

Water Quality of Canals with respect to Criteria parameters during 2019 (January-December)

| Sl. No | Sampling Location | No. of Obs. | Annual average values (Range of values) | | | | | Frequency of violation (Percent of violation) from designated criteria value | | | | Existing Class | Parameters responsible for downgrading the water quality | Possible Reason |
|--|-------------------|-------------|--|------------------|------------------|------------------------|-------------------------------|---|-----------|---|-----------|---------------------------------|--|--|
| | | | Parameters | | | | | DO | BOD | TC | FC | | | |
| | | | pH | DO (mg/l) | BOD (mg/l) | TC (MPN/100 ml) | FC (MPN/100 ml) | | | | | | | |
| Taladanda canal | | | | | | | | | | | | | | |
| 1. | Jobra* | 4 | 7.2 (7.1-7.3) | 7.3 (6.8-7.7) | 1.9 (0.8-3.8) | 13500 (3500-25000) | 2900 (700-4900) | 0 | 1 (25) | 2 ^s (50) 4 ^{ss} (100) | 2 (50) | Does not conform to Class B,C | BOD, TC,FC | Human activities |
| 2. | Ranihat* | 4 | 7.4 (7.2-7.5) | 7.3 (7.0-7.6) | 2.1 (1.2-3.7) | 19300 (4300-54000) | 7125 (1700-22000) | 0 | 1 (25) | 3 ^s (75) 4 ^{ss} (100) | 1 (25) | Does not conform to Class B & C | BOD, TC,FC | Human activities and waste water of Cuttack town |
| 3. | Chatrabazar* | 4 | 7.3 (6.8-7.7) | 6.7 (5.4-7.8) | 2.3 (1.3-4.7) | 39075 (4900-92000) | 14300 (1700-35000) | 0 | 1 (25) | 3 ^s (75) 4 ^{ss} (100) | 3 (75) | | | |
| 4. | Nuabazar* | 4 | 7.3 (6.7-7.7) | 7.0 (6.4-7.4) | 1.8 (0.6-3.4) | 56550 (2800-160000) | 30950 (1700-92000) | 0 | 1 (25) | 3 ^s (75) 4 ^{ss} (100) | 2 (50) | Does not conform to Class B & C | BOD, TC,FC | Human activities |
| 5. | Biribati* | 4 | 7.6 (7.4-7.8) | 7.0 (6.2-7.6) | 1.8 (1.0-2.3) | 18125 (1100-35000) | 7745 (490-17000) | 0 | 0 | 2 ^s (50) 4 ^{ss} (100) | 2 (50) | | TC,FC | |
| 6. | Atharabanki | 12 | 7.6 (7.0-8.2) | 6.3 (0.4-8.4) | 1.5 (0.3-5.6) | 4610 (330-17000) | 1925 (140-7900) | 1 (8) | 1 (8) | 10 ^s (82) 11 ^{ss} (92) | 2 (17) | Does not conform to Class B & C | DO, BOD, TC,FC | Human activities |
| ***Class 'C' | | | 6.5-8.5 | 4 and above | 3 or less | 5000 or less | | Drinking water source with conventional treatment followed by disinfection | | | | | | |
| ***Class 'B' | | | 6.5-8.5 | 5 and above | 3 or less | 500 or less | | Outdoor bathing | | | | | | |
| Water quality criteria for bathing water | | | 6.5-8.5 | 5 and above | 3 or less | | 2500 (Maximum Permissible) | Water use for organised outdoor bathing (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000) | | | | | | |

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| Sl. No | Sampling Location | No. of Obs. | Annual average values (Range of values) | | | | | Frequency of violation (Percent of violation) from designated criteria value | | | | Existing Class | Parameters responsible for downgrading the water quality | Possible Reason |
|--|-------------------|-------------|--|-------------------|------------------|------------------------|-------------------------------|---|-----|---|----|---------------------------------|--|------------------|
| | | | Parameters | | | | | DO | BOD | TC | FC | | | |
| | | | pH | DO (mg/l) | BOD (mg/l) | TC (MPN/ 100 ml) | FC (MPN/ 100 ml) | | | | | | | |
| (b) Puri canal | | | | | | | | | | | | | | |
| 1. | Hansapal | 12 | 7.8 (6.9-8.4) | 8.1 (6.2-11.8) | 1.0 (0.5-1.8) | 2508 (220-3900) | 1063 (78-2200) | 0 | 0 | 0 ^s 2 ^{ss} (17) | 0 | Does not conform to Class B,C | BOD, TC | Human activities |
| 2. | Jagannathpur | 12 | 7.7 (6.9-8.3) | 7.1 (5.5-9.3) | 1.4 (0.6-2.4) | 3005 (460-5400) | 1237 (170-2400) | 0 ^s | 0 | 1 ^s (8) 11 ^{ss} (92) | 0 | Does not conform to Class B & C | BOD, TC | Human activities |
| 3. | Chandanpur | 12 | 7.4 (6.5-8.3) | 6.5 (3.1-7.8) | 1.2 (0.6-2.8) | 1797 (230-4700) | 612 (45-1700) | 1 ^s (8) 1 ^{ss} (8) | 0 | 0 ^s 7 ^{ss} (57) | 0 | | DO, TC, | |
| ***Class 'C' | | | 6.5-8.5 | 4 and above | 3 or less | 5000 or less | | Drinking water source with conventional treatment followed by disinfection | | | | | | |
| ***Class 'B' | | | 6.5-8.5 | 5 and above | 3 or less | 500 or less | | Outdoor bathing | | | | | | |
| Water quality criteria for bathing water | | | 6.5-8.5 | 5 and above | 3 or less | | 2500 (Maximum Permissible) | Water use for organised outdoor bathing (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000) | | | | | | |

* Data for the period August, September, October and November, 2019

*** Tolerance limits for Inland Surface water bodies (IS-2296-1982)

| Sl. No | Sampling Location | No. of Obs. | Annual average value (Range of values) | | | | Frequency of violation (Percent of violation) from designated criteria value | | | Existing Class | Parameters responsible for downgrading the water quality | Possible Reason |
|----------------------------|-------------------|-------------|---|-----------------------------|----------------------|-------------------------|---|-----|---|--|---|--------------------|
| | | | Parameters | | | | EC | SAR | B | | | |
| | | | pH | EC (microSiemens /cm) | SAR | B (mg/l) | | | | | | |
| (a) Taladanda canal | | | | | | | | | | | | |
| 1. | Jobra* | 4 | 7.2 (7.1-7.3) | 172 (151-192) | 0.30 (0.13-0.47) | 0.205 (<0.005-0.061) | 0 | 0 | 0 | Conform to Class E | | |
| 2. | Ranihat* | 4 | 7.4 (7.2-7.5) | 163 (131-193) | 0.23 (0.12-0.34) | 0.014 (0.005-0.027) | 0 | 0 | 0 | | | |
| 3. | Chatrabazar* | 4 | 7.3 (6.8-7.7) | 164 (142-193) | 0.21 (0.13- 0.34) | 0.027 (<0.005-0.079) | 0 | 0 | 0 | | | |
| 4. | Nuabazar* | 4 | 7.3 (6.7-7.7) | 163 (131-192) | 0.32 (0.19-0.41) | 0.023 (0.007-0.037) | 0 | 0 | 0 | | | |
| 5. | Biribati* | 4 | 7.6 (7.4-7.8) | 158 (134-176) | 0.20 (0.12-0.32) | 0.016 (0.008-0.027) | 0 | 0 | 0 | | | |
| 6. | Atharabanki** | 12 | 7.6 (7.0-8.2) | 215 (147-297) | 0.50 (0.24-0.60) | 0.060 (0.005-0.175) | 0 | 0 | 0 | | | |
| (b) Puri canal | | | | | | | | | | | | |
| 1. | Hansapal | 12 | 7.8 (6.9-8.4) | 204 (172-296) | 0.47 (0.23-0.75) | 0.045 (0.003-0.240) | 0 | 0 | 0 | Conform to Class E | | |
| 2. | Jagannathpur | 12 | 7.7 (6.9-8.3) | 194 (137-280) | 0.41 (0.19-0.57) | 0.044 (0.003-0.168) | 0 | 0 | 0 | | | |
| 3. | Chandanpur | 12 | 7.4 (6.5-8.3) | 225 (142-448) | 0.58 (0.13-1.46) | 0.069 (0.005-0.354) | 0 | 0 | 0 | | | |
| *** Class 'E' | | | 6.5-8.5 | 2250 or less | 26 or less | 2 or less | | | | Irrigation, Industrial Cooling or controlled waste disposal | | |

Water Quality of Taladanda Canal with respect to other parameters during 2019 (January-December)

| Sl. No. | Sampling Location | Physical parameters | | Organic pollution Indicators | | | | Mineral constituents | | | | |
|-------------|-------------------|---|------------------|------------------------------|---------------------|-------------------------|-----------------------|----------------------|----------------|--------------------|------------------------|------------------------|
| | | Annual average values (Range of values) | | | | | | | | | | |
| | | TSS | Total alkalinity | COD | NH ₄ -N | Free NH ₃ -N | TKN | TDS | TH | Cl | SO ₄ | F |
| | | (mg/l) | | (mg/l) | | | | (mg/l) | | | | |
| 1. | Jobra* | 91 (15-164) | 73 (64-92) | 15.7 (9.1-27.9) | 0.49 (0.28-0.56) | 0.004 (0.003-0.007) | 7.21 (1.96-14.84) | 104 (84-120) | 70 (60-84) | 7.0 (3.8-9.6) | 14.87 (10.95-24.37) | 0.251 (0.176-0.295) |
| 2. | Ranihat* | 112 (20-188) | 70 (64-84) | 18.0 (12.6-24.2) | 1.19 (0.28-3.36) | 0.023 (0.003-0.067) | 8.19 (1.96-22.68) | 98 (80-112) | 67 (56-80) | 7.0 (3.8-9.6) | 13.32 (9.88-22.63) | 0.249 (0.184-0.284) |
| 3. | Chhatrabazar* | 98 (14-162) | 72 (62-92) | 16.1 (11.6-24.2) | 1.40 (0.84-3.08) | 0.024 (0-0.062) | 10.92 (2.52-24.36) | 99 (84-112) | 68 (56-84) | 5.3 (3.8-7.7) | 14.49 (10.00-23.25) | 0.271 (0.253-0.287) |
| 4. | Nuabazar* | 96 (28-149) | 71 (64-88) | 16.6 (10.9-24.2) | 1.40 (0.28-3.92) | 0.019 (0-0.049) | 5.83 (1.20-15.96) | 102 (88-116) | 68 (60-82) | 7.7 (5.8-9.6) | 13.49 (10.35-21.14) | 0.284 (0.232-0.328) |
| 5. | Biribati* | 70 (23-98) | 74 (68-84) | 16.7 (7.2-23.2) | 0.84 (0.28-1.68) | 0.018 (0.004-0.029) | 4.97 (1.68-8.68) | 100 (92-112) | 72 (64-84) | 6.5 (5.8-7.7) | 13.97 (9.70-22.02) | 0.291 (0.232-0.379) |
| 6. | Atharabanki | 21 (1-99) | 83 (64-108) | 16.0 (9.1-40.4) | 0.98 (0.28-2.24) | 0.031 (0 -0.056) | 4.29 (1.12-17.92) | 130 (96-178) | 78 (60-100) | 14.5 (8.7-19.2) | 15.0 (6.0-34.2) | 0.358 (0.199-0.598) |
| **Class 'C' | | - | - | - | - | - | - | 1500 | - | 600 | 400 | 1.5 |
| **Class 'E' | | - | - | - | - | - | - | 2100 | - | 600 | 1000 | - |

* Data for the period August, September, October and November, 2019

** Tolerance limits for Inland Surface water bodies (IS-2296-1982)

| Sl. No. | Sampling Location | Nutrients | | Heavy metals | | | | | | | | |
|-------------|-------------------|------------------------------|----------------------------------|---|---------|-------|-------|-------|-------|--------|------|-------|
| | | | | Annual average values (Range of values) | | | | | | | | |
| | | NO ₃ ⁻ | PO ₄ ³⁻ -P | Cr(VI) ## | T. Cr## | Fe## | Ni## | Cu## | Zn## | Cd## | Hg## | Pb## |
| | | (mg/l) | | (mg/l) | | | | | | | | |
| 1. | Jobra* | 1.106 (0.840-1.684) | 0.185 (0.024-0.455) | Not analysed | | | | | | | | |
| 2. | Ranihat* | 1.219 (1.006-1.599) | 0.084 (0.015-0.222) | Not analysed | | | | | | | | |
| 3. | Chhatrabazar* | 1.809 (0.980-3.940) | 0.068 (0.012-0.192) | Not analysed | | | | | | | | |
| 4. | Nuabazar* | 1.716 (0.784-3.466) | 0.126 (0.021-0.241) | Not analysed | | | | | | | | |
| 5. | Biribati* | 1.640 (0.997-2.311) | 0.221 (0.062-0.343) | Not analysed | | | | | | | | |
| 6. | Atharabanki | 1.136 (0.429-3.971) | 0.190 (0.024-0.659) | <0.002 | 0.024 | 0.691 | 0.005 | 0.005 | 0.010 | 0.0021 | -- | 0.003 |
| **Class 'C' | | 50 | - | 0.05 | - | 50 | - | 1.5 | 15.0 | 0.01 | - | 0.10 |
| **Class 'E' | | - | - | - | - | - | - | - | - | - | - | - |

* Data for the period August, September, October and November, 2019

Data for the period April, 2019 ** Tolerance limits for Inland Surface water bodies (IS-2296-1982)

DO : Dissolved Oxygen, BOD : Biochemical Oxygen Demand, TC : Total Coliform, TSS : Total Suspended Solids; COD : Chemical Oxygen Demand, NH₄-N : Ammonical nitrogen, TKN : Total Kjeldahl Nitrogen; FC : Fecal Coliform, EC : Electrical Conductivity, TDS : Total Dissolved Solids, B : Boron ; SAR : Sodium Absorption Ratio, TH : Total hardness; Cl : chloride, SO₄ : sulphate; F : Fluoride; PO₄³⁻ : phosphate, : Cr(VI) : Hexavalent Chromium; T.Cr : total Chromium, Fe : Iron, Ni : Nickel, Cu : Copper, Zn : Zinc; Cd : cadmium; Hg : Mercury; Pb : Lead

Water Quality of Puri Canal with respect to other parameters during 2019 (January-December)

| Sl. No. | Sampling Location | Physical parameters | | Organic pollution Indicators | | | | Mineral constituents | | | | |
|-------------|-------------------|---|------------------|------------------------------|------------------------|-------------------------|----------------------|----------------------|----------------|--------------------|-----------------------|------------------------|
| | | Annual average values (Range of values) | | | | | | | | | | |
| | | TSS | Total alkalinity | COD | NH ₄ -N | Free NH ₃ -N | TKN | TDS | TH | Cl | SO ₄ | F |
| | | (mg/l) | | (mg/l) | | | | (mg/l) | | | | |
| 1. | Hansapal | 30 (1-161) | 83 (68-132) | 8.9 (5.2-16.1) | 1.097 (0.280-3.080) | 0.059 (0-0.385) | 4.36 (0.56-12.32) | 124 (104-168) | 79 (64-124) | 12.5 (5.5-20.1) | 12.25 (4.80-23.25) | 0.305 (0.234-0.407) |
| 2. | Jagannathpur | 33 (2-168) | 84 (68-126) | 11.9 (5.5-28.0) | 1.210 (0.240-3.360) | 0.058 (0-0.328) | 4.36 (1.12-9.80) | 118 (92-174) | 76 (56-112) | 10.7 (5.8-17.3) | 10.88 (4.85-16.54) | 0.328 (0.251-0.420) |
| 3. | Chandanpur | 85 (4-570) | 84 (62-120) | 10.2 (5.4-21.2) | 0.775 (0.112-1.400) | 0.018 (0-0.109) | 2.75 (1.12-4.76) | 136 (84-260) | 80 (56-126) | 19.9 (2.9-62.7) | 12.67 (5.95-26.12) | 0.296 (0.147-0.486) |
| **Class 'C' | | - | - | - | - | - | - | 1500 | - | 600 | 400 | 1.5 |
| **Class 'E' | | - | - | - | - | - | - | 2100 | - | 600 | 1000 | - |

| Sl. No. | Sampling Location | Nutrients | | Heavy metals | | | | | | | | |
|-------------|-------------------|---|----------------------------------|--------------|---------|-------|-------|-------|-------|--------|------|-------|
| | | Annual average values (Range of values) | | | | | | | | | | |
| | | NO ₃ ⁻ | PO ₄ ³⁻ -P | Cr(VI) ## | T. Cr## | Fe## | Ni## | Cu## | Zn## | Cd## | Hg## | Pb## |
| | | (mg/l) | | (mg/l) | | | | | | | | |
| 1. | Hansapal | 2.037 (0.536-9.962) | 0.158 (0.010-0.642) | <0.002 | 0.020 | 0.130 | 0.002 | 0.004 | 0.010 | 0.0013 | -- | 0.003 |
| 2. | Jagannathpur | 0.791 (0.438-1.163) | 0.110 (0.011-0.416) | <0.002 | 0.027 | 0.308 | 0.002 | 0.004 | 0.011 | 0.0018 | -- | 0.004 |
| 3. | Chandanpur | 3.327 (0.704-26.505) | 0.069 (0.001-0.448) | <0.002 | 0.035 | 0.154 | 0.003 | 0.003 | 0.010 | 0.0020 | -- | 0.002 |
| **Class 'C' | | 50 | - | 0.05 | <0.002 | 50 | - | 1.5 | 15.0 | 0.01 | - | 0.10 |
| **Class 'E' | | - | - | - | - | - | - | - | - | - | - | - |

Data for the period April, 2019

** Tolerance limits for Inland Surface water bodies (IS-2296-1982)