Lampiran I

Karakteristik Air *Post-Filtration* PDAM Tirta Binangun Kulon Progo

A. Pengujian Parameter Lapangan

1. Kekeruhan

Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.57	0.33	0.45	1.92	1.81	1.87	0.45	0.43	0.44
9 Mei	0.46	0.43	0.45	2.12	2.15	2.14	7.78	7.71	7.75
16 Mei	5.33	6.04	5.69	2.45	2.58	2.52	2.27	2.11	2.19
22 Mei	0.24	0.27	0.26	2.19	2.29	2.24	0.46	0.66	0.56
30 Mei	0.40	0.41	0.41	0.50	0.41	0.46	0.25	0.21	0.23
7 Agustus	0.80	0.79	0.80	0.62	0.61	0.62	0.62	0.65	0.64
9 Agustus	1.88	1.90	1.89	0.83	0.84	0.84	0.39	0.34	0.37
13 Agustus	1.60	1.65	1.63	0.60	0.61	0.61	0.53	0.55	0.54
15 Agustus	1.27	1.28	1.28	1.38	1.38	1.38	0.84	0.88	0.86
Rerata Total	1,43			1,41			1,51		

Note: Satuan NTU

2. Derajat Keasaman (pH)

Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	5.3	5.3	5.30	7.7	7.6	7.65	7.8	7	7.40
9 Mei	7.3	7.3	7.30	7.4	7.5	7.45	7.3	7.3	7.30
16 Mei	6.6	6.5	6.55	6.4	6.5	6.45	7.8	7.8	7.80
22 Mei	7.4	7.1	7.25	8	7.8	7.90	7.6	7.6	7.60
30 Mei	7.1	7	7.05	6	5.9	5.95	7.1	7.2	7.15
7 Agustus	6.3	6.3	6.3	6.3	6.2	6.25	6.2	6.2	6.2
9 Agustus	7.5	7.6	7.55	7.9	7.8	7.85	7.5	7.5	7.5
13 Agustus	7.3	7.2	7.25	7.1	7.2	7.15	6.3	6.4	6.35
15 Agustus	7.1	7.2	7.15	7.2	7	7.1	6.9	7	6.95
Rerata Total	6.86			7.08			7.14		

3. Daya Hantar Listrik

Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	292	292	292.0	191.6	192.1	191.85	513	511	512.0
9 Mei	319	320	319.5	193.9	193.4	193.65	530	529	529.5
16 Mei	281	280	280.5	191.3	190.8	191.05	534	529	531.5
22 Mei	228	227	227.5	190.4	190.3	190.35	521	516	518.5
30 Mei	306	304	305.0	211	209	210.0	528	524	526.0
7 Agt	264	265	264.5	198	203	200.5	693	693	693
9 Agt	254	253	253.5	165	167	166	652	652	652
13 Agt	261	260	260.5	193	191	192	675	675	675
15 Agt	290	291	290.5	233	230	231.5	590	579	584.5
Rerata Total	277,1			196,3			580,2		

Note: Satuan µmhos/cm

4. Suhu

Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	28.6	28.5	28.6	30.0	30.0	30.0	31.1	31.1	31.1
9 Mei	28.0	27.9	28.0	30.3	30.0	30.2	29.9	30.2	30.1
16 Mei	28.5	28.4	28.5	29.0	29.3	29.2	31.0	31.2	31.1
22 Mei	28.1	27.9	28.0	29.5	29.5	29.5	31.2	31.6	31.4
30 Mei	26.7	26.9	26.8	28.1	28.6	28.4	29.5	29.5	29.5
7 Agt	25.9	25.8	25.85	25.6	25.3	25.45	29.1	29.3	29.2
9 Agt	27.3	27.2	27.25	27.6	26.9	27.25	31.3	31.2	31.25
13 Agt	26.8	26.9	26.85	27.6	27.9	27.75	31.3	31.2	31.25
15 Agt	28.3	28.1	28.2	28.4	28.4	28.4	29.1	28.8	28.95
Rerata Total	27.5			28.4			30.4		

Note: Satuan ºC *(Celcius)*

B. Pengujian Parameter Organik

1. *Chemical Oxygen Demand* (COD)

BULK SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	A	B	Rerata	A	B	Rerata	A	B	Rerata
2 Mei	85.062	65.972	75.517	65.522	67.148	66.335	41.668	47.725	44.697
9 Mei	69.243	66.125	67.684	75.530	88.513	82.022	97.713	55.290	76.502
16 Mei	53.756	53.807	53.782	56.261	56.670	56.466	99.962	99.297	99.630
22 Mei	9.493	13.531	11.512	19.051	18.285	18.668	73.434	72.821	73.128
30 Mei	16.547	15.831	16.189	26.309	44.709	35.509	54.012	22.425	38.219
7 Agustus	56.465	61.116	58.791	42.409	48.032	45.221	27.791	24.009	25.900
9 Agustus	64.234	57.590	60.912	57.488	52.836	55.162	58.050	57.079	57.565
13 Agustus	36.940	31.216	34.078	13.376	13.991	13.684	31.523	26.002	28.763
15 Agustus	39.343	38.576	38.960	32.238	30.909	31.574	34.129	31.063	32.596
Rerata Total	46.380			44.960			53		

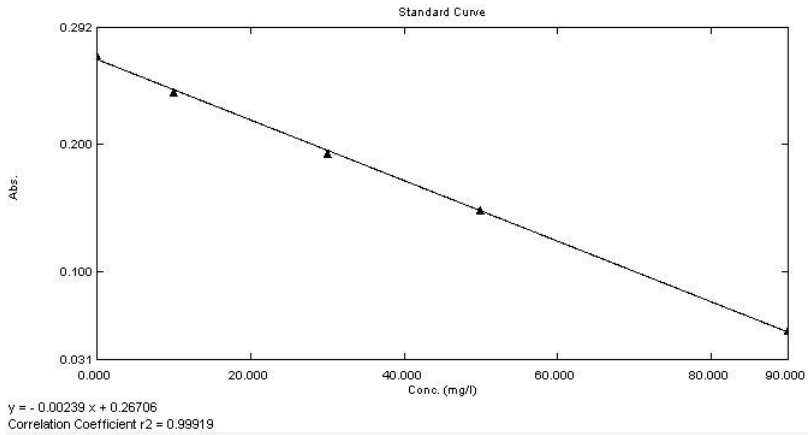
Note: Satuan dalam mg/L

DISSOLVED SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	A	B	Rerata	A	B	Rerata	A	B	Rerata
2 Mei	68.272	61.628	64.950	67.097	68.323	67.710	57.794	53.041	55.418
9 Mei	67.608	72.157	69.883	69.192	61.985	65.589	98.071	77.626	87.849
16 Mei	4.482	9.544	7.013	4.331	24.418	14.375	0.753	4.689	2.721
22 Mei	19.869	28.814	24.342	40.569	30.245	35.407	44.709	47.623	46.166
30 Mei	28.149	25.031	26.590	97.886	61.014	79.450	36.532	33.209	34.871
7 Agustus	68.272	80.692	74.482	46.396	49.310	47.853	37.963	33.465	35.714
9 Agustus	55.750	49.565	52.658	88.973	89.586	89.280	74.048	70.674	72.361
13 Agustus	85.139	86.877	86.008	76.961	63.059	70.010	51.865	58.816	55.341
15 Agustus	34.129	34.845	34.487	37.452	38.780	38.116	34.538	36.327	35.433
Rerata Total	48.935			56.421			47.319		

Note: Satuan dalam mg/L

Tabel Larutan Standar COD

No	Standard	Konsentrasi (mg/L)	Absorbansi
1	STD 0	0	0,270
2	STD 10	10	0,241
3	STD 30	30	0,193
4	STD 50	50	0,148
5	STD 90	90	0,053



<u>Contoh Perhitungan</u>

- PF IPA Sendang Sari Periode 15 Agustus 2018 *(BULK)*

  y = -0,00239x + 0,26706 y = -0,00239x + 0,26706

  x = (0,186-0,26706) ÷ -0,00239 x = (0,193-0,26706) ÷ -0,00239

  = 34,129 mg/L (A) = 31,063 mg/L (B)

  Rerata COD = (34,129 mg/L + 31,063 mg/L) ÷ 2

  = 32,596 mg/L

- PF IPA Progo Periode 13 AGustus 2018 *(DISSOLVED)*

  y = -0,00239x + 0,26706 y = -0,00239x + 0,26706

  x = (0,064-0,26706) ÷ -0,00239 x = (0,060-0,26706) ÷ -0,00239

  = 85,139 mg/L (A) = 86,877 mg/L (B)

  Rerata COD = (85,139 mg/L + 86,877 mg/L) ÷ 2

  = 86,008 mg/L

2. Kalium Permanganat/Nilai Permanganat ($KMnO_4$)

BULK SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	A	B	Rerata	A	B	Rerata	A	B	Rerata
2 Mei	0.000	0.661	0.331	10.283	6.038	8.161	0.000	0.000	0.000
9 Mei	2.458	3.926	3.192	12.441	8.918	10.680	0.990	0.000	0.495
16 Mei	2.458	3.633	3.046	5.688	10.679	8.184	0.697	0.697	0.697
22 Mei	3.689	4.949	4.319	10.936	9.046	9.991	3.059	6.210	4.635
30 Mei	3.374	3.374	3.374	8.730	10.360	9.545	4.634	4.319	4.477
7 Agustus	3.033	3.327	3.180	1.566	1.859	1.713	0.392	0.685	0.539
9 Agustus	2.611	1.451	2.031	0.582	1.451	1.017	0.292	0.002	0.147
13 Agustus	1.741	1.741	1.741	1.451	1.741	1.596	0.872	0.872	0.872
15 Agustus	1.955	1.955	1.955	3.122	2.830	2.976	0.496	0.496	0.496
Rerata Total	2.574 mg/L			5.985 mg/L			1.373 mg/L		

<u>Rumus Perhitungan</u>

$KMnO_4 = \frac{[\,(10 + a)\ b - (10 \times c)\,]\ 1 \times 31600}{d} \times e$

Dimana:

a = volume yang dibutuhkan $KMnO_4$ dalam titrasi (mL)

b = normalitas $KMnO_4$ (N)

c = normalitas asam oksalat, yaitu 0,01 N

d = volume sampel (mL)

e = faktor pengenceran

<u>Contoh Perhitungan</u>

- *Post-Filtration* IPA Progo Periode 9 Mei

$KMnO_4$ (A) $= \frac{[\,(10 + 1{,}6)\ 0{,}009291 - (10 \times 0{,}01)\,]\ 1 \times 31600}{100} \times 1$

= 2,458 mg/L

$KMnO_4$ (B) $= \frac{[\,(10 + 2{,}1)\ 0{,}009291 - (10 \times 0{,}01)\,]\ 1 \times 31600}{100} \times 1$

= 3,926 mg/L

Rerata NP = (2,458 mg/L + 3,926 mg/L) ÷ 2

= 3,192 mg/L

DISSOLVED SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	A	B	Rerata	A	B	Rerata	A	B	Rerata
2 Mei	5.101	7.156	6.129	0.000	0.109	0.055	1.284	2.752	2.018
9 Mei	1.871	2.752	2.312	10.092	13.322	11.707	0.697	1.577	1.137
16 Mei	4.004	4.004	4.004	13.772	10.621	12.197	2.744	2.744	2.744
22 Mei	4.634	2.744	3.689	24.485	28.581	26.533	3.059	3.374	3.217
30 Mei	1.566	6.556	4.061	12.426	15.361	13.894	1.566	3.327	2.447
7 Agustus	5.088	5.088	5.088	6.556	5.675	6.116	0.685	0.392	0.539
9 Agustus	3.481	3.481	3.481	6.670	7.540	7.105	0.582	0.292	0.437
13 Agustus	4.641	4.641	4.641	4.061	4.351	4.206	2.031	1.741	1.886
15 Agustus	3.122	3.414	3.268	8.374	8.957	8.666	0.496	1.079	0.788
Rerata Total	4,075			10,053			1,690		

Rumus Perhitungan

$KMnO_4 = \frac{[\,(10 + a)\ b - (10 \times c)\,]\ 1 \times 31600}{d} \times e$

Dimana:

a = volume yang dibutuhkan $KMnO_4$ dalam titrasi (mL)

b = normalitas $KMnO_4$ (N)

c = normalitas asam oksalat, yaitu 0,01 N

d = volume sampel (mL)

e = faktor pengenceran

Contoh Perhitungan

- *Post-Filtration* IPA Sermo Periode 7 Agutus

$KMnO_4$ (A) $= \frac{[\,(10 + 1{,}3)\ 0{,}009291 - (10 \times 0{,}01)\,]\ 1 \times 31600}{100} \times 1$

= 6.556 mg/L

$KMnO_4$ (B) $= \frac{[\,(10 + 1{,}4)\ 0{,}009291 - (10 \times 0{,}01)\,]\ 1 \times 31600}{100} \times 1$

= 5.675 mg/L

Rerata NP = (6.556 mg/L + 5.675 mg/L) ÷ 2

= 6,116 mg/L

Standarisasi Kalium Permanganat ($KMnO_4$) 0,01 N

No	Tanggal Standarisasi	Normalitas (N)
1	2 Mei 2018	0,008955
2	4 Mei 2018	0,009291
3	11 Mei 2018	0,009291
4	17 Mei 2018	0,009291
5	18 Mei 2018	0,009971
6	23 Mei 2018	0,009971
7	24 Mei 2018	0,009971
8	30 Mei 2018	0,009971
9	1 Juni 2018	0,009288
10	7 Agustus 2018	0,009288
11	9 Agustus 2018	0,00917483
12	13 Agustus 2018	0,00917483
13	15 Agustus 2018	0,00923353

Rumus Standarisasi

$N_2 = \frac{V_1 \times N_1}{V_2}$

V_1 = volume $C_2H_2O_4$, yaitu 10 mL

V_2 = volume titrasi $KMnO_4$ (mL)

N_1 = normalitas $C_2H_2O_4$ (0,01 N)

N_2 = normalitas $KMnO_4$ (N)

Contoh Perhitungan

- 9 Agustus 2018

$N_2 = \frac{10\ mL \times 0{,}01}{10{,}9\ mL}$

N_2 = 0,00917483 N

3. Ultra Violet 254 nm (UV_{254})

BULK SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.017	0.016	0.017	0.042	0.039	0.041	0.010	0.013	0.012
9 Mei	0.031	0.033	0.032	0.040	0.041	0.041	0.014	0.015	0.015
16 Mei	0.019	0.017	0.018	0.020	0.019	0.020	0.000	0.000	0.000
22 Mei	0.013	0.016	0.015	0.026	0.026	0.026	0.003	0.004	0.004
30 Mei	0.016	0.016	0.016	0.019	0.020	0.020	0.000	0.000	0.000
7 Agt	0.036	0.036	0.036	0.022	0.016	0.019	0.002	0.000	0.001
9 Agt	0.045	0.045	0.045	0.016	0.018	0.017	0.002	0.003	0.003
13 Agt	0.034	0.035	0.0345	0.018	0.018	0.018	0.001	0.000	0.001
15 Agt	0.026	0.026	0.026	0.017	0.018	0.0175	0.001	0.001	0.001
Rerata Total	0,027			0,024			0,004		

**) Shimadzu Pharmaspec UV-1700 UV-Visible Spectrophotometer*

DISSOLVED SAMPLE									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.016	0.016	0.016	0.024	0.021	0.023	0.002	0.001	0.002
9 Mei	0.027	0.027	0.027	0.028	0.030	0.029	0.008	0.007	0.008
16 Mei	0.010	0.012	0.011	0.010	0.009	0.010	0.000	0.000	0.000
22 Mei	0.029	0.029	0.029	0.016	0.016	0.016	0.000	0.000	0.000
30 Mei	0.008	0.008	0.008	0.008	0.007	0.008	0.000	0.000	0.000
7 Agt	0.029	0.029	0.029	0.012	0.012	0.012	0.000	0.000	0.000
9 Agt	0.017	0.017	0.017	0.017	0.017	0.017	0.008	0.008	0.008
13 Agt	0.012	0.012	0.012	0.009	0.009	0.009	0.000	0.000	0.000
15 Agt	0.026	0.026	0.026	0.017	0.018	0.018	0.001	0.001	0.001
Rerata Total	0,019			0,016			0,002		

**) Shimadzu Pharmaspec UV-1700 UV-Visible Spectrophotometer*

4. Rasio UV 300 nm dan UV-Vis 400 nm ($UV_{3/4}$)

UV 300 *BULK SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.031	0.027	0.029	0.045	0.037	0.041	0.017	0.018	0.018
9 Mei	0.028	0.028	0.028	0.023	0.024	0.024	0.010	0.010	0.010
16 Mei	0.013	0.014	0.014	0.014	0.014	0.014	0.003	0.003	0.003
22 Mei	0.018	0.019	0.019	0.019	0.019	0.019	0.011	0.012	0.012
30 Mei	0.018	0.018	0.018	0.011	0.012	0.012	0.005	0.005	0.005
7 Agt	0.02	0.02	0.02	0.008	0.008	0.008	0.001	0.001	0.001
9 Agt	0.022	0.022	0.022	0.007	0.007	0.007	0.001	0.001	0.001
13 Agt	0.008	0.008	0.008	0.008	0.008	0.008	0.002	0.002	0.002
15 Agt	0.017	0.017	0.017	0.001	0.001	0.001	0.002	0.002	0.002
UV 400 *BULK SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.028	0.028	0.028	0.035	0.034	0.035	0.027	0.026	0.027
9 Mei	0.003	0.002	0.003	0.010	0.011	0.011	0.014	0.013	0.014
16 Mei	0.001	0.002	0.002	0.004	0.005	0.005	0.000	0.000	0.000
22 Mei	0.005	0.006	0.006	0.013	0.013	0.013	0.005	0.005	0.005
30 Mei	0.002	0.002	0.002	0.003	0.004	0.004	0.002	0.004	0.003
7 Agt	0.004	0.004	0.004	0.001	0.001	0.001	0.000	0.000	0.000
9 Agt	0.008	0.008	0.008	0.001	0.001	0.001	0.000	0.000	0.000
13 Agt	0.007	0.007	0.007	0.002	0.002	0.002	0.000	0.000	0.000
15 Agt	0.003	0.003	0.003	0.003	0.003	0.003	0.001	0.002	0.0015

UV 300/400 *BULK SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.029	0.028	1.036	0.041	0.035	1.188	0.018	0.027	0.660
9 Mei	0.028	0.003	11.200	0.024	0.011	2.238	0.010	0.014	0.741
16 Mei	0.014	0.002	9.000	0.014	0.005	3.111	0.003	0.000	0.000
22 Mei	0.019	0.006	3.364	0.019	0.013	1.462	0.012	0.005	2.300
30 Mei	0.018	0.002	9.000	0.012	0.004	3.286	0.005	0.003	1.667
7 Agt	0.020	0.004	5.000	0.008	0.001	8.000	0.001	0.000	0.000
9 Agt	0.022	0.008	2.750	0.007	0.001	7.000	0.001	0.000	0.000
13 Agt	0.008	0.007	1.143	0.008	0.002	4.000	0.002	0.000	0.000
15 Agt	0.017	0.003	5.667	0.001	0.003	0.333	0.002	0.002	1.333
Rerata Total	5,351			3,402			0,745		

**) Shimadzu Pharmaspec UV-1700 UV-Visible Spectrophotometer*

UV 300 *DISSOLVED SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.009	0.008	0.009	0.010	0.011	0.011	0.002	0.003	0.003
9 Mei	0.016	0.014	0.015	0.014	0.016	0.015	0.004	0.002	0.003
16 Mei	0.009	0.010	0.010	0.001	0.002	0.002	0.000	0.000	0.000
22 Mei	0.018	0.018	0.018	0.011	0.011	0.011	0.001	0.001	0.001
30 Mei	0.009	0.009	0.009	0.008	0.007	0.008	0.001	0.001	0.001
7 Agt	0.017	0.017	0.017	0.002	0.002	0.002	0.000	0.000	0.000
9 Agt	0.018	0.018	0.018	0.007	0.007	0.007	0.002	0.002	0.002
13 Agt	0.018	0.017	0.018	0.009	0.009	0.009	0.001	0.001	0.001
15 Agt	0.017	0.017	0.017	0.001	0.001	0.001	0.002	0.002	0.002
UV 400 *DISSOLVED SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.002	0.002	0.002	0.003	0.004	0.004	0.000	0.001	0.001
9 Mei	0.005	0.005	0.005	0.012	0.010	0.011	0.005	0.003	0.004
16 Mei	0.002	0.002	0.002	0.001	0.002	0.002	0.005	0.004	0.005
22 Mei	0.004	0.003	0.004	0.002	0.002	0.002	0.002	0.001	0.002
30 Mei	0.000	0.000	0.000	0.002	0.001	0.002	0.000	0.000	0.000
7 Agt	0.003	0.003	0.003	0.002	0.002	0.002	0.000	0.000	0.000
9 Agt	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.001
13 Agt	0.004	0.004	0.004	0.001	0.001	0.001	0.000	0.000	0.000
15 Agt	0.003	0.003	0.003	0.003	0.003	0.003	0.001	0.002	0.002

UV 300/400 *DISSOLVED SAMPLE*									
Periode	IPA PROGO			IPA SERMO			IPA SENDANG SARI		
	I	II	Rerata	I	II	Rerata	I	II	Rerata
2 Mei	0.009	0.002	4.250	0.011	0.004	3.000	0.003	0.001	5.000
9 Mei	0.015	0.005	3.000	0.015	0.011	1.364	0.003	0.004	0.750
16 Mei	0.010	0.002	4.750	0.002	0.002	1.000	0.000	0.005	0.000
22 Mei	0.018	0.004	5.143	0.011	0.002	5.500	0.001	0.002	0.667
30 Mei	0.009	0.000	0.000	0.008	0.002	5.000	0.001	0.000	0.000
7 Agt	0.017	0.003	5.667	0.002	0.002	1.000	0.000	0.000	0.000
9 Agt	0.018	0.002	9.000	0.007	0.001	7.000	0.002	0.001	4.000
13 Agt	0.018	0.004	4.375	0.009	0.001	9.000	0.001	0.000	0.000
15 Agt	0.017	0.003	5.667	0.001	0.003	0.333	0.002	0.002	1.333
Rerata Total	4,650			3,689			1,306		

**) Shimadzu Pharmaspec UV-1700 UV-Visible Spectrophotometer*