

## ANEXO 1

TABELA 01 – Concentrações nas amostras de sedimentos coletadas nos rios Gualaxo do Norte, Piranga, do Carmo (montante) e córrego de Santarém entre os dias 09 de novembro de 2015 a 2 de junho de 2016; valores de referência da CONAMA 454/2012.

PARÂMETROS	CONCENTRAÇÕES (MG)							CONAMA 454	
	Gualaxo do Norte – Montante		Rio Piranga		Rio do Carmo – Montante		Córrego de Santarém	Nível	
	Máxima	Média	Máxima	Média	Máxima	Média	Valor único	1	2
ARSÊNIO (As) (mg/kg)	55,90	28,39	8,70	2,85	131,00	49,83	1,8	5,9	17
BÁRIO (Ba) (mg/kg)									
BORO (B) (mg/kg)									
CÁDMIO (mg/kg)					2,33	1,70		0,6	3,5
CHUMBO (Pb) (mg/kg)	19,00	10,73	13,00	8,98	25,90	11,55	10	35	91,3
COBRE (Cu) (mg/kg)	35,10	15,41	22,70	14,66	30,20	8,64	12,3	35,7	197
CROMO (Cr) (mg/kg)	20,00	11,10	68,00	40,08	65,90	30,04	48	37,3	90
FERRO (Fe) (mg/kg)	82100,00	55687,50	40500,00	18637,50	81500,00	40560,00			
MANGANÊS (Mn) (mg/kg)	4170,00	3128,75	3000,00	539,50	2250,00	985,74			
MERCÚRIO (Hg) (mg/kg)	1,13	0,68	1,17	0,30	0,69	0,16		0,17	0,486
NÍQUEL (Ni) (mg/kg)	12,50	7,33	32,40	18,41	23,60	12,82	15,3	18	35,9
ZINCO (Zn) (mg/kg)	27,00	13,17	62,00	36,16	123,00	20,47	34	123	315
CARBONO ORG. TOTAL (%)	1,50	0,59	1,78	1,18	4,27	1,67		10*	
N. TOTAL KJEDAHL (mg/kg)	516,00	234,82	922,00	397,23	812,00	309,72	188	4800*	
FÓSFORO TOTAL (mg/kg)	393,00	195,75	432,00	306,07	526,00	265,03	245	2000 *	
POTENCIAL REDOX (mV)	-41,00	-228,00	-122,00	-233,17	1,00	-231,50			
pH (SUSPENSÃO A 5%)	9,61	6,97	9,32	6,96	10,78	6,89	6,38		
SILTE/ARGILA %	46,50	15,59	51,20	24,94	100,00	30,53			

\* Valores orientadores

TABELA 02 – Concentrações nas amostras de sedimentos coletadas no rio do Carmo (Barra Longa - Montante/Jusante) e no rio Doce (Montante, Jusante, Barragem, Ipatinga e Ipaba) entre os dias 09 de novembro de 2015 a 2 de junho de 2016; valores de referência da CONAMA 454/2012.

PARÂMETROS	CONCENTRAÇÕES (MG)								CONAMA 454	
	RIO DO CARMO		RIO DOCE						Nível	
	Barra Longa Jusante/Montante Ponte		Montante/ Jusante /Barragem		Ipatinga Jusante/Montante		Ipaba		1	2
	Máxima	Média	Máxima	Média	Máxima	Média	Máxima	Média		
ARSÊNIO (As) (mg/kg)	30,00	10,11	42,00	13,09					5,9	17
BÁRIO (Ba) (mg/kg)	292,00	35,39	120,00	22,11						
BORO (B) (mg/kg)	3,90	2,65	216,00	67,00						
CÁDMIO (mg/kg)	0,10	0,08	41,00	18,89	0,10	0,10			0,6	3,5
CHUMBO (Pb) (mg/kg)	18,30	5,73	39,00	9,75	18,60	8,86	18,50	6,41	35	91,3
COBRE (Cu) (mg/kg)	32,80	9,53	54,40	14,51	43,40	20,13	18,30	8,60	35,7	197
CROMO (Cr) (mg/kg)	45,20	15,86	79,00	23,83	62,40	31,66	25,00	17,31	37,3	90
FERRO (Fe) (mg/kg)	244118,0	62659,2	754943,0	72122,28	125700,0	44787,50	136400,0	40575,00		
MAGNÉSIO (Mg) (mg/kg)	893,00	159,72	1843,00	220,48						
MANGANÊS (Mn) (mg/kg)	8906,00	386,05	1964,00	245,36	131,00	74,58	138,00	60,23		
MERCÚRIO (Hg) (mg/kg)	0,02	0,02	1,18	0,29	0,01	0,01			0,17	0,486
NÍQUEL (Ni) (mg/kg)	27,50	6,11	37,00	8,10	22,30	12,94	11,40	7,36	18	35,9
ZINCO (Zn) (mg/kg)	46,20	16,13	118,00	21,71	39,50	22,07	28,20	19,16	123	315
CARBONO ORG. TOTAL (%)	34,60	15,32	37,40	16,82	16,30	5,38	12,80	5,83	10*	
N. TOTAL KJEDAHL (mg/kg)	747,21	283,21	278,09	77,04	21,60	12,19	24,60	8,35	4800*	
FÓSFORO TOTAL (mg/kg)	217,79	52,71	440,00	63,04	73,80	30,65	45,80	26,65	2000 *	
POTENCIAL REDOX (mV)	300,00	156,53	284,00	167,21	252,00	197,75	228,00	204,88		
pH (SUSPENSÃO A 5%)	8,25	7,03	7,88	7,00	7,83	7,21	7,85	7,47		
SILTE/ARGILA %	91,30	38,12	100,00	35,83	54,60	40,56	130,10	64,83		

\* Valores orientadores

TABELA 03 – Concentrações nas amostras de sedimentos coletadas no rio Doce (Governador Valadares -Montante/Jusante, Tumiritinga, Resplendor e Aimorés)Montante/Jusante entre os dias 09 de novembro de 2015 a 2 de junho de 2016; valores de referência da CONAMA 454/2012.

PARÂMETROS	CONCENTRAÇÕES							CONAMA 454	
	RIO DOCE – MG							Nível	
	Governador Valadares Montante/Jusante		Tumiritinga		Resplendor	Aimorés Montante/Jusante			
	Máxima	Média	Máxima	Média	Valor único	Máxima	Média	1	2
ARSÊNIO (As) (mg/kg)	19,00	11,77	12,47	12,47		10,60	4,88	5,9	17
BÁRIO (Ba) (mg/kg)	156,00	105,95	69,32	69,32		220,00	136,89		
BORO (B) (mg/kg)	50,40	13,73				194,00	78,09		
CÁDMIO (mg/kg)	0,14	0,12			0,2	1,84	0,53	0,6	3,5
CHUMBO (Pb) (mg/kg)	35,40	12,15	18,30	12,55	14,1	34,60	12,11	35	91,3
COBRE (Cu) (mg/kg)	149,50	20,14	23,60	16,44	21,5	42,40	16,51	35,7	197
CROMO (Cr) (mg/kg)	104,00	34,63	26,70	19,92	43,9	84,00	34,43	37,3	90
FERRO (Fe) (mg/kg)	310391,0	56841,25	84100,00	46916,60	84100	129100,0	30742,70		
MAGNÉSIO (Mg) (mg/kg)	3064,00	1668,10	1357,40	1357,40		4748,00	2797,42		
MANGANÊS (Mn) (mg/kg)	3261,00	594,05	267,84	163,38	118	1045,00	290,20		
MERCÚRIO (Hg) (mg/kg)	0,28	0,13				0,21	0,12	0,17	0,486
NÍQUEL (Ni) (mg/kg)	42,60	13,81	6,60	5,25	11	28,40	11,92	18	35,9
ZINCO (Zn) (mg/kg)	71,00	35,67	37,40	29,50	19,7	89,00	39,06	123	315
CARBONO ORG. TOTAL (%)	33,10	14,70				34,80	17,26	10*	
N. TOTAL KJEDAHN (mg/kg)	1544,47	204,84	246,83	246,83		1208,27	440,06	4800*	
FÓSFORO TOTAL (mg/kg)	707,10	112,21	94,50	55,38	37,2	310,78	58,85	2000 *	
POTENCIAL REDOX (mV)	231,00	147,82	-101,00	-101,00		239,00	176,50		
pH (SUSPENSÃO A 5%)	7,52	6,73	7,60	7,51	7,76	7,88	6,70		
SILTE/ARGILA %	100,00	56,13	32,80	15,83	16,70	100,00	35,98		

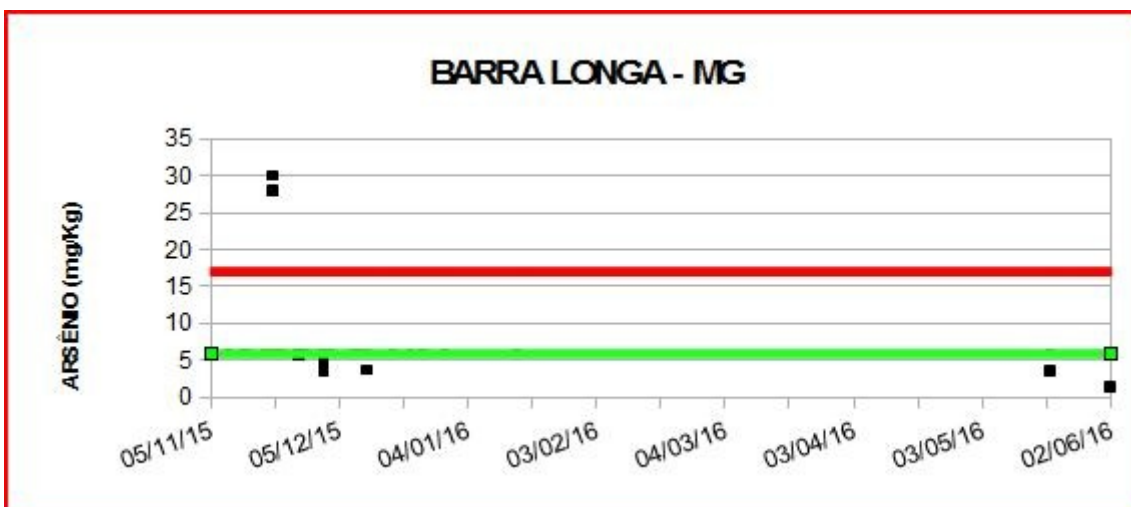
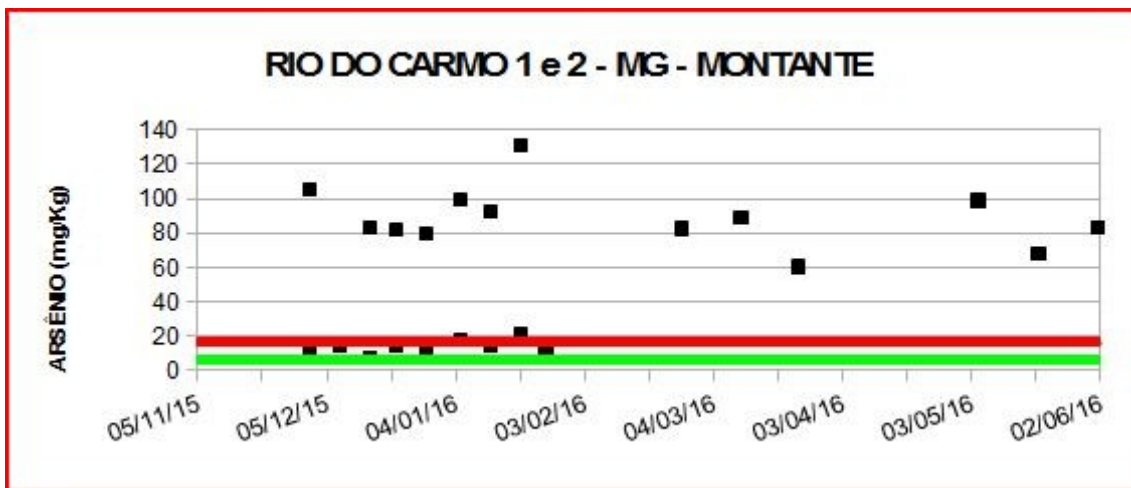
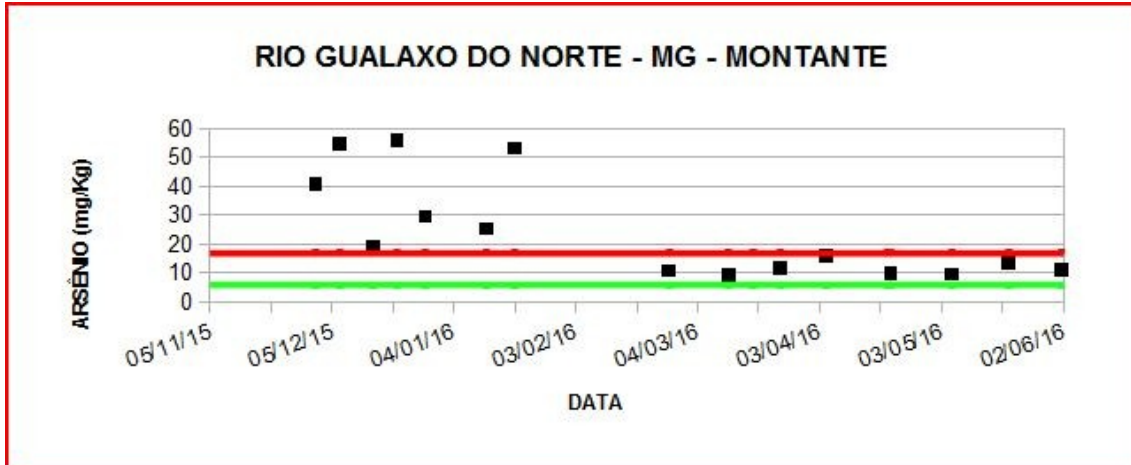
\* Valores orientadores

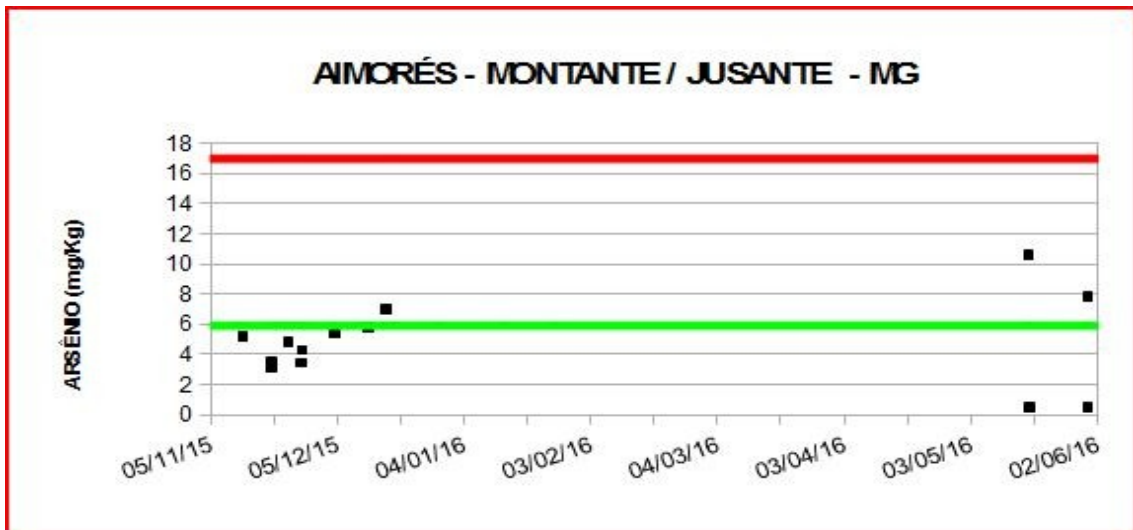
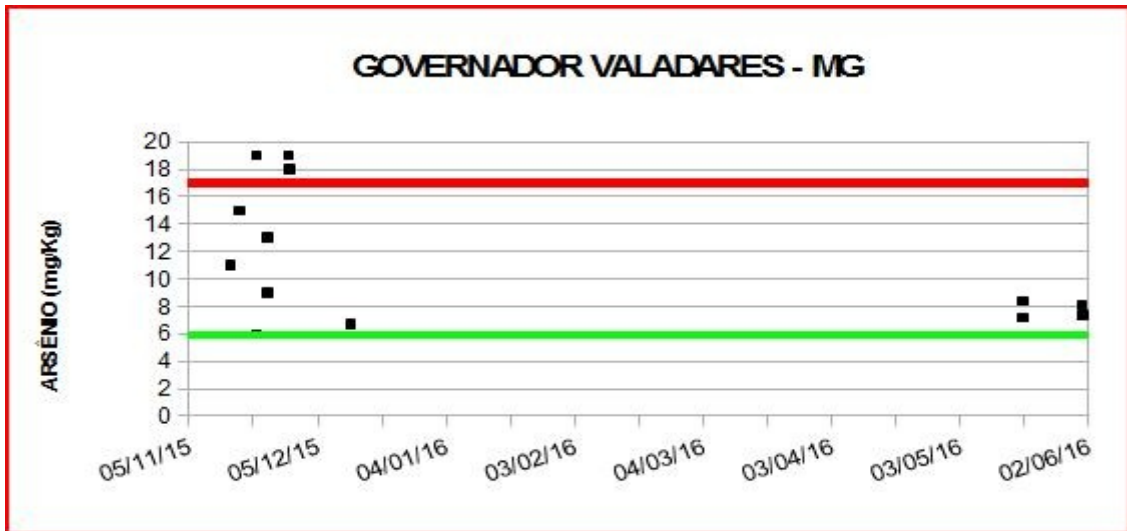
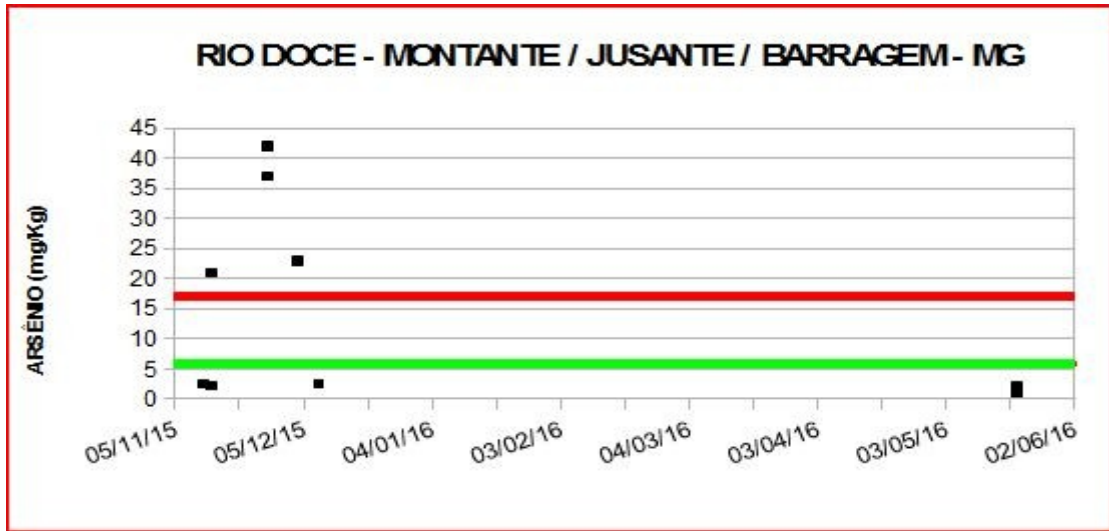
## ANEXO 2

### Gráficos de resultados de análises nos sedimentos em rios no estado de Minas Gerais

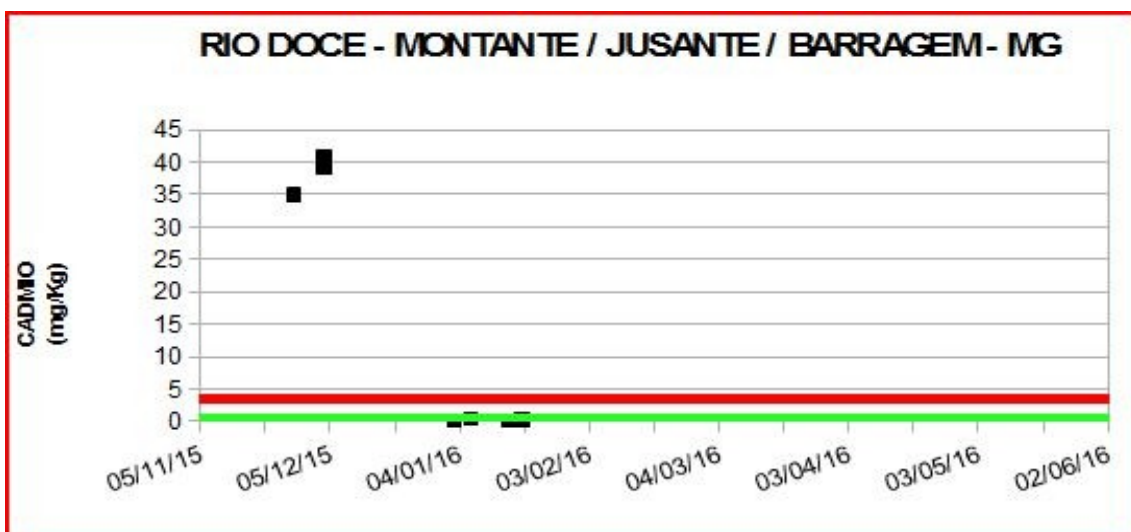
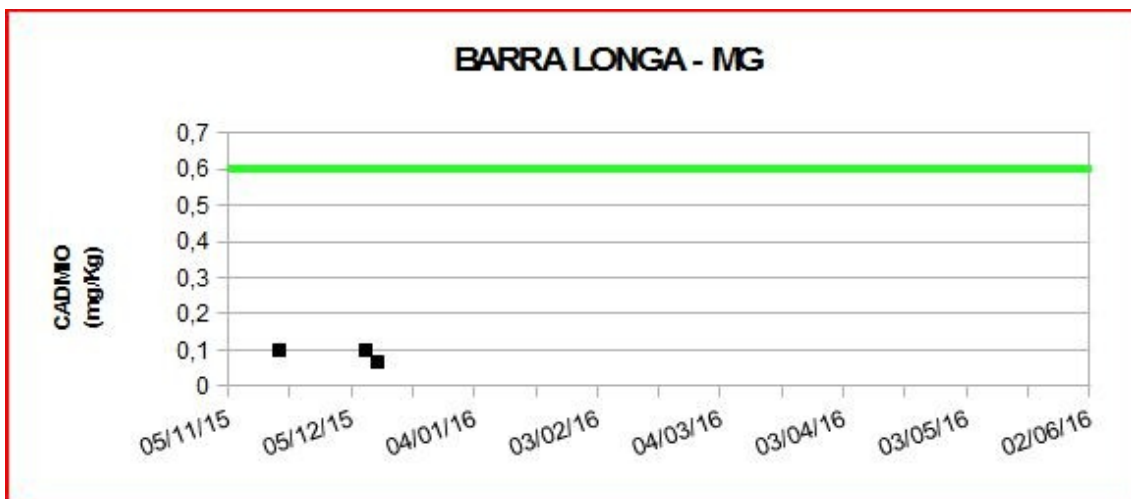
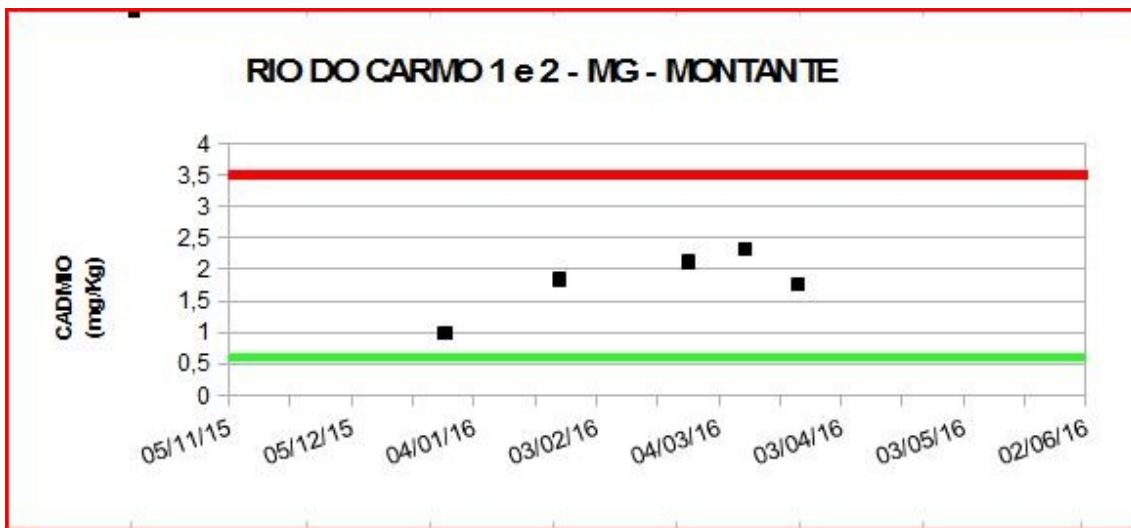
A linha vermelha representa o limite preconizado na CONAMA 454/2012 para nível 2 e a linha verde representa o limite preconizado na CONAMA 454/2012 para nível 1.

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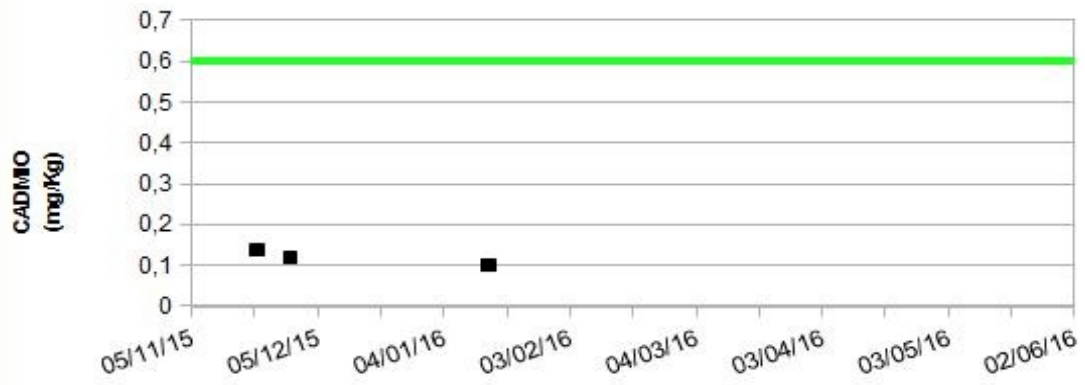




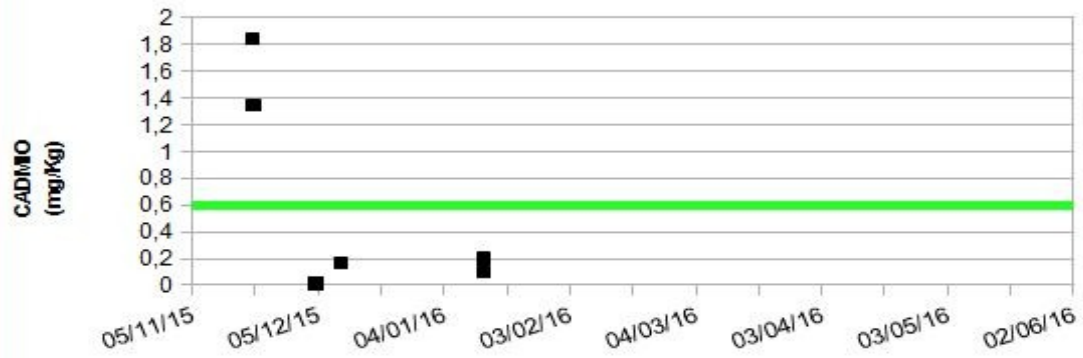
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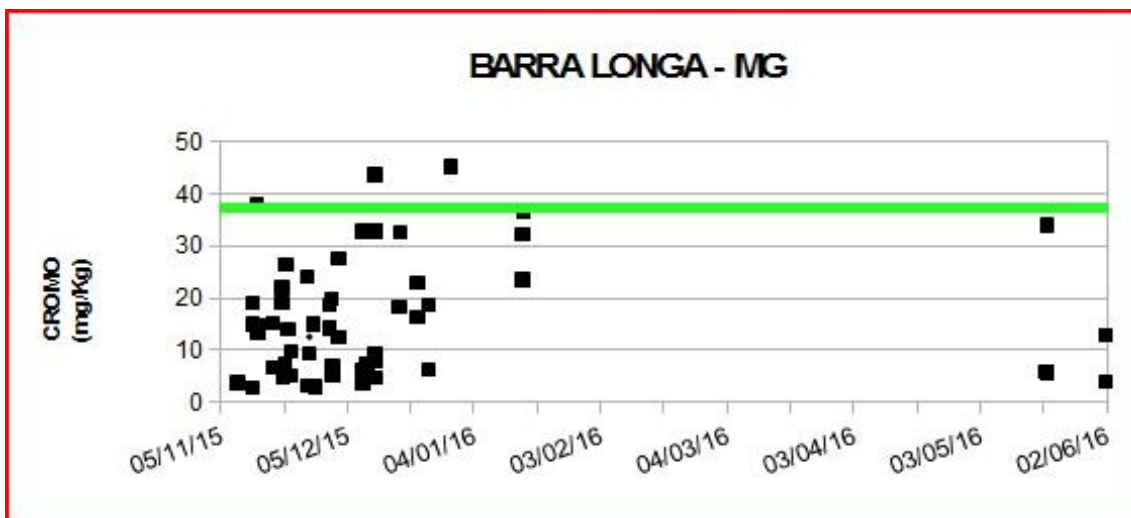
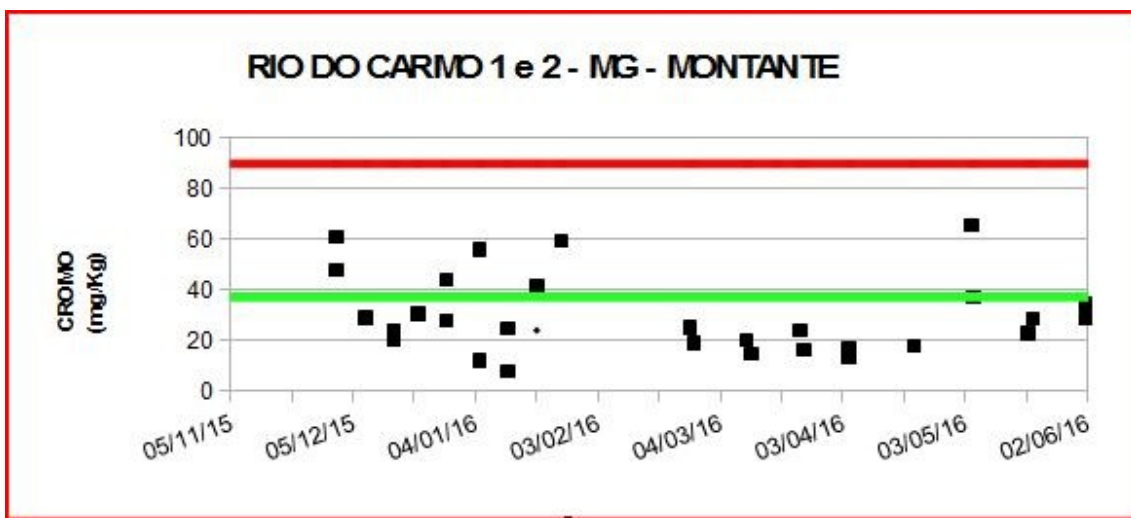
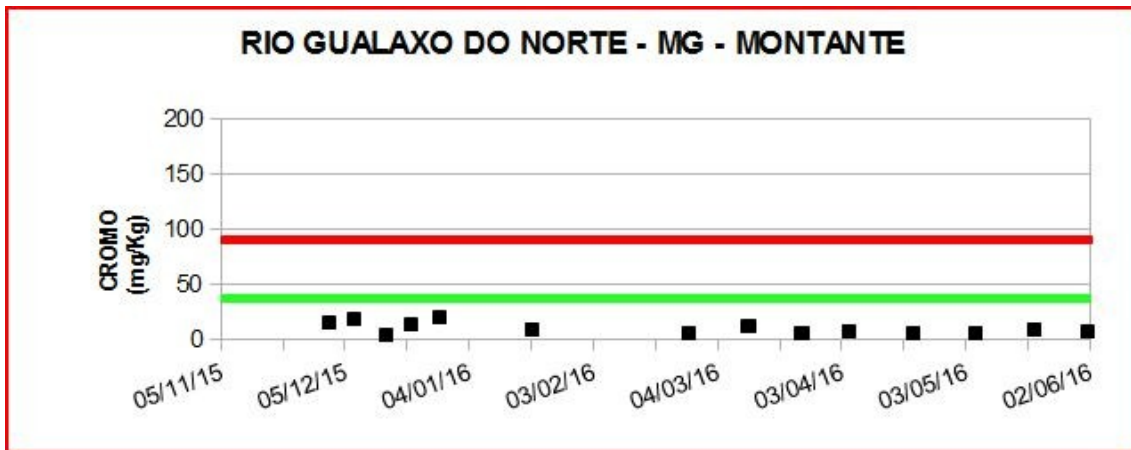
### GOVERNADOR VALADARES - MG

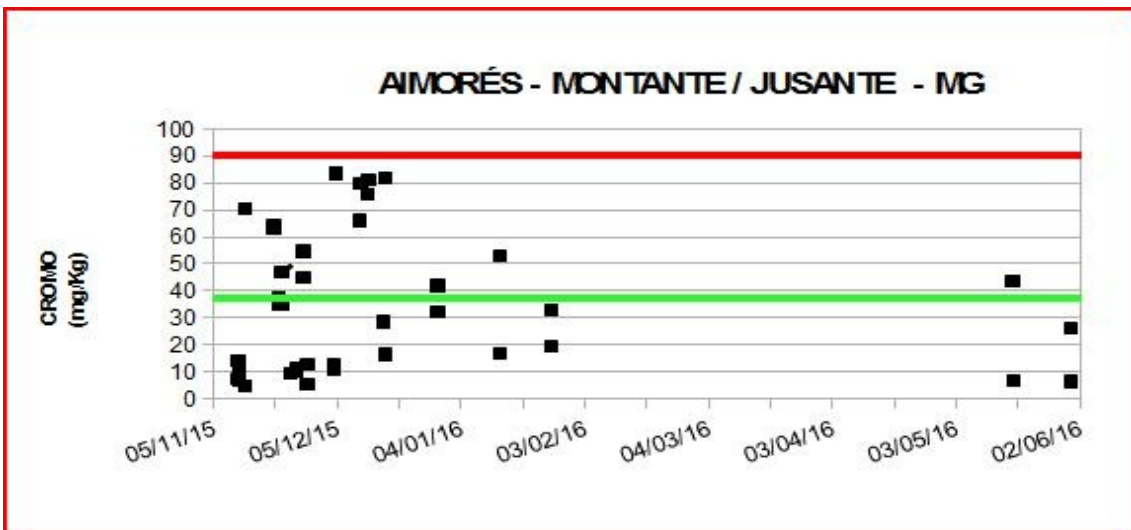
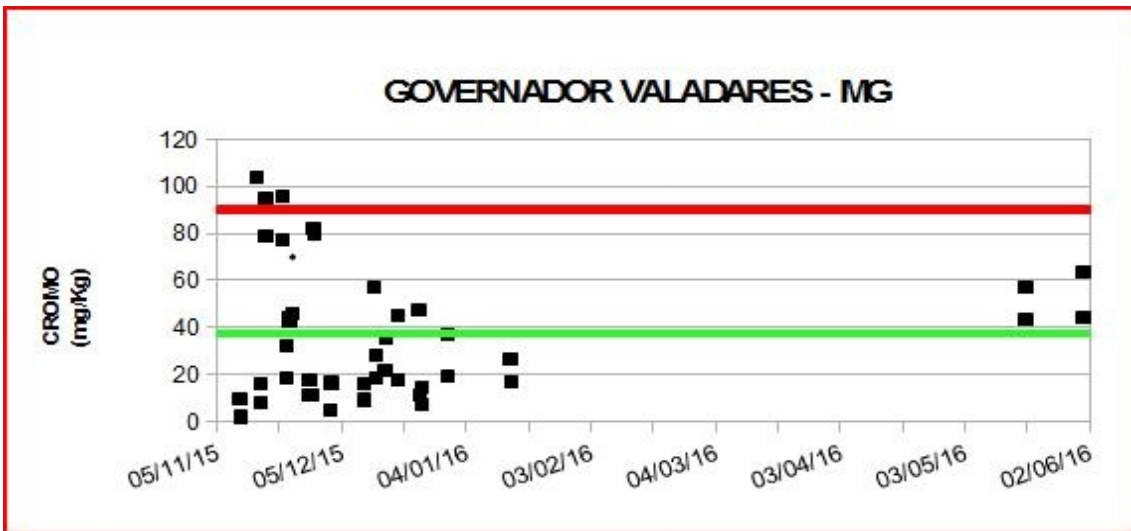
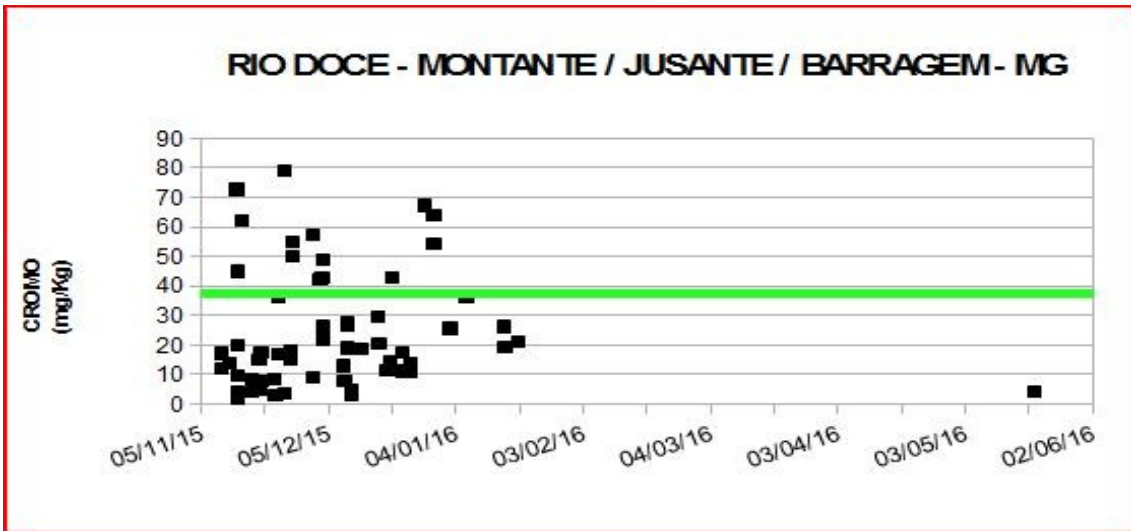


### AIMORÉS - MONTANTE / JUSANTE - MG



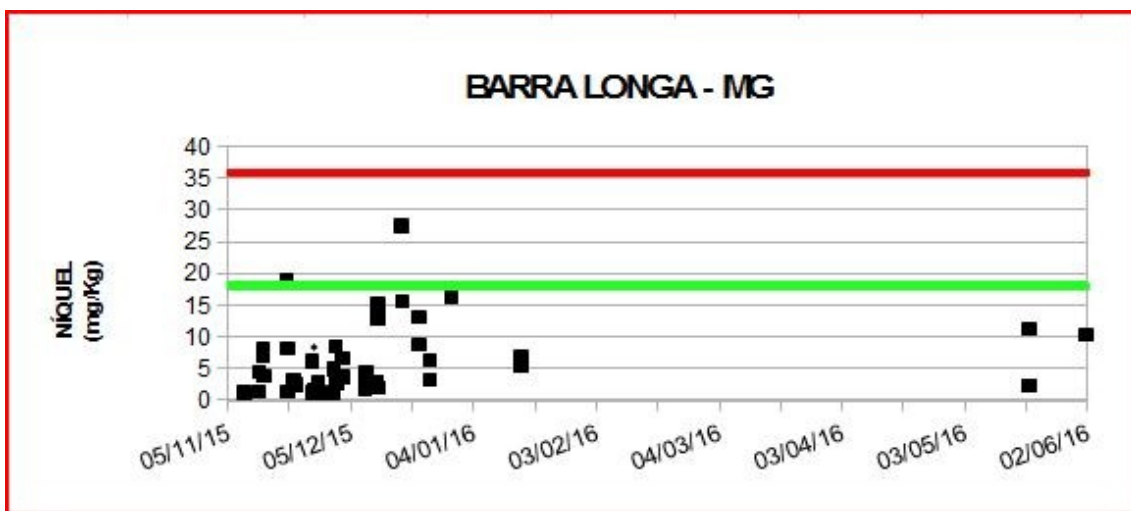
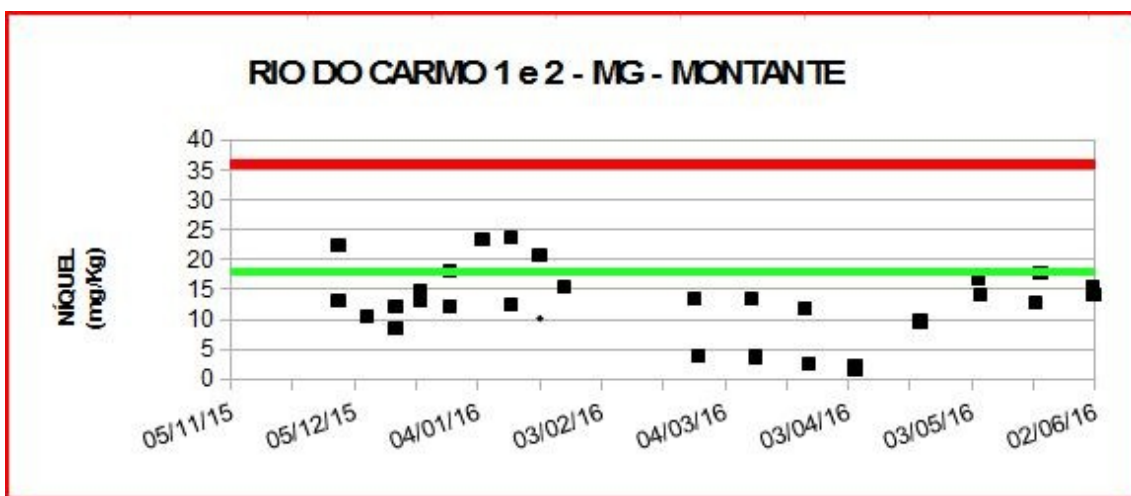
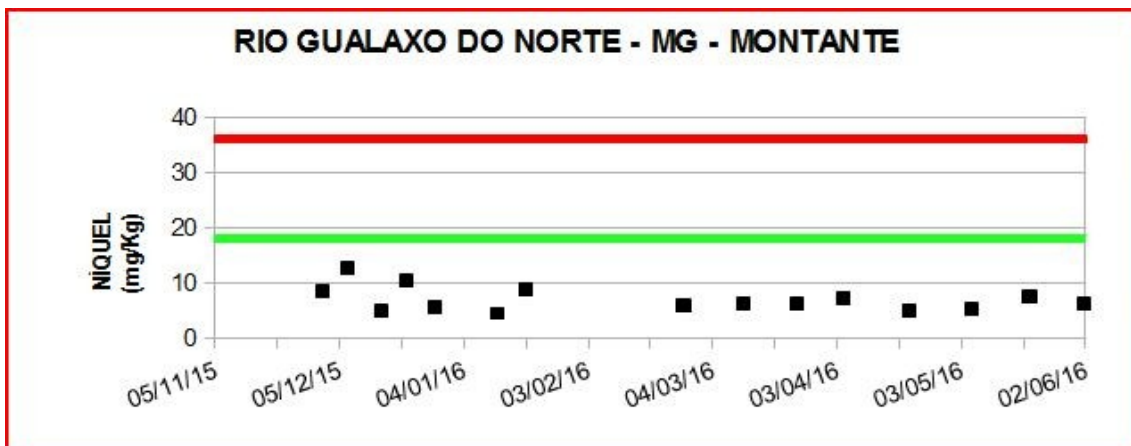
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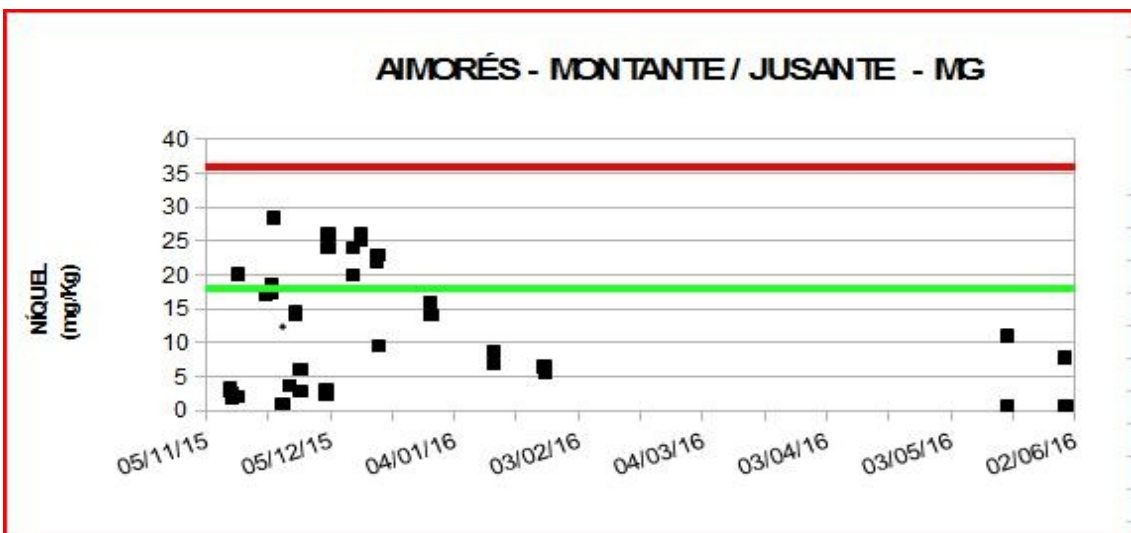
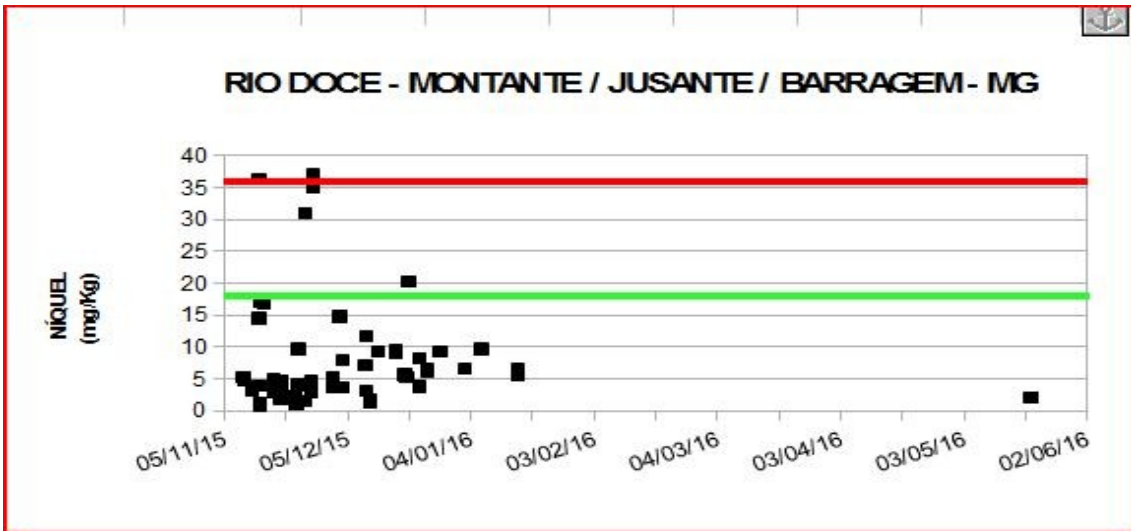




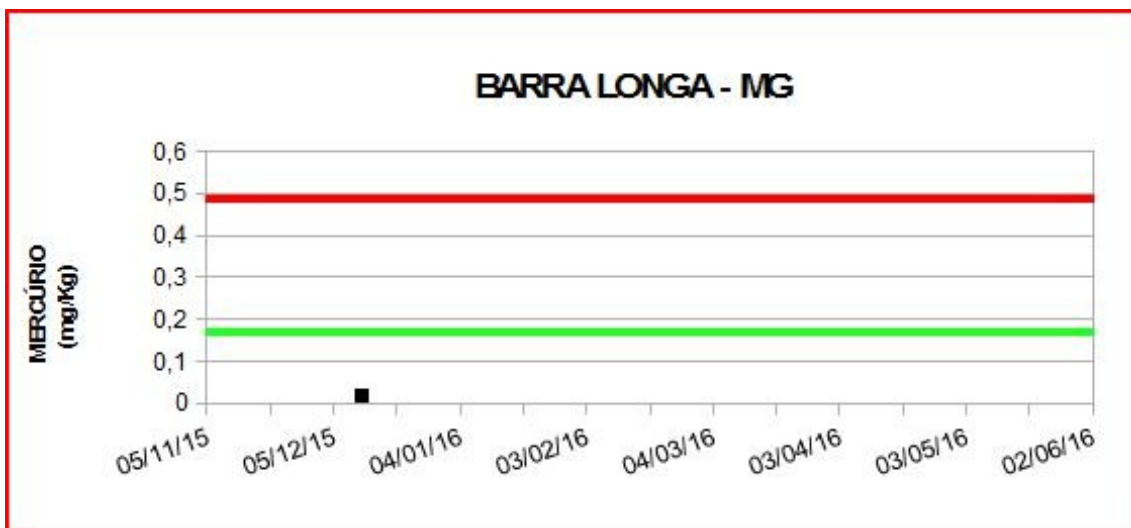
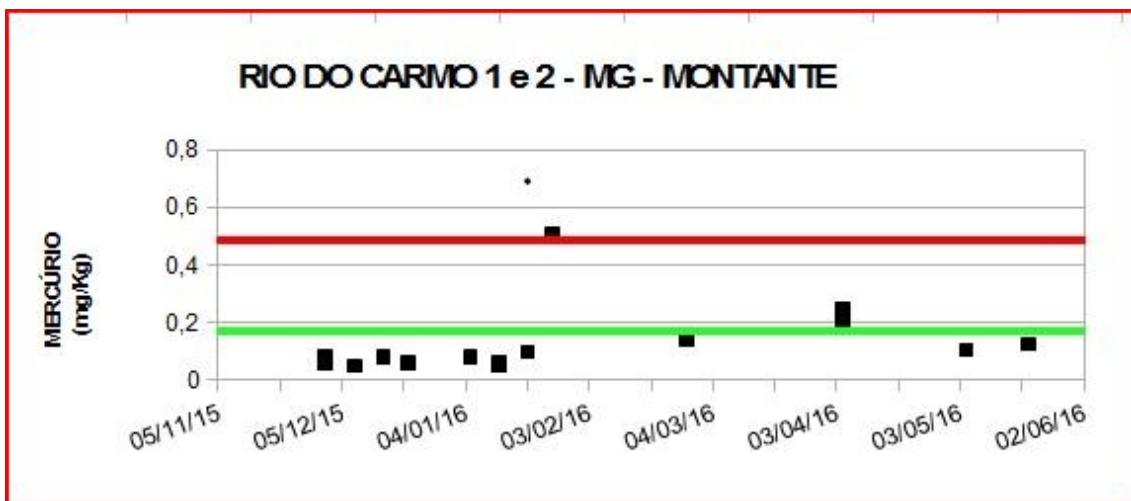
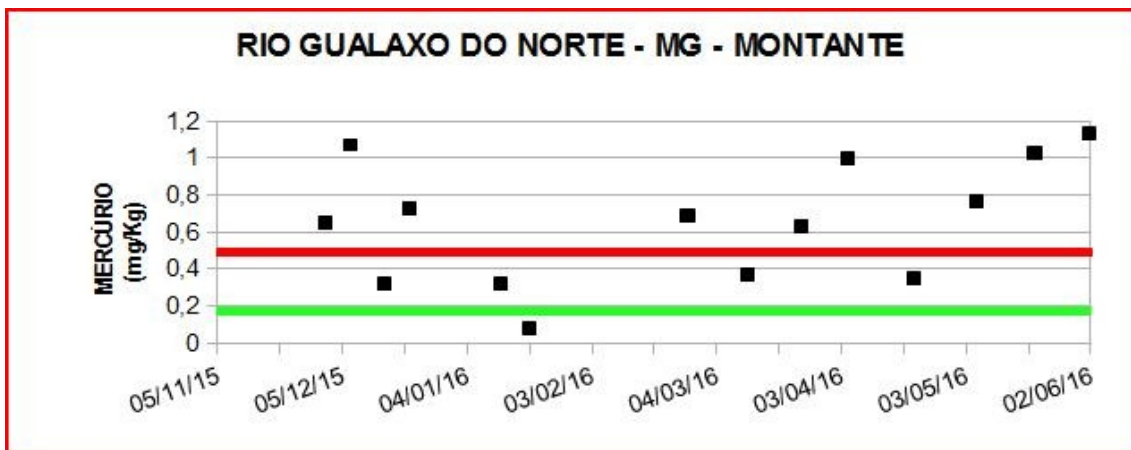


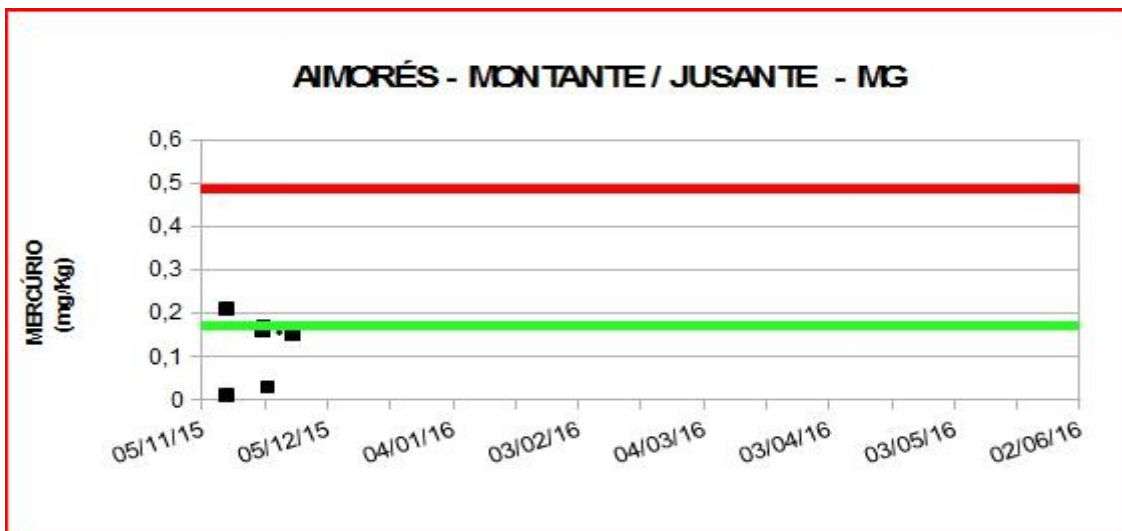
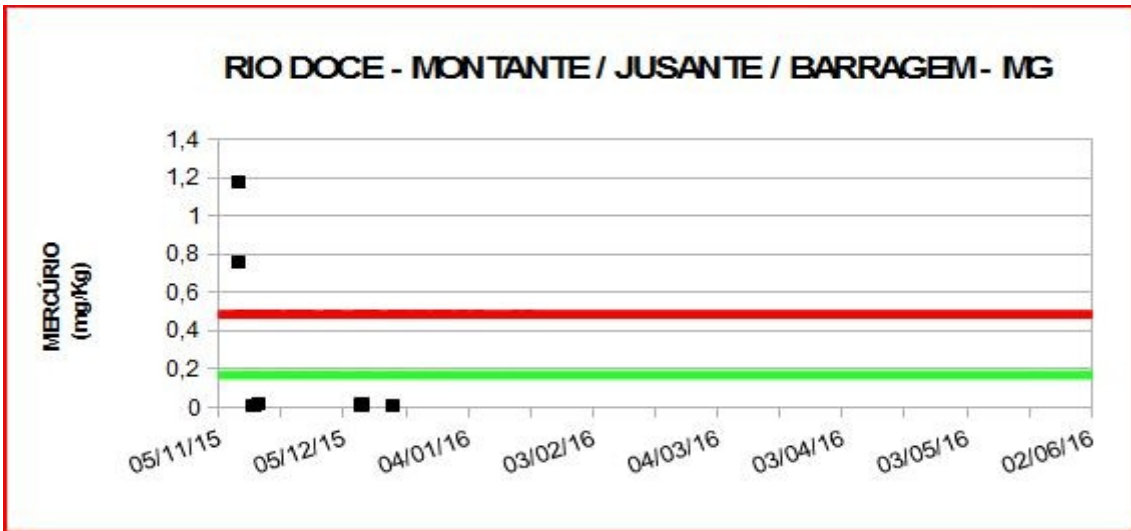
## 2.4 – NÍQUEL



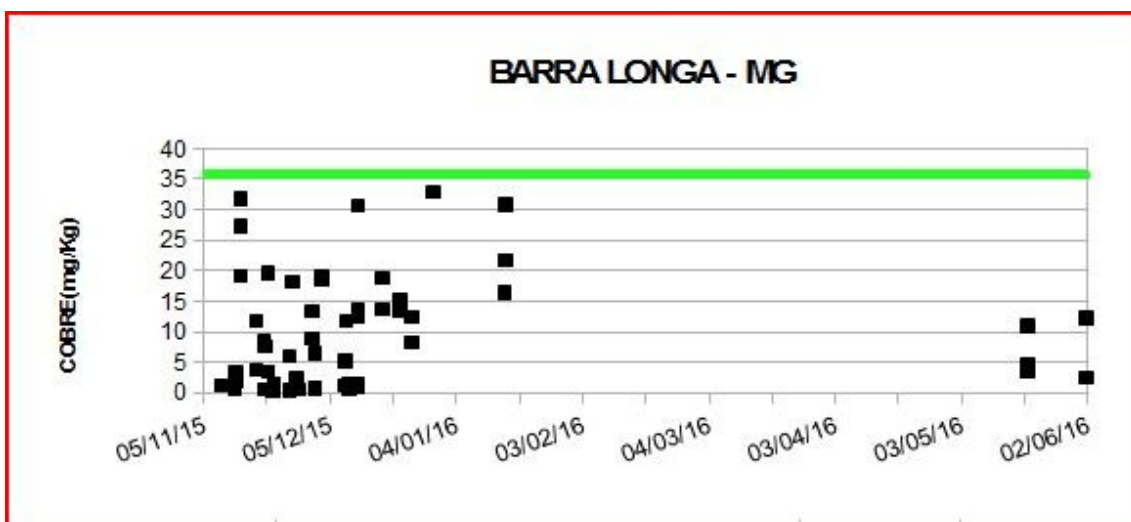
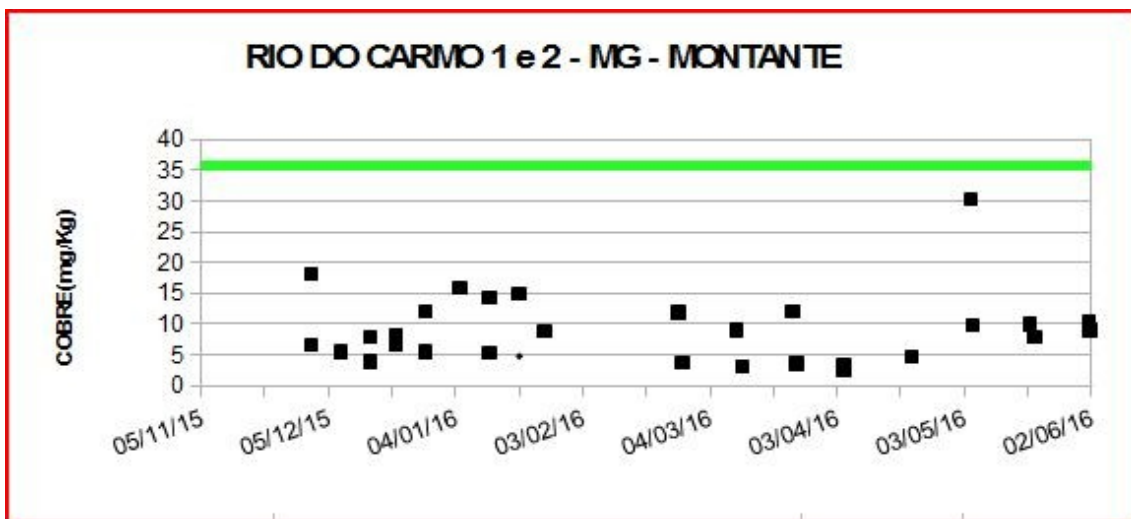
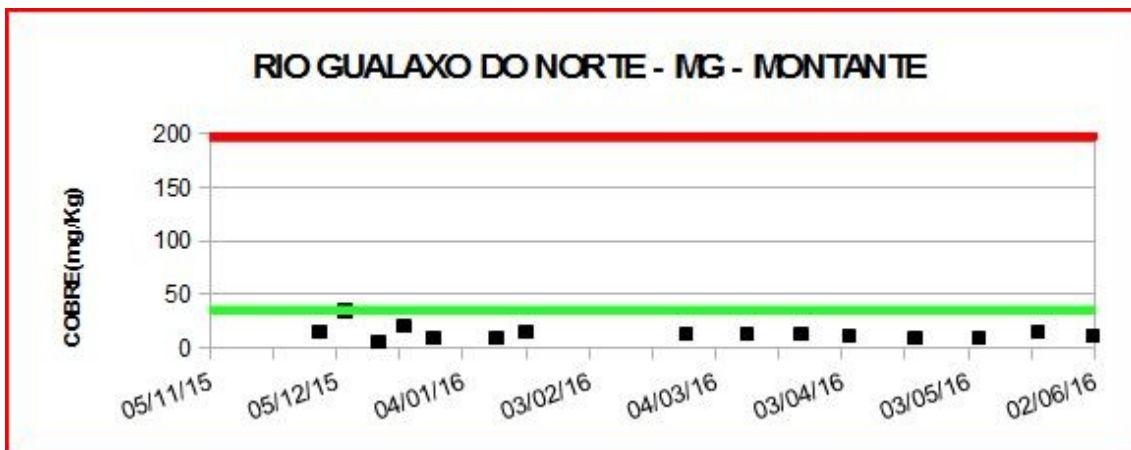


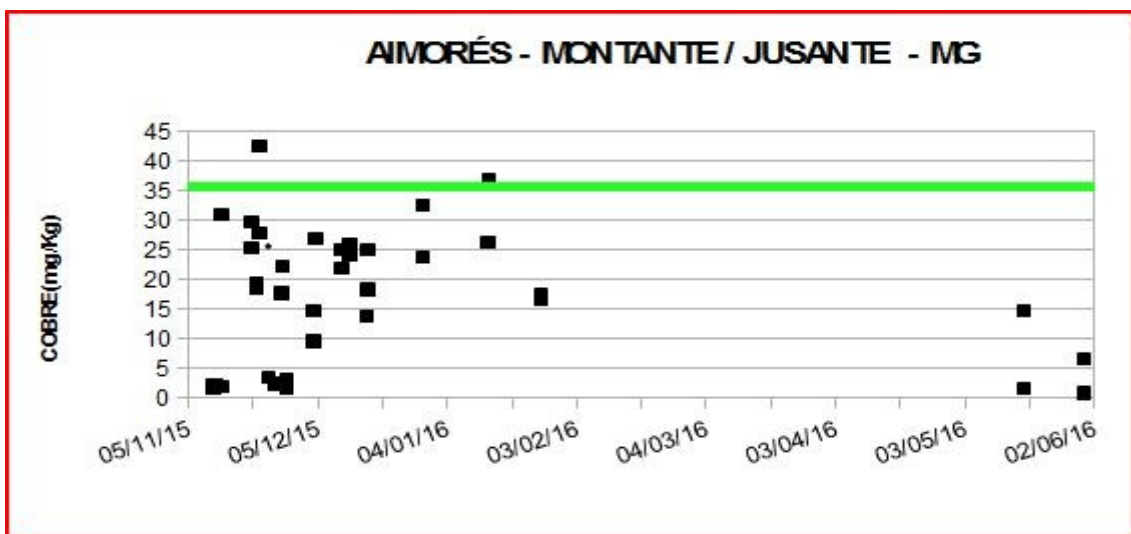
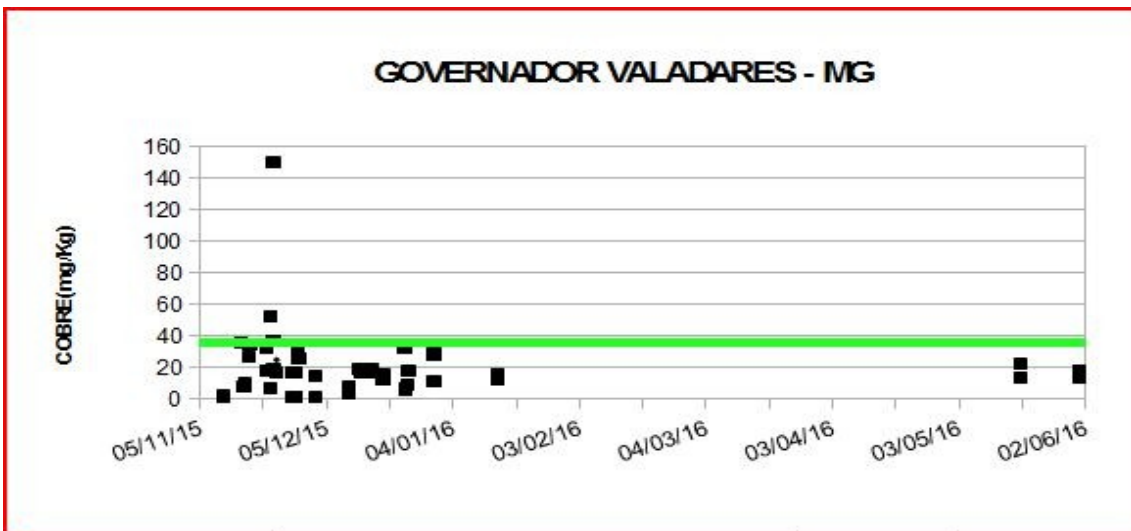
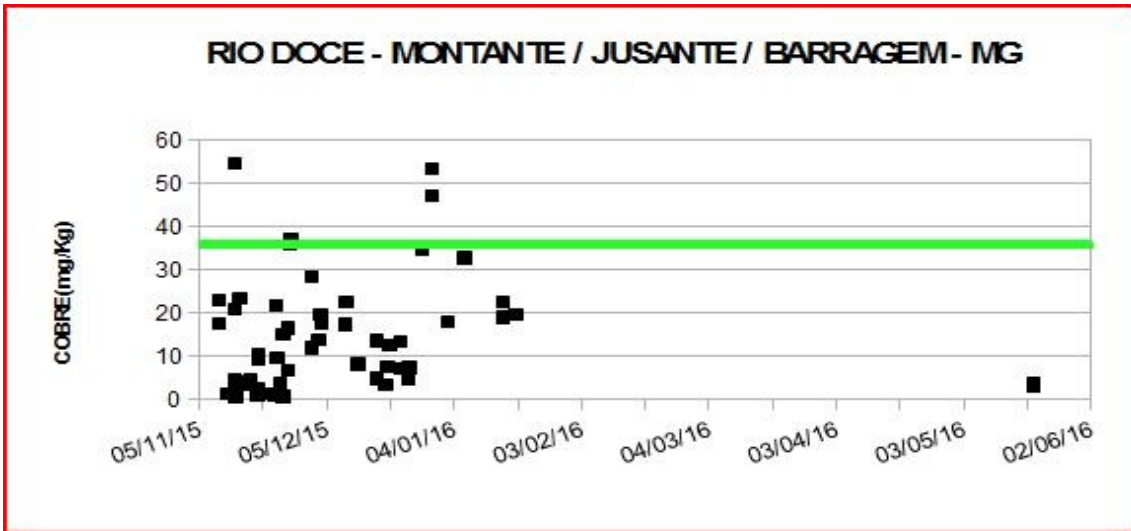
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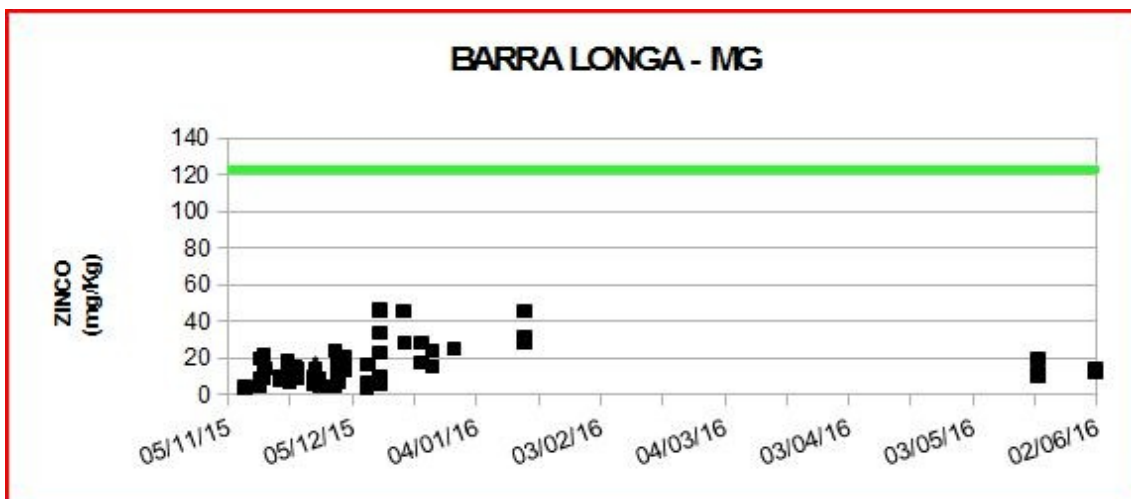
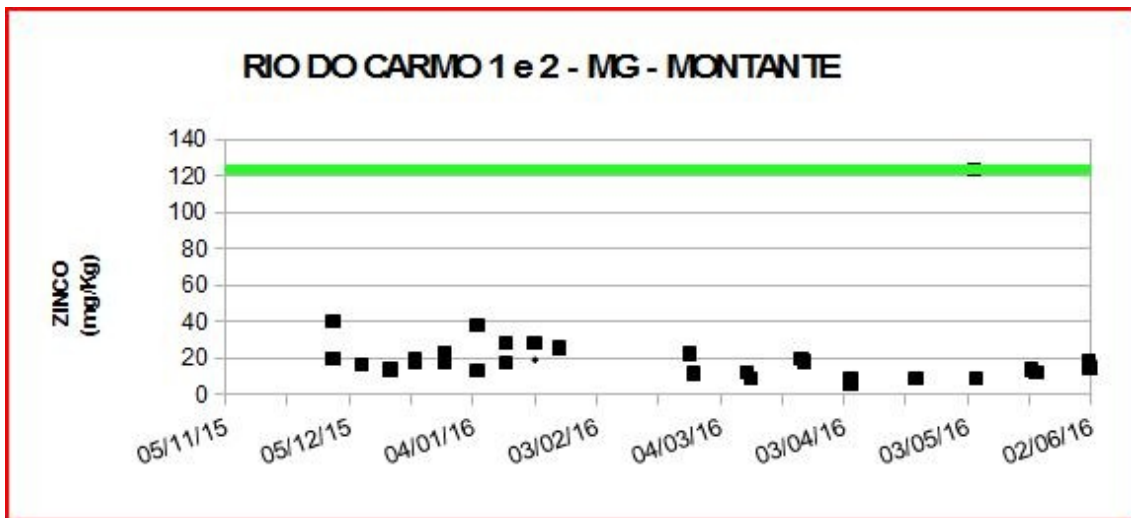
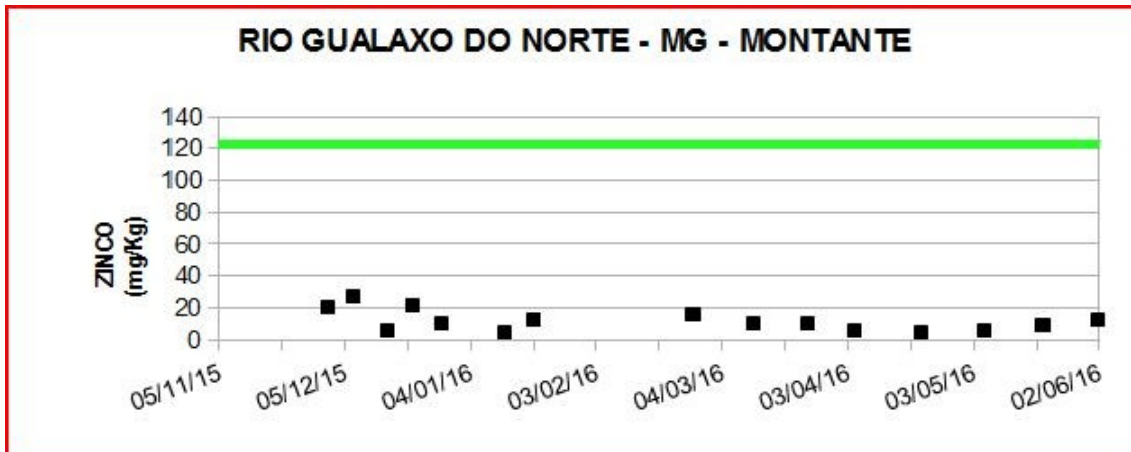


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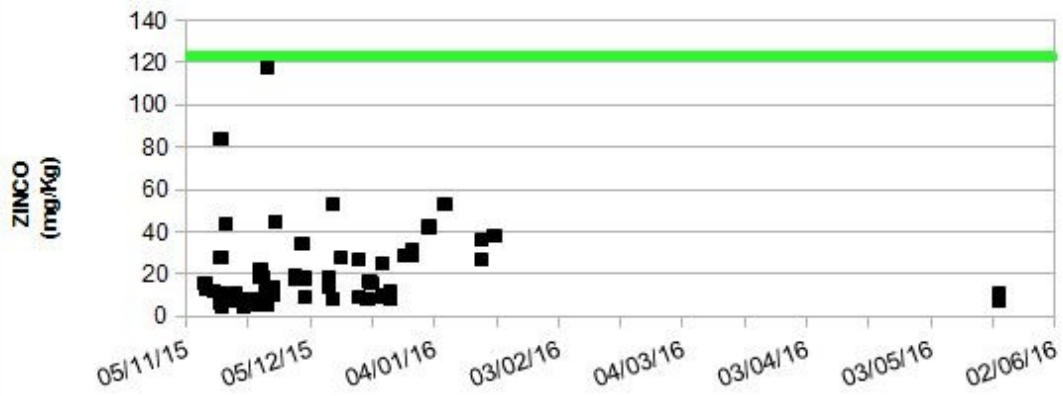




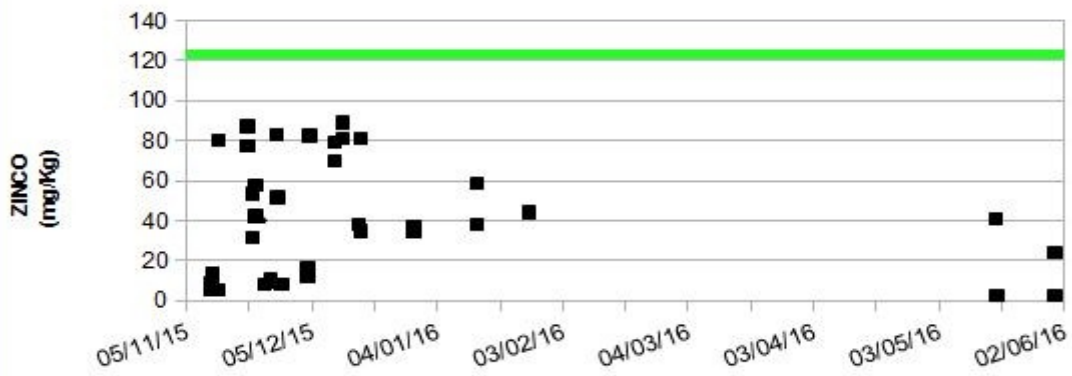
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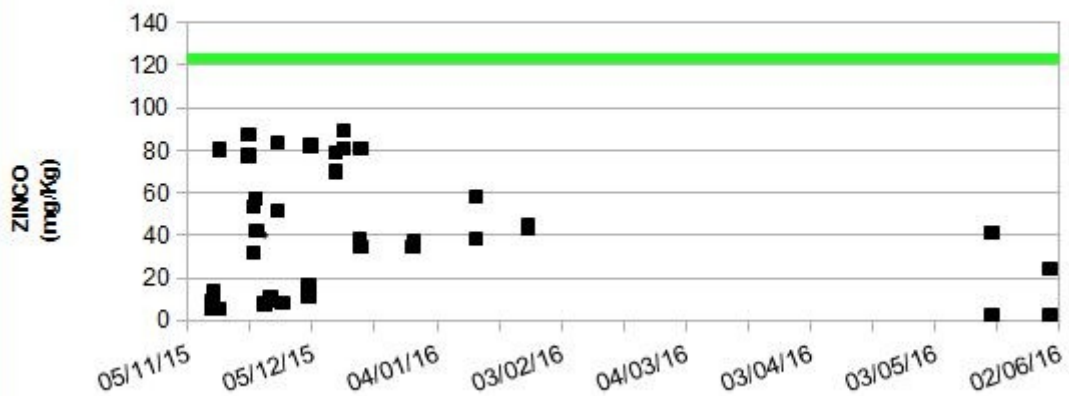
### RIO DOCE - MONTANTE / JUSANTE / BARRAGEM - MG



### GOVERNADOR VALADARES - MG

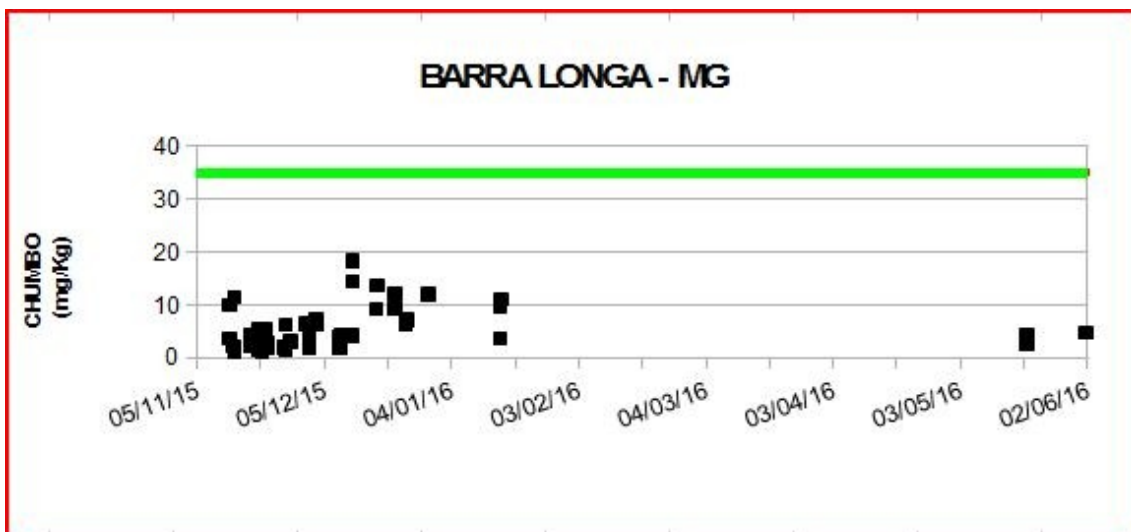
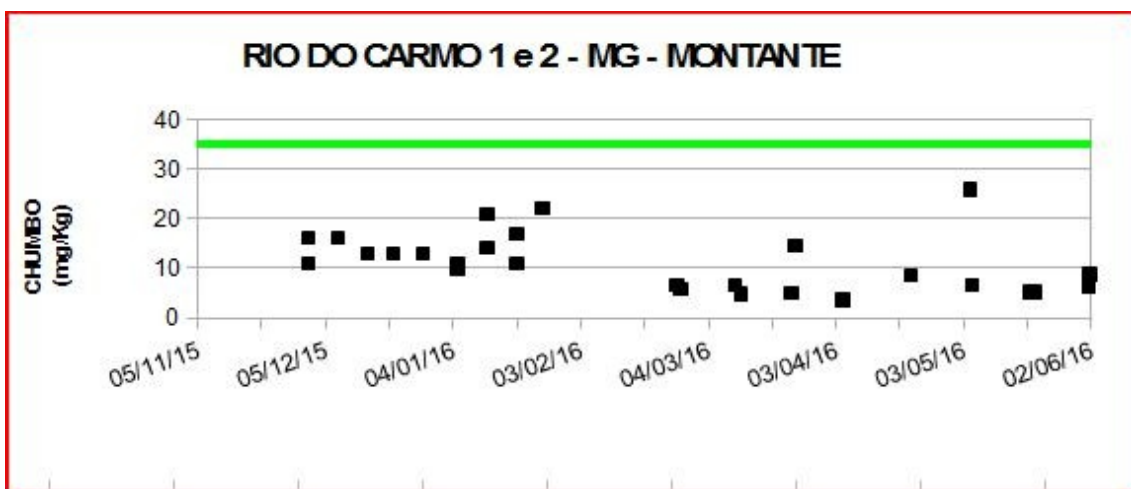
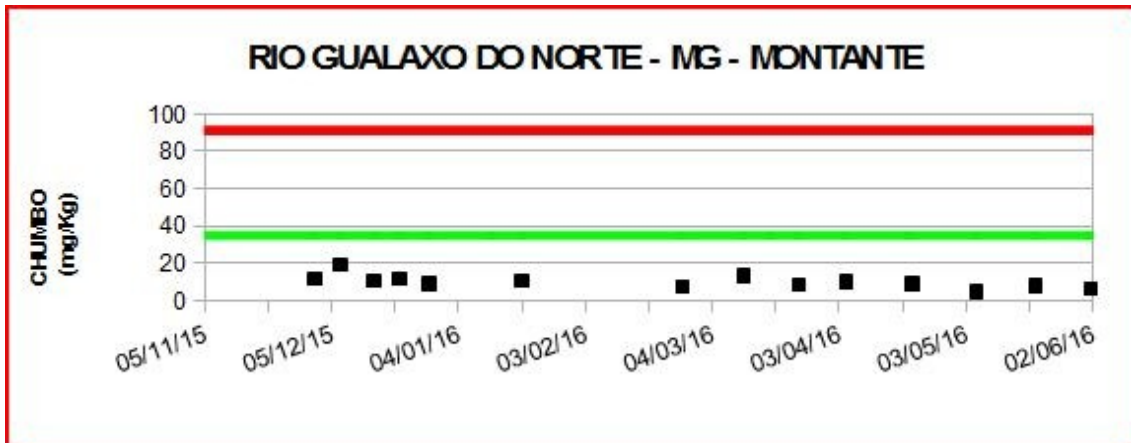


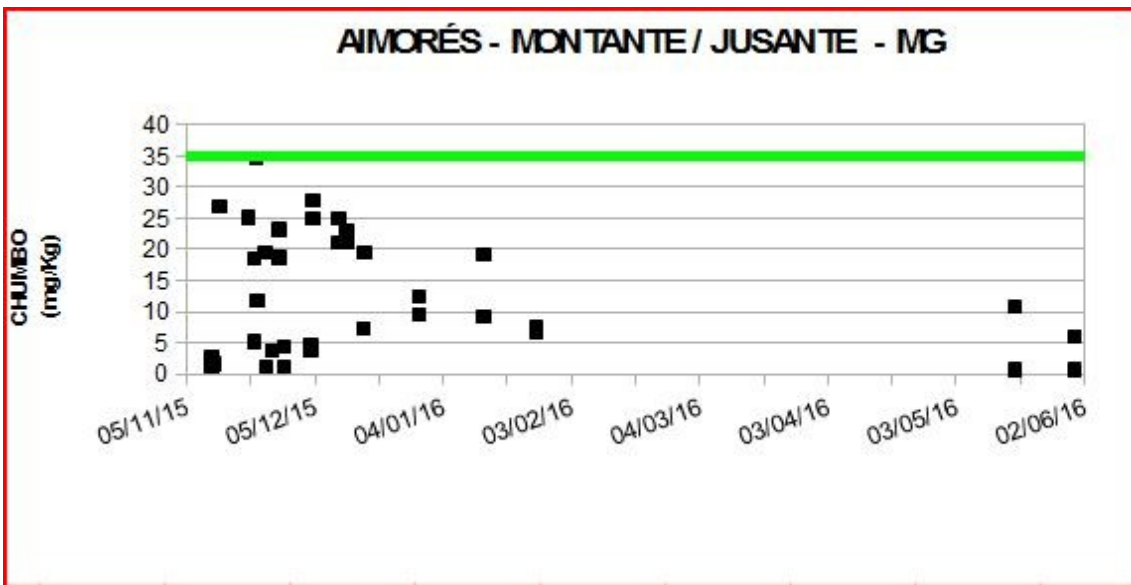
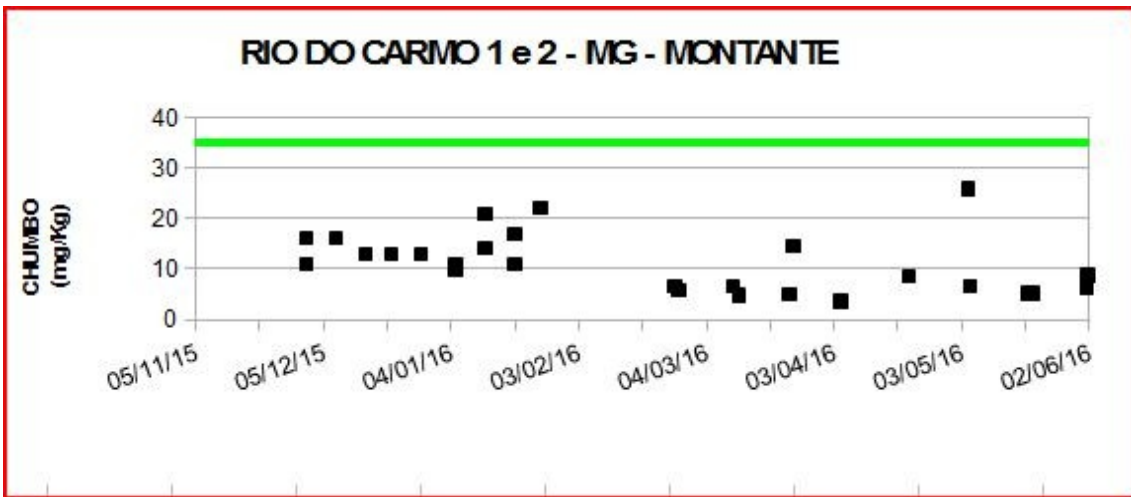
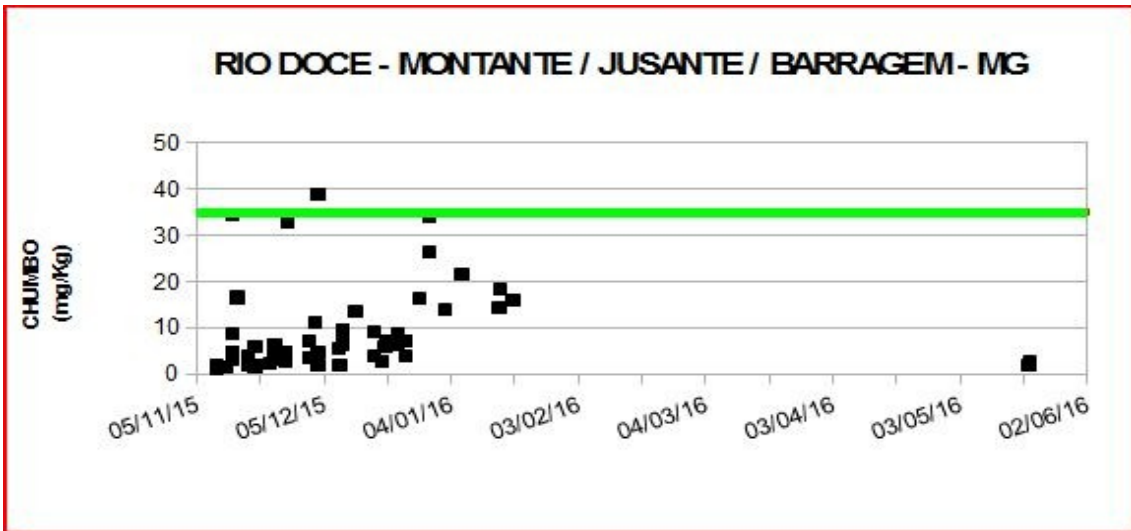
### AIMORÉS - MONTANTE / JUSANTE - MG



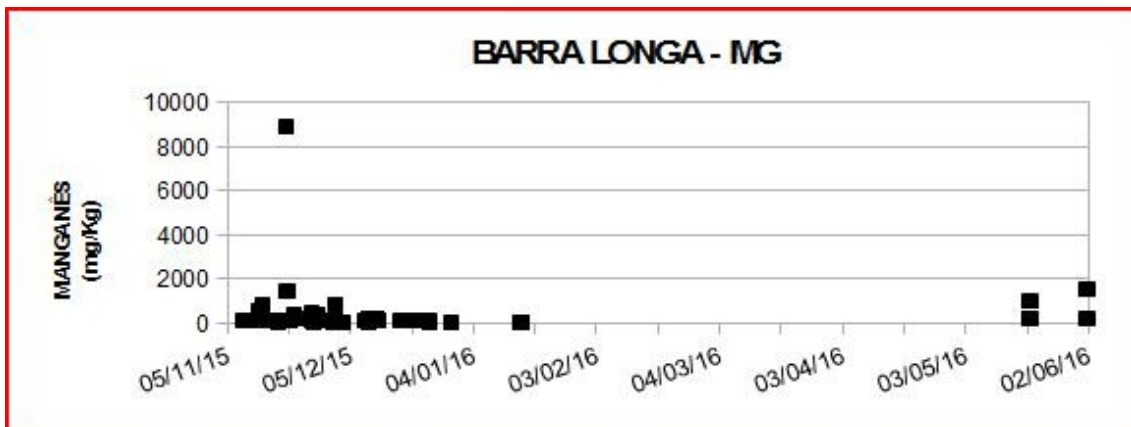
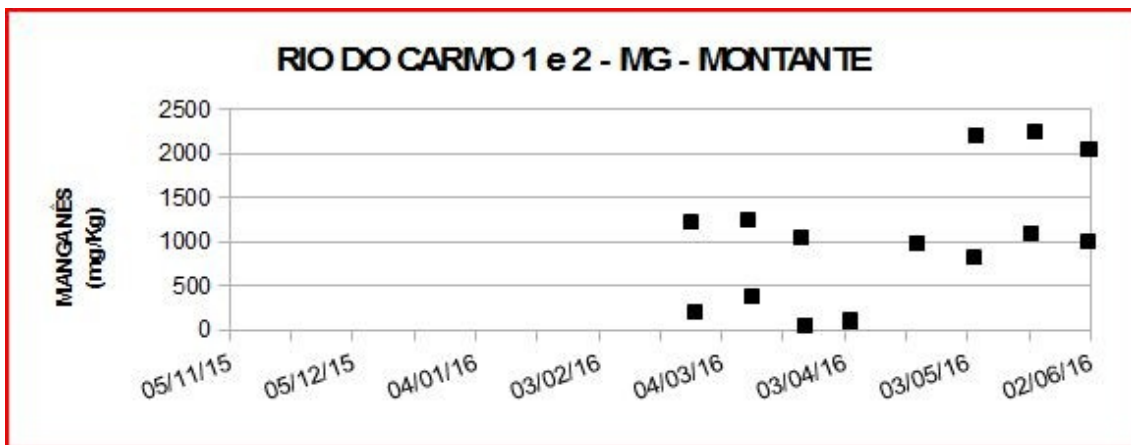
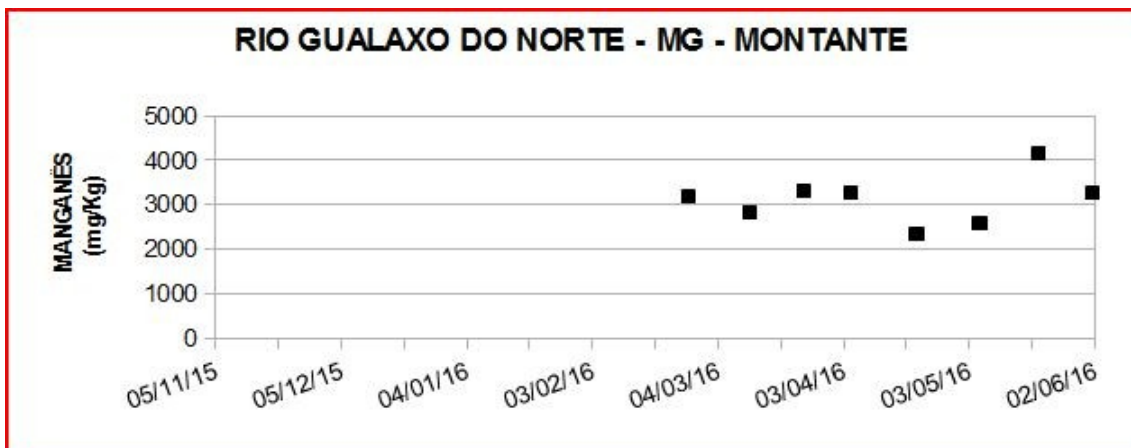


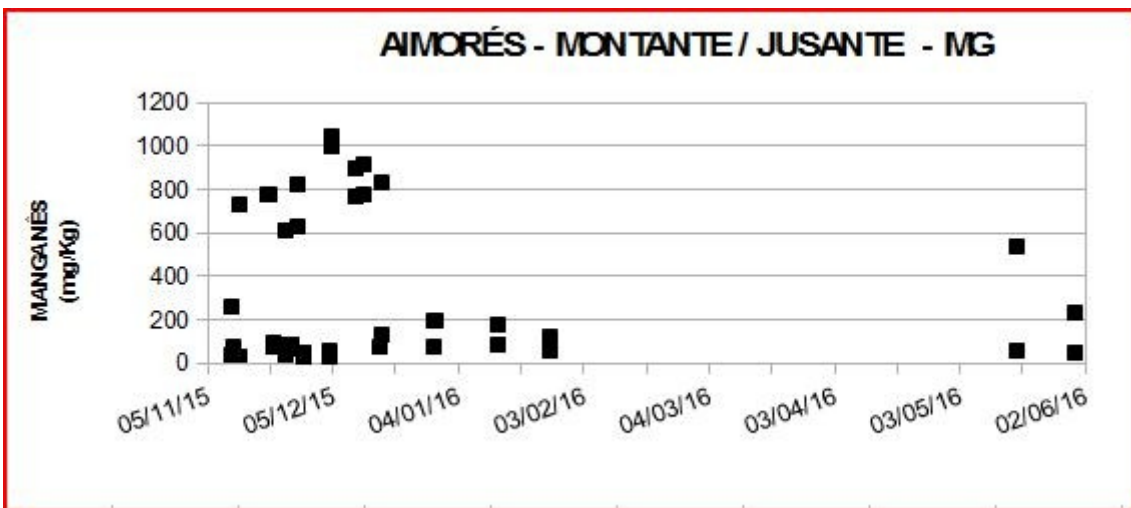
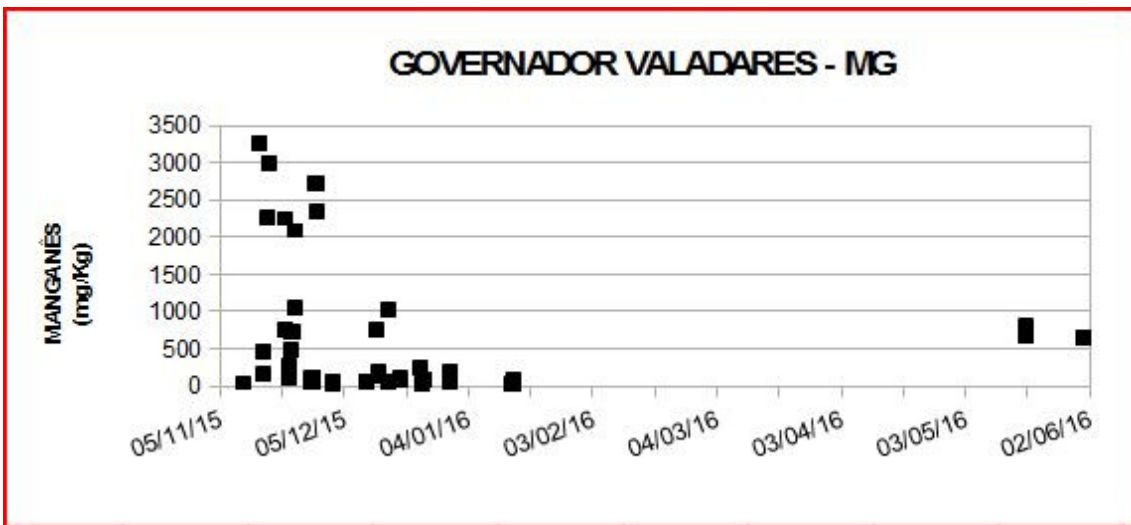
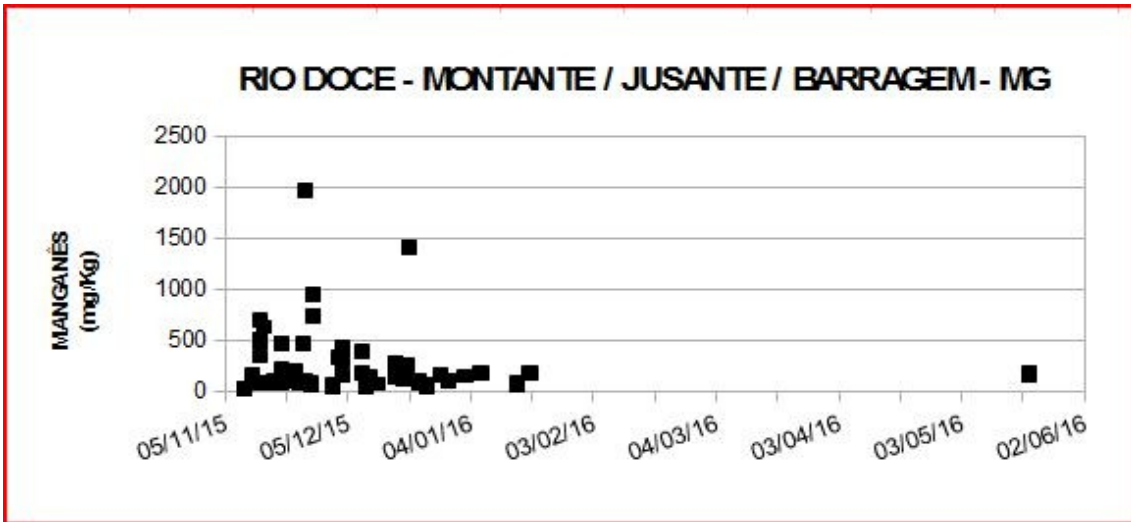
## 2.8 – CHUMBO



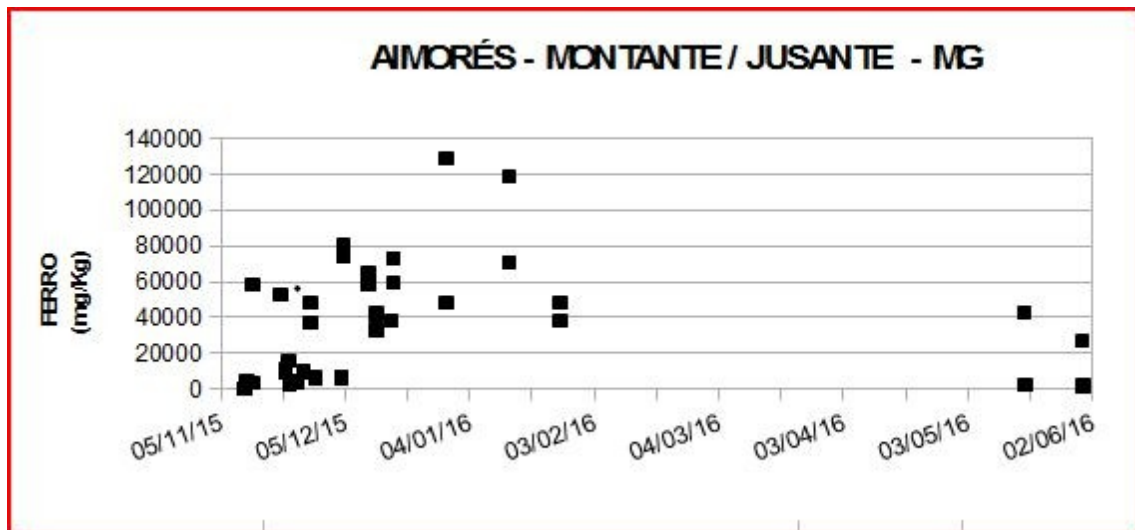
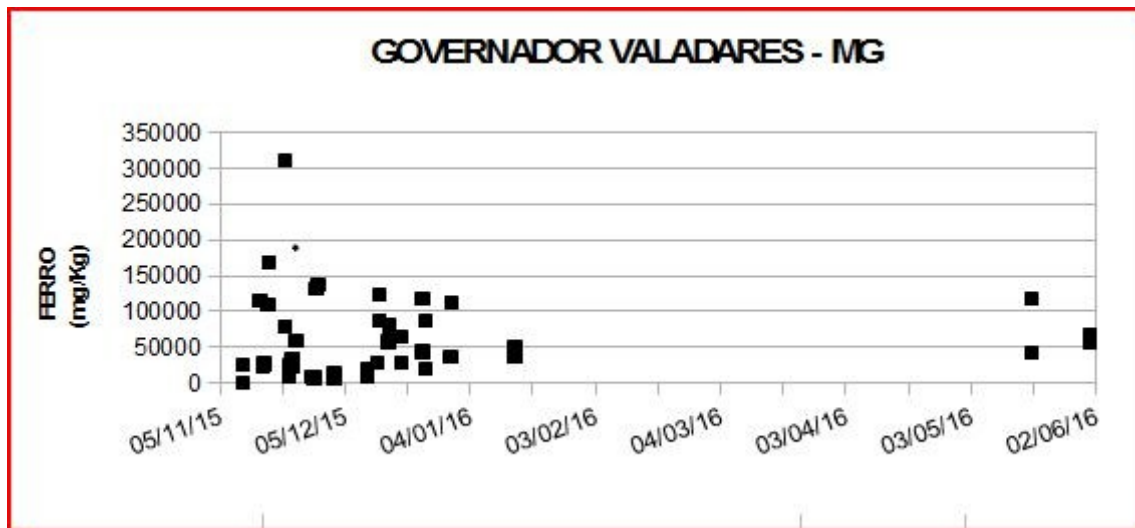
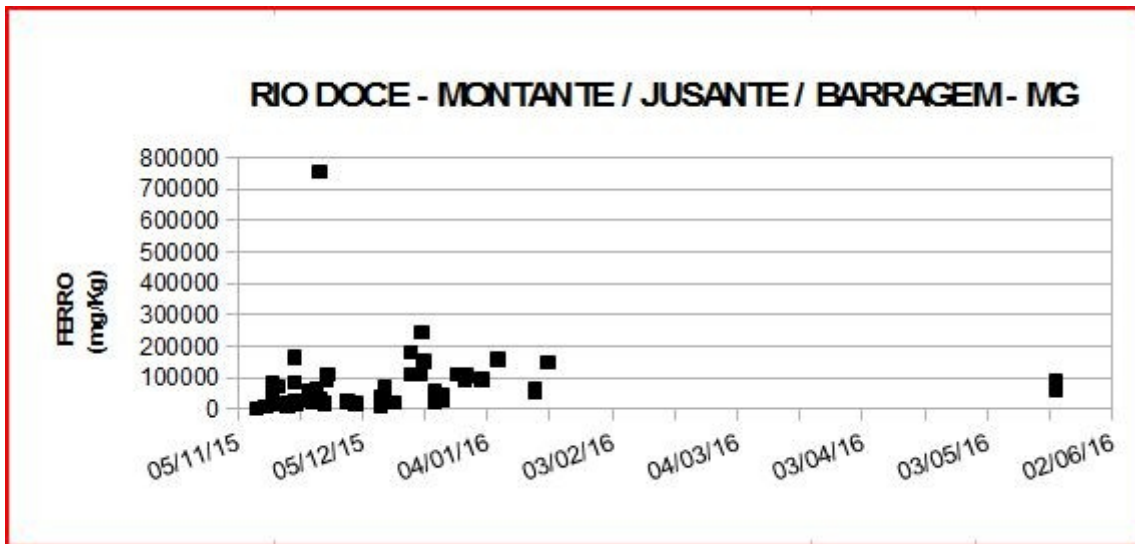


## 2.9 – MANGANÊS









### ANEXO 3

## SUMÁRIOS ESTATÍSTICOS DOS DADOS DE AGUA DOCE-MG ANALISADOS

#### 1- ALUMÍNIO DISSOLVIDO (mg/L)

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	0,162843	0,222064	0,001	1,19	1,189
Aimorés	60	0,826313	1,15415	0,001	5,06	5,059
Barra Longa	62	0,241605	0,470557	0,00729	2,1	2,09271
Galiléia	29	1,00372	1,29651	0,02	5,01	4,99
Governador Valadares	202	0,904728	0,953579	0,02	5,28	5,26
Ipaba	9	0,691111	0,883055	0,02	2,35	2,33
Ipatinga	34	0,731768	1,45513	0,02	5,88	5,86
Resplendor	4	0,4235	0,31386	0,133	0,804	0,671
Rio Doce	57	0,331865	0,735179	0,02	4,99	4,97
Tumiritinga	6	0,504833	0,427901	0,105	1,02	0,915
Total de observações	<b>506</b>	0,668306	0,971799	0,001	5,88	5,879

#### 2-ARSÊNIO TOTAL (mg/L)

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	27	0,00803704	0,00262358	0,004	0,01	0,006
Aimorés	80	0,00723125	0,0055381	0,0005	0,045	0,0445
Barra Longa	85	0,006808	0,00372915	0,001	0,027	0,026
Galiléia	21	0,00726048	0,00322332	0,001	0,01	0,009
Governador Valadares	157	0,00703631	0,00322729	0,001	0,016	0,015
Ipaba	7	0,00928571	0,00188982	0,005	0,01	0,005
Ipatinga	36	0,00722222	0,00333904	0,001	0,01	0,009
Resplendor	8	0,00675	0,00301188	0,004	0,01	0,006
Rio Doce	74	0,00581973	0,00340038	0,001	0,017	0,016
Tumiritinga	14	0,00749214	0,0045597	0,00389	0,02	0,01611
Total de observações	<b>509</b>	0,0069664	0,00381022	0,0005	0,045	0,0445

#### 3-BÁRIO TOTAL (mg/L)

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,0469644	0,0459345	0,01	0,28	0,27
Aimorés	62	0,0766081	0,0597833	0,01	0,28	0,27
Barra Longa	66	0,180082	0,393006	0,013	3,0	2,987
Galiléia	29	0,15131	0,19648	0,014	0,84	0,826
Governador Valadares	204	0,111721	0,0761949	0,02	0,48	0,46
Ipaba	9	0,08	0,0583095	0,02	0,17	0,15
Ipatinga	34	0,167765	0,193445	0,02	0,73	0,71
Resplendor	4	0,04725	0,0227651	0,022	0,076	0,054
Rio Doce	60	0,126217	0,120539	0,02	0,42	0,4
Tumiritinga	6	0,0415	0,0231582	0,02	0,078	0,058
Total de observações	<b>519</b>	0,116305	0,173072	0,01	3,0	2,99

#### 4-CHUMBO TOTAL (mg/L)

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,00992222	0,0190449	0,001	0,121	0,12
Aimorés	62	0,0135345	0,0130269	0,001	0,059	0,058
Barra Longa	66	0,0284561	0,0571097	0,001	0,42	0,419
Galiléia	29	0,0218621	0,0209314	0,005	0,07	0,065
Governador Valadares	204	0,0167206	0,0135314	0,002	0,082	0,08
Ipaba	9	0,0191111	0,015447	0,002	0,055	0,053
Ipatinga	34	0,0239294	0,027307	0,005	0,116	0,111
Resplendor	4	0,00625	0,0025	0,005	0,01	0,005
Rio Doce	60	0,0185475	0,0189783	0,002	0,073	0,071
Tumiritinga	6	0,008	0,00244949	0,005	0,01	0,005
Total de observações	<b>519</b>	0,0180736	0,0259971	0,001	0,42	0,419

**5 - CIANETO LIVRE (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	0,00367279	0,0016994	0,001	0,00518	0,00418
Aimorés	58	0,00454828	0,00589101	0,001	0,025	0,024
Barra Longa	62	0,0017429	0,0011553	0,001	0,005	0,004
Galiléia	28	0,00486429	0,00404019	0,001	0,017	0,016
Governador Valadares	196	0,0045025	0,00331258	0,001	0,02	0,019
Ipaba	8	0,0025	0,00092582	0,002	0,004	0,002
Ipatinga	30	0,004219	0,00682946	0,001	0,034	0,033
Resplendor	4	0,0021	0,00127017	0,001	0,0032	0,0022
Rio Doce	54	0,00299222	0,003288	0,001	0,015	0,014
Tumiritinga	6	0,0017	0,000883176	0,001	0,0032	0,0022
Total de observações	<b>489</b>	0,00383483	0,00384566	0,001	0,034	0,033

**6 – CLORETO TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	1,11791	0,379577	0,5	2,18	1,68
Aimorés	62	14,6555	44,4736	2,0	356,42	354,42
Barra Longa	63	2,87508	3,36152	0,67	16,0	15,33
Galiléia	29	12,1283	17,7056	0,1	98,9	98,8
Governador Valadares	202	5,80589	4,28025	1,0	29,91	28,91
Ipaba	8	4,23375	2,34093	1,21	9,07	7,86
Ipatinga	32	3,84844	1,85932	1,3	10,3	9,0
Resplendor	4	9,675	9,66795	0,1	20,7	20,6
Rio Doce	55	31,8478	86,238	0,5	445,76	445,26
Tumiritinga	6	8,85667	8,48533	1,0	19,5	18,5
Total de observações	<b>504</b>	9,25167	33,8185	0,1	445,76	445,66

**7- CONDUTIVIDADE (µS/cm)**

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	44	49,9714	35,3359	7,68	163,0	155,32
Aimorés	62	164,505	235,288	31,8	1265,0	1233,2
Barra Longa	65	268,612	674,31	30,8	5014,0	4983,2
Galiléia	30	112,477	30,3745	62,5	195,0	132,5
Governador Valadares	206	482,221	5344,08	12,0	76800,0	76788,0
Ipaba	9	99,1333	44,6164	56,9	209,8	152,9
Ipatinga	35	2251,23	12485,2	50,0	74000,0	73950,0
Resplendor	5	72,78	15,7128	57,0	94,0	37,0
Rio Doce	61	2904,72	12048,4	50,0	60000,0	59950,0
Tumiritinga	8	88,2125	27,9729	48,0	140,1	92,1
Total de observações	<b>525</b>	743,833	6232,38	7,68	76800,0	76792,3

**8 - COR-VERDADEIRA (mgPt/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Media</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	54,0314	70,6628	5,0	266,0	261,0
Aimorés	60	1244,54	2688,32	10,0	10172,0	10162,0
Barra Longa	62	581,985	1235,13	7,75	8980,0	8972,25
Galiléia	29	555,322	459,943	45,0	1988,0	1943,0
Governador Valadares	200	662,287	986,571	5,0	10000,0	9995,0
Ipaba	9	272,222	280,748	100,0	1000,0	900,0
Ipatinga	33	1152,82	1874,4	9,0	8292,0	8283,0
Resplendor	4	172,873	128,029	42,0	331,0	289,0
Rio Doce	53	1174,42	1647,35	28,0	5832,0	5804,0
Tumiritinga	6	141,845	91,5474	39,0	267,0	228,0
Total de observações	<b>499</b>	733,307	1440,8	5,0	10172,0	10167,0



**9 - CROMO TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,01191	0,018563	0,001	0,1	0,099
Aimorés	62	0,0298787	0,037516	0,001	0,22	0,219
Barra Longa	65	0,132864	0,375244	0,001	2,32	2,319
Galiléia	29	0,0527586	0,0542413	0,01	0,23	0,22
Governador Valadares	204	0,0405402	0,0355409	0,01	0,26	0,25
Ipaba	9	0,04	0,0308221	0,01	0,09	0,08
Ipatinga	33	0,0855152	0,123752	0,005	0,54	0,535
Resplendor	4	0,018	0,00927362	0,01	0,027	0,017
Rio Doce	60	0,0622783	0,0769128	0,01	0,3	0,29
Tumiritinga	6	0,0158333	0,0066458	0,01	0,025	0,015
Total de observações	<b>517</b>	0,0539854	0,145397	0,001	2,32	2,319

**10 – DEMANDA BIOQUÍMICA DE OXIGÊNIO - DBO (mgO2/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	3,05605	0,244415	3,0	4,4	1,4
Aimorés	49	2,69388	1,34725	0,27	6,8	6,53
Barra Longa	53	2,31943	1,10244	0,87	9,0	8,13
Galiléia	29	3,18103	0,984561	1,8	6,0	4,2
Governador Valadares	196	3,05959	1,48493	1,8	15,3	13,5
Ipaba	8	2,1	0,282843	2,0	2,8	0,8
Ipatinga	28	2,37857	0,637912	2,0	4,6	2,6
Resplendor	6	2,66667	1,63299	2,0	6,0	4,0
Rio Doce	58	2,42948	0,97922	1,45	5,8	4,35
Tumiritinga	5	2,4	0,547723	2,0	3,0	1,0
Total de observações	<b>475</b>	2,80122	1,25072	0,27	15,3	15,03

**11 - FERRO DISSOLVIDO (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	0,750591	1,39782	0,0206	8,6	8,5794
Aimorés	59	1,21994	1,50989	0,02	5,8	5,78
Barra Longa	64	19,9614	106,968	0,02	632,0	631,98
Galiléia	29	2,35852	2,91027	0,23	10,7	10,47
Governador Valadares	202	2,53623	2,97645	0,02	15,3	15,28
Ipaba	9	1,49111	1,40353	0,08	4,4	4,32
Ipatinga	32	1,88656	3,22339	0,1	15,49	15,39
Resplendor	4	1,07275	0,987053	0,234	2,5	2,266
Rio Doce	57	1,33361	2,57262	0,01	15,9	15,89
Tumiritinga	6	1,11467	0,937193	0,203	2,46	2,257
Total de observações	<b>505</b>	4,20452	38,3748	0,01	632,0	631,99

**12 - FÓSFORO TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	0,0816279	0,093705	0,02	0,41	0,39
Aimorés	55	0,295891	0,390807	0,01	1,6	1,59
Barra Longa	71	0,941254	2,07133	0,005	15,0	14,995
Galiléia	30	0,488633	0,520633	0,01	2,65	2,64
Governador Valadares	204	0,533034	0,529847	0,01	3,08	3,07
Ipaba	9	0,560222	0,490914	0,24	1,71	1,47
Ipatinga	34	1,15129	3,62668	0,01	21,3	21,29
Resplendor	6	0,363667	0,792106	0,01	1,98	1,97
Rio Doce	73	0,464685	0,65214	0,01	2,9	2,89
Tumiritinga	5	0,0476	0,0672555	0,009	0,167	0,158
Total de observações	<b>530</b>	0,548187	1,29114	0,005	21,3	21,295

**13 - MANGANÊS TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,468676	0,757299	0,013	4,82	4,807
Aimorés	62	0,302624	0,369742	0,0136	1,65	1,6364
Barra Longa	67	18,3303	84,4797	0,018	526,0	525,982
Galiléia	29	1,86049	1,66606	0,0001	6,46	6,4599
Governador Valadares	204	1,7088	1,6502	0,018	12,64	12,622
Ipaba	9	1,23556	1,03152	0,1	3,06	2,96
Ipatinga	34	2,21785	3,57296	0,03	13,34	13,31
Resplendor	4	0,15325	0,166025	0,024	0,379	0,355
Rio Doce	60	2,40063	2,99838	0,05	9,95	9,9
Tumiritinga	6	0,510667	1,03527	0,03	2,62	2,59
Total de observações	<b>520</b>	3,66302	30,7088	0,0001	526,0	526,0

**14 - MERCÚRIO TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,000197778	0,000279194	0,0001	0,002	0,0019
Aimorés	56	0,000207857	0,000220303	0,0001	0,0015	0,0014
Barra Longa	65	0,000781077	0,00271344	0,0001	0,0215	0,0214
Galiléia	28	0,000965	0,0033541	0,0001	0,018	0,0179
Governador Valadares	196	0,000317551	0,000342573	0,0001	0,0026	0,0025
Ipaba	9	0,0007	0,000681909	0,0002	0,0021	0,0019
Ipatinga	34	0,000351471	0,000357484	0,0001	0,00173	0,00163
Resplendor	4	0,00033	0,000446766	0,0001	0,001	0,0009
Rio Doce	57	0,00035614	0,000366459	0,0001	0,0017	0,0016
Tumiritinga	6	0,000136667	0,0000496655	0,0001	0,0002	0,0001
Total de observações	<b>500</b>	0,00040252	0,00130135	0,0001	0,0215	0,0214

**15 - NÍQUEL TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	44	0,00778795	0,00678892	0,001	0,03	0,029
Aimorés	60	0,0110238	0,0127609	0,001	0,071	0,07
Barra Longa	66	0,0375191	0,111219	0,001	0,752	0,751
Galiléia	28	0,0207321	0,0198925	0,001	0,09	0,089
Governador Valadares	202	0,0153168	0,0106218	0,001	0,068	0,067
Ipaba	9	0,0143333	0,0102225	0,001	0,026	0,025
Ipatinga	34	0,0264706	0,0395183	0,001	0,182	0,181
Resplendor	3	0,00616667	0,00464579	0,001	0,01	0,009
Rio Doce	59	0,0193795	0,0232811	0,0002	0,1	0,0998
Tumiritinga	6	0,01025	0,00209165	0,0075	0,014	0,0065
Total de observações	<b>511</b>	0,0184095	0,0436237	0,0002	0,752	0,7518

**16 - NITRATO como N (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	23	0,617826	0,38993	0,1	1,96	1,86
Aimorés	23	1,95696	2,70666	0,26	10,4	10,14
Barra Longa	35	0,347714	0,230678	0,05	0,9	0,85
Galiléia	13	0,949231	0,353281	0,05	1,32	1,27
Governador Valadares	100	0,9531	0,499342	0,02	3,61	3,59
Ipatinga	13	0,783077	0,178996	0,45	1,0	0,55
Resplendor	1	0,31		0,31	0,31	0
Rio Doce	26	0,484231	0,341633	0,05	1,6	1,55
Tumiritinga	2	0,46	0	0,46	0,46	0
Total de observações	<b>236</b>	0,860339	1,00924	0,02	10,4	10,38

**17 - NITRITO (como N) (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	23	0,026087	0,0146905	0,02	0,08	0,06
Aimorés	23	0,014913	0,0102288	0,006	0,04	0,034
Barra Longa	35	0,0121143	0,00815934	0,006	0,041	0,035
Galiléia	13	0,0196154	0,00138675	0,015	0,02	0,005
Governador Valadares	100	0,03392	0,0492371	0,004	0,383	0,379
Ipatinga	13	0,0513846	0,0875962	0,006	0,335	0,329
Resplendor	1	0,01		0,01	0,01	0
Rio Doce	26	0,0181923	0,00970369	0,006	0,05	0,044
Tumiritinga	2	0,01	0	0,01	0,01	0
Total de observações	<b>236</b>	0,0262076	0,0397262	0,004	0,383	0,379

**18 - NITROGÊNIO AMONICAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	0,132674	0,061776	0,06	0,297	0,237
Aimorés	62	0,218653	0,364737	0,01	1,96	1,95
Barra Longa	60	0,16619	0,224525	0,01	1,6	1,59
Galiléia	29	0,168966	0,230223	0,01	1,29	1,28
Governador Valadares	202	0,272616	0,575083	0,01	5,23	5,22
Ipaba	9	0,647778	1,2857	0,1	4,07	3,97
Ipatinga	33	0,810727	2,06924	0,01	10,74	10,73
Resplendor	4	0,492	0,435746	0,01	0,906	0,896
Rio Doce	56	0,18852	0,242763	0,01	1,39	1,38
Tumiritinga	7	0,268571	0,46998	0,01	1,32	1,31
Total de observações	<b>505</b>	0,269684	0,701481	0,01	10,74	10,73

**19 - OXIGÊNIO DISSOLVIDO (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	41	5,33976	1,36272	3,09	8,92	5,83
Aimorés	60	6,69083	1,20182	3,93	8,99	5,06
Barra Longa	70	6,09043	0,990784	3,76	8,91	5,15
Galiléia	31	6,23484	0,877276	3,91	7,19	3,28
Governador Valadares	210	6,33152	1,03013	1,8	9,02	7,22
Ipaba	9	7,26444	1,56668	5,09	9,61	4,52
Ipatinga	37	5,81162	1,43676	3,0	9,68	6,68
Resplendor	8	6,0725	1,35836	5,05	8,6	3,55
Rio Doce	65	6,28877	1,29628	2,9	9,45	6,55
Tumiritinga	10	5,929	0,878084	4,72	7,16	2,44
Total de observações	<b>541</b>	6,22303	1,18605	1,8	9,68	7,88

**20 - pH**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	44	7,77977	0,664766	6,81	9,47	2,66
Aimorés	70	6,83357	0,684194	4,98	8,24	3,26
Barra Longa	72	7,23833	0,815334	5,15	8,83	3,68
Galiléia	31	7,21032	0,212986	6,86	7,83	0,97
Governador Valadares	210	7,17519	0,49728	4,32	9,03	4,71
Ipaba	9	6,90333	0,508035	6,23	7,71	1,48
Ipatinga	37	7,08486	0,857178	4,86	8,47	3,61
Resplendor	8	7,235	0,477404	6,64	7,9	1,26
Rio Doce	66	7,16727	0,671191	5,3	8,54	3,24
Tumiritinga	10	7,104	0,507066	6,21	7,74	1,53
Total de observações	<b>557</b>	7,17838	0,655463	4,32	9,47	5,15

**21 - POTÁSSIO TOTAL (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	42	1,12405	0,881063	0,26	3,96	3,7
Aimorés	62	3,91387	1,27379	1,2	7,4	6,2
Barra Longa	66	2,08294	1,49754	0,1	8,5	8,4
Galiléia	29	7,15828	9,03972	0,4	44,5	44,1
Governador Valadares	204	4,16191	2,9056	0,22	22,8	22,58
Ipaba	9	3,39556	0,420033	2,73	3,95	1,22
Ipatinga	34	3,78706	1,63027	1,07	9,15	8,08
Resplendor	4	2,3225	0,548597	1,59	2,8	1,21
Rio Doce	60	4,32433	3,99011	1,53	20,0	18,47
Tumiritinga	7	2,80286	0,400862	2,3	3,52	1,22
Total de observações	<b>517</b>	3,73627	3,46362	0,1	44,5	44,4

**22 - SÓLIDOS DISSOLVIDOS TOTAIS (mg/L)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	50,7256	27,1161	11,0	108,0	97,0
Aimorés	59	145,576	258,681	21,0	1676,0	1655,0
Barra Longa	63	753,049	2637,82	10,0	20076,0	20066,0
Galiléia	29	101,769	41,3779	42,0	196,7	154,7
Governador Valadares	200	101,631	102,205	15,8	945,0	929,2
Ipaba	9	66,5556	30,0629	38,0	141,0	103,0
Ipatinga	34	1632,96	8476,19	10,0	49580,0	49570,0
Resplendor	4	53,25	23,5991	38,0	88,0	50,0
Rio Doce	55	2402,41	8455,1	29,9	40200,0	40170,1
Tumiritinga	7	46,3429	23,1663	27,2	94,0	66,8
Total de observações	<b>503</b>	537,335	3726,49	10,0	49580,0	49570,0

**23 - SULFATO TOTAL (mg/L) – retirados 2 valores discrepantes (3699,63 e 4463,08 - Barra Longa , 06.11.2015)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	43	4,64535	3,24248	0,5	11,8	11,3
Aimorés	62	7,56597	4,29168	0,5	22,5	22,0
Barra Longa	60	9,53467	8,83185	0,5	52,4	51,9
Galiléia	28	7,19107	3,43557	0,5	16,21	15,71
Governador Valadares	202	6,61639	2,84465	0,5	16,9	16,4
Ipaba	8	5,7625	1,6998	3,38	7,91	4,53
Ipatinga	32	5,66	4,59034	0,5	24,3	23,8
Resplendor	4	2,15	1,91224	0,5	4,0	3,5
Rio Doce	55	9,37127	13,4388	0,99	65,53	64,54
Tumiritinga	7	4,63	2,10396	0,5	6,8	6,3
Total de observações	<b>501</b>	7,11064	6,28594	0,5	65,53	65,03

**24 - TURBIDEZ (NTU) retirado 1 valor discrepante (150000 - Barra Longa, 06.11.2015)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	192,764	481,501	1,1	2870,0	2868,9
Aimorés	67	844,157	1059,07	2,1	5230,0	5227,9
Barra Longa	65	4171,66	6798,48	1,0	46400,0	46399,0
Galiléia	29	1756,07	1784,57	98,0	8200,0	8102,0
Governador Valadares	204	1748,31	1413,96	8,5	6830,0	6821,5
Ipaba	9	3398,78	2567,13	1100,0	9050,0	7950,0
Ipatinga	35	8170,91	17736,9	89,0	78300,0	78211,0
Resplendor	6	337,017	254,335	31,0	610,0	579,0
Rio Doce	62	2617,62	4852,52	1,2	27350,0	27348,8
Tumiritinga	8	383,775	240,794	43,6	610,0	566,4
Total de observações	<b>530</b>	2316,85	5774,5	1,0	78300,0	78299,0

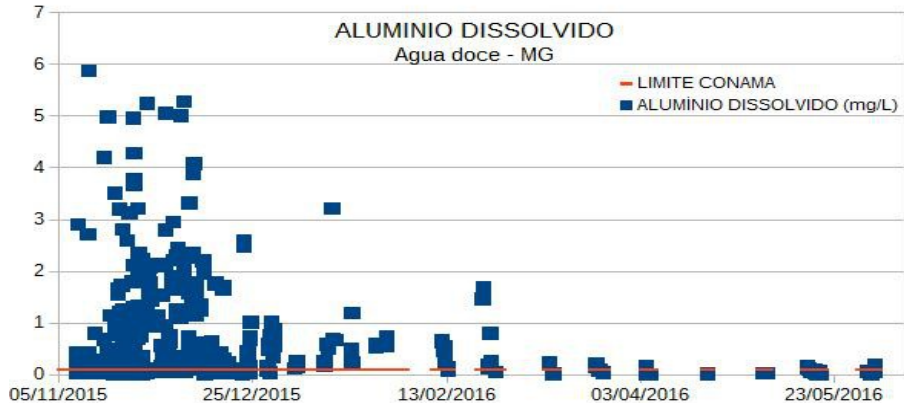
**25 - ZINCO TOTAL (mg/L) retirado 1 ponto discrepante (27,0 – Barra Longa, 06.11.2015)**

<i>LOCAL</i>	<i>Observações</i>	<i>Média</i>	<i>Desvio Padrão</i>	<i>Mínimo</i>	<i>Máximo</i>	<i>Intervalo</i>
Afluentes MG	45	0,0867531	0,093839	0,001	0,5	0,499
Aimorés	62	0,0628971	0,0893169	0,00158	0,684	0,68242
Barra Longa	65	0,111182	0,254577	0,00845	1,93	1,92155
Galiléia	29	0,1	0,066346	0,025	0,32	0,295
Governador Valadares	204	0,0815186	0,0380814	0,01	0,28	0,27
Ipaba	9	0,0733333	0,0324037	0,05	0,13	0,08
Ipatinga	34	0,0948794	0,0816647	0,015	0,39	0,375
Resplendor	4	0,036	0,0129357	0,025	0,05	0,025
Rio Doce	60	0,0748	0,0636169	0,01	0,25	0,24
Tumiritinga	7	0,0427143	0,00992831	0,025	0,05	0,025
Total de obsevações	<b>519</b>	0,0835782	0,107837	0,001	1,93	1,929

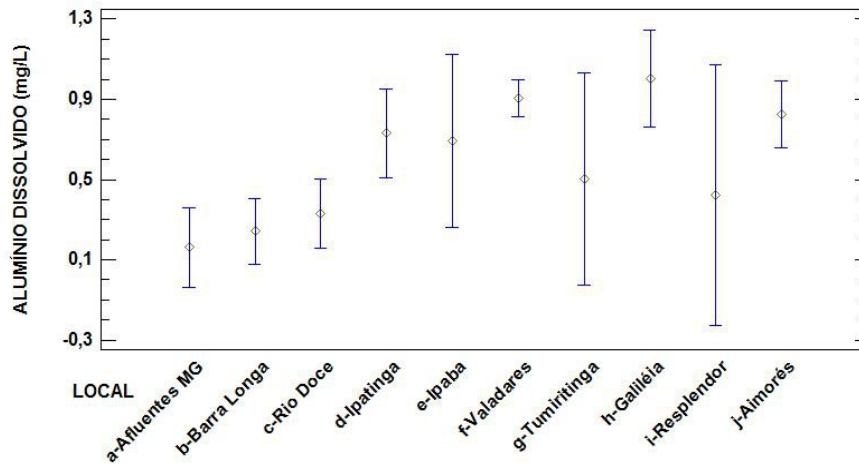
# ANEXO 4

## GRAFICOS POR PARÂMETRO

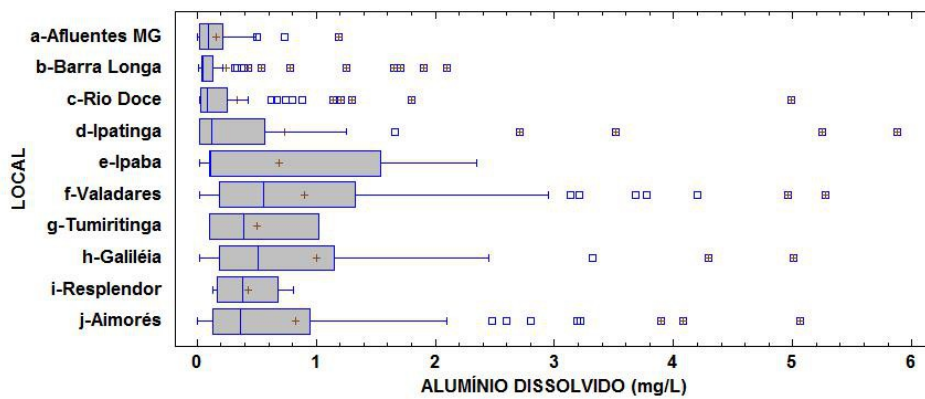
### 1- Alumínio Dissolvido



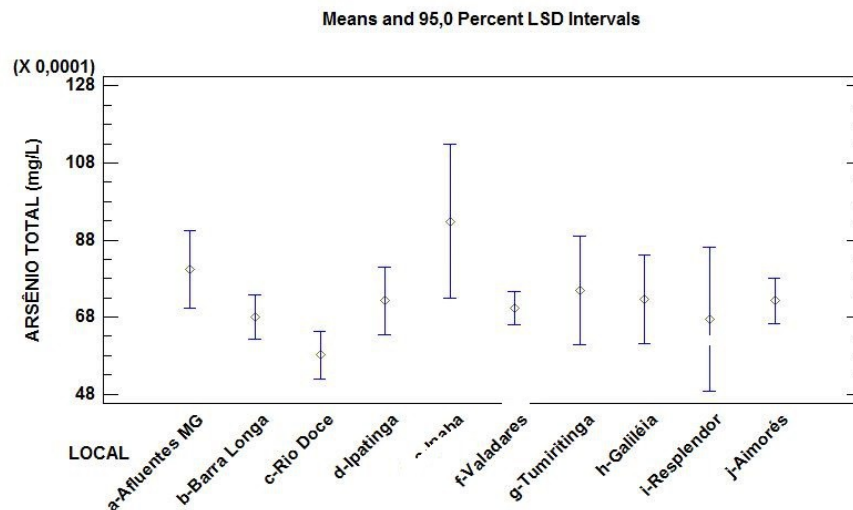
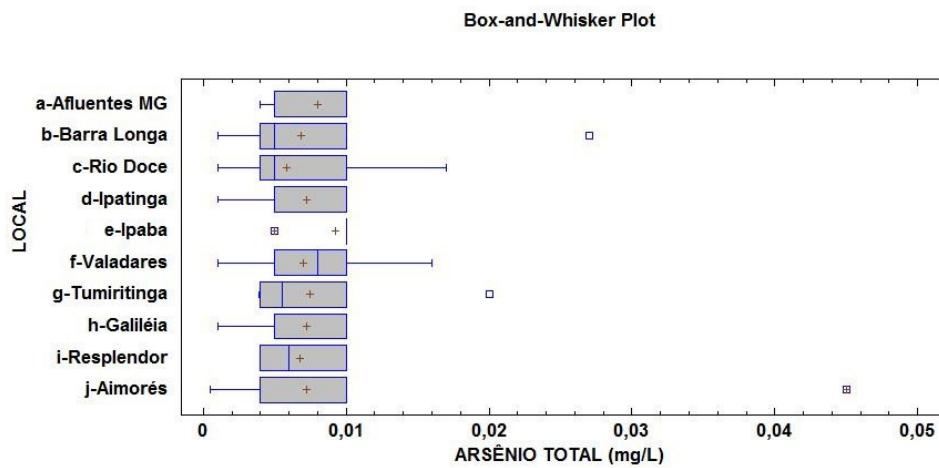
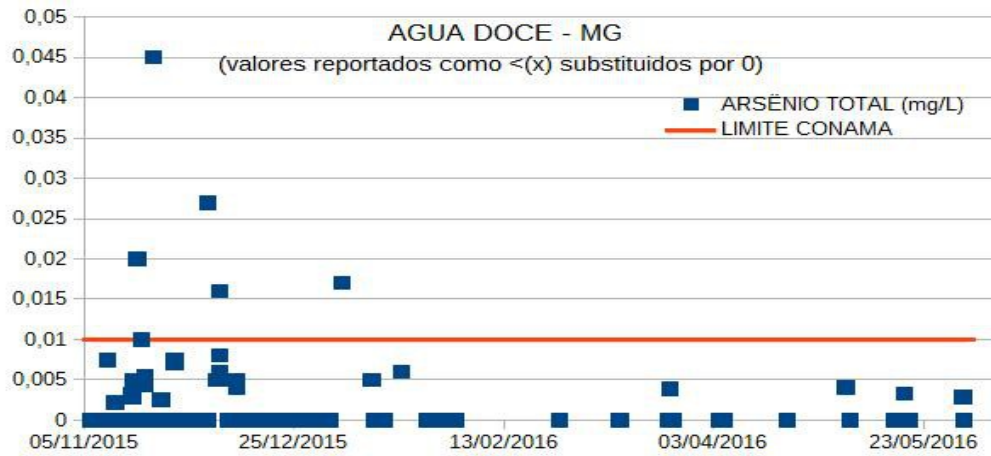
Means and 95,0 Percent LSD Intervals



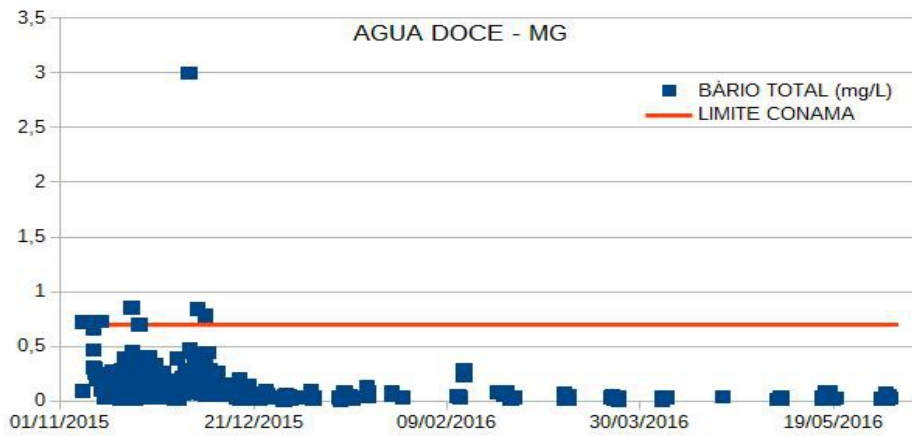
Box-and-Whisker Plot



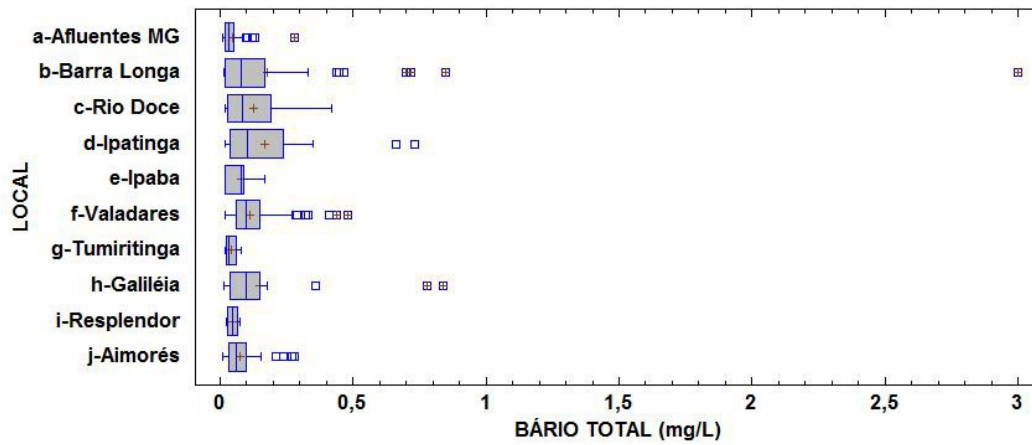
## 2- Arsênio total



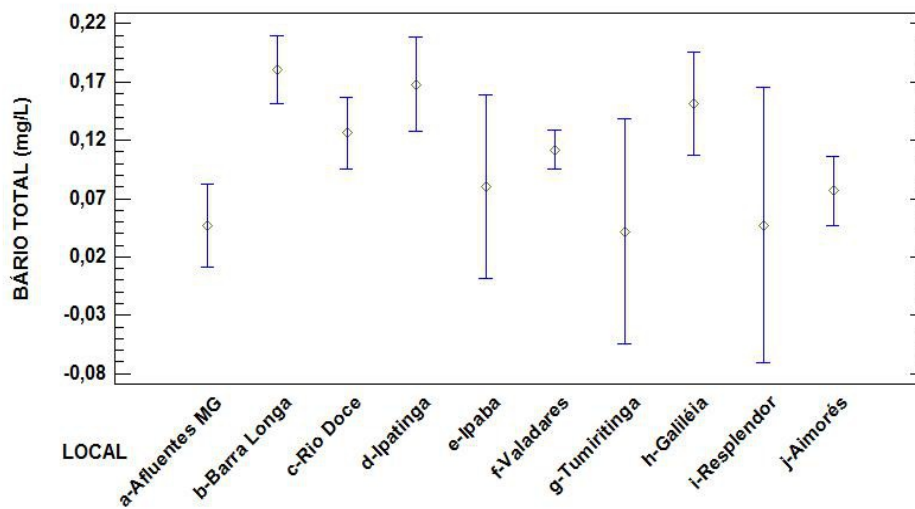
### 3- Bário Total



Box-and-Whisker Plot

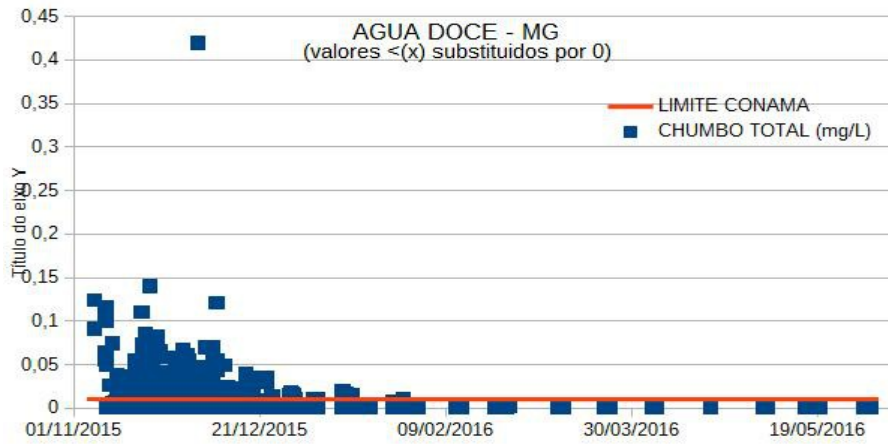


Means and 95,0 Percent LSD Intervals

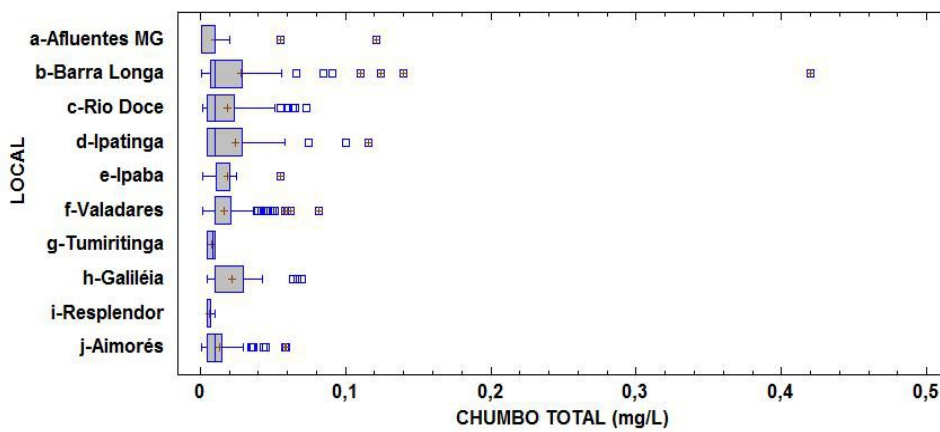




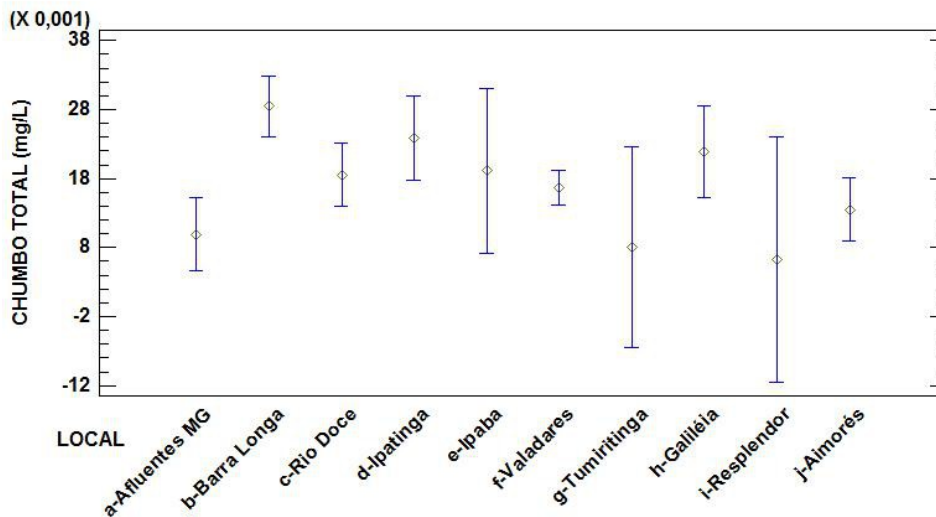
## 4- Chumbo Total



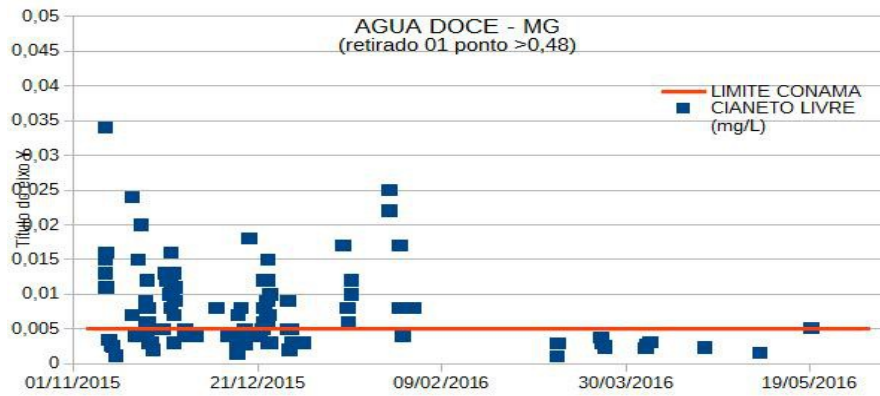
Box-and-Whisker Plot



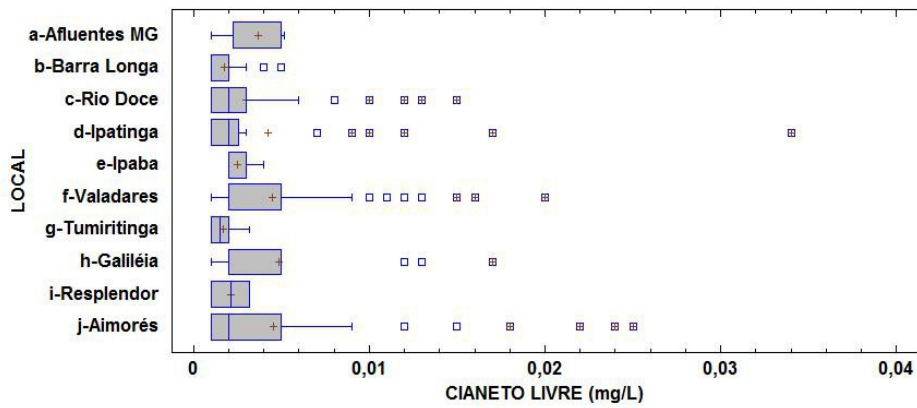
Means and 95,0 Percent LSD Intervals



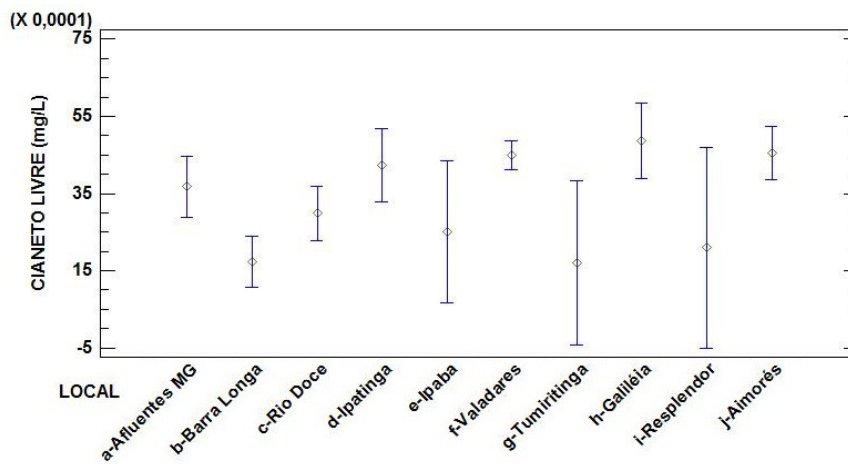
## 5- Cianeto Livre



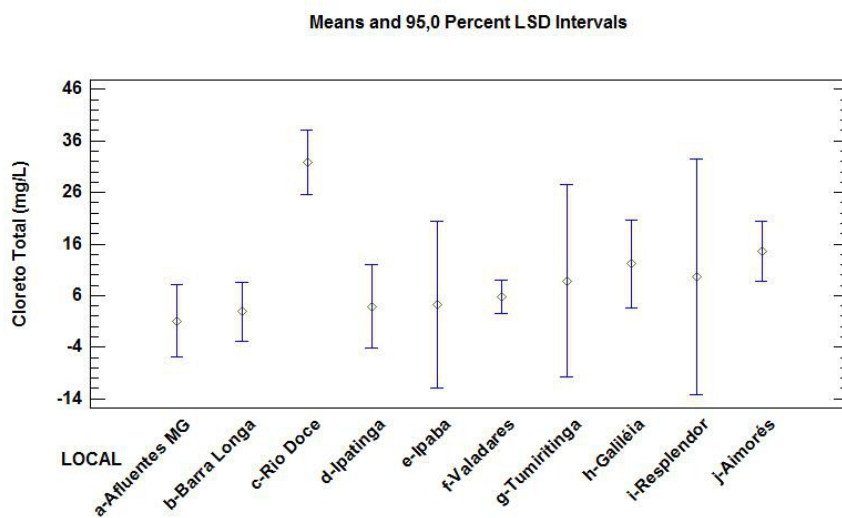
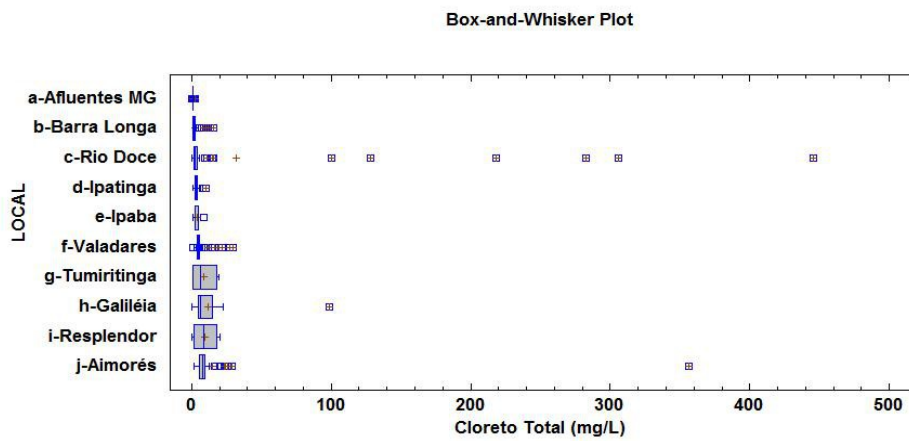
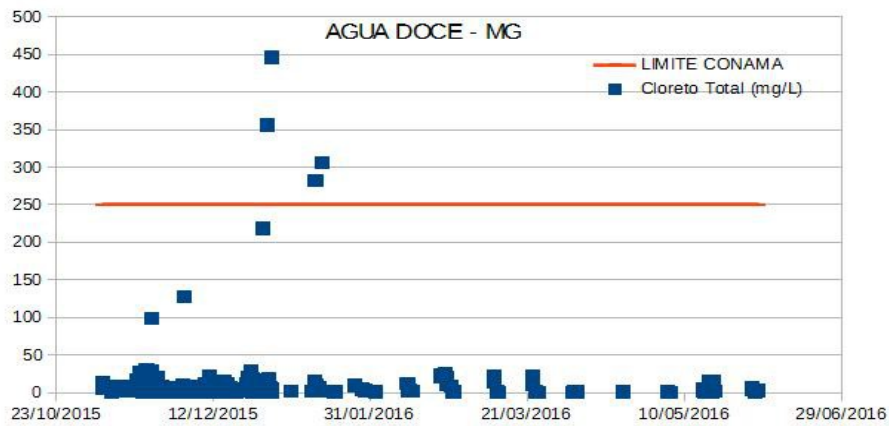
Box-and-Whisker Plot



Means and 95,0 Percent LSD Intervals

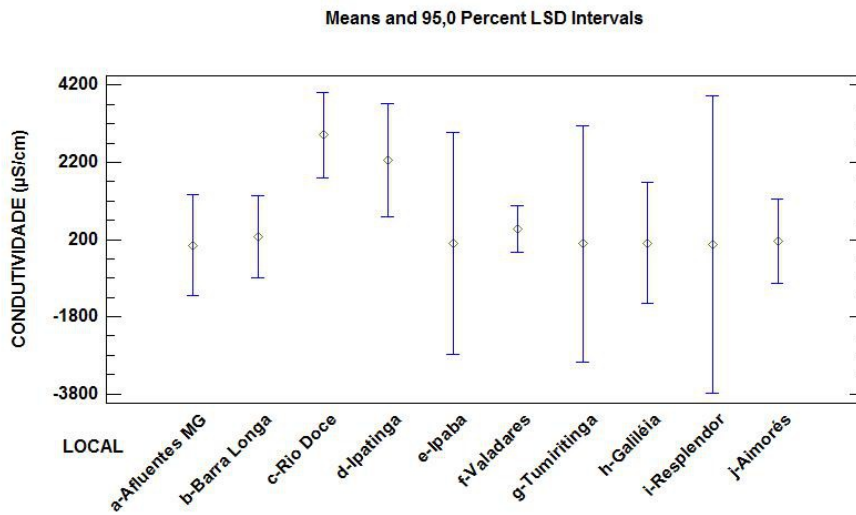
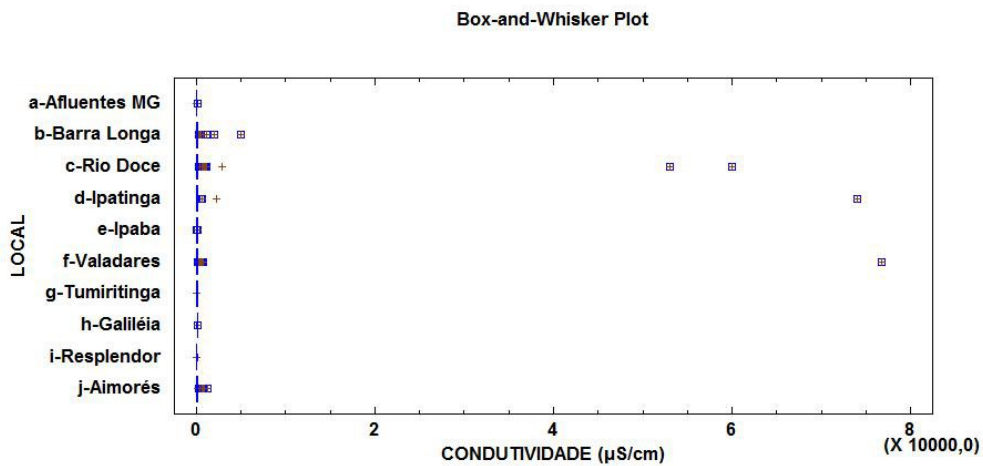
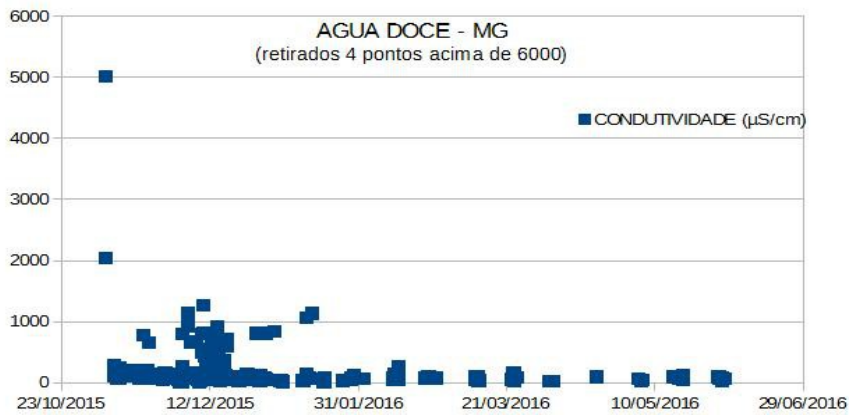


## 6- Cloreto Total (mg/L)

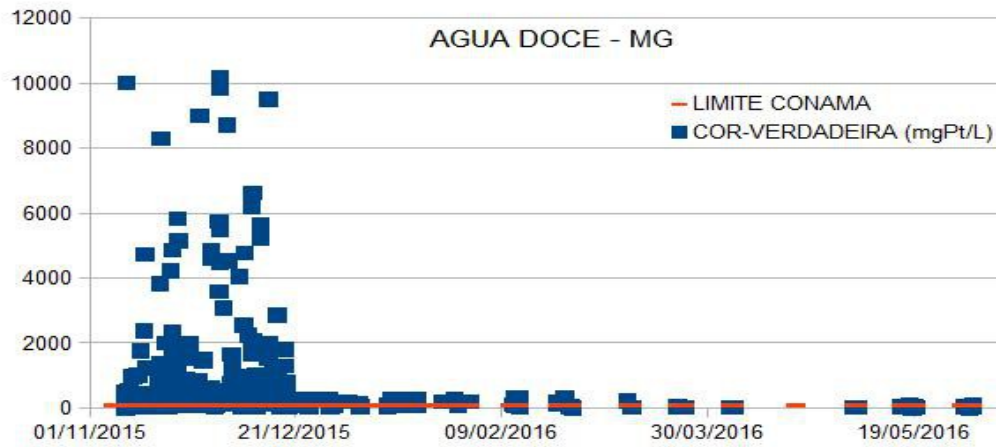


## 7- Condutividade ( $\mu\text{S/cm}$ )

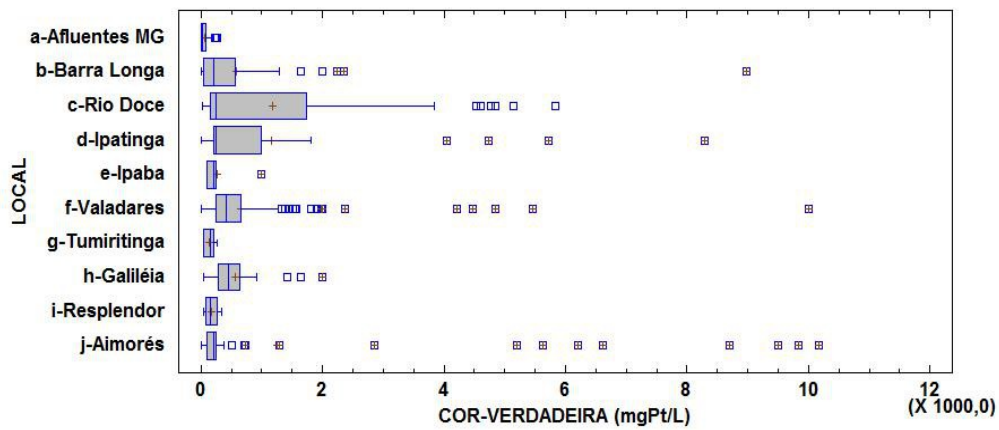
OBS: A Resolução CONAMA 357/2005 não apresenta limite legal para este parâmetro



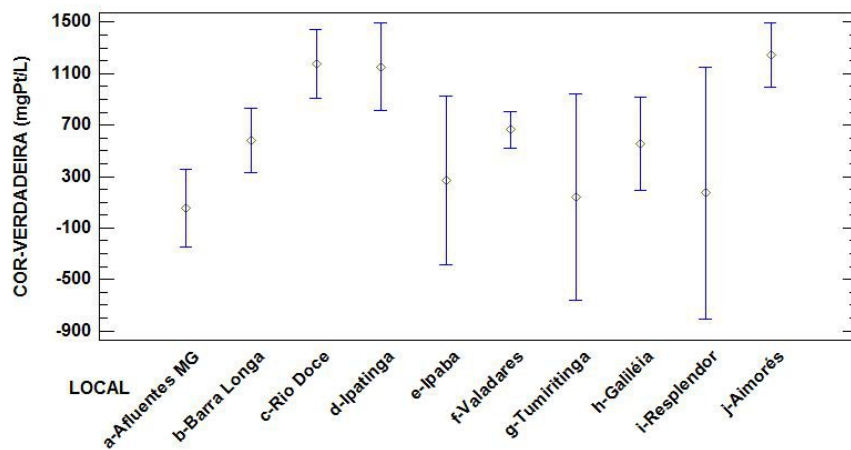
## 8- Cor Verdadeira (mgPt/L)



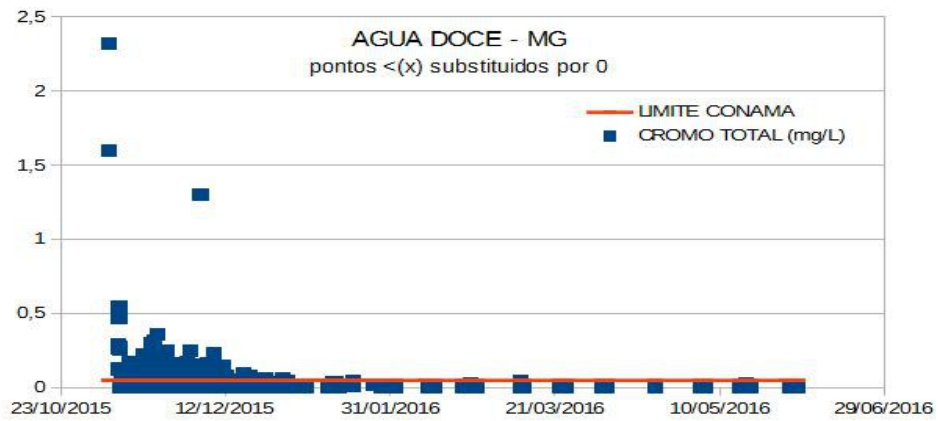
Box-and-Whisker Plot



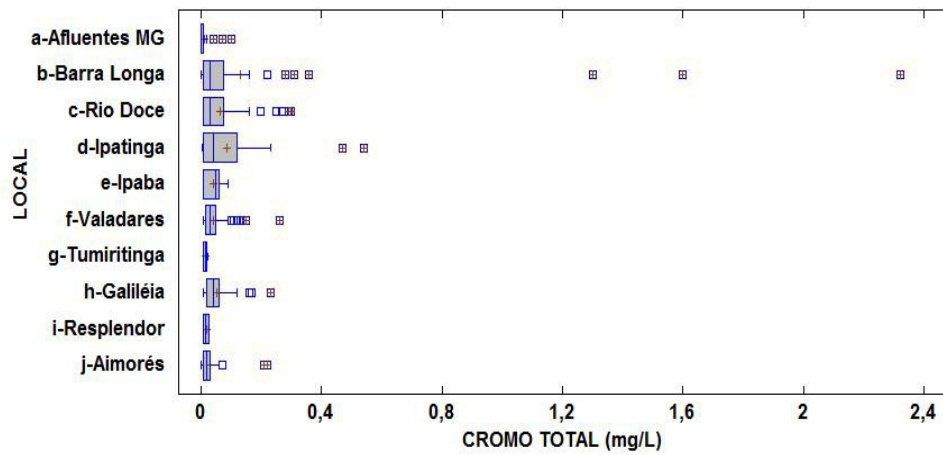
Means and 95,0 Percent LSD Intervals



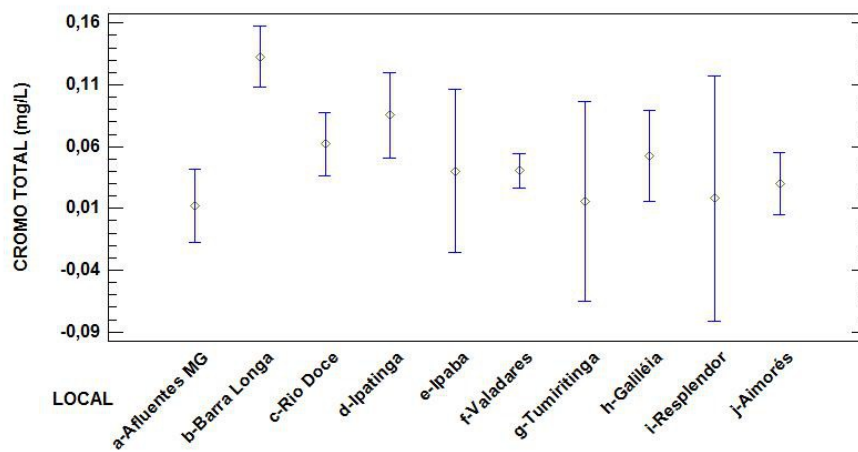
## 9 - Cromo Total (mg/L)



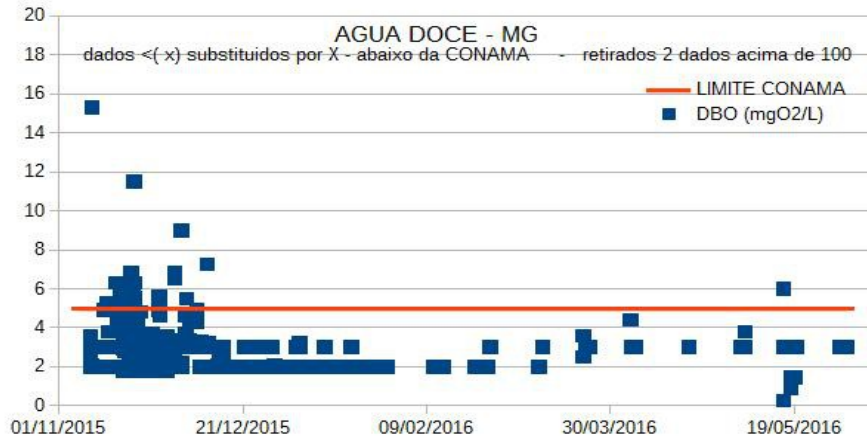
Box-and-Whisker Plot



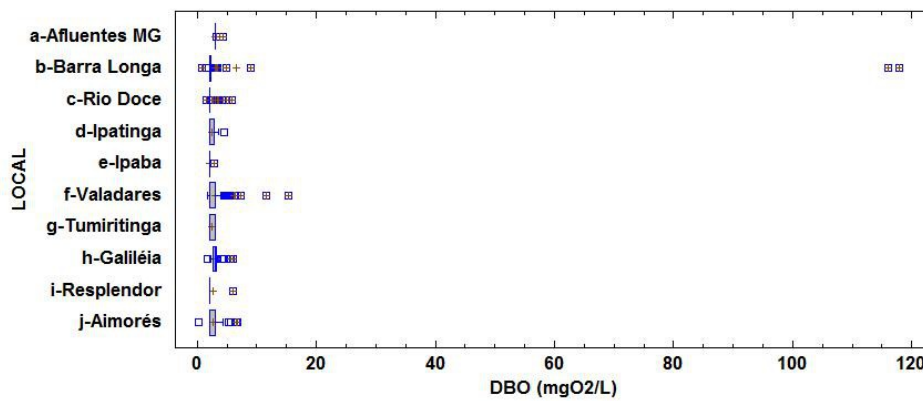
Means and 95,0 Percent LSD Intervals



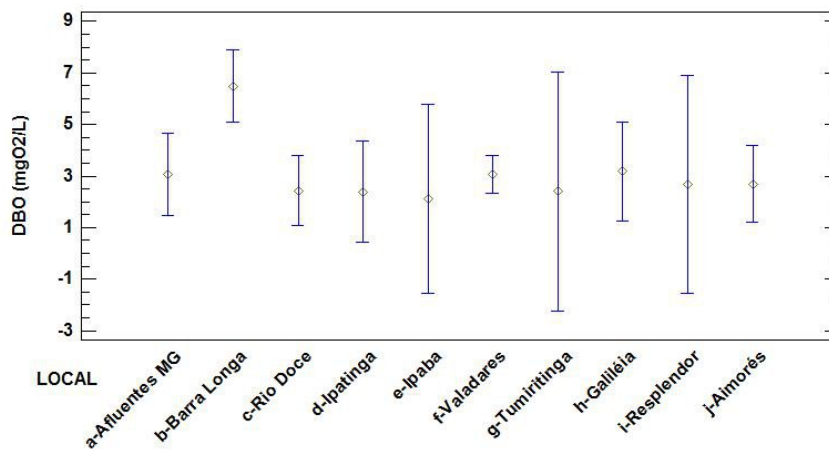
# 10 - Demanda Bioquímica de Oxigênio (DBO) (mgO2/L)



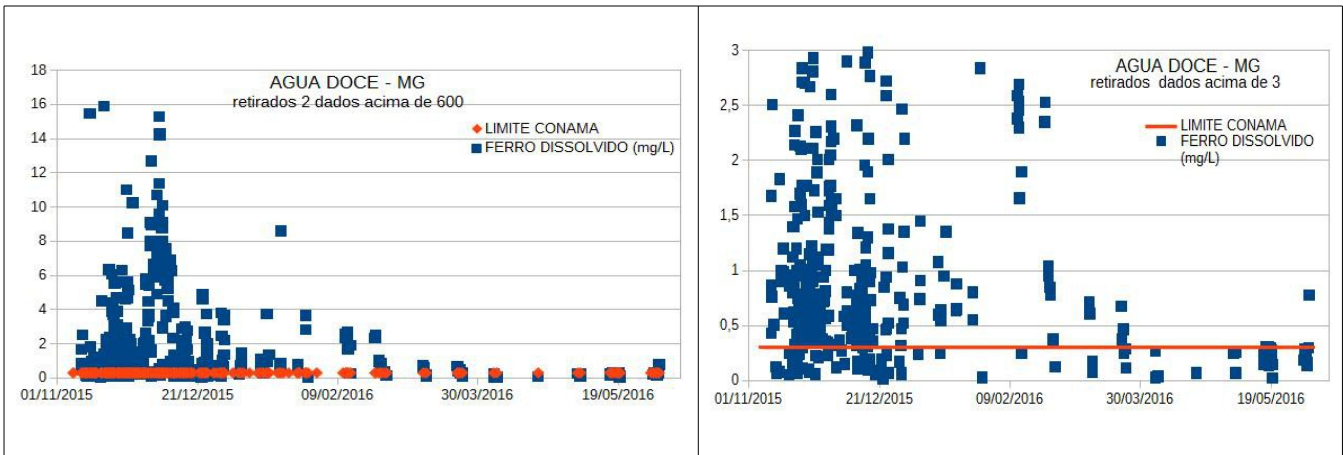
Box-and-Whisker Plot



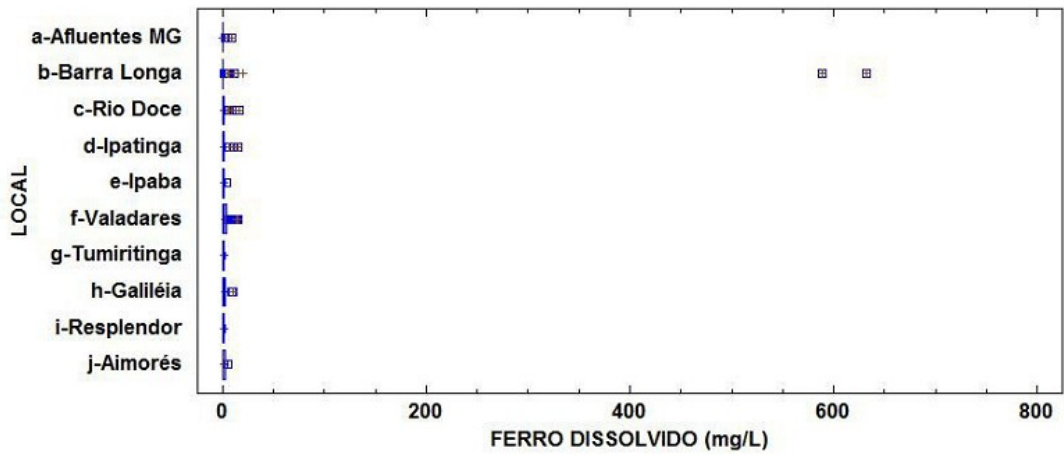
Means and 95,0 Percent LSD Intervals



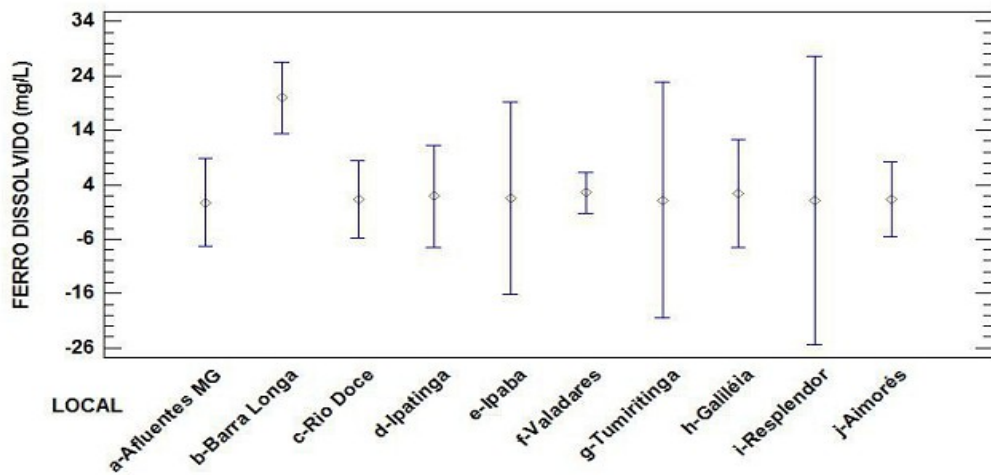
# 11 - Ferro Dissolvido (mg/L)



Box-and-Whisker Plot

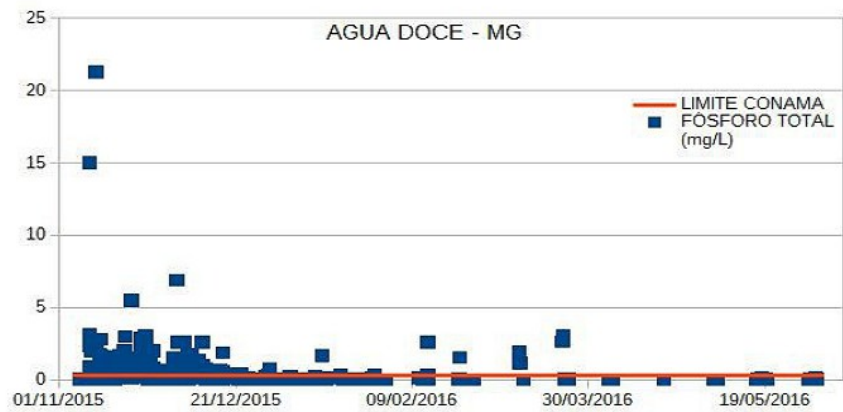


Means and 95,0 Percent LSD Intervals

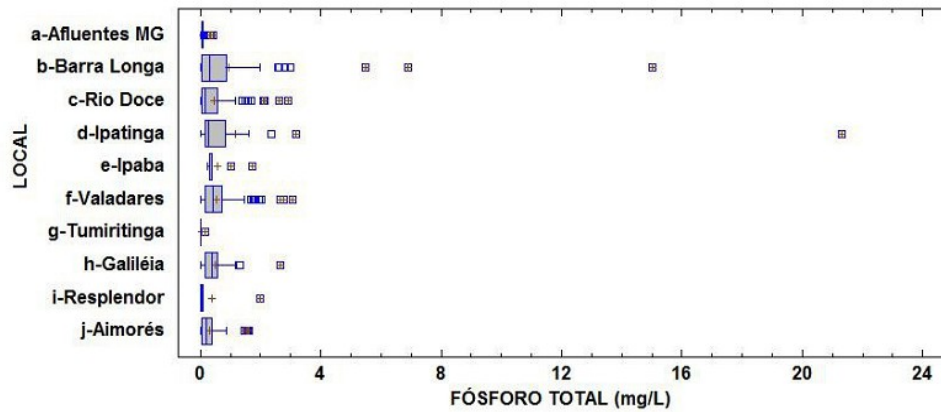




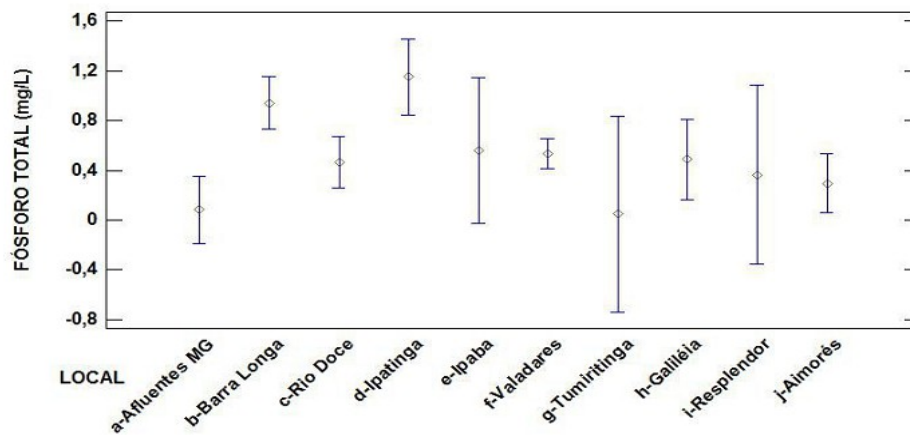
## 12 - Fósforo Total (mg/L)



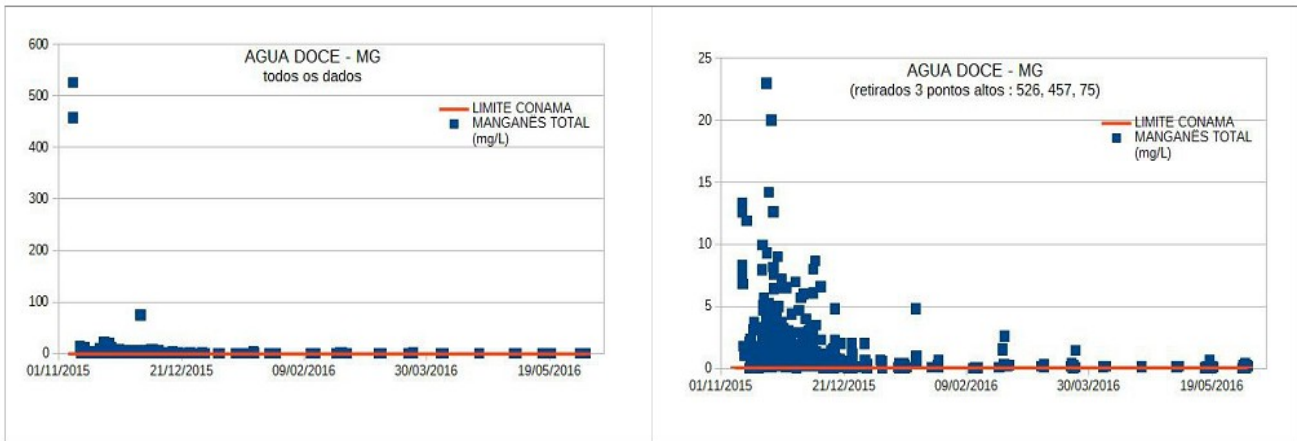
Box-and-Whisker Plot



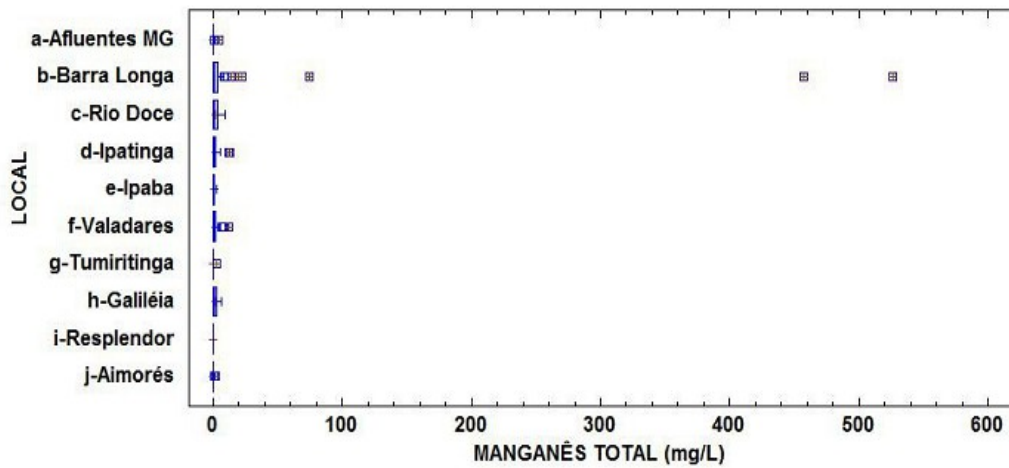
Means and 95,0 Percent LSD Intervals



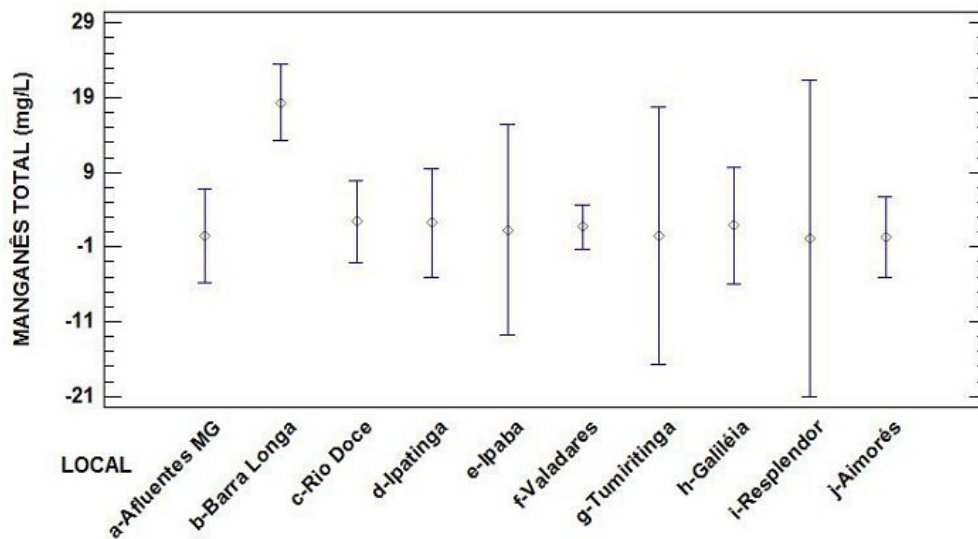
### 13 - Manganês Total (mg/L)



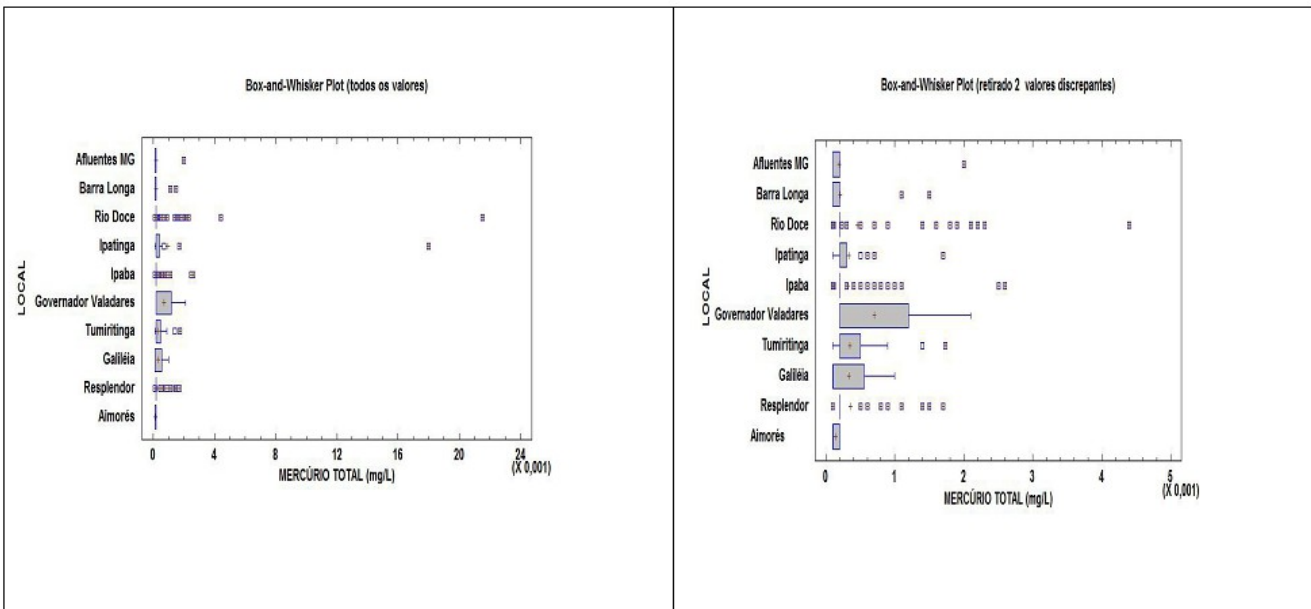
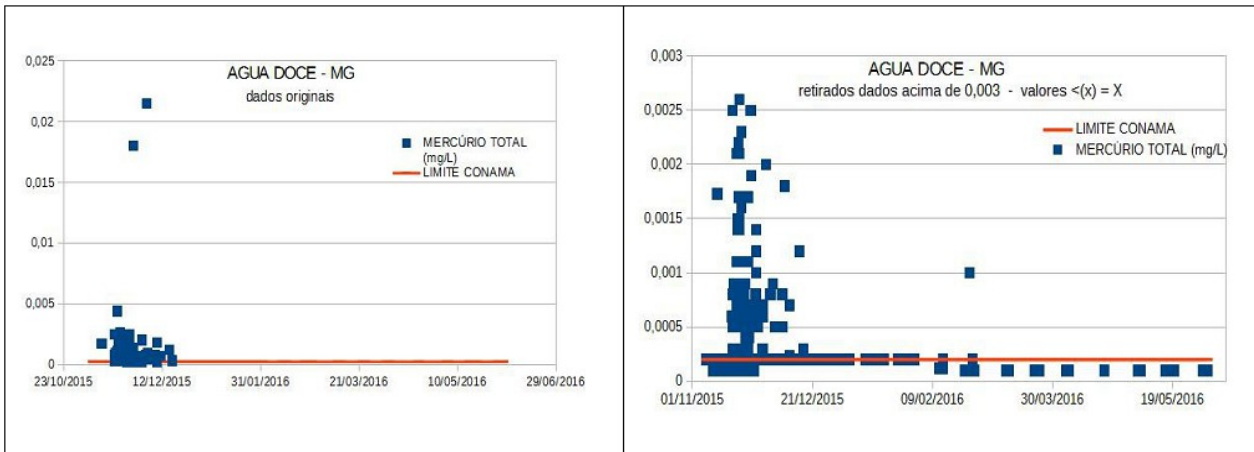
Box-and-Whisker Plot



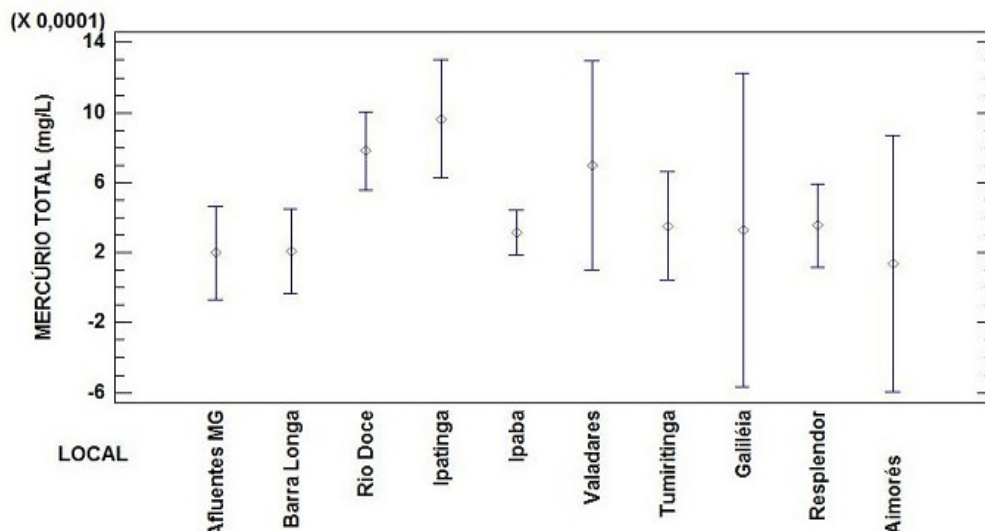
Means and 95,0 Percent LSD Intervals



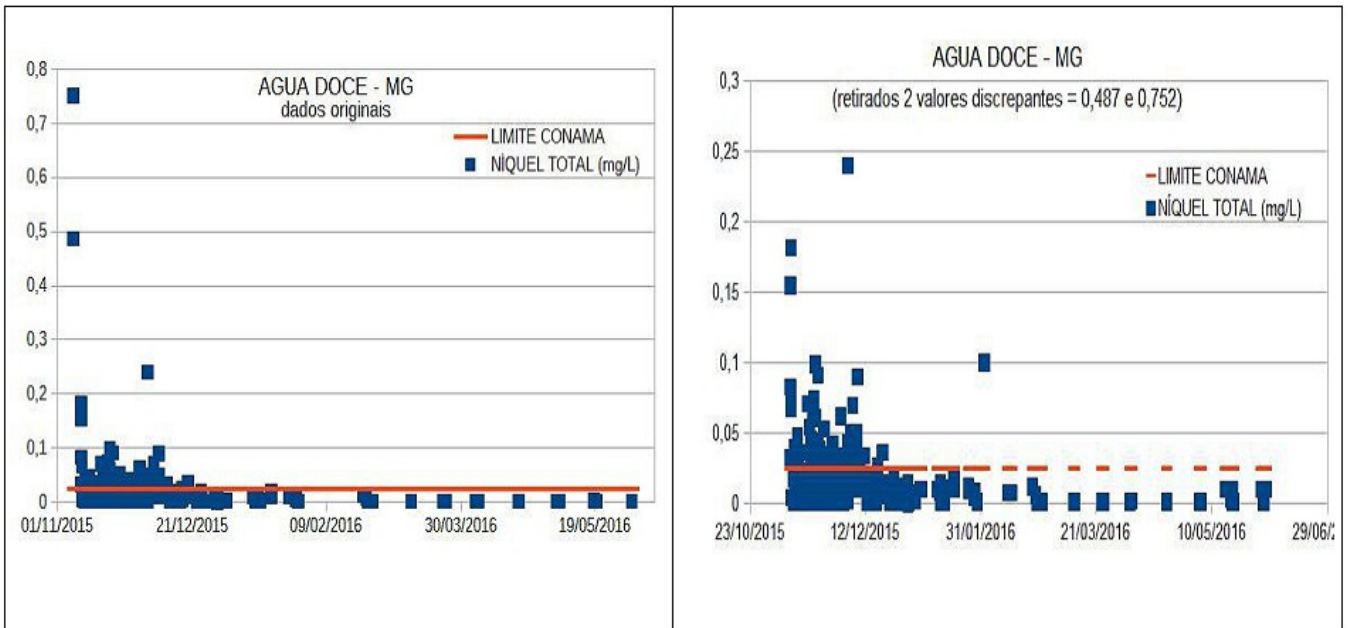
# 14 - Mercúrio Total (mg/L)



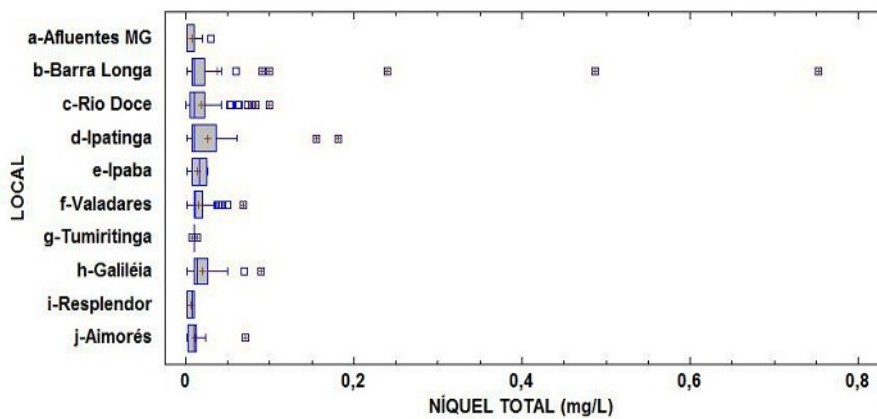
Means and 95,0 Percent LSD Intervals (todos os valores)



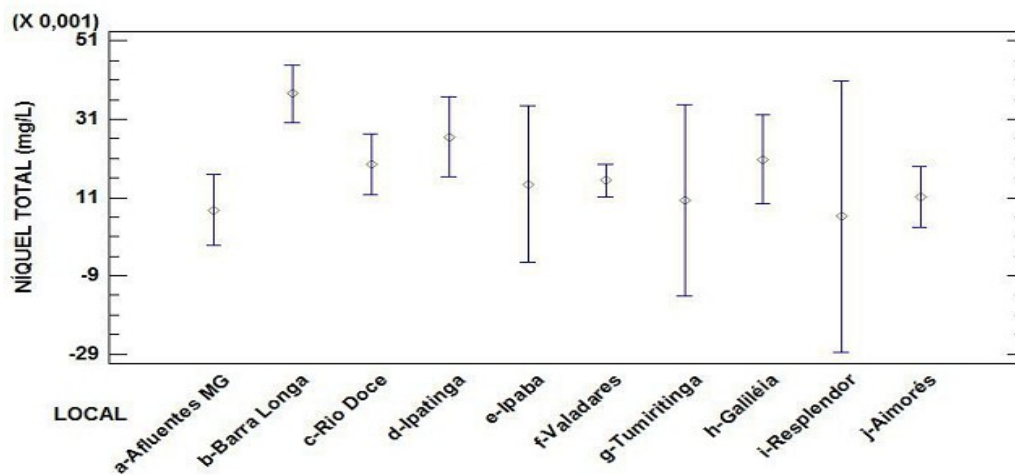
## 15 - Níquel Total (mg/L)



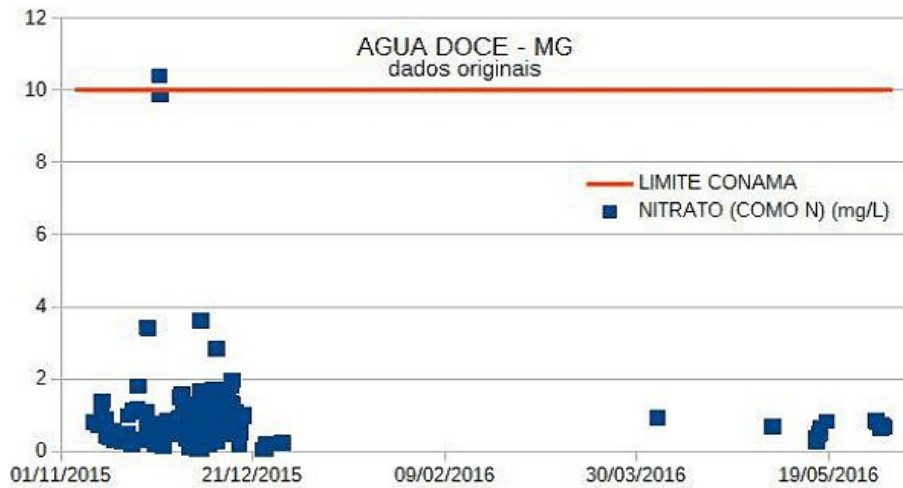
Box-and-Whisker Plot



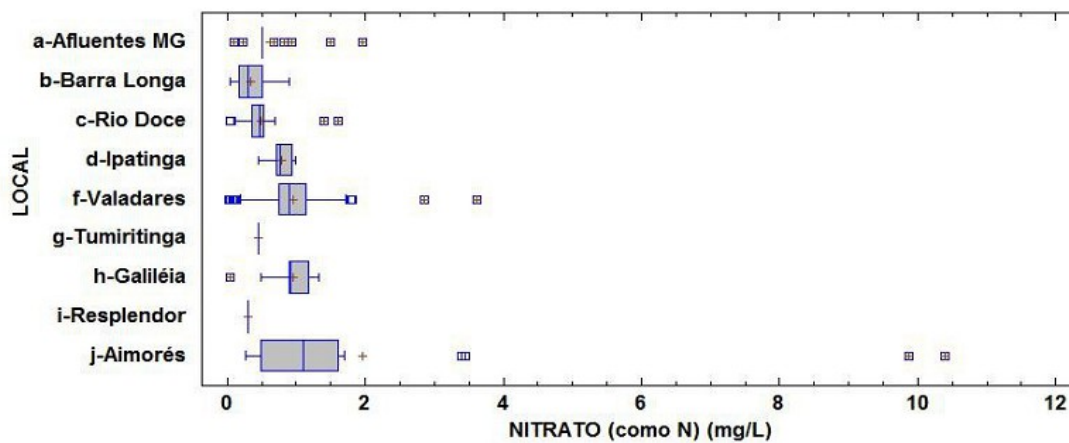
Means and 95,0 Percent LSD Intervals



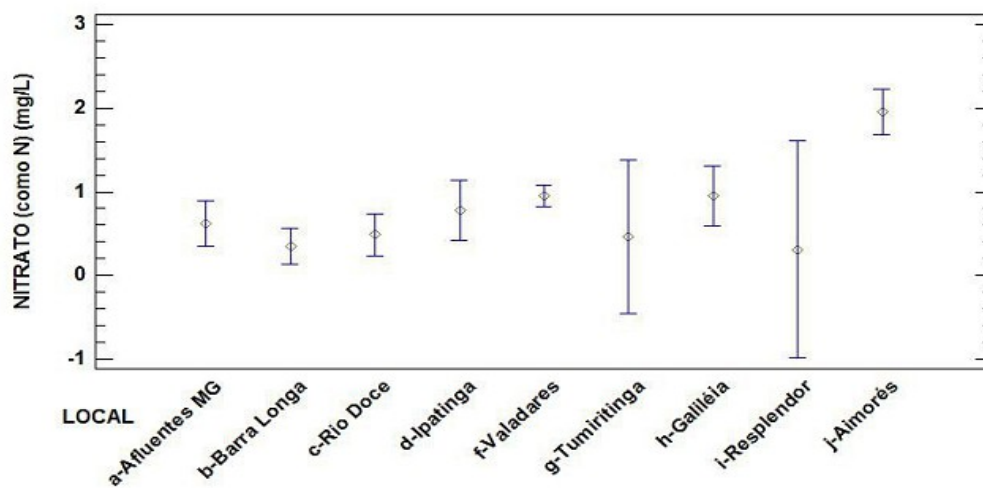
**16 – Nitrato como Nitrogênio (mg/L)**



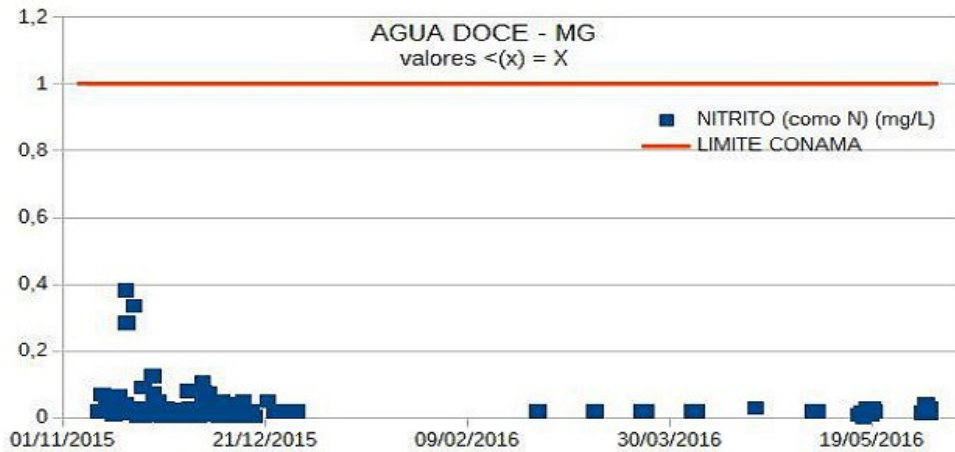
**Box-and-Whisker Plot**



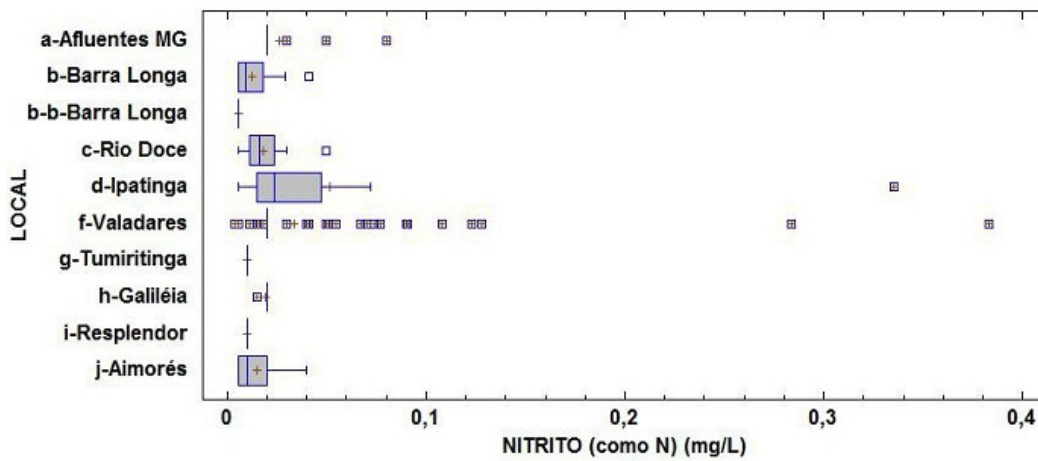
**Means and 95,0 Percent LSD Intervals**



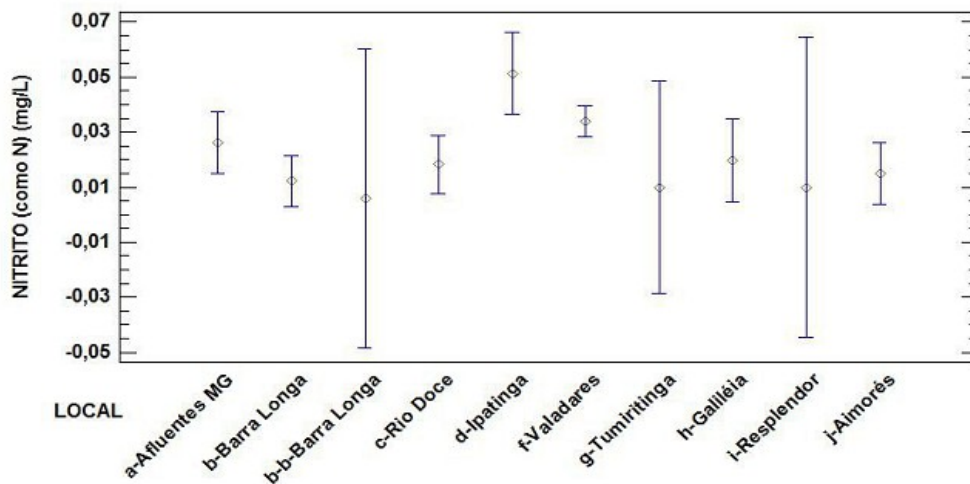
## 17 – Nitrito como Nitrogênio (mg/L)



Box-and-Whisker Plot

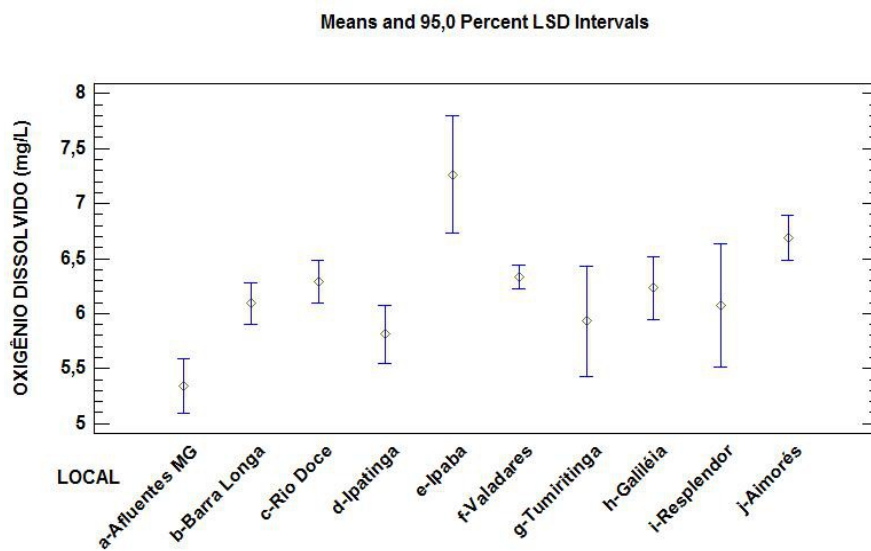
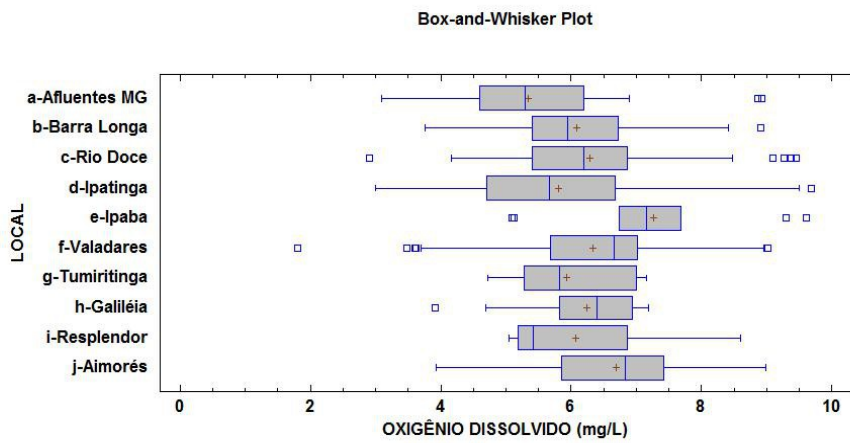
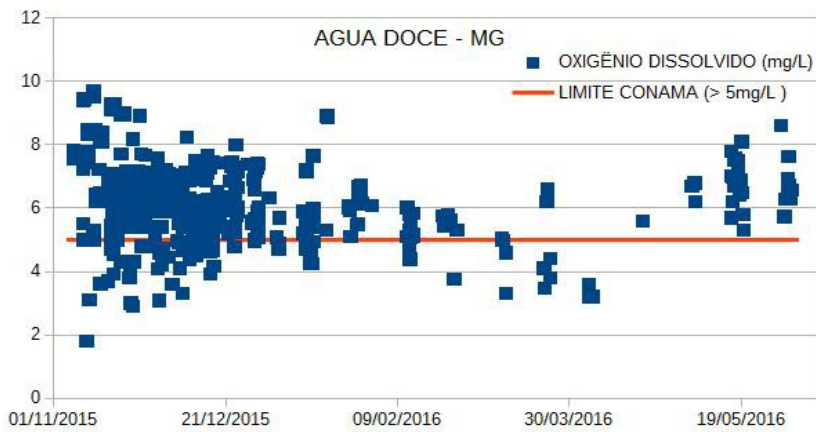


Means and 95,0 Percent LSD Intervals





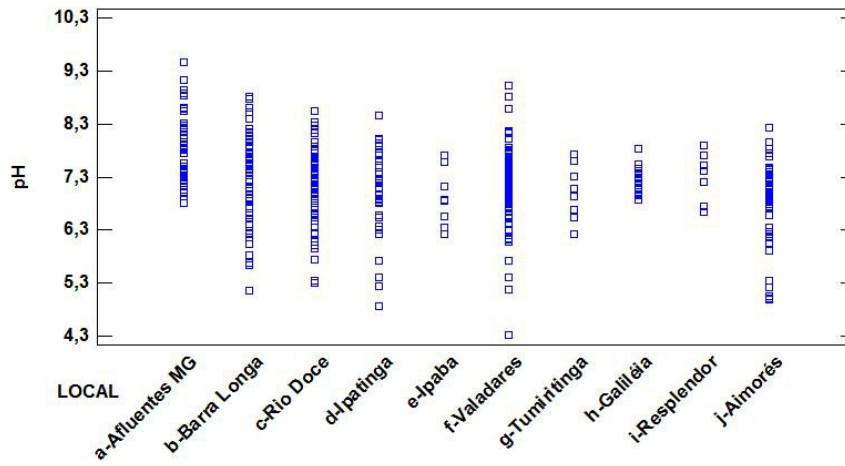
## 19 – Oxigênio Dissolvido (mg/L)



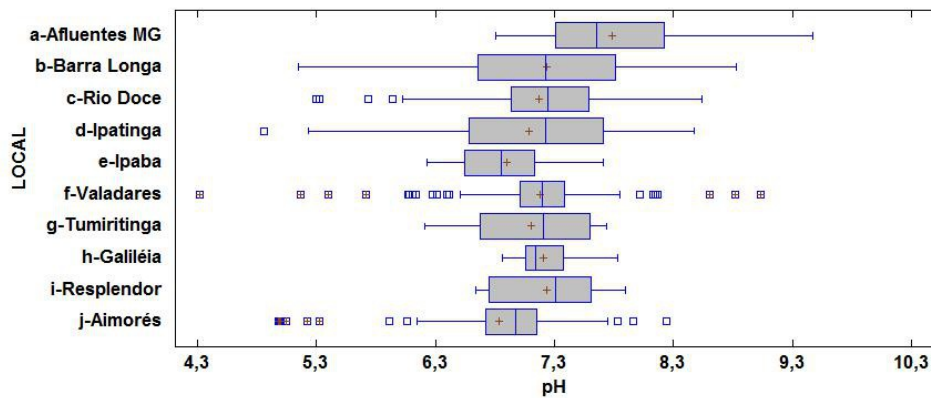


# 20 – pH

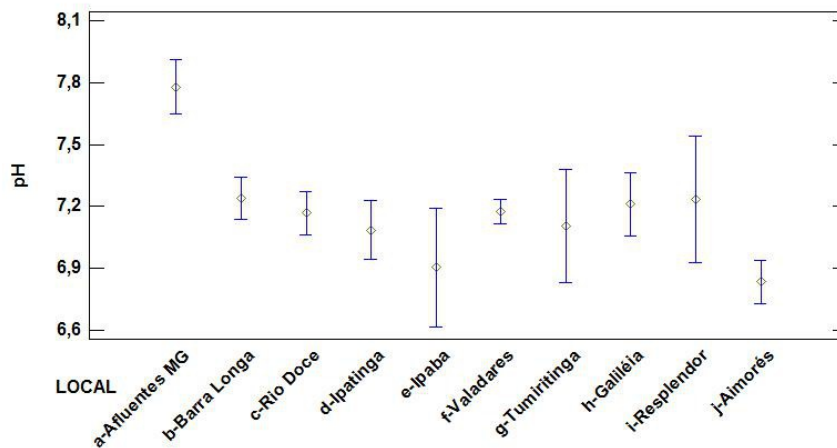
Scatterplot by Level Code



Box-and-Whisker Plot

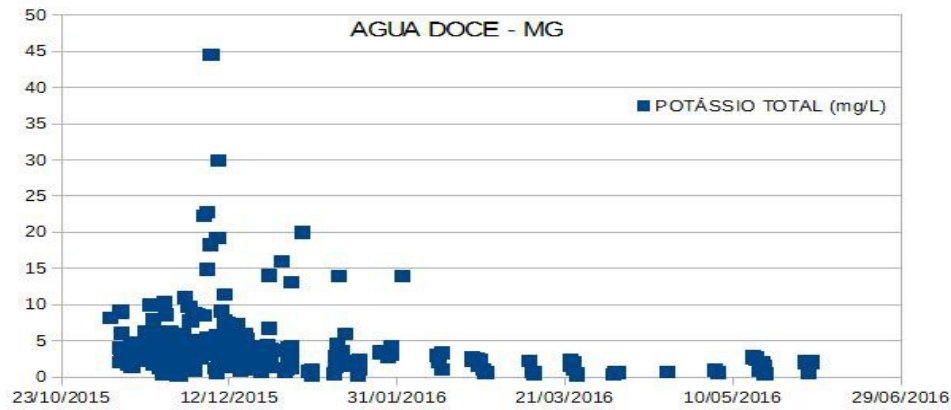


Means and 95,0 Percent LSD Intervals

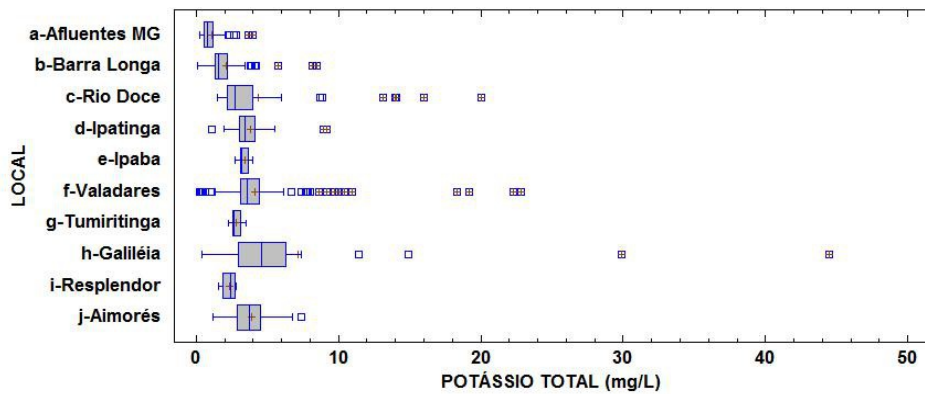


## 21 - Potássio Total (mg/L)

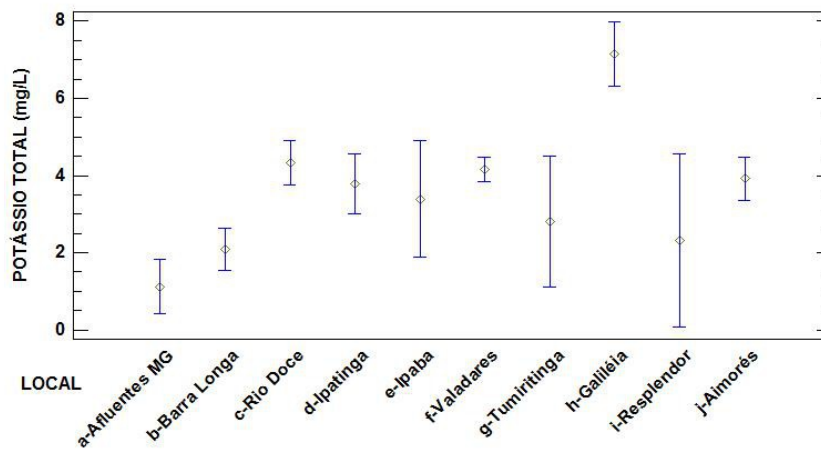
OBS: A Resolução CONAMA 357/2005 não apresenta limite legal para este parâmetro



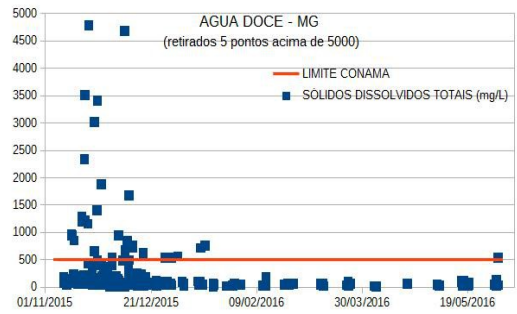
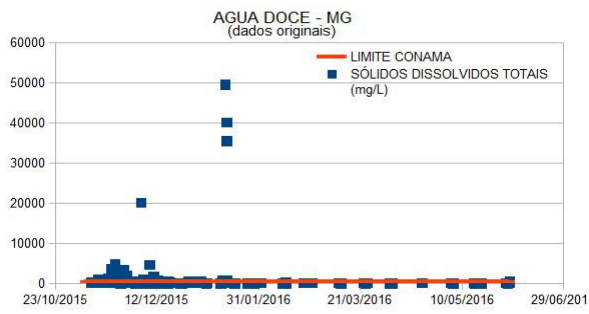
Box-and-Whisker Plot



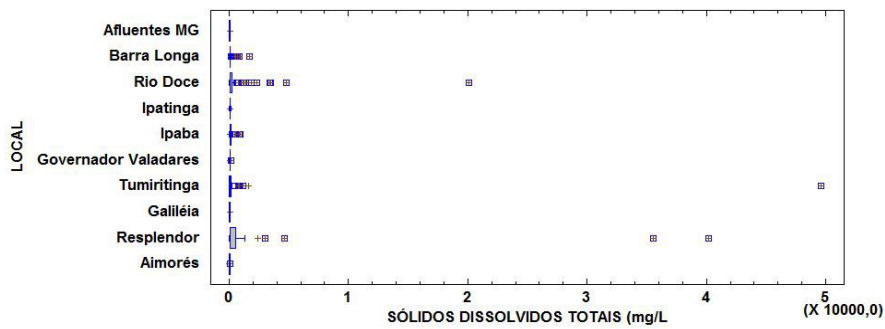
Means and 95,0 Percent LSD Intervals



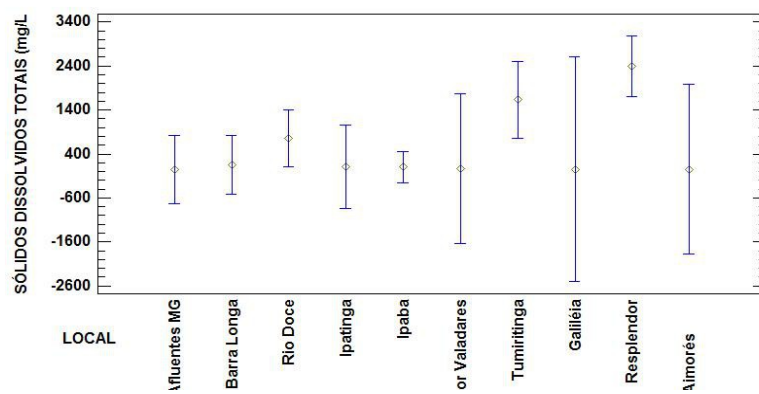
## 22 – Sólidos Dissolvidos Totais (mg/L)



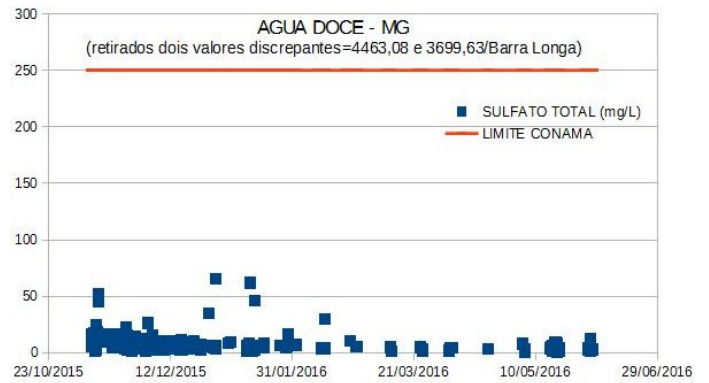
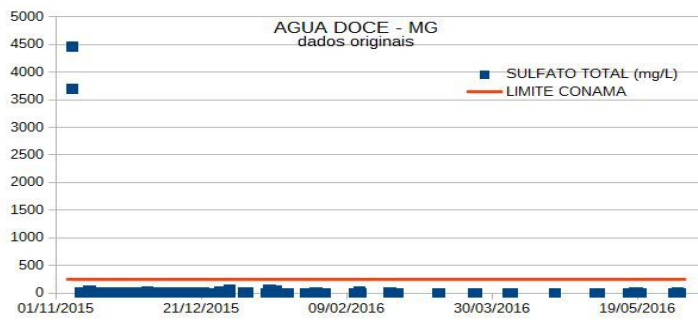
Box-and-Whisker Plot (todos os valores)



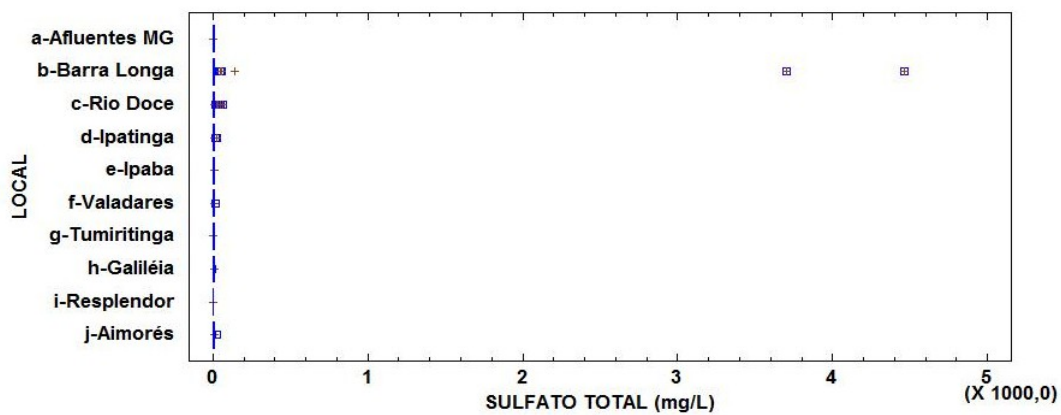
Means and 95,0 Percent LSD Intervals (todos os valores)



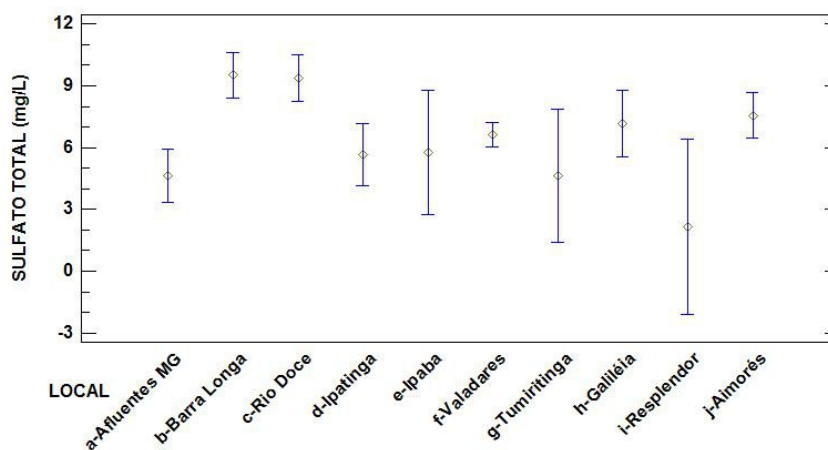
## 23 - Sulfato Total (mg/L)



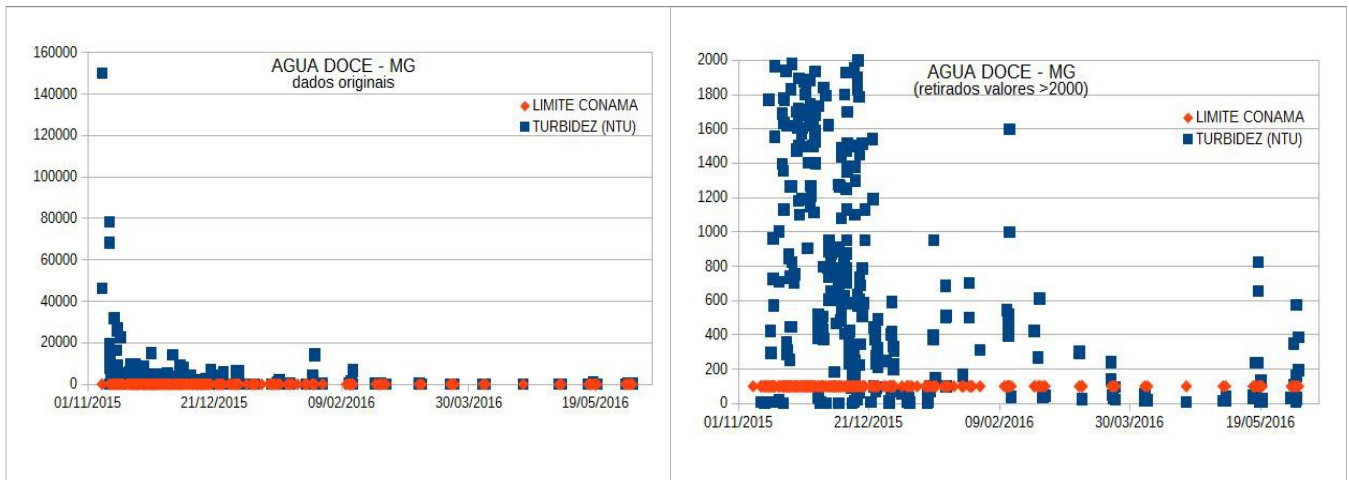
Box-and-Whisker Plot



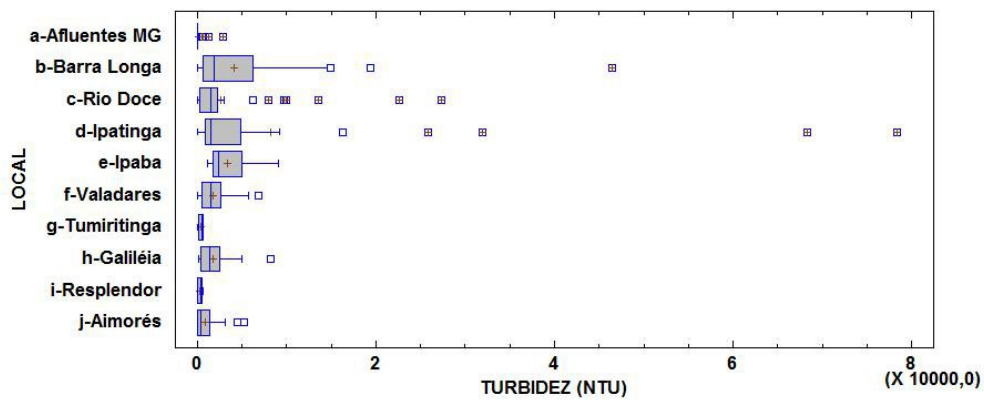
Means and 95,0 Percent LSD Intervals (retirados 2 valores discrepantes)



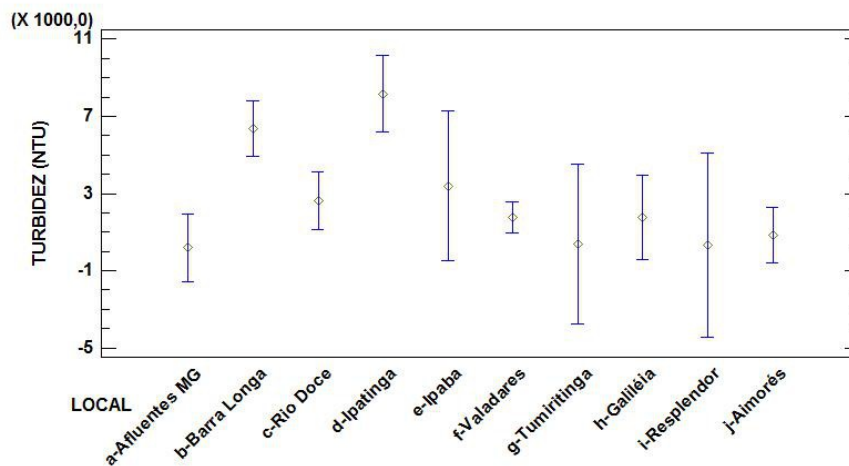
## 24 – Turbidez (NTU)



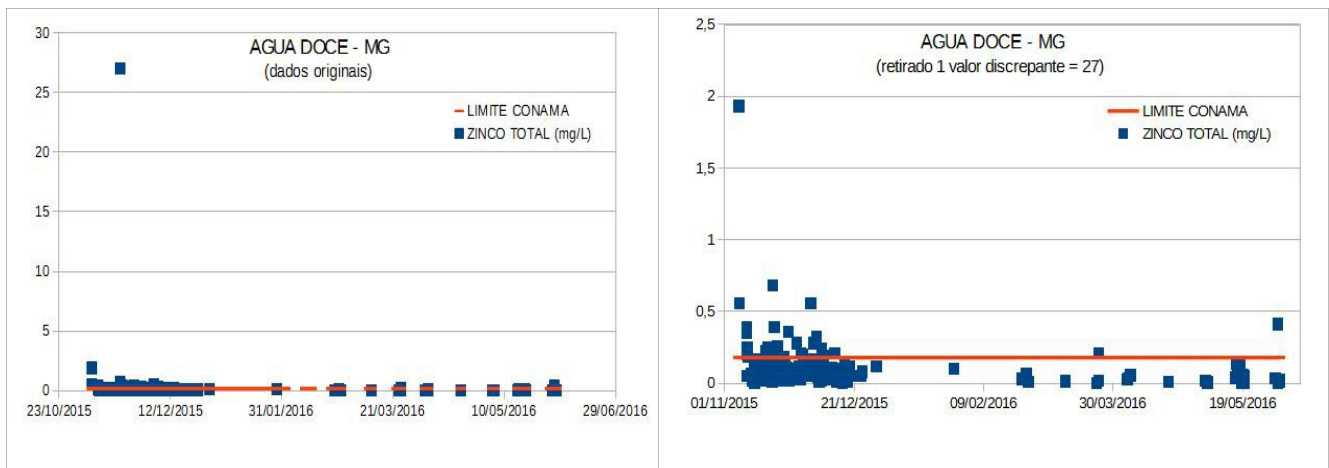
Box-and-Whisker Plot (retirado 1 valor discrepante)



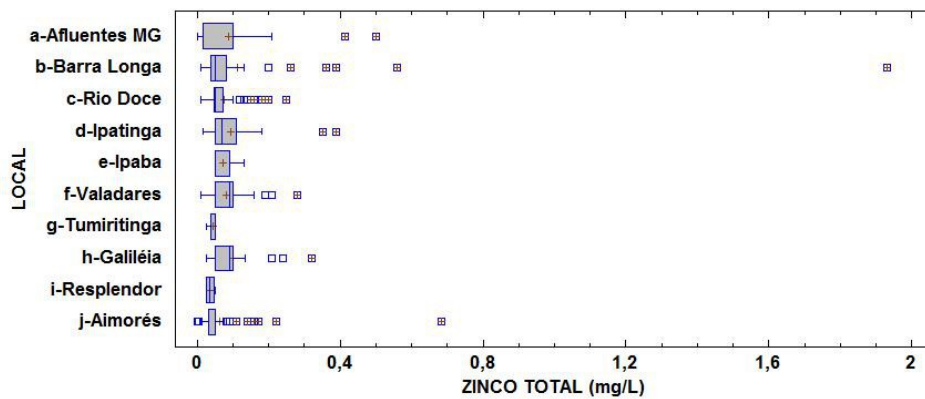
Means and 95,0 Percent LSD Intervals



## 25 - Zinco Total (mg/L)



Box-and-Whisker Plot (retirado 1 valor discrepante)



Means and 95,0 Percent LSD Intervals (retirado 1 valor discrepante)

