

**Appendix F SRS (site-wide) Regression and
Cluster Analysis Approach
Results**

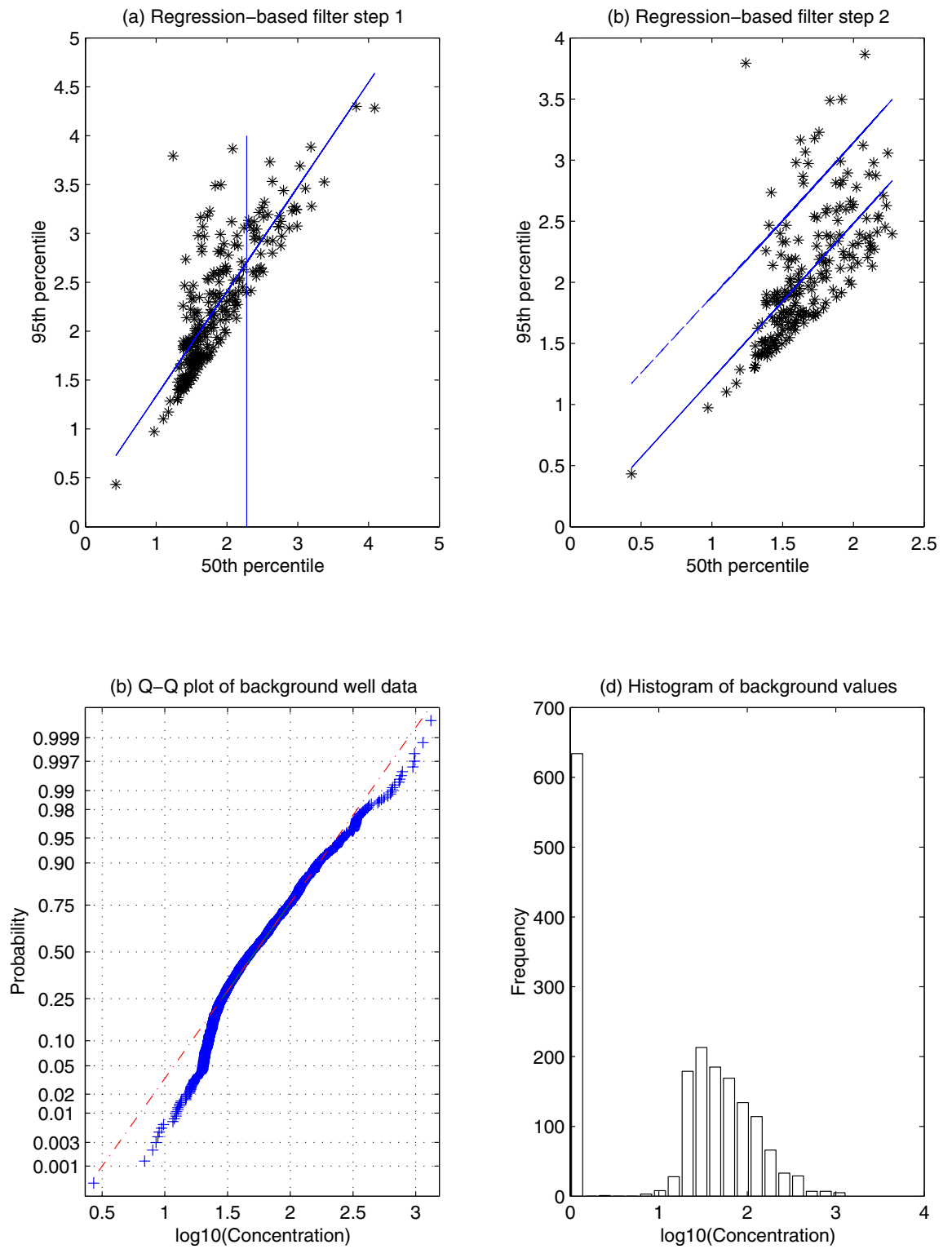


Figure F.1: Aluminum regression approach results for SRS, in ($\log_{10}(ug/L)$)

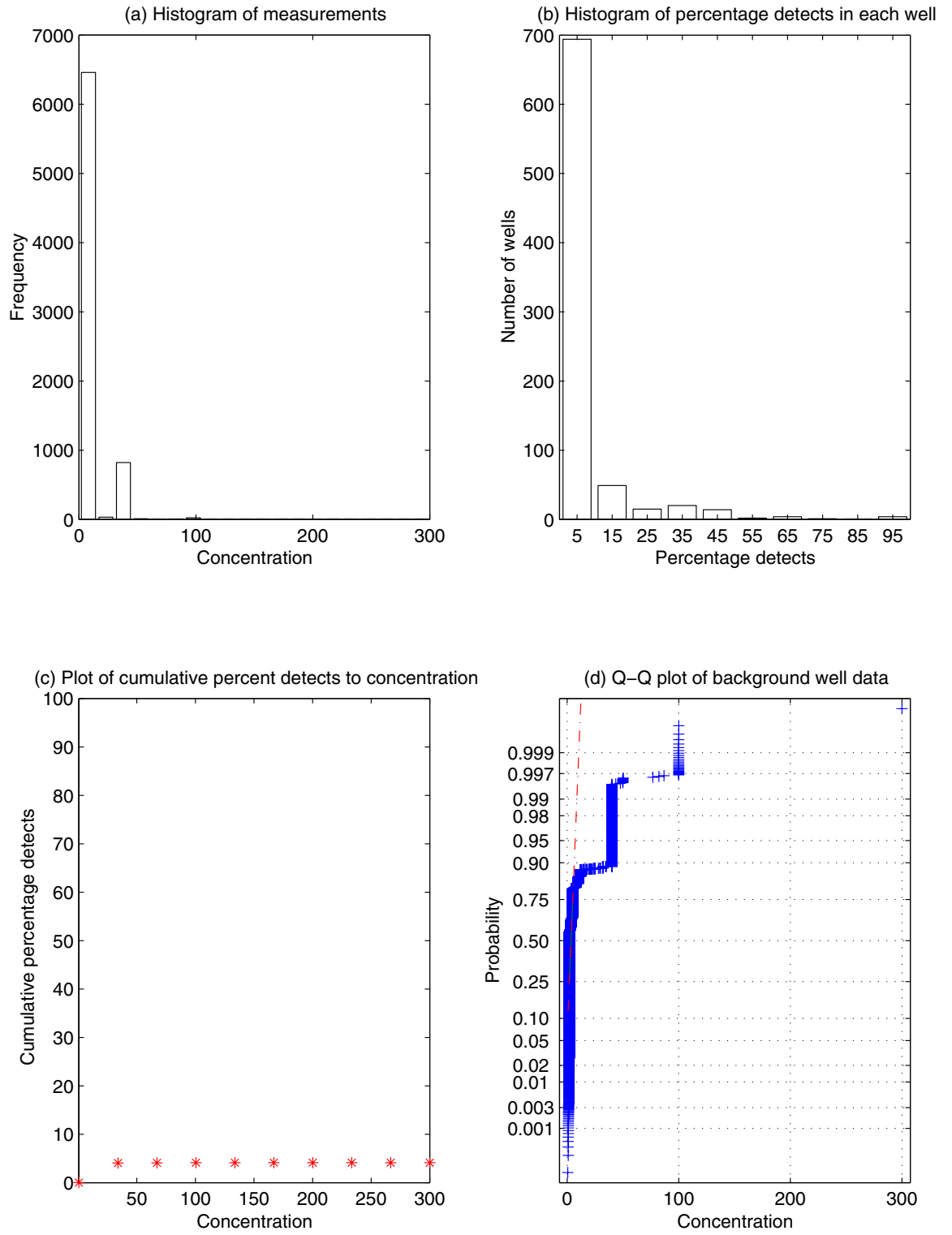


Figure F.2: Arsenic background results for SRS, ((ug/L))

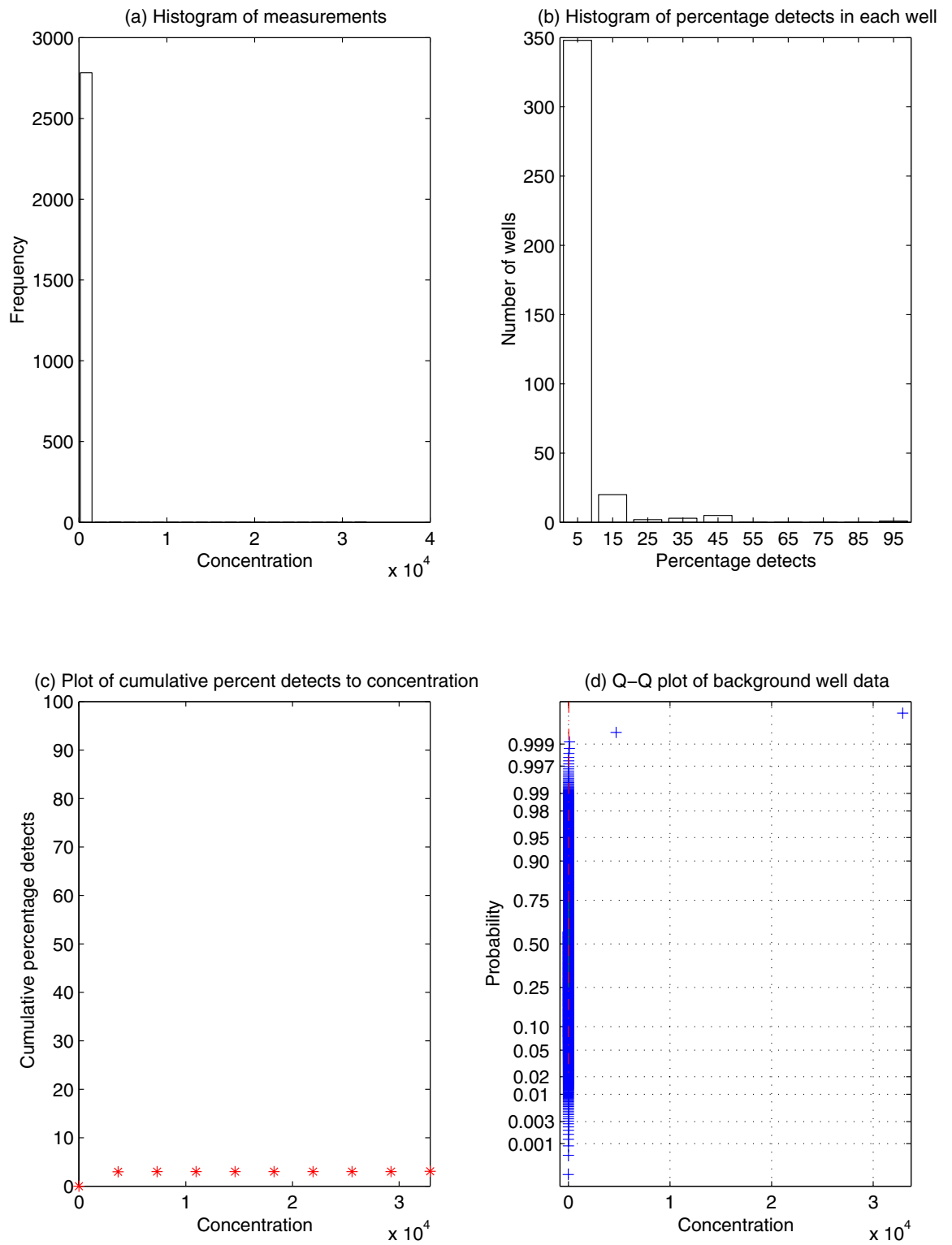


Figure F.3: Cesium-137 background results for SRS, (pCi/L)

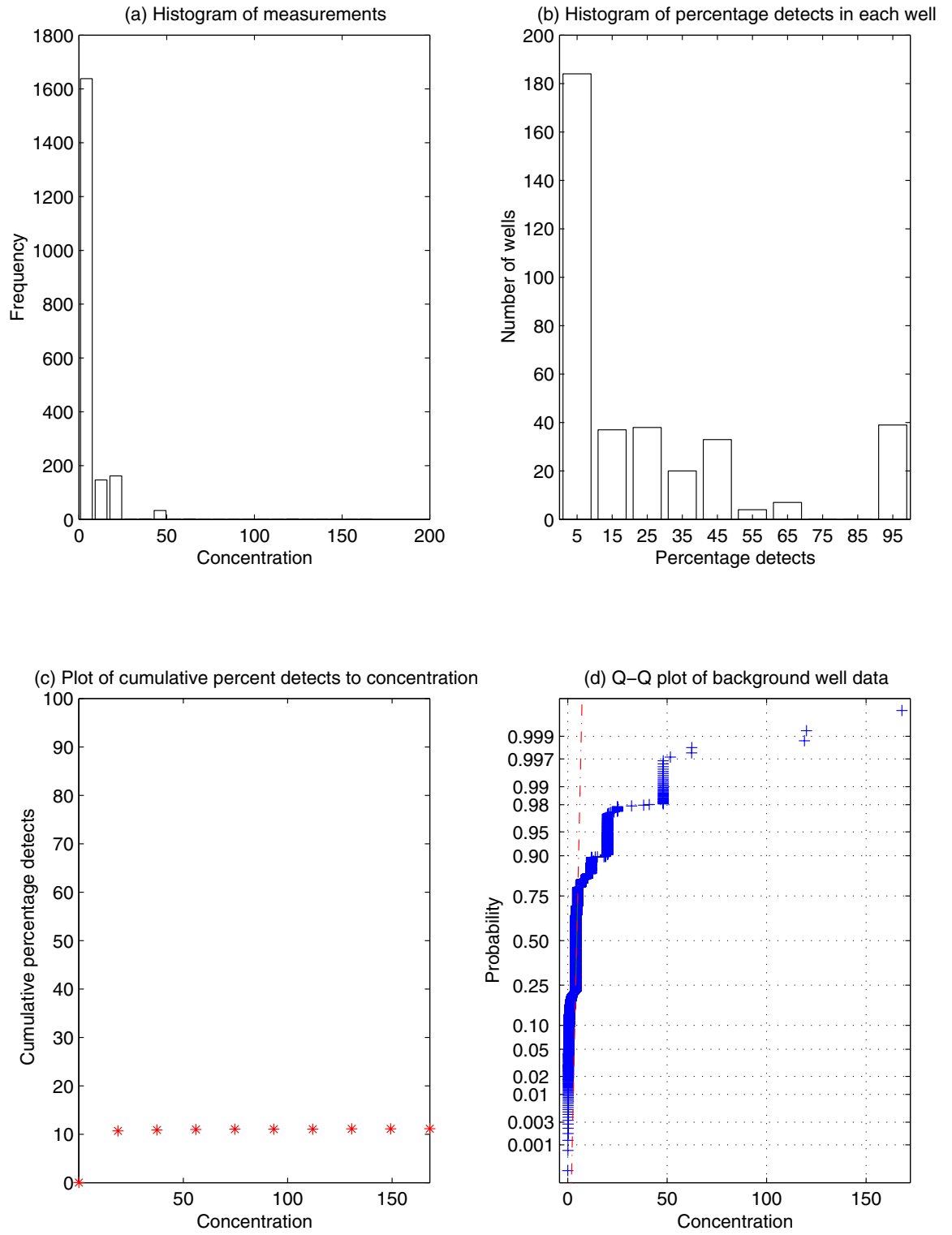


Figure F.4: Cobalt background results for SRS, (ug/L)

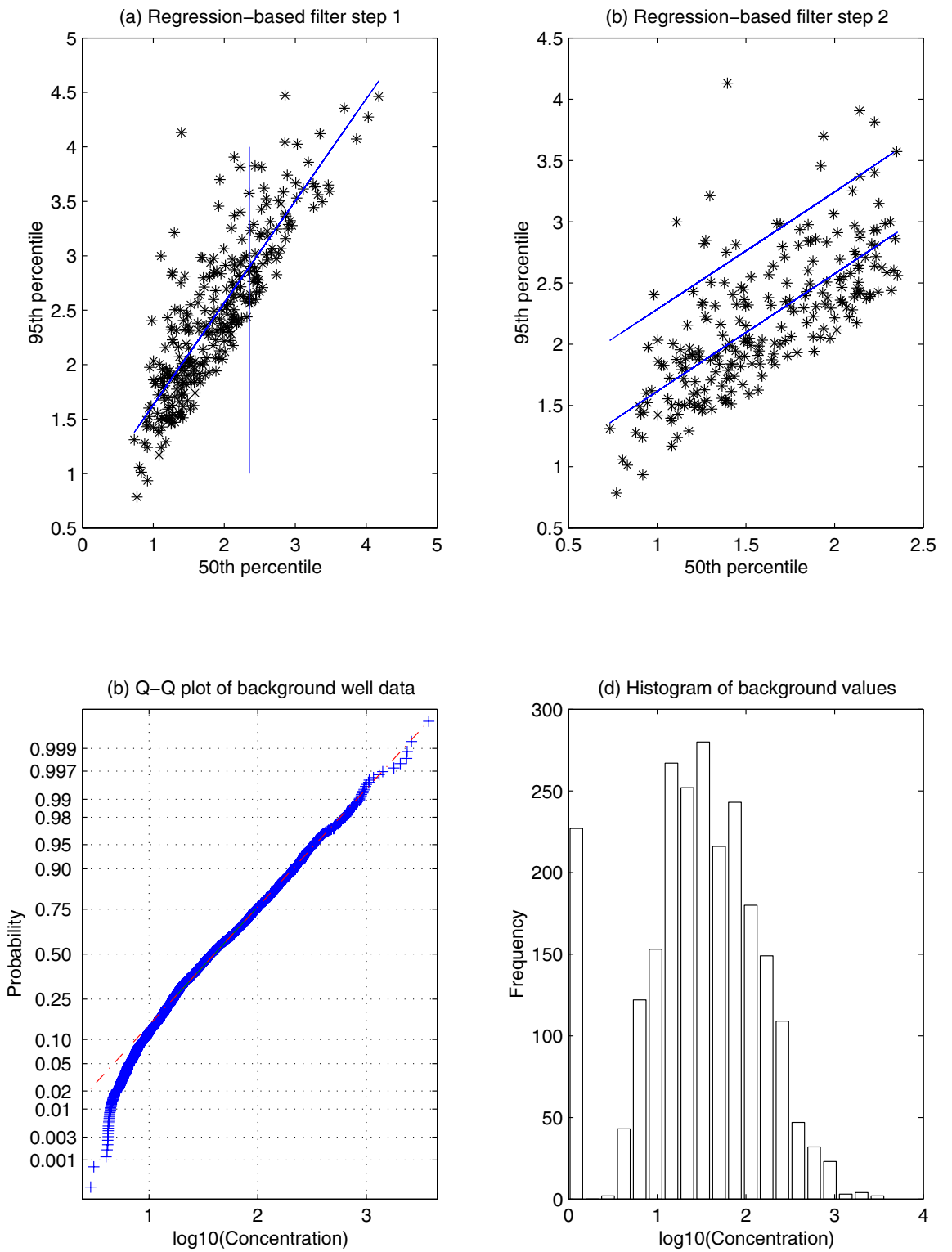


Figure F.5: Iron regression approach results for SRS, in $(\log_{10}(\mu\text{g}/\text{L}))$

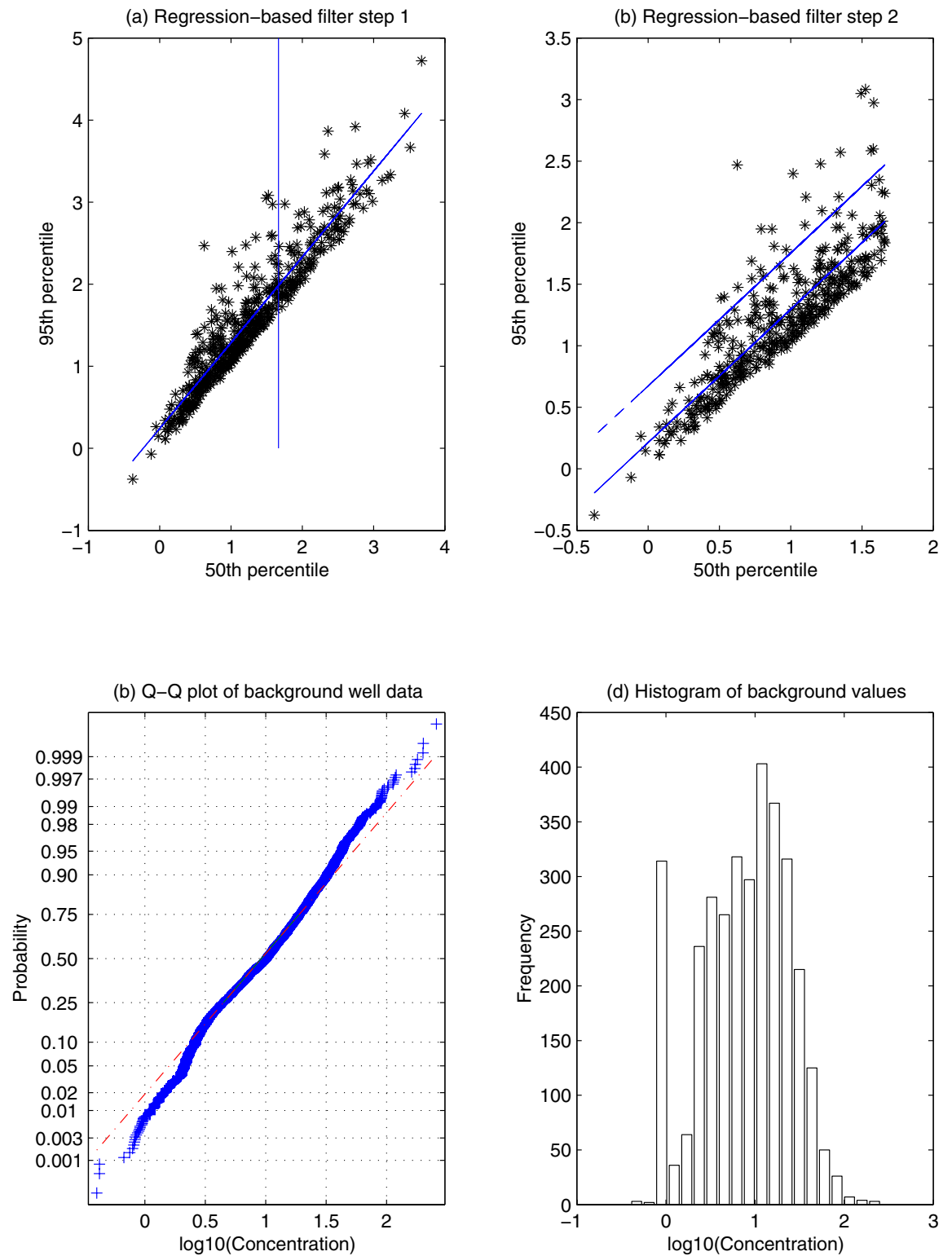


Figure F.6: Manganese regression approach results for SRS, in ($\log_{10}(ug/L)$)

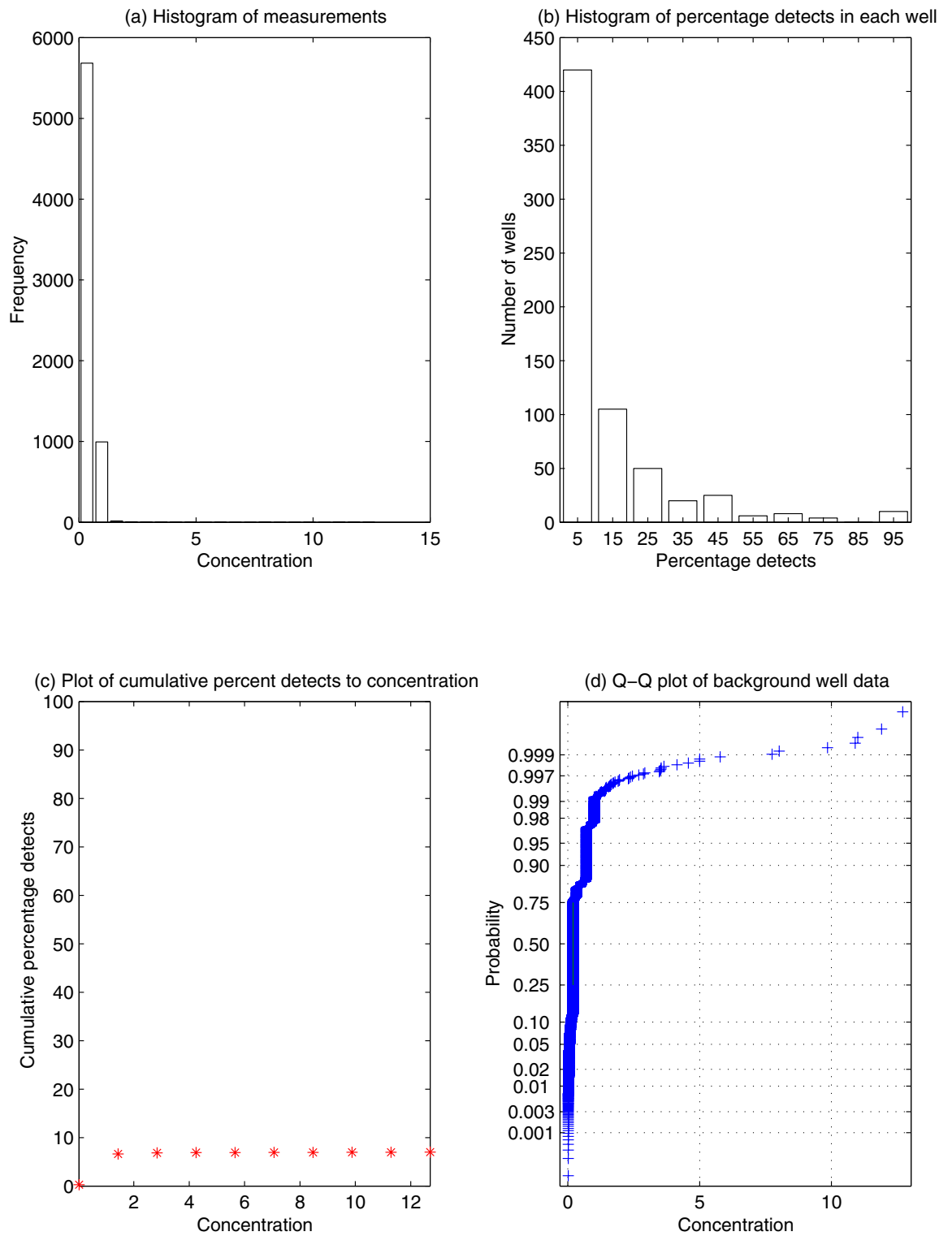


Figure F.7: Mercury background results for SRS, ((ug/L))

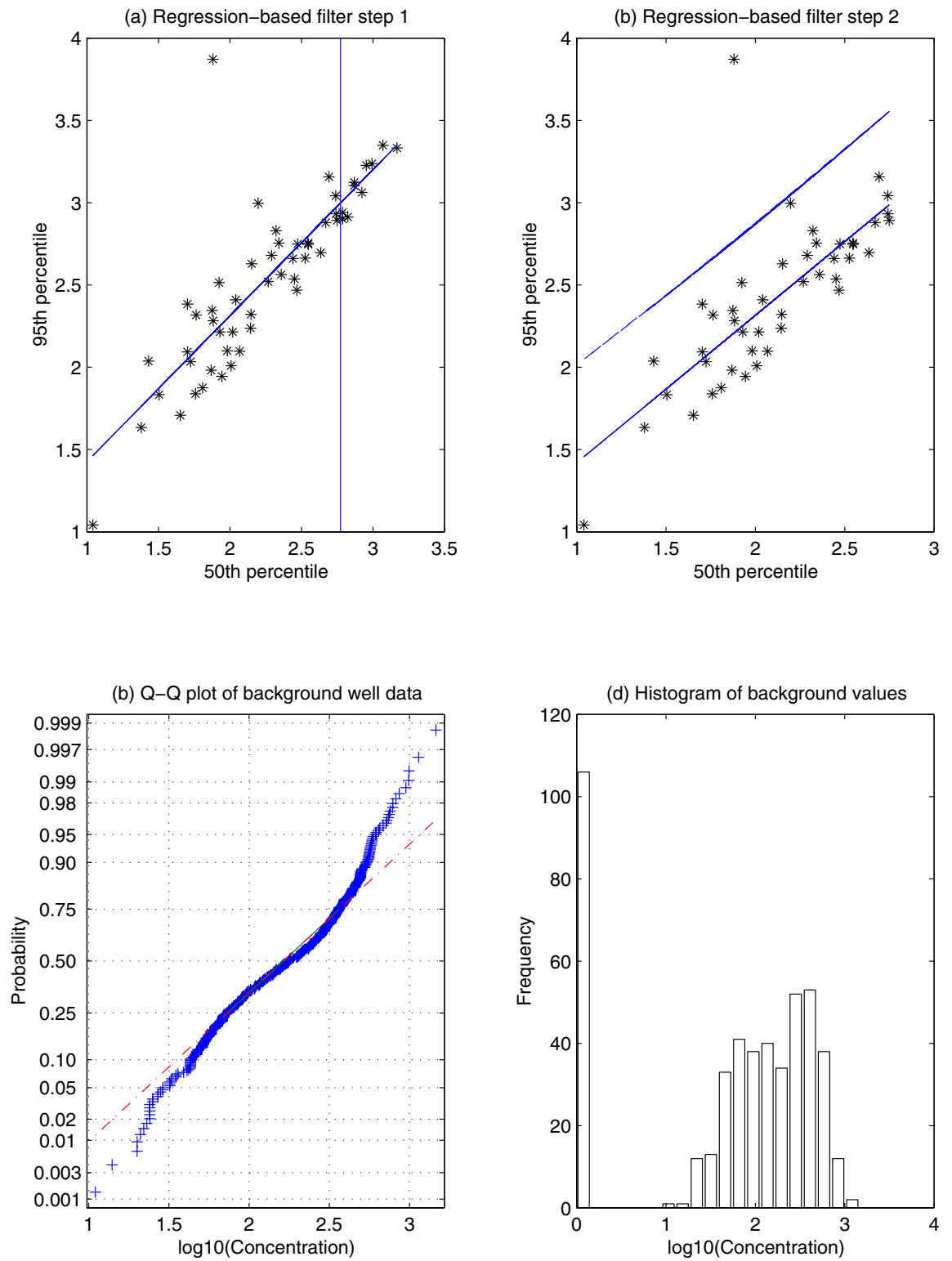


Figure F.8: Nitrate as nitrogen regression approach results for SRS, in $(\log_{10}(ug/L))$

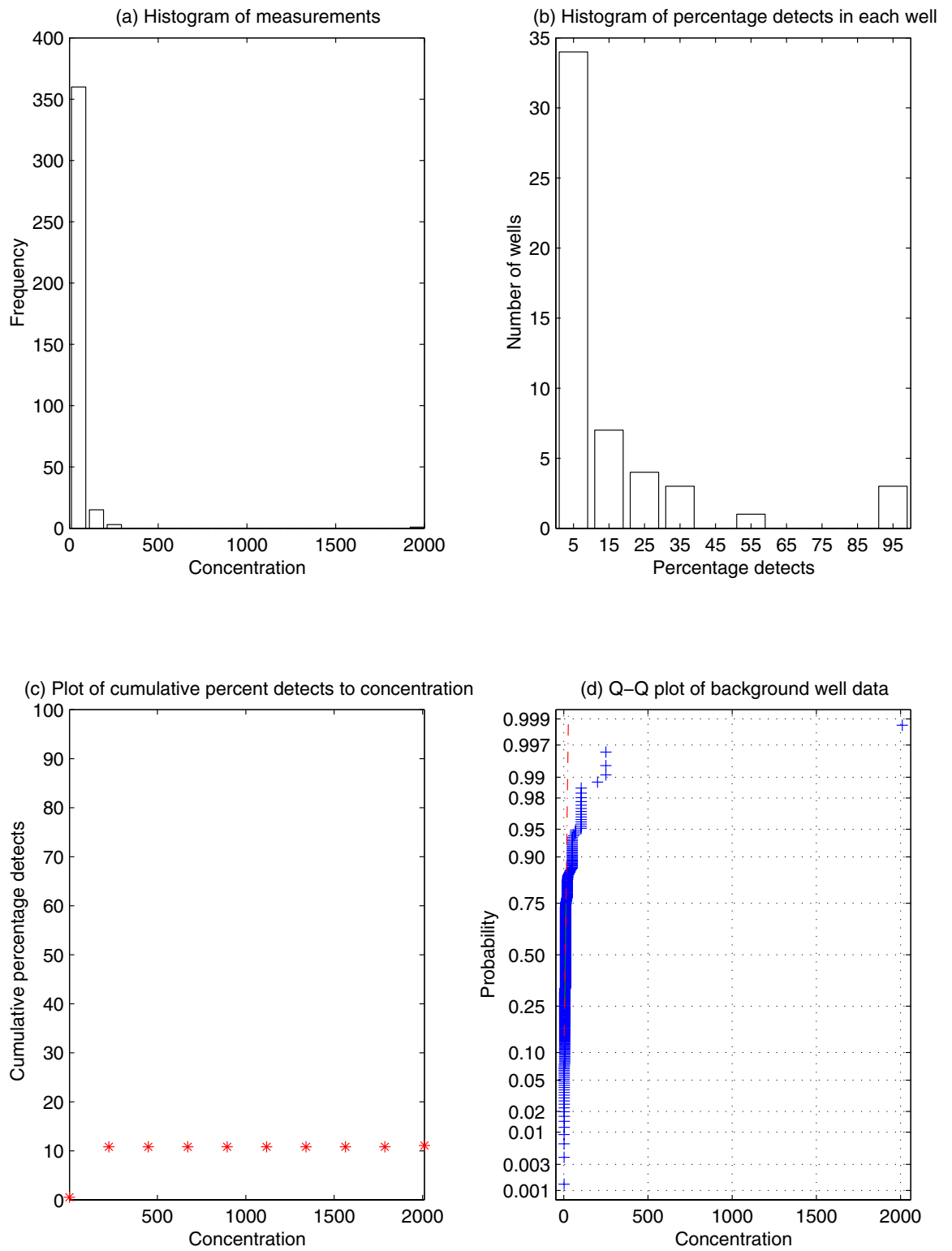


Figure F.9: Nitrite as nitrogen background results for SRS, ((ug/L))

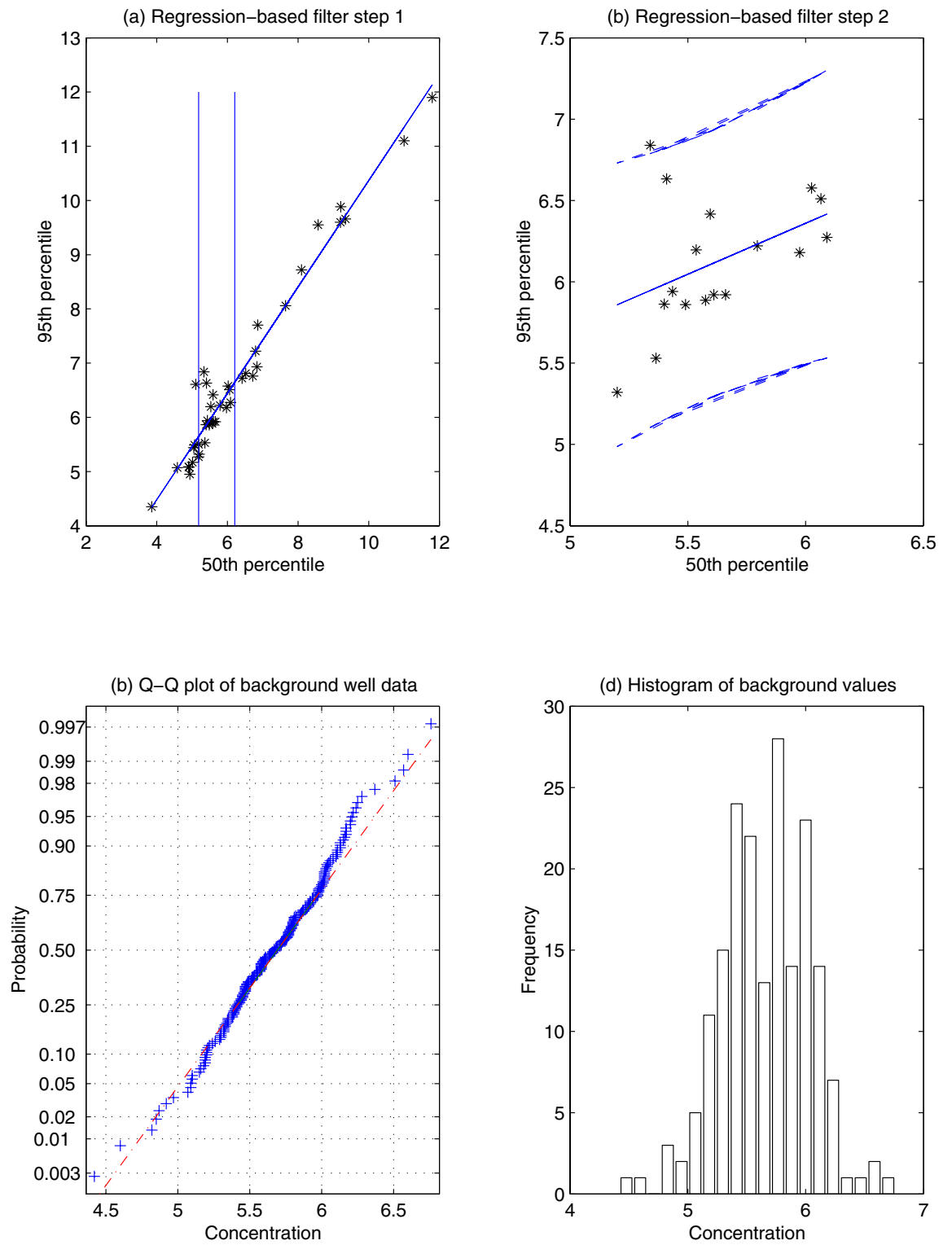


Figure F.10: pH regression approach results for SRS, in normal units

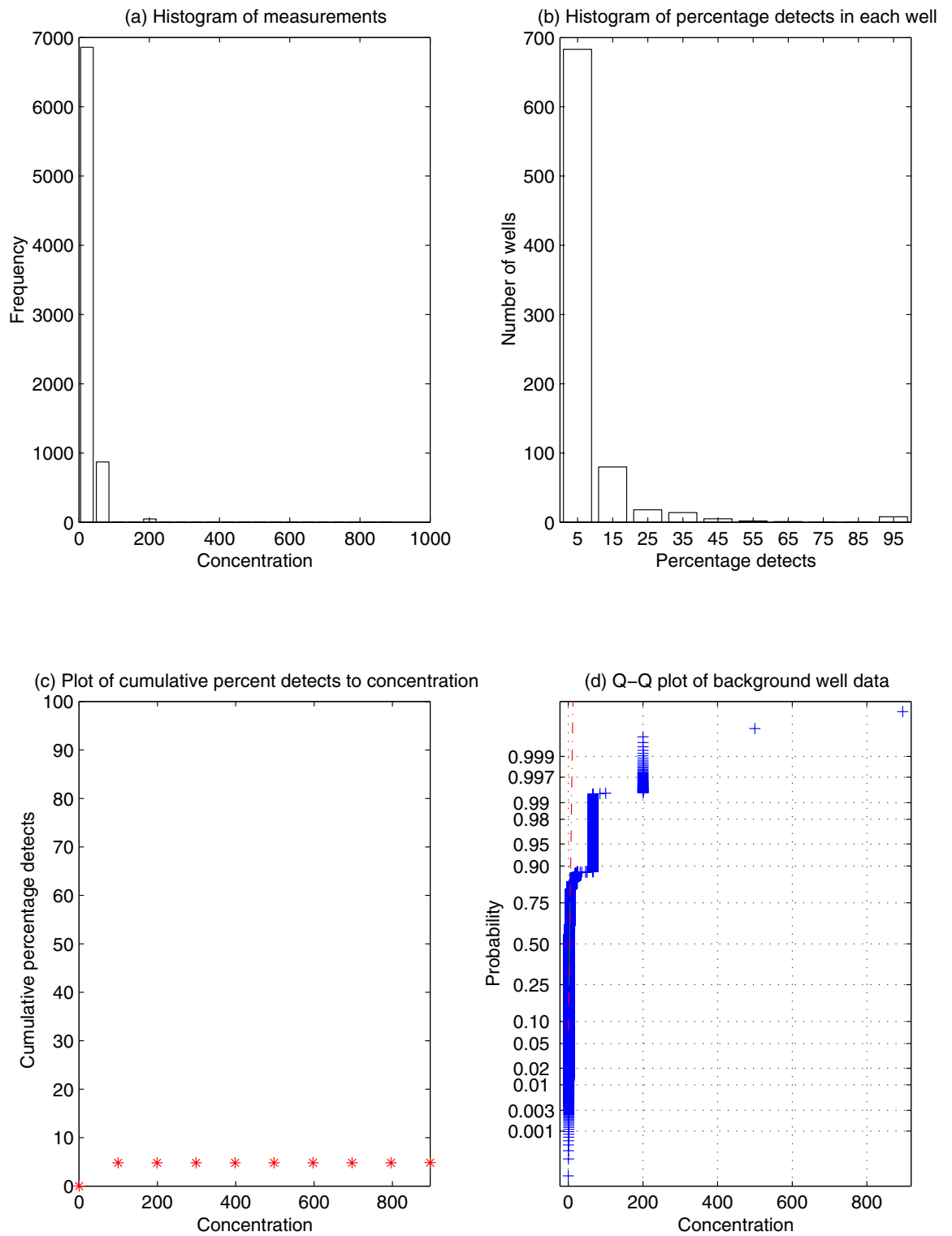


Figure F.11: Selenium background results for SRS, (ug/L)

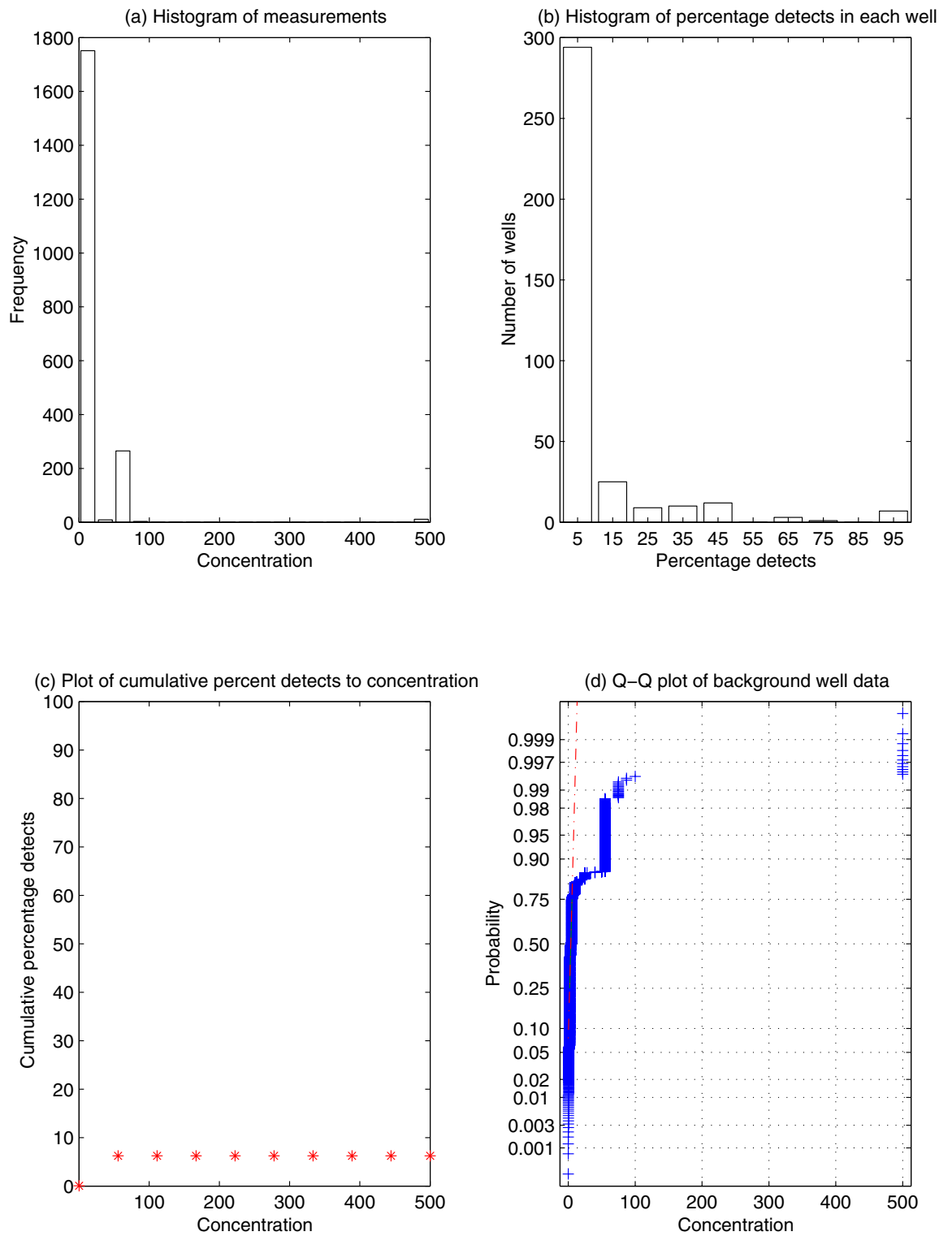


Figure F.12: Thallium background results for SRS, ((ug/L))

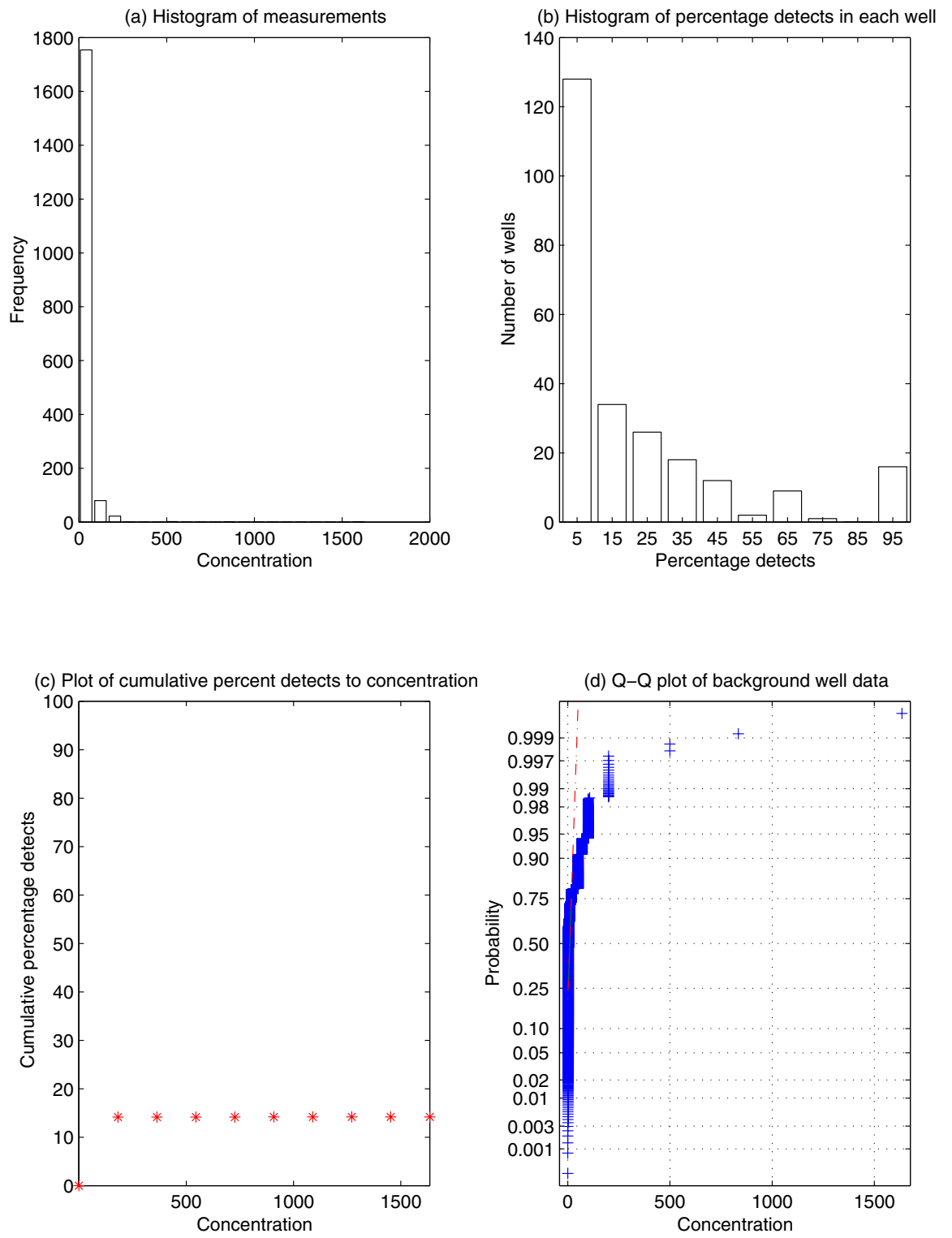


Figure F.13: Tin background results for SRS, (ug/L)

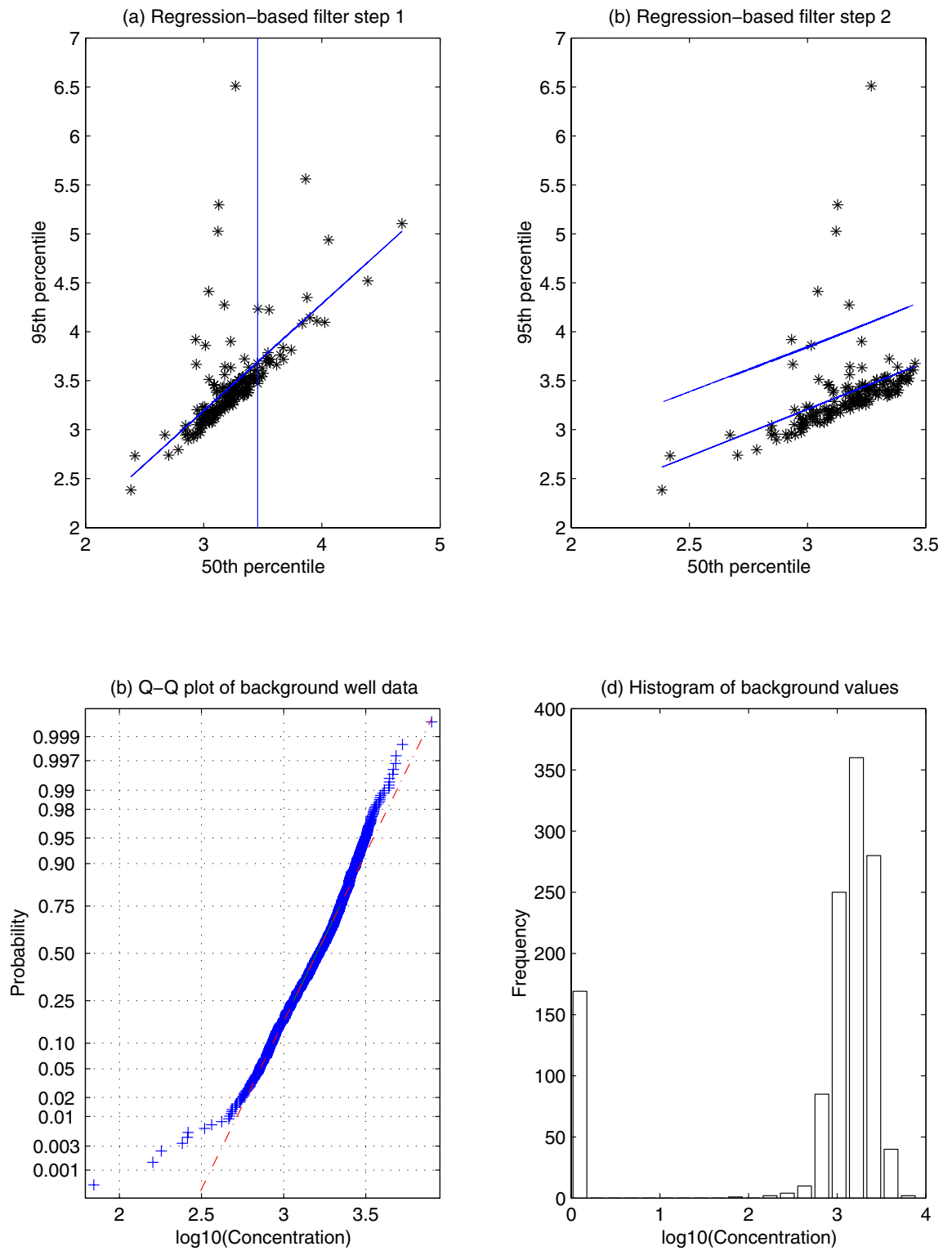


Figure F.14: Tritium regression approach results for SRS, in ($\log_{10}(pCi/L)$)

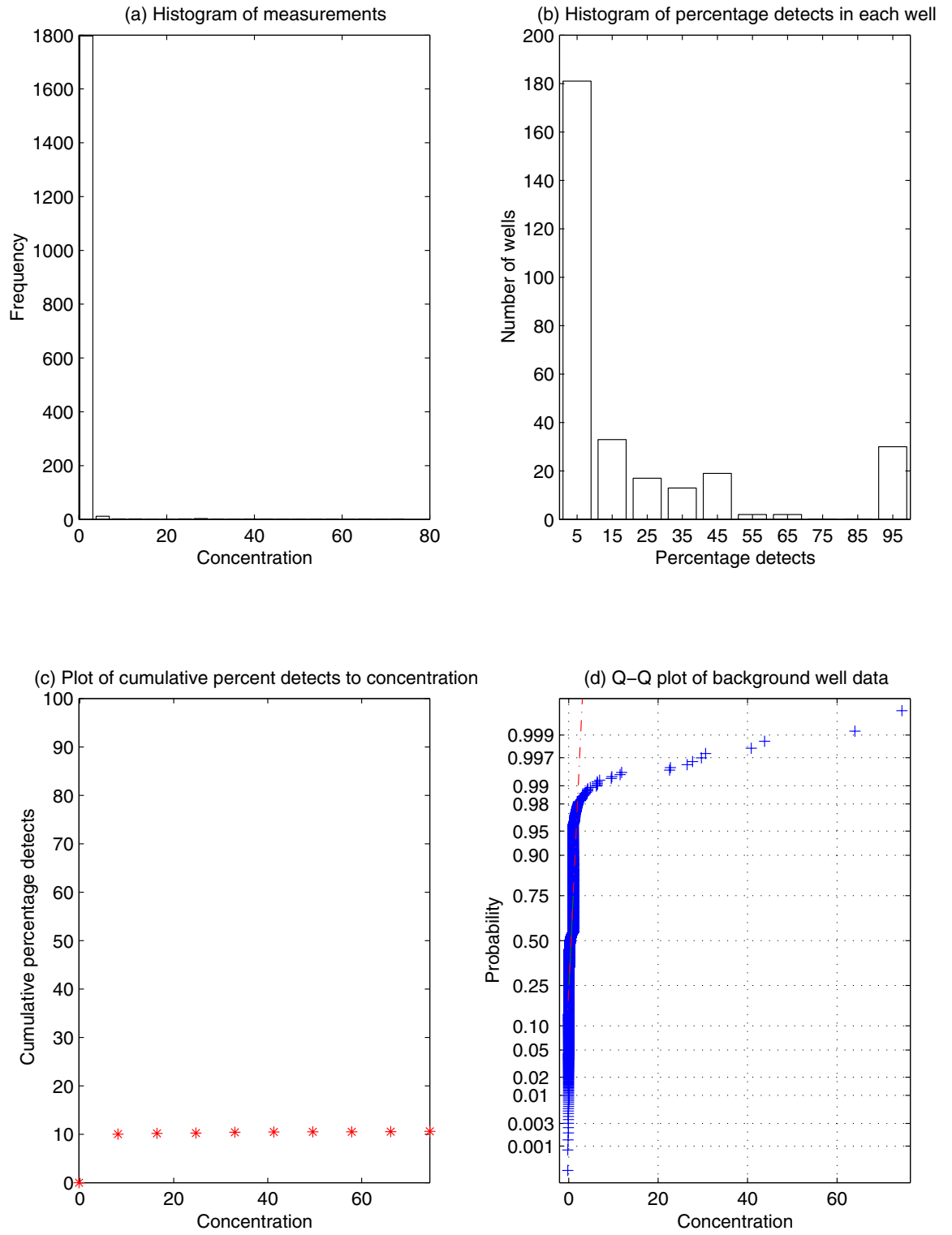


Figure F.15: Uranium-238 background results for SRS, (pCi/L)

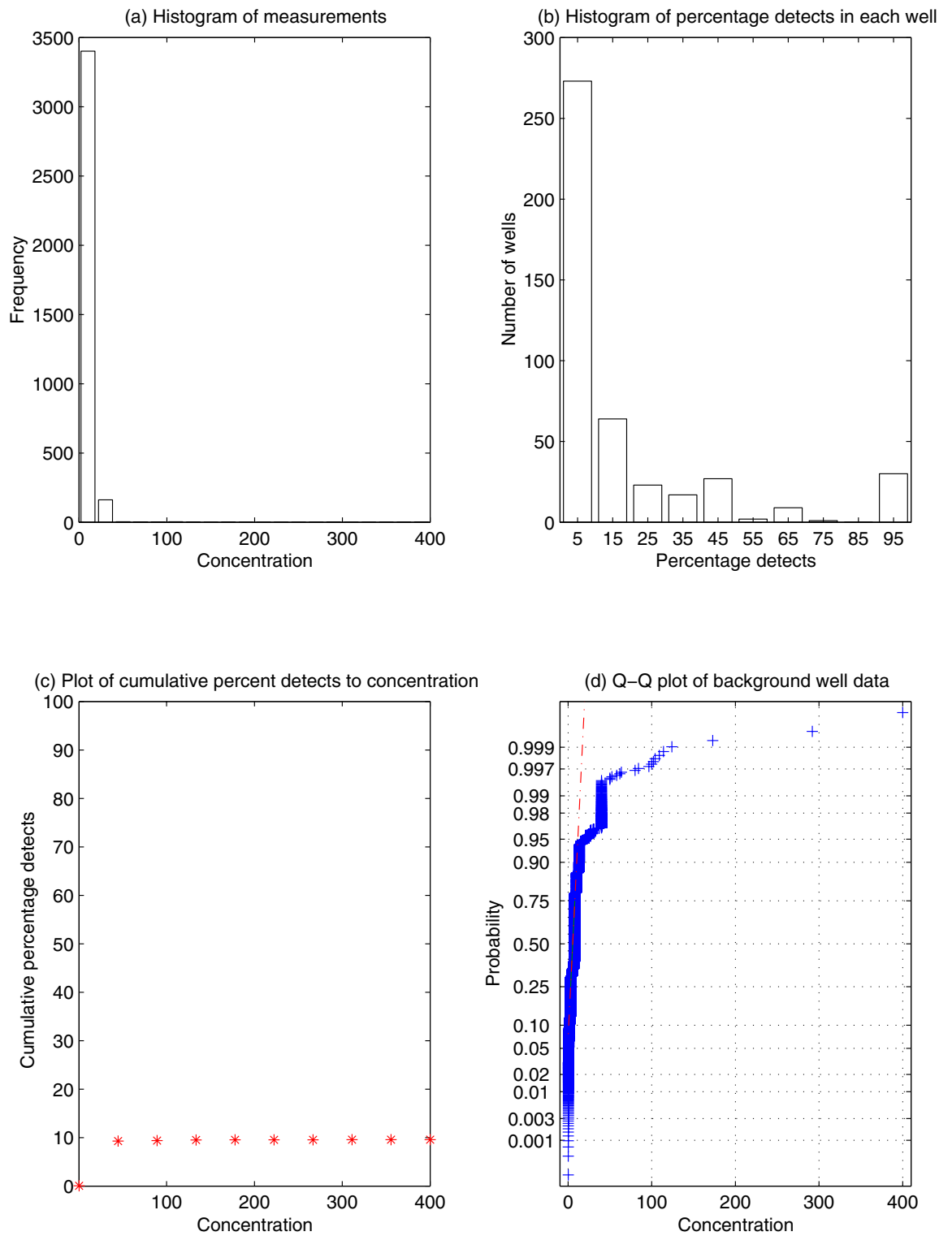


Figure F.16: Vanadium background results for SRS, (ug/L)

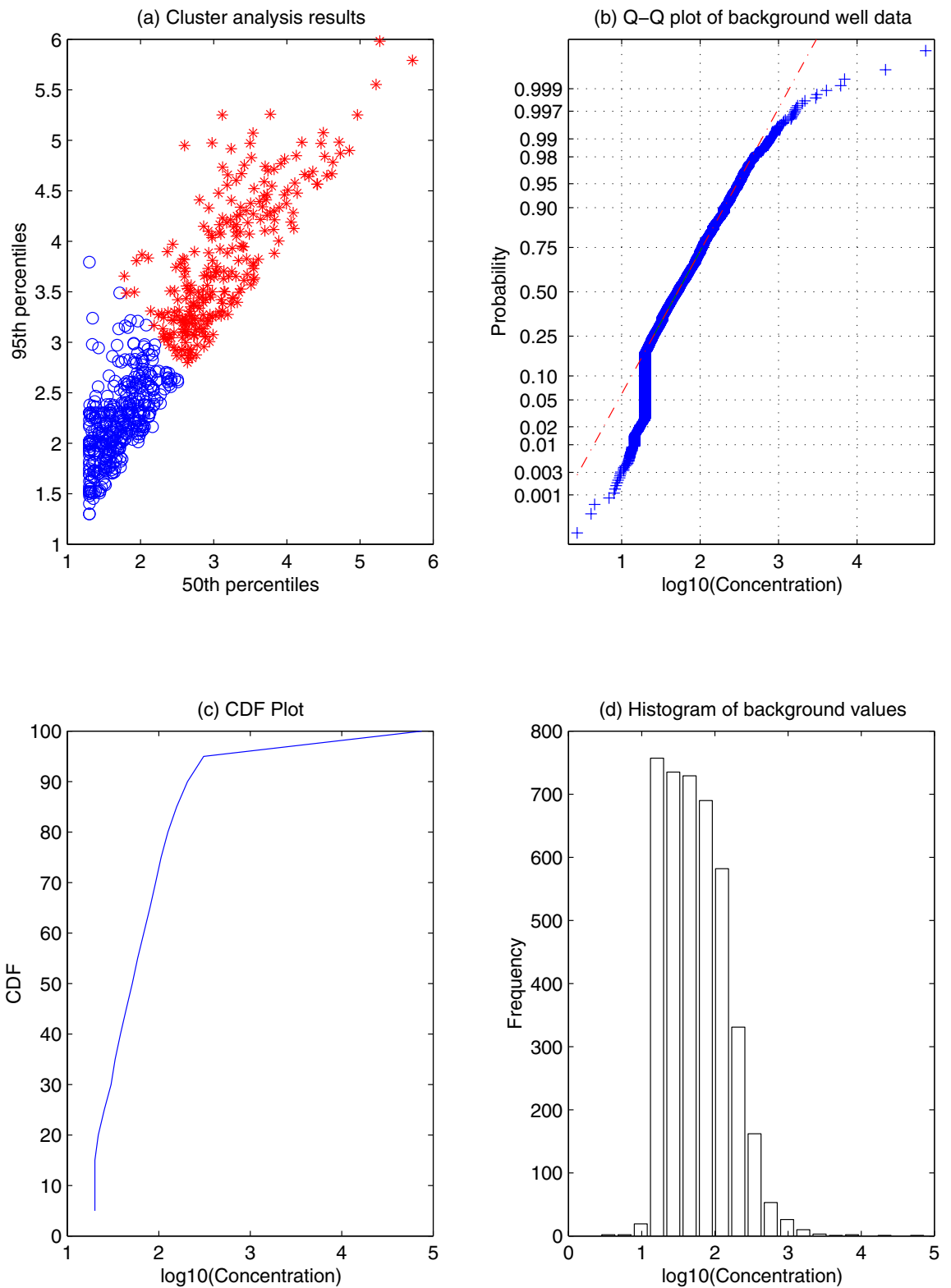


Figure F.17: Aluminum cluster analysis approach results for SRS, in $(\log_{10}(\text{ug/L}))$

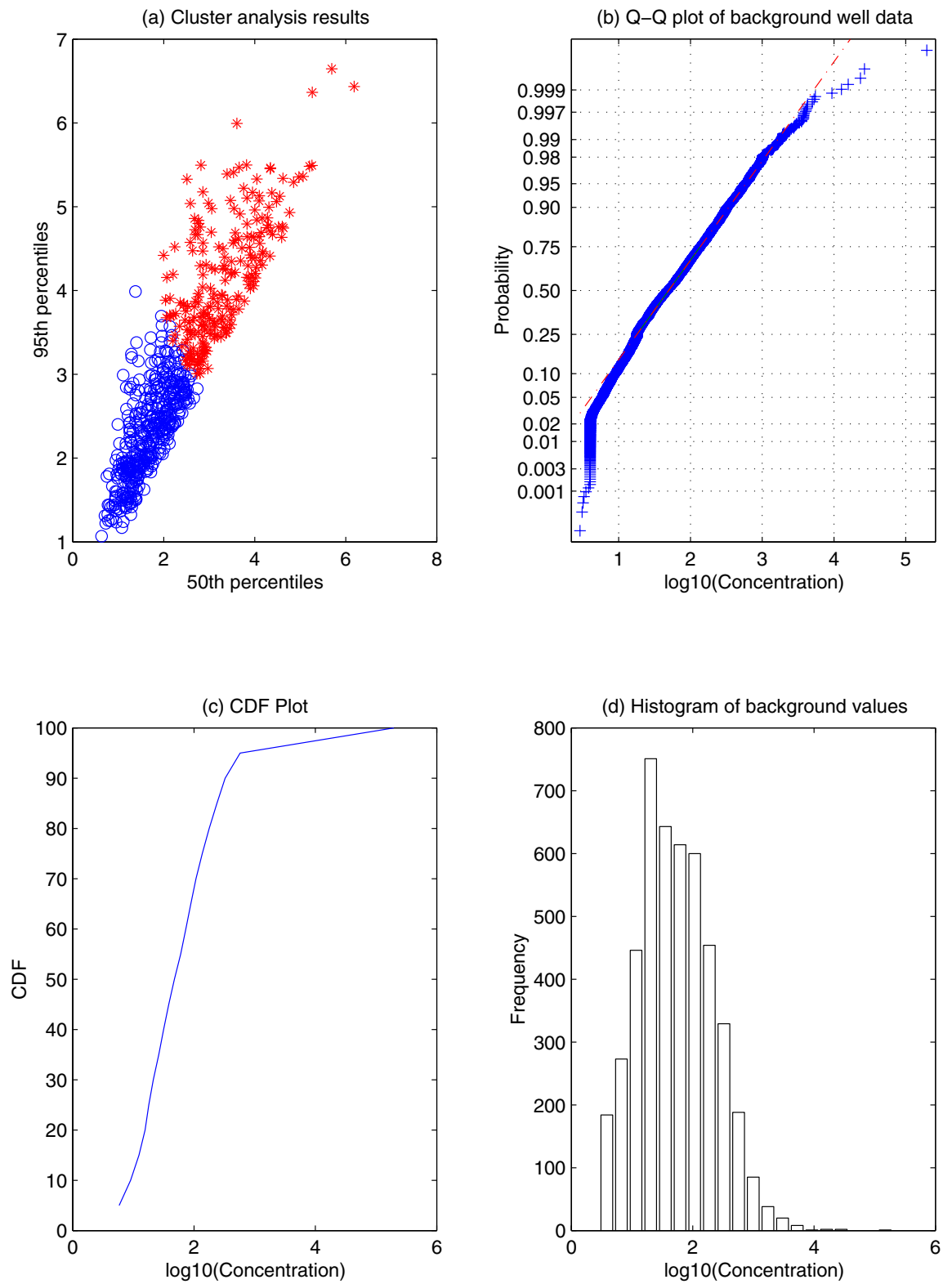


Figure F.18: Iron cluster analysis approach results for SRS, in $(\log_{10}(ug/L))$

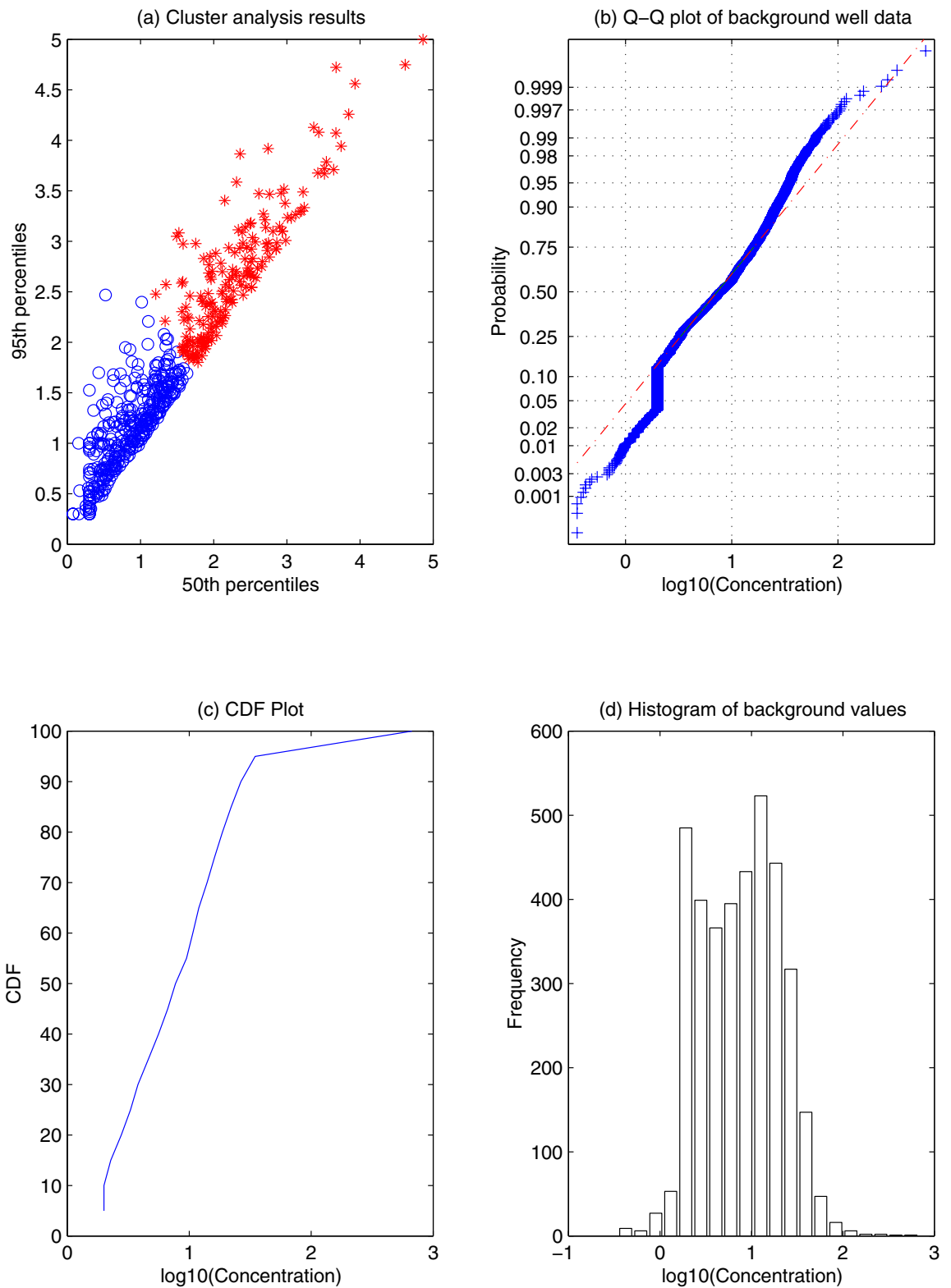


Figure F.19: Manganese cluster analysis approach results for SRS, in $(\log_{10}(\text{ug/L}))$

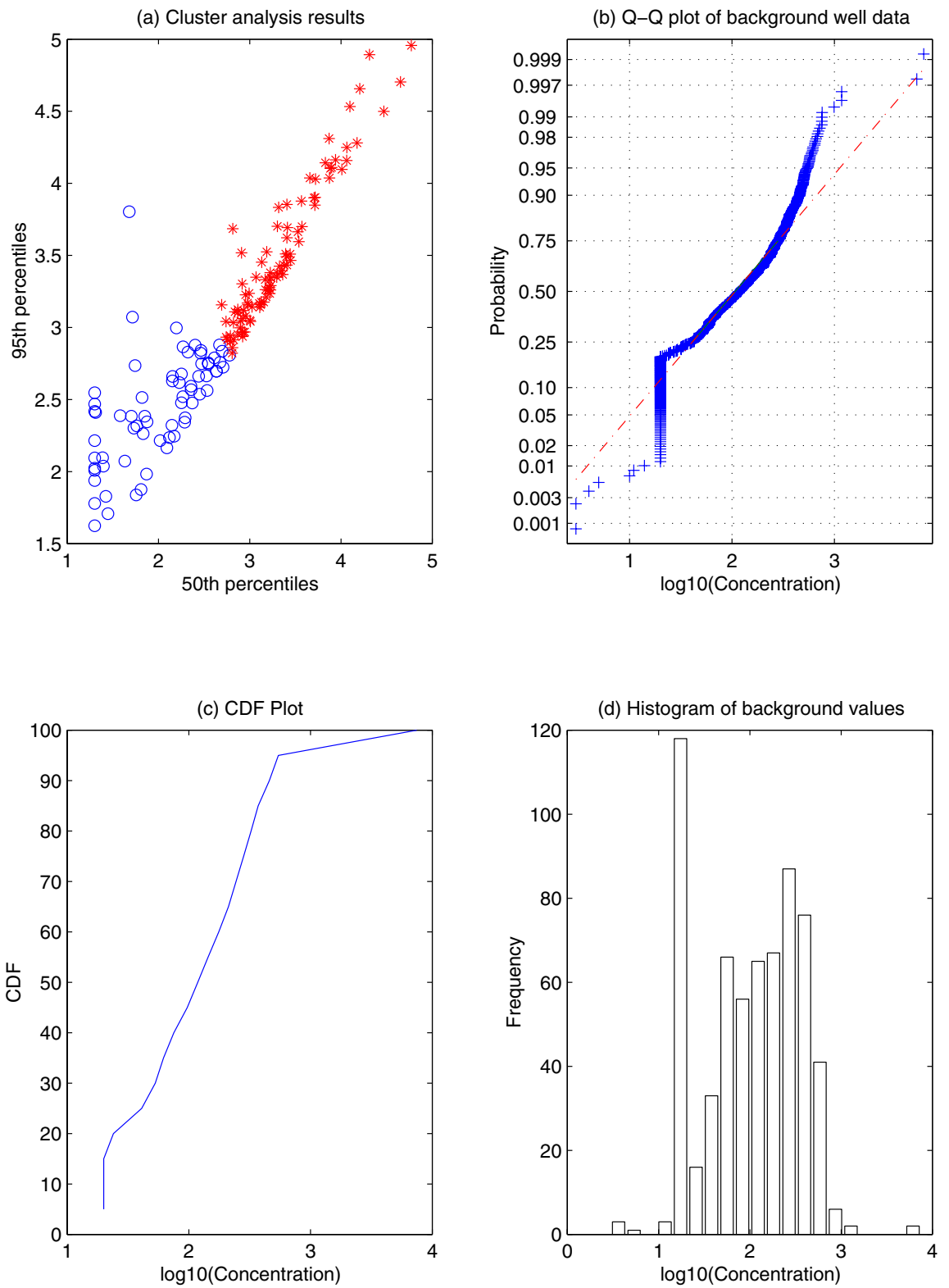


Figure F.20: Nitrate cluster analysis approach results for SRS, in ($\log_{10}(\mu\text{g}/\text{L})$)

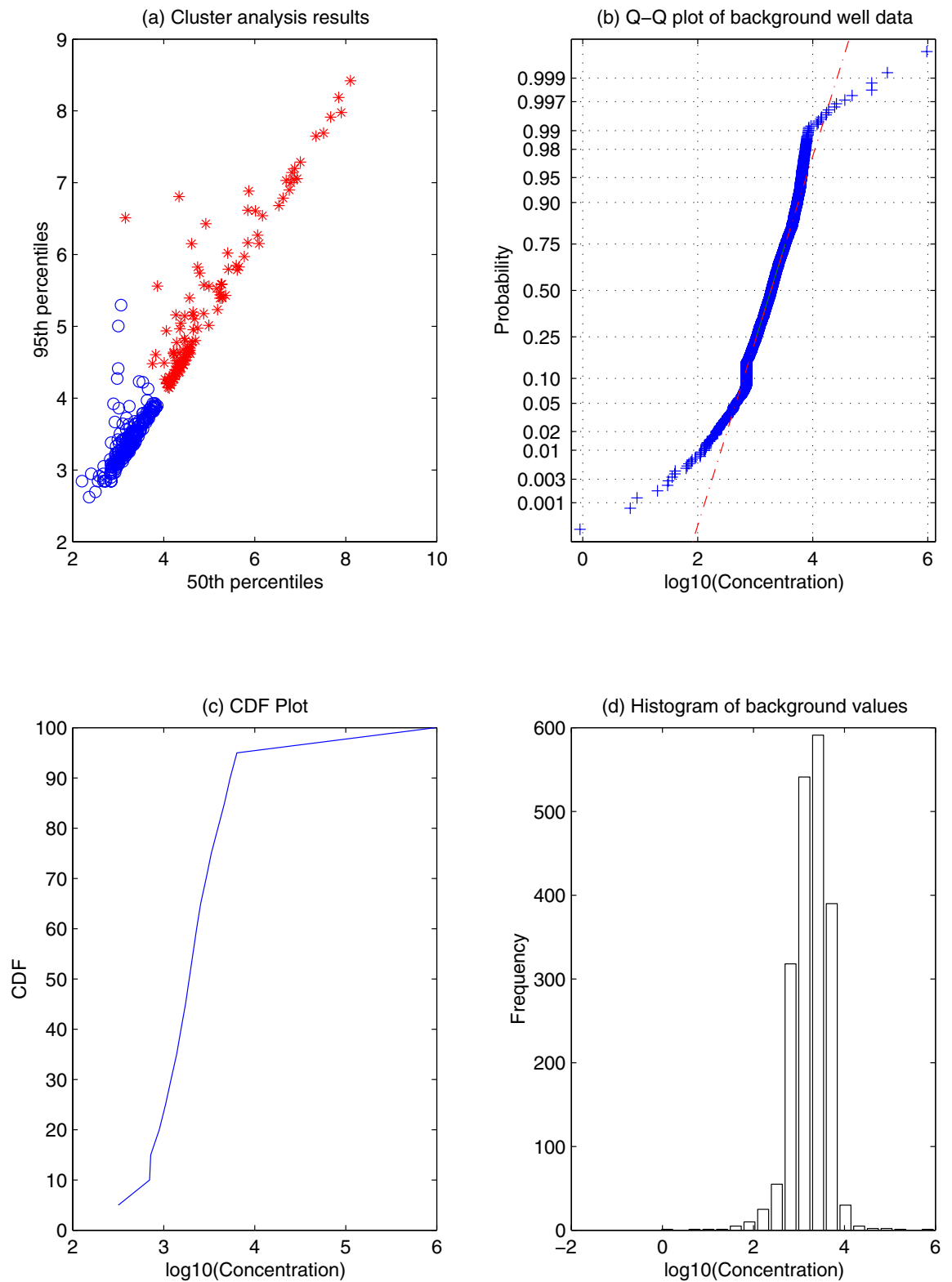


Figure F.21: Tritium cluster analysis approach results for SRS, in $(\log_{10}(pCi/L))$

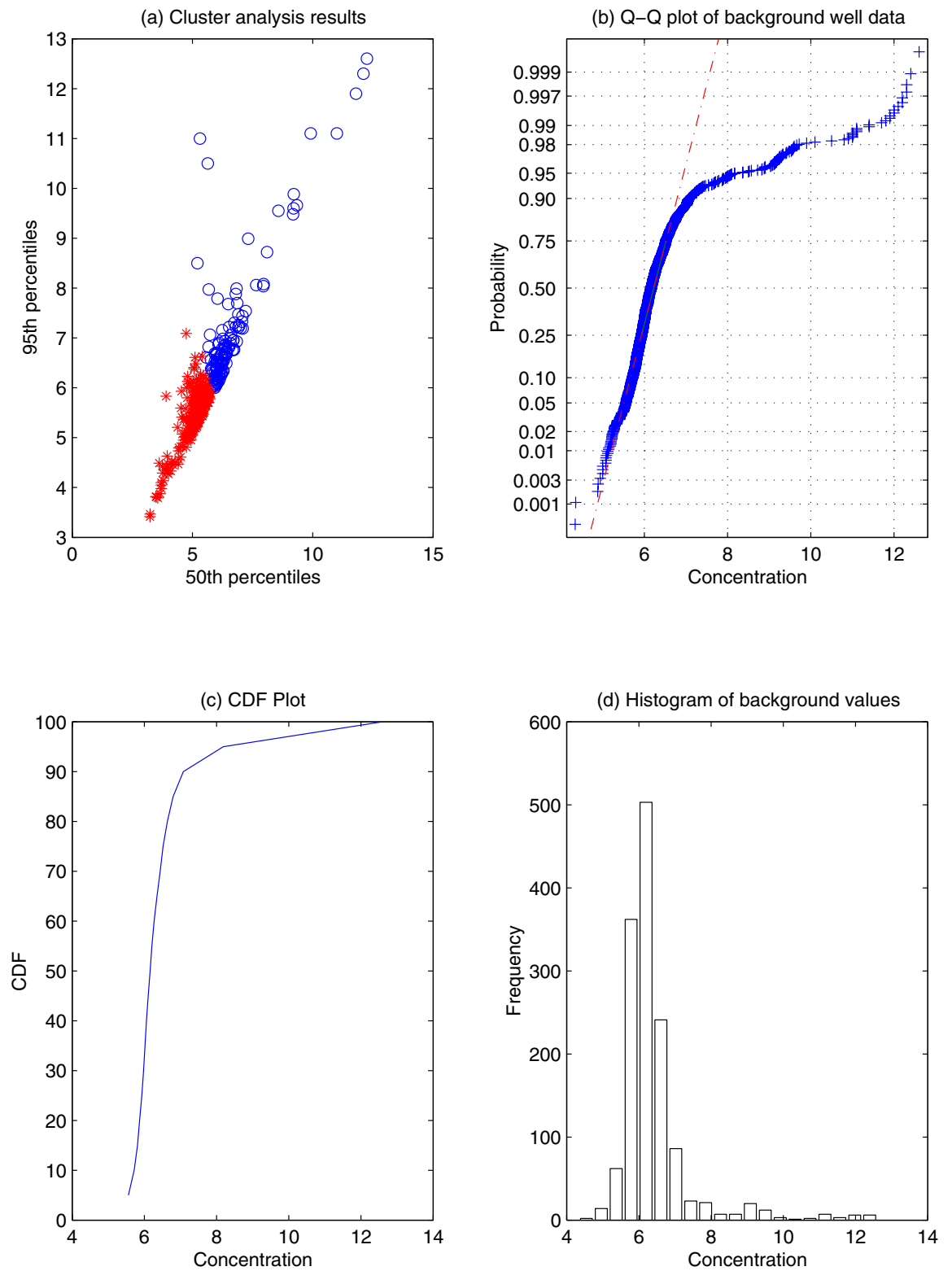


Figure F.22: pH cluster analysis approach results for SRS, in normal units

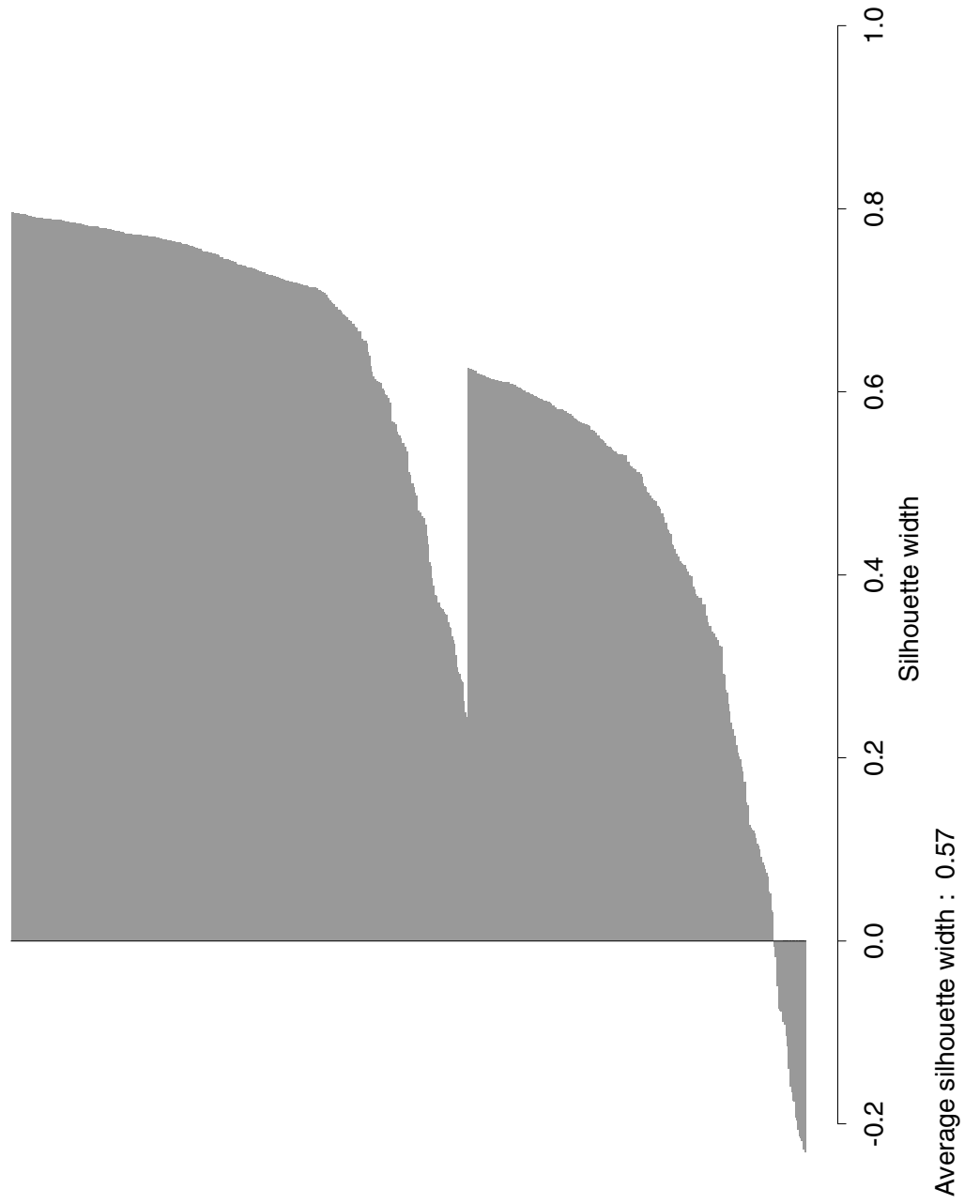


Figure F.23: Aluminum silhouette plot

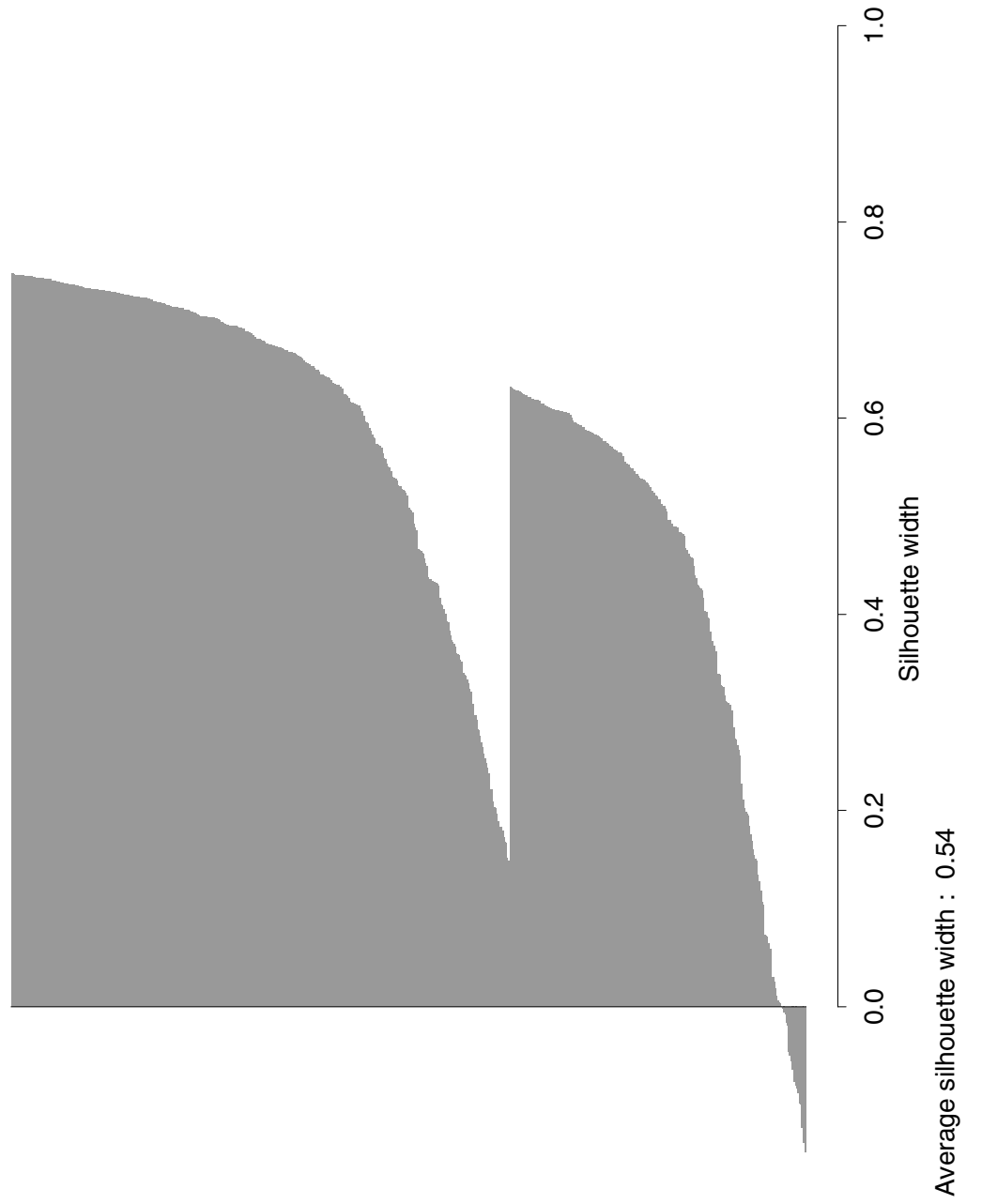


Figure F.24: Iron silhouette plot

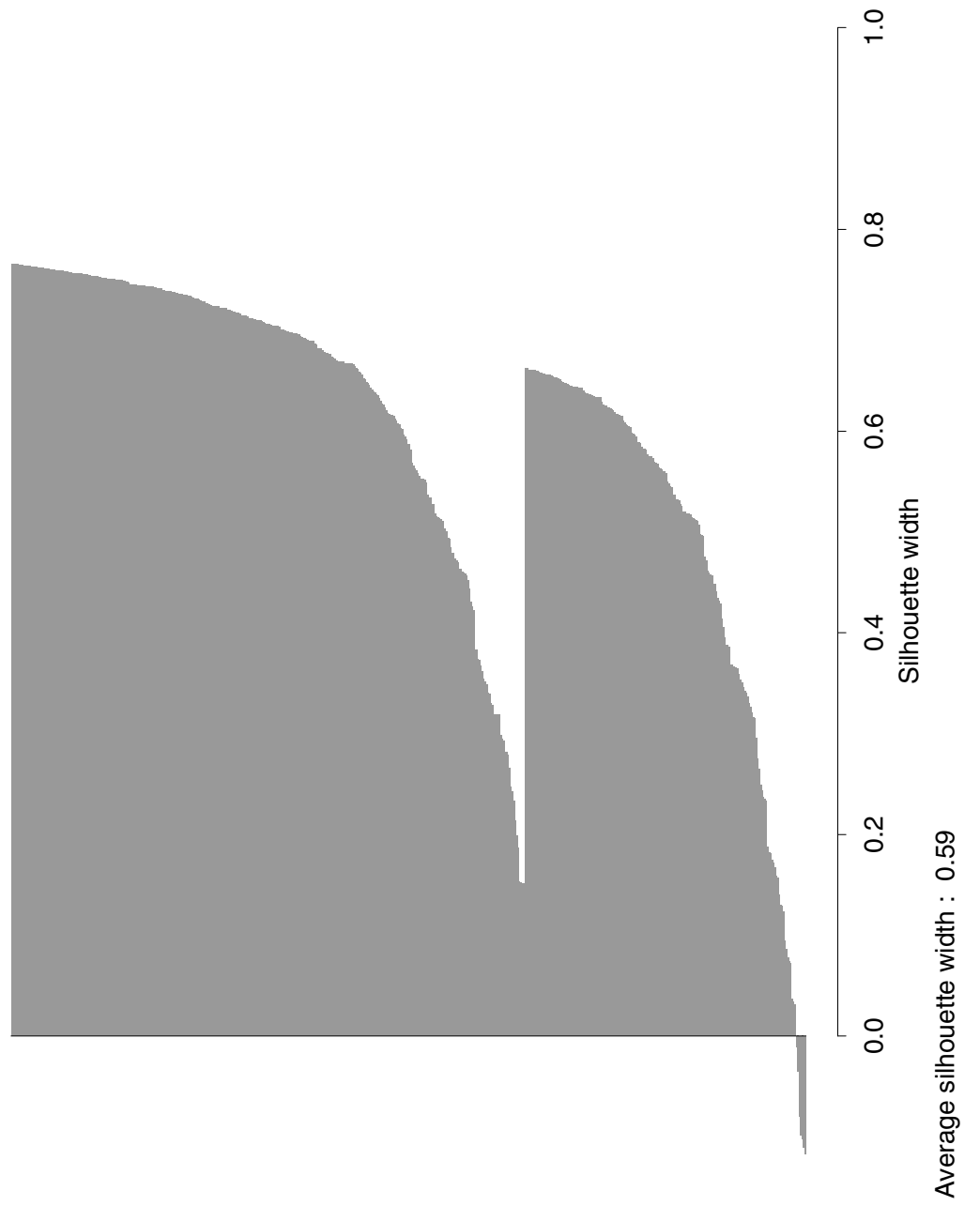


Figure F.25: Manganese silhouette plot

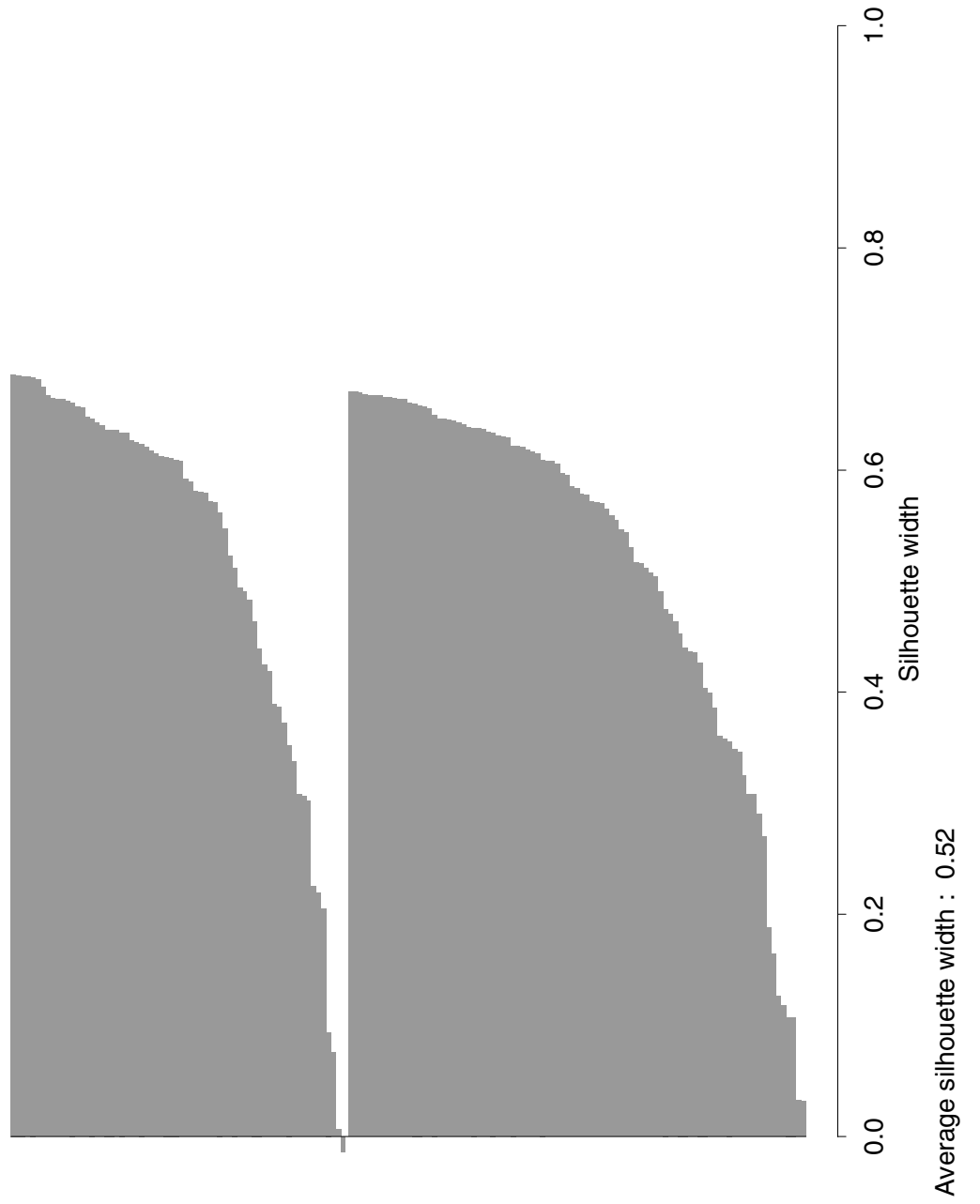


Figure F.26: Nitrate silhouette plot

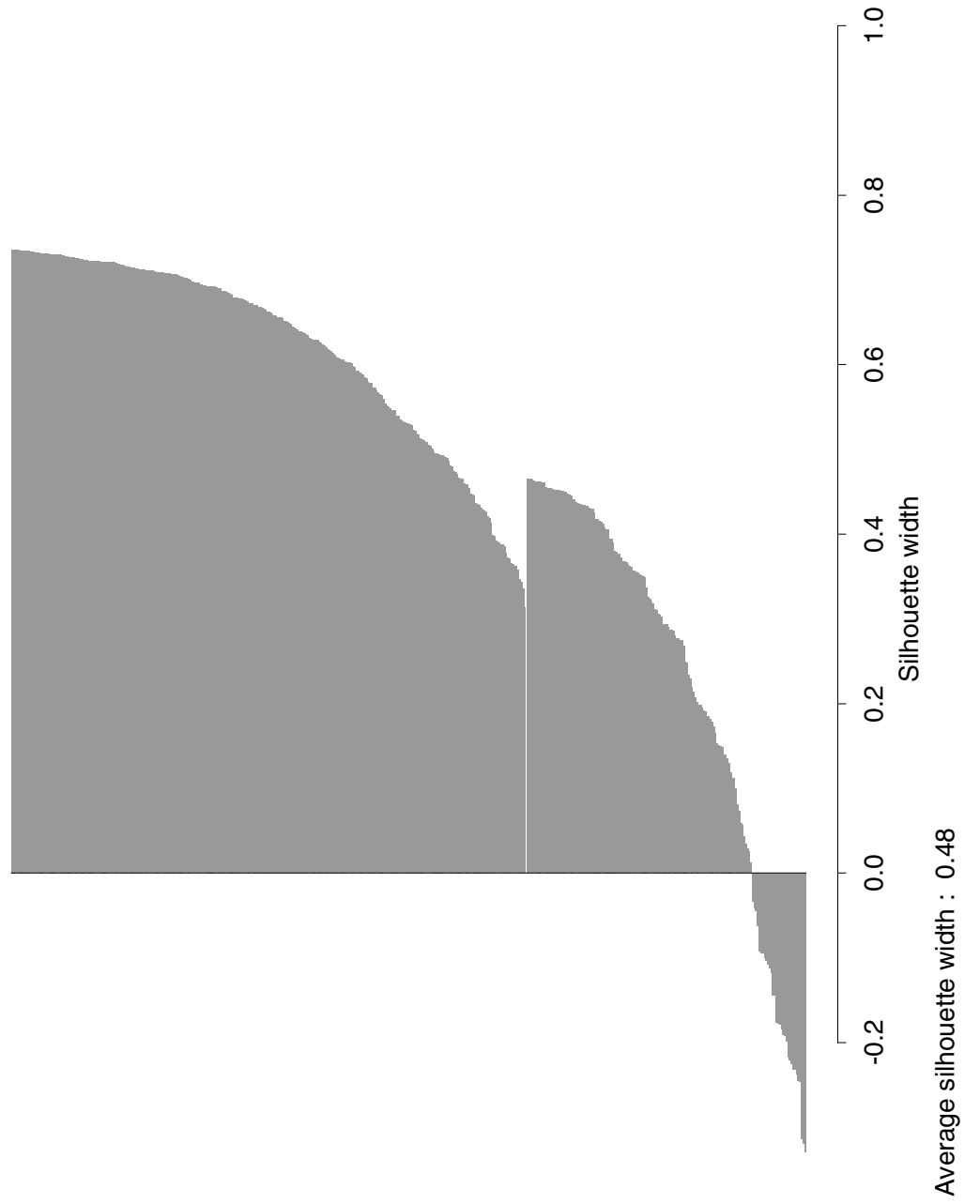


Figure F.27: pH silhouette plot

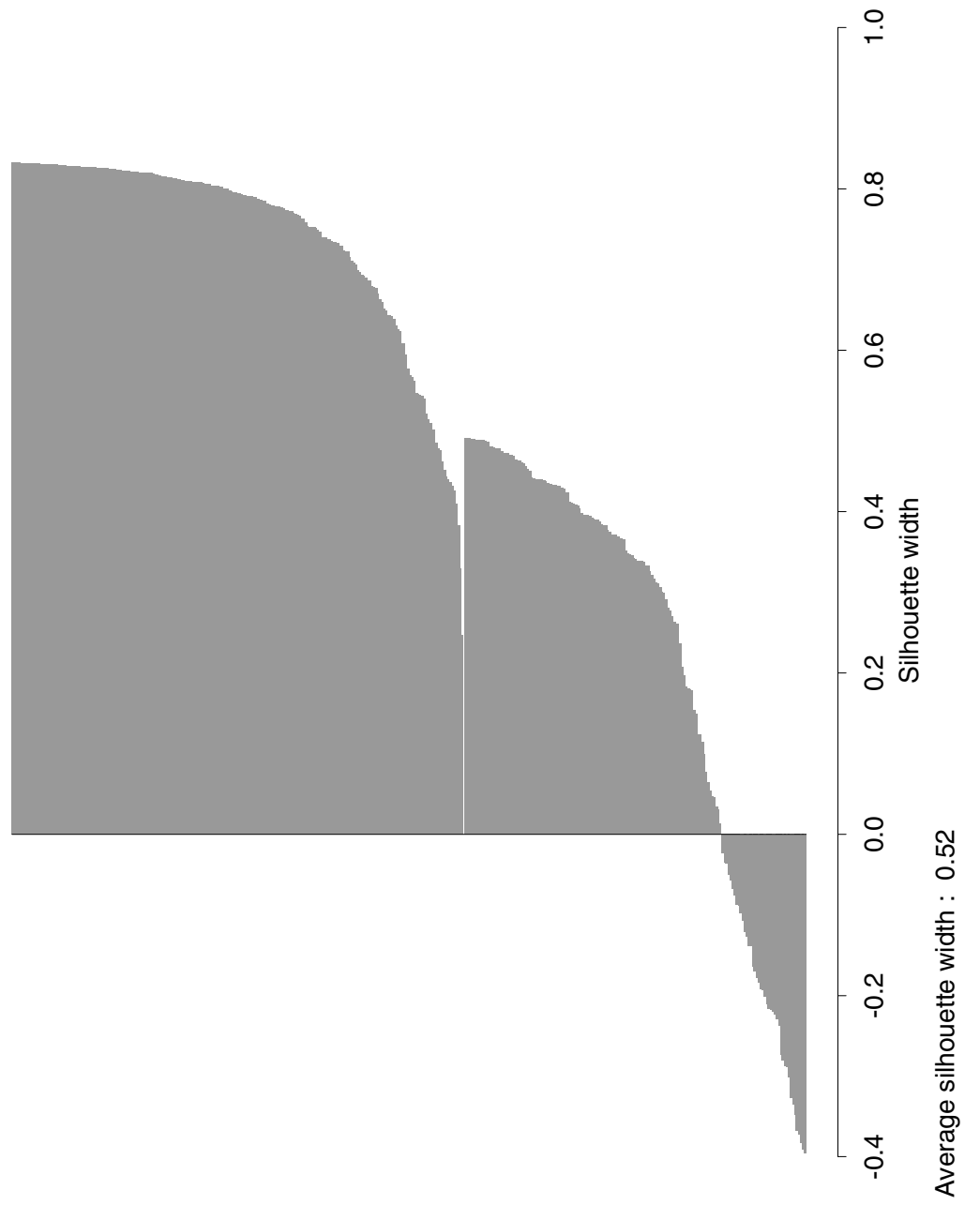


Figure F.28: Tritium silhouette plot

APPENDIX G. GSA - BACKGROUND WELLS THROUGH REGRESSION APPROACH

<u>Arsenic</u>	FAC4	FTF5	HSB115D
BG52	FAC6	FTF6	HSB116D
BG54	FAC7	FTF7	HSB117D
BG55	FAC8	FTF8	HSB125D
BG59	FAL1	FTF9	HSB126D
BG60	FAL2	FTF12	HSB127D
BG61	FCA2D	FTF13	HSB129D
BG67	FCA10A	FTF15	HSB130D
BG91	FCA10D	FTF16	HSB131D
BG92	FCA16A	FTF17	HSB132D
BG93	FCA16D	FTF18	HSB134D
BG96	FCA19D	FTF19	HSB135D
BG101	FCB2	FTF20	HSB136D
BG103	FCB3	FTF21	HSB137D
BG104	FCB4	FTF22	HSB138D
BG108	FCB5	FTF23	HSB139D
BG109	FCB6	FTF24A	HSB140D
BG110	FET1D	FTF25A	HSB141D
BG122	FET2D	FTF26	HSB142D
BGO1D	FET3D	FTF27	HSB143D
BGO2D	FET4D	HAC1	HSB146D
BGO3D	FNB1	HAC2	HSB147D
BGO4D	FNB2	HAC3	HSB148D
BGO5D	FNB3	HAC4	HSB149D
BGO6D	FNB4	HAP1	HSB150D
BGO7D	FSB76	HCA1	HSB151D
BGO8D	FSB77	HCA2	HSB152D
BGO9D	FSB78	HCA3	HSS3D
BGO10DR	FSB79	HCA4	HTF5
BGO11D	FSB87D	HCB2	HTF6
BGO12D	FSB88D	HCB3	HTF7
BGO15D	FSB89D	HCB4	HTF8
BGO16D	FSB91D	HET2D	HTF13
BGO18D	FSB93D	HET3D	HTF14
BGO20D	FSB95DR	HET4D	HTF15
BGO21D	FSB97D	HMD1D	HTF16
BGO23D	FSB98D	HMD2D	HTF17
BGO24D	FSB99D	HMD3D	HTF18
BGO26D	FSB104D	HMD4D	HTF19
BGO27D	FSB105DR	HR812	HTF20
BGO28D	FSB106D	HSB65	HTF22
BGO30D	FSB107D	HSB66	HTF23
BGO31D	FSB108D	HSB67	HTF24
BGO32D	FSB109D	HSB68	HTF25
BGO33D	FSB110D	HSB69	HTF26
BGO34D	FSB111D	HSB70	HTF27
BGO35D	FSB112D	HSB71	HTF28
BGO36D	FSB113D	HSB83D	HTF29
BGO37D	FSB114D	HSB84D	HTF32
BGO38D	FSB115D	HSB86D	HTF34
BGO39D	FSB116D	HSB100D	MGC9
BGO40D	FSB117D	HSB102D	MGC19
BGO45D	FSB118D	HSB103D	MGC32
BGX3D	FSB119D	HSB104D	MGC36
BGX4D	FSB120D	HSB105D	MGE9
BGX5D	FSB122D	HSB106D	MGE21
BGX9D	FSB123D	HSB107D	MGG15
BGX10D	FSS1D	HSB108D	MGG19
BGX12D	FSS2D	HSB109D	MGG23
BRR1D	FSS3D	HSB110D	MGG36
BRR2D	FSS4D	HSB111E	NBG1
BRR3D	FTF2	HSB112E	NBG2
BRR4D	FTF3	HSB113D	NBG3
BRR5D	FTF4	HSB114D	NBG4

NBG5	HAA2D	FSB92D	HSB131D
SBG2	HAA3D	FSB93D	HSB132D
SBG3	HAA4D	FSB98D	HSB134D
SCA2	HAA6D	FSB99D	HSB135D
SCA3	BRR8DR	FSB104D	HSB136D
SCA3A	BGO51D	FSB105DR	HSB137D
SCA4	BGO52D	FSB106D	HSB138D
SCA4A	FST1D	FSB107D	HSB139D
SCA5	BGO12DR	FSB108D	HSB140D
SCA6	BGO11DR	FSB109D	HSB141D
SLP1	BGO3DR	FSB110D	HSB142D
Z9	<u>Cesium-137</u>	FSB111D	HSB143D
ZBG1	BGO1D	FSB112D	HSB146D
ZBG1A	BGO2D	FSB113D	HSB147D
ZBG2	BGO3D	FSB114D	HSB148D
ZDT1	BGO5D	FSB115D	HSB149D
ZDT2	BGO6D	FSB116D	HSB150D
ZW2	BGO7D	FSB117D	HSB151D
ZW3	BGO8D	FSB118D	HSB152D
ZW4	BGO9D	FSB119D	HTF7
ZW5	BGO10DR	FSB120D	HTF8
ZW6	BGO11D	FSB122D	HTF13
ZW7	BGO12D	FSB123D	HTF14
ZW9	BGO15D	HAC2	HTF15
ZW10	BGO16D	HAC4	HTF16
BGO50D	BGO18D	HAP1	HTF17
BGO29D	BGO20D	HCA1	HTF18
BGO14DR	BGO21D	HCA2	HTF19
BGO49D	BGO23D	HCA3	HTF20
BGX1D	BGO24D	HCA4	HTF22
BGX6D	BGO26D	HCB2	HTF23
BGX7D	BGO27D	HCB3	HTF24
BGO44D	BGO28D	HCB4	HTF25
YSC2D	BGO30D	HET2D	HTF26
FCA9DR	BGO31D	HET3D	HTF27
BGO17DR	BGO32D	HET4D	HTF28
BGX8DR	BGO33D	HR812	HTF29
BGX11D	BGO34D	HSB65	HTF32
FSB121DR	BGO35D	HSB66	HTF34
BGO22DR	BGO36D	HSB67	NBG1
FSB0PD	BGO37D	HSB68	NBG2
FSL6D	BGO38D	HSB69	NBG3
FSL8D	BGO39D	HSB70	NBG4
HSL1D	BRR1D	HSB71	NBG5
HSL3D	BRR2D	HSB83D	SBG2
HSL2D	BRR3D	HSB84D	SBG3
HSL4D	BRR4D	HSB86D	ZBG1
FSL1D	BRR5D	HSB100D	ZBG1A
HSL8D	FAL1	HSB101D	ZBG2
HSL7D	FAL2	HSB102D	ZDT1
HSL6D	FCA2D	HSB103D	ZDT2
HSL5D	FCA9D	HSB104D	ZW9
FSL9D	FCA10A	HSB105D	ZW10
FSL7D	FCA10D	HSB106D	BGO29D
FSL2D	FCA16A	HSB107D	BGO14DR
FSL4D	FCA16D	HSB108D	FCA9DR
FSL5D	FCA19D	HSB109D	BGO17DR
FBP5D	FNB1	HSB110D	FSB121DR
FBP6D	FNB2	HSB111E	FSB0PD
FBP9D	FNB3	HSB112E	FSL6D
FBP10D	FNB4	HSB113D	FSL8D
FBP13D	FSB76	HSB114D	HSL1D
BRR6D	FSB77	HSB115D	HSL3D
BRR7D	FSB79	HSB116D	HSL2D
FNB5	FSB87D	HSB117D	HSL4D
HIW2D	FSB88D	HSB125D	FSL1D
FAB1	FSB89D	HSB126D	HSL8D
FAB3	FSB90D	HSB127D	HSL7D
FAB4	FSB91D	HSB129D	HSL6D
HAA1D		HSB130D	HSL5D

FSL7D
FSL2D
FSL3D
FSL4D
FSL5D
FBP5D
FBP6D
FBP9D
FBP13D
BRR6D
BRR7D
FNB5
HAA1D
HAA2D
HAA3D
HAA4D
HAA6D
BRR8DR
BGO12DR
BGO3DR

Mercury

BG54
BG59
BG60
BG61
BG91
BG92
BG93
BG96
BG101
BG103
BG104
BG108
BG109
BG110
BG122
BGO1D
BGO2D
BGO3D
BGO4D
BGO5D
BGO6D
BGO7D
BGO8D
BGO9D
BGO10DR
BGO11D
BGO12D
BGO15D
BGO16D
BGO18D
BGO20D
BGO21D
BGO23D
BGO24D
BGO26D
BGO27D
BGO32D
BGO33D
BGO34D
BGO35D
BGO36D
BGO37D
BGO38D
BGO39D
BGO40D
BGO45D
BGX3D
BGX4D

BGX5D
BGX9D
BGX10D
BGX12D
BRR2D
BRR3D
FAC6
FAL1
FAL2
FCA2D
FCA9D
FCA10A
FCA10D
FCA16D
FCA19D
FCB2
FCB3
FCB4
FCB5
FCB6
FET1D
FET2D
FET3D
FET4D
FNB1
FNB4
FSB87D
FSB99D
FSB105DR
FSB106D
FSB108D
FSB109D
FSB113D
FSB114D
FSB115D
FSB116D
FSB120D
FSB122D
FSB123D
FSS2D
FSS3D
FTF1
FTF2
FTF3
FTF6
FTF8
FTF9
FTF10
FTF11
FTF15
FTF16
FTF17
FTF19
FTF21
FTF22
FTF23
HAC1
HAP1
HCA1
HCA2
HCA3
HCB2
HCB3
HCB4
HET2D
HMD1D
HMD2D
HMD3D
HMD4D
HR812

HSB66
HSB69
HSB70
HSB71
HSB110D
HSB111E
HSB112E
HSB115D
HSB116D
HSB117D
HSB130D
HSB131D
HSB132D
HSB137D
HSB138D
HSB139D
HSB140D
HSB141D
HSB142D
HSB143D
HSB146D
HSB147D
HSB148D
HSB149D
HSB151D
HSB152D
HSS3D
HTF5
HTF7
HTF8
HTF13
HTF14
HTF16
HTF17
HTF19
HTF28
HTF34
MGA36
MGC9
MGC19
MGC23
MGC36
MGE30
MGG15
MGG23
MGG36
NBG4
NBG5
SBG2
SBG3
SCA2
SCA3
SCA3A
SCA4
SCA4A
SCA5
SCA6
SLP1
Z9
ZBG1
ZBG1A
ZBG2
ZDT1
ZDT2
BGO50D
BGO29D
BGO14DR
BGO49D
BGX1D
BGX6D

BGX7D
BGO44D
YSC2D
BGO17DR
BGX8DR
BGX11D
FSB121DR
BGO22DR
HSL3D
HSL2D
FSL1D
HSL7D
FSL7D
FSL2D
FSL3D
FSL4D
FBP5D
FBP6D
FBP9D
FBP10D
FBP13D
BRR6D
BRR7D
HIW2D
FAB2
FAB3
FAB4
HAA1D
HAA2D
HAA4D
HAA6D
BRR8DR
BGO51D
BGO52D
FST1D
BGO12DR
BGO11DR
BGO3DR

Nitrite as nitrogen

FSS1D
FSS2D
FSS3D
FSS4D
HCA4
HR812
HSB83D
HSS3D
HTF17
ZBG1
ZBG1A
ZBG2
HSL3D
HSL2D
HSL4D
HSL8D
HSL7D
HSL6D
FAB1
FAB2
FAB3
FAB4
HAA1D
HAA2D
HAA3D
HAA4D
HAA6D

pH

BGO20D	BRR3D	FTF7	HSB131D
FCA16A	BRR4D	FTF8	HSB132D
FTF22	BRR5D	FTF9	HSB134D
NBG1	FAC3	FTF12	HSB135D
NBG2	FAC6	FTF13	HSB136D
NBG3	FAC8	FTF15	HSB137D
NBG4	FAL1	FTF16	HSB138D
NBG5	FAL2	FTF17	HSB139D
Selenium	FCA2D	FTF18	HSB140D
BG52	FCA10A	FTF19	HSB141D
BG54	FCA10D	FTF20	HSB142D
BG55	FCA16A	FTF21	HSB143D
BG59	FCA16D	FTF22	HSB146D
BG60	FCA19D	FTF23	HSB147D
BG61	FCB2	FTF24A	HSB148D
BG67	FCB3	FTF25A	HSB149D
BG91	FCB4	FTF26	HSB150D
BG92	FCB5	FTF27	HSB151D
BG93	FCB6	HAC1	HSB152D
BG96	FET1D	HAC2	HSS3D
BG101	FET2D	HAC3	HTF5
BG103	FET3D	HAC4	HTF6
BG104	FET4D	HAP1	HTF7
BG108	FNB1	HCA1	HTF8
BG109	FNB2	HCA3	HTF13
BG110	FNB3	HCA4	HTF14
BG122	FNB4	HCB2	HTF15
BGO1D	FSB76	HCB3	HTF16
BGO2D	FSB77	HCB4	HTF17
BGO3D	FSB78	HET2D	HTF18
BGO4D	FSB79	HET3D	HTF19
BGO5D	FSB87D	HET4D	HTF20
BGO6D	FSB88D	HMD1D	HTF22
BGO7D	FSB89D	HMD2D	HTF23
BGO8D	FSB90D	HMD3D	HTF24
BGO9D	FSB91D	HMD4D	HTF25
BGO10DR	FSB92D	HR812	HTF26
BGO11D	FSB93D	HSB65	HTF27
BGO12D	FSB95DR	HSB66	HTF28
BGO15D	FSB97D	HSB67	HTF29
BGO16D	FSB98D	HSB68	HTF32
BGO18D	FSB99D	HSB69	HTF34
BGO20D	FSB104D	HSB70	MGC9
BGO21D	FSB105DR	HSB71	MGC19
BGO23D	FSB106D	HSB83D	MGC32
BGO24D	FSB107D	HSB84D	MGC36
BGO26D	FSB108D	HSB86D	MGE9
BGO27D	FSB109D	HSB100D	MGE21
BGO28D	FSB110D	HSB101D	MGG15
BGO30D	FSB111D	HSB102D	MGG19
BGO31D	FSB112D	HSB103D	MGG23
BGO32D	FSB113D	HSB104D	MGG36
BGO33D	FSB114D	HSB105D	NBG1
BGO34D	FSB115D	HSB106D	NBG2
BGO35D	FSB116D	HSB107D	NBG3
BGO36D	FSB117D	HSB108D	NBG4
BGO37D	FSB118D	HSB109D	NBG5
BGO38D	FSB119D	HSB110D	SBG2
BGO39D	FSB120D	HSB111E	SBG3
BGO40D	FSB122D	HSB112E	SCA2
BGO45D	FSB123D	HSB113D	SCA3
BGX3D	FSS1D	HSB114D	SCA3A
BGX4D	FSS2D	HSB115D	SCA4
BGX5D	FSS3D	HSB116D	SCA4A
BGX9D	FSS4D	HSB117D	SCA5
BGX10D	FTF2	HSB125D	SCA6
BGX12D	FTF3	HSB126D	SLP1
BRR1D	FTF4	HSB127D	Z9
BRR2D	FTF5	HSB129D	ZBG1
	FTF6	HSB130D	ZBG1A

ZBG2
ZDT1
ZDT2
ZW2
ZW3
ZW4
ZW5
ZW6
ZW7
ZW9
ZW10
BGO50D
BGO29D
BGO14DR
BGO49D
BGX1D
BGX6D
BGX7D
BGO44D
YSC2D
FCA9DR
BGO17DR
BGX8DR
BGX11D
FSB121DR
BGO22DR
FSB0PD
FSL6D
FSL8D
HSL1D
HSL3D
HSL2D
HSL4D
FSL1D
HSL8D
HSL7D
HSL6D
HSL5D
FSL9D
FSL7D
FSL2D
FSL3D
FSL4D
FSL5D
FBP5D
FBP6D
FBP9D
FBP10D
FBP13D
BRR6D
BRR7D
FNB5
HIW2D
FAB3
FAB4
HAA1D
HAA2D
HAA3D
HAA4D
HAA6D
BRR8DR
BGO51D
BGO52D
FST1D
BGO12DR
BGO11DR
BGO3DR

Uranium-238

BG91

BG92
BG93
BG96
BG101
BG103
BG104
BG108
BG109
BG110
BG122
BGO1D
BGO2D
BGO3D
BGO4D
BGO5D
BGO6D
BGO7D
BGO8D
BGO9D
BGO10DR
BGO11D
BGO12D
BGO15D
BGO16D
BGO18D
BGO20D
BGO21D
BGO23D
BGO24D
BGO26D
BGO27D
BGO28D
BGO30D
BGO31D
BGO32D
BGO33D
BGO34D
BGO35D
BGO36D
BGO37D
BGO38D
BGO39D
BGO40D
BGO45D
FNB1
FNB4
FSB76
FSB108D
FSB111D
FSB114D
FSB118D
FSB123D
FSS1D
FSS2D
FSS3D
FSS4D
HAC2
HAC4
HAP1
HCA1
HCA2
HCA3
HCA4
HCB2
HCB3
HCB4
HET2D
HET3D
HET4D
HR812

HSB65
HSB66
HSB67
HSB68
HSB69
HSB70
HSB71
HSB83D
HSB86D
HSB100D
HSB103D
HSB104D
HSB106D
HSB107D
HSB108D
HSB109D
HSB117D
HSB125D
HSB126D
HSB127D
HSB129D
HSB130D
HSB131D
HSB132D
HSB134D
HSB135D
HSB137D
HSB138D
HSB139D
HSB140D
HSB141D
HSB142D
HSB143D
HSB146D
HSB147D
HSB148D
HSB149D
HSB150D
HSB151D
HSB152D
HTF5
HTF7
HTF8
HTF13
HTF14
HTF15
HTF16
HTF18
HTF19
HTF20
HTF22
HTF23
HTF24
HTF25
HTF26
HTF27
HTF28
HTF29
HTF32
HTF34
SBG2
SBG3
ZDT1
ZDT2
ZW9
ZW10
BGO50D
BGO29D
BGO14DR
BGO49D

BGO44D
FCA9DR
BGO17DR
BGO22DR
FSL6D
FSL8D
HSL1D
HSL3D
HSL2D
HSL4D
FSL1D
HSL8D
HSL7D
HSL5D
FSL9D
FSL7D
FSL2D
FSL3D
FSL4D
FSL5D
FBP5D
FBP6D
FBP9D
FBP13D
HAA1D
HAA2D
HAA3D
HAA4D
HAA6D
BGO51D
BGO12DR
BGO3DR

Aluminum

BG91
BG92
BG96
BG101
BG103
BG122
BGO9D
BGO10DR
BGO11D
BGO12D
BGX4D
HMD3D
HMD4D
SBG2
SCA2
SCA3A
SCA4A
BGX7D
BGO12DR
BGO11DR

Cobalt

BGO5D
BGO7D
BGO8D
BGO16D
BGO18D
BGO20D
BGO23D
BGO36D
BGO39D
BGX9D
BRR2D
FAC4
FNB4
FSB76
FSB87D

FSB99D
 FSB106D
 FSB108D
 FSB109D
 FSB111D
 FSB113D
 FSB115D
 FSB116D
 FSB120D
 FSB123D
 HAC2
 HAC4
 HAP1
 HCA1
 HCA2
 HCA3
 HCA4
 HCB2
 HCB3
 HCB4
 HET2D
 HET3D
 HET4D
 HR812
 HSB65
 HSB66
 HSB67
 HSB70
 HSB71
 HSB83D
 HSB84D
 HSB100D
 HSB101D
 HSB110D
 HSB111E
 HSB117D
 HSB129D
 HSB130D
 HSB131D
 HSB132D
 HSB135D
 HSB137D
 HSB138D
 HSB139D
 HSB140D
 HSB141D
 HSB142D
 HSB143D
 HSB146D
 HSB147D
 HSB148D
 HSB149D
 HSB150D
 HSB151D
 HSB152D
 HTF5
 HTF6
 HTF7
 HTF8
 HTF13
 HTF14
 HTF15
 HTF16
 HTF17
 HTF18
 HTF19
 HTF20
 HTF22
 HTF23
 HTF24

HTF25
 HTF26
 HTF27
 HTF28
 HTF29
 HTF32
 HTF34
 NBG1
 SBG2
 SBG3
 ZBG1
 ZDT1
 ZDT2
 ZW9
 ZW10
 BGO14DR
 FSL6D
 FSL8D
 HSL1D
 HSL3D
 HSL2D
 HSL4D
 HSL8D
 HSL7D
 HSL5D
 FSL7D
 FSL3D
 FSL4D
 FSL5D
 HIW2D
 HAA1D
 HAA2D
 HAA3D
 HAA4D
 BRR8DR
 BGO12DR
 BGO3DR

Iron

BG92
 BG93
 BG96
 BG103
 BG110
 BG122
 BGO4D
 BGO5D
 BGO6D
 BGO7D
 BGO8D
 BGO9D
 BGX3D
 BGX4D
 FSB77
 FSB78
 FSB91D
 FSB92D
 FSB93D
 FSB95DR
 FSB99D
 FSB107D
 FSB109D
 FSB113D
 FSB117D
 FSB118D
 FSB120D
 FSB122D
 HMD2D
 HMD3D
 HSB66

HSB67
 HSB70
 HSB71
 HSB83D
 HSB84D
 HSB86D
 HSB102D
 HSB103D
 HSB104D
 HSB105D
 HSB107D
 HSB108D
 HSB109D
 HSB110D
 HSB111E
 HSB112E
 HSB114D
 HSB116D
 HSB117D
 HSB125D
 HSB126D
 HSB127D
 HSB129D
 HSB130D
 HSB132D
 HSB134D
 HSB135D
 HSB137D
 HSB138D
 HSB149D
 SCA4A
 ZBG1
 ZBG2
 BGX6D
 BGX7D
 FSB0PD
 BGO3DR

Manganese

BG61
 BG91
 BG93
 BG96
 BG101
 BG103
 BG104
 BG108
 BG109
 BG110
 BGO2D
 BGO3D
 BGO6D
 BGO8D
 BGO12D
 BGO16D
 BGO21D
 BGO23D
 BGO24D
 BGO26D
 BGO28D
 BGO30D
 BGO34D
 BGO35D
 BGO36D
 BGO39D
 BGX3D
 BGX4D
 BGX12D
 BRR2D
 BRR3D
 BRR4D
 BRR5D
 FAC6
 FAL1
 FCA16A
 FCA16D
 FCA19D
 FCB3
 FCB4
 FCB5
 FET1D
 FET2D
 FET4D
 FNB1
 FNB4
 FSB76
 FSB109D
 FSB122D
 FSS2D
 FTF18
 HAC2
 HAC3
 HAP1
 HCA1
 HCA4
 HET2D
 HET3D
 HET4D
 HMD1D
 HSB66
 HSB70
 HSB71
 HSB83D
 HSB84D
 HSB100D
 HSB101D
 HSB111E
 HSB117D
 HSB125D
 HSB126D
 HSB130D
 HSB131D
 HSB135D
 HSB137D
 HSB139D
 HSB140D
 HSB141D
 HSB142D
 HSB143D
 HSB146D
 HSB147D
 HSB149D
 HSB151D
 HSB152D
 HSS3D
 HTF8
 HTF15
 HTF16
 HTF18
 HTF19
 HTF24
 HTF25
 HTF26
 HTF28
 HTF32
 MGA36
 MGC36
 NBG1
 NBG2
 NBG3

NBG4
 NBG5
 SCA2
 SCA4
 SCA5
 ZBG1
 ZBG2
 ZW3
 ZW5
 ZW6
 BGO29D
 BGO49D
 BGO44D
 YSC2D
 BGX8DR
 HSL4D
 HSL8D
 HSL5D
 FBP13D
 BRR7D
 HIW2D
 FAB2
 FAB3
 FAB4
 HAA1D
 HAA2D
 HAA4D
 BRR8DR
 BGO52D
 BGO12DR
 BGO11DR
 BGO3DR

Tin

BGO1D
 BGO2D
 BGO3D
 BGO4D
 BGO5D
 BGO6D
 BGO7D
 BGO8D
 BGO9D
 BGO11D
 BGO15D
 BGO18D
 BGO20D
 BGO24D
 BGO26D
 BGO27D
 BGO30D
 BGO31D
 BGO32D
 BGO34D
 BGO35D
 BGO36D
 BGO37D
 BGO38D
 BGO39D
 BGO45D
 BGX3D
 BGX4D
 BGX9D
 BGX10D
 BGX12D
 FNB1
 FNB2
 FNB3
 FNB4
 FSB90D

FSB92D
 FSB95DR
 FSB97D
 FSS1D
 FSS2D
 FSS3D
 FSS4D
 HAC2
 HAC4
 HAP1
 HCA1
 HCA2
 HCA3
 HCA4
 HCB2
 HCB3
 HCB4
 HET2D
 HET3D
 HET4D
 HMD2D
 HMD4D
 HR812
 HSB65
 HSB66
 HSB67
 HSB68
 HSB69
 HSB71
 HSB83D
 HSB84D
 HSB86D
 HSB100D
 HSB101D
 HSB102D
 HSB103D
 HSB104D
 HSB105D
 HSB106D
 HSB107D
 HSB108D
 HSB109D
 HSB110D
 HSB111E
 HSB112E
 HSB114D
 HSB115D
 HSB116D
 HSB117D
 HSB125D
 HSB126D
 HSB127D
 HSB129D
 HSB130D
 HSB131D
 HSB132D
 HSB134D
 HSB135D
 HSB136D
 HSB137D
 HSB138D
 HSB139D
 HSB140D
 HSB141D
 HSB142D
 HSB143D
 HSB146D
 HSB147D
 HSB148D
 HSB149D

HSB150D
 HSB151D
 HSB152D
 HTF5
 HTF6
 HTF7
 HTF8
 HTF13
 HTF14
 HTF15
 HTF16
 HTF17
 HTF18
 HTF19
 HTF20
 HTF22
 HTF23
 HTF24
 HTF25
 HTF26
 HTF27
 HTF28
 HTF29
 HTF32
 HTF34
 SBG2
 SBG3
 ZDT1
 ZDT2
 ZW9
 ZW10
 BGO50D
 BGO14DR
 BGO49D
 BGX1D
 BGX6D
 BGX7D
 BGO44D
 BGO17DR
 BGX8DR
 BGX11D
 BGO22DR
 FSL6D
 FSL8D
 HSL1D
 HSL3D
 HSL2D
 HSL4D
 FSL1D
 HSL8D
 HSL7D
 FSL9D
 FSL7D
 FSL2D
 FSL3D
 FSL4D
 FSL5D
 BGO51D
 BGO52D
 BGO12DR
 BGO11DR
 BGO3DR

Thallium

BGO5D
 BGO7D
 BGO8D
 BGO16D
 BGO18D
 BGO20D

BGO23D
 BGO36D
 BGO39D
 BRR1D
 BRR2D
 BRR3D
 BRR4D
 BRR5D
 FNB1
 FNB2
 FNB3
 FNB4
 FSB76
 FSB77
 FSB78
 FSB87D
 FSB88D
 FSB89D
 FSB90D
 FSB91D
 FSB92D
 FSB93D
 FSB95DR
 FSB97D
 FSB98D
 FSB99D
 FSB104D
 FSB105DR
 FSB106D
 FSB107D
 FSB108D
 FSB109D
 FSB110D
 FSB111D
 FSB112D
 FSB113D
 FSB114D
 FSB115D
 FSB116D
 FSB117D
 FSB118D
 FSB119D
 FSB120D
 FSB122D
 FSB123D
 HAC2
 HAC4
 HAP1
 HCA1
 HCA2
 HCA3
 HCA4
 HCB2
 HCB3
 HCB4
 HET2D
 HET3D
 HET4D
 HR812
 HSB66
 HSB83D
 HSB101D
 HSB102D
 HSB105D
 HSB107D
 HSB110D
 HSB111E
 HSB113D
 HSB114D
 HSB115D

HSB116D	BGO4D	HAC2	HTF13
HSB134D	BGO5D	HAC4	HTF14
HSB143D	BGO6D	HAP1	HTF15
HSB148D	BGO7D	HCA1	HTF16
HSB150D	BGO9D	HCA2	HTF17
HTF5	BGO10DR	HCA3	HTF18
HTF6	BGO11D	HCA4	HTF19
HTF7	BGO12D	HC2	HTF20
HTF8	BGO15D	HC3	HTF22
HTF13	BGO18D	HC4	HTF23
HTF14	BGO20D	HET2D	HTF24
HTF15	BGO21D	HET3D	HTF25
HTF16	BGO23D	HET4D	HTF26
HTF17	BGO24D	HMD1D	HTF27
HTF18	BGO26D	HMD2D	HTF28
HTF19	BGO27D	HMD3D	HTF29
HTF20	BGO28D	HMD4D	HTF32
HTF22	BGO30D	HR812	HTF34
HTF23	BGO31D	HSB65	NBG1
HTF24	BGO32D	HSB66	SBG2
HTF25	BGO33D	HSB67	SBG3
HTF26	BGO34D	HSB68	ZBG1
HTF27	BGO35D	HSB69	ZDT1
HTF28	BGO36D	HSB70	ZDT2
HTF29	BGO37D	HSB71	ZW9
HTF32	BGO38D	HSB83D	ZW10
HTF34	BGO39D	HSB84D	BGO50D
SBG2	BGO40D	HSB86D	BGO29D
SBG3	BGO45D	HSB100D	BGO14DR
ZBG1	BGX3D	HSB102D	BGO49D
ZDT1	BGX4D	HSB103D	BGX1D
ZDT2	BGX5D	HSB104D	BGX6D
ZW9	BGX9D	HSB105D	BGX7D
ZW10	BGX10D	HSB106D	BGO44D
BGO14DR	BGX12D	HSB107D	BGO17DR
FSB121DR	FNB1	HSB108D	BGX8DR
FSB0PD	FNB2	HSB109D	BGX11D
FSL6D	FNB3	HSB110D	FSB121DR
FSL8D	FNB4	HSB111E	FSB0PD
HSL1D	FSB76	HSB113D	FSL8D
HSL3D	FSB77	HSB114D	HSL1D
HSL2D	FSB78	HSB115D	HSL3D
HSL4D	FSB79	HSB116D	HSL2D
FSL1D	FSB87D	HSB117D	HSL4D
HSL8D	FSB88D	HSB125D	HSL8D
HSL7D	FSB89D	HSB126D	HSL5D
HSL6D	FSB90D	HSB127D	FSL9D
HSL5D	FSB91D	HSB129D	FSL4D
FSL9D	FSB92D	HSB130D	FSL5D
FSL7D	FSB93D	HSB131D	FNB5
FSL2D	FSB98D	HSB132D	HAA1D
FSL3D	FSB99D	HSB134D	HAA2D
FSL4D	FSB104D	HSB135D	HAA4D
FSL5D	FSB106D	HSB136D	HAA6D
BRR6D	FSB107D	HSB137D	BRR8DR
BRR7D	FSB108D	HSB138D	BGO51D
FNB5	FSB110D	HSB139D	BGO52D
HAA1D	FSB111D	HSB140D	BGO12DR
HAA2D	FSB112D	HSB141D	BGO11DR
HAA3D	FSB113D	HSB142D	BGO3DR
HAA4D	FSB114D	HSB143D	
HAA6D	FSB115D	HSB146D	
BRR8DR	FSB116D	HSB147D	
BGO12DR	FSB117D	HSB149D	
BGO3DR	FSB118D	HSB151D	
Vanadium	FSB119D	HSB152D	
BGO1D	FSB120D	HTF5	
BGO2D	FSB122D	HTF6	
BGO3D	FSB123D	HTF7	
	FSS2D	HTF8	

APPENDIX H. GSA - BACKGROUND WELLS THROUGH CLUSTERING APPROACH

Nitrate as nitrogen

BGX3D
FAC3
FAC6
FAC8
FSS1D
FSS3D
HAC2
HMD2D
HMD3D
HSB71
HSB131D
HSB140D
HSB141D
ZBG2
FBP5D
FBP9D
FBP13D
FAB2
FAB3
HAA1D
HAA2D
HAA6D

pH

BGO12D
BGO16D
BGO23D
BGO24D
BGO28D
BGO34D
BGO37D
BGX4D
BGX10D
BRR3D
BRR4D
FAC3
FAC6
FAL2
FCA9D
FCA10D
FCA16A
FCA16D
FCA19D
FCB3
FSB106D
FSB109D
FSS1D
FSS2D
FTF9
FTF12
FTF13
FTF21
FTF24A
FTF25A
FTF26
FTF27
HAP1
HCA2
HCA3
HCA4
HMD2D
HMD4D

HSB138D
HTF5
HTF13
HTF14
HTF22
HTF23
NBG3
ZDT1
BGO50D
BGX1D
BGX6D
BGX7D
BGX8DR
FSL2D
FBP9D
FAB1
FAB2
FAB3
FAB4
HAA3D

Tritium

BG52
BG54
BG61
BG92
BG103
BG104
BG108
BG109
BG110
BG122
BGO2D
BGO4D
BGO12D
BGO18D
BGO21D
BGO23D
BGO26D
BGO31D
BGO33D
BGO37D
BGO39D
BGX10D
BGX12D
BRR1D
BRR5D
FAC3
FAC4
FAC6
FAC7
FAL1
FAL2
FCA2D
FCA9D
FCA10A
FCA16A
FCA19D
FCB3
FCB4
FCB5
FCB6
FET2D
FNB4
FSB106D
FSB108D

FSS1D
FSS4D
FTF3
FTF4
FTF5
FTF6
FTF9
FTF12
FTF13
FTF17
FTF19
FTF20
FTF22
FTF25A
FTF26
FTF27
HAC1
HAC2
HAC3
HAC4
HAP1
HET4D
HMD1D
HMD2D
HMD4D
HR812
HSB65
HSB66
HSB70
HSB71
HSB110D
HSB143D
HSB149D
HSB150D
HTF6
HTF8
HTF14
HTF17
HTF19
HTF20
HTF22
HTF27
HTF28
HTF32
HTF34
MGC19
MGE9
NBG3
NBG4
NBG5
SBG3
SCA2
SCA3
SCA3A
SCA4
SCA4A
SCA5
SLP1
Z9
ZW3
ZW4
ZW5
ZW6
ZW10
BGO29D
BGO49D

FCA9DR
BGO17DR
BGX11D
FSL8D
HSL5D
FBP6D
FBP9D
FBP13D
BRR7D
HIW2D
FAB3
HAA1D
HAA4D
BGO51D
BGO52D
FST1D

Aluminum

BG92
BG93
BG96
BG101
BG103
BG108
BG109
BG122
BGO2D
BGO5D
BGO7D
BGO8D
BGO9D
BGO10DR
BGO11D
BGO12D
BGO15D
BGO16D
BGO18D
BGO20D
BGO21D
BGO26D
BGO31D
BGO37D
BGO45D
BGX4D
BGX12D
BRR1D
BRR2D
BRR4D
BRR5D
FAC4
FAL1
FCA16A
FCB2
FCB4
FCB5
FCB6
FET2D
FET3D
FET4D
FSB76
FSB99D
FSB106D
FSB109D
FSB111D
FSB113D
FSB114D

FSB118D
 FSB120D
 FSB122D
 FSB123D
 HAC1
 HAC2
 HAC3
 HAC4
 HAP1
 HCA2
 HCA3
 HET2D
 HET3D
 HMD3D
 HR812
 HSB65
 HSB70
 HSB71
 HSB83D
 HSB84D
 HSB100D
 HSB107D
 HSB110D
 HSB117D
 HSB125D
 HSB130D
 HSB131D
 HSB132D
 HSB135D
 HSB137D
 HSB138D
 HSB139D
 HSB143D
 HSB149D
 HSB151D
 NBG1
 NBG4
 NBG5
 SBG2
 SBG3
 SCA2
 SCA3A
 SCA4
 SCA4A
 SCA5
 SLP1
 ZDT2
 ZW2
 ZW7
 ZW9
 BGO50D
 BGO14DR
 BGO49D
 BGX1D
 BGX6D
 BGX7D
 BGO17DR
 FSL8D
 HSL3D
 HSL2D
 HSL8D
 FSL2D
 BRR6D
 HIW2D
 HAA1D
 HAA2D
 BRR8DR
 BGO51D
 BGO52D
 BGO12DR

BGO11DR
 BGO3DR

Iron

BG61
 BG92
 BG93
 BG96
 BG101
 BG103
 BG104
 BG109
 BG110
 BG122
 BGO1D
 BGO2D
 BGO3D
 BGO4D
 BGO5D
 BGO6D
 BGO7D
 BGO8D
 BGO9D
 BGO10DR
 BGO11D
 BGO12D
 BGO15D
 BGO16D
 BGO18D
 BGO20D
 BGO21D
 BGO24D
 BGO26D
 BGO27D
 BGO30D
 BGO31D
 BGO34D
 BGO37D
 BGO39D
 BGO40D
 BGO45D
 BGX3D
 BGX4D
 BGX5D
 BGX9D
 BGX12D
 BRR4D
 FAC4
 FAL1
 FCA2D
 FCA10D
 FCA16A
 FCA16D
 FCB5
 FCB6
 FET1D
 FET2D
 FET3D
 FET4D
 FNB1
 FNB2
 FNB4
 FSB76
 FSB77
 FSB78
 FSB79
 FSB89D
 FSB91D
 FSB92D
 FSB93D

FSB95DR
 FSB99D
 FSB107D
 FSB108D
 FSB109D
 FSB111D
 FSB113D
 FSB114D
 FSB117D
 FSB118D
 FSB120D
 FSB122D
 FSB123D
 FTF21
 HAC4
 HAP1
 HCA2
 HCA3
 HCB2
 HCB3
 HCB4
 HET2D
 HET3D
 HMD2D
 HMD3D
 HMD4D
 HSB65
 HSB66
 HSB67
 HSB70
 HSB71
 HSB83D
 HSB84D
 HSB86D
 HSB102D
 HSB103D
 HSB104D
 HSB105D
 HSB106D
 HSB107D
 HSB108D
 HSB109D
 HSB110D
 HSB111E
 HSB112E
 HSB114D
 HSB116D
 HSB117D
 HSB125D
 HSB126D
 HSB127D
 HSB129D
 HSB130D
 HSB132D
 HSB134D
 HSB135D
 HSB137D
 HSB138D
 HSB143D
 HSB146D
 HSB147D
 HSB149D
 NBG1
 NBG4
 NBG5
 SCA2
 SCA4A
 ZBG1
 ZBG2
 ZDT1

BGO14DR
 BGO49D
 BGX1D
 BGX6D
 BGX7D
 BGO17DR
 FSB121DR
 FSB0PD
 FSL6D
 FSL8D
 HSL1D
 HSL3D
 HSL2D
 HSL8D
 HSL7D
 HSL6D
 FSL9D
 FSL7D
 FSL2D
 FSL4D
 FSL5D
 FNB5
 HIW2D
 HAA1D
 HAA2D
 HAA4D
 BRR8DR
 BGO51D
 BGO52D
 BGO12DR
 BGO11DR
 BGO3DR

Manganese

BG92
 BG93
 BG96
 BG101
 BG103
 BG104
 BG108
 BG109
 BG110
 BGO2D
 BGO3D
 BGO6D
 BGO8D
 BGO12D
 BGO16D
 BGO21D
 BGO23D
 BGO24D
 BGO26D
 BGO32D
 BGO34D
 BGO35D
 BGO36D
 BGO39D
 BGX3D
 BGX4D
 BGX12D
 BRR2D
 BRR3D
 BRR4D
 FAC6
 FAL1
 FCA10D
 FCA16A
 FCA19D
 FCB3

FCB4	ZBG1
FCB5	ZBG2
FET1D	ZDT1
FET2D	BGO29D
FET4D	BGO49D
FNB1	BGO44D
FNB4	YSC2D
FSB76	BGX8DR
FSB109D	BGX11D
FSB113D	HSL4D
FSB115D	HSL8D
FSB120D	HSL5D
FSB122D	FSL3D
FSS2D	HIW2D
FSS4D	FAB2
FTF21	FAB3
FTF22	FAB4
HAC2	HAA1D
HAP1	HAA2D
HCA1	HAA3D
HCA4	HAA4D
HET2D	BRR8DR
HET3D	BGO52D
HET4D	BGO12DR
HMD1D	BGO11DR
HSB65	BGO3DR
HSB66	
HSB70	
HSB71	
HSB83D	
HSB84D	
HSB100D	
HSB101D	
HSB111E	
HSB117D	
HSB126D	
HSB130D	
HSB131D	
HSB135D	
HSB138D	
HSB139D	
HSB140D	
HSB141D	
HSB142D	
HSB143D	
HSB146D	
HSB147D	
HSB149D	
HSB151D	
HSB152D	
HSS3D	
HTF8	
HTF16	
HTF18	
HTF24	
HTF25	
HTF26	
HTF28	
HTF29	
HTF32	
MGA36	
MGC36	
NBG1	
NBG2	
NBG4	
NBG5	
SCA2	
SCA3	
SCA4	
SCA5	

**APPENDIX I. SRS (SITEWIDE) BACKGROUND WELLS
THROUGH REGRESSION APPROACH**

Arsenic

ABP3	BGO24D	CSR3	FSB116D
ABP8D	BGO26D	CSR4	FSB117D
AC2B	BGO27D	DBP1	FSB118D
AC3B	BGO28D	DBP2	FSB119D
ACB1A	BGO30D	DBP3	FSB120D
ACB2A	BGO31D	DBP4	FSB122D
ACB3A	BGO32D	DCB1A	FSB123D
ACB4A	BGO33D	DCB2A	FSS1D
AMB5	BGO34D	DCB3A	FSS2D
AMB6	BGO35D	DCB4A	FSS3D
AMB7	BGO36D	DCB5A	FSS4D
AMB8D	BGO37D	DCB7	FTF2
AMB9D	BGO38D	DCB8	FTF3
AMB10D	BGO39D	DCB9	FTF4
AMB10DD	BGO40D	DCB10	FTF5
AMB11D	BGO45D	DCB12	FTF6
AMB12D	BGX3D	DOB1	FTF7
AOB1	BGX4D	DOB2	FTF8
AOB2	BGX5D	DOB3	FTF9
AOB3	BGX9D	DOB4	FTF12
ARP1A	BGX10D	FAC4	FTF13
ARP2	BGX12D	FAC6	FTF15
ARP3	BRD1	FAC7	FTF16
ARP4	BRD2	FAC8	FTF17
ASB1A	BRD3	FAL1	FTF18
ASB2A	BRD5D	FAL2	FTF19
ASB3A	BRR1D	FCA2D	FTF20
ASB4	BRR2D	FCA10A	FTF21
ASB5A	BRR3D	FCA10D	FTF22
ASB6A	BRR4D	FCA16A	FTF23
ASB7	BRR5D	FCA16D	FTF24A
ASB9	CBR1D	FCA19D	FTF25A
BG52	CBR2D	FCB2	FTF26
BG54	CBR3D	FCB3	FTF27
BG55	CCB1	FCB4	GBW1
BG59	CCB2	FCB5	HAC1
BG60	CCB3	FCB6	HAC2
BG61	CCB4	FET1D	HAC3
BG67	CDB1	FET2D	HAC4
BG91	CDB2	FET3D	HAP1
BG92	CMP8	FET4D	HCA1
BG93	CMP10	FNB1	HCA2
BG96	CMP11	FNB2	HCA3
BG101	CMP12	FNB3	HCA4
BG103	CMP13	FNB4	HCB2
BG104	CMP14C	FSB76	HCB3
BG108	CMP15C	FSB77	HCB4
BG109	CRP1	FSB78	HET2D
BG110	CRP4	FSB79	HET3D
BG122	CSA1	FSB87D	HET4D
BGO1D	CSA2	FSB88D	HMD1D
BGO2D	CSA3	FSB89D	HMD2D
BGO3D	CSA4	FSB91D	HMD3D
BGO4D	CSB1A	FSB93D	HMD4D
BGO5D	CSB3A	FSB95DR	HR812
BGO6D	CSB4A	FSB97D	HSB65
BGO7D	CSB5A	FSB98D	HSB66
BGO8D	CSB6A	FSB99D	HSB67
BGO9D	CSD1D	FSB104D	HSB68
BGO10DR	CSD2D	FSB105DR	HSB69
BGO11D	CSD4D	FSB106D	HSB70
BGO12D	CSD8D	FSB107D	HSB71
BGO15D	CSD9D	FSB108D	HSB83D
BGO16D	CSD10D	FSB109D	HSB84D
BGO18D	CSD11D	FSB110D	HSB86D
BGO20D	CSD12D	FSB111D	HSB100D
BGO21D	CSD13D	FSB112D	HSB102D
BGO23D	CSO1	FSB113D	HSB103D
	CSR1	FSB114D	HSB104D
	CSR2	FSB115D	HSB105D

HSB106D	IDP7	LFW42	MSB48D
HSB107D	IDP8	LFW43D	MSB49D
HSB108D	IDP9	LFW44D	MSB50D
HSB109D	IDQ4	LFW45D	MSB51D
HSB110D	IDQ5	LFW46D	MSB52D
HSB111E	IDQ6	LFW47D	MSB53D
HSB112E	IDQ7	LFW56D	MSB54D
HSB113D	IDQ8	LFW57D	MSB55D
HSB114D	IDQ9	LFW58D	MSB56D
HSB115D	IDQ10	LFW59D	MSB57D
HSB116D	IDQ12	LFW60D	MSB58D
HSB117D	KAB1	LFW62D	MSB59D
HSB125D	KAB2	LRP1	MSB60D
HSB126D	KAB3	LRP2	MSB61D
HSB127D	KAB4	LRP3	MSB62D
HSB129D	KAC1	LSB1	MSB63D
HSB130D	KAC2	LSB2	MSB64D
HSB131D	KAC3	LSB3	MSB65D
HSB132D	KAC5	LSB4	MSB67D
HSB134D	KAC6	MCB2	MSB68D
HSB135D	KAC7	MCB4	MSB69D
HSB136D	KCB1	MCB5	MSB70D
HSB137D	KCB2	MCB6	MSB74D
HSB138D	KCB3	MGC9	MSB77D
HSB139D	KDB1	MGC19	MSB82D
HSB140D	KDB2	MGC32	MSB83D
HSB141D	KDB3	MGC36	MSB85D
HSB142D	KDT1D	MGE9	NBG1
HSB143D	KRP1	MGE21	NBG2
HSB146D	KRP2	MGG15	NBG3
HSB147D	KRP3	MGG19	NBG4
HSB148D	KRP4	MGG23	NBG5
HSB149D	KSB1	MGG36	NPM2
HSB150D	KSB2	MSB1D	NPM3
HSB151D	KSB3	MSB2D	NPM4
HSB152D	KSB4A	MSB3D	NPM4DD
HSS3D	KSS1D	MSB4D	PAC1
HTF5	KSS2D	MSB5A	PAC2
HTF6	KSS3D	MSB6A	PAC3
HTF7	LAC1	MSB7A	PAC4
HTF8	LAC2	MSB8A	PAC5
HTF13	LAC3	MSB9C	PAC6
HTF14	LAC4	MSB11F	PCB1A
HTF15	LCO1	MSB13D	PCB2A
HTF16	LCO2	MSB14C	PCB3A
HTF17	LCO3	MSB15C	PCB4A
HTF18	LCO4	MSB15D	PRP1A
HTF19	LDB1	MSB16C	PRP2
HTF20	LDB2	MSB17D	PRP3
HTF22	LFW7	MSB18C	PRP4
HTF23	LFW16	MSB20C	PSB1A
HTF24	LFW19	MSB21C	PSB2A
HTF25	LFW20	MSB24	PSB3A
HTF26	LFW23	MSB26	PSB4A
HTF27	LFW24	MSB27	PSB5A
HTF28	LFW25	MSB28	PSB6A
HTF29	LFW26	MSB30C	PSB7A
HTF32	LFW27	MSB31C	RAC1
HTF34	LFW28	MSB33	RAC2
HWS1A	LFW29	MSB34C	RAC3
HWS2	LFW30	MSB36D	RAC4
HXB4D	LFW31	MSB37D	RCP1D
HXB5D	LFW32	MSB38D	RDB1D
IDB4	LFW33	MSB39D	RDB2D
IDB5	LFW34	MSB40D	RDB3D
IDB6	LFW35	MSB41D	RRP1
IDB7	LFW36	MSB42D	RRP2
IDB8	LFW38	MSB44C	RRP3
IDP4	LFW39	MSB46C	RRP4
IDP6	LFW41	MSB47D	RSA7

RSA8	XSB2D	MSB87C	TNX20D
RSA9	XSB3A	MSB88D	TNX21D
RSA10	XSB4D	BRR6D	TNX22D
RSB7	YSB1A	BRR7D	DOB12
RSB8	YSB4A	FNB5	DOB14
RSC2	Z9	LAC5DU	FST1D
RSC3	ZBG1	LAC6DU	CRP3D
RSC4	ZBG1A	LAC7DU	CRP5D
RSC5	ZBG2	LAC8DU	CRP7D
RSC6	ZDT1	LCO8DU	CRP8D
RSC7	ZDT2	LFW63D	CRP9D
RSC8	ZW2	LFW66D	MCB11D
RSC9	ZW3	LFW67D	ABP9D
RSC10	ZW4	LFW68D	ABP10D
RSD1	ZW5	LFW69D	RSP1D
RSD3	ZW6	LFW70D	RBW1D
RSD4	ZW7	LFW71D	RBW2D
RSD5	ZW9	LFW72D	TNX23D
RSD6	ZW10	HIW2D	TNX24D
RSD7	BGO50D	FAB1	TNX26D
RSD8	BGO29D	FAB3	BGO12DR
RSE1B	BGO14DR	FAB4	BGO11DR
RSE1C	BGO49D	HAA1D	BGO3DR
RSE3A	BGX1D	HAA2D	KSB5D
RSE10	BGX6D	HAA3D	KRP6
RSE18	BGX7D	HAA4D	CSF1D
RSE19	AMB4D	HAA6D	CSF2D
SBG2	K301P	CBR4D	LFW6R
SBG3	KRB17D	BRR8DR	LFW36R
SCA2	KRB18D	BGO51D	LFW41R
SCA3	KRB19D	KCB5	MSB78DR
SCA3A	KRB16D	LFW74D	TRW2
SCA4	CSB2A	LFW75D	TRW3
SCA4A	KSM1D	AMB14D	TRW4
SCA5	NPM19A	AMB15D	KRP7
SCA6	BGO44D	AMB16D	<u>Cesium-137</u>
SLP1	NPM34A	CMP10D	AOB1
SRW1	YSC2D	CMP11D	AOB2
SRW2	FCA9DR	CMP14D	AOB3
SRW4	BGO17DR	CMP30D	ARP1A
SRW5	BGX8DR	CMP31C	ARP2
SRW6	BGX11D	CMP32C	ARP3
SRW7	FSB121DR	CMP32D	ARP4
SRW8	BGO22DR	KDB4	ASB1A
SRW9	FSB0PD	KDB5	ASB2A
SRW10	FSL6D	LDB3	ASB3A
SRW11	FSL8D	LDB4	ASB4
SRW12C	HSL1D	PDB4	ASB5A
SRW13C	HSL3D	PDB5	ASB6A
SRW14C	HSL2D	DOB7	ASB7
SRW15C	HSL4D	DOB8	ASB9
SRW16C	FSL1D	DOB9	BGO1D
TBG1	HSL8D	DOB10	BGO2D
TBG3	HSL7D	BGO52D	BGO3D
TBG4	HSL6D	DCB17A	BGO5D
TBG5	HSL5D	DCB18A	BGO6D
TBG6	FSL9D	DCB19A	BGO7D
TBG7	FSL7D	DCB20A	BGO8D
TNX1D	FSL2D	DCB21A	BGO9D
TNX2D	DBP5	DCB22A	BGO10DR
TNX3D	FSL4D	DCB23A	BGO11D
TNX4D	FSL5D	DCB24A	BGO12D
TNX5D	ASB2AR	TRW1	BGO15D
TNX6D	ASB3AR	TNX13D	BGO16D
TNX7D	ASB5AR	TNX14D	BGO18D
TNX8D	FBP5D	TNX15D	BGO20D
TNX9D	FBP6D	TNX16D	BGO21D
TNX10D	FBP9D	TNX17D	BGO23D
TNX12D	FBP10D	TNX18D	BGO24D
XSB1D	FBP13D	TNX19D	

BGO26D	FSB92D	HSB131D	PSB6A
BGO27D	FSB93D	HSB132D	PSB7A
BGO28D	FSB98D	HSB134D	RAC3
BGO30D	FSB99D	HSB135D	RCP1D
BGO31D	FSB104D	HSB136D	RDB1D
BGO32D	FSB105DR	HSB137D	RDB2D
BGO33D	FSB106D	HSB138D	RDB3D
BGO34D	FSB107D	HSB139D	RSA7
BGO35D	FSB108D	HSB140D	RSA8
BGO36D	FSB109D	HSB141D	RSA9
BGO37D	FSB110D	HSB142D	RSA10
BGO38D	FSB111D	HSB143D	RSB7
BGO39D	FSB112D	HSB146D	RSD1
BRR1D	FSB113D	HSB147D	RSD3
BRR2D	FSB114D	HSB148D	RSE1B
BRR3D	FSB115D	HSB149D	RSE1C
BRR4D	FSB116D	HSB150D	RSE3A
BRR5D	FSB117D	HSB151D	RSE10
CMP8	FSB118D	HSB152D	SBG2
CMP12	FSB119D	HTF7	SBG3
CMP13	FSB120D	HTF8	SRW1
CMP15C	FSB122D	HTF13	SRW2
CRP1	FSB123D	HTF14	SRW4
CRP4	HAC2	HTF15	SRW5
CSA1	HAC4	HTF16	SRW6
CSA2	HAP1	HTF17	SRW7
CSA3	HCA1	HTF18	SRW8
CSA4	HCA2	HTF19	SRW9
CSB1A	HCA3	HTF20	SRW10
CSB3A	HCA4	HTF22	SRW11
CSB4A	HCB2	HTF23	SRW12C
CSB5A	HCB3	HTF24	SRW13C
CSB6A	HCB4	HTF25	SRW14C
CSO1	HET2D	HTF26	SRW15C
DCB1A	HET3D	HTF27	SRW16C
DCB2A	HET4D	HTF28	TBG1
DCB3A	HR812	HTF29	TBG4
DCB4A	HSB65	HTF32	TBG7
DCB5A	HSB66	HTF34	TNX1D
DCB6	HSB67	HXB4D	TNX2D
DCB7	HSB68	HXB5D	TNX3D
DCB8	HSB69	KRP1	TNX4D
DCB9	HSB70	KRP2	TNX5D
DCB10	HSB71	KRP3	TNX6D
DCB11	HSB83D	KRP4	TNX7D
DCB12	HSB84D	KSB4A	TNX8D
DCB13	HSB86D	LAC1	TNX9D
DCB15	HSB100D	LAC2	TNX10D
DCB16	HSB101D	LAC3	TNX11D
FAL1	HSB102D	LAC4	TNX12D
FAL2	HSB103D	LCO1	XSB1D
FCA2D	HSB104D	LCO2	XSB2D
FCA9D	HSB105D	LCO3	XSB3A
FCA10A	HSB106D	LCO4	XSB4D
FCA10D	HSB107D	MSB3D	ZBG1
FCA16A	HSB108D	MSB22	ZBG1A
FCA16D	HSB109D	NBG1	ZBG2
FCA19D	HSB110D	NBG2	ZDT1
FNB1	HSB111E	NBG3	ZDT2
FNB2	HSB112E	NBG4	ZW9
FNB3	HSB113D	NBG5	ZW10
FNB4	HSB114D	PRP1A	BGO29D
FSB76	HSB115D	PRP2	BGO14DR
FSB77	HSB116D	PRP3	K301P
FSB79	HSB117D	PRP4	KRB17D
FSB87D	HSB125D	PSB1A	KRB18D
FSB88D	HSB126D	PSB2A	KRB19D
FSB89D	HSB127D	PSB3A	KRB16D
FSB90D	HSB129D	PSB4A	CSB2A
FSB91D	HSB130D	PSB5A	FCA9DR

BGO17DR	AC2B	BGO37D	DOB2
FSB121DR	AC3B	BGO38D	DOB3
FSB0PD	ACB1A	BGO39D	DOB4
FSL6D	ACB2A	BGO40D	FAC6
FSL8D	ACB3A	BGO45D	FAL1
HSL1D	AMB5	BGX3D	FAL2
HSL3D	AMB6	BGX4D	FCA2D
HSL2D	AMB7	BGX5D	FCA9D
HSL4D	AMB8D	BGX9D	FCA10A
FSL1D	AMB9D	BGX10D	FCA10D
HSL8D	AMB10D	BGX12D	FCA16D
HSL7D	AMB10DD	BRD1	FCA19D
HSL6D	AMB11D	BRD2	FCB2
HSL5D	AMB12D	BRD3	FCB3
FSL7D	AOB1	BRD5D	FCB4
FSL2D	AOB2	BRR2D	FCB5
FSL3D	AOB3	BRR3D	FCB6
FSL4D	ARP1A	CBR1D	FET1D
FSL5D	ARP2	CBR2D	FET2D
ASB2AR	ARP3	CBR3D	FET3D
ASB3AR	ARP4	CCB1	FET4D
ASB5AR	ASB1A	CCB2	FNB1
FBP5D	ASB2A	CCB3	FNB4
FBP6D	ASB3A	CCB4	FSB87D
FBP9D	ASB4	CDB1	FSB99D
FBP13D	ASB5A	CDB2	FSB105DR
BRR6D	ASB6A	CMP8	FSB106D
BRR7D	ASB7	CMP10	FSB108D
FNB5	ASB9	CMP11	FSB109D
LAC5DU	BG54	CMP12	FSB113D
LAC6DU	BG59	CMP13	FSB114D
LAC7DU	BG60	CMP14C	FSB115D
LAC8DU	BG61	CMP15C	FSB116D
LCO8DU	BG91	CRP1	FSB120D
HAA1D	BG92	CRP4	FSB122D
HAA2D	BG93	CSA1	FSB123D
HAA3D	BG96	CSA2	FSS2D
HAA4D	BG101	CSA3	FSS3D
HAA6D	BG103	CSA4	FTF1
BRR8DR	BG104	CSB1A	FTF2
CMP10D	BG108	CSB3A	FTF3
CMP14D	BG109	CSB4A	FTF6
CMP30D	BG110	CSB5A	FTF8
CMP31C	BG122	CSD2D	FTF9
CMP32C	BGO1D	CSD4D	FTF10
DCB17A	BGO2D	CSD8D	FTF11
DCB18A	BGO3D	CSD9D	FTF15
DCB19A	BGO4D	CSD10D	FTF16
DCB20A	BGO5D	CSD11D	FTF17
DCB21A	BGO6D	CSD12D	FTF19
DCB22A	BGO7D	CSD13D	FTF21
DCB23A	BGO8D	CSO1	FTF22
DCB24A	BGO9D	CSR1	FTF23
CRP5D	BGO10DR	CSR2	GBW1
CRP7D	BGO11D	CSR3	HAC1
CRP8D	BGO12D	CSR4	HAP1
CRP9D	BGO15D	DBP1	HCA1
MCB11D	BGO16D	DBP3	HCA2
RSP1D	BGO18D	DBP4	HCA3
RBW1D	BGO20D	DCB1A	HCB2
RBW2D	BGO21D	DCB2A	HCB3
BGO12DR	BGO23D	DCB3A	HCB4
BGO3DR	BGO24D	DCB7	HET2D
KRP6	BGO26D	DCB8	HMD1D
KRP7	BGO27D	DCB11	HMD2D
RSP7D	BGO32D	DCB12	HMD3D
<u>Mercury</u>	BGO33D	DCB13	HMD4D
ABP3	BGO34D	DCB15	HR812
ABP8D	BGO35D	DCB16	HSB66
	BGO36D	DOB1	HSB69

HSB70	KDB2	MGC23	NPM4
HSB71	KDB3	MGC36	NPM4DD
HSB110D	KDT1D	MGE30	PAC1
HSB111E	KRP1	MGG15	PAC2
HSB112E	KRP2	MGG23	PAC3
HSB115D	KRP3	MGG36	PAC4
HSB116D	KRP4	MSB1D	PAC5
HSB117D	KSB1	MSB2D	PAC6
HSB130D	KSB2	MSB3D	PCB1A
HSB131D	KSB3	MSB5A	PCB3A
HSB132D	KSB4A	MSB6A	PCB4A
HSB137D	KSS1D	MSB7A	PRP1A
HSB138D	KSS2D	MSB8A	PRP2
HSB139D	KSS3D	MSB9C	PSB1A
HSB140D	LAC2	MSB11F	PSB2A
HSB141D	LAC3	MSB13D	PSB3A
HSB142D	LAC4	MSB14C	PSB4A
HSB143D	LCO1	MSB15D	PSB5A
HSB146D	LCO2	MSB16C	PSB6A
HSB147D	LCO3	MSB17D	PSB7A
HSB148D	LDB1	MSB18C	RAC1
HSB149D	LDB2	MSB20C	RAC2
HSB151D	LFW6	MSB21C	RAC3
HSB152D	LFW7	MSB24	RDB1D
HSS3D	LFW8	MSB26	RDB2D
HTF5	LFW10A	MSB27	RDB3D
HTF7	LFW17	MSB28	RRP1
HTF8	LFW18	MSB30C	RRP2
HTF13	LFW19	MSB31C	RRP3
HTF14	LFW20	MSB33	RRP4
HTF16	LFW21	MSB34C	RSA8
HTF17	LFW22	MSB36D	RSA9
HTF19	LFW23	MSB37D	RSC4
HTF28	LFW25	MSB38D	RSC5
HTF34	LFW26	MSB39D	RSC8
HWS1A	LFW27	MSB40D	RSC10
HWS2	LFW28	MSB41D	RSD1
HXB5D	LFW29	MSB42D	RSD4
IDB4	LFW30	MSB46C	RSD5
IDB5	LFW31	MSB48D	RSD7
IDB6	LFW32	MSB49D	RSD8
IDB7	LFW33	MSB50D	RSE1B
IDB8	LFW34	MSB51D	RSE1C
IDP4	LFW35	MSB52D	RSE3A
IDP6	LFW36	MSB53D	RSE19
IDP7	LFW37	MSB54D	SBG2
IDP8	LFW40	MSB55D	SBG3
IDP9	LFW41	MSB56D	SCA2
IDQ4	LFW42	MSB57D	SCA3
IDQ5	LFW44D	MSB58D	SCA3A
IDQ6	LFW45D	MSB59D	SCA4
IDQ7	LFW46D	MSB60D	SCA4A
IDQ8	LFW47D	MSB61D	SCA5
IDQ9	LFW48D	MSB62D	SCA6
IDQ10	LFW56D	MSB63D	SLP1
IDQ12	LFW57D	MSB64D	SRW1
KAB1	LFW61D	MSB65D	SRW5
KAB2	LRP1	MSB67D	SRW6
KAB3	LRP2	MSB68D	SRW7
KAB4	LRP3	MSB69D	SRW8
KAC1	LSB1	MSB70D	SRW9
KAC2	LSB2	MSB74D	SRW10
KAC3	LSB3	MSB77D	SRW11
KAC5	LSB4	MSB82D	SRW12C
KAC6	MCB2	MSB83D	SRW13C
KAC7	MCB4	MSB85D	SRW14C
KCB1	MCB6	NBG4	SRW15C
KCB2	MGA36	NBG5	SRW16C
KCB3	MGC9	NPM2	TBG1
KDB1	MGC19	NPM3	TBG5

TBG7
 TNX2D
 TNX5D
 TNX7D
 TNX8D
 TNX9D
 TNX10D
 TNX11D
 TNX12D
 YSB1A
 YSB3A
 YSB4A
 Z9
 ZBG1
 ZBG1A
 ZBG2
 ZDT1
 ZDT2
 BGO50D
 BGO29D
 BGO14DR
 BGO49D
 BGX1D
 BGX6D
 BGX7D
 AMB4D
 K301P
 KRB17D
 KRB18D
 KRB19D
 KRB16D
 CSB2A
 KSM1D
 NPM19A
 BGO44D
 NPM34A
 YSC2D
 BGO17DR
 BGX8DR
 BGX11D
 FSB121DR
 BGO22DR
 HSL3D
 HSL2D
 FSL1D
 HSL7D
 FSL7D
 FSL2D
 FSL3D
 DBP5
 FSL4D
 ASB2AR
 ASB3AR
 ASB5AR
 FBP5D
 FBP6D
 FBP9D
 FBP10D
 FBP13D
 MSB87C
 MSB88D
 BRR6D
 BRR7D
 LAC5DU
 LAC6DU
 LAC7DU
 LAC8DU
 LCO8DU
 LFW66D
 LFW69D

LFW70D
 LFW71D
 LFW72D
 HIW2D
 FAB2
 FAB3
 FAB4
 HAA1D
 HAA2D
 HAA4D
 HAA6D
 CBR4D
 BRR8DR
 BGO51D
 KCB7
 LFW74D
 LFW75D
 AMB14D
 AMB15D
 AMB16D
 CMP10D
 CMP11D
 CMP14D
 CMP30D
 CMP31C
 CMP32C
 CMP32D
 KDB4
 KDB5
 LDB3
 LDB4
 PDB4
 PDB5
 DOB7
 DOB8
 DOB9
 DOB10
 BGO52D
 DCB17A
 DCB18A
 DCB19A
 DCB20A
 DCB21A
 DCB22A
 DCB23A
 DCB24A
 TNX13D
 TNX14D
 TNX15D
 TNX16D
 TNX17D
 TNX18D
 TNX19D
 TNX20D
 TNX21D
 TNX22D
 DOB14
 FST1D
 CRP3D
 CRP5D
 CRP7D
 CRP8D
 CRP9D
 MCB11D
 ABP9D
 ABP10D
 RSP1D
 RBW1D
 RBW2D
 TNX23D

TNX24D
 TNX26D
 BGO12DR
 BGO11DR
 BGO3DR
 KSB5D
 KRP6
 CSF1D
 CSF2D
 LFW6R
 LFW8R
 LFW41R
 MSB78DR
 TRW3
 TRW4
 KRP7

Nitrate as nitrogen

ASB9
 KAC2
 KAC6
 KSS2D
 KSS3D
 LFW8
 LFW10A
 LFW16
 LFW17
 LFW18
 LFW21
 LFW22
 LFW25
 LFW31
 LFW32
 LFW36
 LFW37
 LFW38
 LFW39
 LFW40
 LFW41
 LFW42
 LFW44D
 LFW46D
 LFW47D
 LFW48D
 LFW57D
 LFW58D
 LFW59D
 LFW60D
 LFW61D
 LFW62D
 PAC2
 PAC5
 PAC6
 PSS3D
 LFW63D
 LFW66D
 LFW67D
 LFW68D
 LFW69D
 LFW70D
 LFW71D
 LFW72D
Nitrite as nitrogen
 CSA1
 CSA2
 CSA3
 CSA4

CSD1D
 CSD2D
 CSD4D
 CSD8D
 CSD9D
 CSD10D
 CSD11D
 CSD12D
 CSD13D
 DCB6
 DCB7
 FSS1D
 FSS2D
 FSS3D
 FSS4D
 HCA4
 HR812
 HSB83D
 HSS3D
 HTF17
 KSS1D
 KSS2D
 KSS3D
 PSS1D
 PSS2D
 PSS3D
 TNX1D
 TNX9D
 ZBG1
 ZBG1A
 ZBG2
 HSL3D
 HSL2D
 HSL4D
 HSL8D
 HSL7D
 HSL6D
 FAB1
 FAB2
 FAB3
 FAB4
 HAA1D
 HAA2D
 HAA3D
 HAA4D
 HAA6D
 TNX15D
 TNX16D

pH

BGO20D
 FCA16A
 FTF22
 KSS2D
 KSS3D
 MSB1D
 MSB26
 MSB53D
 MSB60D
 MSB61D
 NBG1
 NBG2
 NBG3
 NBG4
 NBG5
 PSS3D

Selenium

ABP3
 ABP8D
 AC2B

AC3B	BGO33D	DCB2A	FSB122D
ACB1A	BGO34D	DCB3A	FSB123D
ACB2A	BGO35D	DCB5A	FSS1D
ACB3A	BGO36D	DCB7	FSS2D
AMB5	BGO37D	DCB8	FSS3D
AMB6	BGO38D	DCB9	FSS4D
AMB7	BGO39D	DCB10	FTF2
AMB8D	BGO40D	DCB11	FTF3
AMB9D	BGO45D	DCB12	FTF4
AMB10D	BGX3D	DCB16	FTF5
AMB10DD	BGX4D	DOB1	FTF6
AMB11D	BGX5D	DOB2	FTF7
AMB12D	BGX9D	DOB3	FTF8
AOB1	BGX10D	DOB4	FTF9
AOB2	BGX12D	FAC3	FTF12
AOB3	BRD1	FAC6	FTF13
ARP1A	BRD2	FAC8	FTF15
ARP2	BRD3	FAL1	FTF16
ARP3	BRD5D	FAL2	FTF17
ARP4	BRR1D	FCA2D	FTF18
ASB1A	BRR2D	FCA10A	FTF19
ASB2A	BRR3D	FCA10D	FTF20
ASB3A	BRR4D	FCA16A	FTF21
ASB5A	BRR5D	FCA16D	FTF22
ASB6A	CBR1D	FCA19D	FTF23
ASB7	CBR2D	FCB2	FTF24A
ASB9	CBR3D	FCB3	FTF25A
BG52	CCB1	FCB4	FTF26
BG54	CCB2	FCB5	FTF27
BG55	CCB3	FCB6	GBW1
BG59	CCB4	FET1D	HAC1
BG60	CDB1	FET2D	HAC2
BG61	CDB2	FET3D	HAC3
BG67	CMP8	FET4D	HAC4
BG91	CMP10	FNB1	HAP1
BG92	CMP11	FNB2	HCA1
BG93	CMP12	FNB3	HCA3
BG96	CMP13	FNB4	HCA4
BG101	CMP14C	FSB76	HCB2
BG103	CMP15C	FSB77	HCB3
BG104	CRP1	FSB78	HCB4
BG108	CRP4	FSB79	HET2D
BG109	CSA1	FSB87D	HET3D
BG110	CSA2	FSB88D	HET4D
BG122	CSA3	FSB89D	HMD1D
BGO1D	CSA4	FSB90D	HMD2D
BGO2D	CSB1A	FSB91D	HMD3D
BGO3D	CSB3A	FSB92D	HMD4D
BGO4D	CSB4A	FSB93D	HR812
BGO5D	CSB5A	FSB95DR	HSB65
BGO6D	CSB6A	FSB97D	HSB66
BGO7D	CSD1D	FSB98D	HSB67
BGO8D	CSD2D	FSB99D	HSB68
BGO9D	CSD4D	FSB104D	HSB69
BGO10DR	CSD8D	FSB105DR	HSB70
BGO11D	CSD9D	FSB106D	HSB71
BGO12D	CSD10D	FSB107D	HSB83D
BGO15D	CSD11D	FSB108D	HSB84D
BGO16D	CSD12D	FSB109D	HSB86D
BGO18D	CSD13D	FSB110D	HSB100D
BGO20D	CSO1	FSB111D	HSB101D
BGO21D	CSR1	FSB112D	HSB102D
BGO23D	CSR2	FSB113D	HSB103D
BGO24D	CSR3	FSB114D	HSB104D
BGO26D	CSR4	FSB115D	HSB105D
BGO27D	DBP1	FSB116D	HSB106D
BGO28D	DBP2	FSB117D	HSB107D
BGO30D	DBP3	FSB118D	HSB108D
BGO31D	DBP4	FSB119D	HSB109D
BGO32D	DCB1A	FSB120D	HSB110D

HSB111E	IDQ6	LFW43D	MSB48D
HSB112E	IDQ7	LFW44D	MSB49D
HSB113D	IDQ8	LFW45D	MSB50D
HSB114D	IDQ9	LFW46D	MSB51D
HSB115D	IDQ10	LFW47D	MSB52D
HSB116D	IDQ12	LFW56D	MSB53D
HSB117D	KAB1	LFW57D	MSB54D
HSB125D	KAB2	LFW58D	MSB55D
HSB126D	KAB3	LFW59D	MSB56D
HSB127D	KAB4	LFW60D	MSB57D
HSB129D	KAC1	LFW61D	MSB58D
HSB130D	KAC3	LFW62D	MSB59D
HSB131D	KAC5	LRP1	MSB60D
HSB132D	KAC6	LRP2	MSB61D
HSB134D	KAC7	LRP3	MSB62D
HSB135D	KCB1	LSB1	MSB63D
HSB136D	KCB2	LSB2	MSB64D
HSB137D	KDB1	LSB3	MSB65D
HSB138D	KDB2	LSB4	MSB67D
HSB139D	KDB3	MCB2	MSB68D
HSB140D	KDT1D	MCB4	MSB69D
HSB141D	KRP1	MCB5	MSB70D
HSB142D	KRP2	MCB6	MSB74D
HSB143D	KRP3	MGC9	MSB77D
HSB146D	KRP4	MGC19	MSB82D
HSB147D	KSB1	MGC32	MSB83D
HSB148D	KSB2	MGC36	MSB85D
HSB149D	KSB3	MGE9	NBG1
HSB150D	KSB4A	MGE21	NBG2
HSB151D	KSS1D	MGG15	NBG3
HSB152D	KSS2D	MGG19	NBG4
HSS3D	KSS3D	MGG23	NBG5
HTF5	LAC1	MGG36	NPM2
HTF6	LAC2	MSB1D	NPM3
HTF7	LAC4	MSB2D	NPM4
HTF8	LCO1	MSB3D	NPM4DD
HTF13	LCO2	MSB4D	PAC1
HTF14	LCO3	MSB5A	PAC2
HTF15	LDB1	MSB6A	PAC3
HTF16	LDB2	MSB7A	PAC4
HTF17	LFW6	MSB8A	PAC5
HTF18	LFW7	MSB9C	PAC6
HTF19	LFW8	MSB11F	PCB1A
HTF20	LFW10A	MSB13D	PCB3A
HTF22	LFW16	MSB14C	PCB4A
HTF23	LFW17	MSB15C	PRP1A
HTF24	LFW18	MSB15D	PRP2
HTF25	LFW19	MSB16C	PRP3
HTF26	LFW20	MSB17D	PRP4
HTF27	LFW21	MSB18C	PSB1A
HTF28	LFW22	MSB20C	PSB2A
HTF29	LFW24	MSB21C	PSB3A
HTF32	LFW25	MSB24	PSB4A
HTF34	LFW26	MSB26	PSB5A
HWS1A	LFW27	MSB27	PSB6A
HWS2	LFW28	MSB28	PSB7A
HXB4D	LFW29	MSB30C	RAC1
HXB5D	LFW30	MSB31C	RAC2
IDB4	LFW31	MSB33	RAC3
IDB5	LFW32	MSB34C	RAC4
IDB6	LFW33	MSB36D	RCPID
IDB7	LFW34	MSB37D	RDB1D
IDB8	LFW35	MSB38D	RDB2D
IDP4	LFW36	MSB39D	RDB3D
IDP6	LFW37	MSB40D	RRP1
IDP7	LFW38	MSB41D	RRP2
IDP8	LFW39	MSB42D	RRP3
IDP9	LFW40	MSB44C	RRP4
IDQ4	LFW41	MSB46C	RSA7
IDQ5	LFW42	MSB47D	RSA8

RSA9	XSB3A	MSB88D	DOB12
RSA10	XSB4D	BRR6D	DOB14
RSB7	YSB1A	BRR7D	FST1D
RSB8	YSB2A	FNB5	CRP3D
RSC2	Z9	LAC5DU	CRP5D
RSC3	ZBG1	LAC6DU	CRP7D
RSC4	ZBG1A	LAC7DU	CRP8D
RSC5	ZBG2	LAC8DU	CRP9D
RSC6	ZDT1	LCO8DU	MCB11D
RSC7	ZDT2	LFW63D	MCB13D
RSC8	ZW2	LFW66D	ABP9D
RSC9	ZW3	LFW67D	ABP10D
RSC10	ZW4	LFW68D	RSP1D
RSD1	ZW5	LFW69D	RBW1D
RSD3	ZW6	LFW70D	RBW2D
RSD4	ZW7	LFW71D	TNX23D
RSD5	ZW9	LFW72D	TNX24D
RSD6	ZW10	HIW2D	TNX26D
RSD7	BGO50D	FAB3	BGO12DR
RSD8	BGO29D	FAB4	BGO11DR
RSE1B	BGO14DR	HAA1D	BGO3DR
RSE1C	BGO49D	HAA2D	KSB5D
RSE3A	BGX1D	HAA3D	KRP6
RSE10	BGX6D	HAA4D	CSF1D
RSE18	BGX7D	HAA6D	CSF2D
RSE19	AMB4D	CBR4D	LFW6R
SBG2	K301P	BRR8DR	LFW8R
SBG3	KRB17D	BGO51D	LFW36R
SCA2	KRB18D	KCB6	LFW41R
SCA3	KRB19D	KCB7	MSB78DR
SCA3A	KRB16D	LFW74D	TRW2
SCA4	CSB2A	LFW75D	TRW3
SCA4A	KSM1D	AMB14D	TRW4
SCA5	NPM19A	AMB15D	KRP7
SCA6	BGO44D	AMB16D	RSP4D
SLP1	NPM34A	CMP10D	RSP5D
SRW1	YSC2D	CMP11D	RSP6D
SRW2	FCA9DR	CMP14D	RSP7D
SRW5	BGO17DR	CMP30D	<u>Tritium</u>
SRW6	BGX8DR	CMP31C	ABP3
SRW7	BGX11D	CMP32D	ACB2A
SRW8	FSB121DR	KDB4	AOB1
SRW9	BGO22DR	KDB5	AOB2
SRW10	FSB0PD	LDB3	ARP1A
SRW11	FSL6D	LDB4	ARP2
SRW12C	FSL8D	PDB4	ARP3
SRW13C	HSL1D	DOB7	ARP4
SRW14C	HSL3D	DOB8	ASB1A
SRW15C	HSL2D	DOB9	ASB4
SRW16C	HSL4D	DOB10	ASB6A
TBG1	FSL1D	BGO52D	BRD1
TBG3	HSL8D	DCB17A	BRD2
TBG4	HSL7D	DCB18A	CMP12
TBG5	HSL6D	DCB19A	CMP13
TBG6	HSL5D	DCB20A	CMP15C
TBG7	FSL9D	DCB21A	CSD9D
TNX1D	FSL7D	DCB22A	DBP1
TNX2D	FSL2D	DCB23A	DBP2
TNX3D	FSL3D	DCB24A	DBP3
TNX4D	DBP5	TRW1	DBP4
TNX5D	FSL4D	TNX13D	DCB1A
TNX6D	FSL5D	TNX14D	DCB3A
TNX7D	ASB2AR	TNX15D	DCB5A
TNX8D	ASB5AR	TNX16D	DCB7
TNX9D	FBP5D	TNX17D	DCB13
TNX10D	FBP6D	TNX18D	DOB1
TNX11D	FBP9D	TNX19D	DOB2
TNX12D	FBP10D	TNX20D	KAC5
XSB1D	FBP13D	TNX21D	KAC6
XSB2D	MSB87C	TNX22D	

KSS2D	TBG4	BG122	HAC4
LFW6	TNX1D	BGO1D	HAP1
LFW20	TNX2D	BGO2D	HCA1
LFW23	TNX3D	BGO3D	HCA2
LFW25	TNX6D	BGO4D	HCA3
LFW27	TNX7D	BGO5D	HCA4
LFW29	TNX8D	BGO6D	HC2
LFW35	TNX9D	BGO7D	HC3
LFW41	TNX11D	BGO8D	HC4
LFW43D	TNX12D	BGO9D	HET2D
LFW44D	XSB2D	BGO10DR	HET3D
LFW46D	XSB4D	BGO11D	HET4D
MCB5	YSB2A	BGO12D	HR812
MCB6	YSB3A	BGO15D	HSB65
MSB5A	YSB4A	BGO16D	HSB66
MSB8A	DBP5	BGO18D	HSB67
MSB33	ASB2AR	BGO20D	HSB68
MSB34C	ASB3AR	BGO21D	HSB69
MSB38D	ASB5AR	BGO23D	HSB70
MSB41D	MSB87C	BGO24D	HSB71
MSB42D	MSB88D	BGO26D	HSB83D
MSB53D	LFW70D	BGO27D	HSB86D
MSB70D	LFW72D	BGO28D	HSB100D
MSB74D	LFW74D	BGO30D	HSB103D
MSB77D	LFW75D	BGO31D	HSB104D
MSB82D	AMB16D	BGO32D	HSB106D
MSB85D	CMP14D	BGO33D	HSB107D
RAC1	CMP30D	BGO34D	HSB108D
RAC3	CMP31C	BGO35D	HSB109D
RAC4	CMP32C	BGO36D	HSB117D
RCP1D	TNX13D	BGO37D	HSB125D
RDB1D	TNX14D	BGO38D	HSB126D
RDB2D	TNX15D	BGO39D	HSB127D
RDB3D	TNX16D	BGO40D	HSB129D
RRP1	TNX18D	BGO45D	HSB130D
RRP2	TNX19D	CRP1	HSB131D
RRP3	TNX21D	CRP4	HSB132D
RSA7	TNX22D	CSB1A	HSB134D
RSA8	FST1D	CSB3A	HSB135D
RSA10	MCB11D	CSB4A	HSB137D
RSB7	MCB13D	CSB5A	HSB138D
RSB8	ABP9D	CSO1	HSB139D
RSC2	ABP10D	DCB1A	HSB140D
RSC3	TNX23D	DCB2A	HSB141D
RSC4	TNX24D	DCB3A	HSB142D
RSC5	LFW6R	DCB4A	HSB143D
RSC7	TRW4	DCB5A	HSB146D
RSC8	<u>Uranium-238</u>	DCB6	HSB147D
RSC9	ABP3	DCB7	HSB148D
RSC10	ABP8D	DCB8	HSB149D
RSD1	ARP2	DCB9	HSB150D
RSD3	ARP4	DCB10	HSB151D
RSD4	ASB1A	DCB11	HSB152D
RSD5	ASB2A	DCB12	HTF5
RSD6	ASB3A	DCB13	HTF7
RSD7	ASB5A	DCB15	HTF8
RSD8	ASB6A	DCB16	HTF13
RSE3A	ASB7	FNB1	HTF14
RSE18	ASB9	FNB4	HTF15
RSE19	BG91	FSB76	HTF16
SRW2	BG92	FSB108D	HTF18
SRW5	BG93	FSB111D	HTF19
SRW6	BG96	FSB114D	HTF20
SRW7	BG101	FSB118D	HTF22
SRW10	BG103	FSB123D	HTF23
SRW11	BG104	FSS1D	HTF24
SRW14C	BG108	FSS2D	HTF25
SRW15C	BG109	FSS3D	HTF26
SRW16C	BG110	FSS4D	HTF27
TBG1		HAC2	HTF28

HTF29	BGO29D	AMB7	LFW10A
HTF32	BGO14DR	AMB8D	LFW17
HTF34	BGO49D	AMB10D	LFW18
HXB4D	CSB2A	AMB11D	LFW19
HXB5D	BGO44D	AMB12D	LFW20
IDB4	FCA9DR	AOB1	LFW21
IDB5	BGO17DR	AOB2	LFW22
IDB6	BGO22DR	ARP1A	LFW23
IDB7	FSL6D	ARP2	LFW24
IDB8	FSL8D	ARP4	LFW25
KRP1	HSL1D	ASB1A	LFW26
KRP2	HSL3D	ASB4	LFW27
KRP3	HSL2D	ASB6A	LFW28
KRP4	HSL4D	ASB9	LFW29
LAC1	FSL1D	BG92	LFW30
LAC2	HSL8D	BG96	LFW31
LAC3	HSL7D	BG101	LFW34
LAC4	HSL5D	BG103	LFW35
LCO1	FSL9D	BG122	LFW37
LCO2	FSL7D	BGO9D	LFW38
LCO3	FSL2D	BGO10DR	LFW39
LCO4	FSL3D	BGO11D	LFW40
MCB2	FSL4D	BGO12D	LFW41
MCB4	FSL5D	BGX4D	LFW42
MCB5	ASB2AR	BRD1	LFW43D
MCB6	ASB3AR	BRD2	LFW44D
MSB5A	ASB5AR	BRD5D	LFW45D
MSB7A	FBP5D	CCB1	LFW47D
MSB8A	FBP6D	CCB2	LFW48D
MSB14C	FBP9D	CCB3	LFW56D
MSB15C	FBP13D	CCB4	LFW57D
MSB21C	LAC5DU	CSA1	LFW58D
MSB31C	LAC6DU	CSA3	LFW59D
MSB36D	LAC7DU	CSA4	LFW61D
MSB39D	LAC8DU	CSB6A	LRP1
PSB1A	LCO8DU	CSD2D	LRP2
PSB2A	HAA1D	CSD4D	LRP3
PSB3A	HAA2D	CSD8D	MSB1D
PSB4A	HAA3D	CSD9D	MSB5A
PSB5A	HAA4D	CSD10D	MSB7A
PSB6A	HAA6D	CSD11D	MSB13D
PSB7A	BGO51D	CSD12D	MSB15D
RAC3	DCB17A	CSD13D	MSB17D
RSE10	DCB19A	CSR1	MSB18C
SBG2	DCB20A	CSR2	MSB21C
SBG3	DCB21A	CSR3	MSB24
TBG1	DCB22A	CSR4	MSB26
TBG4	DCB23A	DOB1	MSB27
TBG7	DCB24A	DOB2	MSB28
TNX1D	CRP3D	DOB4	MSB30C
TNX2D	CRP5D	GBW1	MSB34C
TNX3D	CRP7D	HMD3D	MSB36D
TNX4D	CRP8D	HWS1A	MSB38D
TNX5D	CRP9D	HWS2	MSB39D
TNX6D	MCB11D	IDB6	MSB41D
TNX7D	MCB13D	IDB7	MSB49D
TNX8D	ABP9D	IDB8	MSB54D
TNX9D	ABP10D	IDP4	MSB55D
TNX10D	RSP1D	IDP6	MSB57D
TNX11D	RBW1D	IDP7	MSB58D
TNX12D	RBW2D	IDQ7	MSB60D
XSB1D	BGO12DR	IDQ8	MSB65D
XSB2D	BGO3DR	KAB1	MSB67D
XSB3A	KRP6	KAB2	MSB68D
XSB4D	KRP7	KAB3	MSB69D
ZDT1	RSP7D	KAC1	MSB70D
ZDT2	<u>Aluminum</u>	KAC5	MSB74D
ZW9	AC2B	KRP1	MSB82D
ZW10	AC3B	KRP2	MSB83D
BGO50D		KRP3	MSB85D

PSS2D	AMB11D	HCA4	LAC2
SBG2	AMB12D	HCB2	LAC3
SBG3	AOB1	HCB3	LAC4
SCA2	AOB2	HCB4	LCO1
SCA3A	AOB3	HET2D	LCO2
SRW1	ARP1A	HET3D	LCO3
SRW2	ARP2	HET4D	LCO4
SRW4	ARP4	HR812	LFW30
SRW5	ASB1A	HSB65	LFW31
SRW6	ASB4	HSB66	LFW32
SRW7	ASB6A	HSB67	LFW34
SRW8	ASB9	HSB70	LFW43D
SRW9	BGO5D	HSB71	LRP1
SRW10	BGO7D	HSB83D	LRP2
SRW11	BGO8D	HSB84D	LSB1
SRW12C	BGO16D	HSB100D	LSB2
SRW13C	BGO18D	HSB101D	LSB3
SRW14C	BGO20D	HSB110D	LSB4
SRW15C	BGO23D	HSB111E	MCB2
SRW16C	BGO36D	HSB117D	MCB4
TBG7	BGO39D	HSB129D	MCB6
TNX2D	BGX9D	HSB130D	MSB1D
TNX6D	BRR2D	HSB131D	MSB2D
TNX7D	CBR1D	HSB132D	MSB3D
TNX11D	CCB1	HSB135D	MSB4D
TNX12D	CCB2	HSB137D	MSB5A
BGX7D	CCB3	HSB138D	MSB6A
AMB4D	CCB4	HSB139D	MSB7A
ASB2AR	CMP8	HSB140D	MSB8A
ASB3AR	CMP12	HSB141D	MSB9C
MSB88D	CMP13	HSB142D	MSB11F
LFW63D	CMP15C	HSB143D	MSB13D
LFW66D	CRP1	HSB146D	MSB14C
LFW67D	CSA1	HSB147D	MSB15C
LFW68D	CSA2	HSB148D	MSB15D
LFW69D	CSA3	HSB149D	MSB16C
LFW70D	CSA4	HSB150D	MSB17D
LFW71D	CSB1A	HSB151D	MSB18C
LFW72D	CSB3A	HSB152D	MSB20C
LFW74D	CSB4A	HTF5	MSB21C
LFW75D	CSB5A	HTF6	MSB24
DOB7	CSR1	HTF7	MSB26
DOB9	CSR3	HTF8	MSB27
TRW1	CSR4	HTF13	MSB28
TNX17D	DBP1	HTF14	MSB30C
BGO12DR	DBP3	HTF15	MSB31C
BGO11DR	DBP4	HTF16	MSB33
LFW6R	DOB2	HTF17	MSB34C
LFW8R	DOB3	HTF18	MSB36D
LFW36R	DOB4	HTF19	MSB37D
LFW41R	FAC4	HTF20	MSB38D
TRW3	FNB4	HTF22	MSB39D
TRW4	FSB76	HTF23	MSB40D
Cobalt	FSB87D	HTF24	MSB41D
ABP3	FSB99D	HTF25	MSB42D
ABP8D	FSB106D	HTF26	MSB44C
AC2B	FSB108D	HTF27	MSB46C
AC3B	FSB109D	HTF28	MSB47D
ACB1A	FSB111D	HTF29	MSB48D
ACB2A	FSB113D	HTF32	MSB49D
ACB3A	FSB115D	HTF34	MSB50D
ACB4A	FSB116D	HXB4D	MSB51D
AMB5	FSB120D	HXB5D	MSB52D
AMB6	FSB123D	KCB1	MSB53D
AMB7	HAC2	KCB2	MSB54D
AMB8D	HAC4	KRP1	MSB55D
AMB9D	HAP1	KRP2	MSB56D
AMB10D	HCA1	KRP3	MSB57D
AMB10DD	HCA2	KRP4	MSB58D
	HCA3	LAC1	MSB59D

MSB60D	ZW10	ACB3A	HSB108D
MSB61D	BGO14DR	ACB4A	HSB109D
MSB62D	AMB4D	AMB7	HSB110D
MSB63D	CSB2A	AMB9D	HSB111E
MSB64D	FSL6D	AMB10D	HSB112E
MSB65D	FSL8D	AMB11D	HSB114D
MSB67D	HSL1D	AMB12D	HSB116D
MSB68D	HSL3D	AOB2	HSB117D
MSB69D	HSL2D	AOB3	HSB125D
MSB70D	HSL4D	ARP1A	HSB126D
MSB74D	HSL8D	ASB1A	HSB127D
MSB77D	HSL7D	ASB6A	HSB129D
MSB82D	HSL5D	ASB9	HSB130D
MSB83D	FSL7D	BG92	HSB132D
MSB85D	FSL3D	BG93	HSB134D
NBG1	FSL4D	BG96	HSB135D
PRP2	FSL5D	BG103	HSB137D
PSB1A	ASB2AR	BG110	HSB138D
PSB2A	ASB3AR	BG122	HSB146D
PSB3A	ASB5AR	BGO3D	HSB149D
PSB4A	MSB87C	BGO4D	HWS1A
PSB5A	MSB88D	BGO5D	IDB4
PSB6A	LAC5DU	BGO6D	IDB5
PSB7A	LAC6DU	BGO7D	IDB6
RAC1	LAC7DU	BGO8D	IDB7
RAC2	LAC8DU	BGO9D	IDB8
RAC3	LCO8DU	BGX3D	IDP4
RAC4	LFW71D	BGX4D	IDP5
RSE10	HIW2D	BRD2	IDP6
SBG2	HAA1D	BRD5D	IDP7
SBG3	HAA2D	CCB1	IDP8
SRW1	HAA3D	CCB4	IDQ6
SRW2	HAA4D	CMP14C	IDQ7
SRW4	BRR8DR	CSA1	IDQ9
SRW5	KCB6	CSA3	IDQ10
SRW6	KCB7	CSD2D	IDQ12
SRW7	LFW74D	CSD4D	KAC1
SRW8	LFW75D	CSD9D	KAC3
SRW9	AMB14D	CSD10D	KAC5
SRW10	AMB15D	CSD12D	KRP2
SRW11	AMB16D	CSD13D	KRP4
SRW12C	CMP10D	DOB4	KSS3D
SRW13C	CMP11D	FSB77	LAC1
SRW14C	CMP14D	FSB78	LAC2
SRW15C	CMP30D	FSB91D	LAC3
SRW16C	CMP31C	FSB92D	LCO1
TBG1	CMP32C	FSB93D	LCO3
TBG3	CMP32D	FSB95DR	LFW20
TBG4	DOB8	FSB99D	LFW25
TBG5	DOB9	FSB107D	LFW26
TBG6	DOB10	FSB109D	LFW27
TNX1D	DOB14	FSB113D	LFW29
TNX2D	CRP7D	FSB117D	LFW30
TNX3D	CRP8D	FSB118D	LFW31
TNX4D	CRP9D	FSB120D	LFW33
TNX7D	MCB11D	FSB122D	LFW42
TNX8D	MCB13D	HMD2D	LFW43D
TNX9D	ABP9D	HMD3D	LFW56D
TNX10D	ABP10D	HSB66	LSB1
TNX11D	RSP1D	HSB67	MSB1D
TNX12D	RBW1D	HSB70	MSB4D
XSB1D	RBW2D	HSB71	MSB5A
XSB2D	BGO12DR	HSB83D	MSB8A
XSB3A	BGO3DR	HSB84D	MSB9C
XSB4D	KRP6	HSB86D	MSB11F
YSB1A	MSB78DR	HSB102D	MSB13D
ZBG1	KRP7	HSB103D	MSB17D
ZDT1	Iron	HSB104D	MSB21C
ZDT2	ACB2A	HSB105D	MSB24
ZW9		HSB107D	MSB26

MSB27	LFW68D	CMP15C	HTF26
MSB28	DOB7	CRP1	HTF28
MSB31C	DOB9	CSA1	HTF32
MSB34C	TRW1	CSA3	HWS2
MSB38D	TNX14D	CSB1A	IDB4
MSB47D	TNX16D	CSB4A	IDB5
MSB49D	BGO3DR	CSB6A	IDB8
MSB50D	TRW2	CSD1D	IDQ5
MSB52D	TRW3	CSD2D	IDQ7
MSB54D	TRW4	CSD8D	IDQ8
MSB55D		CSD9D	IDQ9
MSB56D	<u>Manganese</u>	CSO1	IDQ10
MSB57D	ABP3	CSR1	IDQ12
MSB58D	ABP8D	CSR3	KAC1
MSB59D	ACB1A	DBP1	KAC3
MSB60D	AMB5	DCB3A	KAC5
MSB61D	AMB7	DOB3	KAC6
MSB62D	AMB9D	DOB4	KAC7
MSB63D	AMB12D	FAC6	KRP1
MSB64D	AOB1	FAL1	KRP2
MSB65D	AOB2	FCA16A	KRP3
MSB67D	ARP2	FCA19D	KSB1
MSB69D	ARP3	FCB3	KSB2
MSB74D	ARP4	FCB4	KSB3
MSB82D	ASB1A	FCB5	KSS1D
MSB83D	BG91	FET1D	KSS2D
PSB5A	BG93	FET2D	KSS3D
PSS2D	BG96	FET4D	LAC3
SCA2	BG101	FNB1	LCO1
SCA4A	BG103	FNB4	LCO3
SRW2	BG104	FSB76	LDB1
SRW4	BG108	FSB109D	LFW8
SRW5	BG109	FSB122D	LFW18
SRW6	BGO2D	GBW1	LFW19
SRW8	BGO3D	HAC2	LFW20
SRW9	BGO6D	HCA1	LFW23
SRW10	BGO8D	HCA4	LFW24
SRW11	BGO12D	HET2D	LFW25
SRW12C	BGO16D	HET3D	LFW26
SRW13C	BGO21D	HET4D	LFW27
SRW14C	BGO23D	HMD1D	LFW28
SRW15C	BGO24D	HSB66	LFW29
SRW16C	BGO26D	HSB70	LFW31
TBG1	BGO34D	HSB71	LFW32
TBG3	BGO35D	HSB83D	LFW33
TBG4	BGO36D	HSB84D	LFW34
TBG6	BGO39D	HSB100D	LFW35
TBG7	BGX3D	HSB101D	LFW39
TNX1D	BGX4D	HSB111E	LFW40
TNX2D	BGX12D	HSB117D	LFW42
TNX7D	BRD1	HSB126D	LFW44D
TNX12D	BRD2	HSB130D	LFW45D
XSB1D	BRD3	HSB131D	LFW47D
XSB2D	BRD5D	HSB135D	LFW48D
XSB3A	BRR2D	HSB139D	LFW56D
XSB4D	BRR3D	HSB140D	LFW59D
YSB2A	BRR4D	HSB141D	LFW60D
ZBG1	CBR1D	HSB142D	LRP2
ZBG2	CBR2D	HSB143D	LRP3
BGX1D	CCB1	HSB146D	LSB2
BGX6D	CCB2	HSB147D	LSB4
BGX7D	CCB3	HSB149D	MCB2
AMB4D	CCB4	HSB151D	MCB4
FSB0PD	CDB1	HSB152D	MCB5
ASB2AR	CDB2	HSS3D	MCB6
ASB3AR	CMP8	HTF8	MGA36
MSB88D	CMP10	HTF16	MGC36
LAC6DU	CMP11	HTF18	MSB1D
LAC8DU	CMP13	HTF24	MSB6A
LCO8DU	CMP14C	HTF25	MSB7A

MSB13D	SRW9	TNX20D	FSB92D
MSB14C	SRW10	TNX22D	FSB95DR
MSB15C	SRW11	CRP5D	FSB97D
MSB15D	SRW12C	CRP8D	FSS1D
MSB16C	SRW14C	CRP9D	FSS2D
MSB17D	SRW15C	MCB11D	FSS3D
MSB18C	TBG5	BGO12DR	FSS4D
MSB20C	TNX4D	BGO11DR	HAC2
MSB24	TNX5D	BGO3DR	HAC4
MSB26	TNX6D	KSB5D	HAP1
MSB31C	TNX7D	LFW41R	HCA1
MSB34C	TNX8D	TRW4	HCA2
MSB38D	TNX9D	<u>Tin</u>	HCA3
MSB46C	TNX11D	AMB5	HCA4
MSB47D	XSB1D	AMB6	HCB2
MSB48D	XSB4D	AMB7	HCB3
MSB49D	YSB2A	AMB8D	HCB4
MSB51D	ZBG1	AMB9D	HET2D
MSB52D	ZBG2	AMB10D	HET3D
MSB53D	BGO49D	AOB1	HET4D
MSB56D	AMB4D	AOB2	HMD2D
MSB58D	K301P	AOB3	HMD4D
MSB60D	KRB17D	ARP1A	HR812
MSB61D	KRB18D	ARP2	HSB65
MSB62D	KRB16D	ARP3	HSB66
MSB63D	NPM19A	ARP4	HSB67
MSB64D	BGO44D	BGO1D	HSB68
MSB67D	YSC2D	BGO2D	HSB69
MSB74D	BGX8DR	BGO3D	HSB71
MSB82D	HSL4D	BGO4D	HSB83D
MSB83D	HSL8D	BGO5D	HSB84D
MSB85D	HSL5D	BGO6D	HSB86D
NBG1	ASB3AR	BGO7D	HSB100D
NBG2	MSB88D	BGO8D	HSB101D
NBG4	LAC5DU	BGO9D	HSB102D
NBG5	LAC6DU	BGO11D	HSB103D
NPM4DD	LAC7DU	BGO15D	HSB104D
PAC1	LAC8DU	BGO18D	HSB105D
PAC4	LCO8DU	BGO20D	HSB106D
PRP1A	LFW63D	BGO24D	HSB107D
PRP2	LFW67D	BGO26D	HSB108D
PRP3	LFW68D	BGO27D	HSB109D
PSB3A	LFW70D	BGO30D	HSB110D
PSB4A	LFW71D	BGO31D	HSB111E
PSB5A	LFW72D	BGO32D	HSB112E
PSB6A	HIW2D	BGO34D	HSB114D
PSS2D	FAB2	BGO35D	HSB115D
PSS3D	FAB3	BGO36D	HSB116D
RAC1	HAA1D	BGO37D	HSB117D
RAC3	HAA2D	BGO38D	HSB125D
RAC4	HAA4D	BGO39D	HSB126D
RDB1D	CBR4D	BGO45D	HSB127D
RSA7	BRR8DR	BGX3D	HSB129D
RSA8	LFW74D	BGX4D	HSB130D
RSA9	LFW75D	BGX9D	HSB131D
RSA10	AMB14D	BGX10D	HSB132D
RSB7	AMB16D	BGX12D	HSB134D
RSC7	CMP11D	DBP1	HSB135D
RSD3	CMP14D	DBP2	HSB136D
RSE3A	CMP32C	DBP3	HSB137D
SCA2	KDB4	DOB1	HSB138D
SCA4	LDB4	DOB2	HSB139D
SCA5	PDB4	DOB3	HSB140D
SRW1	PDB5	DOB4	HSB141D
SRW2	DOB9	FNB1	HSB142D
SRW4	BGO52D	FNB2	HSB143D
SRW5	TNX13D	FNB3	HSB146D
SRW6	TNX14D	FNB4	HSB147D
SRW7	TNX18D	FSB90D	HSB148D
SRW8	TNX19D		HSB149D

HSB150D	TNX7D	ASB9	FSB78
HSB151D	TNX8D	BGO5D	FSB87D
HSB152D	TNX9D	BGO7D	FSB88D
HTF5	TNX10D	BGO8D	FSB89D
HTF6	TNX11D	BGO16D	FSB90D
HTF7	TNX12D	BGO18D	FSB91D
HTF8	XSB1D	BGO20D	FSB92D
HTF13	XSB2D	BGO23D	FSB93D
HTF14	XSB3A	BGO36D	FSB95DR
HTF15	XSB4D	BGO39D	FSB97D
HTF16	ZDT1	BRR1D	FSB98D
HTF17	ZDT2	BRR2D	FSB99D
HTF18	ZW9	BRR3D	FSB104D
HTF19	ZW10	BRR4D	FSB105DR
HTF20	BGO50D	BRR5D	FSB106D
HTF22	BGO14DR	CBR1D	FSB107D
HTF23	BGO49D	CBR2D	FSB108D
HTF24	BGX1D	CBR3D	FSB109D
HTF25	BGX6D	CCB1	FSB110D
HTF26	BGX7D	CCB2	FSB111D
HTF27	AMB4D	CCB3	FSB112D
HTF28	BGO44D	CCB4	FSB113D
HTF29	BGO17DR	CMP8	FSB114D
HTF32	BGX8DR	CMP12	FSB115D
HTF34	BGX11D	CMP13	FSB116D
KRP2	BGO22DR	CMP15C	FSB117D
LFW32	FSL6D	CRP1	FSB118D
LFW34	FSL8D	CRP4	FSB119D
LFW43D	HSL1D	CSA1	FSB120D
MSB1D	HSL3D	CSA2	FSB122D
MSB2D	HSL2D	CSA3	FSB123D
MSB3D	HSL4D	CSA4	HAC2
MSB4D	FSL1D	CSB1A	HAC4
MSB5A	HSL8D	CSB3A	HAP1
MSB6A	HSL7D	CSB4A	HCA1
MSB7A	FSL9D	CSB5A	HCA2
MSB8A	FSL7D	CSB6A	HCA3
MSB13D	FSL2D	CSO1	HCA4
MSB33	FSL3D	CSR1	HCB2
MSB57D	FSL4D	CSR3	HCB3
MSB58D	FSL5D	CSR4	HCB4
MSB59D	ASB3AR	DBP1	HET2D
MSB60D	BGO51D	DBP2	HET3D
MSB62D	LFW74D	DBP3	HET4D
MSB63D	LFW75D	DBP4	HR812
MSB64D	AMB16D	DCB1A	HSB66
SBG2	BGO52D	DCB2A	HSB83D
SBG3	BGO12DR	DCB3A	HSB101D
SRW1	BGO11DR	DCB4A	HSB102D
SRW5	BGO3DR	DCB5A	HSB105D
SRW6	<u>Thallium</u>	DCB6	HSB107D
SRW7	ABP3	DCB7	HSB110D
SRW8	ABP8D	DCB8	HSB111E
SRW9	AMB5	DCB9	HSB113D
SRW10	AMB6	DCB10	HSB114D
SRW11	AMB7	DCB11	HSB115D
SRW12C	AMB8D	DCB12	HSB116D
SRW13C	AMB9D	DCB13	HSB134D
SRW14C	AMB10D	DCB15	HSB143D
SRW15C	AOB1	DCB16	HSB148D
SRW16C	AOB2	DOB1	HSB150D
TBG1	AOB3	DOB2	HTF5
TBG3	ARP1A	DOB3	HTF6
TBG4	ARP2	DOB4	HTF7
TBG5	ARP3	FNB1	HTF8
TBG6	ARP4	FNB2	HTF13
TNX1D	ASB1A	FNB3	HTF14
TNX2D	ASB4	FNB4	HTF15
TNX3D	ASB6A	FSB76	HTF16
TNX4D		FSB77	HTF17

HTF18	PSB4A	FSL3D	AMB8D
HTF19	PSB5A	FSL4D	AMB9D
HTF20	PSB6A	FSL5D	AMB10D
HTF22	PSB7A	ASB2AR	AOB1
HTF23	RAC1	ASB3AR	AOB2
HTF24	RAC2	ASB5AR	AOB3
HTF25	RAC3	BRR6D	ARP1A
HTF26	RAC4	BRR7D	ARP2
HTF27	RSE10	FNB5	ARP3
HTF28	SBG2	LAC5DU	ARP4
HTF29	SBG3	LAC6DU	ASB4
HTF32	SRW1	LAC7DU	ASB6A
HTF34	SRW2	LAC8DU	ASB9
HXB4D	SRW4	LCO8DU	BGO1D
HXB5D	SRW5	HAA1D	BGO2D
KCB1	SRW6	HAA2D	BGO3D
KCB2	SRW7	HAA3D	BGO4D
KCB3	SRW8	HAA4D	BGO5D
KRP1	SRW9	HAA6D	BGO6D
KRP2	SRW10	BRR8DR	BGO7D
KRP3	SRW11	KCB5	BGO9D
KRP4	SRW12C	KCB6	BGO10DR
LAC1	SRW13C	KCB7	BGO11D
LAC2	SRW14C	LFW74D	BGO12D
LAC3	SRW15C	LFW75D	BGO15D
LAC4	SRW16C	AMB16D	BGO18D
LCO1	TBG1	CMP10D	BGO20D
LCO2	TBG3	CMP11D	BGO21D
LCO3	TBG4	CMP14D	BGO23D
LCO4	TBG5	CMP30D	BGO24D
LFW28	TBG6	CMP31C	BGO26D
LFW30	TNX1D	CMP32C	BGO27D
LFW31	TNX2D	CMP32D	BGO28D
LFW32	TNX3D	DOB7	BGO30D
LFW34	TNX4D	DOB8	BGO31D
LFW43D	TNX7D	DOB9	BGO32D
LRP1	TNX8D	DOB10	BGO33D
LRP2	TNX9D	DCB17A	BGO34D
LRP3	TNX10D	DCB18A	BGO35D
LSB1	TNX11D	DCB19A	BGO36D
LSB2	TNX12D	DCB20A	BGO37D
LSB3	XSB1D	DCB21A	BGO38D
LSB4	XSB2D	DCB22A	BGO39D
MCB2	XSB3A	DCB23A	BGO40D
MCB4	XSB4D	DCB24A	BGO45D
MCB5	YSB1A	DOB12	BGX3D
MCB6	ZBG1	DOB14	BGX4D
MSB1D	ZDT1	CRP3D	BGX5D
MSB2D	ZDT2	CRP5D	BGX9D
MSB3D	ZW9	CRP7D	BGX10D
MSB4D	ZW10	CRP8D	BGX12D
MSB5A	BGO14DR	CRP9D	CBR1D
MSB6A	AMB4D	MCB11D	CBR2D
MSB8A	CSB2A	MCB13D	CBR3D
MSB13D	FSB121DR	ABP9D	CCB1
MSB33	FSB0PD	ABP10D	CCB2
MSB57D	FSL6D	RSP1D	CCB3
MSB58D	FSL8D	RBW1D	CCB4
MSB59D	HSL1D	RBW2D	CMP8
MSB60D	HSL3D	BGO12DR	CMP12
MSB62D	HSL2D	BGO3DR	CMP13
MSB63D	HSL4D	KRP6	CMP15C
MSB64D	FSL1D	KRP7	CRP1
PRP1A	HSL8D	<u>Vanadium</u>	CRP4
PRP2	HSL7D	ABP3	CSA1
PRP3	HSL6D	ABP8D	CSA2
PRP4	HSL5D	AMB5	CSA3
PSB1A	FSL9D	AMB6	CSA4
PSB2A	FSL7D	AMB7	CSB1A
PSB3A	FSL2D		CSB3A

CSB4A	CSB5A	CSO1	CSR1	CSR3	CSR4	DBP1	DBP2	DBP3	DBP4	DCB1A	DCB2A	DCB3A	DCB4A	DCB5A	DCB6	DCB7	DCB8	DCB9	DCB10	DCB11	DCB12	DCB13	DCB15	DCB16	DOB3	DOB4	FNB1	FNB2	FNB3	FNB4	FSB76	FSB77	FSB78	FSB79	FSB87D	FSB88D	FSB89D	FSB90D	FSB91D	FSB92D	FSB93D	FSB98D	FSB99D	FSB104D	FSB106D	FSB107D	FSB108D	FSB110D	FSB111D	FSB112D	FSB113D	FSB114D	FSB115D	FSB116D	FSB117D	FSB118D	FSB119D	FSB120D	FSB122D	FSB123D	FSS2D	HAC2	HAC4	HAP1	HCA1	HCA2	HCA3	HCA4	HCB2	HCB3	HCB4	HET2D	HET3D	HET4D	HMD1D	HMD2D	HMD3D	HMD4D	HR812	HSB65	HSB66	HSB67	HSB68	HSB69	HSB70	HSB71	HSB83D	HSB84D	HSB86D	HSB100D	HSB102D	HSB103D	HSB104D	HSB105D	HSB106D	HSB107D	HSB108D	HSB109D	HSB110D	HSB111E	HSB113D	HSB114D	HSB115D	HSB116D	HSB117D	HSB125D	HSB126D	HSB127D	HSB129D	HSB130D	HSB131D	HSB132D	HSB134D	HSB135D	HSB136D	HSB137D	HSB138D	HSB139D	HSB140D	HSB141D	HSB142D	HSB143D	HSB146D	HSB147D	HSB149D	HSB151D	HSB152D	HTF5	HTF6	HTF7	HTF8	HTF13	HTF14	HTF15	HTF16	HTF17	HTF18	HTF19	HTF20	HTF22	HTF23	HTF24	HTF25	HTF26	HTF27	HTF28	HTF29	HTF32	HTF34	KCB2	KCB3	KRP1	KRP2	KRP3	KRP4	LAC1	LAC2	LAC3	LAC4	LCO1	LCO2	LFW6	LFW8	LFW10A	LFW16	LFW17	LFW18	LFW19	LFW20	LFW21	LFW22	LFW23	LFW24	LFW25	LFW26	LFW27	LFW28	LFW29	LFW30	LFW31	LFW32	LFW33	LFW34	LFW35	LFW36	LFW37	LFW38	LFW39	LFW40	LFW41	LFW42	LFW43D	LFW44D	LFW45D	LFW46D	LFW47D	LFW56D	LFW57D	LFW58D	LFW59D	LFW60D	LFW61D	LFW62D	LRP1	LRP2	LSB1	LSB2	LSB3	LSB4	MCB2	MCB4	MCB6	MSB1D	MSB2D	MSB3D	MSB4D	MSB5A	MSB6A	MSB7A	MSB8A	MSB13D	MSB33	MSB57D	MSB58D	MSB59D	MSB60D	MSB63D	MSB64D	NBG1	PRP2	PSB1A	PSB2A	PSB3A	PSB4A	PSB5A	PSB6A	PSB7A	RAC1	RAC2	RAC3	RAC4	RSE10	SBG2	SBG3	SRW1	SRW2	SRW4	SRW5	SRW6	SRW7	SRW8	SRW9	SRW10	SRW11	SRW12C	SRW13C	SRW14C	SRW15C	SRW16C	TBG1	TBG3	TBG4	TBG5	TBG6	TNX1D	TNX2D	TNX3D	TNX4D	TNX7D	TNX8D	TNX9D	TNX10D	TNX11D	TNX12D	XSB1D	XSB2D	XSB3A	XSB4D	YSB1A
-------	-------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	------	------	------	------	-------	-------	-------	-------	-------	-------	------	------	------	------	------	------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	-------	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	--------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	--------	-------	--------	--------	--------	--------	--------	--------	------	------	-------	-------	-------	-------	-------	-------	-------	------	------	------	------	-------	------	------	------	------	------	------	------	------	------	------	-------	-------	--------	--------	--------	--------	--------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	-------	-------	-------	-------	-------

ZBG1	DCB20A
ZDT1	DCB21A
ZDT2	DCB22A
ZW9	DCB23A
ZW10	DCB24A
BGO50D	DOB14
BGO29D	CRP7D
BGO14DR	CRP8D
BGO49D	CRP9D
BGX1D	MCB11D
BGX6D	MCB13D
BGX7D	ABP9D
AMB4D	ABP10D
CSB2A	RSP1D
BGO44D	RBW1D
BGO17DR	RBW2D
BGX8DR	BGO12DR
BGX11D	BGO11DR
FSB121DR	BGO3DR
FSB0PD	KRP6
FSL8D	KRP7
HSL1D	
HSL3D	
HSL2D	
HSL4D	
HSL8D	
HSL5D	
FSL9D	
FSL4D	
FSL5D	
ASB2AR	
ASB3AR	
ASB5AR	
FNB5	
LAC5DU	
LAC6DU	
LAC7DU	
LAC8DU	
LCO8DU	
LFW63D	
LFW66D	
LFW67D	
LFW68D	
LFW69D	
LFW70D	
LFW71D	
LFW72D	
HAA1D	
HAA2D	
HAA4D	
HAA6D	
BRR8DR	
BGO51D	
KCB6	
KCB7	
LFW74D	
LFW75D	
AMB16D	
CMP10D	
CMP11D	
CMP14D	
CMP30D	
CMP31C	
CMP32C	
CMP32D	
DOB9	
BGO52D	
DCB17A	
DCB18A	
DCB19A	

APPENDIX J. SRS (SITEWIDE) BACKGROUND WELLS THROUGH CLUSTERING APPROACH

Nitrate as nitrogen

ASB9
DBP4
DOB3
FAC3
FAC6
FAC8
FSS1D
HAC2
HMD2D
HMD3D
HSB71
HSB131D
HSB140D
HSB141D
KAC2
KAC6
KSS3D
LAC4
LFW6
LFW8
LFW10A
LFW16
LFW17
LFW18
LFW21
LFW22
LFW25
LFW31
LFW36
LFW37
LFW38
LFW39
LFW40
LFW41
LFW42
LFW46D
LFW47D
LFW48D
LFW57D
LFW58D
LFW59D
LFW60D
LFW61D
PAC2
PAC5
PAC6
PSS3D
TNX12D
FBP5D
FBP9D
FBP13D
LAC8DU
LFW63D
LFW66D
LFW67D
LFW68D
LFW69D
LFW70D
LFW71D
LFW72D
FAB2

FAB3
HAA1D
HAA2D
DOB7
DOB8
TNX23D
pH
AC3B
ACB1A
AMB7
AMB10DD
AMB11D
AMB12D
BGO12D
BGO16D
BGO23D
BGO24D
BGO28D
BGO34D
BGO37D
BGX4D
BGX10D
BRR3D
BRR4D
CMP13
CMP14C
CMP15C
DOB1
FAC3
FAC6
FAL2
FCA9D
FCA10D
FCA16A
FCA16D
FCA19D
FCB3
FSB106D
FSB109D
FSS1D
FSS2D
FTF9
FTF12
FTF13
FTF21
FTF24A
FTF25A
FTF26
FTF27
HAP1
HCA2
HCA3
HCA4
HMD2D
HMD4D
HSB138D
HTF5
HTF13
HTF14
HTF22
HTF23
HXB4D
HXB5D
KAB4

KAC1
KAC3
KSS3D
LAC4
LCO1
LCO4
LFW6
LFW8
LFW10A
LFW17
LFW18
LFW21
LFW36
LFW40
LFW48D
LFW57D
MCB6
MSB1D
MSB13D
MSB14C
MSB16C
MSB20C
MSB28
MSB36D
MSB44C
MSB46C
MSB48D
MSB49D
MSB50D
MSB52D
MSB62D
MSB64D
MSB67D
NBG3
PAC2
PAC3
PAC5
PAC6
RDB2D
RDB3D
RSC5
RSC9
RSC10
TBG7
TNX1D
TNX12D
YSB1A
YSB3A
ZDT1
BGO50D
BGX1D
BGX6D
BGX7D
BGX8DR
FSL2D
ASB2AR
ASB3AR
FBP9D
MSB87C
LAC5DU
LAC6DU
LAC7DU
FAB1
FAB2

FAB3
FAB4
HAA3D
CMP10D
CMP14D
CMP30D
CMP32C
KDB4
KDB5
LDB3
TNX17D
CRP3D
CRP9D
Tritium
ABP3
ACB2A
AOB1
AOB2
ARP1A
ARP2
ARP3
ARP4
ASB1A
ASB4
ASB6A
BGO26D
BRD1
BRD2
BRD5D
CBR1D
CCB2
CCB4
CMP12
CMP13
CMP15C
CSA3
CSA4
CSD9D
DBP1
DBP2
DBP3
DBP4
DCB1A
DCB2A
DCB3A
DCB5A
DCB6
DCB7
DCB8
DCB9
DCB13
DCB15
DOB1
DOB2
DOB4
FAC3
FAC4
FAC6
FAC7
FAL1
FAL2
FCA9D
FCA10A
FCA16A

FCA19D	RRP3	LFW67D	BGO9D
FCB4	RSA7	LFW70D	BGO10DR
FET2D	RSA8	LFW72D	BGO11D
FNB4	RSA9	FAB3	BGO12D
FSS4D	RSA10	KCB5	BGO15D
FTF3	RSB7	KCB6	BGO18D
FTF4	RSB8	LFW74D	BGO20D
FTF9	RSC2	LFW75D	BGO21D
FTF17	RSC3	AMB15D	BGO26D
FTF20	RSC4	AMB16D	BGO31D
HWS2	RSC5	CMP14D	BGO37D
KAC5	RSC6	CMP30D	BGO45D
KAC6	RSC7	CMP31C	BGX4D
KRP3	RSC8	CMP32C	BGX12D
KSS2D	RSC9	TNX13D	BRD1
LAC1	RSC10	TNX14D	BRD2
LAC4	RSD1	TNX15D	BRD5D
LCO3	RSD3	TNX16D	BRR1D
LDB2	RSD4	TNX17D	BRR2D
LFW6	RSD5	TNX18D	BRR4D
LFW17	RSD6	TNX19D	BRR5D
LFW19	RSD7	TNX21D	CBR1D
LFW20	RSD8	TNX22D	CBR3D
LFW22	RSE1B	FST1D	CCB1
LFW23	RSE3A	CRP8D	CCB2
LFW25	RSE18	MCB11D	CCB3
LFW27	RSE19	MCB13D	CCB4
LFW29	SRW2	ABP9D	CDB2
LFW33	SRW5	ABP10D	CMP8
LFW35	SRW6	TNX23D	CMP10
LFW41	SRW7	TNX24D	CMP11
LFW43D	SRW9	TNX26D	CMP14C
LFW44D	SRW10	LFW6R	CRP1
LFW46D	SRW11	LFW36R	CRP4
LRP1	SRW13C	TRW4	CSA1
LRP2	SRW14C	<u>Aluminum</u>	CSA2
LRP3	SRW15C	ABP3	CSA3
MCB5	SRW16C	AC2B	CSA4
MCB6	TBG1	AC3B	CSB4A
MSB5A	TBG4	ACB1A	CSB6A
MSB8A	TNX1D	ACB2A	CSD2D
MSB33	TNX2D	ACB3A	CSD4D
MSB34C	TNX3D	AMB7	CSD8D
MSB38D	TNX4D	AMB8D	CSD9D
MSB41D	TNX6D	AMB9D	CSD10D
MSB42D	TNX7D	AMB10D	CSD11D
MSB50D	TNX8D	AMB10DD	CSD12D
MSB53D	TNX9D	AMB11D	CSD13D
MSB67D	TNX11D	AMB12D	CSO1
MSB70D	TNX12D	AOB1	CSR1
MSB74D	XSB2D	AOB2	CSR2
MSB77D	XSB4D	ARP1A	CSR3
MSB82D	YSB2A	ARP2	CSR4
MSB83D	YSB3A	ARP4	DBP1
MSB85D	YSB4A	ASB1A	DCB2A
PAC2	ZW3	ASB6A	DCB3A
PAC3	ZW6	ASB9	DCB16
PAC5	DBP5	BG92	DOB1
PAC6	ASB2AR	BG93	DOB2
PCB1A	ASB3AR	BG96	DOB4
PCB2A	ASB5AR	BG101	FAC4
RAC1	FBP6D	BG103	FAL1
RAC3	FBP9D	BG108	FCA16A
RAC4	FBP13D	BG109	FCB2
RCP1D	MSB87C	BG122	FCB4
RDB1D	MSB88D	BGO2D	FCB5
RDB2D	LAC5DU	BGO5D	FCB6
RDB3D	LAC6DU	BGO7D	FET2D
RRP1	LAC8DU	BGO8D	FET3D
RRP2	LFW66D		FET4D

FSB99D	LCO2	MSB49D	YSB1A
FSB106D	LCO3	MSB50D	ZDT2
FSB109D	LFW10A	MSB53D	ZW2
FSB111D	LFW17	MSB54D	ZW7
FSB113D	LFW18	MSB55D	ZW9
FSB114D	LFW19	MSB57D	BGO50D
FSB118D	LFW20	MSB58D	BGO14DR
FSB120D	LFW21	MSB60D	BGO49D
FSB122D	LFW22	MSB61D	BGX1D
FSB123D	LFW23	MSB65D	BGX6D
GBW1	LFW24	MSB67D	BGX7D
HAC1	LFW25	MSB68D	AMB4D
HAC2	LFW26	MSB69D	KRB17D
HAC3	LFW27	MSB70D	KRB19D
HAC4	LFW28	MSB82D	KRB16D
HAP1	LFW29	MSB83D	NPM34A
HCA2	LFW30	MSB85D	BGO17DR
HCA3	LFW31	NBG1	FSL8D
HET3D	LFW32	NBG4	HSL3D
HMD3D	LFW33	NBG5	HSL2D
HR812	LFW34	NPM3	HSL8D
HSB65	LFW35	NPM4DD	ASB2AR
HSB70	LFW36	PAC1	ASB3AR
HSB71	LFW37	PAC2	MSB88D
HSB83D	LFW38	PAC3	BRR6D
HSB100D	LFW39	PAC4	LAC6DU
HSB107D	LFW40	PRP4	LAC8DU
HSB110D	LFW41	PSB1A	LCO8DU
HSB117D	LFW42	PSB2A	LFW63D
HSB125D	LFW43D	PSB3A	LFW66D
HSB130D	LFW44D	PSB4A	LFW67D
HSB131D	LFW45D	PSB5A	LFW68D
HSB132D	LFW46D	PSB6A	LFW69D
HSB135D	LFW47D	PSB7A	LFW70D
HSB137D	LFW48D	PSS2D	LFW71D
HSB138D	LFW56D	RAC2	LFW72D
HSB139D	LFW57D	RAC3	HIW2D
HSB143D	LFW58D	SBG2	HAA1D
HSB149D	LFW59D	SBG3	HAA2D
HSB151D	LFW60D	SCA2	BRR8DR
HWS1A	LFW61D	SCA3A	BGO51D
HWS2	LRP1	SCA4	LFW74D
IDB6	LRP2	SCA4A	LFW75D
IDB7	LRP3	SRW1	CMP31C
IDB8	LSB1	SRW2	PDB4
IDP4	LSB3	SRW4	DOB7
IDP5	LSB4	SRW5	DOB9
IDP6	MCB4	SRW6	DOB10
IDP7	MCB6	SRW7	BGO52D
IDQ7	MSB1D	SRW8	TRW1
IDQ8	MSB2D	SRW9	TNX17D
IDQ12	MSB5A	SRW10	TNX19D
KAB1	MSB7A	SRW11	TNX20D
KAB2	MSB8A	SRW12C	DOB12
KAB3	MSB13D	SRW13C	CRP5D
KAC1	MSB15D	SRW14C	CRP8D
KAC2	MSB17D	SRW15C	CRP9D
KAC5	MSB18C	SRW16C	TNX24D
KCB1	MSB21C	TBG5	BGO12DR
KCB2	MSB24	TBG7	BGO11DR
KDB2	MSB26	TNX2D	BGO3DR
KRP1	MSB27	TNX5D	LFW6R
KRP2	MSB28	TNX6D	LFW8R
KRP3	MSB30C	TNX7D	LFW36R
KSB2	MSB33	TNX8D	LFW41R
KSB3	MSB34C	TNX9D	TRW2
KSB4A	MSB36D	TNX11D	TRW3
LAC1	MSB38D	TNX12D	TRW4
LAC2	MSB39D	XSB3A	<u>Iron</u>
LCO1	MSB41D	XSB4D	

ABP3	CMP10	HMD2D	KSB2
ACB2A	CMP11	HMD3D	KSB3
ACB3A	CMP14C	HMD4D	KSS3D
ACB4A	CMP15C	HSB65	LAC1
AMB5	CRP1	HSB66	LAC2
AMB7	CRP4	HSB67	LAC3
AMB9D	CSA1	HSB70	LCO3
AMB10D	CSA3	HSB71	LDB1
AMB11D	CSB4A	HSB83D	LDB2
AMB12D	CSB5A	HSB84D	LFW16
AOB2	CSD2D	HSB86D	LFW19
AOB3	CSD4D	HSB102D	LFW20
ARP1A	CSD8D	HSB103D	LFW23
ARP2	CSD9D	HSB104D	LFW24
ARP4	CSD10D	HSB105D	LFW25
ASB1A	CSD11D	HSB106D	LFW26
ASB4	CSD12D	HSB107D	LFW27
ASB6A	CSD13D	HSB108D	LFW28
ASB9	CSO1	HSB109D	LFW29
BG61	CSR3	HSB110D	LFW30
BG92	CSR4	HSB111E	LFW31
BG93	DBP1	HSB112E	LFW32
BG96	DCB3A	HSB114D	LFW33
BG103	DCB4A	HSB116D	LFW34
BG104	DOB4	HSB117D	LFW35
BG109	FAC4	HSB125D	LFW41
BG110	FAL1	HSB126D	LFW42
BG122	FCA2D	HSB127D	LFW43D
BGO1D	FCA10D	HSB129D	LFW44D
BGO2D	FCA16A	HSB130D	LFW45D
BGO3D	FCA16D	HSB132D	LFW46D
BGO4D	FCB5	HSB134D	LFW47D
BGO5D	FCB6	HSB135D	LFW56D
BGO6D	FET1D	HSB137D	LFW59D
BGO7D	FET2D	HSB138D	LFW60D
BGO8D	FET3D	HSB143D	LRP1
BGO9D	FET4D	HSB146D	LRP2
BGO10DR	FNB1	HSB147D	LRP3
BGO11D	FNB2	HSB149D	LSB1
BGO12D	FNB4	HWS1A	LSB3
BGO15D	FSB76	HXB5D	MCB4
BGO16D	FSB77	IDB4	MCB5
BGO18D	FSB78	IDB5	MCB6
BGO20D	FSB79	IDB6	MSB1D
BGO21D	FSB89D	IDB7	MSB2D
BGO24D	FSB91D	IDB8	MSB4D
BGO26D	FSB92D	IDP4	MSB5A
BGO27D	FSB93D	IDP5	MSB8A
BGO30D	FSB95DR	IDP6	MSB9C
BGO31D	FSB99D	IDP7	MSB11F
BGO34D	FSB107D	IDP8	MSB13D
BGO37D	FSB108D	IDP9	MSB17D
BGO39D	FSB109D	IDQ5	MSB18C
BGO40D	FSB111D	IDQ6	MSB21C
BGO45D	FSB113D	IDQ7	MSB24
BGX3D	FSB114D	IDQ9	MSB26
BGX4D	FSB117D	IDQ10	MSB27
BGX5D	FSB118D	IDQ12	MSB28
BGX9D	FSB120D	KAC1	MSB31C
BGX12D	FSB122D	KAC2	MSB33
BRD1	FSB123D	KAC3	MSB34C
BRD2	FTF21	KAC5	MSB38D
BRD5D	HAC4	KCB1	MSB47D
BRR4D	HAP1	KCB3	MSB49D
CBR1D	HCA2	KDB2	MSB50D
CBR2D	HCA3	KDB3	MSB51D
CBR3D	HCB3	KRP1	MSB52D
CCB1	HCB4	KRP2	MSB54D
CCB4	HET2D	KRP4	MSB55D
CMP8	HET3D	KSB1	MSB57D

MSB59D	BGX7D	TRW4	CSD8D
MSB60D	AMB4D	<u>Manganese</u>	CSD9D
MSB61D	KRB18D	ABP3	CSO1
MSB62D	KRB19D	ABP8D	CSR1
MSB63D	KRB16D	ACB1A	CSR3
MSB64D	KSM1D	AMB5	DBP1
MSB65D	NPM19A	AMB7	DCB2A
MSB67D	BGO17DR	AMB9D	DCB3A
MSB69D	FSB121DR	AMB12D	DCB8
MSB70D	FSB0PD	AOB1	DOB3
MSB74D	FSL6D	AOB2	DOB4
MSB77D	FSL8D	ARP2	FAC6
MSB82D	HSL1D	ARP3	FAL1
MSB83D	HSL3D	ARP4	FCA10D
NBG1	HSL2D	ASB1A	FCA16A
NBG4	HSL8D	ASB4	FCA19D
NBG5	HSL7D	BG92	FCB3
NPM2	HSL6D	BG93	FCB4
NPM3	FSL9D	BG96	FCB5
PAC1	FSL7D	BG101	FET1D
PCB2A	FSL2D	BG103	FET2D
PCB4A	DBP5	BG108	FET4D
PRP1A	FSL4D	BG109	FNB1
PSB1A	FSL5D	BGO2D	FNB4
PSB2A	ASB2AR	BGO3D	FSB76
PSB7A	ASB3AR	BGO6D	FSB109D
PSS2D	MSB88D	BGO8D	FSB113D
RAC2	FNB5	BGO12D	FSB115D
RAC3	LAC6DU	BGO16D	FSB120D
RRP1	LAC8DU	BGO21D	FSB122D
RRP2	LCO8DU	BGO23D	FTF21
RRP4	LFW63D	BGO24D	HAC2
RSA8	LFW66D	BGO26D	HCA1
SCA2	LFW67D	BGO32D	HCA4
SCA4A	LFW68D	BGO34D	HET2D
SRW1	LFW70D	BGO35D	HET3D
SRW2	LFW72D	BGO36D	HET4D
SRW4	HIW2D	BGO39D	HSB65
SRW5	HAA1D	BGX3D	HSB66
SRW6	HAA2D	BGX4D	HSB70
SRW8	HAA4D	BGX12D	HSB71
SRW9	BRR8DR	BRD1	HSB84D
SRW10	BGO51D	BRD2	HSB100D
SRW11	CMP31C	BRD3	HSB101D
SRW12C	CMP32C	BRD5D	HSB111E
SRW13C	PDB4	BRR2D	HSB117D
SRW14C	DOB7	CBR1D	HSB126D
SRW15C	DOB9	CBR2D	HSB130D
SRW16C	DOB10	CCB1	HSB131D
TBG1	BGO52D	CCB2	HSB135D
TBG3	TRW1	CCB3	HSB138D
TBG4	TNX13D	CCB4	HSB139D
TBG6	TNX14D	CDB1	HSB140D
TBG7	TNX15D	CDB2	HSB142D
TNX1D	TNX16D	CMP8	HSB143D
TNX2D	TNX18D	CMP10	HSB146D
TNX7D	TNX20D	CMP11	HSB147D
TNX12D	TNX22D	CMP12	HSB149D
XSB1D	DOB12	CMP13	HSB151D
XSB2D	CRP5D	CMP14C	HSB152D
XSB3A	CRP8D	CMP15C	HSS3D
XSB4D	CRP9D	CRP1	HTF8
YSB2A	TNX24D	CSA1	HTF16
ZBG1	BGO12DR	CSA3	HTF18
ZBG2	BGO11DR	CSB1A	HTF24
ZDT1	BGO3DR	CSB4A	HTF25
BGO14DR	LFW6R	CSB6A	HTF26
BGO49D	LFW41R	CSD1D	HTF28
BGX1D	TRW2	CSD2D	HTF32
BGX6D	TRW3		HWS2

IDB4	LRP2	PRP1A	BGO44D
IDB5	LRP3	PRP2	BGX8DR
IDB6	LSB2	PSB3A	BGX11D
IDB7	LSB4	PSB4A	HSL4D
IDB8	MCB2	PSB5A	HSL8D
IDQ5	MCB4	PSB6A	HSL5D
IDQ7	MCB5	PSS2D	FSL3D
IDQ8	MCB6	PSS3D	ASB3AR
IDQ9	MGA36	RAC1	MSB88D
IDQ10	MGC36	RAC3	LAC5DU
IDQ12	MSB1D	RAC4	LAC6DU
KAC1	MSB6A	RSA7	LAC7DU
KAC2	MSB7A	RSA8	LAC8DU
KAC3	MSB11F	RSA9	LCO8DU
KAC5	MSB13D	RSA10	LFW63D
KAC6	MSB14C	RSB7	LFW67D
KAC7	MSB15C	RSD3	LFW68D
KRP1	MSB15D	RSE1B	LFW70D
KRP2	MSB16C	SCA2	LFW71D
KRP3	MSB17D	SCA4	LFW72D
KSB1	MSB18C	SCA5	HIW2D
KSB2	MSB20C	SRW1	FAB3
KSB3	MSB24	SRW2	HAA1D
KSS1D	MSB26	SRW4	HAA2D
KSS3D	MSB31C	SRW5	HAA3D
LAC3	MSB34C	SRW6	HAA4D
LCO1	MSB38D	SRW7	BRR8DR
LCO3	MSB39D	SRW8	LFW74D
LDB1	MSB46C	SRW9	LFW75D
LFW8	MSB47D	SRW10	AMB14D
LFW18	MSB48D	SRW11	AMB16D
LFW19	MSB49D	SRW12C	CMP11D
LFW20	MSB51D	SRW14C	CMP32C
LFW23	MSB52D	SRW15C	KDB4
LFW24	MSB53D	TBG5	LDB4
LFW25	MSB54D	TNX4D	PDB4
LFW26	MSB56D	TNX5D	PDB5
LFW27	MSB58D	TNX6D	DOB9
LFW28	MSB60D	TNX7D	DOB10
LFW29	MSB61D	TNX8D	BGO52D
LFW31	MSB62D	TNX9D	TNX13D
LFW32	MSB63D	TNX11D	TNX14D
LFW33	MSB64D	XSB1D	TNX18D
LFW34	MSB65D	XSB4D	TNX19D
LFW35	MSB67D	YSB2A	TNX20D
LFW39	MSB74D	YSB3A	CRP5D
LFW40	MSB77D	ZBG1	CRP8D
LFW41	MSB82D	ZBG2	CRP9D
LFW42	MSB83D	ZDT1	BGO12DR
LFW44D	MSB85D	BGO49D	BGO11DR
LFW45D	NBG1	AMB4D	BGO3DR
LFW47D	NBG4	K301P	KSB5D
LFW48D	NBG5	KRB17D	LFW41R
LFW56D	NPM4DD	KRB18D	TRW4
LFW59D	PAC1	KRB16D	
LFW60D	PAC4	NPM19A	

APPENDIX K. RESPONSE TO COMMENTS FROM REVIEWS OF THE DRAFT REPORT

K.1. Comments from the CRESPI Internal Review Committee

Comments are italicized and indented, and responses appear in normal text.

The authors apply a wide variety of statistical techniques to the data set, but there may be a critical flaw in the analysis, which revolves around a basic assumption of the modeling effort: the methods used assume that some relatively large number of wells in the data set are likely to be uncontaminated, and that the job of the analysis is to weed out the contaminated ones from the uncontaminated set; however, it may be argued that the study should be required to prove that a well belongs in the uncontaminated group, not that it does not belong in this group. In this way, the distribution of concentrations in uncontaminated wells is likely to have a central tendency that is lower, thereby lowering the threshold for a finding that a particular well is uncontaminated, or that a well's water quality has been successfully reduced to the baseline level. Such a perspective would be far more protective of public health than the point of view assumed by the authors of this study.

Based on the methodology used by this study, there is no *a priori* reason to assume that the central tendency of concentrations in uncontaminated wells would be lower if the analysis were to include a well in the uncontaminated group, rather than excluding it from the contaminated group. The regression-based approach has an explicit step that checks for the central tendency of uncontaminated wells (wells whose median value of concentrations is higher than the group median value of concentrations are excluded). The clustering approach divides the wells into two groups, so the issue of including or excluding a well from a group does not arise at all.

The inclusion of lists of Tables and Figures would be helpful.

Lists of tables and figures have been included in the revised manuscript.

“US EPA Region IV”, “SCDHEC”, and “USGS” should be defined.

Full forms of USEPA, SCDHEC and USGS have been included.

Page iii, 1st paragraph, lines 4-6: the statement that “The site is relatively flat and slopes southeastward....” May cause problems with interpretation, in that the western part of the site drains largely to the southwest, its surface waters feeding tributaries of the Savannah River, which forms its southwestern boundary.

The phrase “and slopes southwestwards” was deleted to prevent problems of interpretation.

Page iii, 2nd paragraph: the text refers to “seventeen COPCs in groundwater” but only 15 are identified. Later in the report, nitrate, nitrite, and vanadium are included as COPCs, but strontium-90 appears to be dropped in many tabulations, making it difficult to interpret the statements about the data.

Page 1, 1st paragraph, lines 3-5: this sentence is the same as that appearing on page iii, 1st paragraph (see above comment).

Page 1, 4th paragraph, lines 3-5: the text refers to “sixteen” constituents, but only 15 are identified.

16 COPCs are identified, and a reason is given for exclusion of strontium-90 from further analysis.

Page iii, 2nd paragraph, line 7: “was” should be changed to “were”.

Page iii, 3rd paragraph, line 8: the first “were” should be changed to “was”.

Page 2, 1st paragraph, line 3: the last “reports” should be deleted.

Typographical errors were corrected.

Page 1, 1st paragraph: Although the surface topography is cited, no information on the volume or directional flow of the groundwater is given, yet a paper focused on groundwater quality might be expected to include information on the sub-surface geology and hydrology.

A more detailed explanation of the sub-surface hydrogeology is included in the revised report.

Page 2, 3rd paragraph: it would be helpful to include a map, referenced here, showing the boundaries of the SRS and the General Separations Area (GSA), since their boundaries are not clear in the maps of Appendix C.

A revised map is included as Figure 10.

Page 2, 3rd paragraph: “low-level” and “high-level” should be hyphenated consistently here and elsewhere.

Suggested modifications were made.

Page 2, last paragraph: why is no reference made to historical data on the sampling of groundwater in the region during the time before development of the SRS plant; or the data reported, for example by Looney et al in the March 1987 publication entitled “Selection of Chemical Constituents and Estimation of Inventories for Environmental Analysis of Savannah River Waste Sites”, which contains on-site well sampling data from the mid-1980s?

Based on discussions with SRS personnel responsible for maintaining GIMS, including Mr. Looney, a decision was made that the most reliable and consistent measurements were those from 1991 onwards. Data from preceding periods were examined and discarded due to quality control problems arising from inconsistencies in sampling, analysis and reporting of data.

Also, although Figures 3 and 4 show domestic wells in Georgia that are used for monitoring tritium, no explanation is given as to why these same wells were not used in COPC analyses to provide a view of the larger off-site area.

Domestic wells in Georgia were used as “control” wells to evaluate the background level estimates for the SRS. They could not be included in the analysis due to this reason.

Page 2, last paragraph, last line: “P” wells are said to be “distributed evenly within SRS”, but Figure 1 shows this not to be the case; i.e., 4 are shown in the northern third, 4 in the southern third, and 10 in the middle third of the site.

The statement was rephrased as “distributed throughout the SRS area” to reflect the spatial distribution of wells more precisely.

*Page 2, 4th paragraph, line 4: “this” should be changed to “these”.
Page 2, 4th paragraph, line 5: “strontium” should be changed to “strontium-90”.*

Suggested modifications were made.

Page 3: the map in Figure 1 has no legend to identify the features shown, and the maps in Appendix E are not clear in many respects.

As indicated in the caption accompanying the figure, the figure is originally from Strom and Kabeck (1992). No additional details are available in the original figure. The maps in Appendix E are included as color maps in the final report. The color maps are much more informative than the black and white figures included in the draft report.

Pages 4 and 5: the symbol for liter is “L” and should be used consistently.

Suggested modifications were made.

Page 4, Tale 1, title: why is the antiquated unit “Tritium Units” used here?

“Tritium Units” were converted to pCi/L.

Page 4, Table 2 : is the “strontium” stable strontium or strontium-90, and what are the units for this entry? Also, this is the first mention of “vanadium”.

“Strontium” refers to dissolved strontium in ug/L. “Strontium” was changed to “Strontium (dissolved)”. Vanadium now appears in the list of 16 COPCs.

Page 8, Figure 5: what are the units for the tritium levels?

pCi/L. Units were added to figure caption.

Page 12, 1st paragraph, line 5: “detects” should be changed to “that of non-detects”.

Typographical errors were corrected.

Page 12, 1st paragraph, last line: A basic criterion of the multistage methodological approach outlined in Figure 9 is the proportion of non-detects for the COPCs. Although this criterion seems reasonable, the considerable uncertainty involved in the characterization of the non-detects (in situ measurements below MDL, etc.), make this an uncertain criterion, as well. Also, it is puzzling that the methodological framework (presented in Figure 9) is based on the decomposition of a spatio/temporal phenomenon into a purely spatial component (modeled in terms of geostatistical variables) and a purely temporal component (represented by time series). It is not clear that this decomposition is a necessary one. It is usually more meaningful physically to view space and time as an integrated process, and statistical predictions are usually improved thereby. Is there a valid reason for using such a decomposition at this stage of the analysis (e.g., inadequate data sets for an accurate experimental calculation of spatiotemporal variograms, space/time support effects, numerical problems in the solution of large space/time systems of equations, the intention to include a composite space/time analysis at a later stage in the investigation, etc.)?

This issue is addressed in the report. This study is interested in all contamination, past or present. It is immaterial whether a plume passed through a well, is approaching a well, or is currently captured by a well. In that sense, the temporal dimension is required just for the identification of trends. Beyond that, temporal and spatial trends can be treated separately, which is why spatial kriging was used instead of spatiotemporal kriging. The two methods are insensitive to the use of proportion of non-detects as a criterion because the proportions are so widely and clearly separated.

Also, although Figure 9 is very useful, it does not include the step of removing all wells from the <20% detect group which have three detects in a row.

The omission was rectified.

Page 12, 2nd paragraph, line 4: “was” should be inserted after “wells”.

Page 12, 3rd paragraph, line 2: the second “were” should be changed to “was”.

Typographical errors were corrected.

Page 13, Figure 10: since the location of the observation points needs to be visualized clearly if kriging is to be performed, this figure is important and should be more legible.

Figure 10 has been revised and enlarged.

Furthermore, even a cursory look at the map in this figure indicates that the wells are rather clustered in space, so that the observations from these wells are likely to be autocorrelated over space. One would, therefore, expect spatial dependency in the data. In technical terms this spatial dependency appears as a non-diagonal variance-covariance matrix. Hence, before attempting any kriging or other geostatistical technique, it would have been advisable to examine the spatial dependency in the data thoroughly, since the results obtained from any one of the available kriging methods will depend heavily on the variance-covariance matrix, as evident from examination of the estimators for any kriging weights.. An examination of spatial dependency requires the development of a semi-variogram. Although spatial dependency can also be examined with a covariogram, a semi-variogram is preferred because of its robustness to outliers. The development of such a semi-variogram includes an analysis of spatial dependency in various directions over space (testing for anisotropy). Before examining the second-order effects (spatial dependency), as described above, efforts should be made to visualize the presence of first-order effects, otherwise known as a global trend over space. The presence of such a trend should point in the direction of using universal, as opposed to ordinary, kriging.. These methods are now available within the Spatial Statistics module of S-Plus, a package apparently familiar to the authors of the report. Also, in reporting kriging results, it is important to produce a surface of standard errors. Typically, such errors are high over areas with few observations, providing an idea of the confidence of kriging estimates.

This study does not have a primary goal of analyzing or mapping the spatiotemporal distribution of concentrations of COPCs, nor does it aim to predict future concentrations. Spatial mapping of concentrations is but one component of one approach (out of two) used to identify unimpacted wells. The simple application of the mapping method should be viewed in this context. Since kriging is only one filtering stage in the methodology, the use of a simple spatial mapping method is considered adequate for excluding wells in obviously contaminated areas. Spatial trends would certainly have an influence on the kriging results, so the analysis now uses a kriging algorithm based on the theory of Spatial Random Fields under the intrinsic hypothesis, instead of Ordinary Kriging. Intrinsic Kriging can be used when spatial trends may or may not be present. The algorithm computes a polynomial spatial covariance for a local neighborhood around the point of spatial estimation, so it accounts for any regional variance in the spatial structure represented by the measurements. A cross-validation algorithm incorporated into the kriging computer code computes optimum orders of spatial intrinsity, and the parameters

for the local generalized spatial covariance are estimated on the basis of the spatial pattern of data within the local neighborhood. Details of the intrinsic kriging method are included in the revised report.

Page 14 et seq: In the identification of measurements that fell below detection limits of the analytical techniques (non-detects), the detection process itself is considerably uncertain (lab variabilities, measurement errors, different techniques, etc.). Hence the use of a model that would provide a systematic quantification of the uncertainty in the detection process might conceivably aid the background analysis. The statistical characteristics of such models are well-characterized, and the models seem to work well in many practical situations. A stochastic measurement model with additive white noise might be a useful option.

Formulation of a stochastic model requires that repeated measurements are available at the same instant in time and the same location in space. No such data are available for the SRS area. In any case, analysis of measurement certainty; and prediction or modeling of data; are beyond the scope of this study.

Page 14, 2nd paragraph: The description of what measurements are included in the analysis is confusing, in that the combined measurements of blank, U, V, and J qualifiers number far more than the “90,000 measurements” that are said to have been considered for analysis.

The histogram in Figure 11 may have been confusing because it included data from 1986 onwards, while only data from 1992 onwards was used in the study. A revised histogram was included, which has the distribution of qualifiers from 1992 onwards.

Page 14, 2nd paragraph, line 5: the second “is” should be changed to “are”.
Page 14, 2nd paragraph, line 13: “were” should be changed to “was”.
Page 15, 1st paragraph, line 8: “effects” should be changed to “affects”.

Typographical errors were corrected.

Page 15, Table 4: “J” is defined as an “estimated quantity” in the table, but the last paragraph on page 15 states that “all J values except estimated values are rejected...”.

This part has been rephrased to make it clearer.

Page 15, 1st paragraph, last line: the captions at the bottom of each page in Appendix B do not seem to make sense.

The captions have been changed.

Page 16, Table 5: what are the units for “strontium”, and should the entry be labeled “strontium-90”?

Page 17, Table 6: why is there no entry for strontium in this table?

Strontium-90 was excluded from all analyses because of insufficient data. Table captions have been changed to reflect the exclusion.

Page 17, 1st paragraph: more details about the computation of the 75th percentile should be added, since no time series includes 100 observations; i.e., does the percentile selected correspond to the observation closest to the 75th rank (e.g., in the case of 10 observations, is the 7th closest to the 75th rank selected?) or is it the result of some kind of interpolation between observations?

The selected percentile corresponds to the observation closest to the 25th rank from the highest to the lowest values (i.e. 75th percentile is 3rd highest in case of 10 observations). This clarification has been added to the discussion.

Page 17, 2nd paragraph et seq: The spatial mapping stage of the analysis (preliminary identification of uncontaminated wells) has important consequences for the subsequent stages, and the use of kriging is a well established geostatistical technique for the purpose. Given the spatial non-homogeneity characteristics of the COPC distributions at certain regions of the SRS, however, it is possible that intrinsic kriging, rather than ordinary kriging might have been preferable for use in these regions

Intrinsic kriging is used in the revised study. Please refer to the revised report for details.

The application of kriging is puzzling in other respects, as well:

1) The same covariance model seems to have been used for all constituents, thereby eliminating the main advantage of kriging, which is to account for the pattern of variability of the attribute under study. No information is provided on how the variogram model was chosen, why the range was 2.1 km, or whether any nugget effect is included in the model. The statement (on page 18, lines 4-6) that “an exponential covariance model with a spatial correlation length of approximately 2.1 kilometers was determined to give the best estimates” implies that a cross validation was performed, but the constituents for which the estimates were the “best” and the criterion according to which the judgement was made are not clear.

2) The reason for having used only a single model, rather than several covariance models (different shapes, anisotropic characteristics, generalized functions, etc.) to capture local variations, is not apparent. Might it have been more realistic to have used a set of covariance models with varying correlation ranges in different neighborhoods for each CPOC? It seems surprising that all CPOC’s would exhibit the same covariance behavior, particularly if there is localized contamination emanating from different

sources for the different COPC's. More information should be provided about how the variogram was developed, as this is key to the kriging analysis. Also, the maps in Appendix D are unclear, particularly the difference between wells labeled as "baseline" and those labeled as monitoring wells. Were all wells shown used in the kriging analysis?

These comments are addressed by the use of local neighborhoods in the intrinsic kriging algorithm. Please refer to the revised report for details.

3) Having used the same covariance model for all constituents, a log transform of the data to prevent numerical artifacts in kriging was not justified. The kriging matrices depend only on the data configuration and covariance model, not on the observations themselves.

Log-transform of data is more useful for other filtering steps such as regression and detection of trends. Log transformed data were used for kriging just to maintain consistency with other steps. Since kriging estimates depend on the spatial pattern of measurements rather than the magnitude of measurements, data transformations do not impact kriging results. The distance units were rescaled from meters to kilometers to prevent numerical artifacts due to badly conditioned kriging matrices. The relevant paragraph in the report has been rephrased for greater clarity.

4) The separation of areas on the basis of kriged estimates is likely to be sensitive to the definition of the estimation grid. If the grid is very fine, grid nodes will coincide with well locations and the kriged estimates will correspond to the 75th percentile data. Since the mean of the kriged estimates is generally close to the sample mean, this criterion may simply amount to classifying as potentially uncontaminated the 50% of wells with the smallest 75th percentile data.

This comment assumes that the "mixed" probability distribution from the impacted as well as the unimpacted wells will be close to normal or lognormal. This study shows that the wells come from two separate populations, and the initial mixed distribution is close to, but not clearly, bimodal. Consequently, using the upper-half criterion does not amount to a straightforward rejection of half of the wells. The results in Table 9 and Table 13 indicate unambiguously that this is not the case. For example, Table 13 shows that out of the 843 wells measuring aluminum, 512 were excluded based on the kriging step.

5) A comparative analysis of numerical indicators of the kriging could have been helpful in optimal sampling design for the SRS region.

Optimal sampling design is beyond the scope of this study. The study uses available measurements, but is not intended to analyze the sampling strategy employed for monitoring groundwater quality.

6) Also, in the kriging analysis, all wells in the bottom half of the 75th percentile mapping were considered potentially uncontaminated; however, there is no reason to think that one-half of the wells should be uncontaminated and one half contaminated. Why not a 25/75% split, for example? There is an arbitrariness about this assignment that is troubling. Furthermore, once the wells have been split into the two groups, a well that fell into the potentially uncontaminated group could only be eliminated from further consideration as an uncontaminated site if it failed a subsequent hypothesis test. Of course, a failure in a hypothesis test is difficult to obtain; when the test is done at the $\alpha=0.05$ level, for example, the data must be within approximately 2 standard deviations from the expected value

This comment, like comment 4 above, assumes incorrectly that the initial “mixed” distribution is close to normal or lognormal. Observational evidence in the form of summary statistics (percentiles and histograms indicates otherwise. Since the distribution is not normal or lognormal, having a 50-50 split does not amount to filtering out half of the wells, and confidence tests at the $\alpha=0.05$ level do not apply. Results in Table 9 and Table 13 indicate very clearly that far more than half the wells are filtered out by this step. The mixed population of wells made the application of conventional statistical methods impossible, and this study represents an adaptation that accounts for the unique characteristics of the problem of defining background levels when there is no *a priori* information on a “clean” population.

So, a test must have a lot of power in order to allow a rejection, and for those wells which have a small number of time values for the wells (which is certainly the case for some wells based on the graphs presented), the trend tests probably had little power to detect a trend. Similarly, the null hypothesis of the outlier tests are that the points are not outliers; it would take a lot of evidence to deduce that a point was an outlier. Also, if the bulk of the wells still did not belong in “baseline”, this test would be unable to detect that – it would only detect those with values far outside of the mean of the set of potentially uncontaminated wells.

The results indicate that several wells were indeed rejected due to the trend tests. Furthermore, if any well had insufficient data, it was not considered for these tests.

Page 18, 3rd paragraph, line2: the text states that the maps in Appendix C refer to SRS, whereas their captions state that they refer to GSA.

Page 18, 4th paragraph, line 7: “were” should be changed to “was”.

Typographical errors were corrected.

Page 18, 4th paragraph et seq: the use of the three types of histograms to identify background wells is not adequately explained.

Page 19, 1st paragraph, last line: “Appendix E” should be changed to

“Appendices D and F”. Also, it is not clear how the third type of histogram in these appendices (“cumulative percent detects to concentration”) is computed nor what its significance is. Obviously, some subjective judgements were made from these histograms, but no explanation is offered. There should be a discussion, COPC by COPC, of how wells were eliminated from the “baseline” pool based on these histograms. Again, the emphasis should be on putting wells into the baseline pool, not removing contaminated wells from the pool.

These histograms were included for providing additional information. They were not used in any subsequent analysis. The text has been rewritten to reflect this.

In addition, there is an implicit assumption in this methodology that values over the detection limit indicate contamination – the detection limit is essentially the cutoff point for distinguishing contaminated from uncontaminated wells. This is presumably because the authors believe that virtually none of these compounds are naturally occurring, so that any detection of them, excluding the effects of natural variability, indicates contamination. This is an acceptable assumption to make, but it should be justified by science, not by the fact these compounds fell into the largely undetected category.

This assumption derives logically from the preponderant *observed* presence of non-detects; therefore, it does not require mechanistic arguments to support it. In any case, scientific arguments are supposed to explain observed reality. This study does attribute observed reality (a series of consecutive detects in a dataset that is predominantly composed of non-detects) to the presence of contamination, and in that sense, it constitutes science.

Page 19, 3rd paragraph et seq: this section of the report seems to have a better theoretical background than the other sections, in that the determination of background levels is based in this section on the results of statistical tests, instead of on arbitrary decisions regarding the number of consecutive detects or the threshold value for kriged estimates. The use of control charts is more restricting, but the assumption of independence is reasonable if all wells displaying trends have been removed. The assumption of normality cannot be tested for the small number of observations considered in the study. Furthermore, it should be noted that a normal-score transform, as implemented in Gslib, is usually a better alternative than a log-normal transform since it ensures the normality of the final histogram, regardless of the shape of the original histogram.

The log transform was used when the observations span several orders of magnitude. The use of control charts is supported by the heteroscedasticity of the data because any observation that does not fit into the initial probability distribution would be declared “out of control” and rejected.

Also, it would be of practical interest to derive the multi-point distributions of each COPC -- i.e., to obtain the N-variate ($N > 1$) probability distribution that relates the COPC values at N spatial points simultaneously -- rather than a set of N separate univariate distributions each one of which represents the value at a single point.

A multivariate distribution of concentrations for each COPC would be of interest if the data were to be modeled stochastically (for example, by stochastic simulation methods). Such an exercise is beyond the scope of this work.

Although not essential for the report, a brief introductory discussion of the groundwater regime within which the evaluated wells were located would be helpful. Since all of the wells appear to have been in the vadose zone, one wonders whether any of the observed temporal changes in tritium concentrations, as indicated in Figure 12, might have been related to groundwater flow from one contaminated well to another, as opposed to the contamination of each well independently by surface run-off.

A brief discussion of the hydrogeological regime has been included in the revised report. All the wells were located in the water table aquifer. The basic hypothesis is that wells were contaminated by a subsurface plume. Wastes were never injected into the subsurface from wells, so the question of flow from one contaminated well to another does not arise.

Page 19, Figure 12: this figure is illegible.

The revised figure is more legible.

Page 20: The space/time distributions of certain COPCs may be interrelated (cross-effects, etc.), and if this is the case, the statistical analysis could be improved by considering a multivariable (vectorial) framework. In other words, it may be useful to compare the results of the scalar kriging analysis with vector (or co-kriging) analysis simultaneously involving more than one COPC, etc.

This study does not seek to address issues of co-occurrence of different COPCs. Kriging is used as a simple filter, and co-kriging represents an inappropriate level of complexity for the intended objectives of the filtering step.

Page 20, 2nd paragraph, line 13: "were" should be changed to "was".

Typographical error was corrected.

Page 21, 2nd paragraph et seq: The regression analysis suffers from some of the same problems as the kriging analysis. The regression analysis is essentially

two analyses: the first analysis is really independent of the regression and simply says that all remaining wells whose 50th percentile is greater than the 75th percentile for all the measurements are not baseline. That's another judgement – it moves the breakpoint between contaminated and uncontaminated wells further down the set of wells, but really is not supported by any science or even statistical test. Now, since this analysis has excluded a set of points, and is not dependent on the regression, it should have been before the regression line was fit, since the regression will identify wells that are governed by a process different from that for the other wells.

The approach used in this study is not conventional regression, and should not be confused as such. Conventional regression would assume that the measurements are from one population (ie, the sample is homoscedastic), whereas a basic assumption behind this study is that the data are heteroscedastic. This method is an adaptation of regression analysis, and should be viewed accordingly.

The regression-based filter is now divided into two separate and consecutive steps: in the first step, the wells are filtered by their central tendency, and in the second one, they are filtered by their dispersion characteristics. Section 3.6 describes the revised regression-based method.

In any case, once that regression is performed, the only way a point can be removed is, once again, to fail the 95% test (based on the 95% confidence interval). (Actually, the picture for this regression was surprising, because one would expect the confidence interval line to diverge away from the mean values, but it seems to remain parallel to the fitted line. Perhaps the divergence in this case was too small to see on the scale of the graph). If the well fails this test, then the interpretation can be made that it is unlikely that the 95th percentile has the same relationship to the 50th percentile as the other wells in the data set.

The dashed line is not the 95th percentile confidence interval. It is the line where the 95th percentile of each individual well should lie, if there is a perfect regression fit. This is a vital difference. It also explains why the dashed line does not diverge away from the mean values.

If the assumption is that contaminated wells tend to have more “pulsing” of concentration than background wells, then this is a reasonable separation criterion. However, there is no science presented to explain why this should be so, and one may question it as a characteristic of long-term contaminated wells. (As an aside, using the procedure shown on page 12, figure 13 implies that 30 tritium wells should be excluded based on the regression analysis, but Table 8 says 8 were excluded. Also, one might suppose that the last 5 columns of Table 8 should add up the “total number of wells” column, but for some COPC's, they do not.)

The “pulsing” phenomenon referred to in this comment is an observed physical fact, so additional scientific explanations are superfluous. This is not an implied characteristic of long-term or short-term contamination. The pulsing occurs because the 95th percentile of concentrations in a well is higher than its expected value. Contamination drives the 95th percentile higher; hence this is a logically sound and physically intuitive separation criterion. The reason why the total number of wells does not add up is explained in the table footnotes.

Page 21, 2nd paragraph, 3rd bullet: “percentiles” should be changed to “percentile”.

Typographical error was corrected.

Page 22, 3rd paragraph: as noted in the text, the choice of exclusion parameters is somewhat arbitrary; hence it needs further explanation and justification (see above comments on Section 3.3).

Additional comments have been added in the revised report to reflect the basic assumptions that influenced the choice of this particular approach and the attendant choice of exclusion parameters.

Page 22, last paragraph et seq: the technique of using a cluster algorithm to group wells according to the values of several percentiles is appealing, and it would be interesting to know how the percentiles correlate with one another and whether it is necessary to incorporate all the variables in the analysis.

The percentiles appear to be highly correlated with each other (> 0.8). The reviewer is correct in pointing out that the additional information obtained by including several percentiles in the cluster analysis decreases as the correlation between the percentiles increase. However, as long as all pairs of percentiles have correlation coefficients of less than 1, use of all the percentiles will provide more information than if one or more of the percentiles had been left out of the analysis. Perhaps the only definitive answer to the question of how many percentiles are appropriate to include in the cluster analysis is to perform the analysis using an increasing number of percentiles, until the results of the clustering are essentially unchanged.

Because of its simplicity, cluster analysis is used extensively in a variety of applications. In general, the distance between items to be classified is computed on the basis of a set of variables that characterize the items, and then an algorithm is used, which on the basis of the calculated distance between items will assign them to a number of classes normally defined by the user. Different types of distance measures are available for the purpose (Euclidean, Manhattan, etc.), and the results depend on the combination of distance and algorithm that is chosen. The authors do not explain the why the particular algorithm was used, nor do they discuss the distance that was used. Whether a different combination would have led to different results is open to

question.

A method that could achieve the same objective cluster analysis but has a more elaborate statistical theory behind it is discriminant analysis. Was this method considered by the authors?

Application of discriminant analysis was considered. However, it could not be applied since an *a priori* classification of “background” and “not background” wells was unavailable.

Also, there are questions that relate to assumptions of the regression model that are obviously violated. The 95th percentile in a distribution represents a value that is always greater than the 50th percentile. This forces all the points in a scatterplot of such a relationship to be in one side of the 45 degree angle line that splits the first quadrant of the XY coordinate system in half.

This comment incorrectly confuses a 1-1 plot with a regression plot. A 1-1 plot would have a 45 degree angle line, but a regression plot is not required to have that slope *per se*. For example, the linear regression given by $y = .57x + .5$ will have a slope of .57, which corresponds to an angle of 30 degrees to the horizontal.

In most of the scatterplots shown in Appendices D and F, data points occupy almost all their allowable space, indicating the presence of heteroscedasticity. In attempting to correct for this assumption violation, one would resort to the weighted least squares method of estimation, as opposed to ordinary least squares, and it is not clear how such a correction would affect the 95th confidence interval of the regression line and ultimately the obtained classification of wells.

Heteroscedasticity is a basic and implicit assumption in this study, since there are two different populations: one of impacted wells, and one of unimpacted wells. In that sense, this is not a standard application of the regression method. The regression filter employed here rests on principles of linear regression, but it goes beyond the assumption (employed in standard regression plots) of a single, homogeneous population. It should be reiterated that the 95th confidence intervals are not used - the upper dashed line corresponds to “expected” values of 95th percentiles.

A point related to the above is the spatial distribution of the observations. This is known to lead to a non-diagonal variance-covariance matrix, necessitating the use of generalized least squares for the estimation of parameters in regression analysis. Again, the question is whether such a method would affect the results in any substantial way.

The use of intrinsic kriging addresses this issue by using a generalized polynomial covariance. A singular value decomposition solver is used by the algorithm to solve the kriging system of equations.

The computation of the discriminatory power of each percentile could improve the understanding of the clustering. Also, the possibility that the results of the cluster analysis could be inserted back into the kriging system to obtain improved maps of the COPC distributions may deserve to be considered.

As stated previously, this study does not intend to provide maps of spatial distributions of COPCs. Kriging is merely used as one filtering step among many, in one of the two independent approaches (regression-based and clustering). The results from the two approaches are not intermixed because they are intended to provide independent intercomparison.

Finally, it should be noted that modern spatiotemporal geostatistics (MSTG) techniques have features that may serve well at least some of the goals of the SRS study. These features include: 1) rigorously taking into consideration various forms of physical knowledge (hydrogeologic laws, multiple-point statistics, empirical relationships, hard and soft data), thus improving the accuracy and scientific content of space/time mapping; 2) providing the means to avoid the circular problem of empirical geostatistics (i.e., using the data to estimate the covariance models and then using the same data for kriging purposes); 3) MSTG are non-linear estimators, which permit more flexible estimation criteria (e.g., posterior pdf maximization) which are well-defined even for heavy-tailed fields; 4) N-variate ($N > 1$) probability distributions can be calculated.; 5) non-Gaussian laws are automatically incorporated; and 6) by taking into account physical laws, MSTG techniques possess global estimation features.

The authors are aware of the power of modern spatiotemporal geostatistics, and have employed spatiotemporal random field (STRF) theory for other applications. However, STRF or other MSTG applications were not considered necessary or appropriate for this study for reasons explained previously.

Page 24, 1st paragraph et seq: instead of comparing only the 50th and 95th percentiles of the probability distributions yielded by the regression analysis and the cluster analysis, Q-Q plots could be used to compare the whole distribution, over the full range of values, which could be more informative (the plots in Appendix D are not Q-Q plots but are either normal or log-normal probability plots).

There is no overriding fundamental difference between a Q-Q plot and a probability plot. Q-Q plots typically plot the observed quantiles versus the theoretical quantiles on plain graph paper. This is often referred to as a normal probability plot if the theoretical quantiles are taken from a normal distribution. Sometimes a normal or a log-normal

probability plot graphs the observed quantiles versus the corresponding probabilities ($1/n$, $2/n$, $3/n$, etc) but on normal or lognormal probability paper. The plots in Appendix D and Appendix F perform the latter and hence the comment by the reviewer. The plots serve essentially the same purpose.

Each point (star) on the Q-Q plots represents the percentiles for an individual well. The purpose for these plots is to identify how closely each well conforms to the overall grouped probability distribution, hence the choice of these particular percentiles.

It is not clear why the authors placed more trust in the results provided by the regression approach, on grounds that it allows for the input of expert judgement. Expert judgement is also used to determine the variables included in the cluster analysis.

The discussions in the revised report have been rephrased to reflect more clearly that results from both methods are given equal importance.

Furthermore, the approach adopted in this study was based on a Boolean, or crisp, classification of wells into contaminated and uncontaminated sets. A “fuzzy” classification would have been a more flexible alternative, which would have allowed a probability of contamination to be assigned to each well. The resulting probabilities could then have been used to compute a weighted average of the probability distribution for each well and, in turn, the probability distribution of background concentrations.

This study is driven by regulatory motivations, where a binary (yes or no) answer is needed for the contamination status of a well. In that sense, a boolean classification of wells is more appropriate. This discussion is added to the report.

As the authors point out, the distribution of concentrations in the baseline wells in the GSA tend to have higher concentrations than those in the SRS. If these wells are all supposed to represent naturally occurring conditions, this is a surprising result. Unless the geology and hydrology in these areas is quite different, the two sets of distributions should not be very different. The likely explanation is that some of the baseline wells of the GSA wells are contaminated with respect to the background wells of the SRS. Using the spirit of the methodology presented here, one might be tempted to conclude that all of the SRS wells are contaminated and all of the GSA wells are uncontaminated.

This comment seems contradictory because it first asserts: “*The likely explanation is that some of the baseline wells of the GSA wells are contaminated with respect to the background wells of the SRS*”; and then goes on to say “*Using the spirit of the methodology presented here, one might be tempted to conclude that all of the SRS wells are contaminated and all of the GSA wells are uncontaminated*”.

The study draws from records of operations at the SRS as well as unambiguous observational evidence that the GSA is far more contaminated than the SRS as a whole. The basic distinction between background and baseline wells was made to reflect the presence of elevated and diffuse contamination in the GSA, and the elevated final distribution of concentrations in the baseline wells in GSA is a consequence of the diffuse contamination of the area as a whole. The baseline wells do not in any way represent different natural conditions in the GSA.

Page 25, Table 7: the footnotes should be arranged in logical order.

Page 28, Table 9: “cesium” and “strontium” are called for in the title but are missing from the table.

Page 28, Table 10: this table shares the same number with another “Table 10” which appears on page 30. As a result, all the remaining tables in the report are misnumbered, and the references to “Table 10” in the text on pages 28-33 are ambiguous.

Typographical errors were corrected.

Page 29, Figure 16: In comparing the results of the regression and cluster analysis (discussion around Figure 16 and in the Conclusions), it is stated that the results are very similar or consistent. This is a subjective statement, however, and it is not clear how close the two sets have to be to be called “consistent”.

This discussion has been rewritten.

Page 30, Table 10: this table should be renumbered as “Table 11”, and its footnotes should be arranged in logical order.

Page 31, Table 11: this table should be renumbered as “Table 12”.

Page 32, Table 12: this table should be renumbered as “Table 13”, and although “cesium” and “strontium” are called for in the title, they are missing from the table.

Page 45, Figure B.3.: are the units for “cesium-137” correct? Should they be in pCi/L?

Page 66, Figure D.3.: are the units for “cesium-137” correct? Should they be in pCi/L?

Page 108, Figure F.3.: are the units for “cesium-137” correct? Should they be in pCi/L?

Appendix K, pages 176-179: in each figure, the proper units for the respective analyte should be used in the figure legend, not “pCi/l or ?g/l”, neither of which is appropriate for use in the legend of the figure for pH (on page 177).

Typographical errors have been corrected.

K.2. Comments from EPA Region 4.

The background groundwater report should provide a discussion concerning the nature of data used. As the study focused on the water table aquifer, a total of 869 wells were used, and overall, about 90,000 measurements were considered for further statistical analysis to determine the background or baseline values of 15 analytes (aluminum, arsenic, cobalt, iron, manganese, mercury, nitrate, selenium, thallium, tin, cesium-137, strontium-90, tritium, uranium-238, and pH). The report utilized groundwater data from separate studies or investigations, including SRS groundwater monitoring data collected from October 1992 to September 1998, the data from USGS investigations (Clarke et al., 1994 and 1996; Leeth et al., 1996), and probably data from Marine (1976). The report needs to present a clear source-list of data used.

The actual analysis used only data collected from SRS groundwater monitoring wells, from October 1992 to September 1998. The rest of the data were used to evaluate the estimated background and baseline probability distributions obtained from the regression-based and cluster analysis approaches.

Statistical analysis of the data was based on large amounts of data. The use of various “system operations” associated with the statistical analysis for each study may be different and therefore is a concern.

The system operations were specific to this study, and are likely to change for a different setting. However, the study identifies and addresses some fundamental problems encountered in addressing the issue of identifying background levels of COPCs. The approach of this study was to have built-in redundancy to ensure that the issue is addressed comprehensively. The multiple steps; as well as two independent approaches outlined in this study; constitute a sufficiently flexible methodology that would be a sound starting point for other studies that seek to identify background levels in different settings.

As a result of the different sources of data obtained to evaluate background conditions in groundwater, the report should address the nature of data used for the statistical analysis, including comparability of the measurements from period to period, and the variables designed in the system operations. Individual investigations typically have specific goals and variables designed in the system. Therefore, large databases may have data collected for different purposes under different investigations (systems) which could result in difficulties in building the statistical model. The model may then be ill suited for: detecting trends over time; for testing any hypothesis about system behavior because the record is not consistent and comparable from period to period; variables that affect the system have not been observed; or, the range of variable has been restricted by the system’s operation. Considering the objective of the report is to formulate statistical approaches for defining background or baseline levels of chemicals in

groundwater at SRS by evaluating the existing groundwater monitoring data, a detailed description concerning the nature of data should be included in the report.

The study initially considered a far longer time period for examining background levels – from 1986 onwards instead of 1992 onwards. However, examination of data revealed inconsistencies in sampling, analysis, and reporting. Consequently, a shorter period from 1992 to 1996 was chosen for the actual analysis, in order to avoid the data inconsistencies that this comment very correctly alludes to. The preprocessing and selection of data used in the study involved extensive preliminary analyses and informal discussions that could not be included in the report because of their exploratory and tentative nature. Some of the histograms that were prepared for the preliminary analysis of COPCs with a high proportion of non-detects are presented as supplemental data in Appendix B, Appendix D, and Appendix F. The data that were selected for the final study were carefully screened for consistency over the entire time period under consideration, to ensure that they were suitable for the filters such as trend detection.

In general, in the background groundwater report's use of the non-detect (ND) values were handled appropriately. The NDs were classified into three categories ($\geq 80\%$, between 50% and 80%, and $\leq 50\%$). For the proportion of NDs greater than 50%, statistical analysis relied on histograms and Quantile-Quantile plots. For NDs lower than 50%, two statistical approaches, regression and cluster analysis, were used. The cluster analysis was used as an independent means of confirming the results of the regression analysis. However, the use of zero to replace ND values below the limit of detection can result in biased low mean values, particularly for the following five chemicals; aluminum, iron, manganese, nitrate, and tritium, which have greater than 93% of detects (the censored data is less than 7%). For these five chemical, statistical methods, like the trimmed mean and the Winsorized mean, can be used to estimate the mean values. Hill and Dixon (1982) found that a 15% trimmed mean was a "safe" estimator for asymmetric distribution. If more than 15% of the measurements in the sample have been censored, the 15% trimmed mean cannot be computed. In this way, unbiased mean values for the five chemicals could be obtained. Using zero as replacement value for NDs is not the best way to "treat NDs consistently." Chemicals with a high proportion of NDs should not be treated as same as the chemicals with a low proportion of NDs.

The three categories for non-detects broadly follow the guidance provided in EPA (1989), with the exception that the cutoff for the category with a low proportion of non-detects is at 20% instead of the recommended 15%. According to EPA (1989), an acceptable substitution for non-detects is (Method Detection Limit)/2 when the proportion of non-detects is less than 15%. For the six COPCs in this category, all except aluminum had a fraction of non-detects less than 15%, and for aluminum the fraction was only slightly higher at 19% (sitewide). This one exception was considered acceptable for another major reason: percentiles were used in all filtering steps as well as for reporting summary statistics. Percentiles are robust to non-detects since the relative rank of a

measurement will not be influenced by the presence of non-detects. An added consideration was that due to changing (but not incompatible) laboratory analysis methods, the estimated “J” flagged measurements were often lower than the MDLs for the same COPC. Discussions with DOE and EPA Region IV staff on this subject led to the consensus that “J” values represent valuable information, and that they should be not be substituted. Use of Winsorized or trimmed statistics would be incompatible with the use of estimated values. The use of percentiles helped resolve this conundrum in a defensible manner.

Executive Summary. In the second paragraph, the document states that 17 COPCs in groundwater are being considered. However, the list of those COPCs that directly follows this statement lists only 15 COPCs. The text should be corrected.

Page 1, Introduction. The fourth paragraph on this page states that 16 COPCs are considered in this study. However, as outlined previously, only 15 are listed. The text should be corrected.

Page 1, Section 2. The document describes the extensive source of data available from the “P” wells and “C” wells. However, listing the number of “P” wells (within SRS) and the number of “C” wells (outside SRS) that were removed by the various screening processes is needed so the reader can determine how many of the wells within SRS and outside of SRS were retained. The most appropriate place for this information is in Section 4: Results.

Page 12, Section 3.0 . The text should be corrected from “ If the proportion of detects is lower than 50%, ” , to “ If the proportion of non-detects is lower than 50%, ”

These comments relate to clarifications; corrections of typographical errors; or other changes that have been incorporated in the revised report.

Page 18, Section 3.4. The text states that "all wells reporting measurements for a specific COPC were checked for the presence of three or more consecutive detects. If such consecutive detected measures were observed, the well was rejected as being contaminated. The rest of the wells were considered background." There appears to be a problem with the text. If a well is rejected as being contaminated, then it is not clear how the well can be considered for subsequent analyses. The way the text reads, wells rejected as being contaminated by the specified criteria are not considered to represent background conditions (i.e. "the rest of the wells were considered background"). Since the well is rejected as being contaminated, but not considered background, the status of the well is unclear. The text should be revised for clarification. The use of the term rejected appears to be the problem. Rejected as being contaminated may mean that the well is considered to be contaminated if three consecutive detect

values were observed. However, the meaning of the statement "the well was rejected as being contaminated" is ambiguous and should be re-written.

The phrase “rejected as being contaminated” is changed to “is considered contaminated and removed from the set of potentially unimpacted wells.” This should make it unambiguous.

Page 19, Section 3.4. For cobalt, mercury, tin, and uranium-238, more discussion is needed to explain the rationale for rejecting wells from the upper half of the 75th percentile range in the kriging maps as being known contaminant wells. The report should describe how was this accomplished.

Section 3.5. As a general statement, the term “removed for” that is used throughout this section of the document (i.e., “when a trend was detected for a COPC in a specific well, that well was removed for the set of potential background wells for that COPC”) should be changed to “removed from” for clarity.

Page 20, Section 3.5.2. The discussion of the data needs for the Seasonal Kendall Test should state the minimum number of “seasons” that are required for the test. Just a brief discussion, such as Gilbert’s (1987) “many years” suggestion is appropriate.

Typographical errors were corrected and discussion was expanded to make this section clearer.

Page 21, Section 3.5.3. The requirement of independence is crucial for correct application of the Shewart Cumulative Sum chart analysis. The document does recognize this requirement, and states that “for this study, the measurements were at widely separated time intervals and therefore were considered to meet the criterion of independence”. However, some additional analyses would help strengthen the assumption of data independence. If data are available, application of the Darcy Equation, as seen in USEPA (1992) page 8-11 would validate independence. If data are unavailable for determining a reasonable sampling frequency using the Darcy Equation, then analyses of serial correlation, or some further defense of the assumption of independence is needed.

The issue of data independence becomes crucial only for analyses where replicates are present, or where very high frequency sampling methods are used. Both of these conditions are absent in the dataset used in this study. Further analyses would only corroborate this reasonable and justifiable assumption, so additional effort justifying this assumption was not considered necessary.

Section 3.5. It is not clear in the report whether control charts were modified to handle non-detects as recommended in USEPA (1989) or USEPA (1993). If so, these modifications should be briefly discussed. If no modifications for non-

detections were conducted, the rationale behind the approach should be discussed / defended.

The control charts handle non-detects as recommended in USEPA (1989).

Page 21, Section 3.5.3. The document states that the Shewart Cumulative Sum control chart approach is “more robust for the normality (or log-normality) criterion, so the data need not have an exact normal or log-normal distribution”. While this is generally a valid statement, the EPA reference (USEPA, 1989) does suggest normality testing / verification as a precursor to the Shewart-Cumulative Sum control chart analysis. A more defensible reason for not testing normality should be given, or normality testing should be conducted.

Q-Q plots (not included) of intermediate steps revealed that at this stage, the grouped data from filtered wells were sufficiently close to lognormal or normal distributions to permit the use of control charts.

Section 3.7. This report used the Partitioning Around Mediods (pam) clustering method, as implemented in S-Plus. This method computes a dissimilarity matrix for a provided $n \times p$ data matrix and then determines k mediods, where k is determined by the user. Silhouette plots were created as a graphical output for these analyses. While the approach used to determine an optimal clustering size is valid, a discussion is needed to describe how clusters were divided into “background” versus “not background” wells. Many of the silhouettes do not have a clear division between groups. For example, how were those wells in the “grey” area between clusters in Figure F.23 divided into either “background” or “not background”. In addition, many of the plots have negative silhouette widths, which generally indicates that these objects are probably placed in the wrong cluster. A discussion is needed to explain how these “questionable” objects were classified.

The wells were divided into “background” and “non-background” wells based only on the assignment of wells to clusters by the PAM algorithm. The “background” cluster was identified by examining the median concentration of the well at the medoid of each cluster generated using PAM. Only wells in the cluster corresponding to the medoid well with the lowest median concentration was classified as “background” wells.

The vast majority of the silhouette widths of the potentially background wells presented in the silhouette plots are positive, indicating that cluster indicated by the silhouette diagnostic is in accordance with that assigned by the PAM algorithm. However, a small number of wells have silhouette widths that are either negative, or only marginally positive, indicative of cluster assignments that are incorrect or marginally correct, as judged by the silhouette diagnostic. In the revised report, the wells with a negative silhouette width were not considered part of the background cluster. This change has been made in the report text as well.

A detailed discussion on this subject is included in Section 3.7.

Appendix A. An explanation should be provided as to why there are no decimals on the last 20 UTM coordinates on page 41.

Appendix B. The title of Figure B.1 seems to be wrong. The title should be "Aluminum Baseline results for GSA (ug/L)."

The list of water table wells was obtained from Hiergesell, 1998; and is reproduced without modifications. The other typographical error was corrected.