!\$%(\$1916!
) +9+#\$=+5+'926!1'9: *H\$51!



H- ' -? .* | L* \$% > 5 \$ R' 5 = ! 7 5 (+ # 9 * ' 5 9 2 * \$

p " 6 + ' " % ; " 0 & 0 * 4 + 2 * " % + 3 " 6 + ' * + 4 * ? ' " " 3 - f !!
9 \$ \ T !

A ! & + * 1 : # + O + 5 9 ! * 1 ! * ! R) \$, + 6 ! * 5 L !

J ! Z M M \$ # H \$ 5 O + 5 9 ! F + 9 R + + 5 ! 1 * O M , ' 5 = ! * 5 L ! * 5 * , 2 1 ' 1 !

Z , , \$ R 1 ! * () ' + 8 + O + 5 9 ! \$ % \$ M H O * , ! : 5 (+ # 9 * ' 5 9 2 !!

n+9*3''' *: *; -*3/''' (->*.+*'''3/&-8-*PPF<**

- ! m#*M)!%\$#!,+] : (+!1)\$R1!9) *9!7!'1!9\$\$!)'=)!1\$7' ', \$. (\$0' , /-' \$B.\$
- ! n++L!9\$!@5\$R!1\$: #(+!\$%7!!
 - ! %#\$O!1*OM,'5=!\$#!%#\$O!()+O'(*,!*5*,21'1G!!
 - !

H- ' -?.0*IM*\$%>5\$R'5=!75(+ #9*'592*\$

F2+8&>-0*.++%4+2*#+' &.+2&' (*q1"%&.5*+4!* "#\$%&' (*

T! <+] +#!9) *5!*11: O'5=\T!

T! e(\$##+(9' !1*OM,'5=!M#\$9\$(\$,!R*1!e(\$##+(9,2^!'OM,+O+59+L!

T! #+1: ,H5=!5!*!e#+M#+1+59*H8+^!1*OM,+!

T! m'8+1!g: *5H9*H8+!+1HO*9+!\$%1*OM,'5=!g: *,'92!

T! <#'5=!1*OM,'5=!R'9)'5!1'O',*#!wXcwZ!9\$!*5*,21'1!

T! _9) +#!9\$\$,1!9\$!'OM#\$8'5=!g: *,'92\T!!

T! p*, 'L*9+!1*OM,'5=!M#\$9\$(\$,!CR'9)!X[3D!

T! [#*'5!*5L!(+ #H%2!1*OM,+ #1!CR'9)!3" [D!

$n+9^*$; $-0.^* .+^* -h\$2-00^*\%''2(-^*: ' 3-2.'\&' .5^*$

•! $K) +5!7^!'1!8+\#2!, * \# = +!CyNbqGD6!R+!5++L!F+] +#!R^*21!\$%$
 $+; M\#+11'5=!9!$

—! $B\% 7! \#^* 5 = +! = \$ + 1! x! b6! (* 5^9! F + !9) + !e9\#: +!8^*, : +^!$

•! $n+R!R^*21!\$%+; M\#+11'5=!B7\$; B. /\$) +9+\#\$\$ = +5+'92^A!: 1+!$
 $/TT2.11Tf[()) - 0.4(+) 0.4(9+) 0.4(\#) 0.4(\$) - 0.30.4 - 0.4$

: *g' *g*? <(4-30(3+ ' .0*%' ' ' >*g' 8-06 ("6+' 0!

Site#	Source of Pollution	End use	Prime contaminant	Sampling method	U'%	%Prop Samp	Prop Anal
1	Mine Sn/Cu	Housing	Arsenic	Trial Pit	65	94	6
2	Gasworks waste	Public access	Lead	Trial Pit	51	93	7
3	Infill after WWII Bombing	Private gardens	Lead	Qd 0 BT 18 0 0 18 n /T0.2 () h-16Tm /			

: *42+ #*0" # \$%&' (* + . / - 2* # - > &"**

- ! I : M, '(*9+!O+9) \$L! *MM, '(*F, +!9\$!O*52!L'a+#+59!O+L' *!P! *5* ,29+1!!
- ! 4+8+, 1!\$% 7^!8*#2!=#+ *9,2!%#\$O!x0q!9\$!yUJq!
- !

! 3+\$-^*''' >^*2+%-*+4^*''' ''%563''%*3/-#&0.25*

- ! 3'9: *H\$5!M#+1+591!*!=\$,L+5!\$MM\$#9: 5'92!%\$#!O+*1: #+O+59!
1('+5H19!9\$!F#\$*L+5!9)+'#!#\$,+.!!
- ! 3*OM,'5=!M+#1\$55+,!*#+!: 1: *,,2!M\$\$#,2!9#*'5+L!9\$!9* (@,+!9)+1+!
O+*1: #+O+59!'11: +16!F: 9!!
- ! Z5*,2H(*,!())+O'191!(\$:,L!: 1+%: ,,2!+;9+59!9)+#!+;'1H5=!+;M+#H1+!
9\$!(\$51'L+#!9)+!R)\$,+!O+*1: #+O+59!M#\$(+11.!!
- ! Z,1\$!*MM,'+1!9\$!B7\$;B./\$*7,\$\$5T1'9+\$O+*1: #+O+591!!
- ! <#\$*L+5!*5*,2H(*,!1('+5(+!9\$!'5(,: L+!L+1'=5!\$%M#'O*#2!1*OM,'5=!

C + ' 3%10&+ ' 0*

A.! 3*OM,'5='!1!M*#9!\$%&9)+!O+*1:#+O+59!M#\$ (+11!!

J.!

B3j ' + 9%- > (-# - ' .0*

C+=9+2j -20*

Z#'*L5+!Z#=2#*@'!

{+552!425!

"*: ,![*2,\$#!

>*92!<\$5!

" +9+#!/\$19#\$5!

3)*#\$5!3g: '#+1!

{\$5=!X): 5!4++!

{*(g: '![)\$O*1!

m#*(+!3\$,\$O\$5T

K'1L\$O!

B,*#'*!' '* ,+19#*!

!

C+%"; +2".+20*

&'@+![])\$OM1\$5!

39+8+!Y,, '1\$5!!

/ \$=+#!K \$ \$L!

Z5L#+R! ! *O*59!

")',! "\$] 1!

&'@+!m*#L5+#!

Z55*!K)'] *@+#!

{ \$) 5! - + * 9) (\$ 9 + !

&+OF+#1!(1\$d/0* -&' = \$! \$

: #b@6 \ b\$f (0WB7N\$>0 (/ _ ; \$

(7\$A\$10 (= \$#* = _ # 7 N \$

!

P1' >&' (**

Y" 3/X!

j 3Z!P!&Zjj!

[3<6! I [B!P!pZ&!

I \$: 5#+ *2!3'9+!/+19\$#*H\$5!49L!

n! Z!

X4\ZB/Y!

YZ!

X\$#: 1!

n*H\$5* ,!m#'L!

X\$OO\$5R+*,9)!3()\$, *#1)'M1!

