JAPAN INTERNATIONAL COOPERATION AGENCY MINISTRY OF ENVIRONMENT THE REPUBLIC OF LITHUANIA

STUDY ON THE SEWERAGE SYSTEM IMPROVEMENT OF

BIRZAI AND SKUODAS TOWN IN THE REPUBLIC OF LITHUANIA

FINAL REPORT

VOLUME III

SUPPORTING REPORT (BIRZAI)



NIPPON JOGESUIDO SEKKEI CO., LTD.

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1. Water Sampling and Water Quality Analysis Results

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Supporting Report (Birzai) Water Sampling and Water Quality Analysis

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1.1 PRESENT SYSTEM FOR WATER QUALITY SURVEY AND MANAGEMENT

The present system for the water quality survey is summarized as follows:

(a) River

Regional offices of the MOB are in charge of water sampling and taboratory testing for their respective control areas (municipalities). Each regional office carries out the sampling and tests directly, or requests the local Water Company to perform the survey in its area. The results are regularly submitted to the Combined Research Center of MOE in Vilnius. The research center compiles all the data collected from the regional offices and inputs them in their computer data base system.

In regard to environmental management, the municipality of Birzai falls under jurisdiction of the Panevėžys Regional office of the MOE. The municipality of Skuodas falls under jurisdiction of the Klaipėda Regional office.

There are 47 rivers and 99 sampling stations in the country used for the water quality survey by the MOE. Sampling stations related to the proposed project are as follows:

- The Tatula River (Birzai): 3 locations (1.8 km, 17.5 km and 18.8km from the confluence with the Musa river)
- The Bartuva River (Skuodas): 2 locations (48 km and 55 km from the river mouth)

The sampling locations were selected at significant places including both up-anddownstream sides of discharge points of effluent. The location map for the water sampling stations by MOE is shown in Figure 1.1.

(b) Lake/Reservoir/Pond

In Lithuania, there are 2,834 lakes over 0.5 ha in surface area. Among them, seven lakes were selected by the MOE for water quality surveys. The lakes in and around Birzai as well as Skuodas were not included.

In Birzai and Skuodas, water quality surveys in the lakes/reservoirs/ponds are carried out by the MOH but only for locations where people enjoy water recreation, mostly swimming. Testing is usually limited to bacteria. Sampling period is generally only the summer season. The Sirvenos Lake in Birzai and the Skuodas Lake in Skuodas are included in the locations sampled by the MOH.

(c) Groundwater

There are two organizations in charge of sampling and water quality surveys of groundwater. National groundwater monitoring is performed by the Geological Survey of Lithuania (MOE) and is financed from the national budget. Groundwater monitoring for waterworks is under the responsibility of the companies carrying out groundwater exploitation.

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The national groundwater monitoring covers 42 monitoring stations including those in Birzai and Skuodas. In Karajimiskis village located west of the Birzai town, there are eight wells, which have been monitored since 1979. In Rusupiai village located east of the Skuodas town, there are two monitoring wells installed since 1962. The location map of these wells is shown in Figure 1.2.

(d) Sewage Treatment Plant

The Water Company is in charge of conducting water quality surveys at the STPs. In Birzai, the State Company "Agro Labo" carries out the water sampling and analyses. In Skuodas, "PALANGOS LABORATORIJA" carries out the sampling and analyses under direction of the Water Company in Palanga. The Water Companies in Birzai and Skuodas cooperate in the survey and receive the results. The location map of the sewage treatment plant is shown in Figure 1.3.

(e) Major Pollution Sources

There are several major pollution sources in Birzai as well as in Skuodas, such as factories, hospitals, restaurants and schools. Sampling and analyses at these locations are the same as those for the sewage treatment plants. The location map of major pollution sources (together with STP locations) is shown in Figure 1.3.

1.2 PRESENT SYSTEM OF FLOW MEASUREMENT

The Meteohydrological Service (MOE) carries out river flow measurement. The Meteohydrological Service was formerly an independent organization during the Soviet period but now belongs to the MOE. There are 76 river flow measurement stations in the country. Many of them have comparatively long-term records (nearly 30 years or more). The location map of flow measurement stations in Lithuania is shown in Figure 1.4. Periods of flow measurement of the rivers in the project area are shown in Figure 1.5. The following rivers are included:

- (a) Apascia River
- (b) Agluona River
- (c) Tatula River
- (d) Bartuva River

1.3 PRESENT WATER QUALITY STANDARDS AND CRITERIA

The Republic of Lithuania intends to become an official member country of the EU. It is therefore necessary for Lithuania to adjust to the EU water quality standards although the EU water registration methods are currently undergoing a fundamental reappraisal.

The order of MOE called "Waste Water Pollution Standards (LAND 10-96)" was approved in July 1997. The standards aim at setting water quality improvement goals and regulating pollution of inland and territorial waters by domestic and industrial waters. There are two categories of standards as follows:

- (a) Main standards for pollutants for wastewater discharged to surface waters
- (b) Pollution standards for wastewater discharged into municipal sewer collection system

The essential parts of "LAND 10-96" are presented in Table 1.1.

The water quality standards for other sectors (drinking water, river water, lake water, groundwater, water for fish, source for water supply, etc.) are not yet updated. In general, the previous USSR standards are comparable with the standards and recommendations of HELCOM, EU, WHO, World Bank and other European countries.

The draft of "Drinking Water Standards" has been finalized and will be approved soon. The major parts of the drinking water standards (final draft) are presented in Table 1.2. Present river water quality is generally evaluated according to currently applied maximum allowable concentrations that conform to requirements of the fishing sector (shown in Table 1.3) and also water quality classifications (shown in Table 1.4). The river water quality standards currently used are those used during the previous USSR period and are based on the requirements for fish that live in clean water (such as trout and salmon).

In addition to the Lithuanian standards, the Japanese standards are attached for reference evaluation (see Sections 2.4 and 3.4) as follows:

- (a) Water Quality Standards for Rivers and Lakes/Ponds in Japan (Table 1.5)
- (b) Effluent Standards For Sewerage Systems in Japan (Table 1.6)

1.4 JICA SURVEY

The Study Team conducted water sampling and water quality analysis, including flow measurement, of raw sewage, major pollution sources (factories), alternative rivers which could receive final effluent, and groundwater. Sampling and laboratory tests were sub-contracted to a local firm (VIKTA Laboratory, through UAB Ekoprojektas) under supervision of the Study Team.

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2 WATER QUALITY SURVEY FOR THE PROJECT IN BIRZAI

2.1 PRESENT CONDITIONS RELATED TO THE SURVEY IN BIRZAL

2.1.1 River System and Lakes

The river systems and lake in and around Birzai town are shown in Figure 2.1. The major rivers related to the study are listed, in order, from east to west as follows:

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- (a) The Roveja River
- (b) The Apascia River
- (c) The Agluona River
- (d) The Juodupe River
- (e) The Tatula River
- (f) The Sirverios Lake

2.1.2 River Runoff Data

The Meteohydrological Service (MOE) carries out river flow measurements at the following rivers:

- (a) The Apascia River
- (b) The Agluona River
- (c) The Tatula River

The flow measurement stations in Birzai are shown in Figure 2.2. The monthly mean discharge records at the flow measurement stations (including that in the Bartuva River) are summarized in Table 2.1. The runoff is relatively large from February to April and small from July to October.

The mean discharges together with the river lengths and catchment areas at the representative locations of the following rivers are summarized in Table 2.2.

- (a) The Roveja River
- (b) The Obelaukias River
- (c) The Apascia River
- (d) The Agluona River
- (e) The Juodupe River
- (f) The Tatula River

Note: The Bartuva and Luoba Rivers in Skuodas are also included in the table for reference.

In the table, the annual mean discharges of the Roveja, Obelaukias, and Juodupe Rivers are estimated by using the annual specific discharge of a river with long-term measurement records.

2.1.3 Water Use

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There are three kinds of water bodies; river, groundwater, and lake. Water bodies are used mainly for the following activities/purposes, at present.

(A) River water

(a) Water supply for irrigation/agricultural use

There are no intakes, as far as known from our field reconnaissance. If there is any, water intake from the river would be necessary only during the dry period in the spring and summer. The agricultural irrigation method used in Lithuania is mostly rainfed farming. The use of river water for agriculture is limited.

(b) Drainage

Rain water drains into the rivers or lake/ponds in Birzai, through drainage ditches and from the ground surface.

(c) Recreation

Leisure fishing is popular in Lithuania. In Birzai, some locations along the rivers are used for fishing, but are limited in number. Boating and swimming has been seen but not is common along the river.

The river is not used for commercial fisheries, transportation, sand-mining or as a source of drinking water, at present.

(B) Groundwater

(a) Water supply for domestic and industrial use

The water supply source is primarily from groundwater. The public water supply and factories take water from deep wells. Individual houses without public water supply service take water either from deep or shallow wells.

(b) Water supply for irrigation use No definite information was obtained on agricultural use of groundwater, but a portion of the well water may be used for farming or landscaping.

(C) Lakes

(a) Water Supply

Water from the lake is not used as a water supply for domestic use. Some factories may use the water for industrial use.

(b) Drainage

Some rainwater drains into the Sirvenos Lake directly through ditches and the ground surface. The Apascia and Agluona Rivers drain into the lake.

(c) Recreation

Leisure fishing, boating and swimming are popular in summer.

2.2 EXISTING WATER QUALITY RECORDS IN BIRZAI

The existing water quality records are classified as follows:

- (a) River water
- (b) Lake/Reservoir/Pond water
- (c) Groundwater
- (d) STP wastewater
- (e) Pollution sources

(1) Existing Water Quality Records for River Water

The annual records (1994-1997) for river water quality obtained from the MOE are presented in the tables listed as follows:

(a) The Tatula River (1.8 km from the confluence to the Musa River);

Tables 2.3 - 2.6

- (b) The Tatula River (17.5 km from the confluence to the Musa River); Tables 2.7 – 2.10
- (c) The Tatula River (18.8 km from the confluence to the Musa River); Tables 2.11 – 2.14

Summaries of river water quality records (1994-1997) at the respective stations are presented in the following tables:

- (a) The Tatula River (1.8 km from the confluence to the Musa River); Table 2. 15
- (b) The Tatula River (17.5 km from the confluence to the Musa River); Tables 2.16
- (c) The Tatula River (18.8 km from the confluence to the Musa River); Tables 2.17

(2) Existing Water Quality Records for Lake/Reservoir/Pond

There are records of bacteria present for the Sirvenos Lake from the Human Health Center of MOH in Birzai as shown in Table 2.18.

(3) Existing Water Quality Records for Groundwater

The summarized records, in the annual report (1996) prepared by the Geological Survey of Lithuania (MOE), are presented in Table 2.19 as a representative of the existing water quality records for groundwater.

Beside the above, the survey results for the Birzai area in 1994 showed the following conditions:

| Item | Urban area | Surrounding area |
|--|------------|------------------|
| Total No. of well surveyed | 13 wells | 6 wells |
| Exceeding the standard of NO2- N (45mg/l) | 9 wells | 2 wells |
| Exceeding the standard of NO ₃ -N (3.3mg/l) | 1 well | 0 |
| Exceeding the standard of NH ₄ -N (2.0mg/l) | 2 wells | 1 well |

(4) Existing Water Quality Records for the STP Wastewater

The water quality monitoring records for the STP are presented in Table 2.20.

(5) Existing Water Quality Records for Pollution sources

The water quality monitoring records at various pollution sources (taken by the Water Company) are summarized as shown in Table 2. 21.

2.3 WATER QUALITY SURVEY IN BIRZAI BY THE JICA STUDY TEAM

2.3.1 Water Sampling and Laboratory Tests

Water sampling points in Birzai are shown in Figure 2.3. Items for water quality testing were selected in consideration of the study and the conditions at the pollution sources as follows:

(a) Raw Sewage (at STP and factories)

For all samples

Water temperature, pH, Suspended Solids, BOD (Total), BOD (Soluble), COD, Total-

N, PO₄-P, Total-P, and Influent flow measurement (at STP)

For samples an selected days

NH4-N, NO2-N, NO3-N, Cl', ABS, DO, Oil, Total coliforms, and Alkalinity (as CaCO3)

(b) River/Lake Water

Water temperature, Color, Odor, pH, Transparency, Electric Conductivity, Suspended Solids, BOD, COD, Total-N, PO₄-P, Total-P, Flow Measurement, NH₄-N, NO₂-N, NO₃-N, CI, ABS, DO, Oil, and Total coliforms

(c) Ground Water Quality

Water temperature, Color, Odor, p11, Transparency, Electric Conductivity, Suspended Solids, BOD, COD, Total-N, PO₄-P, Total-P, Flow Measurement, NH₄-N, NO₂-N, NO₃-N, CF, ABS, DO, Oil, Total coliform group

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The sampling locations and frequency were selected as follows:

(a) Raw Sewage (at STP and factories)

1) Point of inflow at the Treatment Plant

4 days (2 days/month x 2 months)

13 samples/day (every 2 hours for 24 hours)

Total = 52 samples

2) Point of discharge at the dairy products factory

4 days (2 days/month x 2 months)

5 samples/day (every 2 hours from 8:00 to 16:00 hours)

Total = 20 samples

3) Point of discharge at the brewery

4 days (2 days/month x 2 months)

5 samples/day (every 2 hours from 8:00 to 16:00 hours)

Total = 20 samples

(b) River/Lake Water

Sampling was carried out in the following rivers and locations:

- 1) The Roveja River; at approximately 2 km upstream of the dairy factory
- The Apascia River; at a bridge approximately 0.5km upstream of Sirvenos Lake
- The Agluona River ; at a bridge approximately 1km upstream of Sirvenos Lake
- 4) The Tatula River, at approximately 0.5 km upstream from the confluence with the Juodupe River.
- 5) The Tatula River; at approximately 0.5km downstream from the confluence with the Juodupe River
- 6) The Juodupe River; at approximately 0.1 km upstream of the discharge point from the existing STP.
- 7) The Juodupe River, at approximately 0.1km downstream of the discharge point from the existing STP

The sampling and frequency were selected as follows:

2 days/month (one each for dry and rainy weather) x 2 months

I sample/day

Total = 4 samples/point

Note: For the Juodupe River, only one sample per month at the two locations.

(c) Ground Water Quality

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Sampling was carried out from the following wells:

- 1) North side of Sirvenos Lake
- 2) In the town area
- 3) Southside of the town
- 4) At approximately 2 km southwest of town.
- 5) At approximately 5 km west of town

The sampling and frequency were selected as follows::

3 days/month

1 sample/day

Total = 3 samples/point

The following tables show summaries of the survey, which are explained above.

(a) Quantity of Water Quality Survey (Table 2.22)

(b) Summary of Water Sampling Date (Table 2.23)

2.3.2 Results of Water Quality Analysis

The survey results obtained are presented in the following tables:

- (a) S.T.P Influent (Tables 2.24 to 2.27)
- (b) Dairy Factory Effluent (Tables 2.28 to 2.31)
- (c) Brewery Effluent (Tables 2.32 to 2.35)
- (d) Rivers (Tables 2.36 to 2.42)
- (e) Groundwater (Tables 2.43 to 2.47)
- (f) Lake (Tables 2.48 and 2.49)

A summary of the records was prepared as follows:

- (a) S.T.P Influent (Table 2.50)
- (b) Dairy Factory Effluent(Table 2.51)
- (c) Brewery Effluent(Table 2.52)
- (d) Rivers(Table 2.53)
- (e) Groundwater (Table 2.54)
- (f) Lake (Table 2.55)

In addition to above, results of the water quality tests for the supernatant of raw sewage, which were taken and settled in 1 litter cylinder by the Study Team staff at the STP, are shown in Table 2.56. The test was carried out additionally for preliminary design of the STP.

2.4 EVALUATION OF WATER QUALITY FOR BIRZAU

An evaluation was made against the water quality standards as explained in Section 1.3. Essential and representative parameters, for which standards are available, were selected for evaluation. In addition, mean values are used for comparison with the standards. The maximum and minimum values are not always reliable to use in evaluations, mainly due to an occasional inaccuracy in sampling and testing.

The evaluation is to be carried out in the following manner:

- (a) Comparison of the existing records with the standards,
- (b) Comparison of the JICA survey results with the standards(and/or the existing records), and

- (c) General evaluation based on the comparison.
- (1) Birzai Sewage Treatment Plant

The evaluation was made using the "Waste Water Pollution Standards (LAND 10-96)" as discussed in Section 1.3.

(a) Comparison of the existing records with the standards

| | - | | Unit: mg/l |
|------------------|------------------|-------------------|-----------------------|
| Item | Inflow (Mean) | Outflow (Mean) | Standard (Outflow) |
| BOD ₇ | 509.8 | 194.0 | 15 |
| SS | 239.8 | 61.7 | 30 |
| T-N | 43.9 | 32.4 | 20 |
| T-P | 5.0 | 3.9 | 15 |

Summary of the existing records (STP, Birzai)

Note: The values in italic and bold exceed the standard.

(b) Comparison of the JICA survey results with the existing records

Summary of JICA survey records (STP, Birzai)

| | Unit: m | g/l |
|-------|---------------|-----|
| Items | Inflow (Mean) | |
| BOD 7 | 255.6 | |
| SS | 216.5 | |
| T-N | 29.5 | |
| T-P | 6.1 | |

Note: The JICA survey was carried out at the STP only of the influent.

(c) General Evaluation

As seen in the tables above, it is apparent that the existing STP can not reduce the pollutants to the required standards. The concentrations of all major parameters shown are higher than the standards; approximately 1.5 times for T-P, approximately 2 times for SS and T-N, and approximately 13 times for BOD7.

Although the JICA survey does not include testing the effluent from the STP, the test results of inflow are almost at the same level as those monitored by the MOE. Only the mean concentration of BOD, is nearly a half that monitored by the MOE. The test results vary remarkably depending on the conditions at the time of sampling. Accordingly, it would be reasonable that the results of the MOE's monitoring with relatively long-term records are used for the basic parameters in design of the STP.

(2) Factories

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The evaluation was to be made using the "Waste Water Pollution Standards (LAND 10-96)" as discussed in Section 1.3.

(a) Comparison of the existing records with the standards

Summary of Existing records (Effluent to the sewerage system from Factorics, Birzai)

Unit: mg/l

| Item | Brewery | Canned | Diary | Standard | Standard |
|------------------|---------|--------|-------|-------------|----------|
| | | Food | | (Lithuania) | (Japan) |
| BOD ₁ | 715 | 231 | 702 | - | 600 |
| SS | 251 | 83 | 163 | - | 600 |

(b) Comparison of the JICA survey results with the standards

Summary of JICA survey records (Effluent to the sewerage system from Factories, Birzai)

unit: mg/l

| | Brewery | Diary | Standard, (Lithuania) | Standarð (Japan) |
|------------------|---------|-------|--------------------------|---------------------|
| BOD ₇ | 2,918 | 989 | - | 600 |
| COD | 8,712 | 2380 | - | - |
| COD/BOD | 2.98 | 2.40 | < 2.5 | - |
| pH | 5.9 | 8.5 | 6.5 - 9.0 | 5.0 - 9.0 |
| SS | 821 | 394 | * | 600 |

(c) General Evaluation

As the data from the Water Company is limited in number and the concentrations are less than those of the JICA surveys. The evaluation was made on the basis of the results of the JICA survey.

The Lithuanian standards are only available for the ratio of COD/BOD and pH. Effluent from the brewery exceeds the limit of the standards for both the COD/BOD ratio and pH. Effluent from the dairy factory is within the limit based on evaluation of the mean concentration.

The effluent concentration from the dairy factory is comparatively less than that from the brewery. It is however noted that effluent flow is remarkably high from the dairy factory. The annual effluent volume is approximately 100,000 m³ from the dairy factory compared to approximately 27,000 m³ from the brewery. Therefore, the total volume of pollutants is higher from the dairy factory.

(3) River

The evaluation was made using the "River Water Quality Standards" currently applied and the "River Water Classification" as presented in Section 1.3.

(a) Comparison of the existing records with the standards

Summary of Existing records (River, Birzai)

unit: mg/l

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| Item | Tatula | Tatula | Tatula | Standard |
|----------------------------------|--------|----------------------|--------------------------|----------|
| | 1.8 km | 17.5 km | 18.8 km | |
| DO | 7.3 | 5.7 | 22.4 | >6 |
| BOD, | 2.53 | 17.20 | 4.70 | 2.3 |
| NH4-N | 3.02 | 6.92 | 0.83 | 0.39 |
| NO ₂ -N | 0.19 | 17.03 | 0.02 | 0.02 |
| T-N | 3.46 | 8.29 | 4.17 | 2.0 |
| PO ₄ -P | 1.40 | 2.79 | 0.19 | 0.08 |
| T-P | 0.34 | 1.09 | 0.20 | 0.2 |
| River Water Index (BOD range) | Clean | Very contaminated | Slightly Contaminated | - |

Note: Values in italic and bold exceed the standard,

(b) Comparison of the JICA survey results with the standards

Summary of JICA survey records (River, Birzai)

| | | | | | | | U | Init: mg/l |
|--------------------|--------|---------|---------|--------|----------|---------|----------|------------|
| Item | Rousia | Anosoio | Agluona | Tatula | Tatula | Juodupe | Juodupe | Stan- |
| нен | Roveja | Apascia | Agiuona | Up. | Down, | Up. | Down | dards |
| DO | 6.38 | 6.9 | 4.93 | 6.93 | 5.62 | 7.39 | 1.08 | > 6 |
| BOD ₁ | 1.84 | 3.15 | 2.21 | 2.07 | 4.22 | 0.62 | 8.50 | 2.3 |
| NH ₄ -N | 2.05 | 0.58 | 0.46 | 0.33 | 0.95 | 0.16 | 26 | 0.39 |
| NO ₂ -N | 0.008 | 0.022 | 0.05 | 0.015 | 0.83 | 0.01 | 0.01 | 0.02 |
| T-N | 3.8 | 2.55 | 3.78 | 6.13 | 5.44 | 9.4 | 36.2 | 2.0 |
| PO ₄ -P | 0.02 | 0.03 | 0.02 | 0.03 | 0.22 | 0.05 | 0.29 | 0.08 |
| T-P | 0.076 | 0.09 | 0.098 | 0.115 | 0.31 | 0.06 | 2.4 | 0.2 |
| River | Very | Clean | Very | Very | Slightly | Very | Medium | - |
| Water | clean | | clean | clean | Conta- | clean | contami | |
| Index | | | | | minated | 1 | nated | |
| (BOD) | | | ł | | | | <u> </u> | |

Note: Values in italic and bold exceed the standard.

la Tatula

(c) General Evaluation

The existing records of the MOE for the Tatula River only show the following:

- The stretch upstream (18.8 km) of the confluence with the Juodupe River is slightly polluted and the values of BOD, NH₄-N, T-N, PO₄-P and T-P exceed the allowable standards. The pollution possibly comes from the towns and villages located upstream.
- 2) The downstream stretch (17.5 km) after the confluence with the Juodupe River is very polluted and all parameters exceed the limits. The change in water quality caused by contamination is very clear.
- 3) In the further downstream stretch (1.8 km), near the confluence to the Musa River, the river is still polluted and the values of BOD, NH₄-N, NO₂-N, T-N, PO₄-P and T-P still exceed the limits. The contamination level, however, is remarkably improved due to the natural dilution especially from additional flow from the tributaries along the way and is classified as a "clean" river..

The JICA survey results show the following:

- 1) The Roveja River is not polluted while only the T-N exceeds the allowable limits.
- 2) The Apascia and Agluona Rivers are classified as clean rivers, however the values of BOD, NH₄-N, NO₂-N and T-N exceed the limit in the Apascia River and the values of DO, NH₄-N, NO₂-N and T-N exceed the limits in the Agluona River.
- 3) In the Tatula River, the downstream stretch of the confluence with the Juodupe River is polluted and all the parameters exceed the limits. The upstream stretch is still clean and only the parameter of T-N exceeds the limit.
- 4) In the Juodupe River, the change of contamination is more apparent. The downstream stretch from the discharge point of effluent is polluted and all the parameters, except NO₂-N, exceed the standards. It is probable that the actual NO₂-N is also over the limit as the sampling in the Juodupe River was carried out only once. In the upstream stretch, only T-N exceeds the limit.

(4) Groundwater

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The evaluation was made on the basis of the draft standards for drinking water presented in Section 1.3. Groundwater is the source of drinking water. Only iron removal is provided for water supply.

(a) Comparison of the existing records with the standards

Summary of Existing records (Groundwater, Birzai)

Unit: mg/l

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| T4 | Damas of the Acad magnitude | Standard | | | |
|-------------------|-----------------------------|-----------|------|---------------|--|
| Item | Range of the test results | Excellent | Good | Satis-factory | |
| NH ₄ + | 0 2.985 | 0.5 | 1.0 | 2.0 | |
| Cľ | 4.97 30.17 | 25 | 100 | 250 | |
| SO42. | 51 1,283.85 | 150 | 250 | 450 | |
| NO ₃ | 0 15.983 | | 50 | | |
| NO ₂ | 0 1.36 | | 0.1 | | |

Note: Values with italic and bold exceed the (Satisfactory level) standard

(b) Comparison of the JICA survey results with the standards

| | | | | | | | | Unit: m |
|-------------------|-------|-------|-------|-------|-------|----------------|----------|-------------------|
| | GW1 | GW2 | GW3 | GW4 | GW5 | | Standard | |
| | | | | | | Exce- llent | Good | Satis- factory |
| NH ₄ + | 0.41 | 1.14 | 0.47 | 0.16 | 0.17 | 0.5 | 1.0 | 2.0 |
| Cl- | 39.8 | 13.62 | 29.76 | 34.23 | 71.93 | 25 | 100 | 250 |
| pН | 7.99 | 7.95 | 8.01 | 7.74 | 7.92 | 7.0-8.2 | 6.5-9.0 | 6.0-9.0 |
| NO ₃ . | 0.53 | 0.15 | 0.93 | 1.09 | 17.1 | | 50 | • |
| NO5 | 0.001 | 0.003 | 0.001 | 0.011 | 0.013 | 1 | 0.1 | |

Summary of JICA survey records (Groundwater, Birzai)

(c) General Evaluation

Groundwater is used for drinking water and has three allowable limit classes.

According to the records from the Geological Survey (MOE), some cases show the values of NH_4^+ , NO_2^- and $SO_4^{2^-}$ exceeding the specified limits. There are three cases for NH_4^+ , two cases for NO_2^- and 10 cases for $SO4^{2^-}$ among the 16 cases in total.

In the JICA survey, all the test results are within the limit of allowable standards.

In case of NH_4 +, four locations are classified as excellent while one location is satisfactory. In case of CI, one location is excellent; and four locations are good. For pH, all the locations are within the excellent level.

Water quality of the groundwater varies remarkably during the year as well as by location. Long-term records by the Geological Survey has indicated that the groundwater in the area is not always safe for drinking.

(5) Lake

An evaluation was made on the basis of the standards currently applied for river water (shown in Section 1.3), as no separate standards are set for lake water.

(a) Comparison of the existing records with the standards

As seen from Table 2.18, it is difficult to show the mean results.

The results are shown as follows:

Summary of Existing records (the Sirvenos Lake, Birzai)

Unit: Coli-index number

| Year | Monitoring Frequency | Maximum (Coliform) | | Maximum (Coliform) | | Frequency e exceeding (10,1 | g the limit |
|-----------------|-------------------------|--------------------|--------------------|--------------------|---|-----------------------------------|-------------|
| | | Central Beach | Near Youth Park | | | | |
| 1993 | 14 | 13,000 | 260,000 | 2 | 3 | | |
| 1994 | 11 | 20,000 | 324,000 | 1 | 2 | | |
| 1995 | 10 | > 2400 | > 2400 | - | - | | |
| 1996 | 11 | > 2400 | 2,400 | - | - | | |
| 1997 | 9 | > 2400 | 1,600 | - | - | | |
| 1998 (Mid. Aug) | 9 | > 2400 | > 2400 | - | - | | |

Note: Frequency exceeding the limit is not clear since 1995 as the maximum records show only > 2400.

(b) Comparison of the JICA survey results with the standards

Summary of JICA survey records (the Sirvenos Lake, Birzai)

| | | | | Unit: mg/ |
|--------------------------------|--------|---------|-----------------------|-----------------------------|
| Item | At LW1 | At LW2 | Standard Lithuania | Standard Japan (Class A) |
| DO | 6.61 | 5.02 | > 6.0 | 7.5 |
| BOD ₇ | 3.72 | 3.41 | 2.3 | - |
| NH ₄ -N | 0.47 | 0.47 | 0.39 | - |
| NO2-N | 0.04 | 0.03 | 0.02 | - |
| T-N | 1.51 | 2.1 | 2.0 | 0.2 |
| PO ₄ -P | 0.05 | 0.01 | 0.08 | - |
| T-P | 0.12 | 0.07 | 0.2 | 0.01 |
| Total coliform (MPN./100ml) | 70,000 | 430,400 | - | 1,000 |

Note: Values in italic and bold exceed the Lithuanian standard.

(c) General Evaluation

The records from the MOH are as follows:

- 1) Coliform index varies depending upon the time the sampling is conducted.
- 2) The lake water is generally within the allowable level in regard to the coliform parameter although high index values occur occasionally.

The results of the JICA survey show the following matters:

1) At the location of LW1, the values of BOD, NH₄-N, NO₂-N and Total-coliform exceed the allowable limit.

- 2) At the location of LW2, the values of DO, BOD, NH₁-N, NO₂-N, T-N and Totalcoliform exceed the limit of the standards.
- 3) Although the levels are not yet high (except for total coliform), the lake has signs of pollution.
- Note: The results of total coliform seems too high. It is not clear whether the results happened due to the sampling method or the test analysis. It would be reasonable that the records from the MOH with long-term sampling are more reliable for the evaluation of total coliform.

9

3 RECOMMENDATION FOR IMPROVING WATER ENVIRONMENT

Water quality in the rivers receiving effluent from the existing treatment plant will be improved after completion of the new sewage treatment plants. The concentration of the effluent from the new treatment plant will be better than the allowable limits required in the "Waste Water Pollution Standards (LAND 10-96)". Some suggestions and recommendations, which are not described in the main report, are presented herein to ascertain the improvement as follows: (1) Reduction of Pollutants at the Pollution Sources

The types of pollution sources in the future will be basically the same as the present sources, although some changes will occur because of human and economic activities. The potential pollution sources are generally categorized as follows:

(a) Residential houses

The BOD level of sewage from residences is high when people use many kinds of high BOD consumables such as cooking oils, fat meats, and washing detergent. Although the population may not increase in the town, the concentration of pollutants in the effluent from individual house may sometime increase according to the improvement of living standards.

(b) Factories

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The concentrations of BOD, COD, total solids, SS, dissolved solids, P, and N are generally high in the wastewater from factories. Toxic substances are occasionally discharged.

(c) Commercial/public facilities

Commercial wastes from offices, stores/shops, hospitals, hotels, markets, etc occasionally cause high concentration of water pollutants. In addition, toxic substances are occasionally included in the discharge from hospitals, clinics, petrol stations and a research center, if not properly controlled.

(d) Live-stock farm waste

The concentrations of BOD, COD, SS, P and N from pigs, cows, horses, chickens, etc. are generally high, although the number of live stock breeding farms are not high in, and around, the project areas.

(e) Agriculture activities

Farms generally use many kinds of agricultural chemicals such as fertilizers, weed killer and pesticides (Herbieides, insecticides, etc.), which generally contain toxic chemicals. Although it is understood that the use of these chemicals has decreased over the years due to strict regulation and control of their use.

- (f) Others
 - Forest (decaying debris from the forest/trees contain many substances such as P, K, Ca, Mg, Na, Cl, and N)

- Atmospheric fallout and rain (Fallout contains various kinds of substances such as acid chemicals, pesticides, heavy metals and radioactive substances.)

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- Construction waste
- Landfills and trash dumps
- Liquid waste ponds
- Road surface dust (from traffic)

Among the above, attention should be paid primarily to the discharges from industry (factories) and commercial/public facilities. The following is suggested:

- (a) Regular monitoring of water quality from potential pollution sources.
- (b) An inventory survey of pollution sources
- (c) Guidance for pollution sources to reduce the contaminants
- (d) Assisting in construction of pre-treatment facilities for the major industries
- (e) Promptly determining penalties and collecting fines when discharges exceed the allowable standards.

As seen from the test results, the wastewater concentrations discharged from the factories to the sewerage system exceed the standards. The high biological concentration of these discharges coming into the STP is one of the major problems.

(2) Treatment at Pollutant Sources without connecting to the Sewage System

There are some areas, in which industries, other facilities and houses will remain without a connection to the sewerage system after the completion of the project. It would be a significant cost to connect them to the network or take counter-measures to correct these situations. Water quality improvement should be considered on the same level for the whole town area. A comprehensive study will be required to identify and remedy these conditions. For example, the existing sludge/liquid waste ponds located outside of Birzai town should be eliminated as early as possible.

(3) Monitoring of Water Quality

To assure the positive effects of the project, it is essential to continue regular monitoring of water quality, as follows:

- (a) Daily monitoring <u>At STP</u> (See the main report.)
- (b) Periodical/Monthly monitoring <u>At STP</u> (See the main report.)

<u>At Major Pollution Sources</u> (Outflow to the sewerage system or the surface water) Item: (More parameters in addition to the currently tested ones, depending on the characteristics of the sources)

<u>At Rivers</u> (At up-and-downstream locations from the effluent discharge points in the Juodupe River for Birzai as well as in the Bartuva River for Skuodas) Item: (The same items currently used by the MOE, but additional parameters be required and a review is suggested)

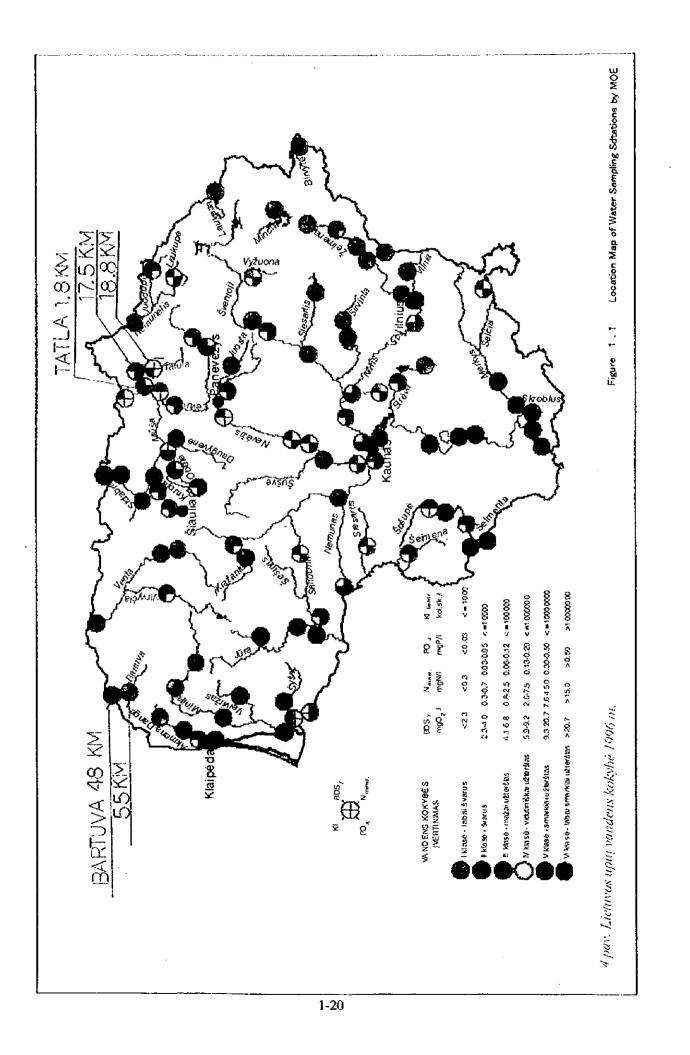
Note: Monitoring at the Tatula River should be continued by the MOE. The locations for the Bartuva River can be adjusted to those used in the MOE monitoring.

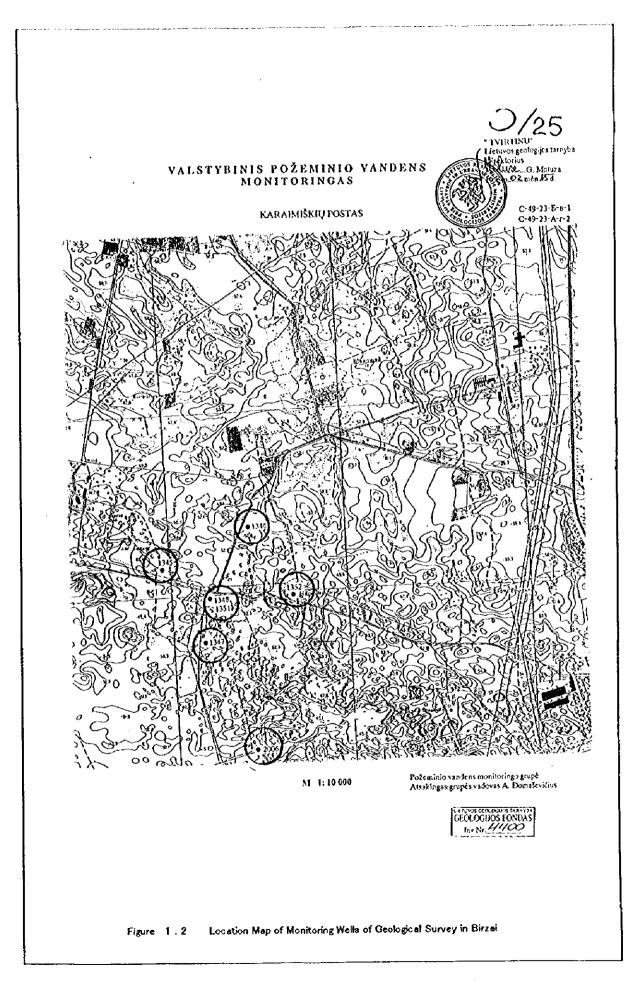
(4) Monitoring of Fishes in the Rivers

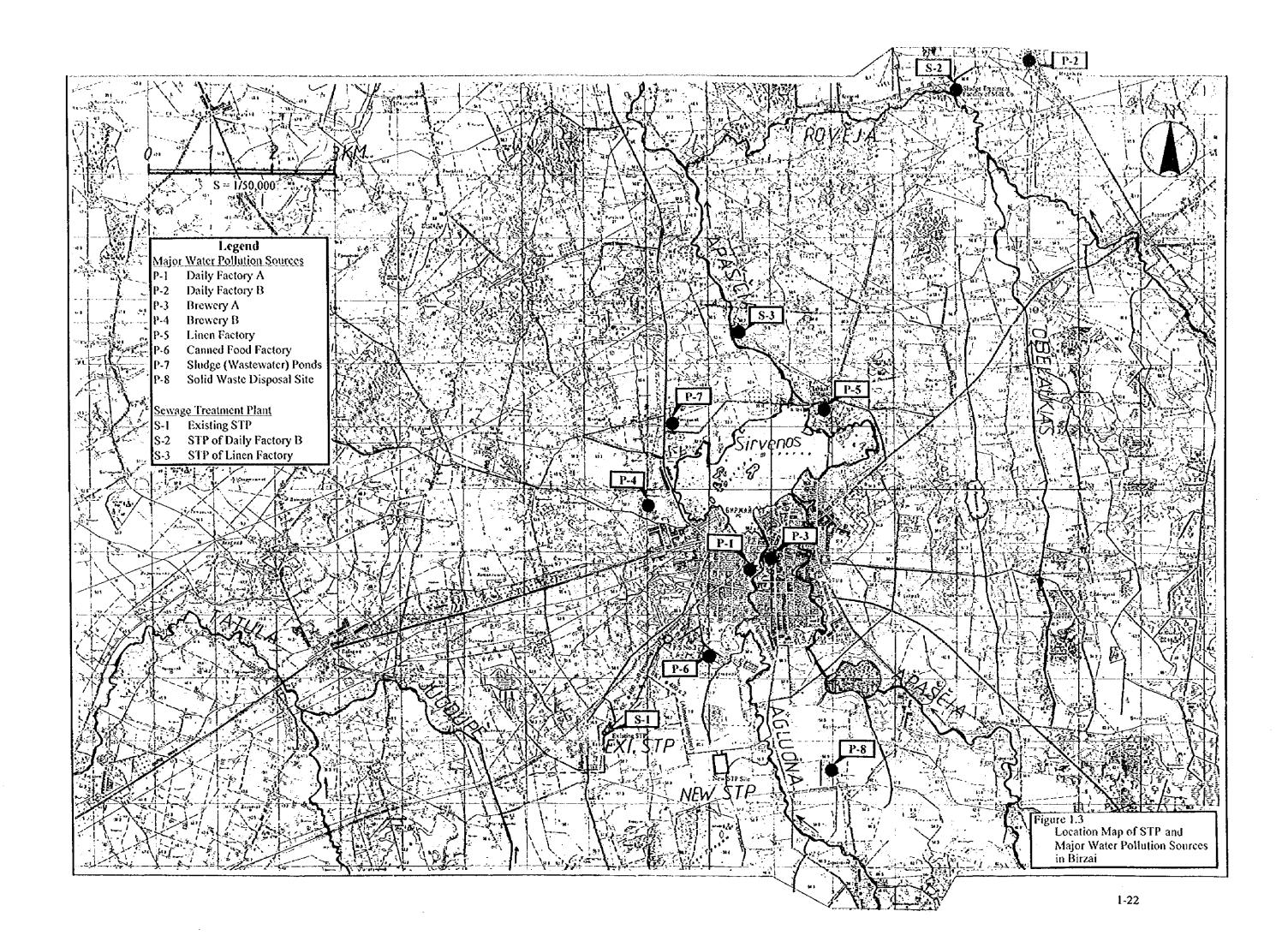
)

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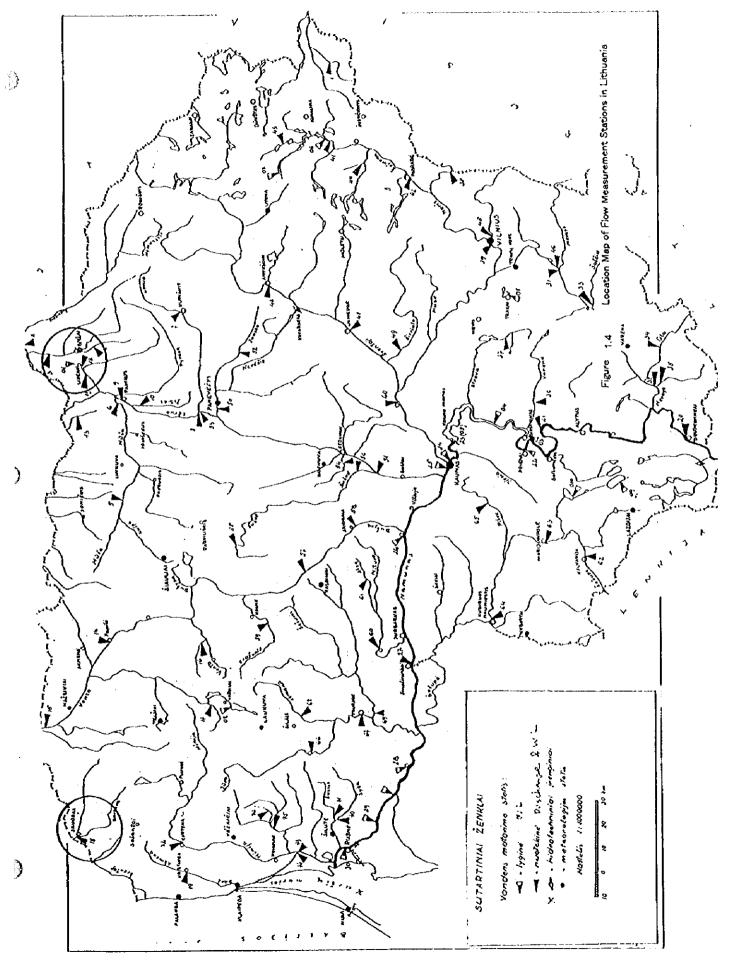
It is recommended that the number and variety of fish in the rivers receiving effluent from the sewage treatment plants be monitored. For example, clear evidence of improvement is certain if the number of crayfish increases after the new STP starts operation.







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1-23

| | | | | | 1 | Fig | Figure 1.5 | 1.5 | | Ĩ4 | No. | Me | Flow Measurement Leriou | enc | | | Į | | | | | | | | | | | | | | |
|---------|--|---------|------|------|------|-------|------------|------|-------|----------|------|----------|-------------------------|--------------------------------|--------|------|----------|---------------|------|-----|-----|--|-----|------|------|------|------|------|------|-----|------|
| | I acation of | | | | | | | | | | | | Flow | Flow Measurement Period (Year) | asur | emer | at Pe | poin | ざと | ច្ន | | | | | | | [| | | | |
| River | Casine Station 19681969197019711972197319741 | 1968196 | 5919 | 7019 | 7119 | 72/19 | 73/19 | 7419 | 75119 | 7619 | 7715 | 1824 | 21676 | <u>380h</u> | 1186 | 9821 | 9831 | <u>8</u> 1 | 9851 | 986 | 987 | 975 1976 11977 11978 11979 11980 11981 11982 11984 11985 11986 11987 11988 11989 11990 11991 11992 11993 11995 11995 11995 11997 | 989 | 1990 | 1661 | 1992 | 1993 | 1994 | 2661 | 361 | 1997 |
| | 0-0-0 | | ╢── | ┨ | | ╂── | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apascia | Apascia Nausedziai | | | | | | | | - | | | | | | \neg | † | | | -† | | | | | T | | | | | | | |
| - | | | | | | | | | _ | | | | | | ┨ | | | | | | | | T | _[| | | | | | | |
| Aguona | Aguona Duvonakiai | | | | | | | | | | | <i></i> | | | | | | | | -1 | -1 | | Ì | | | | | | | | |
| | | | ┢─ | ┝ | ┢─ | | | | | - | | | | | | | | | | | ÷ | | | | | | | | | | |
| Tatula | Tatula Trecionys | | ┢ | ╉─ | | | ┨─ | ╟ | ╉─ | ╢ | ┢ | | [| | | ┢┈ | | | | | | | | | - | | | | | | |
| | | | + | | | | ╂╌╴ | + | | ┼╌ | | <u> </u> | | <u> </u> | | ┢ | | | | | | | | | | | | | | | |
| Bartuva | Bartuva Skuodas | | ╋ | ╂─ | | | ┢ | ┢ | ┢── | ┠── | | | | | | | | | | | | | | | | | | | | | |
| | - | | { | 1 | | | | | | ł | | | | | | | | | | | | | | | | | | | | | |

Fioure 1.5 Flow Measurement Period

1-24

Table 1.1 (1/4) Effluent Stendards in Lithuania

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| | Permissible rate | |
|--|------------------|---------|
| Pollutants Item | Mean | Maximum |
| | mg/l | mg/l |
| BOD7 | | |
| < 5m³/d | 30 | 50 |
| 5m ³ /d < and < 5,000people | 25 | 40 |
| 5,000 - 10,000 people | 20 | 30 |
| 10,000 people < | 15 | 25 |
| COD | | |
| < 10,000 people | 100 | 150 |
| 10,000 people < | 75 | 120 |
| Total P | | |
| 10,000 people < | 1.5 | 2.5 |
| Total N | | |
| 10,000 – 100,000 people | 20 | 35 |
| 100,000 people < | 15 | 25 |
| SS . | | |
| < 100,000 people | 30 | 45 |
| 100,000 people < | 25 | 35 |

(Discharged into surface water reservoir)

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1-25

Table 1.1 (2/4) Effluent Stendards in Lithuania

| Pollutants Item | Permissible rate | Remarks |
|---------------------------|------------------|---------------------------------------|
| Pollutants item | mg/l | |
| Biogenic Item | | · · · · · · · · · · · · · · · · · · · |
| Nitrites-N | 1 | Average |
| Ammonium~N | 5 | Average |
| Ion-organic item | | |
| Cd | 0.04 | Maximum |
| Gr | 0.5 | Maximum |
| Cr (6+) | 0.1 | Maximum |
| Cu | 0.1 | Maximum |
| Hg | 0.002 | Maximum |
| Ni | 0.2 | Maximum |
| Ръ | 0.1 | Maximum |
| Μα | 1 | Maximum |
| (Tin) | 1 | Maximum |
| V (Vanadium) | 2 | Maximum |
| Zn | 0.3 | Maximum |
| AI | 0.5 | Maximum |
| Cyanides | 0.1 | Maximum |
| Active Chlorine | 0.6 | Maximum |
| Chlorides | 500 | Maximum |
| Fluorides | 8 | Maximum |
| Sulphides | 0.5 | Maximum |
| Sulphates | 300 | Maximum |
| As (Arsenic) | 0.05 | Maximum |
| Organic item (Detergents) | | |
| Anionic | 1.5 | Maximum |
| Non-ionic | 2 | Maximum |
| Oil products | 1 | Maximum |
| Phenols | 0.2 | Maximum |
| Fats | 1 | Maximum |

(Discharged into surface water reservoir 2/2)

| (Discharged into Sewera | Permissible rate | Remarks |
|---------------------------|------------------|---------|
| Pollutants Item | mg/l | |
| General item | | |
| COD/BOD7 | < 2.5 | |
| PH | 6.5 - 9 | |
| Non-organic item | | |
| Cd | 0.1 | Maximum |
| Cr | 1 | Maximum |
| Cr (6+) | 0.2 | Maximum |
| Cu | 1 | Maximum |
| Hg | 0.01 | Maximum |
| : Ni | 0.5 | Maximum |
| РЬ | 0.6 | Maximum |
| Mn | 10 | Maximum |
| (Tin) | 2 | Maximum |
| V (Vanadium) | | |
| Zn | 1 | Maximum |
| Al | | |
| Cyanides | 0.5 | Maximum |
| Active Chlorine | 0.6 | Maximum |
| Chlorides | | |
| Fluorides | 10 | Maximum |
| Sulphides | 2 | Maximum |
| Sulphates | | |
| As (Arsenic) | 0.1 | Maximum |
| Organic item (Detergents) | | |
| Anionic | 10 | Maximum |
| Non-ionic | 15 | Maximum |
| Oil products | 5 | Maximum |
| Phenols | 3 | Maximum |
| Fats | | |

Table 1.1(3/4) Effluent Standard in Lithuania (Discharged into Sewerage System 1/1)

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| Effluent Standards in Lithuania |
|---------------------------------|
| (4/4) |
| |
| Table |

| Immunication A-4 Pesticides: B. Met 1 Azinphosetil 1 Aldrine 2 0 2 Azinphosetil 1 Aldrine 2 0 3 Phenitrotion 3 Endosulphane 3 4 4 Malation 4 Endosulphane 4 4 5 Paration 5 Dichlorphos 2 4 7 Paration 4 Endosulphane 4 4 1 Alation 4 Endosulphane 4 4 5 Paration 5 Dieldrine 3 4 7 Parationetil 3 Andosulphane 4 1 Tin tetrabutil A-6 Other organic materials 1 Tin tetrabutil 3 Benzene 1 1 Tin tetrabutil 3 Benzene 1 2 Arazylontroluole) 5 Initrobenzene 1 3 Triputul tin compounds 5 Isoberretoluole) 1 3 Triputul 5 Initrobenzene 1 | | | e N | | QN | ltem | No. | ltem |
|---|--------|--------------------------------|-----|------------------------|----|-------------------------------|------------|----------------------------|
| Organia materials (substances) Analytic (substances) B. Commounds thereof B. Commounds thereof Organia materials (substances) An2 Organia materials (substances) An2 Organia prices B. Commounds thereof Organia biolen compounds An2 Organia prices 1 And the compounds An4 Ferency and the compounds I Carloun tetrachlorido 1 Arian And the compounds An4 Pentilipation 1 Hencury and the compounds I Control 2 Dishorphas 2 Dishorphas 2 Dishorphas 2 Earticlas 1 Hencury and the compounds Hencury and t | 0Z | Weth I | | | | | | Metals and the non-organic |
| Organic halogen compounds: A-2 Organic phosphor compounds: A-4 Restury and the compounds: Mercury and the compounds: 1 Carbon tetrachlorido 1 Azimphosetti 1 Addrine 1 thereof 2 Chloroform 2 Dichlorohosetti 1 Addrine 2 thereof 3 Dichlorohosetti 3 Plentiforio 3 Endosuphare 2 thereof 3 Dichlorohosetti 4 Endosuphare 2 thereof 2 4 Actoroficion 3 Plentiforion 3 thereof 2 5 Paration 4 Endosuphare 5 thereof 2 6 Hoasehlorobonsol 6 Paration 4 Acryton 4 Acryton 7 Cy-HCH) 7 Paration 5 Dictoroficion 2 4 Acryton 6 Hoasehlorobonsol 6 Paration 4 Acryton 5 Compands 5 <td>4</td> <td>Orvanic materials (substances)</td> <td></td> <td></td> <td></td> <td></td> <td>mi</td> <td>compounds thereof</td> | 4 | Orvanic materials (substances) | | | | | mi | compounds thereof |
| Organic halogen compounds: A-2 Organic phosphor compounds A-4 Pesticides: 1 the compounds 1 Carbon vetrachlorida 1 Acino hosphor compounds 1 Acino hosphor compounds 1 thereof 1 Cadmium and 1 Cadmium and 1 thereof 2 Cadmium and 1 Acino hosphor compounds 1 Acino hosphor 2 Chloroform 2 2 2 Chloroform 2 2 Chloroform 2 2 Chloroform 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | | | | | | | | Mercury and |
| Organic halogen compounds: A-2 Organic phosphor compounds A-4 Pesticides: 1 Interest 1 Carbon tetrachlorida 1 Acimphosetali 1 Acimphosetali 1 Cadmium and the compounds 2 Chloroform 2 Dieldrine 2 Dieldrine 2 Externedit 1 the compounds 2 Chloroform 2 Dieldrine 3 Endersteil 2 Externedit 2 3 2 Dieldrine 3 Endosubhane 5 Dieldrine 3 Externedit 4 Hexachlorothane 5 Peretionic 5 Dieldrine 4 Arternedit 7 Focombounds: 7 Acresterion 5 Dieldrine 4 Arternedit 8 Hexachlorothane 5 Peretion 4 Arternedit 5 Dieldrine 4 Arternedit 7 Hoxachlorothane 7 Arternedit 7 Arternedit 5 Diendi ppi | | | | | | | | the compounds |
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| Carbon tetrachloride 1 Addrine 1 Addrine 2 the comounds there of the compounds Chloroform 2 Dichloroptes 2 Dichloroptes 2 the comounds 1.2-Dibromethame 3 Phenitrotion 3 Endosubhame 2 the comounds 1.2-Dibromethame 3 Phenitrotion 3 Endosubhame 4 the comounds 2.42.5-2.63,4 4 Malation 3 Endosubhame 4 thereof 2.42.5-2.63,4 4 Malation 3 Endosubhame 4 Areadon the compounds 2.42.5-2.63,4 4 Malation 4 Endosubhame 4 Areadon the compounds 1.2-Dichlorarbinol 5 Parationetiol 5 Die and p.cDDDD 4 Argenic 1.2-Dichlorarbinol 7 Parationetiol 5 Die and p.cDDD 4 Argenic 1.2-Dichlorarbinol 7 Parationetiol 5 Die and p.cDDD 5 Die and p.cDDD 5 | - | | 2 | | - | | | Cadmium and |
| Carbon terrachloride 1 Aldrine 2 thereof Chloroform 2 Dieldrine 3 Lead and the compounds Chloroform 2 Dieldrine 3 Endouthe 1 Lead and the compounds Di-Domonethane 3 Pentitrotion 3 Endouthe 3 thereof Di-Domonethane 3 Pentitrotion 3 Endouthe 3 thereof Di-Domonethane 3 Pentitrotion 3 Endouthe 4 Areeof Di-Domonethane 5 Paration 4 Areeof 3 thereof 1.12-Dichlorethane 5 Paration 4 Areeof 3 thereof Ideinorabilitie 5 Paration 1 Aref Other organic materials 4 Areeof Isofut 7 Parationethyl 1 Aref Other organic materials 5 5 Permente 4 Arsenic 3 Arref 2.2.5.2.6.9 1 2.2.5.2.6.9 Isofut 7 Parationethyl 3 Endomotes 2 Arsenic Isofut 8 7 Parationethyl 1 Arovyloritione 2 2.5.2.6.9 < | | | | | | | | the compounds |
| under of commentant 2 Dichlorobos 2 Dichlorobos 2 Dichlorobos 2 Dichlorobos 3 Endosulphane 3 Lead and the commonds 1.2-Dibromethane 3 Phenitrotion 3 Endosulphane 3 Iteration 3 Iteration 3 Iteration 3 Iteration 3 Iteration 3 Iteration 4 Anterior 4 4 4 | F- | Carbon tatrachlorida | | Azinphosetil | - | Aldrine | 2 | thereof |
| Chloroform 2 Dichlorphos 3 comoounds 12-Dibromethane 3 Phenitrotion 3 Connounds 12-Dibromatiline (A3- 3 Endosubhane 3 thereoff 2452-263.4- 4 Malation 4 Endrine 4 Arsenti 2452-263.4- 5 Paration 4 Endrine 4 Arsenti 12-Dictionentiane) 5 Paration 4 Arsenti 4 Arsenti 12-Dictionentiane 5 DE and p.pDDD) 4 Arsention 12-Dictionentiane 6 Parationetian 5 DE and p.pDDD) Hexachiorbensol 6 Parationetian 5 DE and p.pDDD) Hexachiorbensol 6 Parationetian 2 Arsentian Isofrine 7 Areacionmethyl Areacion 4 Arsentian Polichlorraniline 3 Tributuit 2.5-7.26- 2.5-7.26- Xiol 3 Tributuit 6 Simazine Xiol 3 Triphenytin 6 Simazine Xiol 3 Triphenytin 6 Simazine Non 6 Simazine 7 Trifiluralis | | | | | ┝ | | | Lead and the |
| Chloroform 2 Diellorine 3 Diellorine 3 Iterroof 12-Dibromethane 3 Phenitrotion 3 Endosubhane 3 Iterroof 2/2-Dibromethane 3 Phenitrotion 3 Endosubhane 3 Areenic 2/2-Dischonethane 5 Paration 4 Endosubhane 4 Areenic 12-Dischonethane 5 Paration 4 Endosubhane 4 Areenic 12-Dischonethane 5 Parationetiti 4 Endosubhane 4 Areenic 12-Dischonethane 5 Parationetiti Area Compounds (sp. '- 4 Areanic 12-Dischonethane 5 Perationetiti Area Compounds (sp. '- 4 Areanic 12-Dischonethane 7 Parationetiti Area Compounds (sp. '- 2 Areanic 13-odirine Area Orten Area Areanic 2 Areanic 1 Farationetityu Are Orten< | | | _ | | | | | compounds |
| Topolity 3 Endoruphane 4 Arsenic 12-Dibromethane 3 Phenitrotion 3 Endoruphane 4 Arsenic 24-r-25-2.63.34- 4 Malation 4 Endrine 2 4 24-r-25-2.63.34- 4 Malation 4 Endrine 4 Arsenic 24-r-25-2.63.34- 5 Paration 4 Endrine 5 DDT and 12-Dichlorethane 5 DEf and p.p.'-DDD) 5 DEf and p.p.'-DDD) Hexachlorbersol 6 Parationetil 1 Argonitrile Hexachlorbersol 7 Parationetil 1 Argonitrile Isolin 3 Benzeme 1 2 Argonitrile Polichlorrethane 2 Argonitrile 2 2 Polichlorrethane 3 Benzeme 1 2 Polichlorrethylene 2 Tributil tin compounds: 2 2 Polichlorrethylene 3 Tributile 2 3 Arazine 5 Senzeme 1 1 Polichlorrethylene 3 Tributilitie 2 Arazine 5 Senzeme 2 2 Arazine | | | ~ | | 2 | Dieldrine | 3 | thereof |
| Dicthoraniline (A3- A Malation 4 Endrine 2.4:2.5-2.6:3.4- 4 Malation 4 Endrine ichloraniline) 5 DDT and DDT and 1.2-Dichlorethane 5 Paration 5 DDE and pp'-DDD) Hazachlorbensol 6 Parationetil 5 DDE and pp'-DDD) Hexachlorbensol 6 Other organic materials - Hexachlorbensol 7 Parationethyl 1 A=O Other organic materials Polofine A-3 Organic tin compounds: 2 Atrazine Polofines 1 Tin tetrabutil 1 A=Offormethole(a) Polichlorterpeniles 1 Tin tetrabutil 2 Atrazine Olichlorterpeniles 1 Tin tetrabutil 3 Benzene 2.4.5-Trichloranilin 3 Tribhenvliti 5 Isobenzene Oxiola 7 Tributilite 1 Dickines 7 Tributilite 1 | 10 | | က | | 3 | Endosulphane | 4 | Arsenic |
| 2.42.5-2.6/3.4 4 Malation 4 Endrine idichlorraniline) 5 DDT and DDT and 1.2-Dichlorethane 5 Paration 5 DDE and pp '-DDD) Hexachlorethane 5 Paration 5 DDE and pp '-DDD) Hexachlorethane 6 Paration 7 Parationetial Hexachlorethane 5 DDE and pp '-DDD) Hexachlorethone 7 Parationetial 1 Area Organic 1 Areachlorethone Area Organic 3 Bertzerie Pertachlorethone 1 Tintroberrzene (1,2- 1 Tintroberrzene (1,2- 2.5-: 2.6- 1 Tintroberrzene (1,2- 2.5-: 2.6- 1 Tintroberrzene (1,2- 2.5-: 2.6- Xylol 7 Trithrealine Xylol 7 Trithrealine | | | | | | | | |
| dichloraniline) 4 Malation 4 Endrine 12-Dichlorethane 5 Paration 5 DDT and Hexachlorothensol 6 Parationethl 5 DDE and p.pDDD) Hexachlorothensol 6 Parationethl 7 DDE and p.pDDD) Hexachlorothensol 7 7 A-r6 Other organic materials e (x - HOH) 7 7 A-r6 Other organic materials Pentachlorothenol A-3 Organic tin sompounds: 2 Atrazine Pentachlorothylene 1 Tin tetrabutil 3 Benzen Yolo 3 Tribuene 2.5-7.26- Xolo 3 Tribuene 2.5-7.26- Xolo 3 Tribuene 1 Xolo 3 Tribuene 1 Xolo 3 Tribuene 1 Xolo 3 Tribuene 1 Volo 3 Tribuene 1 Xolo 3 Tribuene 1 Xolo 3 Tribuene 1 Volo 3 Tribuene 1 Xolo 3 Tribuene 1 Xolo 3 Tribuene < | | 2.4-:-2.5-2.6:3.4- | | | | | | |
| 12-Dichlorethane 5 Paration 5 DDT and compounds (p.p ⁻¹) Hexachlorbensol 6 Parationnetil 5 DDE and pi-10DD) Hexachlorbensol 6 Parationnetil 3 DDT and compounds (p.p ⁻¹) e(γ -HCH) 7 Parationnethyl A-6 Other organic materials e(γ -HCH) 7 Parationnethyl A-6 Other organic materials e(γ -HCH) 3 Creanic tin compounds: 2 Arazine Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Polichlorterphenol 2 Tributil tin compounds 5 Isobenzene Xylol 7 Trifutraline 7 Trifutraline Dioxines 7 7 Trifutraline | 4 | dichloraniline) | 4 | | 4 | Endrine | | |
| 12-Dichlorethane 5 Paration 5 DE and pp -000) Hexachlorrehnsol 6 Parationetil 5 DE and pp -000) Hexachlorrehnsol 6 Parationetil A-6 Other organic materials e (Y -HCH) 7 Parationmethyl A-6 Other organic materials isodrine A-3 Organic tin compounds: 2 Arrazine Pentachlorehenol A-3 Organic tin compounds: 2 Arrazine Polichlorterpeniles 1 Tin tetrabutil 3 Encreten Yold 3 Tributi tin compounds 5 isobenzene (1,2- Xylol 3 Triphenyl tin compounds 5 isobenzene (1,2- Xylol 7 Trifutiraline 7 1 Dioxines 7 Trifutiraline 7 1 | | | | | | DDT and | | |
| 1.2-Dichlorethane 5 Paration 5 DDE and PP -0UU) Hexachlorbernsol 6 Parationetil 1 Acr 0 Other organic materials Hexachlorbhernal 7 7 Parationetil 1 Acrylonitrile e (χ -HCH) 7 7 Parationmethyl A-6 Other organic materials e (χ -HCH) 3 7 Tin tetrabutil 3 2 Arazine Polichlorterpeniles 1 Tin tetrabutil 3 2.5-7.2.6 Yolol Xylol 5 Isoberzene (1.2- Xylol 7 Tribuchilen 5 Sebenzen Dioxines 8 6 Simazine | | | | | | compounds (p.p [.] – | | |
| Hexachlorbensol 6 Parationetil 1 Hexachlorciklohexan 7 Parationmethyl A-6 e (Y-HCH) 7 Parationmethyl A-6 e (Y-HCH) 7 Parationmethyl A-6 lsofne A-3 Organic tin compounds: 2 Atrazine Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Tetrachlorethylene 2 Tributil tin compounds 5 Sintrooluole) X/sol 3 Tributil tin compounds 5 Simazine X/sol 3 Tributil tin compounds 7 Trifuraline Dioxines 7 Trifuraline 7 Trifuraline | ເມ | | S | | ŝ | DDE and p.p' - DDD) | | |
| Hexachlorciklohexan 7 Parationmethyl A=6 Other organic materials e (Y-HCH) 7 Parationmethyl A=6 Other organic materials isodrine A=3 Organic tin compounds: 2 Atrazine Pentachlorphenol A=3 Organic tin compounds: 2 Atrazine Pentachlorphenol A=3 Organic tin compounds: 3 Benzene Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Polichlorterpeniles 2 Tributil tin compounds 4 ainitrotoluole) Z4.6-Trichloranilin 3 Triphenyl tin compounds 5 sinasine XINN Nonv(phenolethoxilist 7 Trifluraline 7 Trifluraline | 9 | | 9 | <u><u> </u></u> | | | F - | |
| e (y - HCH) 7 Parationmethyl A=6 Other organic materials isodrine 1 Acrylonitrile 1 Acrylonitrile Pentachlorrehenol A-3 Organic tin compounds: 2 Atrazine Polichlorterpeniles 1 Tin tetrabutil 3 Atrazine Polichlorterpeniles 2 Tributil tin compounds 4 dinitrobenzene (12- Xylol 3 Triphenyl tin compounds 5 Isobenzen Xylol 3 Triphenyl tin compounds 5 Isobenzen Dioxines 1 Trifuraline 7 Trifuraline | | Hexachiorciklohexan | | | | - | | |
| isodrine 1 Acrylonitrile Pentachlorphenol A-3 Organic tin compounds: 2 Atrazine Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Z4.6-Trichlorantilin 2 Tributil tin compounds 4 dinitroblence Zylol 3 Triphenyl tin compounds 5 softmazine Dioxines 4 dinitroblocle) 7 Trifluraline | ~ | | - | Parationmethyl | |)ther organic materials | | |
| Pentachlorphenol A-3 Organic tin compounds: 2 Atrazine Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Polichlorethylene 2 Tributil tin compounds 4 dinftrobenzene (1,2- 24.6-Trichloranilin 3 Triphenyl tin compounds 4 dinftrotoluole) Xylol Xylol 5.5-: 2,6- 5 Nonylphenolethoxilat 6 Simazine Dioxines 7 Trifluraline | 8 | | | | - | Acrylonitrile | | |
| Polichlorterpeniles 1 Tin tetrabutil 3 Benzene Fetrachlorethylene 2 Tributil tin compounds 4 0initrobenzene (1,2- : 2,5-; 2,6- : 2,5-; 2,6- 2,4,6-Trichloranilin 3 Triphenyl tin compounds 5 Isobenzen Xylol 5 Isobenzene 7 Trifiuraline Dioxines 7 Trifiuraline 7 Trifiuraline | စ | | A-3 | Organic tin compounds: | ~ | Atrazine | | |
| Tetrachlorethylene 2 Tributil tin compounds 4 Dinitrobenzene (1,2- 1:2,5-:2,6- 2,4,6-Trichloranilin 2,4,6-Trichloranilin 3 Triphenyl tin compounds 5 Isobenzen Xylol 5 Isobenzen 7 Trifluraline Nonylphenolethoxilat 7 Trifluraline | 2 | | 1 | Tin tetrabutil | 3 | Benzene | | |
| Tetrachlorethylene 2 Tributil tin compounds 4 dinitrotoluole) 2,4.6-Trichloranilin 3 Triphenyl tin compounds 5 Isobenzen Xylol 6 Simazine 7 Trifluraline Dioxines 7 Trifluraline | | | | | | Dinitrobenzene (1,2- | | |
| Tetrachlorethylene 2 Tributil tin compounds 4 dinitrotoluole) 24.6-Trichloranilin 3 Triphenyl tin compounds 5 Isobenzen Xylol 6 Simazine Nonylphenolethoxilat 7 Trifluraline | | | | | | : 2.5-: 2,6- | | |
| 2.4.6-Trichloranilin 3 Triphenyl tin compounds 5 Isobenzen Xylol 6 Simazine Nonylphenolethoxilat 7 Trifiuraline | | Tetrachlorethylene | 2 | - | 4 | dinitrotoluole) | F | |
| Xylol Nonylphenolethoxilat Dioxines | 12 | 2,4,6-Trichloranilin | . 3 | | ഹ | lsobenzen | | |
| Nonviphenolethoxilat Dioxines | 13 | | | - 1 | G | Simazine | — т | |
| | 14 | | ·1 | | 7 | Trifluraline | | |
| | 15 | | | | | | | |
| | J | | | | | | | |
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Table 1.2 (1/3)

Drinking Water Standards (Draft) in Lithuania

LST : 1997

Table 3. Toxic analytes in potable water, their allowable values and requirements of analysis methods

| Analytes | Allowable value | Unit of | 24 | kequurence of substances we wanted the substances when the substances we wanted the substances w | /sis methods |
|--|-----------------|--------------|-------------|--|--|
| | or marine | | Accuracy, % | Precision, % | Determination limits of analyte values, % |
| 1 Arcenie As | 10 | ne∕1 | 10 | 10 | 10 |
| 7 Cvanide CN ⁻ (a) | 50 | (/an | 10 | 10 | 10 |
| a Chrome Cr | 50 | Van | 10 | 10 | 10 |
| 4 Fluorine F | 1.5 | m <u>e/1</u> | 10 | 10 | 10 |
| 5. Mercury. Ho | 1 | 1/211 | 10 | 10 | 10 |
| 6. Cadmium, Cd | 5 | 1/211 | 10 | 10 | 10 |
| 7. Nickel. Ni | 20 | 1/201 | 10 | 10 | 10 |
| 8. Nitrate, NO ₃ . | 50 (b.c) | ng∕l | 10 | 10 | 10 |
| 9. Nitrite. NO- | 0.1 (b,c) | ng∕1 | 10 | 10 | 10 |
| 10. Lead. Pb | 25 (c) | 1/311 | 10 | 10 | 10 |
| 11. Copper, Cu | 2000 (c) | l/an | 10 | 10 | 10 |
| 12. Polycyclic aromatic hydrocarbons (d) | 0.2 | l∕ठो1 | 25 | 25 | 25 |
| Benzo-a-pyrenc | 0.01 | l∕gi√ | 25 | 25 | 25 |
| 13. 1.2-dichloroethane, C,H,Cl, | 3 | 1/311 | 25 | 25 | 10 |
| 14. Tetrachloroethene. C,Cla | 40 | Vari | 25 | 25 | 10 |
| 15 Trichloroethene, CHCh | 70 | /जन | 25 | 25 | 10 |

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(5/3) 1.2 Table

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Drinking Water Standards (Draft) in Lithuania

| | Allowable value | | • | | |
|--|---|-------------------------------------|-----------------------|-----------------------------|---|
| | | | Accuracy, % | Precision, % | Determination limits of analyte values, % |
| 16 Ration R | 300 | [/an | 10 | 10 | 10 |
| 17 Selenium Se | 10 | l/an | 10 | 10 | 10 |
| 13. Stihin Sh | m | Van | 10 | 10 | 10 |
| 19. Benzene, CaHk | 1 | 1/grí | 25 | 25 | 10 |
| 20. Enichlorohvdrin. C.H.OCl (c) | 0.5 | 1/3/1 | | | |
| 21. Pesticides (f) | 0.1 | ∕ön | 25 | 25 | 25 |
| 22. Vinvl chloride. C,H ₂ Cl (g) | 0.5 | I/ðil | 25 | 25 | 10 |
| NOTES: a - this method should be used to determine total amount of cyanides; b - allowable values of analytes may be changed, i.e.: increased up to 0.5 mg/l for nitrite provided that [nitrate]/50 + [nitrite]/3 ≤ 1 (unit of analyte value : | ic total amount of cyanic hanged, i.e.: increased u | les; ip to 0.5 mg/l for | nitrite provided that | [mitrate]/50 + [mitrite | √3 ≤ 1 (unit of analyte value |
| mg/l); c - for packaged drinking water intended for baby food | for haby food allowable | analyte values are | reduced, i.e.: for ni | trate down to 10 ${ m mgA}$ | allowable analyte values are reduced, i.e.: for nitrate down to 10 mg/l. for nitrite down to 0.02 mg/l. |
| for lead down to 10 µg/l, for copper down to 100 µg/l; d - allowable value of analyte is the total value of benzo-a-pyrene, fluoranthene, benzo-k-fluoranthene, benzo-ghi-perylene, indene- | t to 100 µg/1; value of benzo-a-pyrene | e, fluoranthene, b | enzo-b-fluoranthene, | , benzo-k-fluoranthen | e, benzo-ghi-perylene, indene |
| 1,2,3-cd-pyrene. Concentration of benzo-a-pyrene should not exceed 0.01 µg/l; e - analyte should be tested only in materials in which it may be present. It n | n-pyrene should not exce nials in which it may be te resins is 1 mo/ker | ced 0.01 µg/t; present. It may 1 | be tested also in a] | polymeric material ac | d not exceed 0.01 µg/l; it may be present. It may be tested also in a polymeric material according to its allowable value. w/w: |
| f - allowable value of analyte is applied to each individual pesticide; | cach individual posticide | | • | | E |

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| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | Analyte | ater, their all | owable valı | ues and test req | Table 5. Indicator analytes in potable water, their allowable values and test requirements (a. b) | | | |
|--|--|--|--|---|---|----------------|-----------------|-------------------------------------|
| Excellent Good Satisfactory Accuracy, $%_{6}$ ViH, (c) 0.5 1.0 2.0 mg/l 10 carbon, C ₀ (d) 1.5 4.0 5.0 mg/l 10 carbon, C ₀ (d) 1.5 4.0 5.0 mg/l 10 carbon, C ₀ (d) 1.5 3.0 Turbidity according to 10 citivity 0.58 0.87 1.74 formazine, mg/l 10 citivity 0.58 0.87 1.74 formazine, mg/l 10 dvalue 0.1 0.2 1.0 2500 μ Saturation % 10 dvalue 0.1 0.2 0.1 0.2 5.0 mg/l 10 Mn 0.05 0.1 0.2 0.1 0.2 mg/l 10 Mn 0.05 0.1 0.2 $0.5.0$ mg/l 10 Mn 0.05 0.1 0.2 0.2 $0.5.0$ mg/l 25 id value | | Value of | analyte allo | wable for | Unit of measure | Requi | rements of tes | ting methods |
| UH, (c) 0.5 1.0 2.0 mg/l 10 carbon, $C_0(d)$ 1.5 4.0 5.0 mg/l 10 carbon, $C_0(d)$ 1.5 4.0 5.0 mg/l 10 25 100 250 mg/l 10 10 1.0 1.5 3.0 1 urbidity according to 10 0.58 0.87 1.74 formazine, mg/l 10 0.58 0.87 1.74 formazine, mg/l 10 0.58 0.87 1.74 formazine, mg/l 10 0.1 0.2 1.0 mg/l 10 0.0 d value 0.1 0.2 1.0 mg/l 10° d value 0.05 0.1 0.2 0.2 0.2 0.2 d value 0.05 0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 d value | _ | Excellent | Good | Satisfactory | | Accuracy, % | Precision, % | Test limits of analyte values, % |
| Matrix 1.5 4.0 5.0 mg/l 10 10 carbon, $C_0(d)$ 25 100 250 mg/l 10 10 25 100 250 mg/l 10 10 10 carbon, $C_0(d)$ 1.6 1.5 3.0 Turbidity according to 10 0.58 0.87 1.74 formazine, mg/l 10 10 civity 0.1 0.2 1.0 mg/l 10 10 gen, O_1 2.0 1.0 1.0 mg/l 10 10 d value 0.1 0.2 1.0 mg/l 10 10 dvalue Acceptable to users and has no mg/l 10 10 10 Mn 0.05 0.1 0.2 0.2 0.2 10 25 Mn 0.05 5.0 5.0 0.7, mg/l 25 25 25 old value 150 250 40 10 10 | Ammonium NH. (c) | 0.5 | 10 | 2.0 | mg/l | 10 | 10 | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | Rasic Arganic carbon Cold | 1.5 | 4.0 | 5.0 | - 1/2m | 10 | 10 | 10 |
| 1.0 1.5 3.0 Turbidity according to 10 civity 0.58 0.87 1.74 formazine, mg/l 10 civity 0.58 0.87 1.74 formazine, mg/l 10 civity 1000 2000 2500 $\mu S cm^{-1}$ at $20^{\circ}C$ 10 gen, O_2 2.0 $ Saturation %_6$ 10 d value $Acceptable to users and has no mg/l 10 10 Mn 0.05 0.1 0.2 0.7 10 Mn 0.05 0.1 0.2 0.7 10 Mn 0.05 0.1 0.2 0.7 10 oxidation (c) 2.0 5.0 6.5 0.7 25 Malue Acceptable to users and has no 0.7 0.7 25 25 Malue 10 0.02 0.01 0.2 0.7 25 Malue 15$ | Chloride OF | 25 | 100 | 250 | mg/l | 10 | 10 | 10 |
| ctivity 1000 2000 2500 $\mu S cm^4$ at 20°C 10 gen, O ₂ 0.1 0.2 1.0 mg/l 10 gen, O ₂ ≥ 50 - - Saturation % 10 d value $\lambda cceptable to users and has no mg/l 10 10 Mn 0.05 0.1 0.2 mg/l 10 Mn 0.05 0.1 0.2 mg/l 10 Mn 0.05 0.1 0.2 mg/l 10 old value 2.0 5.0 6.5 O_2, mg/l 25 old value Acceptable to users and has no mg/l 25 0.7, mg/l 25 id value 15 30 40 mg/l Pt-Co (\lambda = 436ml) 20 10 $ | Turbidity | 1.0 0.5% | 1.5 0.87 | 3.0 | Turbidity according to formazine, mg/l | 10 | 10 | 10 |
| matrix mg/l 10 0.1 0.2 1.0 mg/l 10 gen , O_2 ≥ 50 $ Saturation \%$ 10 d value Acceptable to users and has no mg/l 10 10 Mn 0.05 0.1 0.2 mg/l 10 Mn 0.05 0.1 0.2 mg/l 10 Mn 0.05 0.1 0.2 mg/l 25 Mn 0.05 , mg/l 2.0 5.0 6.5 0.5 , mg/l 25 Mn 0.05 , mg/l 10 25 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 , 0.5 10 10 Mn 150 250 40 mg/l 10 10 | Electric conductivity | 1000 | 2000 | 2500 | uS cm ⁻¹ at 20°C | 10 | 10 | 10 |
| gen, O_2 ≥ 50 Saturation %10d valueAcceptable to users and has no unnatural changes $\operatorname{Saturation %}$ 10 Mn 0.050.10.2 $\operatorname{mg/I}$ 1010 Mn 0.050.10.2 $\operatorname{mg/I}$ 2510e oxidation (e)2.05.06.5 $\operatorname{O_2, mg/I}$ 25old valueAcceptable to users and has no unnatural changes40 $\operatorname{mg/I}$ 70153040 $\operatorname{mg/I}$ 1010 | Basic iron Ra | 10 | 0.2 | 1.0 | m9/I | 10 | 10 | 10 |
| Acceptable to users and has no unnatural changesMag/I10Acceptable0.050.10.20.2 mg/I 10105.05.06.5 $O_2, mg/I$ 25102.05.06.5 $O_2, mg/I$ 25153040 mg/I 10150250450 mg/I 10 | Dissolved oxygen, O2 | 2 50 | | | Saturation % | 10 | 10 | 10 |
| xidation (c) 0.05 0.1 0.2 mg/l 10 xidation (c) 2.0 5.0 6.5 O ₂ mg/l 25 value Acceptable to users and has no unmatural changes 0.0 40 mg/l Pt-Co (\lambda = 436mm)) 20 15 30 40 mg/l Pt-Co (\lambda = 436mm)) 20 10 | Smell threshold value | Acceptabl | e to users : atural char | ind has no | | | | |
| xidation (c) 2.0 5.0 6.5 O ₂ , mg/l 25 value Acceptable to users and has no unmatural changes 40 mg/l 20 20 15 30 40 mg/l 10 10 150 250 450 mg/l 10 | Manganese Mn | 1 | 0.1 | | m <u>e/l</u> | 10 | 10 | 10 |
| Acceptable to users and has no unnatural changesMg/ Pt-Co (\lambda = 436mm)153040mg/ Pt-Co (\lambda = 436mm)150250450mg/ 10 | 0. Permanganate oxidation (c) | 2.0 | 5.0 | 6.5 | O ₂ , mg/l | 25 | 25 | 10 |
| 2. SO. ² . 15 30 40 mg/l Pt-Co (\(\alpha=436m)) 20 20 250 450 mg/l 10 | 1. Taste threshold value | Acceptabl | e to users : atural char | nd has no | | | | |
| 2. SO ² 150 250 450 mg/l 10 | 2 Color | | 30 | | m2/1 Pt-Co (2=436nm) | 20 | 10 | s |
| | 3 Sulfate SO ² | 150 | 250 | 450 | mg/l | 10 | 10 | 10 |
| 14 Hvdroven ion concentration pH (1) 7.0-8.2 6.5-9.0 6.0-9.0 pH | 4 Hvdroven ion concentration pH (f) | 7.0-8.2 | 6.5-9.0 | 6.0-9.0 | μd | | | |
| d industry inclusive of frozen water should be in confi y with requirements of the excellent quality class; non-ionized (NH ₄ ⁺) forms; ermined if amount of supplied water is lower than 10 | OTES: a - drinking water used in food in - bottled drinking water should comply w - conception of "ammonium" covers non - value of this analyte shall not be determ | ndustry inclu with requirem -ionized (NF uned if amou | sive of from ents of the (3) and ioni int of supp | cen water shoul excellent quali zed (NH4 ⁺) for lied water is lo | ld be in conformity with exer ty class; ms; wer than 10 000 m³/24 hour | ellent or good | quality class r | squirements; |

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Table 1.3 River Water Quality Standards In Lithuania

| Matter | MAC |
|---|-------------------------|
| 1 | 2 |
| Dissolved oxygen | ≥ 6 mg/l |
| BOC, (Biochemical oxygen consumption in 7 days) | 2.3 mgO ₂ /1 |
| Ammonia nitrogen | 0.39 mgN/1 |
| Nitrites | 0.02 mgN/1 |
| Basic nitrogen | 2 mg/l |
| Phosphates | 0.08 mgP/i |
| Basic phosphorus | 0.2 mg/l |
| Calcium | 180 mg/l |
| Magnum | 40 mg/l |
| Sodium | 120 mg/1 |
| Potassium | 50 mg/l |
| Sulphates | 100 mg/l |
| Chlorides | 300 mg/l |
| Iron | 0.1 mg/1 |
| Соррег | 1+background value µg/l |
| Zinc | 10 µg/1 |
| Lead | 100 µg/1 |
| Manganese | 0.01 mg/l |
| Chrome | 5 µg/1 |
| Cadmium | 5 µg/l |
| Nickel | 10 µg/l |
| Oil products | 0.05 mg/t |
| Anionic detergents | 0.1 mg/l |
| Phenois | 0.001 mg/l |

Maximum allowable concentrations (MAC) of matter in river water

Tablo 1.4 River Water Classification In Lithuania

River water classification according to general contamination indexes

| Ouality grade | 1 | II | III | N | · 7 | Ч |
|-----------------------|----------|---------|--------------|--------------|--------------|--------------|
| Characteristics | Very | Clean | Slightly | Medium | Very | Super |
| | cican | | contaminated | contaminated | contaminated | contaminated |
| Indexes: | <2.3 | 2.3-4.0 | 4.1-5.8 | 5.9-9.2 | 9.3-20.7 | >20.7 |
| BOC, mgO _A | | | | | | |
| Mineral | <0.3 | | | | ~ ~~~~ | >15.0 |
| nitrogen, mgN/l | | | | | | |
| Phosphates, | <0.03 | | | | | >0.50 |
| mgPA | | | | | | |
| CI, coli/l | ≤1000 | ≤10000 | ≤100000 | ≤1000000 | ≤10000000 | >10000000 |

>500

250-500

125-250

50-125

25-50

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| Town of Medar | | | | River water | vator | | | | | | |
|-----------------------------|-----------|--------------------------------------|---|---|---|--------------|---------------------|--------------------------------------|--|--|---|
| ADD OT TO GOV | Į | | | - | Ľ | c | u. | ₹ | 4 | 9 | ບ |
| (ype/Class (for Water use) | | AA | | 0 | 114 1040 for | Not used for | Not used for | | | Advanced | Not used for |
| Description for Type/class | | Simple treatment for water supply | Ordinary treatment for water supply | Advanced treatment for water supply | Not used for water supply, but for industrial water with ordinary freatment | 53_1 | ¥ <u>ē</u> | Simple treatment for water supply | Ordinary/advanced treatment for water supply | treatment for water supply,but for industrial water with ordinary | water supply, but for industrial water with advanced treatment |
| Test Item Water Temperature | Ŷ. | | | | | | | | | | |
| Color | N.N. | | | | | | | | | | |
| Odor | × z | | | | | | | | | | |
| На | N.N. | 0.5≦PH≦8.5 | 6.5≦PH≤8.5 | 6.5≤PH≤8.5 | 6.5 SPH 58.5 | 6.05PH58.5 | 6.0 A PHA8.5 | 6.5 SPH 58.5 | 6.55PHS8.5 | 6.517PH 13.5 | 8.0 SPH 58.5 |
| Transparancy | N.A. | | | | | | | | | | |
| EC | umhos/cm | | | | | | | | | | |
| SS | mg/l | ≦25mg | ≦25mg | ≦25mg | ≦50mg | 5100mg | No floats are seen. | N TER | Smg | K15mg | No floats are seen |
| 800 | mg/1 | S 1 mg | ≤2mg | ≦3mg | Smr | Sang | 10mg | i∆tmg | \$2mg | \$3mg | \$5mg |
| Soluble BOD | mg/l | | | | | | | | | | |
| cop | me/l | | | | | | | A tent | \$1mg | ≤1mg | St mg |
| TN | me/ | | | | | | | A0.1mg | 502mg | <u>≤0,4/0,6mg+</u> | A T T T T T T T T T T T T T T T T T T T |
| TP | me/l | | | | | | | ≤0.005mg* | 50.01 mg* | 50.03/0.05mg+ | NO.1mge |
| P04 | me/l | | | | | | | - | | | |
| | C. 2/2 | | | | | | | | | | |
| NH4-N | vum/a | | | | | | | | | | |
| N-2ON | me | | | | | | | | | | |
| NO ₃ -N | mg/1 | | | | | | | | | | |
| ţ | mg/1 | | | | | - | | | | | |
| ABS | mg/l | | | | | | | | | - | |
| Q | mg/1 | 7.5mg≦ | 7.5mr.S | 5mgS | 5mgA | 2mg/S | 2mgA | 7.5mg≤ | 7.5mgS | SmgA | 2mg≦ |
| Öl | mg/l | | | | | | | | | | |
| Total coliform | MPN/100ml | | 50MPN/100ml \$1,000MPN/100ml \$5,000MPN/100ml | S5.000MPN/100ml | | | | SSOMPN/100ml | 1,000MPN/100m | | 1 |
| Alkalininvas CaCO-) | | | | | | | | | | | |

Table 1.5 Water Quality Standard, Japanese Standard for River and Lake/Pond

*: Approximate rigures, tuerimoon of 1700% for 1% of 1% Note: The detailed conditions are omitted in this table.

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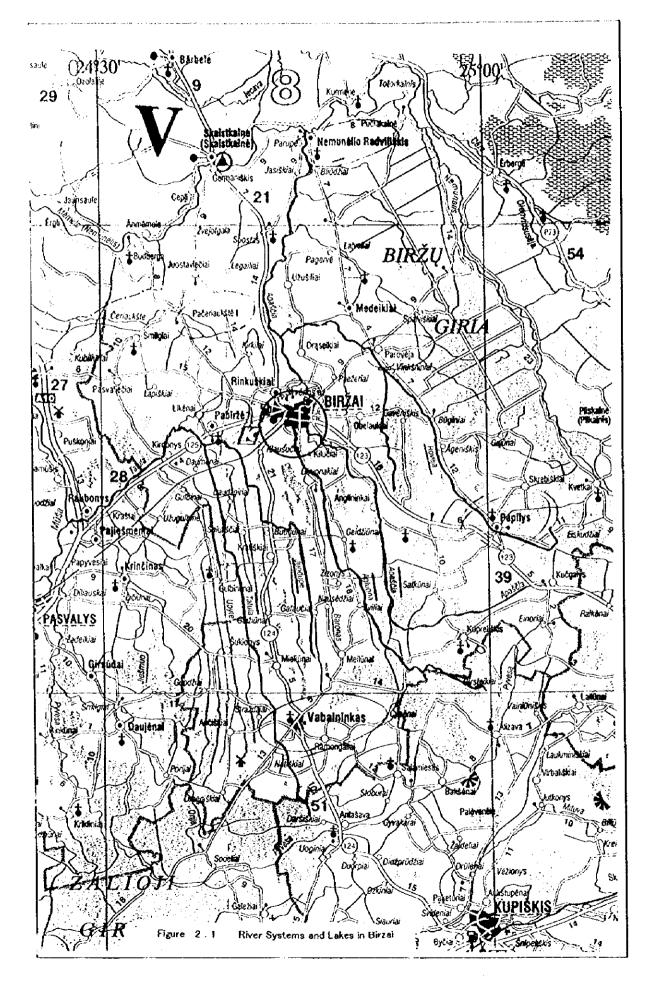
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| | | | 112 | Common limit | For manufactur |
|------------------------------|-------------------|--|-------|-----------------|---------------------------------------|
| T | i | tems | Unit | limit | manuractur |
| | | Cadmium | mg/l | 0.1 | |
| | | Cyanogen | mg/l | 1 | |
| | ance | Organophosphorous | mg/I | 1 | |
| S | bst | РЬ | mg/l | 1 | |
| Central government standards | Harmful Substance | Hexavalent chromium | mg/l | 0.5 | |
| t st | arm | Arsenic (As) | mg/I | 0.5 | |
| nen | Т | Total mercury | mg∕l | 0.005 | |
| erni | | Alkyl mercury | mg/l | 0 | |
| ಸಂಚ | | РСВ | mg/l | 0.003 | |
| tral | | Total chromium | mg/l | _2 | |
| e i | | Cu | mg/ł | 3 | |
| | | Zn | mg/l | 5 | |
| | | Phenols | mg/i | 5 | |
| | | Fe | mg/l | 10 | |
| | | Mn | mg/l | 10 | |
| | tts | Fluorine (F) | mg/l | 15 | · · · · · · · · · · · · · · · · · · · |
| | Intar | BOD | mg/l | 600 | 300 |
| ards | ä | SS | mg/l | 600 | 300 |
| nt stand | Other pollutants | Normal-hexane extracts (Mineral oils) | mg∕∔_ | 5 | |
| Local government standards | | Normal-hexane extracts (Fauna-flora fats & oils) | mg∕l | 30 |) |
| at gr | 1 | PH | | 5.0 - 9.0 | 5.7 - 8.7 |
| 00 | | Temperature | °C | 45 | <u>40</u> |
| · | | lodine (I) consumption | mg/I | 220 | |

Table 1.6 Effluent Standards to Sewege System (Japanese Srandards)

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Note: The detailed classification and conditions are omitted in this table.



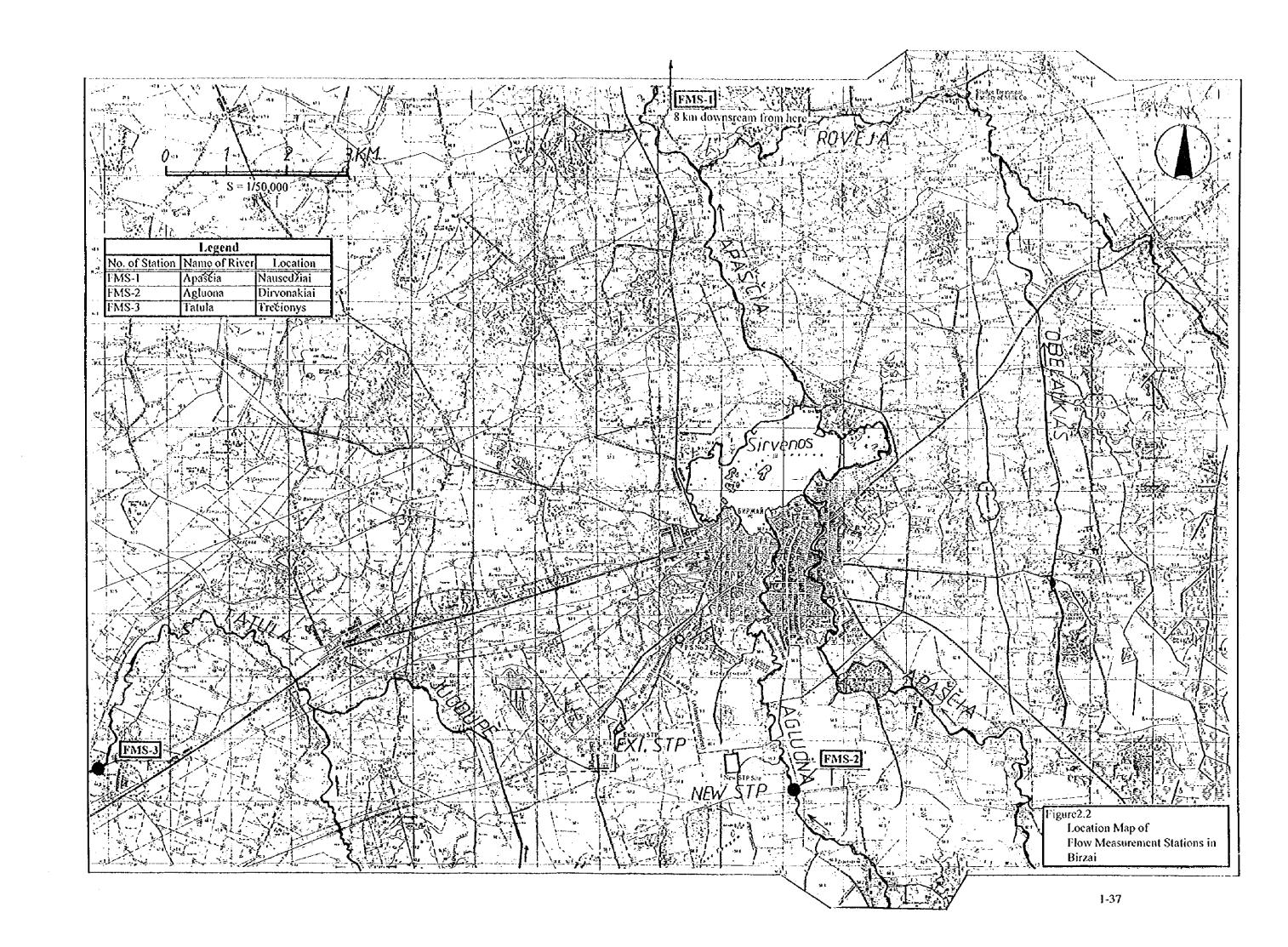
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Table 2.1 Summary of Runoff Records (Apascia, Agluona, Tatula and Bartuva Rivers)

annal Service Mate Mater Data Col

| Name of | Name of Measurement | | | | | | | Month | lth | | | | | | Mean | May. | ž |
|---------|-----------------------|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------------------|--------------------|------|
| Rivers | Rivers Period (Years) | | Jan. | Feb. | March | April | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | | | |
| | | Mean | 2.58 | 11.97 | 10.23 | 14.87 | 4.91 | 2.24 | 0.70 | 0.27 | 0.22 | 0.47 | 0.86 | 1.25 | | | |
| Apascia | | 2 Max. | 17.00 | 36.40 | 31.80 | 65.30 | 11.50 | 5.91 | 1.44 | 0.69 | 0.45 | 0.80 | 1.72 | 2.20 | 4.21 | 65.3 | 0.10 |
| ¢ | | Min. | 0.63 | 0.58 | 0.48 | 0.46 | 1.76 | 1.03 | 0.31 | 0.10 | 0.10 | 0.18 | 0.37 | 0.73 | | | |
| | | Mean | 0.521 | 0.421 | 1.107 | 1.307 | 0.314 | 0.171 | 0.067 | 0.059 | 0.128 | 0.276 | 0.370 | 0.519 | | | |
| Agluona | | 30 Max. | 6.38 | 4,44 | 17.10 | 15.70 | 3.62 | 4.00 | 1.03 | 2.17 | 2.79 | 5.24 | 2.75 | 6.83 | 0.439 | 15.70 | NA |
| ļ | | Min. | 0.003 | 0.006 | 0.014 | 0.037 | 0.021 | 0.013 | 0.005 | N.A. | N.A. | N.A. | 0.003 | 0.006 | | | |
| | | Mean | 1.96 | 2.38 | 6.35 | 8.52 | 2.53 | 1.19 | 0.82 | 0.65 | 0.96 | 1.81 | 2.31 | 2.94 | | - ~ - | |
| Tatula | 25 | 25 Max. | 29.1 | 19.6 | 49.4 | 67.2 | 18.6 | 15.8 | 5.03 | 9.73 | 15.4 | 24.3 | 17.8 | 38.2 | 2.70 | 67.2 | 0.11 |
| | | Min. | - 0,14 | 0.14 | 0.11 | 0.34 | 0.57 | 0.41 | 0.35 | 0.30 | 0.27 | 0.23 | 0.20 | 0.15 | | | |
| | | Mean | 10.66 | 8.22 | 12.99 | 13.58 | 3.02 | 1.68 | 1.66 | 2.93 | 4.67 | 8.41 | 14.85 | 13.73 | | تىف "ىمى <u>مە</u> | |
| Bartuva | | 29 Max. | 86.6 | 81.2 | 122.0 | 153.0 | 25.4 | 45.5 | 89.7 | 95.2 | 89.3 | 83.0 | 144.0 | 120.0 | 8.03 | 153.0 | 0.20 |
| | | Min. | 0.21 | 0.33 | 0.32 | 1.09 | 0.67 | 0.47 | 0.26 | 0.20 | 0.24 | 0.46 | 0.60 | 0.79 | | ~ | |
| | | | | | | | | | | | | | | | Unit : m ³ /sec | 'sec | |

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| Ľ | | Trail Trail | The state of the s | Catch | Catchment Area (km ²) | (km²) | Annual M | (can Disch | Annual Mean Discharge (m ³ /s) | Annual Specific | Remarks |
|-------|-------------|----------------|--|--------------|-----------------------------------|------------------|------------|-------------|---|--|-----------------|
| 11 | Name of | 11 otal Length | 1 oral Lengtry 1 oral Calculuture [| | | | | | | | |
| ωL | | (Jcm) | Area (km ²) | F.M.S. | D.P.E* | W.S.P.* | F.M.S. | D.P.E** | W.S.P.** | Discharge (m ² /s/km ²) | |
| | Rateis | 1 38 1 | 8.061 | | | 173.4 | | • | 1.2 | 0.007*** | |
| | Obelantriae | 50 | | | 4.4 | • | | 0.03 | 1 | 0.007*** | |
| | _ | 00 | 768 | 785.0 | 697.7 | 681.9 | 4.21 | 3.67 | 3.68 | 0.0054 | |
| iszti | | 21.1 | | 63.0 | 77.6 | 82.2 | 0.439 | 0.54 | 0.58 | 0.0070 | |
| B | · | 11 6 | | | 54.4 | 54.4 | | 0.38 | 0.38 | 0.007*** | |
| | Tatula | 64.7 | | 404.0 | | 372.7 371.4(U) | 2.70 | 1 | 2.50 2.49(U) | 0.0067 | |
| | r diuta | | | | | 612.5 D) | | | 8.02(D) | | |
| SE | | | | 0 613 | 0.513 | 257.3(M) | \$ 03 | 8,03 | 3.37(M) 3.36(U) | 0.0131 | |
| pon | Bartuva | C.1UL | | A-71A | | 22.2.2 | | | | | 4.64m3/s at the |
| 4S | Luova | 52.2 | 353.9 | t | 1 | : | · | | 1 | 0.00131**** | confluence |
| | | - | | | | | | | | | |
| j | Note) | | F.M.S. : Flow Measurement Station (by MOE) | it Station (| by MOE) | - | C.A. and] | Discharge : | at FMS: Fi | C.A. and Discharge at FMS: From Meteo-hydrological Service | service |

Table 2. 2 Length, Catchment Area and Mean Discharge of Rivers in Birzai and Skoudas

D.P.E. : Discharge Point of Effluent (Proposed/Alternative *

W.S.P. : Water Sampling Point (by JICA Study Team)

(D): Downstream point(M): Middle-stream point(U): Upstream point

: Roughly measured on a map of 1/50,000

: Calculated based on the assumed specific discharge(S.D.). ¥

*** : The same S.D. of the Agluona River (Assumed) **** : The same S.D. of the Bartuva River (Assumed)

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Table 2.3 River Water Quality Records, Tatela River (1.8km from the mouth) (Birzai) (Year: 1994)

| | T | T | 7 | | T | | | | | | (-] | ··- · | 1 | Frequ | T | T | 1 |
|-----------------------|------------------------|--|----------|----------------|--------------|----------|----------|------------|------------|-------------|--------------|-------------|-------------------|----------|---|----------------|-------------|
| ltem | Unit | Jan. | Feb. | Mar, | Apr. | May | June | Joly | Aug. | Sept. | Qet. | Nov. | Dee. | ency | Mini | Max. | Mean |
| Velocity | nv's | 0.64 | 0.58 | 0.28 | 0.65 | 0.42 | 0.16 | 0.13 | 0.09 | 0.12 | 0.12 | 0.21 | 0.6 | 12 | 0.02 | 0.65 | 0.33] |
| Discharge | cum's | 5.01 | 3,93 | 2.43 | 5.64 | 2.81 | 1.02 | 0.79 | 0.41 | 0.57 | 0.51 | 1.2 | 5.86 | 12 | 0.41 | 5.86 | 2.515 |
| Temperature | 'C | 6 | 2 | 6 | 8 | 10 | 17 | 18 | 25 | 18 | 11 | 5 | 5 | 12 | 2 | 25 | 10.9 |
| Odour | | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Seent | Scent | Sceat | | | | |
| | | less | less | less | less | less | less | less | less | less | lesa 20 | 1css 20 | <u>less</u> 20 | 12 | 19 | | 19 |
| Transparancy | cm | 20 | 20 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | | Z0 Yello | Yello | | | 20 | |
| Colour | | Yello | Yello | Yello | | Yellowis | | | | Yellow | Yello | | vish | | | | 1 |
| | | wish | wish | wish | wish | <u>h</u> | wish | wish | wish | ish | wish | wish | WISD | | • | | |
| Suspeded solid | mgʻl | . 8 | : 8 | 4 | . 6 | 14 | | 2 | 10 | 5 | 5 | 8 | 6 | 12 | 4 | 14 | 7.3 |
| PH 0 | | 8.2 | 8.3 | 8.5 | 8.8 | 8.7 | 89 | · · · | 8.4 | 8.2 | 8.4 | 8.2 | 8.4 | 12 | 8.2 | 8.9 | 8.45 |
| | | 6.4 | 7.9 | 5.2 | 9.8 | 9.6 | 97 | 9.7 | 3.7 | 6.4 | 7.5 | 7.6 | 7.4 | 12 | 3.7 | 9.8 | 7.5 |
| <u>01</u> | | 51.4 | 57 | 41.7 | 82.8 | 85.1 | 101 | 103 | 45.2 | 68.1 | 68.2 | 59.4 | 57.9 | 12 | 41.7 | 103.2 | 63.4 |
| BODs | mgO ₂ A | | 1.2 | 3.8 | 1.4 | 3.4 | 15 | 2 | 3.1 | 19 | 2.7 | 1.7 | 2.2 | 12 | 1.2 | 3.8 | 2.3 |
| BOD ₁ | mgO ₂ /1 | 2.7 | 1.2 | 3.8 | 1.4 | .4 | | | | 1.7 | - 2.1 | 1/ | | | | | |
| COD, Cr | mgOy1 | | | | | | | | | · · · · · · | ┣ | | | | | | |
| COD, Ma | mgO ₂ A | | | | | | | <u> </u> | | | | | | | | | |
| NH4-N | mgN4 | 12.000 | 12.000 | - · · · | 11.000 | | | 7.700 | | | 4.200 | | | 12 | 4.200 | 12.000 | 8,400 |
| NO2-N | mgNA | 0.8 | 0.06 | 0.2 | 0.25 | 0.62 | | | 0.52 | 0.4 | | 0.95 | 0.6 | 11 | 0.06 | 2.10 | 0.70 |
| NO3-N | mgN/I | 0.05 | 0.04 | | 0.03 | 0.05 | 0.09 | | 0.02 | 0.07 | 0.07 | 0.12 | 0.05 | 12 | 0.02 | 0.12 | 0.056 |
| Inorganie N | mgN/1 | 4.400 | 3.600 | | 4.800 | | | 2.600 | | | 0.900 | | | | 0.200 | 5.600 | 2.870 |
| N tetal | mg/l | 5.25 | | 5.87 | 5.08 | | 2.29 | 1 | 0.71 | 2.47 | | 3.27 | | 11 | 0.74 | 5.87 | 3.66 |
| PO ₄ -P | mgP.1 | 6 | 8.3 | 8.2 | 7 | 4.3 | | 3.2 | | 3.2 | | | | | 1.8 | 8.3 | 4.9 |
| P total | mg/l | 0.15 | 0.08 | | 0.06 | | | | 0.36 | | | 0.3 | 0.13 | 12 | 0.06 | 0.4 | 0.225 |
| Ca | mg/l | 0.2 | 0.1 | 0.18 | 0.09 | 0.14 | 0.36 | 0.31 | 0.42 | 0.8 | 0.52 | 0.42 | 0.16 | 12 | 0.09 | 0.8 | 0.308 |
| Mg | mg1 | | | L | | | | | | <u> </u> | 100 | I | | ļ, | | | |
| Na | mg/l | | | <u> </u> | | 41.0 | | 44.0 | | | 40.0 | | ļ | 3 | 40.0 | 44.0 14.0 | 41.6 |
| <u> </u> | mg/l | | Į | <u> </u> | _ | 14.0 | _ | 14.0 | <u> </u> | | 14.0 | | _ | 2 | 14.0 | 4.1 | 14.0 3.6 |
| Si | mg/l | · · · | | | | <u> </u> | | 3.2 | | | 4.1 | | | · | 3.2 | 4.1 | 3.0 |
| HCO, | mg/l | <u> </u> | | _ | | | <u> </u> | | | . | | | | | | | |
| SO4 | mg/l | | | L | | | | | | | ļ | | | ļ | L | | |
| <u> </u> | mg/l | <u> </u> | ļ | · . | | 725 | . | | | | | | 1 | 1 | | | 725 |
| Mineralization | mg/l | 52.0 | 49.0 | 71.0 | 38.0 | 38.0 | 41.0 | | 53.0 | 51.0 | 38.0 | 40.0 | 32.0 | 12 | | 71.0 | 45.3 |
| Total hardness | mgelev/1 | | <u></u> | I | I | 15.0 | | 9.5 | ∔ | Į | 7.4 | - | | 3 | | 15 0.20 | 10.6 |
| Fe | mg/l | | | <u>}</u> | | | 0.10 | | | ╂─── | 0.20 | <u></u> | Į | 2 | 0.10 | | 0.030 |
| Mn | mg/l | ļ | 0.030 | | | | | | | . | 4.96 | | | 2 | | | 7.49 |
| Cu | micro g/l | · | 10.03 | | ┣─── | | | | ╂ | | 5.12 | | ╂ | | | | 8,42 |
| Zn | micro g/l | | 8.04 | _ | <u>↓</u> . | | +- | 1 | +- | | 2.02 | | | 2 | | | 5.03 |
| Cr Ni | micro g/l micro g/l | | 0.71 | | | | + | | | + | 1.95 | | | | 0.71 | | 1.35 |
| Pb | micro g/l | <u> </u> | 0.40 | | | | | 4 | | t | 2.30 | - | | 2 | | 2.30 | 1.35 |
| Cd | micro g1 | | 0.03 | | ╉╼╍╌╌ | | | | 1 | - | 0.42 | | | 2 | | 0.42 | 0.22 |
| Detergent | mg/l | | 1 | | | | 1 | | | 1 | | 1 | 1 | | | | 1 |
| Oil prod. | mg/l | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | | - | | | |
| alfa HCH | micro g/l | 1 | | 1 | 1 | 0.000 | 1 | 1 | 1 | | 0.000 | | | 2 | | | 0.000 |
| beta HCH | micro g1 | 1 | 1 | Ī | 1 | 0.000 | | | | | 0.000 | | | 2 | | | 0.000 |
| gama HCH | micro g/1 | | T | | | 0.000 | | | | | 0.000 | | | 7 | | | 0.000 |
| DDE | micro g/l | | | | | 0.000 | _ | I | | | 0.000 | | 1 | 2 | | | 0.000 |
| DDT | micro g1 | | | | | 0.000 | | | | | 0.000 | 1 | | 12 | 0.000 | 0.000 | 0.000 |
| PCHB | micro g/l | | | | | | | | 1 | _ | 1 | 1 | 1 | I | <u> </u> | | h |
| Ki totat | col/i | | | 1 | 1 | 100000 | _ | \vdash | | _ | 1 | 1 | <u> </u> | | | 100000 | |
| Kl fresh | col/l | _ | 1 | 1 | | <10000 | <u> </u> | . | <u> </u> | - - | 1 | _ | _ | | | | |
| E | col/ml | _ | <u> </u> | · | | <u> </u> | <u> </u> | 1 | | | | <u> </u> | ╂ | | | | |
| HP | col/ml | <u> </u> | \vdash | | | 96000 | _ | | | | | | | | 96000 | | |
| HM | col'm1 | | _ | | | 60 | <u>4</u> | - | | | | - | | 1.1 | 600 | 600 | 600 |
| 3,4-dichlor benzaine | mg/l | 1 | _ | _ | _ | 1 | | + | | 4 | <u> </u> | · | <u>↓</u> | | + | | ┣── |
| penta chlor fenol | mg/1 | | . | 1 | | 4 | | | | ·} | | + | | | + | - | |
| 2-chlor fenol | mg/l | | <u> </u> | | <u> </u> | | | | | | | | · · · · | | | | |
| 2,4-dichlor fenol | mg/l | | | | - | + | + | | | | | + | | + | 1 | + | <u> </u> |
| 2.4,6 trichlot fenol | mg/l | | + | - | | + | | + | + | + | - | + | | + | 1 | + | } |
| 2,3-dimetil fenol | mg/1 | 1- | + | +- | + | + | | | ╉── | | + | + | + | | | + | + |
| 3,4-dimetil fenol | l'am | | | + | ·+ | | | | - <u>-</u> | + | + | + | + | + | 1 | + | + |
| 4-chlor 3-metil fenol | mg/l_ | 1 | | + | + | | + | | + | | | + | + | + | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | i | 1 | | | 1 | محديد مك | | L |

| Item Unit Velocity m/s Dischage cum/ Terreperature C Odour - Transparancy cm Celour - Suspeded solid mg/ PH - O ₄ mg/ BOD, mgO, BOD, mgO, BOD, mgO, COD, Ct mgO, COD, Ct mgO, COD, Mn mgO, NH ₄ -N mgN NO ₂ -N mgN | 4 Scent less 2(Yello wish 50 7.70 7.5 57.1 | Scent less ¥ellowi sh 30.0 | Mar 0.66 5.480 6 Scent less 20 Yello wish 5.0 | Apr. 062 3.790 8 Scent less 20 Yello wish | May 0 36 2 020 6 Scent Iess 20 Yello | 15 Scent Icss | July 0.13 0.640 18 Scentl | Aug 0.10 0.420 22 | Sept. 0.08 0.390 | Oct 0.30 1.050 12 | | Dec. 0.19 0.680 | rreq uene 12 12 | Mini 0.08 0.390 | Max. 0.81 10.500 | Mean 0.36 2.522 |
|---|---|--|--|---|---|------------------------------|---------------------------------------|----------------------------|------------------------|----------------------------|----------|-----------------------|--------------------------|-----------------------|------------------------|-----------------------|
| Discharge cum/ Teraperature *C Odour - Transparancy cm Colour - Suspedd solid mgA FH - O ₄ ngA BOD ₃ mgO ₂ BOD ₃ mgO ₂ COD, Cr mgO ₂ COD, Mn mgO ₂ NH ₄ -N mgN NO ₃ -N mgN | 3 390 4 Scent less 20 Yello wish 60 7.70 7.5 57.1 | 10.600 4 Scent less 8 Yellowi sh 30.0 7.90 | 5.480 6 Scent less 20 Yello wish | 3.790 8 Scent less 20 Yello | 2.020 6 Scent Icss 20 | 1.140 15 Scent Icss | 0.640 18 | 0.420 | 0.390 | 1.050 | 0.600 | | 12 | 0.390 | 10.600 | |
| Temperature C Odour | 4 Scent less 2(Yello wish 50 7.70 7.5 57.1 | 4 Scent less 8 Yellowi sh 30.0 7.90 | 6 Scent less 20 Yello wish | 8 Scent less 20 Yello | 6 Scent Iess 20 | 15 Scent Icss | 18 | | | | | 0.680 | | | | 2 5 2 2 |
| Odour Chi Transparancy Cm Colour Suspeded solid mg2 PH - - Oq %3 - BODq mg0q %4 BODq mg0q - COD, Cr mg0q - COD, Cr mg0q - NHN mgNi - NO ₃ -N mgNi - | Scent less 2(Yello wish 60 7.70 7.5 57.1 | Scent less ¥ellowi sh 30.0 7.90 | Scent less 20 Yello wish | Scent less 20 Yello | lcss 20 | Scent less | | 22 | 12 | 1.5 | | | | | | |
| Transparancy Cm Colour Suspeded solid mg/l PH O ₂ % BOD ₃ mgO ₂ BOD ₃ mgO ₂ COD ₄ Cr MO ₂ NmgO ₂ NH ₄ -N mgO ₂ NH ₄ -N mgN NO ₅ -N mgN | less 2(Yello wish 50 7.70 7.5 57.1 | less 8 Yellowi sh 30.0 7.90 | less 20 Yello wish | less 20 Yello | lcss 20 | less | Scenti | | | | 6 | 4 | 12 | 4 | 22 | 10.1 |
| Transparancy Cm Colour Suspeded solid mg/l PH O ₂ % BOD ₃ mgO ₂ BOD ₃ mgO ₂ COD ₄ Cr MO ₂ NmgO ₂ NH ₄ -N mgO ₂ NH ₄ -N mgN NO ₅ -N mgN | 20 Yello wish 60 1.70 7.5 57.1 | 8 Yellowi sh 30.0 7.90 | 20 Yello wish | 20 Yello | 20 | | | Scent | Scent | Scent | Scent | Scent | | | | |
| Celour Suspeded solid mg/l PH - O1 mg/l O2 % BOD3 mgO2 BOD4 mgO2 COD, Cr mgO2 COD, Cr mgO2 NH4-N mgN2 NO3-N mgN2 | Yello wish 60 7.70 7.5 57.1 | Yellowi sh 30.0 7.90 | Yello wish | Yello | | | ess | less | less | lcss | less | less | | | | |
| Suspeded solid myl PH O ₂ myl O ₃ % BOD ₃ mgO ₂ DOD ₇ mgO ₂ COD, Cr mgO ₂ COD, Cr mgO ₂ COD, Mn mgO ₂ NH ₄ -N mgN NO ₃ -N mgN | wish 60 7.70 7.5 57.1 | sh 30.0 7.90 | wish | | VAILA | 20 | 20 | 19 | 18 | 20 | 18 | 20 | 12 | 8 | 20 | 18 |
| Suspeded solid myl PH O ₂ myl O ₃ % BOD ₃ mgO ₂ DOD ₇ mgO ₂ COD, Cr mgO ₂ COD, Cr mgO ₂ COD, Mn mgO ₂ NH ₄ -N mgN NO ₃ -N mgN | 50 1.70 7.5 57.1 | 30.0 7.90 | | wish | 1 200 | Yellow | Yello | Yello | Yellowi | Yellow | Yellow | Yello | | | | , 1 |
| HI O ₂ mg1 O ₂ % BOD ₃ mgO ₂ BOD ₇ mgO ₂ COD, Cr mgO ₂ COD, Mn mgO ₃ NH ₄ -N mgN NO ₂ -N mgN | 7.70 7.5 57.1 | 7.90 | 5.0 | | wish | ish | wish | niso | sh | ish | ish | wish | | | | L |
| O ₂ mg1 O ₂ % BOD ₃ mgO ₂ BOD ₄ mgO ₂ COD, Cr mgO ₂ COD, Cr mgO ₂ NH ₄ -N mgN NO ₃ -N mgN NO ₃ -N mgN | 7.5 | | | 24.0 | 7.0 | 6.0 | - 6.0 | 4.0 | 24.0 | 13.0 | 19.0 | 9.0 | 12 | 4.0 | 30.0 | 12.7 |
| O2 % BOD3 mgO2 BOD3 mgO2 COD, Cr mgO2 COD, Cr mgO2 COD, Mn mgO2 NH4-N mgN2 NO3-N mgN2 NO3-N mgN2 | 57.1 | 1 0.9 | 8 20 | 8.10 | 8.20 | 8.00 | 8.10 | 7.80 | 8.00 | 7.50 | 7.70 | 7.60 | 12 | 7.50 | 8 20 | 7.90 |
| BOD, mgO, BOD, mgO, COD, Cr mgO, COD, Mn mgO, NH,-N mgN NO,-N mgN NO,-N mgN | | | 10.1 | 8.4 | 5.8 | 4.8 | 38 | 4.7 | - 39 | 41 | 5.6 | 4.4 | 12 | 3.8 | - 10.1 | 6.0 |
| BOD, mgO, COD, Cr mgO, COD, Mn mgO, NH,-N mgN NO,-N mgN NO,-N mgN | 1 20 | 746 | 81.1 | 70.9 | 46.5 | 47.9 | 40.4 | 542 | 40.6 | 38.1 | 44.9 | 33.5 | 12 | 33.5 | 81.1 | 52.4 |
| COD, Cr mgO, COD, Mn mgO, NH, N mgN, NO ₃ N mgN, NO ₃ N mgN, | | 3.0 | - 26 | 1.5 | 2.7 | 1.5 | 1.7 | 2.6 | 2.2 | 3.1 | . 3.2 | 2.1 | 12 | 1.5 | 32 | 23 |
| COD, Mn mgOg NH4-N mgN/ NO4-N mgN/ NO5-N mgN/ | 1 | | 1 | | 1 | | | | | · · . | | | | | | |
| NH4-N mgN NO3-N mgN NO3-N mgN | 1 3 | 82 | . 28 | 34 | 48 | 47 | - 61 | 14 | 31 | 57 | - 44 | 53 | 12 | 14 | 82 | 41 |
| NH4-N mgN NO3-N mgN NO3-N mgN | 1 100 | 20.0 | 12.0 | 12.0 | : 16.0 | 11.0 | 14.0 | 10.0 | 5.0 | 8.0 | 10.0 | 5.0 | 12 | 5.0 | 20.0 | 11.0 |
| <u>NO₂-N</u> mgN NO ₃ -N mgN | | 0.95 | 0.75 | 0.10 | 2.00 | 0.40 | 0.40 | | 11.00 | 0.40 | 1.80 | 1 25 | n | 0.10 | 11.00 | 1.86 |
| NO3-N mgN | | | 0.018 | 0.025 | 0.033 | 0.190 | 0.220 | 0.032 | 0.050 | 0.045 | 0.025 | 0.030 | 12 | 0.018 | 0 220 | |
| | | | 0.60 | 4.40 | 0.90 | 1.50 | 1.50 | 0.85 | 1.85 | 1.30 | 1.35 | 1 95 | 12 | 0.60 | 7 20 | 2.00 |
| Inorganic N mgN | | | 1 368 | 4 525 | 2 933 | 2020 | 2 1 2 0 | 0.882 | 12 900 | 1.745 | 3.175 | 3 230 | 12 | 0.882 | 12 900 | 3977 |
| N total mg/ | Ť | 4 2 | <u> </u> | | 37 | | | 12 | | 1.9 | | · · · · · | 4 | 12 | 42 | 2.7 |
| PO ₄ -P mgP/ | 0.146 | | 0.040 | 0.040 | 0 160 | 0.150 | 0 260 | 0.260 | 0 380 | 0.640 | 0.600 | 0.360 | 12 | 0.040 | 0.640 | 0 268 |
| P total mg1 | 0.140 | 0210 | 0.070 | V.V-47 | 0180 | 0.1.20 | 0100 | 0.300 | V 300 | 0.960 | 0.640 | | 6 | 0.180 | 0.960 | 0.445 |
| Ca mg1 | | | | | 920 | | | 100.0 | | 457.0 | 0.012 | 0.503 | 3 | 92.0 | 457.0 | 2163 |
| Mg mgi | | | | | 36.0 | | | 23.0 | · · | 38.0 | | I4 | 3 | 23.0 | 38.0 | : 323 |
| Na regi | | 35.0 | | | 29.0 | | | 10.0 | | 19.0 | | | 4 | 10.0 | 350 | 23.2 |
| K mg1 | | 120 | t | | 8.0 | | | 3.3 | | 82 | | | 4 | 3.3 | 120 | 7.8 |
| Si mg/ | | 65 | 1 | | 5.0 | | | 6.0 | | 3.5 | | | 4 | 3.5 | 6.5 | 5.5 |
| HCO, mg | | 1 | 1 | | 317 | | | 262 | | 289 | | | 3 | 262 | 317 | 289 |
| | | | | ł | 154 | | | 127 | | 108 | | | - 3 | 108 | 154 | |
| SO ₄ mg/ Cl mg/ | | 21.0 | 35.0 | 35.0 | 26.0 | 35.0 | 33.0 | 47.0 | 53.0 | 45.0 | 40.0 | 38.0 | 12 | 21.0 | 53.0 | 129 36.6 |
| Mineralization mg/ | | 21.0 | .35.0 | . 33.0 | 6620 | | .37.0 | 5727 | | 965.0 | 40.0 | 20.0 | - 3 | 572.7 | 965.0 | 733 2 |
| Total hardness mgck | | 7.0 | <u> </u> | <u> </u> | 8.6 | | | 6.9 | | 27.0 | · · · | ┢──┘ | 4 | 6.9 | 27.0 | 123 |
| Fe mg/ | | 0.97 | | | 0.37 | ┨ | | 0.42 | | 0.52 | <u> </u> | | 4 | 0 37 | 0.97 | 0.57 |
| Ma ng | | 0.058 | _ | { | 0174 | | | 0.154 | | 0 109 | | | 4 | 0.058 | 0.174 | 0.123 |
| Cu micro | | 3.80 | | | 3.22 | | | 3 10 | ╂─── | 3 54 | | | 4 | 3.10 | 3.80 | 3.41 |
| Zn micro | | 7.93 | | | 3 29 | | | 9.64 | <u> </u> | 4 39 | | | 4 | 3 29 | 9 6 4 | 631 |
| Cr micro | the second second | 5 93 | 1 | | 0.45 | | <u> </u> | 4.92 | | 4 26 | | | 4 | 0.45 | 5.93 | 3.89 |
| Ni micro | | 184 | 1 | 1 | 156 | <u> </u> | · · · · · · | 2 63 | <u> </u> | 215 | <u> </u> | | 4 | 1.56 | 2 63 | 2 04 |
| Pb micro | | 0.40 | | | 0.60 | f | 1 | 0.70 | | 0.45 | | | 4 | 0.40 | 0.70 | 0.53 |
| Cd micro | | 0.02 | | | 0.03 | f | | 0.05 | | 0.07 | | | 4 | 0.02 | 0.07 | 0.04 |
| Detergent mg | | | | | | | <u>I</u> | | Γ | 1 | l | [| | | | |
| Oil prod mg | | | | L. | | | | | | | | | | | | |
| alfa HCH micro | | | | | 0.000 | | | | | 0.000 | | | 2 | 0.000 | 0.000 | 0.000 |
| beta HCH micro | | | | 1 | 0.000 | 1. | i | | | 0.000 | 1 | | 2 | 0.000 | 0.000 | 0.000 |
| gama HCH micro | | | 1 | | 0.000 | į | | | | 0.000 | 1 | ļ | 2 | 0.000 | 0.000 | 0.000 |
| DDE micro | | | 1 | 1 | 0.000 | ļ | | <u> </u> | <u> </u> | 0.000 | Į | <u> </u> | 2 | 0.000 | 0.000 | 0.000 |
| DDI micro | | | | <u> </u> | 0.000 | | ļ | | | 0.000 | Į | Ļ | . 2 | 0.000 | 0.000 | 0.000 |
| PCHB micro | × | + | 1 | <u> </u> | I | | | | I | | L | <u> </u> | | [] | | |
| KI total col | | . | _ | <u> </u> | ļ | | I | 1000000 | · | · · | | | <u> </u> | | 1000000 | |
| KI fresh col | | | · · · · | | <u>}</u> | | _ | <10000 | | ļ | | | 1 | 10000 | 10000 | 10000 |
| E col'i | | | 1 | 1 | + | | | <1 | | <u> </u> | Į | | 1 | 1 | <u> </u> | |
| IIP col/i | | | | | | ┢ | | 31000 | | | | ┣ | 1 | 31000 | | |
| HM col'i | | | - <u></u> | 4 | 1 | <u> </u> | | 9400 | <u>'</u> | <u> </u> | | { | 1 | 9400 | 9400 | 940 |
| 3,4-dichlor benzaine mg | | | + | | · { | ┨ | <u> </u> | ┨_─── | <u>{</u> | | | | ╋── | | | |
| penta chlor fenol mg | | | | | + | + | | I | | | ┣ | ┢ | | | ┣─── | <u>}</u> |
| 2-chler fenol mg | | | <u> </u> | + | 1 | <u> </u> | 1 | | | ┣── | ∔ | | I | Į | | |
| 2,4-dichlor fenol mg | | | + | | | | | | | ļ | ! | | | <u> </u> | | ∔ |
| 2,4,6 trichlor fonot mg 2,3-dimetil fenot mg | | -ł | + | | | + | ╂ | <u> </u> | ł | ! | ! | | 1 | I | l | |
| A STOCKAST TANAL 1 10-2 | | | | | + | | + | ł | 1 | } | | ── | | | | ┢─── |
| | | | - | + | + | | + | + | + | + | ╋── | | 1 | | + | |
| 3,4-dimetil fenol mg 4-chlor 3-metil fenol mg | • • | | | | 1 | · · · | _ | I | 1 | 1 | 1 | 1 | 1 | 1 | 1 C | 1 |

Table 2.4 River Water Quality Records, Tatula River (1.8km from the mouth) (Birzai) (Year: 1995)

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Table 2.5 River Water Quality Records, Tatola River (1.8km from the mouth)

(Birzai) (Year: 1996)

| Item | Unit | Jan. | Feb. | Mar. | AN | May | June | July | Aug | Sept. | Oct | Nov. | Dec. | Frequ ency | Mini | Max | Mear |
|---|--------------------|---------------|---------------------|------------------|--------------|----------------|--------------|-------------------|---------------|----------------|-------------------|------------------|-------------------|---------------|--------------|--------|-----------------|
| Velocity | ຫນ່ຮ | 0.11 | 0.13 | 0 21 | 03 | 0.41 | 0.3 | 0 28 | 0.1 | 0.07 | 0.1 | 0.14 | 0.16 | 12 | 0.07 | 0.44 | 0.1 |
| Discharge | cu m/s | 0.349 | 0.210 | 0 220 | 1.050 | 2 850 | 1.000 | 0.830 | | 0.320 | 0.350 | 0.560 | 0.820 | 12 | 0 210 | 2 8 50 | 0.749 |
| Temperature | 'c | 4.0 | 4.0 | 40 | 6.0 | 15.0 | 19.0 | 17.0 | 19.0 | 10.0 | 7.0 | 5.0 | 40 | 12 | 40 | 19.0 | 9.5 |
| Odour | | Scent | Scent | Scent | Sceni | Scent | Scent | Scenti | | Scent | | Scent | Scent | | | | |
| | | less | less | less | less | 1055 | less | <u>ess</u> | less | less | less | less | less | | | | |
| Transparancy | <u>(11)</u> | 17 | 20 | 19 | 19 | 20 | 20 | 20 | 19 | 20 | 20 | 20 | 20 | 12 | 17 | 20 | |
| Colour | .• | Yello | Yello | Yello | Yello | Yello | Yello | Yellow | Yello wish | Yello | Yello | Yellow | Yellow | | | | |
| | | wish | wish 140 | wish 3.0 | wish 19.0 | wish 15.0 | wish 26.0 | <u>ish</u> 4.0 | 12.0 | wish 4.0 | <u>wish</u> 70 | <u>ish</u> 60 | <u>ish</u> 8.0 | 12 | 3.0 | 26.0 | 10 |
| Suspeded solid FH | աջյ | 8.0 7.60 | 7.30 | 7.30 | 7.50 | 8.60 | 7.80 | 7.90 | 7.80 | 7.90 | 8.10 | 8 20 | 7.80 | 12 | 7.30 | 8 20 | |
| 02 IN | | 5.7 | 1.50 | 43 | 7.4 | 7.9 | 9.3 | 8.0 | 3.4 | 5.1 | 10.2 | 6.7 | 83 | 11 | 3.4 | 102 | 6 |
| <u>0</u> | 1 % | 43.4 | | 32.7 | 59.3 | 78.7 | 100.9 | 83.2 | 35.9 | 452 | 84.0 | 523 | 632 | 11 | 327 | 100.9 | 61 |
| BOD, | mgO ₁ 1 | _ | | | | | | | | | 1 | | | [- <u></u> - | | | 1 |
| BOD, | ngO 1 | 3.6 | 33 | 17 | 140 | 1.8 | 41 | 1.9 | 3.0 | 22 | 1.5 | 15 | 1.6 | 12 | 15 | 14.0 | 3 |
| COD, Cr | ngO.1 | 76.0 | 24.0 | 16.0 | 66.0 | 48.0 | 28.0 | 26.0 | 95.0 | 24.0 | 53.0 | 18.0 | 180 | 12 | 160 | 95.0 | |
| COD, Mrs | ngO.4 | 7.0 | 5.0 | 7.0 | 16,0 | 15.0 | 10.0 | 15.0 | 140 | 9.0 | 9.0 | 11.0 | 7.0 | 12 | 5.0 | 160 | |
| NH-N | mgN1 | 0.90 | 2 80 | 0.50 | 4.10 | 0.58 | 1.20 | 0.98 | 023 | 115 | 0.47 | 1.50 | 0.50 | 12 | 0.23 | 4.10 | 12 |
| NO ₂ -N | | 0.060 | - manufacture - | 0.013 | | 0.044 | • | 0.038 | | 0.200 | | 0.014 | 0.014 | 12 | 0.010 | 0 200 | |
| | mgN/I | | 1.50 | 0.80 | 1.95 | 290 | 0.60 | 2.40 | 0.60 | 0.70 | | 0.60 | 240 | 12 | 0.60 | 2.90 | 1.4 |
| NO3-N Inorganic N | mgN/I mgN/I | 2 30 3 260 | | 1.313 | | | | | | | | | 2914 | | 0.840 | 6.114 | |
| N total | re1 | 3 200 | 4.0 | | | 39 | 1 1.477 | 1 | 11 | 1 | 1.8 | | 1 | 4 | 11 | 4.0 | 2 |
| PO,-P | mgP/1 | 0.640 | 0 680 | 0.070 | 0.520 | 0.080 | 0 200 | 0.080 | 0.160 | 0.440 | 1.080 | 0.030 | 0.090 | 12 | 0.030 | 1 080 | 0.33 |
| P total | mg/l | 0 800 | 0.720 | | | 0 110 | 1 | | 0 200 | | 1 160 | | 1 | 5 | 0.110 | 1.160 | 0.59 |
| Ca | mg/l | | 301.0 | | | 142.0 | 1 | | 400.0 | | 144.0 | | | 4 | 140.0 | 400.0 | |
| Mg | eig/l | | 24.0 | | | 15.0 | t | 1 | 24.0 | 1 | 15.0 | | | 4 | 15.0 | 24.0 | 19 |
| Na | mg/l | | | | 1 | 15.0 | 1 | | 55 | | 104.8 | | | 3 | 5.5 | 101.8 | 41 |
| K | mg/l | | | | | 4.1 | | | 4.4 | | 111 | | | 3 | 4.1 | 11.1 | 6 |
| Si | mg/1 | | 4.0 | | | 22 | 1 | L | 20 | I | 1.0 | | | 4 | 1.0 | 4.0 | 2 |
| HOO3 | mgil | | 286 | | | 262 | <u> </u> | | 244 | | 241 | L | | 4 | 244 | 286 | 5 2 |
| SO, | mg." | | 121 | · · | | 96 | | | 70 | | 140 | | | . 4 | 70 | | |
| Ci | mg/l | 38.0 | 57.0 | 31.0 | 35.0 | 33.0 | 31.0 | 38.0 | | 127.0 | | 63.0 | 210 | 12 | 21.0 | 190.0 | |
| Mineralization | mg/l | | | | | 565.1 | | | 810.9 | | 848.9 | | | 3 | 565.1 | 848.9 | |
| Total hardness | mgekv/i | | <u></u> | | | 82 | ! | | 22.0 | ļ | 8.4 | ! | | 1 | 8.2 | 22.0 | _ |
| Fe | mg/l | ļ | 0.17 | | | 0.30 | _ | | 0.10 | _ | 0.10 | | | 4 | 0.10 | 0.30 | - |
| Ma | mg/l | | 0.15 | | - · · | 0.02 | ł | | | ļ | 0.02 | | <u> </u> | | 0.02 | 0.15 | 0.0 |
| <u>Cu</u> | microgl | _ | 1.42 | · · · · · | | 253 | | | | | 165 | | <u> -</u> | 1 | 1.42 | 2 53 | $\frac{1}{100}$ |
| <u>2n</u> | micro g1 | - <u>-</u> | 12 30 | L | ļ | 11 24 | { | | | • • • | 0.63 | ł | <u> </u> | 3 | 6.85 0.68 | 12 30 | |
| <u></u> | micro g1 | | 8 24 | | | 10.66 | | | + | ╆ | 1 21 | + | <u> </u> | 3 | 1 21 | 1 69 | 1 |
| <u>Ni</u> | micro gl | <u>i</u> | <u>1.44</u> 0.70 | | | 1.80 | | | + | | 1.90 | + | ┣━━━ | 3 | 0.70 | 1.90 | _ |
| | microg] microg] | | 0.05 | <u>} · · · ·</u> | ┟ | 0.17 | | { | t | t | 0.20 | | | 3 | 0.05 | 0.20 | |
| Detergent | mg/l | | 0.05 | | { | 1 | ┨ | | 1 | | 1 | | <u> </u> | | | | <u>†</u> |
| Oil prod. | mg/l | | · | (| | 1 | | | | 1 | + | | 1 | | | | 1- |
| alfa HCH | micro g/l | | | | 1 | 0.000 | | | | 1 | 0.000 | | - | 2 | 0 000 | 0.000 | 00 |
| bets HCH | micro g1 | 1 | | | | 0.000 | 1 | | 1 | 1 | 0.000 | | 1 | 22 | 0.000 | 0.000 | 0.0 |
| gama HCH | micro g1 | | | | | 0.000 | | | | | 0.000 | | | | 0 000 | 0.000 | 0.0 |
| DDE | micro g1 | Ι | I | | | 0.000 | | | | 1 | 0.000 | | | 2 | | 0.000 | |
| DDT | micro g-1 | | | | ļ | 0.000 | I | ļ | <u> </u> | | 0.000 | <u> </u> | Į | 2 | | | |
| PCHB | micro g/1 | | | L | | 0.000 | | | <u> </u> | | 0.000 | 1 | Į | 2 | 0.000 | | |
| KI total | rol4 | | | | <u> </u> | 40000 | | _ | 50000 | | <1000 | | Į | 3 | | 50000 | |
| KI feesh | coll | | I | | 1 | <1000 | | 1 | 30000 | 4 | <1000 | <u> </u> | | 3 | | 3000 | |
| E | col/m1 | | | - | | 10 | | <u> </u> | <1 | <u> </u> | <1 | . | ł | 3 | | | |
| HP | col ml | J | | l | <u> </u> | 8600 | | | 14000 | | 14000 | | <u> </u> | 3 | | 1400 | |
| HM | col/ml | | ┣ | | | 10 | " | | <u>970</u> | | 10 | | { | 1-3 | 1-10 | 970 | <u> </u> |
| 3.4-dichlor benzaine | ng/ | 1 | } | <u> </u> | + | 1 | ł | <u> </u> | ╂ | - | | | | + | <u> </u> | + | ·- <u></u>] |
| penta chior fenol | mg 1 | — | | | ł | 1 | · · · | ł | | | 1 | + | | | | + | |
| 2-chlor fenol | mg/1 | | <u></u> + | | | + | | + | ┣ | 1 | · | † | <u> </u> | | · | + | |
| 2,4-dichlor fenol 2,4,6 trichlor fenol | mg-1 | | ł | | + | { - | + | | + | <u>+</u> | 1 | | t | + | + | | · + · · · · |
| 2,4,0 trichlor tenot | mg-1 mg-1 | + | | t | | | t | 1 | † | 1 | t | 1 | <u>+</u> | 1 | <u>+</u> | t | |
| 2,3-cimetil fenol | 612 1 612 1 | 1 | + | + | 1 | ╂─── | <u>+</u> | 1 | 1 | i - | 1 | 1 | 1 | 1 | <u>t</u> | 1 | -†— |
| 4-chlor 3-metil fenol | mg/1 | 1 | 1 | t — | 1 | 1 | + | 1 | + | 1 | 1 | 1 | 1 | 1 | † | 1 | -+ |
| | | + | + | 1 | + | 1 | 1 | 1 | + • | 1 | · † · · · · | 1 | 1 | 1 | 1 - | 1 | -+ |

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Table 2.6 River Water Quality Records, Tatula River (1.8km from the mouth) (Birzai) (Year: 1997)

| | | | | | ·· | | | | | | | | | | | | |
|---|----------------------|--------------|-------------------|--|------------|------------|------------|----------------|------------|------------|--------------|------------|--------------|---------------|----------------|-------|-------|
| Itera | Unit | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Frequ ency | Mini. | Max. | Mean |
| Velocity | fa's | 0.12 | 0.31 | 0.61 | 0.8 | 0.61 | 0.45 | 0.3 | 0.13 | | 0.12 | 0.45 | 0.45 | 11 | 0.12 | 0.8 | 0.39 |
| Discharge | cu m's | 0.38 | 0.63 | 4.13 | 6.5 | 3.65 | 2.76 | 1.52 | 0.48 | 0.55 | 0.41 | 1.81 | 2.52 | 12 | 0.38 | 6.5 | 2.111 |
| Temperature | <u> </u> | 4.0 | 4.0 | 6.0 | 5.0 | 5.0 | 17.0 | 22.0 | 19.0 | 18.0 | 17.0 | 6.0 | 5.0 | 12 | 4.0 | 22.0 | 10.6 |
| Odour | | Scent | Scent | Scent | Scent | Scent | Scent | Scentl. | Scent | Scent | Scent | Scent | Scent | • | | | |
| Transparancy | | less 20 | <u>less</u> 20 | less 20 | less 20 | less 20 | 1¢53 20 | esis 20 | less 16 | less 19 | less 20 | 1055 20 | less 20 | 12 | 16 | 20 | 19 |
| I ransparancy | ¢m | Yello | Yello | Yello | Yello | Yello | Yello | Yello | Yello | Yello | Yello | Yello | Yello | | | | |
| Colour | | wish | wish | wish | wish | wish | wish | wish | wish | wish | wish | wish | wish | | | | |
| Suspeded solid | mg/l | 7.0 | 5.0 | 4.0 | 6.0 | 5.0 | 27.0 | 7.0 | 28.0 | 11.0 | 6.0 | 5.0 | 8.0 | 12 | 4.0 | 28.0 | 9.9 |
| PH | | 7.6 | 7.4 | 7.7 | 8.1 | 8.1 | 7.9 | 7.9 | 82 | 8.0 | 8.0 | 8.0 | 7.6 | 12 | 7.4 | 8.2 | 7.9 |
| 0, | mg/l | 8.4 | 8.7 | 8.5 | 9.2 | 8.5 | 7.3 | 7.2 | 6.8 | 7.0 | 6.3 | 7.8 | 7.3 | 12 | 6.3 | 9.2 | 7.7 |
| 02 | % | 63.9 | 66.2 | 68.2 | 71.9 | 66.4 | 75.9 | 83.0 | 73.8 | 74.4 | 65.5 | 62.6 | 57.0 | 12 | 57.0 | 83.0 | 69.1 |
| BODy | mgO ₂ /1 | 1 1 1 | | 1111 | 1. E | | | | | . : | | | | : | | | |
| BOD, | mgO ₂ /l | 2.0 | 2.6 | 1.2 | 1.4 | 2.0 | 2.4 | .1.9 | 5.3 | 1.3 | 1.6 | 1.6 | 1.2 | 12 | 1.2 | 5.3 | 2.0 |
| CÓD, Cr | mgO ₂ /1 | 15.0 | 11.0 | 16.0 | 16.0 | 38.0 | 21.0 | 25.0 | 38.0 | 32.0 | 28.0 | 18.0 | 19.0 | 12 | 11.0 | 38.0 | 23.0 |
| COD, Mn | mgO ₂ /1 | 11.0 | 11.0 | 10.0 | 10.0 | 16.0 | 13.0 | 17.0 | 21.0 | 13.0 | 12.0 | 8.0 | 11.0 | 12 | 8.0 | 21.0 | 12.7 |
| NH ₄ -N | mgN1 | 0.6 | 1.2 | 0.5 | 0.4 | 0.8 | 0.7 | 0.4 | 0.4 | 0.6 | 0.6 | 0.4 | 0,6 | 12 | 0.4 | 1.2 | 0.6 |
| NO ₂ -N | mgN/1 | 0.044 | 0.008 | | 0.016 | 0.016 | | | 0.000 | 0.000 | 0.000 | 0.016 | 0.020 | 12 | 0.000 | 0.065 | 0.01 |
| NO ₃ -N | mgN/I | 0.6 | 2.3 | 5.5 | : 5.5 | . 4.4 | 3.4 | 0.75 | 0.3 | 0.4 | 0.5 | 8.9 | 6.2 | 12 | 0.3 | 8.9 | 3.2 |
| Inorganie N | mgN/I | 1.244 | | 5.968 | 5.916 | 5.216 | | <u> </u> | 0.700 | | 1.120 | 9.316 | 6.770 7.5 | 12 11 | 0.700 | 9.316 | 3.83 |
| N total | mg/l | | 3.6 | 6.7 | 6.4 | 5.3 | 4.7 | 1.6 | 1.0 | 3.4 | 1.2 | 12.0 | | | 1.0 | 12.0 | |
| PO4-P | mgP/1 | 0.120 | 0.280 | | 0.060 | 0.050 | 0.180 | 0.050 0.060 | 0.050 | 0.050 | 0.060 | 0.050 | 0.015 | 12 | 0.015 0.020 | 0.280 | 0.083 |
| P total Ca | mg 1 mg 1 | | 0.370 312.0 | 0.050 | 0.070 | 124.0 | 0.190 | 0.000 | 156.0 | 0.000 | 120.0 | 0.000 | 0.020 | 4 | 120.0 | 312.0 | 178.0 |
| Mg | mg1 | | 84.0 | <u> </u> | | 38.0 | | | 29.0 | | 43.0 | | | 4 | 29.0 | 84.0 | 48.5 |
| Na | mg 1 | | 19.4 | | | 9.2 | | | 14.0 | | 13.0 | | | 4 | 9.2 | 19.4 | 13.5 |
| K | mg 1 | | 6.4 | | <u> </u> | 3.9 | | | 6.6 | | 9.2 | | <u> </u> | 4 | 3.9 | 92 | 6. |
| Si | wg1 | | 7.0 | | | 2.0 | | t | 4.0 | | 5.0 | | | 4 | 2.0 | 7.0 | 4.5 |
| HCO ₃ | mg 1 | | 235 | · · | | 211 | | | 244 | | 272 | | | 4 | 211 | 272 | 24 |
| SO4 | mg l | | 180 | | | 150 | | | 100 | | 168 | | | 4 | 100 | 180 | 14 |
| Cl | mg 1 | 61.0 | 34.0 | 41.0 | \$5.0 | 55.0 | 34.0 | 34.0 | 34.0 | 36.0 | 36.0 | 30.0 | 42.0 | 12 | 30.0 | 61.0 | 41.0 |
| Mineralization | mg 1 | | 870.8 | | | 591.1 | | | 583.6 | I | 661.2 | <u> </u> | ļ | 4 | 683.6 | 870.8 | 676.6 |
| Total hardness | mgekv l | | .17.0 | ļ | | 9.3 | | ļ | 10.0 | | 9.5 | i | | 4 | 9.3 | 17.0 | 11.4 |
| Fe | mg] | | 0.20 | <u> </u> | | 0.20 | ┞— | | 0.10 | _ | 0.20 | | <u> </u> | 4 | 0.10 | 0.20 | 0.1 |
| Mn Cu | mg l micro g l | | 0.029 | i — | | 1.07 | <u> </u> | | 0.035 | | · · · · · | | | $\frac{2}{2}$ | 0.93 | 1.07 | 1.00 |
| Zn | micro g1 | | 3.94 | <u> </u> | { | 5.65 | | | - | <u> </u> | . | | | 2 | 3.94 | 5.65 | 4.79 |
| Cr | micro g/l | | 0.33 | <u> </u> | | 0.27 | | | 1 | | | | <u> </u> | 2 | 0.27 | 0.33 | 0.3 |
| Ni | micro g/l | | 0.21 | <u>† </u> | · · | 0.41 | | | t | | 1. | 1 | 1 | 2 | 0.21 | 0.41 | 0.3 |
| Pb | micro g/l | | 0.42 | <u> </u> | | 0.40 | | | | | | | | 2 | 0.40 | 0.42 | 0.4 |
| Cð | micro g/l | | 0.08 | | | 0.05 | | | | | | | | 2 | 0.05 | 0.08 | 0.0 |
| Detergent | mg 1 | | | | | • | | | | | · · · | | | | | | |
| Oil prod. | mg] | L | 0.03 | ļ | 1 | 0.07 | 1 | <u> </u> | 0.09 | | 0.08 | | | 4 | | 0.09 | 0.0 |
| alfa HCH | micro g/l | | <u> </u> | <u> </u> | <u> </u> | 0.000 | <u> </u> | | ── | ╉──── | 0.000 | | <u> </u> | 2 | 0.000 | 0.000 | 0.00 |
| beta HCH | micro g1 micro g1 | | | ╂ | | 0.000 | | | <u> </u> | ╂── | 0.000 | <u> </u> | <u> </u> | | | 0.000 | |
| gama HCH DDE | micro g/l | | ł | | { | 0.000 | - | 1- | ╂── | + | 0.000 | | 1 | | | 0.000 | |
| DDE | micro g/ | | + | <u>+</u> | + | 0.000 | | 1 | 1 | + | 0.000 | _ | 1 | | | 0.000 | |
| PCHB | micro g/l | | ╋╼┈ | t | t | 0.000 | _ | 1 | 1 | 1 | 0.000 | | <u>† —</u> | | - | 0.000 | |
| KI total | col/1 | | | | | <1000 | | 1 | 4E+03 | 5 | 30000 | 5 | | 3 | 1000 | 4E+05 | 1E+(|
| KI fresh | co11 | | | | | <1001 | | | 80000 | | 30000 | - | | _ | 3 1000 | 80000 | 370 |
| E. | col'ml | | | | | 4 | | _ | 60 | | 1 | | | | 3 1 | | 1 |
| <u></u> | cel/ml | · | _ | | | 190 | _ | - | 40350 | _ | 1330 | | <u> </u> | | | 40350 | _ |
| IM 14 diables berraine | col'ml | | -{ | | ·{ | 0.000 | | | \$230 | 4 | 200 | 4 | | | 3 10 | 970 | |
| 3,4-dichlor benzaine penta chlor fenol | mg/l mg/l | | | | ' | 0.000 | | + | + | + | ╉─── | | + | | | 0.000 | |
| 2-chlor fenol | mg 1 mg 1 | + | + | + | + | 0.000 | | + | + | + | | + | + | _ | | 0.000 | |
| 2,4-dichlor fenol | mg1 | 1 - | 1 | 1 | | 0.000 | | + | 1 | + | 1 | | | | 10.000 | _ | |
| 2,4,6 trichlor fenol | mg1 | 1 | 1 | | 1 | 0.000 | _ | + | 1 | 1 | 1 | 1 | 1 | | | 0.000 | |
| | mg1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2,3-dimetil fenol | FUR/ J | | | | | | - | | _ | | + | | | _ | | + | 10.00 |
| | mg/l | - | | 1 | | 0.000 | | | | | | 1 | | | 1 0.000 | 0.000 | 0.00 |
| 2,3-dimetil fenol | | | | | | 0.000 | | <u> </u> | <u> </u> | <u> </u> | <u></u> | 1 | | _ | 10.000 | 0.000 | 0.00 |

¢

| | | | | | | | | | 1 | | ***** | · | · * * * * * | e | · · · · · · · · · · · · · · · · · · · | | 1 |
|---|------------------------|--------------|--------------|---|--------------|--------------|---|-------------|---------------|---------------|---------------------|--------------|-------------|---------------|---------------------------------------|---------------|-------------------|
| Item | Unit | Jan. | Feb. | Mar. | Apr. | May | June | ЪŊ | Aug. | Sept | Oct. | Nov. | Dee. | Erequ ency | Mini. | Max | Mean |
| Velocity | BV/8 | 0 35 | 0.55 | 0.25 | 0.5 | 0 32 | 0.1 | 0.12 | 0.07 | 01 | 0.13 | 02 | 0.55 | 12 | 0.07 | 0.55 | 0 27 |
| Discharge | cum's | 2 800 | 3.180 | 1.940 | 3.720 | 1950 | 0 670 | 0 550 | 0 270 | 0.380 | 0.350 | 0.800 | 3 860 | 12 | 0270 | 3 860 | 1.705 10.6 |
| Temperature | c | 6.0 Scent | 2.0 | 6.0 Scent | 8.0 Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | '- | | | |
| Odour | .• | less | Weak | less | less | less | tess | less | less. | less | less | less | less | | | | |
| Transparancy | cm | 20 | 20 | 12 | 20 | 17 | - 20 | 20 | 20 | 18 | 18 | 17 | 18 | - 11 | 9 | 19 | 16 |
| Celour | | Yello | Yellə | Colour | Yetto | Yellowi | Yellow | Yello | Colourne | Yellow | Yellow | Yello | Yellow | | | | |
| Suspeded solid | | wish | หารล | ness | wish | sh | ish | wish | <u>S5</u> | ish | ish | wish | ish | | | | |
| | _mg/1 | 6.0 | 7.0 | 10.0 | 6.0 | 14.0 | 110 | 140 | 10.0 | 10.0 | 3.0 | 5.0 | 12.0 | 12 | 3.0 | 14.0 | 9.0 |
| <u> </u> | mg/i | 8.1 | 81 | 8.4 | 8.7 | 8.7 | 8.7 | 8.7 | 8.4 | 8.1 | 8.3 | 8.1 | 83 | 12 | 8.1 | 8.7 | 8.4 |
| 0, | % | 5.6 | 7.7 | 20 | 109 | 113 | 6.8 | 1.9 | 3.5 | 19 | 51 | 7.0 | 7.0 | 12 | 1.9 | 11.3 | 5.8 |
| BOD, | mgO/I | 44.9 | 55.6 | 16.1 | 921 | 100 2 | 70.7 | 19.3 | 428 | 19.8 | 451.4 | 54.7 | 54.7 | 12 | 16.1 | 100 2 | 51.4 |
| BOD, | mgO ₂ /1 | 3.6 | 1.4 | 29.0 | 19 | 6.5 | 4.0 | 48 | 14.4 | 4.6 | 4 2 | 4.7 | 23 | 12 | 1.4 | 29.0 | 6.7 |
| 00D, Cr | mgO ₂ A | | | | | | ·, | | | | | | | | | | |
| COD, Mn NH-N | mgOA mgNA | 140 | 13.0 | 10.0 | 14.0 | 11.0 | 16.0 | 16.0 | 13.0 | 14.0 | 7.4 | 9.0 | 5.0 | 12 | 5.0 | t6.0 | 11.8 |
| NO2-N | mgN4 | 2.10 | 1.20 | 12.00 | 1 25 | 2 20 | 3.00 | 1.30 | 10.00 | 11.00 | 8.70 | 4.90 | 1 20 | 12 | 1 20 | 12:00 | 4.90 |
| NO ₃ -N | mgN/I | 0.040 | 0.080 | 0.040 | 0.050 | 0.075 | 0.020 | | 0.090 | | 0 100 | 0.045 | 0.050 | 10 | 0.020 | 0.100 | 0.059 |
| Inorganic N | mgN/1 | 3.80 | 6.80 | | 5.40 | 2 50 | 0.03 | 0.70 | 0.20 | Ľ | 0 25 | 1.90 | 4.80 | 10 | 0 20 | 6.80 | 2 66 |
| N total | ng1 | 5 94) | 8.080 | 1.1.1 | 6.700 | 4.775 | 3270 | | 10.290 | | 9.050 | 6.845 | 6.050 | 9 | 3 270 | 10 290 | 6.771 |
| PO-P | ngP1 | 6.1 | 92 | 13.0 | 8.5 | 6.0 0.450 | <u>5.5</u> 1 100 | 26 1.100 | 13.0 1.700 | 12 0 4 200 | <u>9.2</u> 1.400 | 8.0 0.540 | 65 0.130 | 12 | 26 | 13.0 4 200 | <u>83</u> 1061 |
| P ketal Ca | ng1 1 | 0.120 | 0.120 | 1.900 | 0 180 | 0.450 | 1 140 | | 1.900 | 4 500 | 1 600 | 0630 | 0.150 | 12 | 0 150 | 4 500 | 1.169 |
| Mg | സൂി | | | | | | | | | | | | | | | | |
| N3 | mg/l | | | | | | | | | | | | | | | | |
| K | mg1 | | ļ | ļ | ļ | 37.0 | ļ | 41.0 | | | 39 <u>.0</u> 140 | | | 3 | 37.0 | 41.0 | 39.0 13.3 |
| Si HCO ₁ | mg.1 | | | | - | 11.0 | <u> </u> | 15.0 | | | 13 | | | 2 | 1.3 | 2.8 | 20 |
| SO4 | mg/l mg/l | | | ┨ | ┨─── | ╉╌─── | | <u>+</u> | | | <u>├</u> | | <u> </u> | | | | |
| ci | mg/l | | ┣ | | - | · · · | | 480.0 | | | 1 | | | 1 | 480 | 480 | 480 |
| Mineralization | mg/l | 34.0 | 41.0 | 43.0 | 35.0 | 33.0 | 38.0 | | 53.0 | 63.0 | | 40.0 | 37.0 | 12 | 25.0 | 63.0 | 41.0 |
| Total hadness | mgekv/l | | <u>i</u> | | | 13.0 | 0.00 | 10.0 | | ! | 7.2 | <u> </u> | | 3 | 7.2 | 13.0 0 20 | 10.0 |
| Fe Mn | mg/l mg/l | ┨─── | ╂─── | | <u> </u> | ╂ | 0.00 | ╂─── | | <u> </u> | 1 0 20 | | | <u> </u> | - 0.00 | | 0.10 |
| Cu | micro g/l | | ╞╌╼╸ | † – – – – – – – – – – – – – – – – – – – | 1 | 1 | 1 | | | | | | | | | | |
| Zn | micro g1 | | | | | | | | <u> </u> | | _ | | ļ | I | | | |
| <u> </u> | micro gʻi | · | ↓ | | | ┨─── | | | | | | ļ | | ╂──- | | i | |
| Ni 10 | microg1 microg1 | | ╂─── | <u> </u> | | | | 1 | | <u> </u> | + | 1 | | | | | |
| Cd | micro g1 | | <u> </u> | 1 | 1 | 1 | | 1 | | | | | | | | | |
| Detergent | നളി | | | | | | Į | ļ | | | | ₋ | <u> </u> | ! | | į | _ |
| Oil prod alfa HCH | mg/l micro g/l | ļ | | | ┨─── | ╉━── | <u> </u> | ╉── | | ╆ | ╂──・ | + | ╂─── | ╂ | l | | |
| beta HCH | microgi microg/l | | † | 1 | + | + | <u> </u> | | | <u> </u> | 1 | 1 | | 1 | | L | |
| gama HCH | micro g/l | 1 | | | | | | | | | | | | | | <u> </u> | |
| DDE | micro g/l | | <u> </u> | | _ | ↓ | · | | | | | | | 1 | <u> </u> | } | |
| DDT PCHB | micro g/l micro g/l | | | + | 1 . | | | + | <u> </u> | + | 1 | 1 | † | + | <u> </u> | <u> </u> | t |
| Ki total | col/l | t | 1 | 1 | 1 | 60000 | <u>, </u> | + | 1 | t | 1 | | 1 | 1 | | | |
| KI fresh | col/l | | | <u> </u> | | <10000 | | | | I | | | | | | | |
| 8 | colimi | | <u> </u> | | | 10 | | <u> ·</u> | } | | | | <u> </u> | ┼╶┤ | | | |
| HP HM | col'ml col'ml | ┨─── | | <u> </u> | <u> </u> | 14000 | | + | 4200 |) | 1000 | | <u> </u> | ┼╌┤ | 330 | | |
| 3.4-dichlor benzaine | mg/l | <u> </u> | + | † | 1 | Ť | | <u>t</u> | | | | | | | 1 | | [|
| penta chior fenol | mg-1 | | | | | 1 | | | | _ | | | | | <u>-</u> | | |
| 2-chlor fenol | mg/l | | | · · · · · | | . | · | | } | | | | | | | l | ┠ |
| 2,4-dichlor fenol 2,4,6 trichlor fenol | mg/l mg/l | ┨─── | + | <u> </u> | ╂╌╸ | + | ╂─── | + | <u> </u> | + | + | 1 | | 1 | 1 | | <u> </u> |
| 2,4,6 unchior fenol | | 1 | 1- | + | <u> </u> | 1 | 1 | 1 | | | 1 | | | | | [| |
| 3,4-dimetal fenol | mg/l | 1 | | | 1 | | | | | | | | | <u> </u> | <u> </u> | | |
| 4-chlor 3-metil fenol | mg/1 | \vdash | <u> </u> | 1 | | | | | } | | | + | | + | ╊ | | <u> </u> |
| | L | | 1 | | 1 | 1 | 1 | | 1 | . I | 1 | 1 | L | J | .L | <u>i</u> | 1 |

River Water Quality Records, Tatula River (17.5 km from the mouth) (Relow Rirzid, at the left bank) (Year: 1994) Table 2.7

.

| | <u></u> | | F-1 | | | | | | | 8 | | | . | Frequ | NG4 | Max | |
|--|------------------------|------------|--------------|--------------|---------------|----------|----------|----------------|--------------|------------|--------------|----------|-----------|-----------------|--------------|--------------|----------|
| Item | Unit | Jan. | Feb. | Mar. | Apr. | Мау | June | July | A-28 | Sept | Oct. | Nov. | Dec. | ency | Mini. | | Mean |
| Velocity | rav's cum/s | 0.65 | 7.000 | 0.6 3 850 | 0 54 3.960 | 0.3 | 0.2 | 0.12 | 0.08 | 0 08 | 0.14 | 0.13 | 0.15 | 12 | 0.08 | 0.72 | 0.30 |
| Discharge Temperature | °C | 2.400 | 4.0 | 60 | 80 | 1.350 | 140 | 19.0 | 23.0 | 17.0 | 120 | 60 | 4.0 | 12 | 4.0 | 230 | 10 2 |
| Odour | | No | No | No | No | No | No | No | No | Weak | No | No | No | | ····· | | |
| Transparancy | an | 19 | 8 | 20 | 20 | 20 | 20 | 18 | 18 | 13 | 17 | 14 | 19 | 12 | 80 | 20.0 | 17.0 |
| | | Yello | Yello | Yello | Yellow | Yellow | Yellow | Yellow | Yellow | Gtey | Yellow | Yellow | Yellou | | | - | |
| Colour | | wish | wish | wish | ish | ish | ish | ish | ish | | ish | ish | ish | | | | |
| Suspeded solid | mgl | 6.0 | 24.0 | 19.0 | 13.0 | 60 | 7.0 | 8.0 | 6.0 | 18.0 | 6.0 | 9.0 | 10.0 | : 12 | 60 | 24.0 | 11.0 |
| <u> </u> | | 1.70 | 7.80 | 8.00 | 8.00 | 8 20 | 7.80 | 7.90 | 1.70 | 7.70 | 7.10 | 7.50 | 750 43 | <u>12</u> 12 | 7.10 | 8 20 10.3 | 7,74 |
| <u> </u> | - mg/1 % | 6.0 | 89 67.80 | 9.9 79.50 | 10.3 | 41.70 | 25 30 | 29.30 | 1.6 18.80 | 5 20 | 28.80 | 32.90 | 32.70 | 12 | 5.20 | 87.00 | 41 20 |
| DOD, | ngO ₂ A | 45.70 | 3.0 | 19:50 | 16 | 3.4 | 7.7 | 35 | 6.4 | 14.0 | 12.0 | 11.0 | 52 | 12 | 10 | 14.0 | 60 |
| BOD, | ingO ₂ /1 | 40 | | | | | | | | | | | | | | | |
| COD, Ci | ngO ₂ 1 | 42 | 70 | - 46 | 42 | 53 | 59 | 63 | 36 | 63 | 103 | 98 | 82 | - 12 | 35 | 103 | 63 |
| COD, Ma | mgO ₂ /1 | 110 | 14.0 | 13.0 | 130 | 180 | 17.0 | 160 | 16.0 | 250 | 15.0 | 120 | 11.0 | 12 | 11.0 | 25.0 | 150 |
| NHL-N | mgN1 | 2.50 | 0.90 | 0.50 | 1.00 | 3 50 | 2 80 | 4.60 | 7.10 | 12 20 | 3.70 | 5.30 | 3.30 | 12 | 0.50 | 12 20 | 3.95 |
| NO ₂ -N | mgN/1 | 0 200 | 0.050 | 0.037 | 0.035 | 0.060 | 0.120 | 0.050 | 0.037 | 0.045 | 0.025 | 0.040 | 0.060 | 12 | 0.025 | 0 200 | 63.000 |
| NO ₂ -N | mgN.1 | 4.40 | 2 80 | 5.90 | 6.20 | 1.60 | 1.35 | 0.60 | 1.15 | 1.00 | 0.00 | 0.85 | 1.75 | 12 | 0.00 | 6.20 | 2 30 |
| Inorganic N | rogN/1 | 7.100 | 3.750 | 6.437 | 7.235 | 5.160 | 4270 | 5 250 | 8 287 | 13 245 | 3.725 | 6.190 | 5.110 | 12 | 3.725 | 13.245 | 6313 |
| N total | mgʻl | | 4.0 | | 1 | 65 | | | 9.5 | | 4.0 | . · | | 4 | 4.0 | 9.5 | 6.0 |
| PO _r P | mgPA | 0 250 | 0 210 | 0.070 | 0.120 | 0.060 | 0.700 | 0 830 | 1.400 | 2 200 | 1.800 | 1.040 | 0.740 | 12 | 0.060 | 2 200 | 0.785 |
| P total | mg/l | | 0 270 | | | 0.060 | | | 1.600 | | 2.820 | 1.120 | 0.800 | 6 | 0.060 | 2.820 | 1.111 |
| Ca | l grit | · | | | · · · · · | 100.0 | | | 128.0 | | 232.0 | | _ | 3 | 100.0 | 2320 | 1533 |
| Mg | mg/1 | | | | | 35.0 | | · · · · | 35.0 | | 25.0 30.0 | - | ┣ | 3 | 25.0 27.0 | 36.0 39.0 | 320 |
| <u>Na</u> K | mg/1 | | 39.0 11.0 | ╆ | | 29.0 | ┨ | | 27.0 | · | 120 | | | 4 | 95 | 120 | 10.8 |
| <u>Si</u> | സുി സുി | | 65 | | | 6.5 | <u> </u> | 1 | 65 | | 10.0 | | <u> </u> | 4 | 6.5 | 10.0 | 7.3 |
| HCO | mg1 | : : | l – ÷ ÷ | | | 295 | | | 314 | | 305 | ł | <u> </u> | 3 | 295 | 314 | 304 |
| SO4 | mg1 | | | 1 | <u> </u> | 31 | | t | 32 | <u> </u> | 69 | 1 | f | 3 | 31 | 69 | 41 |
| <u> </u> | mgʻl | 27.0 | 160 | 320 | 39.0 | 300 | 31.0 | 24.0 | 40.0 | 47.0 | | 42.0 | 38.0 | 12 | 16.0 | 66.0 | 350 |
| Mineralization | rag/1 | | 1 | | | 5320 | | | 585.8 | | 739.1 | | | 3 | 532.0 | 739.1 | 618.9 |
| Total hydress | mgelev 1 | | 4.7 | I | | 8.0 | [| | 9.3 | | 140 | | _ | 4 | 4.7 | 14.0 | 9.0 |
| Fe | നളി | ļ | 0.75 | + | | 0.40 | | _ | 0 36 | l | 0.53 | | | 4 | 0 36 | 0.75 | 0.51 |
| <u></u> | mg/l | | ┇ | <u> </u> | - | ╂ | | | ┨──── | · | - { | | <u> </u> | | | | |
| <u>Cu</u> Zn | micro g/t micro g/t | | } | | | <u> </u> | + | + | ┨─── | | + | + | + | | | | |
| <u> </u> | microg1 | | ┢── | + | | 1 | | +- | ł | <u> </u> | + | | + | + | ļ | | |
| | microgl | | 1 | 1 | <u>+</u> | | | +- | | t | 1 | † | | | 1 | | |
| Pb | microg1 | | | | | | | 1 | | | | · · | | | | | |
| Cd | micro g1 | | | 1 | | | l | _ | | | | | ļ | | · | | |
| Detergent | mg l | L | _ | ļ | <u> </u> | <u> </u> | | <u> </u> | | ļ | <u> </u> | 1 | | | ļ | <u></u> | |
| Oitprod | <u>1 mg1</u> | | | + | | | _ | | | | | + | 4 | | ļ | | <u> </u> |
| <u>alfa HCH</u> beta HCH | micro g1 micro g1 | | | | | | | - | | | | | ╂── | | ┨ | | |
| gyna HCH | micro ga | _ | + | ╉── | + | 1 | + | 1 | <u> </u> | 1 | 1 | + | + | + | 1 | t | |
| DDE | microgi | | 1 | -† | 1 | 1 | 1 | 1 | 1 . | <u> </u> | 1 | 1 | 1 | 1 | t | 1 | 1 |
| DDT | micro gil | | | | | 1 | | | | <u> </u> | | | | | | | L |
| PCHB | micro g/ | | | | | | | | | | | | | | <u> </u> | | <u> </u> |
| Klustal | coll | | 1. | | | 1 | 1 | | 18+0 | | | | _ | | | 1000000 | |
| Kifresh | 0011 | | + | | | | | | <1000 | _ | | | | | | | |
| <u>— Е</u> НР | col'ml col'ml | | | +- | + | | | + | 1430 | | + | + | + | | | _ | |
| HM HM | col'nd | 1 | + | + | + | + | | + | 150 | | | | 1 | | | <u> </u> | |
| 3,4-dichlor benzaine | mgʻl | 1 | 1 | | | | | 1 | 1 | | | | 1 | | 1 | | |
| penta chilor fenol | tre 1 | | | | | 1 | | | | | | | | | | | |
| 2-chlor fenot | rrg/1 | | | | | | | | | | | | | | | | |
| 2,4-dichlor fenol | n_1 | . . | | -+ | - - | + | | | - | | | | 1 | | <u> </u> | | I |
| 2,4,6 trichlor fenol | 1 | | | | | | + | | | - | | | | | | ┨ | <u> </u> |
| 2,3-dimetil fenol 3,4-dimetil fenol | mg1 mg1 | + | | | | | | + | + | + | | | • | | + | -} | |
| 3,4400000000000 | 1 1.21 | _ I | | - | -+ | | | _ _ | _ | | | _ | | - | + | + | |
| 4-chlor 3-metil fenol | നളി | | | | | 1 | | | | | | 1 | | | | 1 | |

Table 2.8 River Water Quality Records, Tabla River (17.5 km from the mouth) (Below Birzai, at the left bank) (Year: 1995)

| liem | Unit | Jan. | Feb. | Mar. | Apr. | Мау | June | July | Ang. | Sept. | Out. | Nov. | Dec. | Frequ ency | Mini. | Max. | Mean |
|-------------------------------|---------------------------------------|--------------|----------------|-----------|--------------|-------------------|--|-------------------|----------|------------|----------|----------|---------------------|-------------------|----------|--|----------------------|
| Velecity | m's | 0.1 | 0.12 | | 0.28 | 0.4 | 0.28 | 0.2 | 0.1 | 0.06 | 0.09 | 0.13 | 0.14 | 11 | 0.06 | 0.4 | 0.17 |
| Discharge | cum's | 0.27 | 0.15 | | 0.7 | 2 | 0.75 | 0.58 | 0.33 | 0.2 | 0.2 | 0.4 | 0.54 | 11 | 0.15 | 2 | 0.565 |
| Temperature | c | 4.0 | 4.0 | | 6.0 | 15.0 | 19.0 | 17.0 | 19.0 | 14.0 | 9.0 | 6.5 | 6.0 | 11 | 4.0 | 19.0 | 10.8 |
| | | Scent | Weak | | Weak | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scerat | | | | |
| Odour | | less | | | | less | less | less | less | less | less | less | less | | | | |
| Transparancy | cra | 15 | 9 | | 9 | 18 | 19 | 19 | 17 | 18 | 18 | 17 | 18 | 11 | 9 | 19 | 16 |
| Colour | | Yello | छन् | | grey | | | | grey | A egow | धुःत्प् | Yello | Yello | | | | |
| | · · · · · · · · · · · · · · · · · · · | wish | 5.0 | | 31.0 | <u>sh</u> 15.0 | nish | <u>ish</u> 6.0 | 35.0 | ish 5.0 | 17.0 | 11.0 | <u>wish</u> 13.0 | - <u>n</u> | 5.0 | 35.0 | 14.8 |
| Suspeded solid PH | mg1 | 10.0 | 7.4 | ·· • • • | 7.2 | 1.9 | 7.5 | 7.4 | 7.6 | 7.6 | 8.0 | 8.0 | 7.5 | - 11 | 7.2 | 8.0 | 7.6 |
| | | 1.0 | 1.2 | | 5.9 | 5.8 | 8.6 | 4.3 | 2.9 | 3.8 | 1.3 | 3.8 | 4.5 | $\frac{1}{11}$ | 1.0 | 8.6 | 3.9 |
| | - mg/1 % | 7.6 | 9.1 | | 47.3 | 57.8 | 93.3 | 44.7 | 31.4 | 37.0 | 11.2 | 30.8 | 36.1 | - 11 | 7.6 | 93.3 | 36.9 |
| BOD | mgO ₂ A | 7.0 | 2.1 | | 47.5 | | | | | | | | | | - 1.0 | 73.5 | |
| BOD ₂ | mgO ₂ 1 | 13.0 | 47.0 | | 45.0 | 6.3 | 13.0 | 16.0 | 38.0 | 5.6 | 11.0 | 6.2 | 8.5 | 11 | 5.6 | 47 | 19 |
| | | 164 | 45 | ļ | 96 | | 32 | | 116 | | 126 | | 26 | - ii | 26 | 161 | 87 |
| COD, Cr | m_2O_1 | 22.0 | 16.0 | | 20,0 | 21.0 | 13.0 | 17.0 | 16.0 | 15.0 | 17.0 | 18.0 | 12.0 | - 11 | 12.0 | 22.0 | 17.0 |
| COD, Mn | mgO ₂ 1 | | | | | | ~~ | | | | 16.50 | 1.80 | | | | | |
| NIL-N | mgN1 | 5.20 | 8.75 | | 9.50 | 2.26 | 3.50 | 7.70 | 7.40 | 11.60 | | | 5.50 | | 1.80 | 16.50 | 7.19 |
| NO ₂ -N | mgN1 | 0.030 | | ł | 0.290 | | 0,140 | 0.200 | 0.060 | | 0.034 | | 0.035 | | 0.018 | 0.290 | 0.108 |
| NO ₂ N | mgN1 | 0.60 | 5.20 14.120 | | 1.20 | 3.70 | 0.60 | 2.90 | 0.25 | 0.60 | 0.25 | 0.45 | 1.20 | <u>– 11</u> 11 | 0.25 | 5.20 16.784 | <u>1.54</u> 8.841 |
| Inorganic N | mgNI | 5.830 | | | 10.990 | 7.0 | 4.240 | 10.800 | 9.6 | 11.016 | 17.0 | 2.210 | 0.130 | | 7.0 | 17.0 | 12.1 |
| N total PO ₄ -P | ng1 mgPJ | 0.860 | 15.0 | ł | 1.600 | 0.160 | 0.320 | 0.900 | 1.200 | 1.900 | | 0.140 | 2 000 | | 0.140 | 2.600 | 1.195 |
| | | | 2.000 | | 1.000 | 0.100 | 0.320 | 10.300 | 1.550 | 1.70 | 2.700 | | 2.000 | | 0.230 | 2.700 | 1.472 |
| Ca | mg1 mg1 | 0.000 | 120.0 | | | 148.0 | | | 168.0 | | 120.0 | | | Á | 120.0 | 168.0 | 139.0 |
| Mg | mg1 | | 29.0 | | | 19.0 | | | 17.0 | | 19.0 | | | 1 | 17.0 | 29.0 | 21.0 |
| Na | mg1 | | | 1 | | 12.0 | | 1 | 9.2 | t | 54.5 | | | 3 | 9.2 | 54.5 | 25.2 |
| K | mgʻl | | | | | 5.0 | · · · · · | | 8.2 | | 20.5 | | | 3 | 5.0 | 20.5 | 11.2 |
| Si | mgʻl | | 4.5 | | | 2.0 | | | 2.0 | L | 4.0 | | | 4 | 2.0 | 4.5 | 3.1 |
| HCO1 | mg1 | | 302 | | | 262 | | | 275 | | 314 | | | . 4 | 262 | 314 | 288 |
| SO4 | mgl | | 55 | | | 70 | | ł | . 35 | | 113 | <u> </u> | | 4 | 35 | 113 | 68 |
| Cl . | mg 1 | 56.0 | 51.0 | | 46.0 | | 33.0 | 44.0 | 38.0 | 284.0 | | 127.0 | 51.0 | 11 | | 284.0 | 84.8 |
| Mineralization | mg 1 | | | · | | 542.0 | | ļ | 550.4 | <u> </u> | \$18.0 | _ | |]] | | 818.0 | 635.8 |
| Total hardness | mgekv1 | | 8.4 | | ! | 9.0 | <u> </u> | ↓ | 9.8 | ļ | 1.6 | | | <u>L 4</u> | 7.6 | 9.8 | 8.7 |
| Fe | mg l | | 0.18 | _ | | 0.30 | ļ | Į | 0.30 | | 0.60 | ł | | ↓ ⁴ | 0.18 | 0.6 | 0.34 |
| Mn | mg i | | | | | ┢─── | <u> </u> | | | | | | | | ŧ | | |
| <u>()</u> | micro g | į | | | | ╆ | ł— | ╉┅── | I | { | | <u>+</u> | \vdash | | ł | | |
| Zn Cr | micro g1 | | | | | | | ┟─── | | <u> </u> | | t | | | <u> </u> | | |
| Ni | micro g1 | <u> </u> | ł | | | | | + | | | | 1 | | t | 1 | | |
| Pb | micro g1 | | | · · · · · | \mathbf{t} | | | 1 | | | | † | 1 | | 1 | 1 | |
| Cd | micro g l | | | | t | 1 | | 1 | | | 1 | | 1 | 1 | 1 | | |
| Detergent | mgl | | | 1 | 1 | | | | | | | | | | | | |
| OJ prod. | mg1 | | | | | | | | | | | L | . | L | | _ | |
| alfa HCH | micro g1 | | | | | | L | L | | | | | ļ | ļ | ļ | | |
| beu HCH | micro g1 | ļ | | | | _ | | | ļ | ₋ | | | <u> </u> | } | <u> </u> | 1 | |
| gama HCH | micro g1 | | | | ļ | ļ | | | Ì | | | | | | | | |
| DDE | micro g1 | | | | - | | | | | | | | ┣ | | ╂ | ╂ | |
| DDT | micro g1 | | | | <u> </u> | <u> </u> | | | { | | | | | | | | + |
| PCHB KI total | col1 | | | | | 70000 | | | 100000 | , | 500000 | | ╉┈╾╼╴ | 1 | 70000 | 500000 | 223333 |
| KI fresh | col 1 | - · · | · · · · | ╋── | | 30000 | | † | 100000 | | 500000 | | ╏┈╾ | | 30000 | | |
| E | col'ml | ┨─── | <u>†</u> | | | 10 | | <u> </u> | 10 | | 30 | | 1 | | | | |
| · 102 | col'ml | 1 | 1 | 1 | <u> </u> | 14000 | , 1 | <u> </u> | 17000 | | 28000 |) | | 3 | 14000 | 28000 | 19665 |
| БМ | col'ml | | 1 | | | 60 | | | 4200 |) | 1000 | 2 | | 3 | 60 | | |
| 3,4-dichlor benzaine | mg.1 | | | | | | | | | | _ | ļ | | | | <u> </u> | L |
| penta chlor fenol | mg 1 | | | | | 1 | ļ | | <u> </u> | | <u> </u> | 1 | <u> </u> | 1 | | | |
| 2-chlor fenol | mg1 | | | | _ | <u> </u> | <u> </u> | <u> </u> | | . | | | . | . | | | |
| 2,4-dichlor fenol | mg 1 | | | _ | <u> </u> | - | | I | | | | <u> </u> | | · | | | ╂ |
| 2.4,6 trichlor fenol | mg 1 | | | | } | | + | | ╉ | | <u> </u> | + | ╋━━ | | ╂ | ł | |
| 2,3-dimetil fenol | mg1 | ↓ | | + | | + | ╂ | | | | + | | | + | · | ╄─── | |
| 3,4-dimetil fenol | mg1 | ╂ | · { | + | ╂ | -1 | | | | + | + | 1 | | | -+ | + | <u> </u> |
| 4-chlor 3-metil feaol | mg l | | | + | + | ╂─── | ┟── | | <u> </u> | + | 1 | | 1 | 1 | 1 | <u> </u> | 1 |
| | | | | | | | | | | | | | | | | | |

Table 2.9 River Water Quality Records, Tatula River (17.53 in from the month) (Below Bizzai, at the left bank) (Year: 1996)

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h

1-46

| Table 2.10 | River Water Quality Records, Tatula River (17.5 km from the mouth) |
|------------|--|
| | (Below Birzai, at the left back) |
| | (Year: 1997) |

()

| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | Mixi Max 0 10 0 68 0 250 4 300 40 22.0 11 20 40 15.0 7.10 8.10 21 7.4 22.8 81.8 17 33.0 0.60 14.00 0.000 0.420 0.000 8.50 | Mean 0.36 1.300 11.3 16 8.3 7.67 5.5 50.0 8.7 31 16.4 4.76 0.120 |
|---|---|---|
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 250 4 300 40 220 11 20 40 150 710 810 21 7.4 228 818 17 330 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 1 300 11 3 16 8 3 7 67 5 5 500 8.7 31 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 40 220 11 20 40 150 710 810 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 113 16 83 767 555 500 8.7 31 16.4 4.76 |
| Temperature C To Secret Secret Secret Secret Secret Secret Secret Secret Iess Ies | 11 20 40 150 710 810 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.00 850 | 83 767 55 500 8.7 31 16.4 4.76 |
| Odivar - Weak less less less less less less less less Weak Weak Weak less less Transparancy ctn 17 19 18 20 19 16 18 11 13 15 16 18 12 Colour - Yellow Yellow </td <td>40 150 710 8.10 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50</td> <td>83 767 55 500 8.7 31 16.4 4.76</td> | 40 150 710 8.10 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 83 767 55 500 8.7 31 16.4 4.76 |
| less less <t< td=""><td>40 150 710 8.10 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50</td><td>83 767 55 500 8.7 31 16.4 4.76</td></t<> | 40 150 710 8.10 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 83 767 55 500 8.7 31 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 40 150 710 8.10 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 83 767 55 500 8.7 31 16.4 4.76 |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 710 810 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.600 14.00 0.000 0.420 0.000 8.50 | 767 55 500 8.7 31 16.4 4.76 |
| sh wish ish wish sh wish h ish wish h ish | 710 810 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.600 14.00 0.000 0.420 0.000 8.50 | 767 55 500 8.7 31 16.4 4.76 |
| Bigeted solution Ing. 100 730 710 800 800 740 770 810 780 780 790 750 12 O_2 mg1 58 61 6.7 7.4 70 6.8 7.1 31 21 31 53 66 12 O_2 % 44.1 45.4 551 609 54.7 692 81.8 336 22.8 33.6 43.6 54.3 12 BOD ₃ mgO ₃ /1 | 710 810 21 7.4 228 818 17 33.0 17 46 9.0 30.0 0.600 14.00 0.000 0.420 0.000 8.50 | 767 55 500 8.7 31 16.4 4.76 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 21 7.4 22.8 81.8 1.7 33.0 17 46 9.0 30.0 0.600 14.00 0.000 0.420 0.000 8.50 | 555 50.0 8.7 31 16.4 4.75 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 228 818 17 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.00 850 | 50.0 8.7 31 16.4 4.76 |
| O1 M201 M | 1.7 33.0 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.000 8.50 | 8.7 31 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.00 8.50 | 31 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 17 46 9.0 30.0 0.60 14.00 0.000 0.420 0.00 8.50 | 31 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 9.0 30.0 0.50 14.00 0.000 0.420 0.00 8.50 | 16.4 4.76 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 0.50 14.00 0.000 0.420 0.00 8.50 | 4.76 |
| COL, NII II_0-17 ISO ISO <thiso< th=""> ISO <th< td=""><td>0.50 14.00 0.000 0.420 0.00 8.50</td><td></td></th<></thiso<> | 0.50 14.00 0.000 0.420 0.00 8.50 | |
| Nugxi ngN1 1000 0320 0.040 0.340 0.044 0.180 0.420 0.000 0.000 0.050 0.045 12 0 NO ₂ N mgN1 0.000 0.320 0.040 0.340 0.044 0.180 0.420 0.000 0.000 0.050 0.045 12 0 NO ₂ N mgN1 0.000 1.90 6.43 6.20 4.60 2.40 1.85 0.20 0.30 0.30 8.50 6.60 12 Inorganic N ngN1 14.006 6.20 9.110 7.140 5.444 4.430 4.270 11.200 11.550 6.100 10.750 7.666 12 4 Notel mg1 6.8 10.0 7.6 5.5 4.7 4.4 11.5 12.0 7.6 13.0 8.2 11 No.4 mg1 3.800 0.670 0.100 1.200 0.450 2.000 1.450 1.440 1.20 0.170 </td <td>0.000 0.420 0.00 8.50</td> <td></td> | 0.000 0.420 0.00 8.50 | |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | 0.00 8.50 | 0.140 |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | | |
| Ntotal mg1 68 100 76 5.5 4.7 4.4 11.5 12.0 7.6 13.0 8.2 11 FO ₄ P mgP1 3800 0.670 0.100 1.200 0.070 0.200 0.420 1.440 1.120 0.170 0.110 1.2 0 P total mg1 0.700 0.140 1.400 0.100 0.240 0.400 1.440 1.120 0.170 0.110 1.2 0 Ca mg1 1.88.0 1.540 1.440 1.520 0.180 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0.120 1.1 0 0 0.120 1.1 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td>9.210 1 14.006</td><td>327</td></td<> | 9.210 1 14.006 | 327 |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | | 8 157 |
| FO _a P mgP1 3 800 0 670 0 100 1 200 0 070 0 200 0 430 1 440 1 120 0.170 0 110 12 0 P total mg1 0.700 0.140 1.400 0.160 0.240 0.450 1.400 1.420 0.170 0.110 12 0 Ca mg1 1.88.0 154.0 0.460 2000 1.500 1200 0.180 0.120 11 0 Ca mg1 188.0 154.0 144.0 152.0 4 4 Mg mg1 44.0 32.0 89.0 17.0 4 Na mg1 16.6 10.0 41.0 40.0 4 K mg1 5.5 4.1 9.7 12.0 4 4 | 4.4 13 | |
| P total mg1 0.700 0.140 1.400 0.100 0.240 0.460 2000 1.560 1.200 0.180 0.120 11 0 Ca mg1 188.0 154.0 144.0 152.0 4 4 Mg mg1 44.0 32.0 89.0 17.0 4 Na mg1 16.6 10.0 41.0 9.7 12.0 4 | 0.070 3.800 | |
| Ca mg1 188.0 154.0 144.0 152.0 41 Mg mg1 44.0 32.0 89.0 17.0 4 Na mg1 16.6 10.0 41.0 40.0 4 K mg1 5.5 4.1 9.7 12.0 4 | 0.100 2.000 | |
| Ng mg1 440 320 890 170 4 Na mg1 166 100 410 400 4 K mg1 55 41 9.7 120 4 | 144.0 188.0 | |
| Na mg1 16.6 10.0 41.0 40.0 4 K mg1 5.5 4.1 9.7 12.0 4 | 17.0 89.0 | |
| K mg1 5.5 4.1 9.7 120 4 | 100 410 | |
| | 41 120 | |
| Si mg1 8.0 20 5.0 8.0 4 | 20 80 | |
| HCO3 mg/l 253 226 287 317 4 | 226 317 | 270 |
| SO ₄ mg1 140 140 100 120 4 | 100 140 | 125 |
| Ci mg1 89.0 41.0 48.0 55.0 68.0 41.0 48.0 55.0 60.0 42.0 60.0 54.0 12 | 41.0 89.0 | 55.0 |
| | 634.1 725.7 | 686.9 |
| Total hardness mgekvi 13.0 10.3 15.0 9.0 4 | 9.0 15.0 | 11.8 |
| Fe mg1 020 020 030 050 4 | 020 050 | 0.30 |
| Mn mg1 | | |
| Cu micro g1 | | |
| Zn microg1 | | |
| Cr mucro g1 | | 1 |
| | | 1 |
| Ni microg1 | | |
| Cd micro g1 | | - |
| | | |
| Oil prod mg/l | | 1 |
| Oil prod. mg1 | | 1 |
| beta HCH micro pA | | - 1 |
| gama HCH micro g/ | | 1 |
| DDE micro g1 | | 1 |
| DDT microgh | | |
| PCIB microgn | | 1 |
| Frids Index gr Kitutal col1 50000 500000 | 50000 70000 | 0 41666 |
| Ki fresh col 50000 300000 3 | | |
| E col/ml 2 150 98 3 | 2 15 | |
| HP col/ml 5800 130700 119500 3 | 5800 13070 | 0 8533 |
| HP 00124 HM col'ml 30 9520 730 3 | 30 952 | |
| 3,4 dichlor benzaine mg1 | | - |
| s,4 alchior benzaule ngg1 | <u> </u> | - |
| | [] | 1 |
| 2-chlor fenol mg1 | <u>t</u> | |
| 2.4-dichlor fenel mg1 | ┢ ┨ | 1 |
| 2,4,6 trichlor fenol mg/ | tt | |
| 2.3-dimetil fenol mg3 | tt | + |
| 3,4 dimetil fenol mg1 | <u> </u> | |
| 4-chlor 3-metil fenol mg1 | ╉──╉─── | |

| (Above Birzai, at the left bank) |
|----------------------------------|
| (Year: 1994) |
| |

| Item | Unit | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | 0.1 | Nov. | Dee. | Frequ | Mioi. | Max. | Mean |
|---|------------------------|-------------|----------------|-------------|-----------|--|------------|-------------------|-------------------|-------------------|-------------------|------------|-------------|----------------|----------|------------------|-------------|
| | m's | 0.35 | | 0.25 | 0.45 | 0.3 | 01 | 0.1 | 0.06 | 0.1 | 0.15 | 0.18 | 0.5 | ency 11 | 0.06 | 0.5 | 0.23 |
| Velocity Discharge | cu ny's | 2.15 | | 1.75 | 2.6 | 1.4 | 0.46 | 0.36 | 0.2 | 0.26 | | 0.54 | 2.63 | n | 0.2 | | 1.14 |
| Temperature | °C | 6 | | 6 | 8 | 10 | 17 | 19 | 25 | 17 | 11 | 5 | 5 | 11 | - 5 | 25 | 11.7 |
| | | Scent | | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | Scent | | | | |
| Odour | •• | less | | less | less | less | less | less | less | less | less | less | tess | [| | · | |
| Transparancy | cm | 20 | | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 | 9 | 20 | 19 |
| Colour | | Green | | Green | Green | | | | | Green | | | | | | | |
| | | ish | | ish | ish | <u>sh</u> 10.0 | ish 8,0 | <u>ish</u> 9.0 | <u>ish</u> 7.0 | <u>ish</u> 4.0 | <u>ish</u> 5.0 | ish 5.0 | ish 28.0 | 11 | 4.0 | 28.0 | 8.4 |
| Suspeded solid PH | mg/l | 5.0 7.90 | | 8.0 8.40 | 4.0 | 8.60 | 8.80 | 8.10 | 8.40 | 8.30 | 8.30 | 8.10 | 8.20 | - ii | 7.90 | 8.80 | 8.35 |
| | | 55.4 | | 40.9 | 95.4 | 102.0 | 88.4 | 79.3 | 52.6 | 68.7 | 52.7 | 64.9 | 59.4 | 11 | 40.9 | 102.0 | 69.0 |
| O ₁ O ₂ | | 6.9 | | 5.1 | 11.3 | 11.5 | 8.5 | 7.3 | 4.3 | 6.6 | 5.8 | 8.3 | 7.6 | ii ii | 4.3 | 11.5 | 7.5 |
| BODs | mgO ₂ A | 2.3 | | 4.0 | 1.4 | 1.8 | 2.8 | 1.9 | 1.7 | 1.5 | 1.1 | 1.6 | 1.7 | | 1.1 | 4.0 | 1.9 |
| BOD ₁ | mgO ₂ /1 | | <u></u> | | | | | | | | | | | | | | |
| COD, Cr | mgO ₂ /1 | | | | | | | | | | | | † | | | | |
| COD, Mn | mgO ₂ A | 11.0 | | 7.7 | 15.0 | 14.0 | 15.0 | 12.0 | 13.0 | 13.0 | 8.2 | 9.0 | 8.0 | $\frac{1}{11}$ | 7.7 | 15.0 | 11.4 |
| NH4-N | | 3.30 | | 0.40 | 0.35 | 0.38 | 0.10 | 4.00 | 0.30 | 0.10 | | 0.30 | 0.60 | 10 | 0.10 | 4.00 | 0.98 |
| NO ₂ -N | mgN/I mgN/I | 0.040 | | p.010 | | | _ | 0.010 | p.015 | | <u>†</u> | 0.020 | 0.015 | 9 | p.010 | | 0.016 |
| NO ₃ -N | mgN/1 | 4.40 | <u> </u> | 5.60 | 6.00 | 2.90 | 0.10 | · · · · | 0.25 | 0.55 | 0.20 | 3.00 | 4.70 | 1 n | 0.10 | 6.00 | 2.54 |
| Inorganie N | mgN/l | 7.740 | | 6.010 | 6.362 | 3.295 | 0.213 | 4,260 | 0.565 | † <u>****</u> | 1 · · · · | B.320 | 5.315 | 9 | 0.213 | | 4.120 |
| N total | mg/l | 8.2 | | 70 | 8.5 | 4.3 | 16 | 4.5 | 1.5 | 1.9 | 0.6 | 3.8 | 65 | | 0.6 | 85 | 44 |
| POrP | mgP/1 | 0.140 | <u> </u> | b.130 | b.030 | 0.190 | | 0.330 | 0.070 | p.066 | 0.060 | 0.060 | 0.065 | 10 | p.030 | p.330 | 0.114 |
| P total | mg/l | 0.200 | f | | | 0 2 1 0 | | 0.360 | p.150 | p.100 | 0.110 | 0.050 | 0.080 | 10 | 0.050 | 0.360 | 0.149 |
| Ca | mg/l | | | | | | | | | | | | | | | | |
| Mg | mg/l | | | ļ | ļ | | | | | | | | _ | | 1 | 1000 | 076 |
| Na | mg/l | | | | | 26.0 | | 30.0 9.0 | | ┣── | 27.0 8.0 | ļ | | $\frac{3}{3}$ | 26.0 | 30.0 | 27.6 8.0 |
| K Si | mg/l mg/l | <u> </u> | | | | /.0 | | 9.0 | | <u> </u> | 1.6 | | | $\frac{3}{2}$ | 1.6 | 1.6 | 1.6 |
| HCO ₁ | | | | | ╂── | | | | <u> </u> | | 1 | | + | - | | | |
| SO4 | ng/l ng/l | | | + | <u> </u> | <u>† </u> | | 260 | | ţ — | | | + | 1 1 | 260 | 260 | 260 |
| | mg1 | 52 | , | 30 | 25 | 25 | 30 | | | 25 | 28 | 27 | 31 | - | 2 | | |
| Mineralization | mg/l | | | | | | | | | 1 | 1 | | | | | | |
| Total hardness | mgekv/l | | | 1 | | 13.0 | | 12.2 | | | 6.0 | | | 3 | 6.0 | 13.0 | 10.4 |
| Fe | mg/l | | | ┨ | <u> </u> | Ļ | 0.00 | <u> </u> | _ | | 0.20 | ļ | | 2 | 0.00 | 0.20 | 0.10 |
| Mn | mg/l | | <u> </u> | | | <u> </u> | | | | | <u> </u> | ┨ | | | | • | |
| Cu Zn | micro g/l micro g/l | | | + | | · } | | | | + | + | | | - | ╂─── | + | |
| Cr | micro g/l | - | | | | | ļ | | <u> </u> | + | + | | + | | ╂──┉ | | |
| Ni | micro g/1 | | - | 1 | <u>†</u> | | | | + | + | † | <u> </u> | + | | | 1 | · · · |
| Pb | micro g/1 | | 1 | - | | | | | | | | | | | | | |
| Cd | micro g/l | | 1 | | | | | | [| | | | | 1 | _ | _ | |
| Detergent | mg/l | · | <u> </u> | | | <u> </u> | | _ | - | | - | ╆ | | | | | |
| Oil prod. | mg/l | · · · | | | | | ļ | | <u> </u> | ╂─── | | | | | | | |
| alfa HCH beta HCH | micro g/l micro g/l | | + | | + | | <u> </u> | + | <u> </u> | | | + | | | + | | 1 |
| gama HCH | micro g/l | | | | 1 | + | † | f | + | 1 | 1 | † | | | 1 | | 1 |
| DDE | micro g/l | | 1 | | | | | | 1 | | | | | | | | 1 |
| DDT | micro g/l | | | | | | | | | | | | | | _ | | _ |
| РСНВ | micro g/ | l | 1 | | | | _ | | ┨ | | | | –- | | 400 | 1 4000 | 4000 |
| KI total | col/1 col/1 | | | | _ | 4000 | | ╂ | ╂ | + | + | + | | + | | 0 4000 0 1000 | |
| KI fresh E | col/i | | | | <u> </u> | <1000 | <u>'</u> | + | + | + | + | | | | | 3000 | |
| HP | col'mi | + | -1 | 1 | 1 | 40 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 4 | | |
| HM | col/ml | | 1 | 1 | Ĺ | | 1 | - | | | | | | — | | | |
| 3,4-dichlor benzaine | mg/l | | | | | | | | | | | | | | _ | | |
| penta chlor fenol | mg/1 | | | | | 1 | | 1 | | | · · · · · | + | . | | | | _ |
| 2-chlor fenol | mgʻl | 1 | | | - | <u> </u> | | | <u> </u> | | | | | + | | | - |
| 2,4-dichlor fenol | mg/l | + | | + | + | + | 1 | | - | + | | | | | 1- | + | |
| 2,4,6 trichlor fenol 2,3-dimetil fenol | mg/l mg/l | | | - | | + | + | -{ | + | 1.1 | + | | 1 | | + | 1 | 1 |
| 3,4-dimetil fenol | mg/l | 1 | + | | -1 | 1 | <u>†</u> | -1 | | | 1 | | Ŀ | | 1 | | |
| 4-chlor 3-metil fenol | | | | | | | | | | | | | | | | | |
| | T | | T | | 1 | 1 | 1 | 1 | 1 | | 1 | | | 1 | Į | 1 | 1 |

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1-48

| Table 2.12 | River Water Quality Records, Tatula River (18.8 km from the month) |
|------------|--|
| | (Above Birzai, at the left back) |
| | (Year: 1995) |

| | | I | | | T | | 1 | 7 | | | | | · | Freque | r | | 1 |
|--|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|---------------|---------------|--------------|-------------|----------|---------------------------------------|--------------|---------------|
| Item | Unit | Jan. | Fcb. | Mar. | Apr. | May | June | July | Aug | Sept. | Q.t | Nov. | Dec | ncy | Mini | Max | Mean |
| Velocity | m's | 0 55 | 0.55 | 0 55 | 0.48 | 0 25 | 0.15 | 0.1 | 80.0 | 0.06 | 0.12 | 0.12 | 0.11 | 12 | 0.06 | 0 55 | 0.26 |
| Discharge | 02 67/8 | 1.52 | 4.80 | 2 52 | 2 05 | 101 | 0.60 | 0 36 | 0 20 | 0.18 | 0.50 | 0.30 | 0.31 | 12 | 0.18 | 4.80 | 1 20 |
| Temperature | 'c | 4.0 | 40 | 60 | 8.0 | 60 | 14.0 | 18.0 | 23.0 | 17.0 | 120 | 6.0 Scent | 40 Scent | 12 | 4.0 | 23.0 | 10.1 |
| Odour | | Scent less | Scent Jess | Scent less | Scent less | Scent less | Scent less | Secot Jess | Scent less | Scent less | Scent less | less | less | | | | |
| Transparany | cm | 20 | 9 | 20 | 20 | 20 | 20 | 20 | 20 | 19 | 20 | 1,743 | 20 | 12 | 9 | 20 | 18 |
| | | Yellow | Yello | Yello | Yello | Yello | Yello | Yello | | Yellow | Yellow | Yello | Yellow | | | | |
| Colour | .• | ish | wish | wish | wish | wish | wish | wish | <u>h</u> | ish | ish | wish | ish | | | | |
| Suspeded solid | നം 1 | 40 | 18.0 | 18.0 | 6.0 | 5.0 | 5.0 | 55 | 20 | 20.0 | 5.0 | 25.0 | 9.0 | 12 | 20 | 25.0 8.10 | 102 |
| <u>HI</u> | | 7.60 | 1.80 | 7.90 | 8 10 12 1 | 8.00 4.8 | 8.10 4.3 | 8.00 | 7.70 | 7.90 | 7.40 | 7.80 63 | 750 | 12 | 3.7 | 12.1 | 63 |
| <u></u> | _ <u>mg1</u> % | 7.4 56.4 | 9.9 75.4 | 81.9 | 102.2 | 385 | 43 | 47.9 | 55 2 | 38.5 | 45.6 | 50.6 | 28 2 | 12 | 28.2 | 102.2 | 55.1 |
| <u>Cı</u> BOD ₄ | ngO ₄ 1 | 1.3 | 29 | 1.0 | 1.1 | 13 | 23 | 12 | 24 | 18 | 12 | 25 | 15 | 12 | 10 | 29 | 17 |
| 800, | mgO ₂ 4 | | ́- | | | | | | | •• | | | | | | | ····· |
| COD, Cr | mgO ₂ 1 | 41 | 53 | 30 | 40 | 47 | 57 | 59 | 23 | 61 | 64 | 85 | 32 | 12 | 23 | 85 | 49 |
| COD, Ma | mgO ₂ A | 9.0 | 17.0 | 120 | 130 | 13.0 | 16.0 | 13.0 | 16.0 | 17.0 | 10.0 | 14.0 | 8.0 | 12 | 8.0 | 17.0 | 13.1 |
| NH-N | mgNl | 0 35 | 1 | 0 25 | 0.55 | 1.6 | 0.3 | 0.15 | 0 | 0.5 | 0.15 | 0.55 | 0.1 | 12 | 0 | 1.5 | 0.45 |
| NO ₂ -N | TOSN1 | 0.030 | 0.055 | 0 017 | 0.025 | 0.020 | 0.010 | 0.017 | 0.000 | 0.025 | 0.000 | 0.000 | 0.020 | 12 | 0.000 | 0.055 | 0.018 |
| NO ₃ -N | mgN/1 | 5 20 | 2 80 | 5.30 | 6.00 | 1.00 | 0.60 | 0.00 | 0 25 | 0.00 | 0 20 | 1.30 | 1.50 | 12 | 0.00 | 6.00 | 2 02 |
| Inorganic N | mgN1 | 5.580 | 3.855 | 5.567 | 6.575 | | 1.110 | 0.167 | 0 250 | 0.525 | 0 350 | 1 850 | 1.620 | 12 | 0.167 | 6.575 | 2 505 |
| N lotal | mg/1 | | 4.0 | | | 4.5 | | | 1.7 | | 08 | <u> </u> | L | 4 | 0.8 | 45 | 27 |
| PO, P | mgP/l | 0.050 | 0 250 | 0.020 | 0 030 | 0.600 | 0.080 | 0.062 | 0.070 | 0.040 | 0.060 | 0.060 | 0.065 | 12 | 0.020 | 0.250 | 0.070 |
| P total | <u>mg/</u>] | · | 0 260 | | | 0.060 | | | 0.080 | | 0 250 | 0.080 | 6.075 | 6 | 0.060 | 0.260 | 0.134 |
| Ca Mg | നപ്പി സുറി | | | | | 340 | | | 29.0 | | 25.0 | ┨─── | | | 25.0 | 34.0 | 29.3 |
| Na | 1.001 | | 180 | *** | | 180 | | | 11.0 | | 12.0 | - | 1 | 4 | 11.0 | 180 | 14.7 |
| K | <u>г</u> у1 | | 60 | | | 6.0 | | | 45 | | 9.2 | | — (| 4 | 4.5 | 9.2 | 6.4 |
| Si | mg1 | 20 | 4.8 | | | 45 | | | 62 | I | 3.0 | | | 4 | 3.0 | 62 | 4.6 |
| HCO, | ாஜ1 | | | | L | 274 | | | 262 | | 207 | ļ | | 3 | 207 | 274 | 247 |
| SO, | m;1 | | ļ | | | 21 | | 1 | 22 | | 57 | | | 3 | 21 | 57 | 33 |
| <u> </u> | n_/ | 40.0 | 13.0 | 27.0 | 27.0 | 28.0 | 28.0 | 19.0 | 481.9 | 71.0 | 16 0 456.7 | 26.0 | 68.0 | 12 | 13.0 469.0 | 710 | 32.0 479.2 |
| Mineralization Total hardness | ing1 | | 2.8 | ┣ | | 72 | | | 9.0 | <u> </u> | 10.0 | <u> </u> | | 4 | 28 | 10.0 | 7.2 |
| Fe | mgekvil mg/l | | 0.60 | - | ┨ | 0 32 | | | 0 33 | 1 | 6 28 | | | 4 | 0.28 | 0.65 | 0.39 |
| Mn | me/1 | | | ţ | | 1 | 1 | 1 | | | | | | | | | |
| Cu | microg1 | | | | | | | | 1 | | | 1. | | | | | |
| Zn | micro g/1 | | 1 | ļ | | | | | | Ľ | | | | _ | _ | | L |
| <u>G</u> | microg1 | ļ | | <u> </u> | | | <u> </u> | <u> </u> | _ | | | | | | | | |
| Ni | micro g l | | { | ┨ | ┣ | | | | ┨──── | | | + | <u>+</u> | 1 | | | |
| <u>Fb</u> Cd | micro g 1 micro g 1 | | | | | | | | + | <u>+</u> | | | | | | <u> </u> | · |
| Delergent | rog1 | | | <u> </u> | <u></u> ── | | † | 1 | | t | - | 1 | | | · · · · · · · · · · · · · · · · · · · | ~~~~ | |
| Oilprod | mgl | | 1 | | | | | 1 | 1 | | | | | | | | |
| alfa HCH | micro g/l | | 1 | <u> </u> | | | | _ | Į | | ļ | _ | | 1 | ļ | | <u> </u> |
| beta HCH | micro g/1 | | | _ | | | | | | | · | ╂─── | <u> </u> | ╉┈┉ | + | | |
| gama HCH DDE | micro g/1 | ╉─── | + | + | | | ╂ | | | | ╉━━ | ╂── | ╂ | | · · · · · | ┨-┷ | |
| DDE | micro gl micro gl | | 1- | + | + | + | 1 | 1 | 1 | 1 | | +- | 1 | 1 . | 1 | 1 | |
| PCHB | micro g1 | | 1 | 1 | 1 | 1 | 1 | 1 | <u>† </u> | | | L | 1 | | | | |
| Kitetal | colA | 1 | | 1 | | | | | 40000 |) | | | | | 400000 | | |
| Kl fresh | co1/1 | _ | 1 | | | _ | | | <10000 | | | + | | _ | 10000 | 10000 | 1000 |
| <u>E</u> | col'm | - | ╂ | | · | | | | 1100 | 1 | | + | | | 1 1100 |) 11000 | 1100 |
| HP HM | cel'mi col'mi | + | | · { | + | | + | + | 120 | | | + | | _ | 1 1200 | | |
| 3.4-dichlot benzaine | пе] | | + | + | | + | | + | 1 | | | <u> </u> | | 1 | <u> </u> | | † |
| penta chlor fenol | n_1 | 1 | 1 | + | 1 | 1 | <u> </u> | | | | | | 1 | 1 | <u> </u> | 1 | 1 |
| 2-rhlor fenol | നുി | | | | | | | | | | | | | | | | 1 |
| 2,4-dichlor fenol | trig/1 | | | | | | _ _ | . | | | - | | 1 | | | l | I |
| 2,4,6 trichlor fenel | mg1 | | | | | | + | · | | <u> </u> | + | | | | 4 | | |
| 2,3-dimetil fenot | <u>1</u> | + | | | | | | | - | | | | | | · | + | |
| 3,4-dimetil fenol 4-chlor 3-metil fenol | ng1 | | | + | | +- | | + | | | | + | | -+ | | + | + |
| | | | | | | | | + | + | + | | | + | + | 1 | 1 | 1 |
| L | 1 | | | - | | | - down | - | 1 | | _ | | | _ | <u> </u> | | <u> </u> |

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