

1 RESULT OF WATER QUALITY SURVEY

Results of Water Quality Survey

1.1 Results in Dry Season

Characteristics of the Drinking Water and Recommendations for the Use

The existing raw water sources for the exploration and utilization for the human consumption, their quality of the potability and available quantity differs substantially in every of the 4 investigated districts. In addition to this general valuation there are local differences which give a complex picture of the drinking water situation of the 7 cities and 8 communities investigated during the present survey study.

For an understanding of the drinking water issue of every locality and for the possibility of recommendations, it's necessary to consider the following aspects:

The physical, chemical and microbiological characteristics of the water in the four investigated provinces are determined by specific climatic, hydrologic and hydrogeologic features of the extensive plains of the Beni.

2. Whether or not exists an infrastructure for the central drinking water supply. Such an infrastructure is only found in the three cities of Trinidad, Riberalta and Guayaramerín as well as in the large populations of San Ignacio de Moxos, San Joaquín and San Ramon.

3. Social, economic and cultural conditions, as well as certain regional habits have developed specific behaviors regarding the domestic use of water.

Because of the mentioned points and the varying local conditions there can't be a global set of recommendations. Additionally, the recommendations have to correspond to realistic technical possibilities and the feasibility within a defined period always adjusted to the local realities.

The recommendations for the dry season are derived from the obtained results of the laboratory analysis in relation to the existing norms and guidelines for drinking water, which allow, completed by the inclusion important observations and special characteristics determined during the actual sampling process in the field, the comparison and estimation of the water quality in the Beni department.

For the evaluation of the water potability serve the corresponding guidelines of the World Health Organization (WHO) and of the European Community as well as the Bolivian Norm NB 689 (see table).

Table

Limit Threshold Values and Guidelines for the Quality of Drinking Water

Parameter	Bolivian Norm NB 689 Norma Boliviana NB 689	Norm of the European Comm. Norma de la Unión Europea	Guidelines of the WHO Guías de la OMS
pH	6.5 – 8.5	6.5 – 9.5	-
Cond. [mS/cm]	-	2000	-
Temp. [°C]	-	25	-
Alc. ^a [mg/l]	-	-	-
Salinity ^b	-	-	-
Hardness ^c [mg/l]	500	-	-
Susp. Sol. [mg/l]	-	-	-
COD [mg/l]	-	5	-
BOD ₅ [mg/l]	-	-	-
F [mg/l]	1.5	1.5	1.5
PO ₄ -P [mg/l]	-	2.2	-
NH ₄ -N [mg/l]	-	0.5	-
NO ₂ -N [mg/l]	-	0.03	0.9
NO ₃ -N [mg/l]	2.26	11.3	11.3
Ca [mg/l]	-	400	-
Fe [mg/l]	0.3	0.2	0.3
Zn [mg/l]	5	5	5
As [mg/l]	0.05	0.05	0.05
Hg [mg/l]	0.001	0.001	0.001
Coliforms			
Fecal [N/100]	0	0	0
Total [N/100]	0	0	0

Norma Boliviana NB 689, November 1996.

Guidelines for the Quality of Water for Drinking Water of the European Community, 80/778/EEG, 1980.

Guidelines of the World Health Organisation, WHO, 1985.

It is worth to anticipate (with exception of only one sample) that of the totality of the water samples collected during the dry season a relatively high temperature have been measured, which exceed the actual value recommended by the guidelines.

This characteristic of the water in the Beni Department can certainly be attributed to the climatic conditions in the amazonic region, and it leads directly to a favorable breeding ground for microorganisms and colibacteria of every kind.

District Cercado

Trinidad

None of the 20 samples taken in Trinidad and surroundings meets completely the established criterions of potability. The parameters frequently exceeding the standards for drinking water are as follows (according to frequency): total and fecal colibacteria, COD, suspended solids, iron and amonium.

Two samples contain elevated values of conductivity and salinity, one sample a significant amount of arsenic (TRI-4).

Only seven samples taken from wells of the 'semi surgente' type and from net of the cooperative (Cooperativa de Agua de Trinidad – COATRI) are free of fecal coliforms but, with exception of TRI-13, all of the samples contain colibacteria.

The water supplied by the cooperative COATRI differs significantly in its quality from one part of the city to another. This can most probably be attributed to different sources or drainage area of the water extraction.

The private water tanks (noque), widespread in the whole urban area, used for the storage of rainwater partly also as a mixture with water from the public supply, as well as the wells of the 'semi surgente' type with manual water pumps perforated by PRAS-BENI, contain water with physical-chemical and microbiological characteristics which not correspond to the criterions of drinking water. The same situation applies to the superficial water from rivers, lakes or ponds.

Recommendations

In the city of Trinidad the quality of the drinking water supplied by the public net is soon about to improve, since new deep wells have already been perforated which will provide the raw water for the drinking water supply. Therefore, there is the possibility that in a near future the public drinking water of Trinidad meets the requirements for potability. The actual deficits of the public water net need to be resolved in order to guarantee the supply of water completely drinkable.

The Noques – a traditional and widespread form for the collection and storage of water in Trinidad – have to be periodically cleaned and disinfected (for instance: chlorine) by the private users. It can be assumed that taking out the water with private vessels which haven't been sufficiently cleaned is an important source for the contamination of water tanks (noque) and open wells (noria).

Because of a generally high salinity degree of the water from "semi surgente" wells installed in the suburbs of Trinidad this source is not used by the people as drinking water supply. For that reason and for a greater representativity only one of those wells has been investigated in Trinidad. The 'semi-surgente' wells aren't reliable sources for the drinking water supply. The population in peripheric areas uses water from existing open wells (noria), water bought from tank trucks or water from their own noques.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

San Pedro Nuevo

In San Pedro Nuevo it was determined that all of the water samples, both from rain water tanks and from underground water, are outside of the margin for potability.

With exception of two underground water samples from wells of the 'semi surgente' type with manual water pumps (SPN-3 y SPN-6), all samples contain a high degree of COD and fecal coliforms. Additionally, the water of this region presents a high content of iron, colibacteria and suspended solids.

The water of the wells 'semi surgente' is characterized by a high degree of salinity (above of a physiologically acceptable value) which is the main reason for the non-use by the population. The likewise high hardness levels and conductivities result from the elevated salinity degree.

Recommendations

The situation of the water used for human consumption in San Pedro Nuevo is rather critical in the final period of the dry season. This situation became even worse because of the deteriorated state of the village's main water tank (noque) of the parish church, which used to store rainwater and diminished the water supply problem. To improve the water supply conditions and to guarantee the quality of the drinking water it is mandatory to repair the noque of the church and to periodically clean and disinfect the tank.

The underground water from the wells 'semi surgente' is not appropriate for the human consumption because of its high salinity level.

The seven presently used artificial excavations retaining rainwater aren't hermetically enclosed and allow the direct access of domestic animals, which contaminate the water without a possible control. The entrance of animals to these places has to be restrained.

It could be observed that the washing of clothes around those artificial ponds is a considerable contamination source as well. This habit has to be changed and domestic work shifted away from the water source.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

San Javier

The water samples of San Javier show similar physico-chemical and microbiological results to those of San Pedro Nuevo: none of the samples meets the requirements for drinking water.

With exception of the wells 'semi surgente' (SJA-1 and SJA-3) in all samples fecal coliforms in differing quantities were detected. Other limiting parameters for the water quality of the typical supply sources: total colibacteria, iron, suspended solids as well as elevated values of COD and salinity.

The least contaminated samples have been taken from the water tank (noque) of the church (SJA-4) and from the open well (noria) of the farm 'El 7' (SJA-8), both sources contain a minor number of colibacteria. The water of the open well (noria) SJA-8 shows results of good quality for drinking water from the physico-chemical point of view.

Recommendations

The water tank (noque) of the church has to be periodically cleaned and disinfected to completely guarantee the potability of the stored water, for it is an important and central source for the water supply.

The water from the well 'semi surgente' of the school "Jorge Monasterio" (SJA-1) and from the noria of the hospital (SJA-7) is because of the high salinity not suitable for human consumption. The second well 'semi surgente' situated in the municipality (SJA-3) also reveals an elevated salinity close to the permitted limit, but for other determined values it is neither apt for human consumption. Generally, the ground water of this region is not suitable for consumption because of its content of mineral salts. Water from those sources is useless for the population without further treatment.

The artificial excavations with collected rainwater allow the direct access of domestic animals to the water. Access of animals has to be avoided. The 'tarope' and other water plants for purification purposes have to be periodically replaced to conserve their purifying effects.

As described for San Pedro Nuevo, it was observed that the washing of clothes around those artificial ponds is an additional contamination source as well. This habit has to be changed and domestic work has to be kept away from the water source.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

Casarabe

The analytical results of the 12 water samples of Casarabe show fair differences, reflecting the distinct origins of the water as well as a distinguished behavior of the users, which could be observed during the sampling. The supply of drinking water comes from water tanks (noque) y artificial excavations, both storing rainwater, and from open wells (noria).

The sample CAS-4 from an open well (noria) of a farm is the only sample with physico-chemical parameters inside the established margins for drinking water. Nevertheless, a high temperature and the presence of colibacteria were detected which is endemic for almost everywhere in the Beni. Surprisingly, the sample CAS-9 from a water tank (noque) of the camp of INCO-TERRA-VELKO (road service) is practically clean and only showing an undesired presence of suspended solids. For taking out the water an electrical pump is used.

The remaining samples contain (according to frequency): total colibacteria and fecal coliforms, high concentrations of iron, suspended solids and ammonium. All the ponds with rainwater generally contain a high load of organic contaminants.

Recommendations

Probably, in Casarabe there is a ground water reservoir of a very good physico-chemical quality at less than a kilometer from the village (estancia of Mr. Manuel Arias). This area should be explored hydrogeologically and studied carefully. Depending on the results, a supply of drinking water of a good quality for the population could be possible, taking advantage of an already existing

infrastructure (elevated water tank)

The water deposits (noques) need to be cleaned and disinfected more frequently to avoid the proliferation of bacteria. The organic contaminants originate from the washing of the roofs during rainfall, but also from not sufficiently cleaned vessels and recipients. More caution about storage and utilization of the water is suggested. Equally important seem to be the installation of materials from PVC or galvanized zinc for the capture of the water from the roof instead of iron tubes, as it is the case of the sampling point CAS-1.

The water of the noque of the road service company (rainwater mixed with water brought from other places) indicates that a successful method to prevent contamination, for instance through fecal bacteria, is to avoid the direct contact of persons with the water by the use of little electrical water pumps.

The artificial excavations with stagnant rainwater, as described earlier, are not adequately enclosed to prevent the access of domestic animals. Equally, tarope and other water plant have to be replaced from time to time to preserve their purifying effects.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

District Moxos

San Ignacio de Moxos

Four of the samples have been directly taken in San Ignacio de Moxos and the remaining samples in different communities to the west and east of the town. The analyzed water samples coming from ground water, rainwater and superficial water are comparably rather clean (70 % free of fecal and 40 % free of total colibacteria).

San Ignacio de Moxos actually counts on a distribution system for drinking water, which covers only a part of the urban area though. The water comes from the Laguna Iserere, the water pump is not very far from the bank. The lake is frequented by people, which bath not far from the water extraction point (fecal coliforms). The raw water from the lake (SIG-4) presents a high content of suspended solids, organic load (COD), fecal and total colibacteria. Additionally, a low degree of minerals was determined. After a little treatment, the physico-chemical characteristics of the water stay almost unchanged (SIG-7) before it arrives at the user through the network.

The two samples of Puerto San Borja from different sources show distinct characteristic features with both samples outside the margin for drinking water. The river water from Río Ampere is essentially contaminated with fecal coliforms and with a high level of organic contents, whereas the well 'semi surgente' (SIG-2) contains water of a high salinity with a limited potability.

In the communities of Monte Grande, Bermejo, Argentina and Fátima, geographically separated, ground water from wells of the 'semi surgente' type (PRAS-BENI) is used. In three cases (SIG-3, SIG-8, SIG-10) the water is of a good quality and microbiologically clean. In the fourth case (Bermejo, SIG-9) the ground water contains an elevated concentration of iron, suspended solids and slightly elevated organic load.

It was observed that the water pumped out with manual pumps has a milky aspect. This is attributed to a whirling during the pump process, which also causes the transport of suspended solids (very fine clay of bright color) and provoke the milky aspect. This fine clay settles down after a few days which indicates that the suspended solids are consequence of an inadequate technique (possibly due to construction failures with poorly dimensioned filters and/or filter sand/gravel or due to a wrong design of the manual pump).

Recommendations

In San Ignacio de Moxos a new drinking water system will operate very soon with water taken from the Laguna Iserere. The physical treatment of the water by sand and gravel filters and the disinfection with chlorine promise to solve some of the present quality problems of the drinking water.

In Puerto San Borja and in the community La Argentina it is necessary to disinfect the water by boiling prior human consumption.

With regard to the milky water from the 'semi surgente' wells technical solution have to be found by perforation engineers, since that phenomenon is observed in every area with aquifers of very fine clay.

San José de Cabito

The samples were taken in four geographically very separated localities. There are well defined sources for the supply of drinking water used by the population of the four localities: open wells (noria), 'semi surgente' wells and the Río Apere who passes through two sampling places.

In the locality of San Lorenzo, the samples SJC-2 and SJC-3 from 'semi surgente' wells are microbiologically clean and besides of an elevated iron value and an acidic pH generally potable. In the open well (noria) of the locality, used by many families as a water supply, the same problem as in other places can be found with a high number of total and fecal coliforms of an anthropogenic origin. The sample of the noria (SJC-1) which has a brown color contains a great quantity of suspended solids and iron, like the previously described wells.

In the community of Monte Grande only open wells (norias) exist for the drinking water supply. The ground water of the two norias (SJC-4 and 6) is characterized by a low pH, a little mineralization degree and an elevated concentration of iron. Microbiological contamination is generally observed.

The two samples taken in Santa Rosa del Apere, one from a 'semi surgente' well (SJC-7) and the other out of the Río Apere (SJC-8) differ regarding their physico-chemical features but both are microbiologically contaminated. The well water contains a very high number of fecal coliforms, the organoleptic characterization during the sampling revealed a decayed smell of the water.

The population of San José de Cabito counts with semi surgente' wells and the Río Apere for the water supply. The Río Apere, which is widely used by the inhabitants of the community, presents the typical problems of superficial waters with a microbiologic contamination and a considerable organic charge (SJC-9). The two investigated wells 'semi surgente' show different qualities: whereas SJC-10 completely corresponds to the requirements of drinking water, the second well (SJC-11) contains iron and fecal as well as total colibacteria.

The water used in the boarding school (SJC-12) comes from the same aquifer as the water SJC-10 since the physico-chemical properties are evidently identical. However, the fact of the water storage in an elevated tank allows the proliferation of bacteria.

Recommendations

In San Lorenzo already exists a certain infrastructure for the central water supply. Also the quality of the ground water, with an adequate treatment to eliminate the iron, is suitable for human consumption. The distribution of drinking water through a net could be realized in a medium period.

In the meantime it is advisable to boil the water prior consumption, above all the water coming from norias. This measure is especially useful in the community Monte Grande, which apparently depends only on norias seriously contaminated with fecal and total colibacteria.

In Santa Rosa del Apere it is necessary to seal off the well 'semi surgente' of the plaza since the quality of the ground water with an extremely high level of fecal coliforms presents a sanitary risk. It is recommended to analyze all of the existing wells 'semi surgente' of this community since it can not be ruled out that there exists a hydrogeological unfavorable situation as a reason for this phenomenon (the Río Apere borders a great part of the village).

In San José de Cabito exists a good alternative for the drinking water supply thanks to the quality of the ground water of the wells 'semi surgentes' compared to the contaminated waters of the Río Apere. In case of the use of river water for human consumption the water has to be boiled before drinking.

On the other side, as shows the well of the school, in San José de Cabito exist natural conditions in favor of a drinking water supply for the community realizable in a medium period of time.

Santísima Trinidad

The community of Santísima Trinidad has as the only sources of drinking water the rivers Izacese and Sasasama. In this region, the rivers still have a strong gradient causing a fast current.

Both waters differ in their geochemical characteristics, but show the same acidic pH, a very little content of mineral salts and a great number of colibacteria. The sample of the Río Izacese additionally contains a slightly elevated value of iron.

Recommendations

Presently, this community doesn't have alternatives for a supply of drinking water of a good quality. Furthermore, the hydrogeological conditions of the area are unknown. The region of the Chapare is known as a zone with high precipitation, therefore exists the possibility to install a central rain water tank (noque) to collect and use rain water, for instance on the terrain of the church.

It is also realistic to search for an underground source for the water supply in a medium period of time.

In the present, the water should be boiled before the consumption because of the considerable quantity of colibacteria.

District Mamoré

Advancing to the north of the Beni department, particularly in the pampas and savannas of the district Mamoré, the geochemical composition of the superficial as well as ground water changes substantially due to the podzolic soil of these regions.

The soil, generally formed of very fine clay, contain very little minerals, which is also reflected by the characteristics of the water. The water of that region show two specific features: a pH value between 4.11 and about 6.0 and a very low degree of mineral salts, almost similar to that of distilled water.

San Joaquín

In San Joaquín there exists an extensive drinking water net which reaches almost every housing, but the majority of the population consumes the water of their private wells (noria). The water samples contain notable concentrations of nitrite and nitrate. In three cases nitrate surpasses the permissible limit established by the Bolivian norm.

It could be confirmed that the four samples from the water network, supplied by the local cooperative, is disinfected and free of fecal colibacteria and two of them (SJO-3 and SJO-8) also free of total colibacteria.

On the other hand, the water from norias, which is preferentially consumed by the people contains fecal as well as total colibacteria without exception in considerable quantities.

Recommendations

The population of San Joaquín prefers to consume water from norias by custom, because supposedly, this is 'sweet' water compared to that of the cooperative. However both water types are identical since it comes from the same subsoil, differing only in the chlorination of the network water for sanitary reasons.

In order to guide the population, it is recommended to realize permanent campaigns about the characteristic features of the local water and sanitary effects in relation to the risk of water from the noria. The deep-rooted but incorrect habit about the 'sweet' water has gradually to be changed.

San Ramón

The characteristic features of the drinking water and the conditions of use in San Ramón are quite similar to those described for San Joaquín. Though it can be pointed out that the population more frequently uses the water from the network supply, which is also distributed by a better and reliable electrical service.

The water is completely demineralized, the conductivity is generally about 25 mS/cm and the pH values differ between 5.18 and 5.95.

Two samples contain nitrate in a concentration, which surpasses the limit of 2.26 mg/l. In three samples (SRA-1, SRA-3 and SRA-8) fecal colibacteria were detected, one of them was taken from the cooperative water supply. However, the water taken from the tab is usually free of fecal and total colibacteria indicating a good effect of the central disinfection (chlorination).

Recommendations

Like in San Joaquín, it is recommended to realize permanent campaigns about the characteristic features of the local water and sanitary effects in relation to the risk of water from the noria in order to guide the population and to gradually change the 'sweet' water habit.

Another point of concern is the fact that the raw water as well as the treated water don't contain the essential minerals for human body. A solution to improve the water quality from this point of view should be found.

Buena Vista

Buena Vista is a little community, which uses a public and a private open well (noria). The water of the wells 'semi surgentes' installed by PRAS-BENI is very rarely uses because of its milky and turbid aspect and other undesired characteristics.

However, the ground water of the wells 'semi surgentes' as well as of the open wells (norias) comes from the same aquifer. The analysis of the water reveals a complete demineralization with electric conductivities lower than 20 mS/cm and an acidic pH in the range between 4.11 and 4.68. From this point of view the water is almost comparable to distilled water with regard to its chemical contents.

The two open wells (noria) are obviously contaminated by fecal colibacteria, a fact, which is not observed in case of the wells 'semi surgentes'. The water samples partly show significant concentrations of iron. The elevated values of suspended solids (fine clay) are the result of eddying caused either by the vessels for water withdrawal or by the manual pumps in case of the wells 'semi surgente'.

Recommendations

In the present time there doesn't exist an alternative to the ground water used by the population of the community. The water completely lacks the essential minerals for the human nutrition.

Since the majority of the population uses the water of the public noria it is necessary to maintain a certain hygienic level with a more cautious use of water taking devices (colifecals). It is also obligatory to keep domestic activities, like for instance washing, away from the actual surrounding of the water source in order to avoid direct infiltration of contaminants through the well walls.

A general recommendation for the water use is the simple disinfection of the water through boiling.

Santa Rosa de Vigo

The 12 samples were taken in rather distant places and in ten cases ground water samples were taken from artificial excavations (pauro) or open wells (noria) which serve as drinking water sources.

With exception of the samples taken in Puerto Siles from the Río Mamoré (SRV-5) and from a private noque (SRV-6), all the other samples are ground water samples with the typical geochemical features of the region: very little contents of mineral salts and a low pH between 4.19 and 5.89. Four samples contain slightly elevated iron values. The water is generally very soft with a mainly milky aspect.

Colibacteria are present in all of the samples, and in ten cases also fecal coliforms have been detected. Only the two samples from wells 'semi surgentes' taken in Alejandría (SRV-11, SRV-12)

are free of fecal bacteria.

The three samples from 'pauros' in Santa Rosa de Vigo (SRV-2, 3, 4) contain significant nitrate concentrations probably resulting from animal secretions.

It is worth to note that the geochemical features of the river water from the Río Mamoré in Trinidad (TRI-1) and in Puerto Siles (SRV-5) respectively, are practically constant.

Recommendations

The two samples taken in Chaco Lejos, ground water from a noria and a well 'semi surgente', contain fecal and total colibacteria. It is recommended to investigate the remaining wells to figure out the origin of the contamination (the well 'semi surgente' has a considerable depth of supposedly 37 m according to declarations of the people). Recently, public latrines have been installed in this community by PRAS-BENI. A general recommendation for the water use is the disinfection of the water through boiling.

In Alturas del Carmen there exist only open wells (noria) for the water supply which are microbiologically contaminated. The water has to be boiled before domestic use.

In Puerto Siles, the Río Mamoré represents the main source for the water supply. However, some families also use water tanks (noques) either filled with rainwater or also with water brought from Alturas del Carmen.

Both supply sources are microbiologically contaminated what makes at least a simple disinfection through boiling necessary.

During the sampling it could be confirmed that it is very probable to find suitable ground water in Puerto Siles, at a depth of about 8 m. On the slopes of the Río Mamoré some springs of water exist at this level, similar to the situation in Santa Rosa de Vigo.

The artificial excavations (pauro) of Santa Rosa de Vigo present disastrous hygienic conditions. Domestic animals, specially pigs, have access to the area and to the water itself. This situation needs to be changed immediately. At the same time, the washing of clothes directly besides the water source is to avoid. In any case, the water must be boiled before consumption.

In Alejandría there exists perhaps an alternative to the presently used demineralized ground water, since there is a lagoon close to the locality. This fact requires a more detailed investigation.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

District Vaca Díez

The district Vaca Díez in the north of the Beni department is characterized by tropical or amazonic forests, also called 'hylea', with particular species of trees and plants typical for this region. Due to the climatic conditions (precipitation, high temperatures), the soil is lateritic of a red color, or in the laterization process. In some areas, like for instance in Cachuela Esperanza, appear acidic rocks (granite) of the Brazilian shield.

Riberalta

Nine out of ten samples taken in Riberalta come from open wells (noria). This reflects that the the noria is the mainly used source for the supply of drinking water, though there exists a central drinking water system in the city but limited to the old city center.

Only the sample RIB-9 was taken from the water system of the cooperative. It is treated water with a considerable water hardness in addition to a elevated iron concentration surpassing the permitted limit for drinking water. Also total colibacteria have been detected.

The difference of the water quality of the centrally supplied water compared to the water from the open wells (noria) is observable. The norias contain, with one exception, high levels of fecal and total colibacteria. The concentration of mineral salts is mainly very low and the values of pH vary between 2.68 and 4.85.

Recommendations

In Riberalta it could be observed that the inhabitants connected to the central water service don't use the water for consumption and maintain the tradition of using private wells (noria). Practically every house has its own noria. The habit is based on the supposedly 'salty' water of the cooperative.

A recommended measure is an explanation campaign for the population of the whole community about the risks of the consumption of water from norias highly contaminated with fecal and total colibacteria.

The extension of the existing water net to the periferic parts of the city is a measure, which the local municipality has to consider according to financial possibilities.

Tumichucua

The 8 samples were taken in three communities located to the southeast of Riberalta. However, the three groups of water samples don't show significant variations with regard to their physico-chemical characteristics. The samples present a conductivity lower than 40 mS/cm, sign for a low mineralization degree, and low pH values between 3.40 and 5.15. All of the samples contain colibacteria, some also fecal coliforms. In the community of Candelaria the water is slightly ferrous.

Recommendations

In the community of Peña Amarilla, which only relies on an artificial excavation (pauro) for the water supply, it is necessary to keep this source and its surroundings clean, additionally to the avoidance of washing clothes close to the place. The water should be boiled before its use.

In Candelaria a well 'semi surgente' has been recently installed which produces water of a better quality than the pauros on the slopes of the Río Beni. Additionally, the construction of an open well (noria) close to the sanitary post is almost finished. The ground water should be of same quality as the water of the well 'semi surgente'.

A general recommendation for the water use for human consumption is the disinfection of the water through boiling.

The waters from the springs, which supply the pauros located along the slopes of the lake Tumichucua differ in their content of fecal coliforms of anthropogenic origin. The water has to be boiled before human consumption. Additionally, sources of contaminations, like domestic activities (washing), have to be kept away from the immediate surroundings.

In the community of Tumichucua exists a rather developed infrastructure for the centralized water supply, but it depends on financial capacities to take advantage of the existing structure.

Cachuela Esperanza

The only sample of the community of Cachuela Esperanza (CES-1), which is representative for this locality, was taken from the two connected water storage tanks (noria). Besides low pH conductivity values (scarce mineralization), the water contains fecal and total colibacteria in a considerable number.

In the community of Santa Teresita del Yata, three water samples of three different locations have been taken. All of them contain fecal and total colibacteria. Though the quality of the water samples is comparable to the well-known situation of this region (scarce mineralization, acidic pH), there are geochemical differences of the three distinct sources. CES-2 was taken from the Río Yata and contains high concentrations of iron and organic contaminants. CES-3 (creek water) presents the lowest conductivity and temperature measured in the Beni and a very low pH value of 2.88. The last could be explained by a significant presence of humic acids in the creek. The ground water of the noria of the school (CES-4), with exception of the presence of fecal bacteria, presents a relatively good quality for drinking water.

In Santa Rosa two samples were taken, one from a well 'semi surgente' (free of fecal coliforms) and one out of a little creek, which is contaminated with fecal and total colibacteria and elevated concentration of iron and organic substances.

Recommendations

In Cachuela Esperanza the construction of an elevated water tank and of a new water extraction point is soon to be finished. It already exists the infrastructure for the centralized water distribution. It is expected that the drinking water problems can be solved soon.

For the community of Santa Teresita del Yata, the supply of drinking water for the population from the noria of the school is recommended, since the quality of this water is better than that of the superficial waters. Nevertheless, it is necessary to boil the water before use.

The well 'semi surgente' in Santa Rosa is a water source free of fecal colibacteria and it should be recommended to use that water for the human consumption.

Guayaramerín

The majority of the population of Guayaramerín is connected to the drinking water system with water from the little river 'Las Arenas'. The people in the new suburbs use water storage tanks (noria). The drinking water supplied by the cooperative does not meet the actual requirements for potability established by the normative. Additionally to low conductivity and pH values the samples contain elevated concentrations of iron and organic contaminants (COD) superior than the permitted limits. Moreover, not only coliformes are present but partly also fecal colibacteria of a large number.

The two samples out of norias (GUA-4 and GUA-5), with exception of fecal bacteria and a pH between 4.53 and 4.81, can be qualified as superior compared to the cooperative water.

The samples taken out of the Río Yata and from a noria in the community Rosario del Yata contain elevated numbers of fecal and total colibacteria in addition of a high iron concentration.

Recommendations

On the actual sampling day in Guayaramerín there were problems with the central drinking water net. This fact can probably explain some 'anomalies' of the water supplied by the cooperative. Nevertheless, the scarce mineralization indicates the source of the water supply for the centralized distribution (Arroyo 'Las Arenas')

The cooperative is obliged to offer a drinking water according to the established normative. The arroyo 'Las Arenas' is probably not a suitable supply source because of its geochemical characteristic. It should be looked for other alternatives, and perhaps the Río Mamoré is a source for qualitatively better water.

Anyway, the raw water must be treated in order to comply with the requirements of potability. For the moment it is necessary to boil the water before consumption.

In the community of Rosario del Yata it is strongly recommended to disinfect the water by boiling before consumption.

SAMPLING TEST

Trinidad - Provincia Cercado

Characteristics of the Sampling Points

The sampling of drinking water in Trinidad was realized in different quarters of the town itself and, additionally, in suburb areas with an extension of about 20 km westwards to Puerto Almacén, Puerto Varador (former meander of the river Mamoré) and in the Río Mamoré (community Los Puentes) following the actual course of the river (actually situated in the province Moxos).

In the Trinidad area 20 water samples were collected. The majority was taken from private tanks (Spanish: noque *) and wells, which represent the predominant sources of drinking water supply used by the people.

* The noque is a closed tank or deposit from cement, sometimes covered with a layer of paint from the inside. The tank contains either rainwater, water from a public supply, water bought from sources not specified or a combination of all kinds. Usually, wells (noria) actually in use are found outside the city center.

There is a so called 'semi surgente' type of wells with a manual water pump installed by PRAS-BENI, which are common in the new suburbs outside the old center of Trinidad (for the term 'semi surgente' doesn't exist a specific technical definition).

In small communities along the banks of the river Mamoré the population takes directly water out of the river. In Puerto Varador and in Puerto Almacén ponds (lagoons) are available for the water supply, which have been formed by the former meander of the Mamoré and the Río Ibare, respectively.

In the city of Trinidad it was possible to take three samples directly from the distribution network of the drinking water cooperative.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-1	Cercado / Trinidad	21.09.2001 / 9.55 h	Rio Mamoré, "Los Puentes"		Eastern bank of the river Mamoré Orilla Este del Mamoré	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly from the river Directo del río	Color Color Slightly gray Levemente gris	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : The people take the water directly from the river / La gente toma directamente el agua del río					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-2	Cercado / Trinidad	21.09.2001 / 10.30 h	"Los Puentes"		Northern shore of the pond Orilla Norte de la Laguna	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly from the pond Directo de la laguna	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-3	Cercado / Trinidad	21.09.2001 / 11.35 h	Puerto " Varador"		Dead arm of the Mamoré Brazo muerto del Mamoré	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly from the pond Directo de la laguna	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Intense Acentuada	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-4	Cercado / Trinidad	21.09.2001 / 11.55 h	Bomba de agua "El Varador"		Water pump of the city Bomba de agua del pueblo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor Putrid Putrefacto	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-5	Cercado / Trinidad	21.09.2001 / 12.40 h	Puerto Almacén		Ibare river Río Ibare	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly from the river Directo del río	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Considerable Fuerte	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código TRI-6	Community / District Provincia / Municipio Cercado / Trinidad	Date / Time of Sampling Fecha / Hora de Muestreo 21.09.2001 / 14.35 h	Address Dirección Barrio Nueva Trinidad, c/ n° 10, Lote N° 6. Familia Ardaya Olivera		Location Lugar Family Ardaya Olivera Noque de la familia Ardaya Olivera	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Water from rain fall Recoge agua de lluvia	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
Comments / Comentarios : -						
Code Código TRI-7	Community / District Provincia / Municipio Cercado / Trinidad	Date / Time of Sampling Fecha / Hora de Muestreo 21.09.2001 / 15.00 h	Address Dirección Barrio Nueva Trinidad, c/ n° 26		Location Lugar Manual pump Bomba manual	
	Type of Water Source Tipo de Fuente Well water for city supply Pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Slightly brown Levemente marrón	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
Comments / Comentarios : -						
Code Código TRI-8	Community / District Provincia / Municipio Cercado / Trinidad	Date / Time of Sampling Fecha / Hora de Muestreo 21.09.2001 / 15.30 h	Address Dirección Barrio Paititi, c/ Santa Rosa N° 30		Location Lugar Familia Montenegro López	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap / Faucet Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
Comments / Comentarios : -						
Code Código TRI-9	Community / District Provincia / Municipio Cercado / Trinidad	Date / Time of Sampling Fecha / Hora de Muestreo 21.09.2001 / 15.50 h	Address Dirección Barrio Paititi c/ Santa Rosa N° 30		Location Lugar Familia Montenegro López	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Rainwater tank Agua de lluvia de noque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
Comments / Comentarios : The Rainwater tank was painted with brown paint / El noque estaba pintado con pintura marrón.						
Code Código TRI-10	Community / District Provincia / Municipio Cercado / Trinidad	Date / Time of Sampling Fecha / Hora de Muestreo 21.09.2001 / 16.15 h	Address Dirección Barrio Las Brisas, Av. Principal		Location Lugar Familia Montenegro López	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro With bucket Con balde	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-11	Cercado / Trinidad	22.09.2001 / 8.25 h	Barrio Universitario,final Tacuaral		Familia Aspiazu	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
TRI-12	Cercado / Trinidad	22.09.2001 / 9.00 h	Barrio El Palmar, Av. Las Palmas18		Familia Méndez	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Suspended solids Partículas suspendidas
	Comments / Comentarios : -					
TRI-13	Cercado / Trinidad	22.09.2001 / 9.30 h	Barrio Universitario,final Tacuaral		Familia Aspiazu	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
TRI-14	Cercado / Trinidad	22.09.2001 / 9.55 h	Barrio San Antonio, calle N. Suárez 153		Familia Canida	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Rainwater tank Agua de lluvia de noque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
TRI-15	Cercado / Trinidad	22.09.2001 / 10.10 h	Barrio San Antonio, calle N. Suárez 153		Familia Canida	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tank Tanque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-16	Cercado / Trinidad	22.09.2001 / 10.55 h	Barrio Mangalito, Av. San Juan 6		Familia Iva	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro The water was taken with bucket <i>El agua fue sacada con un recipiente</i>	Color Color Milky <i>Lechoso</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez Significant <i>Bastante</i>	Sedimentation Sedimentación Medium <i>Mediana</i>
	Comments / Comentarios : -					
TRI-17	Cercado / Trinidad	22.09.2001 / 11.25 h	Barrio 18 de Agosto, Av. Dina Pinto s.n.		Familia Temo - Mendoza	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro The water was taken out with a bucket <i>El agua fue sacada con un recipiente</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguno</i>	Sedimentation Sedimentación Scarcely <i>Escasa</i>
	Comments / Comentarios : -					
TRI-18	Cercado / Trinidad	22.09.2001 / 14.15 h	Barrio Belén, Av 25 de Diciembre 49		Familia Añez - Ardaya	
	Type of Water Source Tipo de Fuente Stagnant water <i>Agua estancada</i>	Water taking Device Tipo de Suministro Rainwater tank <i>Agua de lluvia de noque</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguno</i>	Sedimentation Sedimentación None <i>Ninguna</i>
	Comments / Comentarios : Tank contained rainwater and water supplied by truck <i>Noque con agua suministrada por camion y agua de lluvia</i>					
TRI-19	Cercado / Trinidad	22.09.2001 / 14.40 h	Barrio Villa Corina, Prolongación Monceteñez esq. Rogaguado		Familia Flores - Banegas	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro With bucket <i>Con balde</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguno</i>	Sedimentation Sedimentación None <i>Ninguna</i>
	Comments / Comentarios : -					
TRI-20	Cercado / Trinidad	22.09.2001 / 15.15 h	Calle Cipriano Barace		Laboratorio clínico Altstadt	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro With bucket <i>Con balde</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguno</i>	Sedimentation Sedimentación None <i>Ninguna</i>
	Comments / Comentarios : -					

Results of Analysis

TRI 1 - 10

Parameter	TRI-1	TRI-2	TRI-3	TRI-4	TRI-5	TRI-6	TRI-7	TRI-8	TRI-9	TRI-10
pH	7.58	7.49	7.96	6.80	6.78	9.43	6.91	6.96	8.44	7.29
Cond. [$\mu\text{S}/\text{cm}$]	246	170	630	633	169	800	2241	3415	74	1008
Temp. [$^{\circ}\text{C}$]	29.1	31.2	30.4	26.6	29.6	27.6	27.2	29.1	27.2	26.6
Alc. ^a [mg/l]	91.3	85.8	437.0	423.8	51.3	227.0	376.3	378.8	36.8	379.8
Salinity ^b	0.161	0.115	0.404	0.407	0.114	0.515	1.489	2.310	0.056	0.652
Hardness ^c [mg/l]	< 17.9	131.4	364.3	307.1	45.4	78.4	289.3	1328.6	20.2	237.5
Susp. Sol. [mg/l]	6.0	< 3	44.4	41.2	8.4	4.8	20.0	< 3	< 3	141.6
COD [mg/l]	17.3	14.5	31.2	15.2	37.2	14.9	< 5	< 5	< 5	< 5
BOD ₅ [mg/l]	8	5	11	4	14	< 4	< 4	< 4	< 4	< 4
F [mg/l]	0.23	0.07	0.10	< 0.1	< 0.1	0.36	0.20	0.69	< 0.1	0.09
PO ₄ -P [mg/l]	0.19	0.08	0.09	0.29	0.61	0.08	0.40	0.08	0.12	0.22
NH ₄ -N [mg/l]	0.11	0.09	0.28	2.02	0.48	0.13	0.90	1.29	0.06	0.47
NO ₂ -N [mg/l]	0.06	0.06	0.10	0.03	0.02	0.06	0.07	0.07	0.06	0.05
NO ₃ -N [mg/l]	< 0.23	< 0.23	0.49	< 0.23	1.55	< 0.23	< 0.23	< 0.23	0.61	0.30
Ca [mg/l]	23.36	19.64	85.99	62.69	11.96	11.84	65.80	238.41	10.76	52.39
Fe [mg/l]	0.50	0.31	0.07	18.06	3.98	0.03	0.05	0.08	0.03	0.32
Zn [mg/l]	0.018	0.013	< 0.005	0.288	0.018	0.096	0.072	0.158	0.029	0.018
As [mg/l]	< 0.002	< 0.002	< 0.002	0.334	< 0.002	0.007	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [N/100]	4100	3100	120	0	25	24	0	0	310	6
Total [N/100]	7500	8000	2400	350	1600	1450	1150	90	3500	5200

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 [Standard Methods for the Examination of Water and Wastewater (1992)]

Results of Analysis

TRINIDAD 11-20

Parameter	TRI-11	TRI-12	TRI-13	TRI-14	TRI-15	TRI-16	TRI-17	TRI-18	TRI-19	TRI-20
pH	9.13	7.35	7.25	8.31	7.57	6.96	6.72	8.52	6.40	8.0
Cond. [$\mu\text{S}/\text{cm}$]	652	770	469	75.1	4 45	396	372	115	278	770
Temp. [$^{\circ}\text{C}$]	28.0	27.4	28.5	27.7	27.5	26.6	26.9	26.5	26.9	29.0
Alc. ^a [mg/l]	232.5	282.8	276.5	39.0	268.8	286.3	243.5	69.8	150.0	228.0
Salinity ^b	0.419	0.495	0.301	0.057	0.286	0.255	0.240	0.081	0.181	0.495
Hardness ^c [mg/l]	166.2	167.5	99.3	53.0	110.2	200.0	257.1	99.5	119.8	346.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	92	< 3	< 3	< 3	< 3
COD [mg/l]	6.58	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD ₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	0.36	0.51	0.31	< 0.1	0.30	< 0.1	0.70	< 0.1	0.57	0.43
PO ₄ -P [mg/l]	0.46	0.27	0.25	0.09	0.34	0.59	0.09	0.14	0.20	0.30
NH ₄ -N [mg/l]	0.04	0.05	1.14	0.02	0.19	0.38	0.05	0.03	0.04	0.02
NO ₂ -N [mg/l]	0.05	0.07	0.07	0.05	0.16	0.08	0.05	0.05	0.05	0.05
NO ₃ -N [mg/l]	< 0.23	1.49	< 0.23	0.73	0.75	< 0.23	< 0.23	0.69	0.58	1.24
Ca [mg/l]	33.28	33.52	21.28	13.40	32.26	71.59	44.79	27.04	12.56	50.80
Fe [mg/l]	0.12	0.04	0.07	< 0.02	0.51	0.70	0.68	0.03	0.08	< 0.02
Zn [mg/l]	0.006	0.011	0.011	0.029	0.020	0.015	0.020	0.022	0.011	0.036
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [$\text{N}/100$]	0	0	0	10	0	120	20	8	50	12
Total [$\text{N}/100$]	3850	1300	0	4450	1800	2050	950	1000	2800	2550

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3 .

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution.

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the *Examination* of Water and Wastewater (1992)]

SAMPLING TEST

San Pedro Nuevo - Provincia Cercado

Characteristics of the Sampling Points

The situation of the drinking water supply in this locality is critical during the final days of the dry season. A total number of 9 water samples have been taken from the only existing water sources at this moment.

Two wells installed by PRAS-BENI of the 'semi surgente' type with a manual water pump exist in the village. Nevertheless, these wells are very rarely used by the people because of their rather brackish water. The majority takes the drinking water from various 'wells' installed in the village. Those artificial wells or water deposits hold back the rainwater of various months and contain a variety of aquatic plants with supposedly purifying effects (species of tarope, cañuela, pochi, and other plants commonly called 'yomomo' by the population). A fundamental characteristic feature of the wells is that they are carved in unconsolidated clay and loamy sediments – found in great extensions in the Beni – which are highly impermeable with a retention of the water during long periods

One sample was taken out of a private water deposit (noque) which was the only one still containing the remainders of rainwater.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-1	Cercado / San Pedro Nuevo	24.09.2001 / 09.35 h	Pozo de Agua		Familia Arcelia	
	Type of Water Source Tipo de Fuente Rainwater Agua de Lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor None Ninguno	Turbidity Turbidez Significant Notoria	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : The well is used by various families / El pozo es utilizado por varias familias					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-2	Cercado / San Pedro Nuevo	24.09.2001 / 10.10 h	Calle 6 de Agosto		Familia Lizandro Coimbra	
	Type of Water Source Tipo de Fuente Rainwater Agua de Lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : The well contains plants for purification / El pozo tenía plantas purificadoras					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-3	Cercado / San Pedro Nuevo	24.09.2001 / 10.30 h	Hospital / Posta sanitaria		Centro de salud "Corazón de Jesús", San Pedro	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor Putrid Putrefacto	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-4	Cercado / San Pedro Nuevo	24.09.2001 / 10.50 h	Northern exit of the village Salida norte del pueblo		Cuneta - Poz	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly from a ditch Directo, agua de cuneta	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-5	Cercado / San Pedro Nuevo	24.09.2001 / 11.20 h	Public well east of the plaza Pozo público al este de la plaza			
	Type of Water Source Tipo de Fuente Stagnant water / Rainwater Agua estancada / Agua de lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Light Brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-6	Cercado / San Pedro Nuevo	24.09.2001 / 11.45 h			Municipality / Alcaldía de San Pedro	
	Type of Water Source Tipo de Fuente Well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Clara	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : The water seems a little salty / Un poco salobre					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-7	Cercado / San Pedro Nuevo	24.09.2001 / 12.25 h	Plaza, Northern side / lado norte		Familia Vélez-Soto	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Rainwater Tank Agua de lluvia de noque	Color Color Light Milky Levemente Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-8	Cercado / San Pedro Nuevo	24.09.2001 / 12.40 h	Water tank in the south of the village / Noria al sur del pueblo		Next to the family Guatara-Cuevas Al lado de familia Guatara-Cuevas	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-9	Cercado / San Pedro Nuevo	24.09.2001 / 15.00 h	Carretera de San Pedro a San Javier. Km 15		Estancia " Belleza"	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Champagne Champán	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Light Leve
	Comments / Comentarios : -					

Results of Analysis

SAN PEDRO NUEVO 1 - 9

Parameter	SPN-1	SPN-2	SPN-3	SPN-4	SPN-5	SPN-6	SPN-7	SPN-8	SPN-9
pH	6.71	6.50	6.80	6.68	6.85	6.77	7.33	5.62	5.89
Cond. [$\mu\text{S/cm}$]	97.7	137	3830	54.3	55.0	4090	122	37.1	119
Temp. [$^{\circ}\text{C}$]	27.4	26.5	27.7	30.3	30.0	28.2	28.0	29.8	29.0
Alc. ^a [mg/l]	56.8	68.5	323.5	24.8	22.0	345.0	64.3	21.3	61.3
Salinity ^b	0.070	0.094	2.608	0.046	0.046	2.794	0.085	0.036	0.084
Hardness ^c [mg/l]	41.6	59.3	639.3	28.8	< 17.9	664.3	90.9	34.6	27.0
Susp. Sol. [mg/l]	28.4	16.8	21.6	41.6	20.4	36	15.2	22.0	< 3
COD [mg/l]	25.2	34.8	< 5	18.7	72.2	< 5	9.2	44.5	77.6
BOD₅ [mg/l]	9	12	< 4	6	30	< 4	6	27	34
F [mg/l]	0.14	0.12	0.90	< 0.1	< 0.1	0.36	< 0.1	< 0.1	0.17
PO₄-P [mg/l]	0.16	0.74	0.27	0.26	0.13	0.40	0.56	0.26	0.17
NH₄-N [mg/l]	0.14	0.05	0.86	0.23	0.08	1.00	0.28	0.13	0.07
NO₂-N [mg/l]	0.15	0.06	0.06	0.03	0.08	0.15	0.14	0.15	0.13
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	0.32	< 0.23	< 0.23	0.64	0.66	0.91
Ca [mg/l]	3.06	14.12	178.40	0.81	0.31	213.20	21.86	1.48	5.96
Fe [mg/l]	1.57	1.61	0.89	1.86	1.14	1.41	0.28	2.67	6.40
Zn [mg/l]	0.027	0.027	0.432	0.020	0.025	0.490	0.020	0.186	0.402
As [mg/l]	< 0.002	< 0.002	0.006	< 0.002	< 0.002	0.016	< 0.002	< 0.002	< 0.002
Hg [mg/l]	0.001	0.001	0.001	0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001
Coliforms									
Fecal [N/100]	440	2050	0	460	4800	0	78	1280	2550
Total [N/100]	2560	17500	1280	3840	25600	20	3100	11520	19200

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution.

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Javier - Provincia Cercado

Characteristics of the Sampling Points

The situation of the drinking water supply in San Javier is very much alike to that in San Pedro Nuevo and equally critical at the end of the dry season. In this location 7 samples have been taken. Additionally, two samples were collected in cattle farms along the road to Trinidad where a great number of people work and live with their families.

In San Javier there are various sources used for the supply of drinking water:
wells 'semi surgentes' with manual water pumps (containing water of the same characteristics as earlier described),
artificial water deposits storing rainwater which are filled with aquatic plants,
a few open wells (noria), and
a huge water tank (noque) containing stored rainwater which is situated on the terrain of the church and an important water reservoir for the population.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código SJA - 1	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 25.09.2001 / 8.50 h	Address Dirección Colegio "Jorge Monasterio"		Location Lugar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Lightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
Comments / Comentarios : -						
Code Código SJA - 2	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 25.09.2001 / 9.05 h	Address Dirección Plaza Principal " Benjamín Vargas"		Location Lugar Dr. Erwin Arce Mack	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						
Code Código SJA - 3	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 25.09.2001 / 9.30h	Address Dirección Alcaldía Municipal San Javier		Location Lugar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						
Code Código SJA - 4	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 25.09.2001 / 9.50h	Address Dirección Church / Iglesia		Location Lugar Water deposit of the Church Noque de la Iglesia	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 5	Cercado / San Javier	25.09.2001 / 10.10 h	Main square, southern side Plaza Principal lado sur		Family / Familia Amanda Vargas de Chávez	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Green Verde	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Much Mucha
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 6	Cercado / San Javier	25.09.2001 / 10.35 h	Well / Pozo de la pista		Well at about 200 m east of the community / Pozo al lado este del pueblo, aprox. 200 m	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Honey brown Marrón miel	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 7	Cercado / San Javier	25.09.2001 / 10.55h	Hospital San Javier			
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : Light salty water / Agua levemente salobre					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 8	Cercado / San Javier	25.09.2001 / 11.35 h	Estancia " El 7"			
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 9	Cercado / San Javier	25.09.2001 / 13.00 h	Estancia " La Unión"		Fernado Antelo Gil	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					

Results of Analysis

SAN JAVIER 1 - 9

Parameter	SJA-1	SJA-2	SJA-3	SJA-4	SJA-5	SJA-6	SJA-7	SJA-8	SJA-9
pH	6.83	6.53	6.93	8.33	6.31	5.64	7.47	7.38	6.21
Cond. [$\mu\text{S/cm}$]	2270	128	1942	81.2	67.2	94.3	4910	710	152
Temp. [$^{\circ}\text{C}$]	27.2	26.5	27.5	27.7	26.3	27.4	27.1	26.6	29.8
Alc. ^a [mg/l]	373.0	63.5	413.8	39.5	35.3	29.8	426.	421.3	78.3
Salinity ^b	1.509	0.088	1.283	0.061	0.052	0.068	3.389	0.457	0.104
Hardness ^c [mg/l]	300.0	36.4	266.1	49.6	30.4	50.4	375.0	147.5	35.0
Susp. Sol. [mg/l]	68.8	24.0	41.6	< 3	30.0	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	30.4	26.4	< 5	48.0	111.2	< 5	< 5	98.0
BOD ₅ [mg/l]	< 4	19	18	< 4	25	58	< 4	< 4	49
F [mg/l]	0.15	< 0.1	0.32	< 0.1	< 0.1	0.11	1.31	1.61	< 0.1
PO ₄ -P [mg/l]	0.38	1.19	1.72	0.10	0.76	0.49	0.14	0.06	0.11
NH ₄ -N [mg/l]	1.40	0.24	0.05	0.18	0.18	0.11	0.05	0.07	0.08
NO ₂ -N [mg/l]	0.11	0.16	0.08	0.06	0.09	0.10	0.04	0.06	0.07
NO ₃ -N [mg/l]	< 0.23	0.93	< 0.23	1.15	0.27	1.62	0.44	< 0.23	< 0.23
Ca [mg/l]	90.30	3.00	75.77	21.19	1.55	5.16	125.31	60.97	13.50
Fe [mg/l]	0.03	2.08	0.46	0.30	1.84	6.81	0.15	0.17	3.82
Zn [mg/l]	0.028	0.033	0.018	0.069	0.047	0.032	0.026	0.016	0.018
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms									
Fecal [N/100]	0	70	0	2	1050	3700	40	12	80
Total [N/100]	950	12800	650	1050	15500	16000	1600	650	3850

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution.

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3

[Standard Methods for the *Examination* of Water and Wastewater (1992)]

SAMPLING TEST

Casarabe - Provincia Cercado

Characteristics of the Sampling Points

The variety of sources of the water supply of Casarabe is bigger than those of San Javier and San Pedro Nuevo. Mainly wells (noria), artificial wells and private water tanks (noque) exist in this location. Some families use barrels for water storage. The elevated water tank and the deep well of the village are out of use.

The water tank in the camp of the INCO-TERRA-VELKO company (road service) is the only one counting with the installation of an automatic water pump.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -1	Cercado / Casarabe	26.09.2001 / 9.15 h	Colegio / Escuela "Carlos Loayza Beltran"			
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Rainwater, Stagnant water Agua de lluvia, Agua estancada	Directly Directo	Clear	None Ninguno	None Ninguno	None Ninguno
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -2	Cercado / Casarabe	26.09.2001 / 9.30 h	Next to the water storage tank Al lado del tanque de agua			
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Directly Directo	Light milky Levemente lechoso	None Ninguno	Scarcely Escasa	Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -3	Cercado / Casarabe	26.09.2001 / 9.50 h	Calle 6 de Agosto, casi final			
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Rainwater, Stagnant water Agua de lluvia, Agua estancada	Directly Directo	Brown Marrón	None Ninguno	Significant Bastante	Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -4	Cercado / Casarabe	26.09.2001 / 10.20 h	Avenida Ganadera al final		Dr. Manuel Arias Roca	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Directly Directo	Clear Claro	None Ninguno	None Ninguno	None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -5	Cercado / Casarabe	26.09.2001 / 10.45 h	Estancia familia Gómez			
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : Rain during the sampling process / Lluvia durante el muestreo					
CAS -6	Cercado / Casarabe	26.09.2001 / 11.15 h	Main square / Plaza Principal		Bella Aponte	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : Rain during the sampling process / Lluvia durante el muestreo					
CAS -7	Cercado / Casarabe	26.09.2001 / 11.35 h	Calle Juan Bautista Banega		Sra Mercedes Rocha de Pereira	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Very scarcely Muy escasa
	Comments / Comentarios : Rain during the sampling process / Lluvia durante el muestreo					
CAS -8	Cercado / Casarabe	26.09.2001 / 12.10 h	Avenida Ganadero al Norte			
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Light milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Supply for about 70 % of the population / Lugar de aprovisionamiento del 70% de la gente Rain during the sampling process / Lluvia durante el muestreo					
CAS -9	Cercado / Casarabe	26.09.2001 / 12.40 h	Camp / Campamento consorcio INCO-TERRA-VELKO			
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Tap and pump Grifo y bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Rainwater tank underground / Noque bajo tierra Rain during the sampling process / Lluvia durante el muestreo					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-10	Cercado / Casarabe	26.09.2001 / 14.30 h	Avenida Juan Bautista Banega		Familia Añez-Ortiz	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : Rainwater brought from another place / Agua de lluvia traída de otro lugar Rain during the sampling process / Lluvia durante el muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-11	Cercado / Casarabe	26.09.2001 / 14.50 h	About 1.5 km east of Casarabe 1.5 Km al oeste de Casarabe		Family / Familia Campo	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez None ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling process / Lluvia durante el muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-12	Cercado / Casarabe	26.09.2001 / 15.20 h	Finca " 7 de Marzo"		Antonio Amadeo Caumal	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : Rain during the sampling process / Lluvia durante el muestreo					

Results of Analysis

CASARABE 1- 12

Parameter	CAS-1	CAS-2	CAS-3	CAS-4	CAS-5	CAS-6	CAS-7	CAS-8	CAS-9	CAS-10	CAS-11	CAS-12
pH	7.31	7.13	6.78	6.88	6.75	7.26	8.01	6.83	8.75	7.28	7.16	6.53
Cond. [$\mu\text{S/cm}$]	83.2	360	110	502	119	130	202	129	133	126	110	163
Temp. [$^{\circ}\text{C}$]	27.7	25.6	27.2	26.7	27.7	26.9	27.2	29.0	27.8	26.5	26.4	26.8
Alc. ^a [mg/l]	46.3	205.8	63.5	308.8	65.5	63.5	118.8	67.0	79.3	67.0	52.3	73.0
Salinity ^b	0.062	0.232	0.078	0.322	0.083	0.090	0.134	0.090	0.092	0.087	0.077	0.110
Hardness ^c [mg/l]	< 17.4	127.4	40.2	280.2	63.4	81.8	134.2	45.3	86.4	25.6	75.7	46.9
Susp. Sol. [mg/l]	20.4	< 3	5.2	< 3	23.2	8.8	< 3	4.0	26.0	34.0	140.4	36
COD [mg/l]	10.3	17.3	24.9	< 5	20.0	7.82	6.92	16.3	< 5	19.1	48.0	44.0
BOD₅ [mg/l]	4	8	14	< 4	9	< 4	< 4	7	< 4	9	25	26
F [mg/l]	0.20	1.79	0.90	0.49	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.22	< 0.1
PO₄-P [mg/l]	0.19	0.21	0.38	0.11	0.06	0.13	0.26	0.07	0.12	< 0.05	0.37	0.55
NH₄-N [mg/l]	0.60	5.50	0.45	0.04	0.11	0.05	0.06	0.05	0.04	0.05	0.29	0.12
NO₂-N [mg/l]	0.08	0.06	0.20	0.05	0.06	0.36	0.06	0.06	0.06	0.06	0.17	0.11
NO₃-N [mg/l]	< 0.23	< 0.23	0.79	< 0.23	< 0.23	1.15	0.98	< 0.23	0.55	< 0.23	0.49	0.31
Ca [mg/l]	19.54	36.04	18.31	94.27	15.59	72.07	81.94	14.36	46.17	11.15	10.14	10.45
Fe [mg/l]	0.50	1.81	2.56	0.10	1.75	0.16	0.18	0.99	0.06	0.38	3.92	4.23
Zn [mg/l]	0.081	0.028	0.026	0.018	0.016	0.039	0.037	0.039	0.028	0.035	0.035	0.018
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms												
Fecal [N/100]	25	135	285	0	116	1600	8	330	0	130	1550	2800
Total [N/100]	1000	5760	6590	380	4480	8320	7850	4600	1280	8220	20100	24350

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3 .

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 [Standard Methods for the *Examination of Water and Wastewater* (1992)]

SAMPLING TEST

San Ignacio de Moxos - Provincia Moxos

Characteristics of the Sampling Points

North of San Ignacio de Moxos there is the lake Iserere, of which the drinking water is taken and distributed through a network of plastic pipes (white PVC). But only the old part of the village is connected to this water delivery system.

Other water sources are rainwater tanks (noque, the use of those rainwater deposits is a well-known habit by the long established residents), open wells (noria) and, in one case, a well with a manual water pump.

The majority of the old houses have own open wells (noria) of which a certain number is already out of use for the houses being connected to the local water distribution system.

The sampling has been extended to the communities of Puerto San Borja and Monte Grande west of San Ignacio, and to the eastward till Bermejo, Argentina and Fátima. All these localities count on wells of the 'semi surgente' type installed by PRAS-BENI. In Puerto San Borja one sample was taken directly out of the Río Apere, whose water is frequently used by many residents.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 1	Moxos / San Ignacio	28.09.2001 / 8.15 h	Puerto San Borja		Under the bridge / Bajo del puente, Río Apere	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 2	Moxos / San Ignacio	28.09.2001 / 8.35 h	Puerto San Borja		Terrain of the church Predio de la Iglesia	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 3	Moxos / San Ignacio	28.09.2001 / 9.30 h	Comunidad "Monte Grande"		Leandro Salvatierra	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 4	Moxos / San Ignacio	28.09.2001 / 10.00 h	Laguna Isirere de San Ignacio			
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 5	Moxos / San Ignacio	28.09.2001 / 10.30 h	Calle Montes esq. Ballivian		José Santa Cruz	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 6	Moxos / San Ignacio	28.09.2001 / 11.15 h	Calle Montes esq. Ballivian		José Santa Cruz	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 7	Moxos / San Ignacio	28.09.2001 / 11.50 h	Calle Santiesteban		Sr. Domingo Angola (Pastor)	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
	Comments / Comentarios :					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 8	Moxos / San Ignacio	28.09.2001 / 12.45 h	Comunidad Bermejo		Public water pump / Bomba pública	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 9	Moxos / San Ignacio	28.09.2001 / 13.25 h	Comunidad " La Argentina"			
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG -10	Moxos / San Ignacio	28.09.2001 / 14.40 h	Community / Comunidad Fátima			
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Precipitation (rain) during the sampling / Precipitaciones durante el muestreo					

Results of Analysis

SAN IGNACIO 1- 10

Parameter	SIG-1	SIG-2	SIG-3	SIG-4	SIG-5	SIG-6	SIG-7	SIG-8	SIG-9	SIG-10
pH	7.13	6.70	6.62	7.35	7.74	6.60	6.08	6.95	6.16	6.9
Cond. [$\mu\text{S/cm}$]	141	2145	363	41.0	97.5	41.8	224.0	1320	520	1258
Temp. [$^{\circ}\text{C}$]	29.3	26.3	26.2	30.1	26.6	28.8	26.8	27.6	26.6	26.1
Alc. ^a [mg/l]	83.00	881.0	223.8	22.0	58.0	24.0	13.3	756.5	262.3	539.8
Salinity ^b	0.097	1.424	0.234	0.039	0.070	0.039	0.147	0.860	0.334	0.819
Hardness ^c [mg/l]	71.7	132.8	< 17.4	< 17.4	54.5	30.5	< 17.4	80.2	101.4	133.8
Susp. Sol. [mg/l]	23.2	< 3	< 3	43.6	< 3	< 3	< 3	< 3	82.0	< 3
COD [mg/l]	12.3	< 5	< 5	24.6	< 5	19.9	< 5	< 5	7.10	< 5
BOD₅ [mg/l]	< 4	10	5	8	< 4	7	4	6	6	6
F [mg/l]	< 0.1	1.10	1.04	< 0.1	< 0.1	< 0.1	0.34	0.27	< 0.1	0.90
PO₄-P [mg/l]	0.14	0.09	0.11	0.08	0.26	0.13	0.12	0.10	0.27	0.11
NH₄-N [mg/l]	0.06	0.07	0.05	0.06	0.03	0.16	0.10	0.18	0.27	0.17
NO₂-N [mg/l]	0.06	0.05	0.05	0.07	0.05	0.06	0.05	0.05	0.05	0.05
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	0.72	0.20	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	17.57	47.41	1.65	3.24	38.50	4.35	4.03	21.24	31.10	29.87
Fe [mg/l]	2.32	0.02	0.14	0.02	0.04	0.35	0.37	0.17	5.69	0.19
Zn [mg/l]	0.030	0.121	0.045	0.005	0.033	0.011	0.016	0.030	0.132	0.151
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.016	< 0.002	< 0.002	0.017	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [N/100]	120	0	0	12	35	0	0	0	0	0
Total [N/100]	1920	0	250	1280	950	210	150	0	0	0

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution.

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San José de Cabito - Provincia Moxos

Characteristics of the Sampling Points

The sampling points in the region called 'San José de Cabito' are very scattered and include the following localities: the village San Lorenzo, the communities Monte Grande, Santa Rosa del Apere and San José de Cabito. Of each locality between 2 to 4 representative drinking water samples have been taken from rainwater tanks (noria) and 'semi surgentes' wells.

In Santa Rosa del Apere and San Jose de Cabito the Río Apere is used for the supply of drinking water. In San José de Cabito, additionally, there is a school with dormitory, which owns a deep well with an elevated storage tank and an internal distribution through water pipes.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 1	Moxos / San José de Cabito	29.09.2001 / 10.00 h	San Lorenzo		Calle Moxos, al lado de Elisabeth Castro	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Manual Manual	Brown Marrón	None Ninguno	Significant Bastante	Significant Bastante
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 2	Moxos / San José de Cabito	29.09.2001 / 10.30 h	San Lorenzo, Restaurante		Sra Miriam Saavedra (Profesora)	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Reserved Well Water for City Water Supply Agua de Pozo para Abastecimiento del Pueblo	Manual pump Bomba manual	Clear Claro	None Ninguno	None Ninguno	None Ninguno
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 3	Moxos / San José de Cabito	29.09.2001 / 11.25 h	San Lorenzo		South of the polyfunctional field Al sur del polideportivo	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Reserved Well Water for City Water Supply Agua de Pozo para Abastecimiento del Pueblo	Manual pump Bomba manual	Clear Claro	None Ninguno	None Ninguno	None Ninguno
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 4	Moxos / San José de Cabito	29.09.2001 / 13.35 h	Monte Grande		Central square / Plaza del Pueblo	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Directly Directo	Clear Claro	None Ninguno	None Ninguno	A little Un poco
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 5	Moxos / San José de Cabito	29.09.2001 / 13.55 h	Monte Grande		South of the central square Al sur de la plaza	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 6	Moxos / San José de Cabito	29.09.2001 / 14.25 h	Monte Grande		College / Escuela viejo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Light milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 7	Moxos / San José de Cabito	29.09.2001 / 16.30 h	Santa Rosa del Apere		Central square / Plaza	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Light Milky Levemente lechoso	Odor Olor Putry Putrefacto	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 8	Moxos / San José de Cabito	29.09.2001 / 16.45 h	Santa Rosa del Apere		River / Río Apere	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Light brown Marrón claro	Odor Olor Putrid Putrefacto	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 9	Moxos / San José de Cabito	29.09.2001 / 18.15 h	San José de Cabito		River Apere, general water supply Río Apere, suministro del pueblo	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC -10	Moxos / San José de Cabito	29.09.2001 / 18.40 h	San José de Cabito		Main square, next to Cabito Plaza, al lado de Cabito	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color None Ninguno	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC -11	Moxos / San José de Cabito	29.09.2001 / 19.55 h	Salida a Eva – Eva (Jesús María)		Family / Familia Moye	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color None Ninguno	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC -12	Moxos / San José de Cabito	29.09.2001 / 19.20 h	Dormitory / Internado “San José de Cabito Jesús María”			
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Tap Grifo	Color Color None Ninguno	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

SAN JOSE DE CABITO 1- 12

- The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution.
- Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Santísima de Trinidad - Provincia Moxos

Characteristics of the Sampling Points

This location corresponds to the most southern point of the survey study and, at the moment, it is only reachable through the zone of the Chapare of Cochabamba. The only sources for the extraction of drinking water for this community are the Río Izacese to the north and the Río Sasasama to the south. For this reason only two representative water samples, one of each river, could be taken in the location.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
STR - 1	Moxos / Santísima Trinidad	26.10.2001 / 10.20 h	-		Río Izacese	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
STR - 2	Moxos / Santísima Trinidad	26.10.2001 / 11.15 h	-		Río Sasama	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Results of Analysis**SANTISIMA TRINIDAD 1 - 2**

Parameter	STR-1	STR-2
pH	5.22	4.22
Cond. [$\mu\text{S}/\text{cm}$]	38.7	84.6
Temp. [$^{\circ}\text{C}$]	29.0	29.2
Alc. ^a [mg/l]	16.5	21.0
Salinity ^b	0.037	0.063
Hardness ^c [mg/l]	< 17.4	44.45
Susp. Sol. [mg/l]	< 3	< 3
COD [mg/l]	< 5	< 5
BOD₅ [mg/l]	< 4	< 4
F [mg/l]	< 0.1	0.23
PO₄-P [mg/l]	0.17	0.06
NH₄-N [mg/l]	0.04	0.02
NO₂-N [mg/l]	< 0.015	< 0.015
NO₃-N [mg/l]	< 0.23	< 0.23
Ca [mg/l]	4.89	14.09
Fe [mg/l]	0.78	0.16
Zn [mg/l]	0.033	0.036
As [mg/l]	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001
Coliforms		
Fecal [N/100]	0	0
Total [N/100]	3190	4640

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 . [Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Joaquín - Provincia Mamoré

Characteristics of the Sampling Points

In San Joaquín exists an extensive network which connects nearly every housing to the local drinking water supply. In the village there are two elevated water tanks, but only one is in use right now. It must be stressed that the actual water supply by the cooperative is not a permanent service what means it depends on the function of the electric generator of the village (designated hours of the day).

In spite of the existence of the local distribution red the overwhelming majority of the population uses their own wells (noria) as a water source. There are two reasons for that behavior: on the one hand there is a prejudice that the water of the own open well is 'sweet water' and the water supplied by the network is 'salty water'. On the other hand a great deal of the residents doesn't take water out of the local network because of economic reasons (the quotes of the cooperative can't be paid). Because of the quoted reasons and to get a more representative result of the actual situation the major part of the samples have been taken from the private water sources (open wells - noria).

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 1	Mamoré / San Joaquín	02.10.2001 / 14.35 h	Calle Santa Cruz esq. 6 de Agosto		Felix Mejía Durán	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios :					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 2	Mamoré / San Joaquín	02.10.2001 / 14.55 h	Calle Sucre 19		Radio station / Radio emisora "Agua dulce", Sr. Wilbaldo Bravo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 3	Mamoré / San Joaquín	02.10.2001 / 15.15 h	Calle Sucre 19		Sr. Wilbaldo Bravo R.	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 4	Mamoré / San Joaquín	02.10.2001 / 15.30 h	Calle 21 de Agosto		Family / Familia Osman Cortez	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 5	Mamoré / San Joaquín	02.10.2001 / 16.10 h	Calle Bolivar 46		Dalecio Nuñez	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 6	Mamoré / San Joaquín	02.10.2001 / 16.45 h	Calle Germán Busch 26		Family / Familia Ortiz	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling / Lluvia durante el muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 7	Mamoré / San Joaquín	02.10.2001 / 17.05 h	Calle Tarija 31		Family / Familia Pedro Bejarano Tipa	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Perceptible Perceptible
	Comments / Comentarios : Rain before sampling / Lluvia antes del muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 8	Mamoré / San Joaquín	02.10.2001 / 17.35 h	Calle 18 de Noviembre 43		Family / Familia Sadi Sosa Ojopi	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain before sampling / Lluvia antes del muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 9	Mamoré / San Joaquín	02.10.2001 / 17.55 h	Calle 18 de Noviembre 29		Family / Familia Risco	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain before sampling / Lluvia antes del muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO -10	Mamoré / San Joaquín	02.10.2001 / 18.10 h	Calle Bolivar 1		Family / Familia Jimmi Melgar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain before sampling / Lluvia antes del muestreo					

Results of Analysis

SAN JOAQUIN 1 – 10

Parámetro	SJO-1	SJO-2	SJO-3	SJO-4	SJO-5	SJO-6	SJO-7	SJO-8	SJO-9	SJO-10
pH	4.78	5.95	5.10	5.60	4.60	5.70	5.00	5.12	5.93	5.80
Cond. [$\mu\text{S/cm}$]	33	131	62	279	159	26	12	65	28	36
Temp. [$^{\circ}\text{C}$]	27.1	27.1	29.6	27.5	26.7	26.6	26.9	30.7	30.3	30.0
Alc. [mg/l]	4.5	25.5	6.5	14.3	3.3	11.3	3.3	3.3	15.0	13.0
Salinidad [mg/l]	0.033	0.090	0.050	0.181	0.107	0.029	0.022	0.052	0.032	0.028
Dureza [mg/l]	< 17.4	20.2	< 17.4	28.0	27.5	28.2	< 17.4	< 17.4	< 17.4	< 17.4
Sól. Sus. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
DQO [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
DBO₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.06	0.06	< 0.05	< 0.05	< 0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05
NH₄-N [mg/l]	0.04	0.02	< 0.015	< 0.015	0.07	0.05	0.05	0.02	0.02	0.02
NO₂-N [mg/l]	0.05	0.05	0.04	0.05	0.06	0.05	0.05	0.05	0.05	0.04
NO₃-N [mg/l]	1.04	0.42	2.17	9.22	7.1	0.33	0.37	2.49	< 0.23	0.49
Ca [mg/l]	0.63	10.59	1.07	12.82	2.65	2.76	0.37	0.83	0.90	1.01
Fe [mg/l]	0.13	0.26	< 0.05	< 0.05	< 0.05	0.18	0.54	< 0.05	< 0.05	< 0.05
Zn [mg/l]	0.014	0.115	0.072	0.010	0.016	0.042	0.072	0.078	0.057	0.053
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliformes										
Fecales [N/100]	520	45	0	1160	22	210	25	0	0	0
Totales [N/100]	5220	2900	0	9860	2650	3480	3200	0	7800	8000

- a** The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- b** The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- c** Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Ramón - Provincia Mamoré

Characteristics of the Sampling Points

In this village the situation is very similar to the previously described of San Joaquín (chapter BENI-SJO). As well there exist the same behavior with respect to the consumption of the supplied water by the local network accompanied with the same arguments to use private sources of drinking water. Therefore, the 10 samples of this locality have been taken from the local supply and from the private wells respectively.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 1	Mamoré / San Ramón	03.10.2001 / 9.00 h	Calle Coronel Viera 48		Family / Familia Merín Cuellar	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 2	Mamoré / San Ramón	03.10.2001 / 9.10 h	Calle Coronel Viera 48		Family / Familia Merín Cuellar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 3	Mamoré / San Ramón	03.10.2001 / 9.30 h	Calle Ayacucho 23, San Ramoncito		Family / Familia Suárez Arriaza	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 4	Mamoré / San Ramón	03.10.2001 / 9.45 h	Calle Walter Serrath, esq. Calle Junín		Family / Familia López - Serrath	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Results of Analysis

Code Código SRA - 5	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 10.05 h	Address Dirección Calle Junín 4, Close to the port / Cerca del puerto		Location Lugar Family / Familia López - Serrath	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SRA - 6	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 10.30 h	Address Dirección Plaza Principal 5		Location Lugar Family / Familia Vaca - Arriaga	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SRA - 7	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 11.00 h	Address Dirección Calle Coronel Viera 2		Location Lugar Family / Familia Ramona Vargas	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SRA - 8	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 11.15 h	Address Dirección Calle Coronel Viera 2		Location Lugar Mauro Huasico	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SRA - 9	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 11.25 h	Address Dirección Calle al sur del Colegio "Lucio Soria" esq 18 de Noviembre		Location Lugar Rómulo Moriva	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SRA-10	Community / District Provincia / Municipio Mamoré / San Ramón	Date / Time of Sampling Fecha / Hora de Muestreo 03.10.2001 / 11.45 h	Address Dirección Calle Itunama 10		Location Lugar Family / Familia Herminio Velo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

SAN RAMON 1 - 10

Parameter	SRA-1	SRA-2	SRA-3	SRA-4	SRA-5	SRA-6	SRA-7	SRA-8	SRA-9	SRA-10
pH	5.28	5.6	5.50	5.95	5.57	5.57	5.62	5.18	5.55	5.48
Cond. [$\mu\text{S}/\text{cm}$]	72.1	24.1	22.0	28.4	22.3	21.3	21.5	168	20.4	20.9
Temp. [$^{\circ}\text{C}$]	26.1	28.2	27.8	25.2	29.6	29.2	29.9	26.8	30.4	30.2
Alc. ^a [mg/l]	7.90	7.40	7.20	10.80	8.10	7.60	8.50	8.50	8.20	8.80
Salinity ^b	0.055	0.029	0.028	0.030	0.029	0.028	0.028	0.113	0.028	0.028
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	< 0.05	< 0.05
NH₄-N [mg/l]	0.05	0.03	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.04
NO₂-N [mg/l]	0.05	0.04	0.04	0.05	0.05	0.04	0.04	0.05	0.04	0.04
NO₃-N [mg/l]	2.37	0.86	0.52	0.48	0.54	0.5	0.47	3.08	0.52	0.52
Ca [mg/l]	2.66	0.89	1.00	2.05	0.84	0.76	1.08	5.26	4.68	4.48
Fe [mg/l]	0.02	0.02	0.02	0.03	< 0.01	0.02	0.03	0.06	< 0.01	0.02
Zn [mg/l]	0.006	0.629	0.720	0.743	0.700	0.789	0.758	0.027	0.693	0.773
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [$\text{N}/100$]	15	0	110	0	0	0	0	20	0	0
Total [$\text{N}/100$]	2350	0	950	100	0	0	580	2100	0	1150

- a** The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- b** The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- c** Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Buena Vista - Provincia Mamoré

Characteristics of the Sampling Points

Buena Vista is a community situated along the eastern banks of the Río Machupo. This location is very difficult to approach during the dry season since it doesn't exist a connection through a country road.

In this community there are various well of the 'semi surgente' type (**see chapter Trinidad**) installed by PRAS-BENI, which are less used by the population, for the water often has a milky aspect or a certain grade of turbidity. That's why the majority of the people consumes the drinking water from a well which is located at about 150 m to the east of the village.

A second open well exists on a private terrain, however the use of the well isn't restricted to the public.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código BUV - 1	Community / District Provincia / Municipio Mamoré / Buena Vista	Date / Time of Sampling Fecha / Hora de Muestreo 04.10.2001 / 9.25 h	Address Dirección South of the community Al sur de la comunidad		Location Lugar Francisca Arancibia	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Light milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código BUV - 2	Community / District Provincia / Municipio Mamoré / Buena Vista	Date / Time of Sampling Fecha / Hora de Muestreo 04.10.2001 / 10.00 h	Address Dirección West of the main square / Al oeste de la plaza		Location Lugar Delante de Benedito Camama	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manul pump Bomba manual	Color Color Brown Marrón	Odor Olor Earthy Terroso	Turbidity Turbidez Complete Completa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : The well water isn't frequently used because the water is very muddy El agua de este pozo no se utiliza a menudo porque su agua es muy turbia					
Code Código BUV - 3	Community / District Provincia / Municipio Mamoré / Buena Vista	Date / Time of Sampling Fecha / Hora de Muestreo 04.10.2001 / 10.10 h	Address Dirección		Location Lugar Public well of the village / Noria comunitaria al naciente del Villerio	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with abucket Directo con balde	Color Color Clear Claro	Odor Olor Earthy Terroso	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : This well is used by all of the residents / Este pozo es utilizado por toda la comunidad					
Code Código BUV - 4	Community / District Provincia / Municipio Mamoré / Buena Vista	Date / Time of Sampling Fecha / Hora de Muestreo 04.10.2001 / 10.30 h	Address Dirección		Location Lugar Northe of the village Al Norte del Villerio	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : This well is used for potable water supply / Este pozo es utilizado para agua potable					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 5	Mamoré / Buena Vista	04.10.2001 / 10.55 h	Noria al "centro del villerio"		North of the village Al norte del villerio	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Milky Lechoso	Odor Olor Earthy Terroso	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 6	Mamoré / Buena Vista	04.10.2001 / 11.10 h	In front of the school Delante de la escuela		North of the village Al norte del villerio	
	Type of Water Source Tipo de Fuente R Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Light Pink Rosado Claro	Odor Olor Earthy Terroso	Turbidity Turbidez Complete Completa	Sedimentation Sedimentación High Alta
Comments / Comentarios : -						

Results of Analysis

BUENA VISTA 1 - 6

Parameter	BUV-1	BUV-2	BUV-3	BUV-4	BUV-5	BUV-6
pH	4.17	4.61	4.11	4.41	4.68	4.40
Cond. [$\mu\text{S/cm}$]	18.4	14.1	9.29	11.8	15.3	14.0
Temp. [$^{\circ}\text{C}$]	26.8	27.8	26.8	27.6	28.3	28.6
Alc. ^a [mg/l]	2.40	3.80	1.30	3.20	4.00	2.40
Salinity ^b	0.025	0.024	0.021	0.023	0.025	0.024
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	407.2	< 3	< 3	114.8	529.2
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05
NH₄-N [mg/l]	0.04	0.08	0.04	0.02	< 0.015	0.03
NO₂-N [mg/l]	0.05	0.07	0.06	0.05	0.05	0.04
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	0.59	0.21	0.15	0.60	0.06	0.50
Fe [mg/l]	0.41	2.29	0.25	0.06	0.31	0.23
Zn [mg/l]	0.038	0.810	0.020	0.830	0.794	0.818
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms						
Fecal [N/100]	90	0	105	0	0	0
Total [N/100]	3480	7500	3200	0	0	0

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Santa Rosa de Vigo - Provincia Mamoré

Characteristics of the Sampling Points

The sampling points of the region 'Santa Rosa de Vigo' enclose communities situated along the route San Joaquín - Puerto Siles - Santa Rosa de Vigo - Alejandría. All of those locations are geographically rather distant from each other. It is to be stressed out that in every locality the drinking water supply for the population has got it's own characteristics.

In Chaco Lejos two samples were taken, one from a well of the 'semi surgente' type with a manual water pump, of which a certain number exists in this community. The second sample was taken from an open well (noria), which has a remarkable water output and is very frequented by the population.

Alturas de Carmen located about two kilometers before reaching the Río Mamoré in Puerto Siles, has got only open wells (noria) used for the drinking water supply.

Puerto Siles, an important river port, lies on the banks of the Mamoré, whose water is predominantly used as the source of drinking water by the population. However, there are as well deposits and water tanks for either rainwater or water delivered from Alturas de Carmen.

Santa Rosa de Vigo is a community situated on the banks of the Río Mamoré. For the water supply exist two open wells (noria) of which one already dried out during the dry season. Additional to the wells there are artificial water holes, so called 'pauros' situated along the slopes of the river bank. Those deposits serve as the drinking water source for the majority of the residents.

The 'pauro' is a little artificial excavation in a clay layer, which accumulates water coming out from the overlying horizon with a low productiveness (water arteries). This horizon is also the providing source for the wells (noria) in the interior. Because of the horizontal limited extension of the water bearing horizon the water source gradually dries out in some parts of the river slope.

In the community of Alejandría the drinking water supply is assured by the wells 'semi surgente' with manual water pumps installed by PRAS-BENI.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 1	Mamoré / Santa Rosa de Vigo	04.10.2001 / 13.35 h	Well north of the village Noria al norte del pueblo			
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Directly with a bucket Directo con balde	Milky Lechoso	None Ninguno	None Ninguna	None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 2	Mamoré / Santa Rosa de Vigo	04.10.2001 / 13.55 h			"Pauro" Norte	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water Agua de pozo	Directly Directo	Milky Lechoso	None Ninguno	None Ninguna	None Ninguna
	Comments / Comentarios : The Pauro is situated on a slope of the river bank / El Pauro esta localizado en un barranco de río					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 3	Mamoré / Santa Rosa de Vigo	04.10.2001 / 14.10 h			Pauro close to the port "Pauro" cerca del puerto	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water - Stream water Agua de pozo - Agua corriente	Directly Directo	Milky Lechoso	None Ninguno	None Ninguna	None Ninguna
	Comments / Comentarios : "Pauro " with weeds / "Pauro" con algas					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 4	Mamoré / Santa Rosa de Vigo	04.10.2001 / 14.25 h			"Pauro" a 250m del N 3	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water - Stream water Agua de pozo - Agua corriente	Directly Directo	Milky Lechoso	Like seaweed Olor a algas	None Ninguna	None Ninguna
	Comments / Comentarios : Pauro supplies the mayor part of the drinking water to the city Pauro que suministra la mayor parte del agua a la ciudad					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 5	Mamoré / Santa Rosa de Vigo	04.10.2001 / 18.30 h	Puerto Siles		Rio Mamoré	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Stream water Agua corriente	Directly Directo	Lightly yellow Levemente amarillo	None Ninguno	None Ninguna	Low Baja
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 6	Mamoré / Santa Rosa de Vigo	04.10.2001 / 18.30 h	Puerto Siles		Sra Bella Vda de Angulo	
	Type of Water Source Tipo de Fuente Rain water Agua de lluvia	Water taking Device Tipo de Suministro Rain water tank Noque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 7	Mamoré / Santa Rosa de Vigo	06.10.2001 / 10.30 h	Comunidad "Chaco Lejos"		Family / Familia Jorge Galindo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual Pump Bomba manual	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 8	Mamoré / Santa Rosa de Vigo	06.10.2001 / 10.45 h	Comunidad "Chaco Lejos"		Noria east of the village Noria al este del villerio	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 9	Mamoré / Santa Rosa de Vigo	06.10.2001 / 11.30 h	Puerto Siles- Altura del Carmen		Nori of the family J. Galindo Noria familia Juan Galindo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV-10	Mamoré / Santa Rosa de Vigo	06.10.2001 / 11.45 h	Puerto Siles - Alturas del Carmen		Family / Familia Manuel Abrego	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV-11	Mamoré / Santa Rosa de Vigo	06.10.2001 / 12.45 h	Comunidad Alejandría		Pozo Familia Guzmán y Mole	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV-12	Mamoré / Santa Rosa de Vigo	06.10.2001 / 13.05 h	Comunidad Alejandría		College / Escuela	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Results of Analysis

SANTA ROSA DE VIGO 1 - 12

Parameter	SRV-1	SRV-2	SRV-3	SRV-4	SRV-5	SRV-6	SRV-7	SRV-8	SRV-9	SRV-10	SRV-11	SRV-12
pH	4.78	4.65	5.89	4.65	8.46	7.75	4.83	5.42	4.26	4.19	4.87	5.38
Cond. [$\mu\text{S}/\text{cm}$]	30.3	54.4	162	57.4	250	103	19.1	43.5	18.7	20.4	27.1	41.7
Temp. [$^{\circ}\text{C}$]	28.5	29.4	33.2	30.0	28.5	26.6	31.8	29.3	29.2	29.3	28.0	27.8
Alc. ^a [mg/l]	11.4	5.7	24.0	7.8	90.2	58.8	8.6	15.8	2.5	< 2	13.2	21.0
Salinity ^b	0.033	0.046	0.110	0.048	0.163	0.073	0.028	0.040	0.027	0.027	0.030	0.038
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	0.12	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.16	0.05	< 0.05	0.07	< 0.05	0.13	0.07
NH₄-N [mg/l]	0.13	0.03	0.08	0.03	0.06	0.22	0.03	0.03	0.07	0.03	0.05	0.04
NO₂-N [mg/l]	0.06	0.06	0.07	0.06	0.06	0.08	0.05	0.05	0.06	0.05	0.06	0.05
NO₃-N [mg/l]	< 0.23	3.06	7.82	2.40	< 0.23	0.24	< 0.23	0.86	0.41	0.50	< 0.23	< 0.23
Ca [mg/l]	3.41	5.45	13.69	4.89	5.42	28.99	0.74	5.36	0.43	0.28	1.94	2.09
Fe [mg/l]	0.90	0.60	0.06	0.21	0.56	0.06	0.09	0.25	0.20	0.17	0.26	0.64
Zn [mg/l]	0.015	< 0.005	0.017	0.023	0.011	0.220	0.699	0.096	0.056	0.043	0.155	0.096
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms												
Fecal [N/100]	5	1450	2320	7000	2800	3500	230	440	220	30	0	0
Total [N/100]	5800	23200	13900	35000	28500	21000	1160	2900	5700	1700	1350	3640

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is a unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Riberalta - Provincia Mamoré

Characteristics of the Sampling Points

The city of Riberalta has got a relatively new system of drinking water supply, but limited to the old city center. The suburbs, some of them very recently built, don't count on this service. However, as well in Riberalta like in the previously described locations of San Joaquín and San Ramón the local drinking water distribution is very rarely used by the residents. On one hand exists the sensation that the tap water is 'salty', on the other hand a great deal of the people can't or doesn't want to pay for the drinking water service. For those reasons, the majority of the population uses water from their wells (noria) and the water supplied by the cooperative for other domestic purposes.

The mayor part of the collected water samples comes from wells (noria) of the suburbs of Riberalta.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -1	Riberalta / Vaca Diez	13.10.2001 / 7.45 h	Barrio El Cerrito		Close to the bus stop / cerca de la parada de micros	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water	Directly with a bucket	Milky	None	None	Perceptible
	Agua de pozo	Directo con balde	Lechoso	Ninguno	Ninguna	Perceptible
Comments / Comentarios :		Heavy rain storms during the night before sampling / Tormentas en la noche anterior al muestreo				

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -2	Riberalta / Vaca Diez	13.10.2001 / 8.00 h	Calle Manuripi s/n, Barrio El Cerrito (lower part / parte baja)		Kathy Yoamona	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water - Stagnant water	Directly	Milky	None	None	Perceptible
	Agua de pozo - Agua estancada	Directo	Lechoso	Ninguno	Ninguna	Perceptible
Comments / Comentarios :		Heavy rain storms during the night before sampling / Tormentas en la noche anterior al muestreo				

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -3	Riberalta / Vaca Diez	13.10.2001 / 8.25 h	Barrio San Juan, Calle Amarilla		Family / Familia Carmen Durán	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water	Directly with a bucket	Light Brown	None	Complete	High
	Agua de pozo	Directo con balde	Marrón leve	Ninguno	Completa	Alta
Comments / Comentarios :		The water had a very high turbidity level because of rain the previous night				
		El agua estaba muy turbia porque la noche anterior estuvo lloviendo				

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -4	Riberalta / Vaca Diez	13.10.2001 / 8.40 h	Barrio Integración		Nancy Vira	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water	Directly with a bucket	Light gray	None	None	Scarcely
	Agua de pozo	Directo con balde	Gris claro	Ninguno	Ninguna	Escasa
Comments / Comentarios :		Heavy rain storms during the night before sampling / Tormentas en la noche anterior al muestreo				

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -5	Riberalta / Vaca Diez	13.10.2001 / 9.00 h	Barrio 1° de Septiembre, Calle Alizo esq. Copaibo		Family / Familia Roberto Sanjinés Castillo	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water	Directly with a bucket	Milky	None	None	Scarcely
	Agua de pozo	Directo con balde	Lechoso	Ninguno	Ninguna	Escasa
Comments / Comentarios :		Heavy rain storms during the night before sampling / Tormentas en la noche anterior al muestreo				

Continuation

W - 66

Results of Analysis

RIBERALTA 1 - 10

Parameter	RIB-1	RIB-2	RIB-3	RIB-4	RIB-5	RIB-6	RIB-7	RIB-8	RIB-9	RIB-10
pH	3.73	3.69	4.85	2.68	3.50	3.93	4.07	4.80	6.99	5.27
Cond. [$\mu\text{S/cm}$]	67.5	27.1	13.1	49.0	411	56.8	70.7	14.4	1403	233
Temp. [$^{\circ}\text{C}$]	26.5	26.5	26.4	26.4	26.3	27.4	26.9	26.9	27.2	27.3
Alc. ^a [mg/l]	< 2	< 2	6.4	28.6	< 2	2.0	2.4	4.8	216.4	16.0
Salinity ^b	0.052	0.030	0.023	0.042	0.264	0.047	0.054	0.023	0.916	0.153
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	44.8	39.5	30.9	29.3	< 17.4	280.2	50.2
Susp. Sol. [mg/l]	< 3	< 3	59.20	< 3	< 3	38.80	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.55	< 0.1
PO₄-P [mg/l]	0.15	0.05	0.33	0.21	0.11	0.10	0.09	0.05	0.13	0.08
NH₄-N [mg/l]	0.16	0.05	0.16	0.09	0.93	0.11	0.07	0.04	0.03	0.04
NO₂-N [mg/l]	0.06	0.06	0.06	0.07	0.07	0.06	0.06	0.05	0.05	0.05
NO₃-N [mg/l]	4.49	0.91	0.73	< 0.23	29.1	3.94	5.17	0.46	0.44	6.18
Ca [mg/l]	0.56	0.38	1.16	12.08	3.61	0.84	1.30	2.50	89.39	12.74
Fe [mg/l]	0.12	0.09	0.54	0.37	0.08	0.12	0.20	0.09	0.70	0.07
Zn [mg/l]	0.081	0.076	0.071	0.066	0.063	0.061	0.073	0.068	0.105	0.120
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [N/100]	290	220	770	920	210	1190	540	0	0	10
Total [N/100]	8700	7950	5220	6380	15860	26530	31280	45250	950	1740

- a** The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- b** The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- c** Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Tumichucua - Provincia Vaca Diez

Characteristics of the Sampling Points

The sampling points of the region Tumichucua include the communities located to the southwest of Riberalta: Peña Amarilla, Candelaria and Tumichucua.

In Peña Amarilla there is only one 'pauro' which serves as a drinking water source. There are two more 'pauros' but the water is taken for other uses.

In Candelaria there are one well of the 'semi surgente' type and two 'pauros' situated on the slope of the Río Beni.

The community Tumichucua has a central drinking water network with an elevated storage tank, but the system is out of use due to the lack of financial funds. The drinking water for the whole population is taken out of the 'pauros' along the slope of bank of the lake Tumichucua, whereby the people usually uses the nearest 'pauro'. Some of those 'deposits' are pretty efficient and contain a good amount of water.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código TUM-1	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 12.10.2001 / 8.55 h	Address Dirección Comunidad Peña Amarilla		Location Lugar Pauro of the community / Pauro de la comunidad	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Heavy rain during sampling / Lluvia torrencial durante el muestreo					
Code Código TUM-2	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 12.10.2001 / 11.30 h	Address Dirección Candelaria		Location Lugar Sanitary point / Posta sanitaria	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código TUM-3	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 12.10.2001 / 11.30 h	Address Dirección Candelaria		Location Lugar Pauro southwest of the village Pauro al sudoeste del villerío	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : There were pigs around the Pauro / Habían cerdos alrededor del Pauro					
Code Código TUM-4	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 12.10.2001 / 12.05 h	Address Dirección Candelaria		Location Lugar Pauro east of the village Pauro al este del villerío	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código TUM - 5	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 12.10.2001 / 13.50 h	Address Dirección Candelaria		Location Lugar Pauro next to family / Pauro cerca de familia Yamara - Ortiz	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor Like soap Jabonoso	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The odor like soap is because of the people washing their clothes there El olor jabonoso es debido a que la gente lava sus ropas allí					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM -6	Tumichucua / Vaca Díez	12.10.2001 / 14.05 h	-		Pauro Familia Chávez - Medina	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor Like wood A madera	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Perceptible Perceptible
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM -7	Tumichucua / Vaca Díez	12.10.2001 / 14.25 h	-		Pauro Fartán - Chávez	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM -8	Tumichucua / Vaca Díez	12.10.2001 / 14.40 h	-		Pauro Racua - Moreno	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor Like soap Jabonoso	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Perceptible Perceptible
Comments / Comentarios : -						

Results of Analysis

TUMICHUCUA 1 - 8

Parameter	TUM-1	TUM-2	TUM-3	TUM-4	TUM-5	TUM-6	TUM-7	TUM-8
pH	4.10	3.80	3.98	3.40	4.15	4.87	5.15	3.95
Cond. [$\mu\text{S/cm}$]	35.3	21.6	11.9	37.7	21.4	35.2	11.9	19.5
Temp. [$^{\circ}\text{C}$]	26.0	27.1	28.2	28.4	28.6	28.3	28.8	29.0
Alc. ^a [mg/l]	< 2	8.0	4.6	< 2	< 2	2.4	3.0	3.4
Salinity ^b	0.034	0.027	0.023	0.036	0.028	0.035	0.023	0.027
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.05	0.06	0.05	0.06	0.05	0.06	< 0.05	0.05
NH₄-N [mg/l]	0.02	0.03	0.04	0.03	0.03	0.02	0.03	0.03
NO₂-N [mg/l]	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
NO₃-N [mg/l]	2.70	< 0.23	< 0.23	2.94	1.12	2.63	0.24	1.03
Ca [mg/l]	0.54	0.86	0.83	1.92	0.86	1.93	0.68	1.11
Fe [mg/l]	0.04	0.12	0.65	1.17	0.13	< 0.05	0.07	0.10
Zn [mg/l]	0.071	2.569	0.051	0.058	0.058	0.024	0.026	0.030
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms								
Fecal [N/100]	20	0	0	60	760	190	0	0
Total [N/100]	9860	20	1900	19140	24160	14850	15500	11350

- ^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- ^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- ^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Cachuela Esperanza - Provincia Vaca Diez

Characteristics of the Sampling Points

In Cachuela Esperanza does exist a drinking water network, which works only irregularly, depending on the function of the electric generator. The water for the supply of the people is extracted out of two public wells side by side with a rather big volume of available drinking water. From the two wells the water is directly pumped to the houses of the community. Nevertheless, on the actual sampling day in none of the housings it was possible to get water samples from the tabs of the water network. For that reason the residents had to go with own recipients to take the drinking water directly out of the wells.

In the community Santa Teresita de Yata, located on the way from Cachuela Esperanza to Guayaramerín, water samples were taken from three sources of water supply: the river Yata, the creek Yatorama and the well of the school. The school is situated rather far outside of the community, that is why the wells is only used by the pupils.

In the community Santa Rosa, as well located on the path to Guayaramerín, two water samples were taken, one from a well of the 'semi surgente' type and the second sample from a little stream called 'El Ocho' which borders the community.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código CES - 1	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 8.15 h	Address Dirección		Location Lugar Open well of the village Noria del Pueblo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 2	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 9.05 h	Address Dirección Santa Teresita del Yata		Location Lugar Rio Yata	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Light yellow Amarillo Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código CES - 3	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 9.40 h	Address Dirección Santa Teresita del Yata		Location Lugar Arroyo Yaturama	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Light yellow Amarillo Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 4	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 10.20 h	Address Dirección Santa Teresita del Yata		Location Lugar School / Escuela Antofagasta	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 5	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 11.30 h	Address Dirección Santa Rosa		Location Lugar Sanitary point / Centro de Salud	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 6	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 14.10.2001 / 11.40 h	Address Dirección Santa Rosa Km 8		Location Lugar Arroyo 'El 8'	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Light yellow Amarillo Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Significant Notoria
	Comments / Comentarios : -					

Results of Analysis

CACHUELA ESPERANZA 1 - 6

Parameter	CES-1	CES-2	CES-3	CES-4	CES-5	CES-6
pH	5.10	6.65	2.80	5.06	5.00	4.47
Cond. [$\mu\text{S}/\text{cm}$]	44.9	34.2	6.09	95.4	32.0	8.25
Temp. [$^{\circ}\text{C}$]	27.4	30.1	24.7	26.5	28.5	27.1
Alc. ^a [mg/l]	10.0	17.4	< 2	52.2	15.6	2.8
Salinity ^b	0.040	0.035	0.019	0.069	0.033	0.021
Hardness ^c [mg/l]	< 17.4	19.14	< 17.4	61.8	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	8.45	< 5	< 5	< 5	5.31
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.06	0.07	0.08	0.05	0.05	0.06
NH₄-N [mg/l]	0.03	0.07	0.06	0.03	0.04	0.04
NO₂-N [mg/l]	0.05	0.05	0.06	0.05	0.05	0.05
NO₃-N [mg/l]	1.72	< 0.23	0.29	< 0.23	< 0.23	< 0.23
Ca [mg/l]	3.69	2.89	0.60	17.74	0.97	0.47
Fe [mg/l]	0.06	0.60	0.33	0.09	0.14	2.07
Zn [mg/l]	0.036	0.029	0.036	0.091	3.165	0.076
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms						
Fecal [N/100]	60	50	10	10	0	190
Total [N/100]	6960	2020	5540	2480	210	7150

- a** The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3
- b** The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- c** Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Guayaramerín - Provincia Vaca Diez

Characteristics of the Sampling Points

The city Guayaramerín is the only place of all locations visited during the survey study where a complete drinking water system exists which does not only cover the old city center but also the majority of new suburbs recently constructed during the last couple of years.

In some places of the peripheral quarters there are open wells which are used for drinking water extraction. During the sampling day in Guayaramerín deficiencies in the local drinking water network have been noticed caused by interruptions of the water supply due to reparations or maintenance of the system.

The sample collection was extended to the community of Rosario del Yata situated along the road Guayaramerín - Riberalta. In this location one source of water supply for the population is the Río Yata. In areas farther away from the river the people also use their own wells.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -1	Guayamerín / Vaca Díez	16.10.2001 / 8.30 h	Rosario del Yata		Rio Yata, Crossing of vehicles / <i>cruce de vehículos</i>	
	Type of Water Source <i>Tipo de Fuente</i> Stream water <i>Agua corriente</i>	Water taking Device <i>Tipo de Suministro</i> Directly <i>Directo</i>	Color <i>Color</i> Light Yellow <i>Levemente</i> Amarillo	Odor <i>Olor</i> None <i>Ninguno</i>	Turbidity <i>Turbidez</i> None <i>Ninguna</i>	Sedimentation <i>Sedimentación</i> Significant <i>Bastante</i>
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -2	Guayamerín / Vaca Díez	16.10.2001 / 8.50 h	Rosario del Yata		Family / <i>Familia</i> Angela Amutani	
	Type of Water Source <i>Tipo de Fuente</i> Well water <i>Agua de pozo</i>	Water taking Device <i>Tipo de Suministro</i> Directly <i>Directo</i>	Color <i>Color</i> Light Brown <i>Marrón Claro</i>	Odor <i>Olor</i> None <i>Ninguno</i>	Turbidity <i>Turbidez</i> Significant <i>Bastante</i>	Sedimentation <i>Sedimentación</i> Significant <i>Bastante</i>
	The water had a very high level of turbidity because the previous night it was raining. <i>El agua estaba muy turbia porque la noche anterior estuvo lloviendo.</i>					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -3	Guayamerín / Vaca Díez	16.10.2001 / 9.45 h	Calle 16, Barrio San Martín II		Adelina Sala (Sra Eldi Cartagena, dueña)	
	Type of Water Source <i>Tipo de Fuente</i> Potable water supplied by water cooperative <i>Agua potable suministrada por la cooperativa</i>	Water taking Device <i>Tipo de Suministro</i> Tap <i>Grifo</i>	Color <i>Color</i> Light Yellow <i>Amarillo Claro</i>	Odor <i>Olor</i> None <i>Ninguno</i>	Turbidity <i>Turbidez</i> None <i>Ninguna</i>	Sedimentation <i>Sedimentación</i> None <i>Ninguna</i>
	The water was filtered through a cloth before using <i>El agua era filtrada a traves de un trapo ante de su consumo</i>					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -4	Guayamerín / Vaca Díez	16.10.2001 / 10.00 h	Calle 16, Barrio San Martín II		Adelina Sala (Sra Eldi Cartagena, dueña)	
	Type of Water Source <i>Tipo de Fuente</i> Well water <i>Agua de pozo</i>	Water taking Device <i>Tipo de Suministro</i> Manual <i>Manual</i>	Color <i>Color</i> Clear <i>Claro</i>	Odor <i>Olor</i> None <i>Ninguno</i>	Turbidity <i>Turbidez</i> None <i>Ninguna</i>	Sedimentation <i>Sedimentación</i> Perceptible <i>Perceptible</i>
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -5	Guayamerín / Vaca Díez	16.10.2001 / 10.10 h	Barrio San Isidro, Calle San Ramón / San Isidro		Family / <i>Familia</i> Peralta	
	Type of Water Source <i>Tipo de Fuente</i> Well water <i>Agua de pozo</i>	Water taking Device <i>Tipo de Suministro</i> Directly with bucket <i>Directo con balde</i>	Color <i>Color</i> Clear <i>Claro</i>	Odor <i>Olor</i> None <i>Ninguno</i>	Turbidity <i>Turbidez</i> None <i>Ninguna</i>	Sedimentation <i>Sedimentación</i> Perceptible <i>Perceptible</i>
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -6	Guayamerín / Vaca Díez	16.10.2001 / 10.40 h	Barrio 16 de Julio, Calle Beni		Machine shop / Taller Suárez	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Light Yellow Amarillo Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -7	Guayamerín / Vaca Díez	16.10.2001 / 11.05 h	Barrio Manantial, Calle Beni s/n		Almacen Cruzeiro	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -8	Guayamerín / Vaca Díez	16.10.2001 / 11.40 h	Barrio Central, Calle 24 de Septiembre		Family / Familia Velarde	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -9	Guayamerín / Vaca Díez	16.10.2001 / 11.50 h	Calle Mamoré		Sanitary center / Centro de salud Guayamerín	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Perceptible Perceptible
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA 10	Guayamerín / Vaca Díez	16.10.2001 / 12.05 h	Barrio El Carmen, Calle 24 de Septiembre		Family / Familia Carmen Raldes	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante

Results of Analysis

GUAYARAMERIN 1 - 10

Parameter	GUA-1	GUA-2	GUA-3	GUA-4	GUA-5	GUA-6	GUA-7	GUA-8	GUA-9	GUA-10
pH	7.30	6.57	5.56	4.53	4.81	5.68	6.72	6.03	6.14	6.03
Cond. [$\mu\text{S/cm}$]	40.3	133	8.91	19.2	38.3	7.58	16.2	9.23	9.15	9.30
Temp. [$^{\circ}\text{C}$]	30.6	26.6	29.7	28.2	27.6	28.6	32.7	33.2	30.3	29.6
Alc. ^a [mg/l]	22.8	14.8	4.6	< 2	2.60	4.4	8.8	5.0	4.8	4.6
Salinity ^b	0.038	0.091	0.022	0.026	0.036	0.021	0.027	0.024	0.023	0.022
Hardness ^c [mg/l]	21.2	34.1	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	3.20	10.40	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	16.3	< 5	51.7	< 5	< 5	9.09	8.06	8.44	6.29	11.4
BOD₅ [mg/l]	7	< 4	21	< 4	< 4	< 4	< 4	5	< 4	6
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.10	0.12	0.07	0.05	0.06	0.07	0.06	0.07	0.08	0.17
NH₄-N [mg/l]	0.07	0.08	0.03	0.03	0.05	0.05	0.05	0.04	0.04	0.05
NO₂-N [mg/l]	0.08	0.08	0.05	0.03	0.05	0.05	0.04	0.02	0.02	< 0.015
NO₃-N [mg/l]	< 0.23	6.18	< 0.23	< 0.23	3.06	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	3.36	10.08	0.94	0.16	0.24	1.00	3.01	1.23	1.11	1.36
Fe [mg/l]	0.74	1.34	0.83	0.08	0.04	0.87	0.78	0.96	0.85	1.54
Zn [mg/l]	0.024	0.022	0.010	0.019	0.013	0.016	0.030	0.010	0.050	0.045
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [N/100]	20	890	40	230	0	0	80	160	0	180
Total [N/100]	5800	8700	1270	2340	4640	1160	2610	2030	870	1160

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

Results of Water Quality Survey

1.2 Results in Rainy Season

Water Survey Program - BENI Department**TEST REPORT****Rainy Season**

[69 pages]

- Anexo 1: Comparison: Dry Season – Rainy Season [15 pages]
Anexo 2: Table: Limit Threshold Values [1 page]
Anexo 3: Sampling Protocols [158 sheets]

Introduction

The sampling process in the rainy season was realized between January 7th and February 5th, 2002.

The community of Santísima de Trinidad, located in the National Park 'Isiboro-Sécure', couldn't be visited during this period because of force majeure (social tensions, militarization of the whole area 'Chapare', high waters of the rivers to cross due to heavy rainfalls).

The rainy season opens more possibilities of water supply to the population. Nevertheless, a shortage of water resources have been observed in some of the communities chosen by the initial sampling program, which made it impossible to achieve the total number of planned 176 sampling points. In this second phase of the project there is surplus of water resources in the whole Beni department and, therefore, 158 samples could be taken (not considering the above mentioned 12 sampling points of Santísima de Trinidad and 6 points of Buena Vista for infrastructural reasons).

In continuation, the emphasis is on those points which, regarding the first phase, have experienced changes due to specific conditions of the rainy season. Generally, only a few places are concerned by those conditions.

SAMPLING TEST

Trinidad - Provincia Cercado

Characteristics of the Sampling Points

The sampling of drinking water in Trinidad was realized in different quarters of the town itself and, additionally, in suburb areas with an extension of about 20 km westwards to Puerto Almacén, Puerto Varador (former meander of the river Mamoré) and in the Río Mamoré (community Los Puentes) following the actual course of the river (actually situated in the province Moxos).

In the Trinidad area 20 water samples were collected. The majority was taken from private tanks (Spanish: noque *) and wells, which represent the predominant sources of drinking water supply used by the people.

* The noque is a closed tank or deposit from cement, sometimes covered with a layer of paint from the inside. The tank contains either rainwater, water from a public supply, water bought from sources not specified or a combination of all kinds. Usually, wells (noria) actually in use are found outside the city center.

There is a so called 'semi surgente' type of wells with a manual water pump installed by PRAS-BENI, which are common in the new suburbs outside the old center of Trinidad (for the term 'semi surgente' doesn't exist a specific technical definition).

In small communities along the banks of the river Mamoré the population takes directly water out of the river. The sampling point No. TRI-21 is new because of the inundation of the original place (TRI-2). Instead, the water has been taken directly out of the Río Mamoré. In Puerto Varador and in Puerto Almacén ponds (lagoons) are available for the water supply, which have been formed by the former meander of the Mamoré and the Río Ibare, respectively.

In the city of Trinidad it was possible to take three samples directly from the distribution network of the drinking water cooperative.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-1	Cercado / Trinidad	08.01.2002 / 12.15 h	Río Mamoré, "Los Puentes"		Eastern bank of the Mamoré <i>Orilla este del Mamoré</i>	
	Type of Water Source Tipo de Fuente Stream water <i>Agua corriente</i>	Water taking Device Tipo de Suministro Directly from the river <i>Directo del río</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguno</i>	Sedimentation Sedimentación None <i>Ninguna</i>
Comments / Comentarios : The people take the water directly out of the river / La gente toma directamente el agua del río						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-21	Cercado / Trinidad	08.01.2002 / 12.15 h	Río Mamoré, "Los Puentes"		Eastern bank of the river Mamoré <i>Orilla este del Mamoré</i>	
	Type of Water Source Tipo de Fuente Stream water <i>Agua corriente</i>	Water taking Device Tipo de Suministro Directly from the river <i>Directo del río</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez Scarcely <i>Escasa</i>	Sedimentation Sedimentación None <i>Ninguna</i>
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-3	Cercado / Trinidad	08.01.2002 / 13.05 h	Puerto " Varador"		Dead arm of the Mamoré / pond <i>Brazo muerto del Mamoré / laguna</i>	
	Type of Water Source Tipo de Fuente Stagnant water <i>Agua estancada</i>	Water taking Device Tipo de Suministro Directly from the pond <i>Directo de la laguna</i>	Color Color Slightly yellow <i>Llevemente amarillo</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación None <i>Ninguna</i>
Comments / Comentarios : Floating material (plant parts) / partículas grandes (partes de plantas)						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-4	Cercado / Trinidad	08.01.2002 / 13.35 h	Bomba de agua "El Varador"		Water pump of the city <i>Bomba de agua del pueblo</i>	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro Manual pump <i>Bomba manual</i>	Color Color Slightly yellow <i>Llevemente amarillo</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación None <i>Ninguna</i>
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-5	Cercado / Trinidad	08.01.2002 / 14.10 h	Puerto Almacén		Ibare river <i>Río Ibare</i>	
	Type of Water Source Tipo de Fuente Stream water <i>Agua corriente</i>	Water taking Device Tipo de Suministro Directly from the river <i>Directo del río</i>	Color Color Brown <i>Marrón</i>	Odor Olor Putrid <i>Purtefacto</i>	Turbidity Turbidez Considerable <i>Fuerte</i>	Sedimentation Sedimentación Significant <i>Bastante</i>
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-6	Cercado / Trinidad	11.01.2002 / 7.45 h	Barrio Nueva Trinidad, c/ nº 10, Lote Nº 6. Familia Ardaya Olivera		Family Ardaya Olivera <i>Noque de la familia Ardaya Olivera</i>	
	Type of Water Source Tipo de Fuente Rainwater <i>Agua de lluvia</i>	Water taking Device Tipo de Suministro Water from rain fall <i>Recoge agua de lluvia</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación Scarcely <i>Escasa</i>
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-7	Cercado / Trinidad	11.01.2002 / 7.55 h	Barrio Nueva Trinidad, c/ nº 26		Manual pump <i>Bomba manual</i>	
	Type of Water Source Tipo de Fuente Well water for city supply <i>Pozo para abastecimiento del pueblo</i>	Water taking Device Tipo de Suministro Pump <i>Bomba</i>	Color Color Milky <i>Lechoso</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez Scarcely <i>Escasa</i>	Sedimentation Sedimentación Scarcely <i>Escasa</i>
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-8	Cercado / Trinidad	11.02.2002 / 8.10 h	Barrio Paititi, c/ Santa Rosa Nº 30		Familia Montenegro López	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative <i>Agua potable suministrada por la cooperativa</i>	Water taking Device Tipo de Suministro Tap / Faucet <i>Grifo</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación Scarcely <i>Escasa</i>
Comments / Comentarios : Large particles / Partículas grandes						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-9	Cercado / Trinidad	11.02.2002	Barrio Paititi c/ Santa Rosa Nº 30		Familia Montenegro López	
	Type of Water Source Tipo de Fuente Stagnant water <i>Agua estancada</i>	Water taking Device Tipo de Suministro Rainwater tank <i>Agua de lluvia de noque</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación None <i>Ninguna</i>
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-10	Cercado / Trinidad	11.01.2002 / 8.35 h	Barrio Las Brisas, Av. Principal		Familia Abdón Rivera	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro With bucket <i>Con balde</i>	Color Color Brown, milky Marrón, <i>lechoso</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez Significant <i>Bastante</i>	Sedimentation Sedimentación Significant <i>Bastante</i>
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-11	Cercado / Trinidad	19.01.2002 / 8.50 h	Barrio Universitario, final Tacuaral		Familia Aspiazu	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-12	Cercado / Trinidad	19.01.2002 / 9.00 h	Barrio El Palmar, Av. Las Palmas 18		Familia Méndez	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación Suspended solids Partículas suspendidas
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-13	Cercado / Trinidad	19.01.02002 / 9.15 h	Barrio San Vicente; Calle Machetero / Tamarindo		Familia Cholina - Cayalo	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-14	Cercado / Trinidad	19.01.2002 / 9.45 h	Barrio San Antonio, calle N. Suárez 153		Familia Canido	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Rainwater tank Agua de lluvia de noque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguno
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-15	Cercado / Trinidad	19.01.2002 / 9.55 h	Barrio San Antonio, calle N. Suárez 153		Familia Canida	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tank Tanque	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguno
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-16	Cercado / Trinidad	11.01.2002 / 10.30 h	Barrio Mangalito, Av. San Juan 6		Familia Iva	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro The water was taken with bucket El agua fue sacada con un recipiente	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Medium Mediana
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-17	Cercado / Trinidad	11.01.2002 / 11.10 h	Barrio 18 de Agosto, Av. Dina Pinto s.n.		Familia Temo - Mendoza	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro The water was taken out with a bucket El agua fue sacada con un recipiente	Color Color Yellowish, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-18	Cercado / Trinidad	11.01.2002 / 11.30 h	Barrio Belén, Av 25 de Diciembre 49		Familia Añez - Ardaya	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Rainwater tank Agua de lluvia de noche	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-19	Cercado / Trinidad	11.01.2002 / 10.50 h	Barrio Villa Corina, Prolong. Monceteñez esq. Rogaguado		Familia Flores - Banegas	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro With bucket Con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TRI-20	Cercado / Trinidad	11.01.2002 / 12.00 h	Calle Cipriano Barace		Laboratorio clínico Altstadt	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro With bucket Con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis

TRI 1 – 10, 21

Parameter	TRI-1	TRI-21	TRI-3	TRI-4	TRI-5	TRI-6	TRI-7	TRI-8	TRI-9	TRI-10
pH	7.95	7.83	7.77	6.84	5.64	7.39	7.31	7.04	8.74	7.14
Cond. [$\mu\text{S}/\text{cm}$]	471	491	468	682	49.6	2847	2387	3877	63.8	1166
Temp. [$^{\circ}\text{C}$]	29.7	29.7	31.5	29.1	30.0	28.1	27.0	28.1	27.2	27.8
Alc. ^a [mg/l]	252	267	254	400	23.8	376	361	356	28.2	268
Salinity ^b	0.302	0.315	0.300	0.438	0.043	1.910	1.590	2.641	0.050	0.757
Hardness ^c [mg/l]	219	218	140	262	37.3	296	291	919	34.5	87.3
Susp.Sol. [mg/l]	< 3	< 3	< 3	57	5	< 3	6	5	< 3	179
COD [mg/l]	16.2	17.0	14.8	14.1	54.0	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	6	9	6	8	34	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.85	0.42	0.77	< 0.1	< 0.1
PO₄-P [mg/l]	0.07	0.06	0.06	0.11	0.70	0.71	0.29	< 0.05	< 0.05	0.20
NH₄-N [mg/l]	0.06	0.04	0.08	8.40	0.16	0.06	0.84	1.31	0.06	0.08
NO₂-N [mg/l]	0.02	0.02	< 0.015	< 0.015	0.05	0.05	0.05	0.05	0.05	0.06
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	0.47	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	31.17	21.91	2.26	27.20	20.59	68.96	73.98	221.63	5.90	26.82
Fe [mg/l]	0.13	0.16	2.41	17.06	0.11	0.20	3.65	2.02	< 0.08	1.48
Zn [mg/l]	0.023	0.030	0.030	0.110	0.030	0.040	0.053	0.112	0.039	0.046
As [mg/l]	< 0.002	< 0.002	< 0.002	0.014	< 0.002	0.002	0.002	0.005	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [$\text{N}/100$]	0	0	0	0	0	0	0	0	0	0
Total [$\text{N}/100$]	1740	2550	13800	6300	7850	7800	28500	8750	4800	24100

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

Results of Analysis

TRINIDAD 11-20

Parameter	TRI-11	TRI-12	TRI-13	TRI-14	TRI-15	TRI-16	TRI-17	TRI-18	TRI-19	TRI-20
pH	8.62	7.28	7.19	8.18	6.71	7.01	5.85	8.63	6.28	7.03
Cond. [$\mu\text{S}/\text{cm}$]	389	862	510	46.4	337	467	583	43.5	325	640
Temp. [$^{\circ}\text{C}$]	30.0	29.5	29.2	29.0	28.2	30.7	30.5	28.5	30.7	30.5
Alc. ^a [mg/l]	119	264	258	22.5	185	279	125	25	149	156
Salinity ^b	0.250	0.555	0.327	0.041	0.218	0.300	0.374	0.039	0.210	0.410
Hardness _c [mg/l]	37.7	85.1	284	57.5	165	152	115	91.0	88.0	196
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	5.9	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	0.19	0.48	< 0.1	< 0.1	0.36	< 0.1	< 0.1	0.61	0.36
PO₄-P [mg/l]	0.29	0.23	0.24	0.13	0.52	0.46	0.58	< 0.05	0.11	0.98
NH₄-N [mg/l]	0.03	0.10	1.06	0.03	0.43	0.10	0.10	0.08	0.05	0.38
NO₂-N [mg/l]	0.05	0.05	0.05	0.05	0.07	0.05	0.09	0.07	0.05	0.06
NO₃-N [mg/l]	< 0.23	0.91	< 0.23	< 0.23	< 0.23	< 0.23	1.50	< 0.23	0.59	0.30
Ca [mg/l]	20.63	37.43	23.28	6.96	24.17	41.86	30.36	5.31	12.73	33.01
Fe [mg/l]	< 0.08	0.22	0.22	< 0.08	2.35	< 0.08	1.48	< 0.08	0.10	0.16
Zn [mg/l]	0.045	0.077	0.026	0.082	0.035	0.036	0.126	0.020	0.041	0.069
As [mg/l]	0.005	0.004	0.01	< 0.002	0.006	0.002	0.003	< 0.002	< 0.002	0.003
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	0	0	0	0	0	0	0	0	0	0
Total [N/100]	0	0	0	0	80	10440	6380	9250	13920	12180

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Pedro Nuevo - Provincia Cercado

Characteristics of the Sampling Points

The rainy season eases the critical situation for the population because of the renewed and refilled water reservoirs. Two additional samples (SPN-11 and SPN-12) could be taken to complete the originally planned number of 12 water samples.

Two wells installed by PRAS-BENI of the 'semi surgente' type with a manual water pump exist in the village. Nevertheless, these wells are very rarely used by the people because of their rather brackish water. The majority takes the drinking water from various 'wells' installed in the village. Those artificial wells or water deposits hold back the rainwater of various months and contain a variety of aquatic plants with supposedly purifying effects (species of tarope, cañuela, pochi, and other plants commonly called 'yomomo' by the population). A fundamental characteristic feature of the wells is that they are carved in unconsolidated clay and loamy sediments – found in great extensions in the Beni – which are highly impermeable with a retention of the water during long periods

One sample was taken out of a private water deposit (noque) which was the only one still containing the remainders of rainwater.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-1	Cercado / San Pedro Nuevo	09.01.2002 / 09.05	Pozo de Agua		Familia Arcelia	
	Type of Water Source Tipo de Fuente Rainwater Agua de Lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-2	Cercado / San Pedro Nuevo	09.01.2002 / 8.55 h	Calle 6 de Agosto		Familia Lizandro Coimbra	
	Type of Water Source Tipo de Fuente Rainwater Agua de Lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor Putrid Putrefacto	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Microbes / Microbios					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-3	Cercado / San Pedro Nuevo	09.01.2002 / 9.45 h	Hospital / Posta sanitaria		Centro de salud "Corazón de Jesús", San Pedro	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Slightly yellow Llevemente amarillo	Odor Olor Putrid Putrefacto	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-4	Cercado / San Pedro Nuevo	09.01.2002 / 10.10 h	Northern exit of the village Salida norte del pueblo		Cuneta - Poz	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly from a ditch Directo, agua de cuneta	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

20.02.2002

Test Report/ BENI-SPN

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-5	Cercado / San Pedro Nuevo	09.01.2002 / 11.30 h	Public well east of the plaza Pozo público al este de la plaza		-	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Stagnant water / Rainwater Agua estancada / Agua de lluvia	Directly with bucket Directo con balde	Yellow, milky Amarillo, lechoso	Putrid, intense Muy podrido	Scarcely Escasa	None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-6	Cercado / San Pedro Nuevo	09.01.2002 / 10.20 h	-		Municipality, public well / Alcaldía de San Pedro, pozo público	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Well water for city water supply Agua de pozo para abastecimiento del pueblo	With a bucket Con balde	Clear Claro	None Ninguno	Significant Bastante	Significant Bastante
	Comments / Comentarios : Large particles / Partículas grandes					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-7	Cercado / San Pedro Nuevo	09.01.2002 / 12.45 h	Plaza, Northern side / lado norte		Familia Vélez-Soto	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Rainwater, Stagnant water Agua de lluvia, Agua estancada	Rainwater Tank Agua de lluvia de noque	yellowish amarillo	Putrid Putrefacto	None Ninguna	None Ninguna
	Comments / Comentarios : Well contains microbes / Pozo contiene microbios					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-8	Cercado / San Pedro Nuevo	09.01.2002 / 11.00 h	Water tank in the south of the village / Noria al sur del pueblo		Next to the family Guatara-Cuevas Al lado de familia Guatara-Cuevas	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Rainwater, Stagnant water Agua de lluvia, Agua estancada	Directly with bucket Directo con balde	Brown, milky Marrón, lechoso	Putrid Putrefacto`	None Ninguna	None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-9	Cercado / San Pedro Nuevo	09.01.2002 / 13.45 h	Carretera de San Pedro a San Javier. Km 15		Estancia " Belleza"	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Rainwater, Stagnant water Agua de lluvia, Agua estancada	Directly with bucket Directo con balde	Brown Marrón	Putrid Putrefacto	None Ninguna	None Ninguna
	Comments / Comentarios : -					

20.02.2002

Test Report/ BENI-SPN

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-11	Cercado / San Pedro Nuevo	09.01.2002 / 10.00 h	Health center / Posta Sanitaria		Well next to the health center / Pozo al lado del centro de salud	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Brown Marrón	Odor Olor none Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SPN-12	Cercado / San Pedro Nuevo	09.01.2002 / 10.45 h	-		Well on the eastern side of the plaza / Pozo al lado este de la plaza	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Brown, milky Marrón. lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Results of Analysis

SAN PEDRO NUEVO 1 – 12

Parameter	SPN-1	SPN-2	SPN-3	SPN-4	SPN-5	SPN-6	SPN-7	SPN-8	SPN-9	SPN-10	SPN-11	SPN-12
pH	4.38	5.95	6.91	5.50	6.04	6.48	5.72	4.88	6.00	5.85	5.64	5.02
Cond. [$\mu\text{S/cm}$]	8.7	60.5	4040	40.3	35.9	4238	95.2	35.7	85.2	38.3	54.5	44.3
Temp. [$^{\circ}\text{C}$]	28.0	28.0	28.9	29.1	29.3	29.5	28.2	31.2	29.2	29.2	29.1	31.2
Alc. ^a [mg/l]	7.50	35.0	338	17.5	15.0	328	40.0	20.0	41.2	7.50	31.2	23.8
Salinity ^b	0.021	0.049	2.756	0.038	0.036	2.897	0.069	0.036	0.064	0.037	0.046	0.041
Hardness ^c [mg/l]	< 17.4	34.3	798	< 17.4	< 17.4	1321	60.0	< 17.4	39.1	< 17.4	21.8	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	27	66	6	34	< 3	50	32	< 3	32	35
COD [mg/l]	< 5	17.2	10.0	25.6	20.1	5.3	7.4	30.9	69.6	< 5	20.6	22.5
BOD₅ [mg/l]	< 4	8	< 4	12	11	< 4	< 4	16	39	< 4	10	11
F [mg/l]	< 0.1	< 0.1	0.89	< 0.1	< 0.1	0.11	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	< 0.05	1.47	0.19	0.37	0.11	0.19	0.47	0.40	0.24	0.08	0.43	1.93
NH₄-N [mg/l]	0.05	0.07	0.64	0.68	0.09	0.85	0.10	0.21	0.12	0.26	0.06	0.10
NO₂-N [mg/l]	< 0.015	0.02	0.03	0.36	0.04	0.02	0.07	0.13	0.07	0.06	0.05	0.07
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	0.52	< 0.23	< 0.23	1.47	0.27	< 0.23	0.25	< 0.23	< 0.23
Ca [mg/l]	0.21	4.11	120.40	0.89	0.23	129.01	7.95	0.98	0.94	0.43	2.86	2.14
Fe [mg/l]	< 0.10	2.93	0.40	5.43	2.25	1.00	0.12	3.97	4.20	0.21	4.55	6.58
Zn [mg/l]	< 0.02	0.037	1.500	0.055	0.035	0.480	0.035	0.030	0.033	0.150	0.048	0.068
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.052	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Colibacteria												
Fecal [N/100]	0	0	0	100	0	0	20	870	0	0	20	40
Total [N/100]	1520	3700	1480	15300	14400	4800	27500	12500	9400	720	9250	5760

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Javier - Provincia Cercado

Characteristics of the Sampling Points

The situation of the drinking water supply in San Javier is very much alike to that in San Pedro Nuevo (see chapter BENI-SPN) and equally critical at the end of the dry season. In this location 8 samples have been taken. Additionally, two samples were collected in cattle farms along the road to Trinidad where a great number of people work and live with their families. One additional sample SJA-10 was taken out of an artificial rainwater deposit.

In San Javier there are various sources used for the supply of drinking water: wells 'semi surgentes' with manual water pumps (containing water of the same characteristics as earlier described), artificial water deposits storing rainwater which are filled with aquatic plants, a few open wells (noria), and a huge water tank (noque) containing stored rainwater which is situated on the terrain of the church and an important water reservoir for the population.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 1	Cercado / San Javier	09.01.2002 / 15.40 h	Colegio "Jorge Monasterio"		-	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Lightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 2	Cercado / San Javier	09.01.2002 / 16.00 h	Plaza Principal " Benjamín Vargas"		Dr. Erwin Arce Mack	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, lechoso	Odor Olor Slightly putrid Levemente putrefacto	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 3	Cercado / San Javier	09.01.2002 / 15.30 h	Alcaldía Municipal San Javier		-	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, lechoso	Odor Olor Putrid Putrefacto	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The original bomb was broken / La bomba estaba fregada						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 4	Cercado / San Javier	09.01.2002 / 15.20 h	Church / Iglesia		Water deposit of the Church Noque de la Iglesia	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código SJA - 5	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 09.01.2002 / 15.50 h	Address Dirección Main square, southern side Plaza Principal lado sur		Location Lugar Family / Familia Amanda Vargas de Chávez	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código SJA - 6	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 09.01.2002 / 14.55 h	Address Dirección Well / Pozo de la pista		Location Lugar Well at about 200 m east of the community / Pozo al lado este del pueblo, aprox. 200 m	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor Slightly putrid Levemente putrefacto	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código SJA - 7	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 09.01.2002 / 15.10 h	Address Dirección Hospital San Javier		Location Lugar -	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : Light salty water / Agua levemente salobre						
Code Código SJA - 8	Community / District Provincia / Municipio Cercado / San Javier	Date / Time of Sampling Fecha / Hora de Muestreo 09.01.2002 / 16.40 h	Address Dirección Estancia " El 7"		Location Lugar -	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Yellow, milky Amarillo, lechoso	Odor Olor Putrid Podrido	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 9	Cercado / San Javier	09.01.2002 / 17.20 h	Estancia " La Unión"		Fernado Antelo Gil	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow Amarillo	Odor Olor Putrid Putrefacto	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJA - 10	Cercado / San Javier	09.01.2002 / 15.10 h h	Wetsem side of the main square Lado oeste de la plaza		Fam. Rodriguez	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis

SAN JAVIER 1 - 10

Parameter	SJA-1	SJA-2	SJA-3	SJA-4	SJA-5	SJA-6	SJA-7	SJA-8	SJA-9	SJA-10
pH	6.98	7.22	6.41	7.10	9.58	5.57	7.91	7.44	6.46	9.45
Cond. [$\mu\text{S/cm}$]	2460	128	40.7	54.0	86.2	22.4	4840	795	113	90.2
Temp. [$^{\circ}\text{C}$]	28.7	30.2	30.9	30.2	34.1	32.3	29.7	30.1	31.4	30.0
Alc. ^a [mg/l]	360	52.5	43.8	28.8	31.2	12.5	316	419	57.5	63.8
Salinity ^b	1.639	0.089	0.039	0.046	0.066	0.03	3.332	0.511	0.081	0.067
Hardness ^c [mg/l]	302	< 17.4	71.4	87.9	< 17.4	34.6	261	200	<17.4	66.4
Susp. Sol. [mg/l]	35	9	< 3	< 3	< 3	< 3	< 3	18	10	< 3
COD [mg/l]	< 5	39.0	14.7	< 5	21.5	22.6	< 5	< 5	39.7	6.2
BOD₅ [mg/l]	< 4	22	6	< 4	9	10	< 4	< 4	20	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.21	1.32	< 0.1	< 0.1
PO₄-P [mg/l]	0.08	1.32	1.47	0.07	1.39	0.14	0.10	0.18	0.11	0.10
NH₄-N [mg/l]	1.13	0.21	0.12	0.03	0.41	0.07	0.02	0.27	0.11	0.04
NO₂-N [mg/l]	0.04	0.11	0.15	0.05	0.19	0.27	0.05	0.10	0.07	0.06
NO₃-N [mg/l]	< 0.23	0.61	< 0.23	0.69	0.82	0.62	0.34	0.25	< 0.23	0.66
Ca [mg/l]	45.06	1.64	3.44	3.99	3.48	0.52	50.83	19.33	2.76	8.62
Fe [mg/l]	13.18	2.42	4.10	0.25	4.56	1.23	0.04	0.83	3.24	0.14
Zn [mg/l]	0.105	0.030	0.030	0.200	0.050	0.035	0.050	0.035	0.023	0.043
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	0.001	< 0.001	< 0.001	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	0	290	0	0	120	0	0	0	0	0
Total [N/100]	30	29500	1440	8400	9250	5400	8600	5500	6600	550

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Casarabe - Provincia Cercado

Characteristics of the Sampling Points

The variety of sources of the water supply of Casarabe is bigger than those of San Javier and San Pedro Nuevo. Mainly wells (noria), artificial wells and private water tanks (noque) exist in this location. Some families use barrels for water storage. The elevated water tank and the deep well of the village are out of use. During this second phase the former sampling program has been completely repeated.

The water tank in the camp of the INCO-TERRA-VELKO company (road service) is the only one counting with the installation of an automatic water pump.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código CAS -1	Community / District Provincia / Municipio Cercado / Casarabe	Date / Time of Sampling Fecha / Hora de Muestreo 10.01.2002 / 9.40 h	Address Dirección Collegio / Escuela "Carlos Loayza Beltran"		Location Lugar -	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Water contains particles / Agua contiene partículas					
Code Código CAS -2	Community / District Provincia / Municipio Cercado / Casarabe	Date / Time of Sampling Fecha / Hora de Muestreo 10.01.2002 / 9.50 h	Address Dirección Next to the water storage tank Al lado del tanque de agua		Location Lugar -	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, milky Marrón, lechoso	Odor Olor Putrid Podrido	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Water contains particles / Agua contiene partículas					
Code Código CAS -3	Community / District Provincia / Municipio Cercado / Casarabe	Date / Time of Sampling Fecha / Hora de Muestreo 10.01.2002 / 10.05 h	Address Dirección Calle 6 de Agosto, casi final		Location Lugar -	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, milky Marrón, lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CAS -4	Community / District Provincia / Municipio Cercado / Casarabe	Date / Time of Sampling Fecha / Hora de Muestreo 10.01.2002 / 11.00 h	Address Dirección Avenida Ganadera al final		Location Lugar Dr. Manuel Arias Roca	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -5	Cercado / Casarabe	10.01.2002 / 11.10 h	Estancia familia Gómez		-	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, levemente lechoso	Odor Olor Slightly putrid Levemente podrido	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -6	Cercado / Casarabe	10.01.2002 / 10.20 h	Main square / Plaza Principal		Bella Aponte	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -7	Cercado / Casarabe	10.01.2002 / 10.30 h	Calle Juan Bautista Banega		Sra Mercedes Rocha de Pereira	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Water contains particles / Agua contiene partículas					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -8	Cercado / Casarabe	10.02.2002 / 11.30 h	Avenida Ganadero al Norte		-	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, light milky Marrón, levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS -9	Cercado / Casarabe	10.01.2002 / 11.50 h	Camp / Campamento consorcio INCO-TERRA-VELKO		-	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Tap and pump Grifo y bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rainwater tank underground / Noque bajo tierra					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-10	Cercado / Casarabe	10.01.2002 / 12:00 h	Avenida Juan Bautista Banega		Familia Añez-Ortiz	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-11	Cercado / Casarabe	10.01.2002 / 12:20 h	About 1.5 km east of Casarabe 1.5 Km al oeste de Casarabe		Family / Familia Campo	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez None ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
CAS-12	Cercado / Casarabe	10.01.2002 / 12:40 h	Finca " 7 de Marzo"		Antonio Amadeo Caumal	
	Type of Water Source Tipo de Fuente Rainwater, Stagnant water Agua de lluvia, Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellow, milky Amarillo, lechoso	Odor Olor Slightly putrid Levemente podrido	Turbidity Turbidez None ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Results of Analysis

CASARABE 1 - 12

Parameter	CAS-1	CAS-2	CAS-3	CAS-4	CAS-5	CAS-6	CAS-7	CAS-8	CAS-9	CAS-1 0	CAS-1 1	CAS-1 2
pH	7.61	6.76	6.92	6.74	6.91	6.99	7.47	6.28	8.08	5.87	5.61	6.10
Cond. [μ S/cm]	39.1	164	81	486	55.9	37.1	93.7	87.0	75.0	30.7	37.1	44.8
Temp. [°C]	28.0	27.1	28.1	27.4	28.4	27.9	27.4	29.6	30.2	27.7	30.1	31.1
Alc. ^a [mg/l]	25.0	80.0	43.8	264	33.8	21.2	45.0	40.0	41.2	21.2	20.0	172
Salinity ^b	0.037	0.110	0.061	0.312	0.046	0.036	0.068	0.065	0.058	0.032	0.036	0.041
Hardness ^c [mg/l]	38.4	113	86.4	203	60.3	48.6	71.6	57.8	55.2	30.7	< 17.4	36.2
Susp. Sol. [mg/l]	< 3	20	49	< 3	54	< 3	< 3	70	< 3	< 3	51	50
COD [mg/l]	< 5	12.1	44.5	< 5	23.1	< 5	5.0	24.5	< 5	< 5	21.1	31.7
BOD ₅ [mg/l]	< 4	7	20	< 4	9	< 4	< 4	15	< 4	< 4	12	19
F [mg/l]	< 0.1	< 0.1	< 0.1	0.32	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	0.07	0.67	0.26	0.14	0.13	0.06	0.14	0.13	0.11	< 0.05	0.17	0.27
NH ₄ -N [mg/l]	0.07	0.89	0.16	0.04	0.06	0.09	0.04	0.05	0.03	0.09	0.05	0.08
NO ₂ -N [mg/l]	0.15	0.30	0.36	0.14	0.21	0.11	0.14	0.14	0.23	0.16	0.25	0.27
NO ₃ -N [mg/l]	< 0.23	0.27	0.39	< 0.23	< 0.23	< 0.23	0.56	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	5.23	12.84	6.78	48.24	3.97	5.41	11.17	3.54	11.20	4.02	2.39	2.69
Fe [mg/l]	< 0.08	0.53	1.55	< 0.08	0.91	< 0.08	< 0.08	0.98	< 0.08	< 0.08	1.23	1.01
Zn [mg/l]	0.056	< 0.020	< 0.020	0.025	0.030	0.030	0.030	< 0.020	0.032	0.058	< 0.020	< 0.020
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms	0	0	1500	0	0	0	0	0	0	0	0	0
Fecal [N/100]	15600	6600	5400	770	5220	8950	2900	3480	920	3540	20400	22600
Total [N/100]												

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO₃

^b The salinity is a unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO₃.
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San Ignacio de Moxos - Provincia Moxos

Characteristics of the Sampling Points

The sampling program has not been changed and was entirely repeated. North of San Ignacio de Moxos there is the lake Iserere, of which the drinking water is taken and distributed through a network of plastic pipes (white PVC). But only the old part of the village is connected to this water delivery system.

Other water sources are rainwater tanks (noque, the use of those rainwater deposits is a well-known habit by the long established residents), open wells (noria) and, in one case, a well with a manual water pump.

The majority of the old houses have their own open wells (noria) of which a certain number is already out of use for the houses being connected to the local water distribution system.

The sampling has been extended to the communities of Puerto San Borja and Monte Grande west of San Ignacio, and to the eastward till Bermejo, Argentina and Fátima. All these localities count on wells of the 'semi surgente' type installed by PRAS-BENI. In Puerto San Borja one sample was taken directly out of the Río Apere, whose water is frequently used by many residents.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 1	Moxos / San Ignacio	14.01.2002 / 9.20 h	Puerto San Borja		Under the bridge / Bajo del puente, Río Apere	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 2	Moxos / San Ignacio	14.01.2002 / 9.30 h	Puerto San Borja		Terrain of the church Predio de la Iglesia	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 3	Moxos / San Ignacio	14.01.2002 / 8.30 h	Comunidad "Monte Grande"		Leandro Salvatierra	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 4	Moxos / San Ignacio	14.01.2002 / 10.30 h	Laguna Isirere de San Ignacio		-	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, milky Marrón, lechoso	Odor Olor Slightly putrid Levemente podrido	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 5	Moxos / San Ignacio	14.01.2002 / 10.55 h	Calle Montes esq. Ballivian		José Santa Cruz	
	Type of Water Source Tipo de Fuente Rainwater Agua de lluvia	Water taking Device Tipo de Suministro Directly Directo	Color Color Yellowish Amarillo claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 6	Moxos / San Ignacio	14.01.2002 / 11.05 h	Calle Montes esq. Ballivian		José Santa Cruz	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Yellow Amarillo	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 7	Moxos / San Ignacio	14.01.2002 / 11.20 h	Calle Santiesteban		Sr. Domingo Angola (Pastor)	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 8	Moxos / San Ignacio	14.01.2002 / 12.55 h	Comunidad Bermejo		Public water pump / Bomba pública	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG - 9	Moxos / San Ignacio	14.01.2002 / 13.30 h	Comunidad " La Argentina"		-	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SIG -10	Moxos / San Ignacio	14.01.2002 / 14.40 h	Community / Comunidad Fátima		-	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis / Resultados de Ensayo

SAN IGNACIO 1- 10

Parameter	SIG-1	SIG-2	SIG-3	SIG-4	SIG-5	SIG-6	SIG-7	SIG-8	SIG-9	SIG-10
pH	6.21	7.36	6.87	6.65	8.17	6.34	6.21	6.93	5.92	6.62
Cond. [$\mu\text{S}/\text{cm}$]	55	1210	381	50.3	82.0	55.0	248	1471	424	1384
Temp. [$^{\circ}\text{C}$]	29.5	29.0	27.5	32.4	29.9	31.8	31.8	30.5	29.5	29.2
Alc. ^a [mg/l]	27.5	544	209	28.8	41.2	31.2	131	740	220	518
Salinity ^b	0.046	0.786	0.245	0.045	0.062	0.047	0.163	0.96	0.273	0.902
Hardness ^c [mg/l]	< 17.4	62.8	22.3	28.2	< 17.4	62.8	< 17.4	81.9	96.4	133
Susp. Sol. [mg/l]	5	< 3	< 3	42	< 3	< 3	< 3	15	< 3	< 3
COD [mg/l]	77.8	< 5	< 5	29.4	24.4	21.6	< 5	< 5	5.1	< 5
BOD₅ [mg/l]	38	< 4	< 4	14	9	8	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	0.77	0.56	< 0.1	< 0.1	< 0.1	0.31	0.40	< 0.1	0.85
PO₄-P [mg/l]	0.26	0.06	0.27	0.19	0.18	0.22	0.08	0.28	0.87	0.08
NH₄-N [mg/l]	0.16	0.04	0.05	0.12	0.17	0.19	0.09	0.23	0.29	0.14
NO₂-N [mg/l]	0.28	0.14	0.13	0.21	0.18	0.22	0.13	0.21	0.22	0.21
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	5.67	18.22	1.2	3.57	8.78	4.15	3.15	19.82	16.57	25.83
Fe [mg/l]	1.40	0.16	< 0.08	0.52	0.18	0.18	0.09	0.17	4.41	0.15
Zn [mg/l]	< 0.02	0.746	0.055	0.076	< 0.02	< 0.02	0.043	0.02	0.045	0.096
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.009	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	250	0	0	10	0	0	30	0	0	0
Total [N/100]	27500	4200	26200	8350	14400	2400	24650	19100	4640	13600

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

San José de Cabito - Provincia Moxos

Characteristics of the Sampling Points

No changes have been made with regard to the previous sampling program.

The sampling points in the region called 'San José de Cabito' are very scattered and include the following localities: the village San Lorenzo, the communities Monte Grande, Santa Rosa del Apere and San José de Cabito. Of each locality between two to four representative drinking water samples have been taken from rainwater tanks (noria) and wells of the 'semi surgente' type.

In Santa Rosa del Apere and San Jose de Cabito the Río Apere is used for the supply of drinking water. In San José de Cabito, additionally, there is a school with dormitory, which owns a deep well with an elevated storage tank and an internal distribution through water pipes.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 1	Moxos / San José de Cabito	17.01.2002 / 12.10 h	San Lorenzo		Calle Moxos, al lado de Elisabeth Castro	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Yellow Amarillo	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 2	Moxos / San José de Cabito	17.01.2002 / 12.40 h	San Lorenzo, Restaurante		Sra Miriam Saavedra (Profesora)	
	Type of Water Source Tipo de Fuente Reserved Well Water for City Water Supply Agua de Pozo para Abastecimiento del Pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 3	Moxos / San José de Cabito	17.01.2002 / 12.20 h	San Lorenzo		South of the polyfunctional field Al sur del polideportivo	
	Type of Water Source Tipo de Fuente Reserved Well Water for City Water Supply Agua de Pozo para Abastecimiento del Pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguno
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC - 4	Moxos / San José de Cabito	29.09.2001 / 13.35 h	Monte Grande		Central square / Plaza del Pueblo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código SJC - 5	Community / District Provincia / Municipio Moxos / San José de Cabito	Date / Time of Sampling Fecha / Hora de Muestreo 17.01.2002 / 15.20 h	Address Dirección Monte Grande		Location Lugar South of the central square Al sur de la plaza	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SJC - 6	Community / District Provincia / Municipio Moxos / San José de Cabito	Date / Time of Sampling Fecha / Hora de Muestreo 17.01.2002 / 15.45 h	Address Dirección Monte Grande		Location Lugar College / Escuela vieja	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguno	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SJC - 7	Community / District Provincia / Municipio Moxos / San José de Cabito	Date / Time of Sampling Fecha / Hora de Muestreo 16.01.2002 / 10.10 h	Address Dirección Santa Rosa del Apere		Location Lugar Central square / Plaza	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Milky gray Gris lechoso	Odor Olor Putrid Putrefacto	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código SJC - 8	Community / District Provincia / Municipio Moxos / San José de Cabito	Date / Time of Sampling Fecha / Hora de Muestreo 16.01.2002 / 10.20 h	Address Dirección Santa Rosa del Apere		Location Lugar River / Río Apere	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, slightly milky Marrón, leve- mente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código SJC - 9	Community / District Provincia / Municipio Moxos / San José de Cabito	Date / Time of Sampling Fecha / Hora de Muestreo 16.01.2002 / 11.50 h	Address Dirección San José de Cabito		Location Lugar River Apere, general water supply Río Apere, suministro del pueblo	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJC -10	Moxos / San José de Cabito	16.01.2002 / 12.10 h	San José de Cabito		Main square, next to the Cabildo Plaza, al lado del Cabildo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
SJC -11	Moxos / San José de Cabito	16.01.2002 / 12.30 h	Salida a Eva-Eva (Jesús María)		Family / Familia Moya	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
SJC -12	Moxos / San José de Cabito	16.01.2002 / 12.20 h	Dormitory / Internado "San José de Cabito Jesús María"		-	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis

SAN JOSE DE CABITO 1- 12

Parameter	SJC-1	SJC-2	SJC-3	SJC-4	SJC-5	SJC-6	SJC-7	SJC-8	SJC-9	SJC-10	SJC-11	SJC-12
pH	7.78	6.80	5.43	7.78	6.64	6.03	7.25	5.74	5.72	5.85	5.95	6.05
Cond. [$\mu\text{S/cm}$]	842	512	113	37.7	219	327	931	32.0	36.9	257	201	182
Temp. [$^{\circ}\text{C}$]	27.1	27.2	27.3	26.8	27.6	28.4	27.4	27.1	27.2	28.8	28.1	29.1
Alc. ^a [mg/l]	62.5	278	42.5	20.0	90.0	149	552	22.5	16.2	126	82.5	95.0
Salinity ^b	0.543	0.329	0.080	0.036	0.144	0.211	0.601	0.033	0.035	0.168	0.133	0.122
Hardness ^c [mg/l]	207	321	61.9	38.4	103	55.9	44.6	30.2	< 17.4	53.6	57.7	45.2
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	80	10	17	< 3	< 3	< 3
COD [mg/l]	23.7	< 5	< 5	< 5	< 5	< 5	< 5	45.2	44.6	< 5	< 5	< 5
BOD₅ [mg/l]	14	< 4	< 4	< 4	< 4	< 4	< 4	26	26	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.25	0.72	< 0.05	< 0.05	0.23	0.29	0.27	0.21	0.21	0.10	0.08	0.12
NH₄-N [mg/l]	0.07	0.04	0.06	0.04	0.23	0.35	0.30	0.11	0.14	0.07	0.06	0.07
NO₂-N [mg/l]	0.24	0.15	0.18	0.14	0.20	0.15	0.06	0.07	0.08	0.04	0.06	0.05
NO₃-N [mg/l]	4.54	< 0.23	< 0.23	< 0.23	2.26	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	53.02	81.99	4.72	4.86	27.32	6.18	15.59	3.77	3.71	3.18	20.75	4.26
Fe [mg/l]	0.09	0.09	< 0.08	< 0.08	< 0.08	2.59	0.75	0.88	0.88	0.10	0.72	0.12
Zn [mg/l]	< 0.02	0.06	0.027	0.157	0.029	0.152	0.085	< 0.02	< 0.02	< 0.02	0.03	0.034
As [mg/l]	0.002	< 0.002	< 0.002	0.002	0.005	0.017	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria												
Fecal [N/100]	420	0	0	0	0	0	2500	0	0	0	40	0
Total [N/100]	25200	11020	8700	6380	16820	6960	21600	9280	8760	18400	16200	15750

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is a unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Santísima Trinidad - Provincia Moxos

Characteristics of the Sampling Points

This location could not be visited during the actual sampling process in January/February due to reasons of force majeure already mentioned in the Introduction. The samples had been taken in May.

The location corresponds to the most southern point of the survey study and, at the moment, it is only reachable through the zone of the Chapare of Cochabamba.

The drinking water situation during the rainy season is the same as in the dry season. The only sources for the extraction of drinking water for this community are the Ríos Izacese to the north and Sasasama to the south of the village. For that reason only two representative water samples, one of each river, could be taken in the location.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
STR - 1	Moxos / Santísima Trinidad	16.05.2002 / 12.30 h	-		Río Izacese	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
STR - 2	Moxos / Santísima Trinidad	16.05.2002 / 13.00 h	-		Río Sasama	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarcely Escasa
	Comments / Comentarios : -					

Results of Analysis**SANTISIMA TRINIDAD 1 - 2**

Parameter	STR-1	STR-2
pH	7.38	7.93
Cond. [$\mu\text{S/cm}$]	48.5	75.5
Temp. [$^{\circ}\text{C}$]	27.5	28.0
Alc. ^a [mg/l]	18.0	21.0
Salinity ^b	0.042	0.058
Hardness ^c [mg/l]	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3
COD [mg/l]	< 5	< 5
BOD₅ [mg/l]	< 4	< 4
F [mg/l]	0.16	< 0.1
PO₄-P [mg/l]	1.48	0.08
NH₄-N [mg/l]	0.04	0.03
NO₂-N [mg/l]	0.04	0.05
NO₃-N [mg/l]	< 0.23	< 0.23
Ca [mg/l]	4.69	7.62
Fe [mg/l]	0.48	0.10
Zn [mg/l]	0.06	0.07
As [mg/l]	0.004	0.002
Hg [mg/l]	< 0.001	< 0.001
Coliforms		
Fecal [N/100]	0	0
Total [N/100]	4640	1160

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

MUESTREO / ENSAYO

San Joaquín - Provincia Mamoré

Characteristics of the Sampling Points

In the present sampling program no changes have been made with regard to the first stage of the project.

In San Joaquín exists an extensive network which connects nearly every housing to the local drinking water supply. In the village there are two elevated water tanks, but only one is in use right now. It must be stressed that the actual water supply by the cooperative is not a permanent service what means it depends on the function of the electric generator of the village (designated hours of the day).

In spite of the existence of the local distribution red the overwhelming majority of the population uses their own wells (noria) as a water source. There are two reasons for that behavior: on the one hand there is a prejudice that the water of the own open well is 'sweet water' and the water supplied by the network is 'salty water'. On the other hand a great deal of the residents doesn't take water out of the local network because of economic reasons (the quotes of the cooperative can't be paid).

Because of the quoted reasons and to get a more representative result of the actual situation the major part of the samples have been taken from the private water sources (open wells - noria).

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 1	Mamoré / San Joaquín	21.01.2002 / 7.45 h	Calle Santa Cruz esq. 6 de Agosto		Felix Mejía Durán	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual with bucket Manual con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains large particles (insects) / El agua contiene partículas grandes (insectos)					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 2	Mamoré / San Joaquín	21.01.2002 / 8.00 h	Calle Sucre 19		Radio station / Radio emisora "Agua dulce", Sr. Wilbaldo Bravo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Water contains particles (insects y plant parts) / Agua contiene partículas (insectos, plantas)					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 3	Mamoré / San Joaquín	21.01.2002 / 8.10 h	Calle Sucre 19		Sr. Wilbaldo Bravo R.	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 4	Mamoré / San Joaquín	21.01.2002 / 8.20 h	Calle 21 de Agosto		Family / Familia Osman Cortez	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains large particles / El agua contiene partículas grandes					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 5	Mamoré / San Joaquín	21.01.2002 / 8.35 h	Calle Bolivar 46		Dalecio Nuñez	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 6	Mamoré / San Joaquín	21.01.2002 / 9.10 h	Calle Germán Busch 26		Family / Familia Ortiz	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 7	Mamoré / San Joaquín	21.01.2002 / 9.25 h	Calle Tarija 31		Family / Familia Pedro Bejarano Tipa	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : Waste had been burned next to the well / Se quemaron desechos al lado de la noria						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 8	Mamoré / San Joaquín	21.01.2002 / 9.40 h	Calle 18 de Noviembre 43		Family / Familia Sadi Sosa Ojopi	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO - 9	Mamoré / San Joaquín	21.01.2002 / 9.50 h	Calle 18 de Noviembre 29		Family / Familia Risco	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SJO -10	Mamoré / San Joaquín	21.01.2002 / 9.00 h	Calle Bolivar 1		Family / Familia Jimmi Melgar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis

SAN JOAQUIN 1 – 10

Parameter	SJO-1	SJO-2	SJO-3	SJO-4	SJO-5	SJO-6	SJO-7	SJO-8	SJO-9	SJO-10
pH	4.81	4.32	4.96	4.71	3.35	4.25	4.12	4.57	4.38	4.94
Cond. [$\mu\text{S/cm}$]	179	150	34.4	312	195	20.9	21.1	86.6	85.3	61.3
Temp. [$^{\circ}\text{C}$]	27.3	27.8	27.3	28.4	28.6	29.0	29.5	30.0	31.0	28.9
Alc. ^a [mg/l]	12.5	6.25	17.5	13.8	7.5	11.2	3.75	10.0	6.25	12.5
Salinity ^b	0.120	0.102	0.034	0.202	0.130	0.028	0.028	0.065	0.064	0.050
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	19.3	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD ₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	0.06	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NH ₄ -N [mg/l]	0.02	0.30	0.02	0.02	0.04	< 0.015	0.02	0.02	0.02	0.03
NO ₂ -N [mg/l]	0.16	0.15	0.15	0.16	0.14	0.14	0.13	0.13	0.14	0.14
NO ₃ -N [mg/l]	5.73	4.57	0.29	9.72	7.40	1.05	1.57	1.79	2.05	1.40
Ca [mg/l]	3.36	2.82	1.51	6.60	2.14	0.63	0.07	1.14	0.87	0.87
Fe [mg/l]	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Zn [mg/l]	0.04	0.06	0.09	0.03	0.03	0.07	0.07	0.15	0.04	0.12
As [mg/l]	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	0	10	0	0	0	0	0	0	0	0
Total [N/100]	550	1150	0	0	40	470	1880	0	0	0

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO₃

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO₃.

[Standard Methods for the Examination of Water and Wastewater (1992)]

MUESTREO / ENSAYO

San Ramón - Provincia Mamoré

Characteristics of the Sampling Points

The sampling program of the dry season was repeated in its totality. In this village the situation is similar to the previously described of San Joaquín (chapter BENI-SJO). As well there exist the same behavior with respect to the consumption of the supplied water by the local network accompanied with the same arguments to use private sources of drinking water. Therefore, the 10 samples of this locality have been taken from the local supply and from the private wells respectively.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 1	Mamoré / San Ramón	22.01.2002 / 9.40 h	Calle Coronel Viera 48		Family / Familia Merín Cuellar	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 2	Mamoré / San Ramón	22.01.2002 / 9.50 h	Calle Coronel Viera 48		Family / Familia Merín Cuellar	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 3	Mamoré / San Ramón	22.01.2002 / 10.00 h	Calle Ayacucho 23, San Ramoncito		Family / Familia Suárez Arriaza	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 4	Mamoré / San Ramón	22.01.2002 / 10.10 h	Calle Walter Serrath, esq. Calle Junín		Family / Familia López - Serrath	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 5	Mamoré / San Ramón	22.01.2002 / 10.20 h	Calle Junín 4, Close to the port / Cerca del puerto		Family / Familia López - Serrath	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 6	Mamoré / San Ramón	22.01.2002 / 10.30 h	Plaza Principal 5		Family / Familia Vaca - Arriaga	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 7	Mamoré / San Ramón	22.01.2002 / 10.40 h	Calle Coronel Viera 2		Family / Familia Ramona Vargas	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 8	Mamoré / San Ramón	22.01.2002 / 10.50 h	Calle Coronel Viera 2		Mauro Huasico	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA - 9	Mamoré / San Ramón	22.01.2002 / 11.00 h	Calle al sur del Colegio "Lucio Soria" esq 18 de Noviembre		Rómulo Moriva	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Tap Grifo	Clear Claro	None Ninguno	None Ninguna	None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRA-10	Mamoré / San Ramón	22.01.2002 / 11.10 h	Calle Itunama 10		Family / Familia Herminio Velo	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Tap Grifo	Clear Claro	None Ninguno	None Ninguna	None Ninguna
	Comments / Comentarios : -					

Results of Analysis

SAN RAMON 1 - 10

Parameter	SRA-1	SRA-2	SRA-3	SRA-4	SRA-5	SRA-6	SRA-7	SRA-8	SRA-9	SRA-10
pH	4.25	4.58	4.48	4.55	4.36	4.50	4.78	4.62	4.04	4.91
Cond. [μ S/cm]	93.5	12.6	11.6	11.7	12.1	11.8	12.6	186	102	11.5
Temp. [°C]	29.8	30.9	31.8	31.0	30.9	30.9	30.5	30.7	29.8	31.4
Alc. ^a [mg/l]	6.25	13.8	11.2	11.2	7.5	11.2	7.5	12.5	3.75	8.75
Salinity ^b	0.069	0.024	0.024	0.024	0.024	0.024	0.024	0.124	0.074	0.024
Hardness ^c [mg/l]	< 17.4	24.3	< 17.4	25.3	< 17.4	50.0	< 17.4	57.5	< 17.4	< 17.4
Susp. Sol.[mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BOD ₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.13	< 0.05	< 0.05
NH ₄ -N [mg/l]	0.03	0.02	0.02	0.02	0.04	0.03	0.03	0.11	0.02	0.02
NO ₂ -N [mg/l]	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.06	< 0.015	< 0.015
NO ₃ -N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	3.19	3.70	< 0.23
Ca [mg/l]	2.07	0.58	0.54	0.53	0.66	0.54	0.58	4.21	0.41	0.58
Fe [mg/l]	0.04	0.05	0.06	0.08	0.05	0.17	< 0.08	< 0.08	< 0.08	< 0.08
Zn [mg/l]	0.03	0.30	0.35	0.26	0.31	0.25	0.27	0.06	0.05	0.27
As [mg/l]	0.002	0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	0	0	0	0	0	0	0	30	10	0
Total [N/100]	870	690	720	550	2320	3350	580	5220	1160	1740

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO₃

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO₃.

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Buena Vista - Provincia Mamoré

Characteristics of the Sampling Points

Buena Vista is a community situated along the eastern banks of the Río Machupo. This location is very difficult to approach during the dry season since it doesn't exist a connection through a country road. During the rainy season this community is reached by ship on the Río Machupo.

The previous program has been repeated with only six sampling points, which represent the totality of supply sources during the whole year.

In this community there are various well of the 'semi surgente' type (see chapter BENI-TRI) installed by PRAS-BENI, which are less used by the population, for the water often has a milky aspect or a certain grade of turbidity. That's why the majority of the people consumes the drinking water from a well which is located at about 150 m to the east of the village.

A second open well exists on a private terrain, however the use of the well isn't restricted to the public.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 1	Mamoré / Buena Vista	26.01.2002 / 9.55 h	South of the community Al sur de la comunidad		Francisca Arancibia	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 2	Mamoré / Buena Vista	26.01.2002 / 10.05 h	West of the main square / Al oeste de la plaza		Delante de Benedito Camama	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manul pump Bomba manual	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Scarcely Escasa
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 3	Mamoré / Buena Vista	26.01.2002 / 10.00 h	-		Public well of the village / Noria comunitaria al naciente del Villerío	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Milky Lechoso	Odor Olor None Ninguna	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 4	Mamoré / Buena Vista	26.01.2002 / 10.20 h	-		Northe of the village Al Norte del Villerío	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 5	Mamoré / Buena Vista	26.01.2002 / 10.30 h	Noria al "centro del villerio"		North of the village Al norte del villerio	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Manual pump Bomba manual	Slightly milky Levemente lechoso	None Ninguno	Scarcely Escasa	None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
BUV - 6	Mamoré / Buena Vista	26.01.2002 / 10.40 h	In front of the school Delante de la escuela		North of the village Al norte del villerio	
	Type of Water Source Tipo de Fuente	Water taking Device Tipo de Suministro	Color Color	Odor Olor	Turbidity Turbidez	Sedimentation Sedimentación
	R Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Manual pump Bomba manual	Yellow, milky Amarillo, lechoso	None Ninguno	Scarcely Escasa	None Ninguna
Comments / Comentarios : -						

Results of Analysis

BUENA VISTA 1 - 6

Parameter	BUV-1	BUV-2	BUV-3	BUV-4	BUV-5	BUV-6
pH	3.90	4.40	3.87	4.40	3.97	5.21
Cond. [$\mu\text{S/cm}$]	27.1	19.7	10.6	20.0	14.2	77.4
Temp. [$^{\circ}\text{C}$]	30.0	27.9	28.5	28.1	27.8	28.2
Alc. ^a [mg/l]	6.25	25.0	5.0	13.8	12.5	61.2
Salinity ^b	0.031	0.026	0.022	0.027	0.024	0.059
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	11	44	< 3	375	39	296
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.12	< 0.05	0.06	< 0.05	< 0.05	< 0.05
NH₄-N [mg/l]	0.03	0.12	0.05	0.74	0.04	0.02
NO₂-N [mg/l]	0.08	0.07	0.07	0.04	0.02	0.06
NO₃-N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	0.19	0.56	0.10	0.33	0.08	0.45
Fe [mg/l]	0.18	0.43	0.20	0.22	0.07	0.27
Zn [mg/l]	0.08	4.04	0.07	6.14	1.27	28.59
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria						
Fecal [N/100]	130	0	145	0	0	0
Total [N/100]	8120	560	6960	300	2320	1060

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Santa Rosa de Vigo - Provincia Mamoré

Characteristics of the Sampling Points

The sampling points of the region 'Santa Rosa de Vigo' enclose communities situated along the route San Joaquín - Puerto Siles - Santa Rosa de Vigo - Alejandría. All of those locations are geographically rather distant from each other. It is to be stressed out that in every locality the drinking water supply for the population has got it's own characteristics. During the present stage there are some variations in Santa Rosa de Vigo and Alejandría, respectively.

In Chaco Lejos two samples were taken, one from a well of the 'semi surgente' type, of which a certain number exists in this community. The second sample was taken from an open well (noria), which has a remarkable water output and is very frequented by the population.

Alturas de Carmen located about two kilometers before reaching the Río Mamoré in Puerto Siles, has got only open wells (noria) used for the drinking water supply.

Puerto Siles, an important river port, lies on the banks of the Mamoré, whose water is predominantly used as the source of drinking water by the population. However, there are as well deposits and water tanks for either rainwater or water delivered from Alturas de Carmen.

Santa Rosa de Vigo is a community situated on the banks of the Río Mamoré. For the water supply exist two open wells (noria) from which samples have been taken (new: SRV-13).

The so-called 'pauros' situated along the slopes of the river bank disappear in the rainy season due to a considerable increase of the water quantity of the Río Mamoré. Therefore, three previous water samples of 'pauros' (SRV-2, 3, 4) had to be substituted. One sample was directly taken out of the Río Mamoré (new: SRV-14).

The 'pauro' is a little artificial excavation in a clay layer, which accumulates water coming out from the overlaying horizon with a low productiveness (water arteries). This horizon is also the providing source for the wells (noria) in the interior. Because of the horizontal limited extension of the water bearing horizon the water source gradually dries out in some parts of the river slope.

In the community of Alejandría the drinking water supply is assured by the wells 'semi surgente' with manual water pumps installed by PRAS-BENI in addition to the existing open wells (noria) which contain enough water in the rainy season. In the present sampling one sample has been taken from a noria of the community (new: SRV-15).

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 1	Mamoré / Santa Rosa de Vego	24.01.2002 / 14.40 h	Well north of the village Noria al norte del pueblo		-	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling / Lluvia durante el muestreo					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 5	Mamoré / Santa Rosa de Vego	21.01.2002 / 13.00 h	Puerto Siles		Río Mamoré	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown Marrón	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 6	Mamoré / Santa Rosa de Vego	21.01.2002 / 13.15 h	Puerto Siles		Sra Bella Vda de Angulo	
	Type of Water Source Tipo de Fuente Rain water Agua de lluvia	Water taking Device Tipo de Suministro Rain water tank Noque	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 7	Mamoré / Santa Rosa de Vego	21.01.2002 / 16.20 h	Comunidad "Chaco Lejos"		Family / Familia Jorge Galindo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual Pump Bomba manual	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 8	Mamoré / Santa Rosa de Vego	21.01.2002 / 16.10 h	Comunidad "Chaco Lejos"		Noria east of the village Noria al este del villerio	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains large particles / El agua contiene partículas grandes					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV - 9	Mamoré / Santa Rosa de Vego	21.01.2002 / 14.00 h	Puerto Siles- Altura del Carmen		Nori of the family J. Galindo Noria de la familia Juan Galindo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarcely Escasa	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV-10	Mamoré / Santa Rosa de Vego	21.01.2002 / 14.15 h	Puerto Siles - Alturas del Carmen		Family / Familia Manuel Abrego	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains large particles / El agua contiene partículas grandes					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
SRV-11	Mamoré / Santa Rosa de Vego	24.01.2002 / 6.50 h	Comunidad Alejandría		Well / Pozo Familia Guzmán	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
SRV-12	Mamoré / Santa Rosa de Vego	24.01.2002 / 6.30 h	Comunidad Alejandría		College / Escuela	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para abastecimiento del pueblo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : Public well / Pozo del pueblo						
SRV - 13	Mamoré / Santa Rosa de Vego	24.01.2002 / 15.15 h	-		Well of the medical point / Noria de la posta sanital	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
SRV - 14	Mamoré / Santa Rosa de Vego	24.01.2002 / 14.00 h	-		Río Mamoré	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Brown, milky Marrón, lechoso	Odor Olor Putrid Podrido	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
Comments / Comentarios : -						
SRV - 15	Mamoré / Santa Rosa de Vego	24.01.2002 / 7.05 h	Comunidad Alejandría		Family / Familia Castro	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Pump Bomba	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						

Results of Analysis

SANTA ROSA DE VIGO 1 - 10

Parameter	SRV-1	SRV-5	SRV-6	SRV-7	SRV-8	SRV-9	SRV-10	SRV-11	SRV-12	SRV-13	SRV-14	SRV-15
pH	3.67	6.20	6.22	4.95	5.12	4.24	3.76	5.16	3.83	3.75	4.47	3.62
Cond. [$\mu\text{S/cm}$]	133	78.1	26.4	16.5	58.1	21.4	28.8	29.3	8.5	110	89.9	6.62
Temp. [$^{\circ}\text{C}$]	28.5	32.2	30.7	28.7	28.3	33.1	30.5	25.7	25.8	28.3	31.4	28.6
Alc. ^a [mg/l]	20.0	27.5	15.0	13.8	11.2	6.25	5.0	23.8	11.2	16.8	28.8	8.75
Salinity ^b	0.092	0.060	0.028	0.025	0.048	0.029	0.032	0.031	0.020	0.078	0.067	0.021
Hardness ^c [mg/l]	< 17.4	78	46.4	25.2	43.6	26.6	< 17.4	25.0	< 17.4	71.4	71.5	< 17.4
Susp. Sol. [mg/l]	< 3	162	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	362	< 3
COD [mg/l]	< 5	29.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	27.7	< 5
BOD₅ [mg/l]	< 4	16	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	17	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	< 0.05	0.26	< 0.05	0.08	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.18	< 0.05
NH₄-N [mg/l]	0.03	0.15	0.07	0.06	0.03	0.03	0.02	< 0.015	< 0.015	< 0.015	0.61	< 0.015
NO₂-N [mg/l]	0.05	0.15	< 0.015	< 0.015	< 0.015	0.02	0.03	0.02	0.05	0.04	0.25	0.04
NO₃-N [mg/l]	5.63	0.76	< 0.23	< 0.23	2.67	0.66	0.86	< 0.23	< 0.23	8.02	0.62	< 0.23
Ca [mg/l]	9.57	7.45	0.54	0.56	3.60	0.16	0.07	1.40	< 0.05	5.94	8.57	0.08
Fe [mg/l]	< 0.08	2.63	< 0.08	0.18	< 0.08	< 0.08	< 0.08	0.25	< 0.08	0.11	0.18	0.08
Zn [mg/l]	0.06	0.06	0.06	0.17	0.06	0.05	0.04	0.12	0.45	0.04	0.09	0.13
As [mg/l]	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria												
Fecal [N/100]	11600	520	0	0	20	10	10	680	0	0	10	0
Total [N/100]	23600	13920	2320	4060	8120	3480	7540	15400	13900	20100	9860	16900

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Riberalta - Provincia Mamoré

Characteristics of the Sampling Points

There are no changes regarding the sampling program of the dry season. The city of Riberalta has got a relatively new system of drinking water supply, but limited to the old city center. The suburbs, some of them very recently built, don't count on this service.

However, as well in Riberalta, like in the previously described locations of San Joaquín and San Ramón, the local drinking water distribution is very rarely used by the residents. On one hand exists the sensation that the tap water is 'salty', on the other hand a great deal of the people can't or doesn't want to pay for the drinking water service. For those reasons, the majority of the population uses water from their wells (noria) and the water supplied by the cooperative for other domestic purposes.

The mayor part of the collected water samples comes from wells (noria) of the suburbs of Riberalta.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -1	Riberalta / Vaca Diez	04.02.2002 / 7.35 h	Barrio El Cerrito Family / Familia Angelo Flores		Close to the bus stop / cerca de la parada de micros	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The water contains particles / El agua contiene partículas						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -2	Riberalta / Vaca Diez	04.02.2002 / 7.50 h	Calle Manuripi s/n, Barrio El Cerrito (lower part / parte baja)		Kathy Yoamona	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The water contains large particles (insects, plant parts) / El agua contiene partículas grandes (insectos, plantas)						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -3	Riberalta / Vaca Diez	04.02.2002 / 8.15 h	Barrio San Juan, Calle Amarilla		Family / Familia Carmen Durán	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Brown, milky Marrón, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación High Alta
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -4	Riberalta / Vaca Diez	04.02.2002 / 8.35 h	Barrio Integración		Nancy Vira	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Yellow, milky Amarillo, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Scarce Escasa	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The water contains large particles / El agua contiene partículas grandes						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
RIB -5	Riberalta / Vaca Diez	04.02.2002 / 9.00 h	Barrio 1º de Septiembre, Calle Alizo esq. Copaibo		Family / Familia Roberto Sanjinés Castillo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The water contains large particles / El agua contiene partículas grandes						

Sampling and 'in situ' – Observations

Continuation

Code Código RIB -6	Community / District Provincia / Municipio Ríberalta / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 04.02.2002 / 9.20 h	Address Dirección Barrio Centenario, Calle Santa Teresita		Location Lugar Family / Familia Karín Mojica	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with a bucket Directo con balde	Color Color Milky brown Marrón, lechoso	Odor Olor None Ninguno	Turbidity Turbidez Significant Bastante	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : -					
Code Código RIB -7	Community / District Provincia / Municipio Ríberalta / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 04.02.2002 / 9.35 h	Address Dirección Barrio El Palmar, Av. Brasil		Location Lugar Family / Familia Edmundo Alpírez	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez Perceptible Perceptible	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código RIB 8	Community / District Provincia / Municipio Ríberalta / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 04.02.2002 / 9.55 h	Address Dirección Barrio Heroes del Chaco 469		Location Lugar Family / Familia María Vda. de Estívariz	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling / Lluvia durante el muestreo					
Code Código RIB 9	Community / District Provincia / Municipio Ríberalta / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 04.02.2002 / 10.50 h	Address Dirección Centro calle Máximo Gennicke		Location Lugar Family / Familia Rojas Cronembold	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling / Lluvia durante el muestreo					
Code Código RIB 10	Community / District Provincia / Municipio Ríberalta / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 04.02.2002 / 11.50 h	Address Dirección Centro calle Máximo Gennicke		Location Lugar Family / Familia Rojas Cronembold	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket Directo con balde	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : Rain during the sampling / Lluvia durante el muestreo					

Results of Analysis

RIBERALTA 1 - 10

Parameter	RIB-1	RIB-2	RIB-3	RIB-4	RIB-5	RIB-6	RIB-7	RIB-8	RIB-9	RIB-10
pH	5.30	5.27	6.30	6.46	4.80	5.20	5.32	6.92	8.92	6.29
Cond. [μ S/cm]	74.4	60.6	9.14	21.1	417	81.0	109	31.2	1608	383
Temp. [°C]	27.6	27.7	26.6	26.8	26.9	27.8	27.9	28.1	29.5	28.8
Alc. ^a [mg/l]	6.25	12.5	6.25	11.2	5.0	5.0	5.0	17.5	225	26.2
Salinity ^b	0.057	0.049	0.021	0.027	0.268	0.061	0.077	0.033	1.053	0.247
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	27.8	< 17.4	23.9	235	64
Susp. Sol. [mg/l]	< 3	< 3	18	< 3	< 3	8	< 3	< 3	< 3	< 3
COD [mg/l]	15.0	75.5	< 5	7.6	< 5	7.5	< 5	< 5	12.9	< 5
BOD ₅ [mg/l]	8	34	< 4	< 4	< 4	< 4	< 4	< 4	7	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.44	< 0.1
PO ₄ -P [mg/l]	< 0.05	< 0.05	0.14	< 0.05	< 0.05	0.16	< 0.05	< 0.05	1.10	< 0.05
NH ₄ -N [mg/l]	0.03	0.03	0.21	0.05	0.26	0.45	0.03	0.04	0.03	0.03
NO ₂ -N [mg/l]	< 0.015	< 0.015	0.05	0.05	< 0.015	0.10	< 0.015	< 0.015	< 0.015	< 0.015
NO ₃ -N [mg/l]	4.51	3.12	0.30	< 0.23	26.9	5.08	6.16	0.85	0.67	4.84
Ca [mg/l]	0.37	0.33	0.28	0.45	2.62	1.72	1.23	6.69	95.88	22.20
Fe [mg/l]	0.08	< 0.08	0.41	3.14	0.09	0.94	< 0.08	< 0.08	< 0.08	< 0.08
Zn [mg/l]	0.04	0.05	0.07	0.05	0.03	0.07	0.03	0.04	0.11	0.07
As [mg/l]	0.002	< 0.002	0.002	0.002	< 0.002	0.002	0.002	0.002	0.005	0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria										
Fecal [N/100]	40	0	4640	180	0	7540	210	0	0	70
Total [N/100]	4550	3480	16880	11050	6380	31100	6120	2320	4006	10640

- ^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO₃
- ^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution
- ^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO₃.
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Tumichucua - Provincia Vaca Diez

Characteristics of the Sampling Points

The sampling points of the region Tumichucua include the communities located to the southwest of Riberalta: Peña Amarilla, Candelaria and Tumichucua. In the present sampling campaign the program of 12 samples have been completed which includes the new communities 'Bella Flor', 'El Cruce' and Yeneguagua.

In Peña Amarilla there is only one 'pauro' (see chapter BENI-SRV) which serves as a drinking water source. There are two more 'pauros' but the water is taken for other uses.

In the community 'Bella Flor' exist the wells of the semi-surgente type and also the praxis of taking water from artificial water deposits (pauro). The samples TUM-9 and TUM-10 were taken in 'Bella Flor'.

In the small community 'El Cruce' (from here the main road from Riberalta continues to the departments of La Paz and Pando, respectively) one sample was taken from a noria (TUM-11).

In the community Yeneguagua one sample was directly taken out of the Río Yeneguagua (TUM-12).

In Candelaria there is one well of the 'semi surgente' type and two 'pauros' situated on the slope of the Río Beni.

The community Tumichucua has a central drinking water network with an elevated storage tank, but the system is out of use due to the lack of financial funds. The drinking water for the whole population is taken out of the 'pauros' along the slope of bank of the lake Tumichucua, whereby the people usually uses the nearest 'pauro'. Some of those 'deposits' are pretty efficient and contain a good amount of water.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM-1	Tumichucua / Vaca Díez	03.02.2002 / 10.00 h	Comunidad Peña Amarilla		Pauro of the community / Pauro de la comunidad	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Manual Manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM-2	Tumichucua / Vaca Díez	03.02.2002 / 13.30 h	Candelaria		Sanitary point / Posta sanitaria	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM-3	Tumichucua / Vaca Díez	03.02.2002 / 13.45 h	Candelaria		Pauro southwest of the village Pauro al sudoeste del villerío	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : -						
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM-4	Tumichucua / Vaca Díez	03.02.2002 / 14.05 h	Candelaria		Pauro east of the village Pauro al este del villerío	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
Comments / Comentarios : The water contains particles / El agua contiene partículas						

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM - 5	Tumichucua / Vaca Díez	03.02.2002 / 15.30 h	Candelaria		Pauro next to family / Pauro cerca de familia Yamara - Ortiz	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains large particles from plants / El agua contiene partículas grandes de las plantas					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM - 6	Tumichucua / Vaca Díez	03.02.2002 / 15.10 h	-		Pauro Familia Chávez - Medina	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM - 7	Tumichucua / Vaca Díez	03.02.2002 / 15.00 h	-		Pauro Fartán - Chávez	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
TUM - 8	Tumichucua / Vaca Díez	03.02.2002 / 14.45 h	-		Pauro Racua - Moreno	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

L A B O R A T O R I O M E D I O A M B I E N T A L

20.02.2002

Test Report/ BENI-TUM

Code Código TUM-9	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 03.02.2002 / 12.35 h	Address Dirección Comunidad 'Bella Flor' (km 48)		Location Lugar Pauro of the village / Pauro del pueblo	
	Type of Water Source Tipo de Fuente Stagnant water Agua estancada	Water taking Device Tipo de Suministro Directly Directo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código TUM-10	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 03.02.2002 / 12.25 h	Address Dirección Comunidad 'Bella Flor' (km 48)		Location Lugar Well of the village / Noria del pueblo	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código TUM-11	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 03.02.2002 / 11.20 h	Address Dirección Comunidad 'El Cruce' (km 85)		Location Lugar Well of the gas station / Noria de la gasolinera	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Tab Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código TUM-12	Community / District Provincia / Municipio Tumichucua / Vaca Díez	Date / Time of Sampling Fecha / Hora de Muestreo 03.02.2002 / 10.40 h	Address Dirección Comunidad Yeneguaga (km 110)		Location Lugar Río Yeneguaga	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Significant Bastante
	Comments / Comentarios : Water taking point of the village / Toma del pueblo					

Results of Analysis

TUMICHUCUA 1 - 12

Parameter	TUM-1	TUM-2	TUM-3	TUM-4	TUM-5	TUM-6	TUM-7	TUM-8	TUM-9	TUM-10	TUM-11	TUM-12
pH	4.51	5.51	4.93	5.53	5.02	5.31	5.76	5.08	4.67	7.09	7.65	4.84
Cond. [$\mu\text{S/cm}$]	35.5	17.4	35.8	11.9	24.2	37.9	13.2	15.6	14.1	212	14.8	6.42
Temp. [$^{\circ}\text{C}$]	28.6	30.8	29.2	29.5	28.3	29.6	31.5	29.2	30.0	29.8	31.3	30.5
Alc. ^a [mg/l]	6.25	8.75	3.75	6.25	5.0	< 3	3.75	6.25	6.25	86.25	12.5	6.25
Salinity ^b	0.035	0.027	0.035	0.023	0.029	0.037	0.025	0.025	0.025	0.140	0.026	0.022
Hardness ^c [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	92.6	30.3	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	11
COD [mg/l]	< 5	< 5	< 5	7.6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	8.5
BOD₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	< 0.05
NH₄-N [mg/l]	< 0.015	< 0.015	0.03	0.04	0.03	< 0.015	< 0.015	0.02	< 0.015	0.04	0.02	0.03
NO₂-N [mg/l]	0.15	0.14	0.14	0.16	0.16	0.15	0.15	0.15	0.17	0.23	0.17	0.13
NO₃-N [mg/l]	2.53	< 0.23	< 0.23	< 0.23	1.29	3.40	0.32	0.74	< 0.23	3.08	< 0.23	< 0.23
Ca [mg/l]	0.40	0.74	1.55	0.64	0.85	2.17	0.60	0.31	0.18	33.15	2.87	0.42
Fe [mg/l]	< 0.08	< 0.08	0.11	0.33	< 0.08	< 0.08	0.17	< 0.08	0.12	0.35	< 0.08	0.38
Zn [mg/l]	0.07	0.99	0.04	0.06	0.07	0.05	0.05	0.06	0.04	0.12	0.48	0.03
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	0.002	0.002	< 0.002	0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms												
Fecal [N/100]	0	70	0	0	0	0	840	0	0	2750	10	30
Total [N/100]	20880	18560	6380	3480	5380	2320	4640	19100	6960	29580	520	7540

^a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

^b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

^c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Cachuela Esperanza - Provincia Vaca Diez

Characteristics of the Sampling Points

In Cachuela Esperanza a new water tower had been constructed, situated on an elevation south of the community. Due to the natural gradient of the terrain between the tower and the village, the water supply for the central network is assured by the gravity. Nevertheless, the ground water has to be pumped up to the tower. According to the people, the water supply continues to work irregularly because it depends on the function of the electric generator. In the present, the people keep using water from two public side-by-side wells (norias) with a rather big volume of available drinking water.

The entire program of 12 samples could be completed by six samples, which have been taken directly from tabs of the housings connected to the local network (new: CES-7, CES-8, CES-9, CES-10, CES-11, CES-12).

In the community Santa Teresita de Yata, located on the way from Cachuela Esperanza to Guayaramerín, water samples were taken from three sources of water supply: the river Yata, the creek Yatorama and the well of the school. The school is situated rather far outside of the community, that's why the wells are only used by the pupils.

In the community Santa Rosa, as well located on the path to Guayaramerín, two water samples were taken, one from a well of the 'semi surgente' type and the second sample from a little stream called 'El Ocho' which borders the community.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código CES - 1	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.40 h	Address Dirección -		Location Lugar Open well of the village Noria del Pueblo	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Bomba	Color Color Clear	Odor Olor None	Turbidity Turbidez None	Sedimentation Sedimentación None
			Claro	Ninguno	Ninguna	Ninguna
Comments / Comentarios : -						
Code Código CES - 2	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 11.30 h	Address Dirección Santa Teresita del Yata		Location Lugar Rio Yata	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly	Color Color Light yellow	Odor Olor None	Turbidity Turbidez Significant	Sedimentation Sedimentación Significant
		Directo	Amarillo Claro	Ninguno	Bastante	Bastante
Comments / Comentarios : -						
Code Código CES - 3	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 11.00 h	Address Dirección Santa Teresita del Yata		Location Lugar Arroyo Yaturama	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly	Color Color Light yellow	Odor Olor None	Turbidity Turbidez None	Sedimentation Sedimentación None
		Directo	Amarillo Claro	Ninguno	Ninguna	Ninguna
Comments / Comentarios : The water contains particles / El agua contiene partículas						
Code Código CES - 4	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 10.30 h	Address Dirección Santa Teresita del Yata		Location Lugar School / Escuela Antofagasta	
	Type of Water Source Tipo de Fuente Well water Agua de pozo	Water taking Device Tipo de Suministro Directly with bucket	Color Color Milky	Odor Olor None	Turbidity Turbidez None	Sedimentation Sedimentación None
		Directo con balde	Lechoso	Ninguno	Ninguna	Ninguna
Comments / Comentarios : The water contains particles / El agua contiene partículas						

Sampling and 'in situ' – Observations

Continuation

Code Código CES - 5	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 12.10 h	Address Dirección Santa Rosa		Location Lugar Sanitary point / Centro de Salud	
	Type of Water Source Tipo de Fuente Reserved well water for city water supply Agua de pozo para el abastecimiento del pueblo	Water taking Device Tipo de Suministro Manual pump Bomba manual	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarce Escasa
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
Code Código CES - 6	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 12.20 h	Address Dirección Santa Rosa Km 8		Location Lugar Arroyo 'El 8'	
	Type of Water Source Tipo de Fuente Stream water Agua corriente	Water taking Device Tipo de Suministro Directly Directo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarce Escasa
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
Code Código CES - 7	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 8.45 h	Address Dirección Avenida Costanera		Location Lugar Family / Familia Languidey	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
Code Código CES - 8	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.00 h	Address Dirección Calle Carmelo Saconaca		Location Lugar Family / Familia Vicente Ferreira	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains particles / El agua contiene partículas					

Sampling and 'in situ' – Observations

Continuation

Code Código CES - 9	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.10 h	Address Dirección Calle Carmelo Saconaca		Location Lugar Family / Familia Saucedo	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 10	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.20 h	Address Dirección Calle Riberalta		Location Lugar Family / Familia Torres	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Milky Lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
Code Código CES - 11	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.30 h	Address Dirección Calle Riberalta		Location Lugar Family / Familia Cartagena	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
Code Código CES - 12	Community / District Provincia / Municipio Cachuela Esperanza / Vaca Diez	Date / Time of Sampling Fecha / Hora de Muestreo 01.02.2002 / 9.45 h	Address Dirección Avenida Costanera		Location Lugar Family / Familia Vargas	
	Type of Water Source Tipo de Fuente Potable water supplied by the water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Slightly milky Levemente lechoso	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					

Results of Analysis

CACHUELA ESPERANZA 1 - 12

Parameter	CES-1	CES-2	CES-3	CES-4	CES-5	CES-6	CES-7	CES-8	CES-9	CES-10	CES-11	CES-12
pH	3.44	3.19	1.74	2.57	2.78	2.38	3.12	3.30	3.28	3.12	2.99	3.03
Cond. [$\mu\text{S/cm}$]	71.4	9.37	7.09	30.0	31.1	6.39	22.3	19.1	31.7	46.6	17.1	17.2
Temp. [$^{\circ}\text{C}$]	28.2	29.9	27.3	28.0	29.6	28.1	26.5	27.3	27.5	26.4	27.6	27.1
Alc. ^a [mg/l]	22.5	10.0	7.5	17.5	21.2	3.75	15.0	16.2	21.2	21.2	16.2	18.8
Salinity ^b	0.055	0.023	0.021	0.032	0.033	0.021	0.027	0.026	0.033	0.040	0.025	0.025
Hardness ^c [mg/l]	22.9	20.3	35.5	20.7	< 17.4	< 17.4	< 17.4	20.9	24.1	24.6	19.3	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	< 5	15.6	16.5	< 5	< 5	< 5	< 5	< 5	< 5	6.0	< 5	< 5
BOD ₅ [mg/l]	< 4	9	10	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NH ₄ -N [mg/l]	< 0.015	0.06	0.04	0.03	< 0.015	0.02	0.03	0.04	0.05	< 0.015	0.04	0.04
NO ₂ -N [mg/l]	0.16	0.70	0.73	0.52	0.11	0.13	0.17	0.20	0.14	0.22	0.22	0.14
NO ₃ -N [mg/l]	2.74	0.27	0.33	0.48	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	1.09	< 0.23	< 0.23
Ca [mg/l]	7.28	0.77	0.40	4.72	0.90	0.43	3.48	3.09	5.51	4.69	2.44	2.41
Fe [mg/l]	< 0.08	1.06	0.19	< 0.08	< 0.08	0.28	< 0.08	0.30	0.25	0.14	0.27	0.34
Zn [mg/l]	0.04	0.05	0.08	0.06	0.41	0.05	0.82	0.62	0.58	0.44	0.65	0.45
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria												
Fecal [N/100]	0	40	150	50	0	310	0	270	0	1440	10	0
Total [N/100]	5400	2900	8120	11500	100	7540	6960	12180	9860	19240	11020	9680

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO₃

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO₃.
[Standard Methods for the Examination of Water and Wastewater (1992)]

SAMPLING TEST

Guayaramerín - Provincia Vaca Díez

Characteristics of the Sampling Points

In Guayaramerín the initial sampling program was repeated in its totality. The city Guayaramerín is the only place of all locations visited during the survey study where a complete drinking water system exists which does not only cover the old city center but also the majority of new suburbs recently constructed during the last couple of years.

In some places of the peripheral quarters there are open wells which are used for drinking water extraction. During the sampling day in Guayaramerín deficiencies in the local drinking water network have been noticed caused by interruptions of the water supply due to reparations or maintenance of the system.

The sample collection was extended to the community of Rosario del Yata situated along the road Guayaramerín - Riberalta. In this location one source of water supply for the population is the Río Yata. In areas farther away from the river the people also use their own wells.

Sampling and 'in situ' – Observations: Details and Specific Data from the Defined Sampling Points

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -1	Guayamerín / Vaca Díez	01.02.2002 / 15.15 h	Rosario del Yata		Río Yata, Crossing of vehicles / <i>cruce de vehículos</i>	
	Type of Water Source Tipo de Fuente Stream water <i>Agua corriente</i>	Water taking Device Tipo de Suministro Directly <i>Directo</i>	Color Color Light Yellow <i>Levemente amarillo</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación Significant <i>Bastante</i>
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -2	Guayamerín / Vaca Díez	01.02.2002 / 15.25 h	Rosario del Yata		Family / <i>Familia</i> Angela Amutani	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro Directly <i>Directo</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación None <i>Ninguna</i>
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -3	Guayamerín / Vaca Díez	01.02.2002 / 16.25 h	Calle 16, Barrio San Martín II		Adelina Sala (Sra Eldi Cartagena, <i>dueña</i>)	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative <i>Agua potable suministrada por la cooperativa</i>	Water taking Device Tipo de Suministro Tap <i>Grifo</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación Scarce <i>Escasa</i>
	Comments / Comentarios : The water contains particles / <i>El agua contiene partículas</i>					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -4	Guayamerín / Vaca Díez	01.02.2002 / 16.40 h	Calle San Ramón		Family / <i>Familia</i> Parada	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro Manual <i>Manual</i>	Color Color Milky <i>Lechoso</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación Perceptible <i>Perceptible</i>
	Comments / Comentarios : -					
Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA -5	Guayamerín / Vaca Díez	01.02.2002 / 16.50 h	Barrio San Isidro, Calle San Ramón / San Isidro		Family / <i>Familia</i> Peralta	
	Type of Water Source Tipo de Fuente Well water <i>Agua de pozo</i>	Water taking Device Tipo de Suministro Directly with bucket <i>Directo con balde</i>	Color Color Clear <i>Claro</i>	Odor Olor None <i>Ninguno</i>	Turbidity Turbidez None <i>Ninguna</i>	Sedimentation Sedimentación None <i>Ninguna</i>
	Comments / Comentarios : The water contains particles / <i>El agua contiene partículas</i>					

Sampling and 'in situ' – Observations

Continuation

Code Código	Community / District Provincia / Municipio	Date / Time of Sampling Fecha / Hora de Muestreo	Address Dirección		Location Lugar	
GUA-6	Guayamerín / Vaca Díez	01.02.2002 / 17.20 h	Barrio 16 de Julio, Calle Beni		Machine shop / Taller Suárez	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : -					
GUA-7	Guayamerín / Vaca Díez	01.02.2002 / 17.45 h	Barrio Manantial, Calle Beni s/n		Almacen Cruzeiro	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna
	Comments / Comentarios : The water contains particles / El agua contiene partículas					
GUA-8	Guayamerín / Vaca Díez	01.02.2002 / 17.55 h	Barrio Central, Calle 24 de Septiembre		Family / Familia Velarde	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarce Escasa
	Comments / Comentarios : -					
GUA-9	Guayamerín / Vaca Díez	01.02.2002 / 18.05 h	Calle Mamoré		Sanitary center / Centro de salud Guayamerín	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación Scarce Escasa
	Comments / Comentarios : -					
GUA-10	Guayamerín / Vaca Díez	01.02.2002 / 18.15 h	Barrio El Carmen, Calle 24 de Septiembre		Family / Familia Carmen Raldes	
	Type of Water Source Tipo de Fuente Potable water supplied by water cooperative Agua potable suministrada por la cooperativa	Water taking Device Tipo de Suministro Tap Grifo	Color Color Clear Claro	Odor Olor None Ninguno	Turbidity Turbidez None Ninguna	Sedimentation Sedimentación None Ninguna

Results of Analysis

GUAYARAMERIN 1 - 10

Parameter	GUA-1	GUA-2	GUA-3	GUA-4	GUA-5	GUA-6	GUA-7	GUA-8	GUA-9	GUA-10
pH	4.62	4.96	4.62	3.58	3.85	4.56	6.14	5.58	5.36	5.14
Cond. [$\mu\text{S}/\text{cm}$]	10.0	156	8.86	25.0	77.5	10.7	17.7	13.3	13.8	9.84
Temp. [$^{\circ}\text{C}$]	30.4	28.1	29.4	28.4	27.9	28.8	29.5	28.5	28.6	28.1
Alc. ^a [mg/l]	7.50	20.0	6.25	7.50	6.25	6.25	16.2	8.75	3.75	6.25
Salinity ^b	0.023	0.106	0.022	0.029	0.059	0.023	0.026	0.024	0.024	0.022
Hardness ^c [mg/l]	< 17.4	21.2	< 17.4	< 17.4	< 17.4	18.9	28.6	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
COD [mg/l]	16.1	< 5	9.0	< 5	< 5	9.4	7.4	6.9	7.8	8.4
BOD₅ [mg/l]	9	< 4	4	< 4	< 4	5	< 4	< 4	< 4	4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO₄-P [mg/l]	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NH₄-N [mg/l]	0.06	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.03	0.03
NO₂-N [mg/l]	0.17	0.21	0.19	0.19	0.19	0.21	0.19	0.19	0.22	0.22
NO₃-N [mg/l]	< 0.23	6.0	< 0.23	0.96	5.10	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	0.72	7.34	1.07	0.20	0.24	1.27	3.66	1.98	2.09	1.58
Fe [mg/l]	1.15	0.10	0.21	0.12	<0.08	0.16	0.16	0.12	0.16	0.16
Zn [mg/l]	0.05	0.06	0.04	0.05	0.10	0.07	0.10	0.28	0.07	0.09
As [mg/l]	0.002	0.002	0.002	0.002	0.002	< 0.002	0.002	0.002	0.002	0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Coliforms										
Fecal [$\text{N}/100$]	550	280	40	30	50	60	0	0	0	10
Total [$\text{N}/100$]	2400	9760	100	2320	3480	14400	2900	2050	5220	1160

a The alkalinity consists of the sum of all titratable bases recorded as mg/l CaCO_3

b The salinity is an unitless property of the water. It is calculated from an empirical relationship of salinity and the conductivity of a standard solution

c Water hardness is defined as the sum of the concentrations of calcio and magnesio, recorded as mg/l CaCO_3 .

[Standard Methods for the Examination of Water and Wastewater (1992)]

Results of Water Quality Survey

1.3 Comparison of Results

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

TRI 1 - 21

Página 1

TRINIDAD

Dry Season Results / Resultados de la Epoca de Sequia
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	TRI-1	TRI-2	TRI-3	TRI-4	TRI-5	TRI-6	TRI-7	TRI-8	TRI-9	TRI-10
pH	7.58 7.95	7.49	7.96 7.77	6.80 6.84	6.78 5.64	9.43 7.39	6.91 7.31	6.86 7.04	8.44 8.74	7.29 7.14
Cond. [$\mu S/cm$]	246 471	170	630 468	633 682	169 49.6	800 2847	2241 2387	3415 3877	74 64	1008 1166
Temp. [$^{\circ}C$]	29.1 29.7	312	30.4 31.5	26.6 29.1	29.6 30.0	27.6 28.1	27.2 27.0	29.1 28.1	27.2 27.2	26.6 27.8
Alc. [mg/l]	91.3 252	85.8	437 254	424 400	51.3 23.8	227 376	376 361	379 356	36.8 28.2	380 268
Salinity	0.161 0.302	0.115	0.404 0.300	0.407 0.438	0.114 0.043	0.515 1.910	1.489 1.590	2.310 2.641	0.056 0.050	0.652 0.757
Hardness [mg/l]	< 17.9 219	131.4	364 140	307 262	45.4 37.3	78.4 296	289 291	1329 919	20.2 34.5	238 67.3
Susp. Sol. [mg/l]	6 < 3	< 3	44 < 3	41 57	8 5	5 < 3	20 6	< 3 5	< 3 < 3	142 179
COD [mg/l]	17.3 16.2	14.5	31.2 14.8	15.2 14.1	37.2 54.0	14.9 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5
BOD ₅ [mg/l]	8 6	5	11 6	4 8	14 34	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4
F [mg/l]	0.23 < 0.1	0.07	0.10 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.36 0.85	0.20 0.42	0.69 0.77	< 0.1 < 0.1	0.09 < 0.1
PO ₄ -P [mg/l]	0.19 0.07	0.08	0.09 0.06	0.29 0.11	0.61 0.70	0.08 0.71	0.40 0.29	0.08 < 0.05	0.12 < 0.05	0.22 0.20
NH ₄ -N [mg/l]	0.11 0.06	0.09	0.28 0.08	2.02 8.40	0.48 0.16	0.13 0.06	0.90 0.84	1.29 1.31	0.06 0.06	0.47 0.08
NO ₂ -N [mg/l]	0.06 0.02	0.06	0.10 < 0.015	0.03 < 0.015	0.02 0.05	0.06 0.05	0.07 0.05	0.07 0.05	0.06 0.05	0.05 0.08
NO ₃ -N [mg/l]	< 0.23 < 0.23	< 0.23	0.49 < 0.23	< 0.23 < 0.23	1.55 < 0.23	< 0.23 0.47	< 0.23 < 0.23	< 0.23 < 0.23	0.61 < 0.23	0.30 < 0.23
Cu [mg/l]	23.36 31.17	19.64	85.99 2.26	62.69 27.20	11.96 20.59	11.84 68.96	55.80 73.88	238.41 221.63	10.76 5.90	52.39 26.82
Fe [mg/l]	0.50 0.13	0.31	0.07 2.41	18.06 17.06	3.98 0.11	0.03 0.20	0.05 3.65	0.08 2.02	0.03 < 0.08	0.32 1.48
Zn [mg/l]	0.018 0.023	0.013	< 0.005 0.030	0.288 0.110	0.018 0.030	0.096 0.040	0.072 0.053	0.158 0.112	0.029 0.039	0.018 0.046
As [mg/l]	< 0.002 < 0.002	< 0.002	< 0.002 < 0.002	0.334 0.014	< 0.002 < 0.002	0.007 0.002	< 0.002 0.002	< 0.002 0.005	< 0.002 < 0.002	< 0.002 < 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Fecal [N/100]	4100	3100	120	0	25	24	0	0	310	6
Total [N/100]	7500	8000	2400	350	1600	1450	1150	90	3500	5200
Fecal [N/100]	0		0	0	0	0	0	0	0	0
Total [N/100]	1740		13800	6300	7850	7800	28500	6750	4800	24100

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

TRI 1 - 21

Página 2

TRINIDAD

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	TRI-11	TRI-12	TRI-13	TRI-14	TRI-15	TRI-16	TRI-17	TRI-18	TRI-19	TRI-20	TRI-21
pH	9.13 8.62	7.35 7.28	7.25 7.18	8.31 8.18	7.57 6.71	6.96 7.01	6.72 5.85	8.52 8.63	6.40 6.28	5.0 7.03	7.83
Cond. [μ S/cm]	652 389	770 862	469 510	75.1 46.4	445 337	396 467	372 583	115 43.5	278 325	770 640	491
Temp. [$^{\circ}$ C]	28.0 30.0	27.4 29.5	28.5 29.2	27.7 29.0	27.5 28.2	26.6 30.7	26.9 30.5	26.5 28.5	26.8 30.7	28.0 30.5	29.7
Alc. [mg/l]	232 119	283 264	276 258	39.0 22.5	289 185	286 279	244 125	69.8 25	150 149	228 156	267
Salinity	0.419 0.250	0.495 0.555	0.301 0.327	0.057 0.041	0.288 0.218	0.255 0.300	0.240 0.374	0.081 0.039	0.181 0.210	0.495 0.410	0.315
Hardness [mg/l]	166 37.7	168 85.1	99.3 284	53.0 57.5	110 165	200 152	257 115	99.5 91.0	120 88.0	346 196	218
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	92 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3
COD [mg/l]	6.58 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 5.9	< 5 < 5	< 5 < 5	< 5 < 5	17.0
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	8
F [mg/l]	0.36 < 0.1	0.51 0.19	0.31 0.48	< 0.1 < 0.1	0.30 < 0.1	< 0.1 0.36	0.70 < 0.1	< 0.1 < 0.1	0.57 0.61	0.43 0.38	< 0.1
PO ₄ -P [mg/l]	0.46 0.28	0.27 0.23	0.25 0.24	0.09 0.13	0.34 0.52	0.59 0.46	0.09 0.58	0.14 < 0.05	0.20 0.11	0.30 0.98	0.06
NH ₄ -N [mg/l]	0.04 0.03	0.05 0.10	1.14 1.06	0.02 0.03	0.19 0.43	0.38 0.10	0.05 0.10	0.03 0.08	0.04 0.05	0.02 0.38	0.04
NO ₂ -N [mg/l]	0.05 0.05	0.07 0.05	0.07 0.05	0.05 0.05	0.16 0.07	0.08 0.05	0.05 0.09	0.05 0.07	0.05 0.05	0.05 0.06	0.02
NO ₃ -N [mg/l]	< 0.23 < 0.23	1.49 0.91	< 0.23 < 0.23	0.73 < 0.23	0.75 < 0.23	< 0.23 < 0.23	< 0.23 1.50	0.69 < 0.23	0.58 0.59	1.24 0.30	< 0.23
Ca [mg/l]	33.28 20.63	33.52 37.43	21.28 23.28	13.40 6.88	32.28 24.17	71.59 41.86	44.79 30.36	27.04 5.31	12.56 12.73	50.80 33.01	21.81
Fe [mg/l]	0.12 < 0.08	0.04 0.22	0.07 0.22	< 0.02 < 0.08	0.51 2.35	0.70 < 0.08	0.68 1.48	0.03 < 0.08	0.08 0.10	< 0.02 0.16	0.16
Zn [mg/l]	0.006 0.045	0.011 0.077	0.011 0.026	0.029 0.082	0.020 0.035	0.015 0.036	0.020 0.126	0.022 0.020	0.011 0.041	0.036 0.069	0.030
As [mg/l]	< 0.002 0.005	< 0.002 0.004	< 0.002 0.01	< 0.002 < 0.002	0.003 0.006	< 0.002 0.002	< 0.002 0.003	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 0.003	< 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001
Colibacteria											
Fecal [N/100]	0	0	0	10	0	120	20	8	50	12	
Total [N/100]	3850	1300	0	4450	1800	2050	950	1000	2800	2550	
Fecal [N/100]	0	0	0	0	0	0	0	0	0	0	0
Total [N/100]	0	0	0	0	80	10440	6380	9250	13920	12180	2550

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

TRI 1 - 21

Página 2

TRINIDAD

Dry Season Results / Resultados de la Epoca de Sequia

Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	TRI-11	TRI-12	TRI-13	TRI-14	TRI-15	TRI-16	TRI-17	TRI-18	TRI-19	TRI-20	TRI-21
pH	9.13 8.62	7.35 7.28	7.25 7.19	8.31 8.18	7.57 6.71	6.96 7.01	6.72 5.85	8.52 8.63	6.40 6.28	8.0 7.03	7.83
Cond. [μ S/cm]	652 389	770 862	469 510	75.1 46.4	445 337	396 467	372 583	115 43.5	278 325	770 640	491
Temp. [$^{\circ}$ C]	28.0 30.0	27.4 29.5	28.5 29.2	27.7 29.0	27.5 28.2	26.6 30.7	26.9 30.5	26.5 28.5	26.9 30.7	29.0 30.5	29.7
Alc. [mg/l]	232 119	283 204	276 258	39.0 22.5	269 185	288 279	244 125	69.8 25	150 149	228 156	267
Salinity	0.419 0.250	0.495 0.555	0.301 0.327	0.057 0.041	0.286 0.218	0.255 0.300	0.240 0.374	0.081 0.039	0.181 0.210	0.495 0.410	0.315
Hardness [mg/l]	166 37.7	169 85.1	99.3 284	53.0 57.5	110 165	200 152	257 115	99.5 91.0	120 88.0	346 196	218
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	92 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3
COD [mg/l]	6.58 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 5.9	< 5 < 5	< 5 < 5	< 5 < 5	17.0
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	9
F [mg/l]	0.36 < 0.1	0.51 0.19	0.31 0.48	< 0.1 < 0.1	0.30 < 0.1	< 0.1 0.36	0.70 < 0.1	< 0.1 < 0.1	0.57 0.61	0.43 0.36	< 0.1
PO ₄ -P [mg/l]	0.46 0.29	0.27 0.23	0.25 0.24	0.09 0.13	0.34 0.52	0.59 0.48	0.09 0.58	0.14 < 0.05	0.20 0.11	0.30 0.98	0.06
NH ₄ -N [mg/l]	0.04 0.03	0.05 0.10	1.14 1.06	0.02 0.03	0.19 0.43	0.38 0.10	0.05 0.10	0.03 0.08	0.04 0.05	0.02 0.38	0.04
NO ₂ -N [mg/l]	0.05 0.05	0.07 0.05	0.07 0.05	0.05 0.05	0.16 0.07	0.08 0.05	0.05 0.09	0.05 0.07	0.05 0.05	0.05 0.06	0.02
NO ₃ -N [mg/l]	< 0.23 < 0.23	1.49 0.91	< 0.23 < 0.23	0.73 < 0.23	0.75 < 0.23	< 0.23 < 0.23	< 0.23 1.50	0.69 < 0.23	0.58 0.59	1.24 0.30	< 0.23
Ca [mg/l]	33.28 20.63	33.52 37.43	21.28 23.28	13.40 6.96	32.26 24.17	71.59 41.86	44.79 30.36	27.04 5.31	12.56 12.73	50.80 33.01	21.81
Fe [mg/l]	0.12 < 0.08	0.04 0.22	0.07 0.22	< 0.02 < 0.08	0.51 2.35	0.70 < 0.08	0.68 1.48	0.03 < 0.08	0.08 0.10	< 0.02 0.16	0.16
Zn [mg/l]	0.006 0.045	0.011 0.077	0.011 0.026	0.029 0.082	0.020 0.035	0.015 0.036	0.020 0.126	0.022 0.020	0.011 0.041	0.036 0.069	0.030
As [mg/l]	< 0.002 0.005	< 0.002 0.004	< 0.002 0.01	< 0.002 < 0.002	0.003 0.006	< 0.002 0.002	< 0.002 0.003	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 0.003	< 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001
Colibacteria											
Fecal [N/100]	0	0	0	10	0	120	20	8	50	12	
Total [N/100]	3850	1300	0	4450	1800	2050	950	1000	2800	2550	
Fecal [N/100]	0	0	0	0	0	0	0	0	0	0	0
Total [N/100]	0	0	0	0	60	10440	6380	9250	13920	12180	2550

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SJA 1 - 10

Página 4

SAN JAVIER

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	SJA-1	SJA-2	SJA-3	SJA-4	SJA-5	SJA-6	SJA-7	SJA-8	SJA-9	SJA-10
pH	6.83 6.98	6.53 7.22	6.93 6.41	8.33 7.10	6.31 9.58	5.64 5.57	7.47 7.81	7.38 7.44	6.21 6.46	9.45
Cond. [μ S/cm]	2270 2460	128 128	1842 40.7	81.2 54.0	67.2 86.2	94.3 22.4	4910 4840	710 795	152 113	90.2
Temp. [$^{\circ}$ C]	27.2 28.7	26.5 30.2	27.5 30.9	27.7 30.2	26.3 34.1	27.4 32.3	27.1 29.7	26.6 30.1	28.8 31.4	30.0
Alc. [mg/l]	373 360	63.5 52.5	413 43.8	39.5 28.8	35.3 31.2	29.8 12.5	426 316	421 419	78.3 57.5	63.8
Salinity	1.509 1.639	0.089 0.089	1.283 0.039	0.061 0.046	0.052 0.066	0.068 0.03	3.389 3.332	0.457 0.511	0.104 0.081	0.067
Hardness [mg/l]	300 302	36.4 < 17.4	266 71.4	49.6 87.9	30.4 < 17.4	50.4 34.6	375 261	148 200	35.0 < 17.4	66.4
Susp. Sol. [mg/l]	69 35	24 9	42 < 3	< 3 < 3	30 < 3	< 3 < 3	< 3 < 3	< 3 18	< 3 10	< 3
COD [mg/l]	< 5 < 5	30.4 39.0	26.4 14.7	< 5 < 5	48.0 21.5	111 22.6	< 5 < 5	< 5 < 5	98.0 39.7	6.2
BOD ₅ [mg/l]	< 4 < 4	19 22	18 6	< 4 < 4	25 9	58 10	< 4 < 4	< 4 < 4	49 20	< 4
F [mg/l]	0.15 < 0.1	< 0.1 < 0.1	0.32 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.11 < 0.1	1.31 1.21	1.61 1.32	< 0.1 < 0.1	< 0.1
PO ₄ -P [mg/l]	0.38 0.08	1.19 1.32	1.72 1.47	0.10 0.07	0.76 1.39	0.49 0.14	0.14 0.10	0.06 0.18	0.11 0.11	0.10
NH ₄ -N [mg/l]	1.40 1.13	0.24 0.21	0.05 0.12	0.18 0.03	0.18 0.41	0.11 0.07	0.05 0.02	0.07 0.27	0.08 0.11	0.04
NO ₂ -N [mg/l]	0.11 0.04	0.16 0.11	0.08 0.15	0.06 0.05	0.08 0.19	0.10 0.27	0.04 0.05	0.06 0.10	0.07 0.07	0.08
NO ₃ -N [mg/l]	< 0.23 < 0.23	0.93 0.61	< 0.23 < 0.23	1.15 0.69	0.27 0.82	1.62 0.62	0.44 0.34	< 0.23 0.25	< 0.23 < 0.23	0.66
Ca [mg/l]	90.30 45.06	3.00 1.64	75.77 3.44	21.19 3.99	1.55 3.48	5.18 0.52	125.31 50.83	60.97 19.33	13.50 2.76	8.62
Fe [mg/l]	0.03 13.18	2.08 2.42	0.46 4.10	0.30 0.25	1.84 4.56	6.81 1.23	0.15 0.04	0.17 0.83	3.82 3.24	0.14
Zn [mg/l]	0.028 0.105	0.033 0.030	0.018 0.030	0.069 0.200	0.047 0.050	0.032 0.035	0.028 0.050	0.016 0.035	0.018 0.023	0.043
As [mg/l]	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002
Hg [mg/l]	< 0.001 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 0.001	< 0.001 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001
Colibacteria										
Fecal [N/100]	0	70	0	2	1050	3700	40	12	80	
Total [N/100]	950	12800	650	1050	15500	16000	1600	650	3850	
Fecal [N/100]	0	280	0	0	120	0	0	0	0	0
Total [N/100]	30	29500	1440	8400	9250	5400	8600	5500	6600	550

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

CAS 1 - 12

Page 5

CASARABE

Dry Season Results / Resultados de la Epoca de Sequia
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	CAS-1	CAS-2	CAS-3	CAS-4	CAS-5	CAS-6	CAS-7	CAS-8	CAS-9	CAS-10	CAS-11	CAS-12
pH	7.31 7.61	7.13 6.76	6.78 6.92	6.88 6.74	6.75 6.91	7.26 6.99	8.01 7.47	6.83 6.28	8.75 8.08	7.28 5.87	7.16 5.61	6.53 6.10
Cond. [μ S/cm]	83.2 39.1	360 164	110 81	502 488	119 55.9	130 37.1	202 93.7	129 87.0	133 75.0	126 30.7	110 37.1	163 44.8
Temp. [$^{\circ}$ C]	27.7 28.0	25.6 27.1	27.2 28.1	26.7 27.4	27.7 28.4	26.9 27.9	27.2 27.4	29.0 29.6	27.8 30.2	26.5 27.7	26.4 30.1	26.8 31.1
Alc. [mg/l]	46.3 25.0	206 80.0	63.5 43.8	309 284	65.5 33.8	63.5 21.2	119 45.0	67.0 40.0	79.3 41.2	67.0 21.2	52.3 20.0	73.0 172
Salinity	0.062 0.037	0.232 0.110	0.078 0.061	0.322 0.312	0.093 0.046	0.090 0.036	0.134 0.068	0.090 0.085	0.092 0.058	0.087 0.032	0.077 0.036	0.110 0.041
Hardness [mg/l]	< 17.4 38.4	127 113	40.2 66.4	280 203	63.4 60.3	81.8 48.6	134 71.6	45.3 57.8	86.4 55.2	25.6 30.7	75.7 < 17.4	46.9 38.2
Susp. Sol. [mg/l]	20 < 3	< 3 20	5 49	< 3 < 3	23 54	9 < 3	< 3 < 3	4 70	26 < 3	34 < 3	140 51	36 50
COD [mg/l]	10.3 < 5	17.3 12.1	24.9 44.5	< 5 < 5	20.0 23.1	7.8 < 5	6.9 5.0	16.3 24.5	< 5 < 5	19.1 < 5	48.0 21.1	44.0 31.7
BOD ₅ [mg/l]	4 < 4	8 7	14 20	< 4 < 4	9 9	< 4 < 4	< 4 < 4	7 15	< 4 < 4	9 < 4	25 12	26 19
F [mg/l]	0.20 < 0.1	1.79 < 0.1	0.90 < 0.1	0.49 0.32	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.22 < 0.1	< 0.1 < 0.1
PO ₄ -P [mg/l]	0.19 0.07	0.21 0.67	0.38 0.26	0.11 0.14	0.06 0.13	0.13 0.06	0.26 0.14	0.07 0.13	0.12 0.11	< 0.05 < 0.05	0.37 0.17	0.55 0.27
NH ₄ -N [mg/l]	0.60 0.07	5.50 0.89	0.45 0.16	0.04 0.04	0.11 0.06	0.05 0.09	0.08 0.04	0.05 0.05	0.04 0.03	0.05 0.09	0.28 0.05	0.12 0.08
NO ₂ -N [mg/l]	0.06 0.15	0.06 0.30	0.20 0.36	0.05 0.14	0.06 0.21	0.36 0.11	0.06 0.14	0.06 0.14	0.06 0.23	0.06 0.16	0.17 0.25	0.11 0.27
NO ₃ -N [mg/l]	< 0.23 < 0.23	< 0.23 0.27	0.78 0.39	< 0.23 < 0.23	< 0.23 < 0.23	1.15 0.56	0.98 0.56	< 0.23 < 0.23	0.55 < 0.23	< 0.23 < 0.23	0.49 < 0.23	0.31 < 0.23
Ca [mg/l]	19.64 5.23	36.04 12.84	18.31 6.78	94.27 48.24	15.58 3.87	72.07 5.41	81.94 11.17	14.36 3.54	48.17 11.20	11.15 4.02	10.14 2.39	10.45 2.69
Fa [mg/l]	0.50 < 0.08	1.81 0.53	2.56 1.55	0.10 < 0.08	1.75 0.91	0.18 < 0.08	0.18 < 0.08	0.99 0.98	0.08 < 0.08	0.38 < 0.08	3.92 1.23	4.23 1.01
Zn [mg/l]	0.081 0.056	0.028 < 0.020	0.026 < 0.020	0.018 0.025	0.018 0.030	0.039 0.030	0.037 0.030	0.039 < 0.020	0.028 0.032	0.035 0.058	0.035 < 0.020	0.018 < 0.020
As [mg/l]	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria												
Fecal [N/100]	25	135	285	0	116	1600	8	330	0	130	1550	2800
Total [N/100]	1000	5760	6590	380	4480	8320	7850	4600	1280	8220	20100	24350
Fecal [N/100]	0	0	1500	0	0	0	0	0	0	0	0	0
Total [N/100]	15600	6600	5400	770	5220	8950	2900	3480	920	3540	20400	22600

Laboratorio Medio Ambiental - UPSA - Campus: Av. Paraguay 14° Anillo - Casilla 2844 - Santa Cruz / Bolivia - Tel: 3464000 Int. 168 - Fax: 3492089

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SIG 1 - 10

Page 6

SAN IGNACIO

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	SIG-1	SIG-2	SIG-3	SIG-4	SIG-5	SIG-6	SIG-7	SIG-8	SIG-9	SIG-10
pH	7.13 6.21	6.70 7.36	6.62 6.87	7.35 6.65	7.74 8.17	6.60 6.34	6.08 6.21	6.95 6.93	6.16 5.92	6.9 6.62
Cond. [μ S/cm]	141 55	2145 1210	363 381	41.0 50.3	97.5 82.0	41.8 55.0	224 248	1320 1471	520 424	1258 1384
Temp. [$^{\circ}$ C]	29.3 29.5	29.3 29.0	26.2 27.5	30.1 32.4	26.6 29.9	28.8 31.8	26.8 31.8	27.6 30.5	26.6 29.5	26.1 29.2
Alc. [mg/l]	83.0 27.5	881 544	224 209	22.0 28.8	58.0 41.2	24.0 31.2	13.3 131	758 740	262 220	540 518
Salinity	0.097 0.046	1.424 0.786	0.234 0.245	0.039 0.045	0.070 0.062	0.039 0.047	0.147 0.163	0.860 0.96	0.334 0.273	0.819 0.902
Hardness [mg/l]	71.7 < 17.4	133 62.8	< 17.4 22.3	< 17.4 28.2	54.5 < 17.4	30.5 62.8	< 17.4 < 17.4	80.2 81.9	101 96.4	134 133
Susp. Sol. [mg/l]	23 5	< 3 < 3	< 3 < 3	44 42	< 3 < 3	< 3 < 3	< 3 < 3	< 3 15	82 < 3	< 3 < 3
COD [mg/l]	12.3 77.8	< 5 < 5	< 5 < 5	24.6 29.4	< 5 24.4	19.9 21.6	< 5 < 5	< 5 < 5	7.1 5.1	< 5 < 5
BOD ₅ [mg/l]	< 4 38	< 4 < 4	< 4 < 4	8 14	< 4 9	7 8	< 4 < 4	< 4 < 4	6 < 4	< 4 < 4
F [mg/l]	< 0.1 < 0.1	1.10 0.77	1.04 0.56	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.34 0.31	0.27 0.40	< 0.1 < 0.1	0.80 0.85
PO ₄ -P [mg/l]	0.14 0.26	0.09 0.06	0.11 0.27	0.08 0.19	0.26 0.18	0.13 0.22	0.12 0.08	0.10 0.28	0.27 0.87	0.11 0.08
NH ₄ -N [mg/l]	0.06 0.16	0.07 0.04	0.05 0.05	0.06 0.12	0.03 0.17	0.16 0.19	0.10 0.09	0.18 0.23	0.27 0.29	0.17 0.14
NO ₂ -N [mg/l]	0.06 0.28	0.05 0.14	0.05 0.13	0.07 0.21	0.05 0.18	0.08 0.22	0.05 0.13	0.05 0.21	0.05 0.22	0.05 0.21
NO ₃ -N [mg/l]	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	0.72 < 0.23	0.20 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23
Ca [mg/l]	17.57 5.67	47.41 18.22	1.65 1.2	3.24 3.57	38.50 8.78	4.35 4.15	4.03 3.15	21.24 19.62	31.10 16.57	29.87 25.83
Fa [mg/l]	2.32 1.40	0.02 0.16	0.14 < 0.08	0.02 0.52	0.04 0.18	0.35 0.18	0.37 0.09	0.17 0.17	5.69 4.41	0.19 0.15
Zn [mg/l]	0.030 < 0.02	0.121 0.746	0.045 0.055	0.005 0.076	0.033 < 0.02	0.011 < 0.02	0.016 0.043	0.030 0.02	0.132 0.045	0.151 0.098
As [mg/l]	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	0.016 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	0.017 0.009	< 0.002 < 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Focal [N/100]	120	0	0	12	35	0	0	0	0	0
Total [N/100]	1920	0	250	1280	850	210	150	0	0	0
Focal [N/100]	250	0	0	10	0	0	30	0	0	0
Total [N/100]	27500	4200	26200	8350	14400	2400	24650	19100	4640	13600

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SJC 1 - 12

Page 7

SAN JOSE DE CABITO

Dry Season Results / Resultados de la Época de Sequía
Raining Season Results / Resultados de la Época de Lluvias

Parameter	SJC-1	SJC-2	SJC-3	SJC-4	SJC-5	SJC-6	SJC-7	SJC-8	SJC-9	SJC-10	SJC-11	SJC-12
pH	5.04	5.57	5.58	5.25	5.45	5.58	7.20	7.58	7.80	6.72	6.32	7.06
	7.78	6.80	5.43	7.78	6.64	6.03	7.25	5.74	5.72	5.85	5.95	6.05
Cond. [$\mu\text{S/cm}$]	198	410	102	53.5	80.1	216	845	155	84.2	1024	202	935
	842	512	113	37.7	219	327	931	32.0	36.9	257	201	182
Temp. [$^{\circ}\text{C}$]	25.9	26.8	27.7	27.6	26.8	26.8	27.5	31.5	31.6	26.6	26.2	27.6
	27.1	27.2	27.3	26.8	27.8	28.4	27.4	27.1	27.2	28.8	28.1	29.1
Alc. [mg/l]	33.0	99.3	36.3	22.5	26.0	32.5	595	99.0	50.8	548	138	632
	62.5	278	42.5	20.0	90.0	149	552	22.5	16.2	126	82.5	95.0
Salinity	0.131	0.264	0.073	0.045	0.060	0.142	0.545	0.106	0.070	0.663	0.133	0.604
	0.543	0.329	0.080	0.036	0.144	0.211	0.601	0.033	0.035	0.168	0.133	0.122
Hardness [mg/l]	66.1	109	< 17.4	41.1	54.4	72.8	41.6	110	61.0	26.4	48.6	31.6
	207	321	61.9	38.4	103	55.8	44.8	30.2	< 17.4	53.6	57.7	45.2
Susp. Sol. [mg/l]	200	< 3	< 3	< 3	< 3	< 3	16	4	14	< 3	8	< 3
	< 3	< 3	< 3	< 3	< 3	< 3	80	10	17	< 3	< 3	< 3
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	9.8	11.3	< 5	< 5	< 5
	23.7	< 5	< 5	< 5	< 5	< 5	< 5	45.2	44.6	< 5	< 5	< 5
BOD ₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4	< 4	4	5	< 4	< 4	< 4
	14	< 4	< 4	< 4	< 4	< 4	< 4	26	26	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.56	< 0.1	< 0.1	0.68	< 0.1	1.01
	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	0.12	< 0.05	0.17	0.08	< 0.05	0.05	0.32	0.11	0.11	0.14	0.30	0.35
	0.25	0.72	< 0.05	< 0.05	0.23	0.29	0.27	0.21	0.21	0.10	0.08	0.12
NH ₄ -N [mg/l]	0.13	0.06	0.024	0.07	0.07	0.09	0.21	0.06	0.07	< 0.015	0.18	0.04
	0.07	0.04	0.06	0.04	0.23	0.35	0.30	0.11	0.14	0.07	0.06	0.07
NO ₂ -N [mg/l]	0.07	0.08	0.10	0.09	0.07	0.06	0.09	0.05	0.08	0.05	0.06	0.05
	0.24	0.15	0.18	0.14	0.20	0.15	0.06	0.07	0.08	0.04	0.06	0.05
NO ₃ -N [mg/l]	3.45	< 0.23	< 0.23	< 0.23	1.03	0.77	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
	4.54	< 0.23	< 0.23	< 0.23	2.26	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	18.92	60.88	7.86	10.08	13.69	21.27	16.58	18.11	11.15	4.32	8.58	6.19
	53.02	81.99	4.72	4.86	27.32	6.18	15.59	3.77	3.71	3.18	20.75	4.26
Fe [mg/l]	1.28	4.65	11.36	1.39	0.067	1.56	0.059	1.81	1.75	0.07	2.34	0.10
	0.09	0.09	< 0.08	< 0.08	< 0.08	2.59	0.75	0.88	0.88	0.10	0.72	0.12
Zn [mg/l]	0.038	0.033	0.058	0.035	0.016	0.009	0.028	0.018	0.007	0.077	1.70	0.043
	< 0.02	0.06	0.027	0.157	0.029	0.152	0.085	< 0.02	< 0.02	< 0.02	0.03	0.034
As [mg/l]	< 0.002	0.002	0.005	0.002	0.004	< 0.002	0.002	< 0.002	< 0.002	< 0.002	0.013	< 0.002
	0.002	< 0.002	< 0.002	0.002	0.005	0.017	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria												
Fecal [N/100]	650	0	0	55	240	50	2800	40	180	0	5	0
Total [N/100]	6300	0	0	2450	3200	5800	9400	2300	1760	0	25	210
Fecal [N/100]	420	0	0	0	0	0	2500	0	0	0	40	0
Total [N/100]	25200	11020	8700	6380	16820	6960	21600	9280	8760	18400	16200	15750

Laboratorio Medio Ambiental - UPSA - Campus: Av. Paraguá / 4° Anillo - Casilla 2944 - Santa Cruz / Bolivia - Tel: 3464000 Int. 168 - Fax: 3492089

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SJO 1 - 10

Page 6

SAN JOAQUIN

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	SJO-1	SJO-2	SJO-3	SJO-4	SJO-5	SJO-6	SJO-7	SJO-8	SJO-9	SJO-10
pH	4.78 4.81	5.95 4.32	5.10 4.96	5.60 4.71	4.60 3.35	5.70 4.25	5.00 4.12	5.12 4.57	5.93 4.38	5.80 4.94
Cond. [μ S/cm]	33 179	131 150	62 34.4	279 312	159 195	26 20.9	12 21.1	65 88.6	28 85.3	36 61.3
Temp. [$^{\circ}$ C]	27.1 27.3	27.1 27.8	29.6 27.3	27.5 28.4	26.7 28.6	26.6 29.0	26.9 29.5	30.7 30.0	30.3 31.0	30.0 28.9
Alc. [mg/l]	4.5 12.5	25.5 6.25	6.5 17.5	14.3 13.8	3.3 7.5	11.3 11.2	3.3 3.75	3.3 10.0	15.0 6.25	13.0 12.5
Salinity	0.033 0.120	0.090 0.102	0.050 0.034	0.181 0.202	0.107 0.130	0.029 0.028	0.022 0.028	0.052 0.065	0.032 0.064	0.028 0.050
Hardness [mg/l]	< 17.4 < 17.4	20.2 < 17.4	< 17.4 < 17.4	28.0 < 17.4	27.5 < 17.4	28.2 < 17.4	< 17.4 < 17.4	< 17.4 19.3	< 17.4 < 17.4	< 17.4 < 17.4
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3
COD [mg/l]	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1
PO ₄ -P [mg/l]	0.06 0.06	0.06 0.11	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05
NH ₄ -N [mg/l]	0.04 0.02	0.02 0.30	< 0.015 0.02	< 0.015 0.02	0.07 0.04	0.05 < 0.015	0.05 0.02	0.02 0.02	0.02 0.02	0.02 0.03
NO ₂ -N [mg/l]	0.05 0.16	0.05 0.15	0.04 0.15	0.05 0.16	0.06 0.14	0.05 0.14	0.05 0.13	0.05 0.13	0.05 0.14	0.04 0.14
NO ₃ -N [mg/l]	1.04 5.73	0.42 4.57	2.17 0.29	9.22 9.72	7.1 7.40	0.33 1.05	0.37 1.57	2.49 1.79	< 0.23 2.05	0.49 1.40
Ca [mg/l]	0.63 3.36	10.59 2.82	1.07 1.51	12.82 6.60	2.65 2.14	2.76 0.63	0.37 0.07	0.83 1.14	0.90 0.87	1.01 0.87
Fe [mg/l]	0.13 < 0.08	0.26 < 0.08	< 0.05 < 0.08	< 0.05 < 0.08	< 0.05 < 0.08	0.18 < 0.08	0.54 < 0.08	< 0.05 < 0.08	< 0.05 < 0.08	< 0.05 < 0.08
Zn [mg/l]	0.014 0.04	0.115 0.06	0.072 0.09	0.010 0.03	0.016 0.03	0.042 0.07	0.072 0.07	0.078 0.15	0.057 0.04	0.053 0.12
As [mg/l]	< 0.002 0.002	< 0.002 0.003	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Fecal [N/100]	520	45	0	1160	22	210	25	0	0	0
Total [N/100]	5220	2900	0	9960	2650	3480	3200	0	7800	8000
Fecal [N/100]	0	10	0	0	0	0	0	0	0	0
Total [N/100]	550	1150	0	0	40	470	1880	0	0	0

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SRA 1 - 10

Page 9

SAN RAMON

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	SRA-1	SRA-2	SRA-3	SRA-4	SRA-5	SRA-6	SRA-7	SRA-8	SRA-9	SRA-10
pH	5.28 4.25	5.6 4.58	5.50 4.48	5.95 4.55	5.57 4.36	5.57 4.50	5.62 4.78	5.18 4.62	5.55 4.04	5.48 4.91
Cond. [μ S/cm]	72.1 93.5	24.1 12.6	22.0 11.6	28.4 11.7	22.3 12.1	21.3 11.8	21.5 12.6	168 186	20.4 102	20.9 11.5
Temp. [$^{\circ}$ C]	26.1 29.8	28.2 30.9	27.8 31.8	25.2 31.0	29.6 30.9	29.2 30.9	29.8 30.5	26.8 30.7	30.4 29.8	30.2 31.4
Alc. [mg/l]	7.90 6.25	7.40 13.8	7.20 11.2	10.8 11.2	8.10 7.5	7.60 11.2	8.50 7.5	8.50 12.5	8.20 3.75	8.80 8.75
Salinity	0.055 0.069	0.028 0.024	0.028 0.024	0.030 0.024	0.029 0.024	0.028 0.024	0.028 0.024	0.113 0.124	0.028 0.074	0.028 0.024
Hardness [mg/l]	< 17.4 < 17.4	< 17.4 24.3	< 17.4 < 17.4	< 17.4 25.3	< 17.4 < 17.4	< 17.4 50.0	< 17.4 < 17.4	< 17.4 57.5	< 17.4 < 17.4	< 17.4 < 17.4
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3
COD [mg/l]	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.2 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1
PO ₄ -P [mg/l]	0.07 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	< 0.05 < 0.05	0.10 0.13	< 0.05 < 0.05	< 0.05 < 0.05
NH ₄ -N [mg/l]	0.05 0.03	0.03 0.02	0.04 0.02	0.04 0.02	0.03 0.04	0.04 0.03	0.03 0.03	0.04 0.11	0.03 0.02	0.04 0.02
NO ₂ -N [mg/l]	0.05 0.04	0.04 0.04	0.04 0.04	0.05 0.03	0.05 0.04	0.04 0.05	0.04 0.05	0.05 0.06	0.04 < 0.015	0.04 < 0.015
NO ₃ -N [mg/l]	2.37 < 0.23	0.68 < 0.23	0.52 < 0.23	0.48 < 0.23	0.54 < 0.23	0.5 < 0.23	0.47 < 0.23	3.08 3.19	0.52 3.70	0.52 < 0.23
Ca [mg/l]	2.66 2.07	0.89 0.58	1.00 0.54	2.05 0.53	0.84 0.66	0.76 0.54	1.08 0.58	5.26 4.21	4.68 4.41	4.48 0.58
Fe [mg/l]	0.02 0.04	0.02 0.05	0.02 0.06	0.03 0.08	< 0.01 0.05	0.02 0.17	0.03 < 0.08	0.08 < 0.08	< 0.01 < 0.08	0.02 < 0.08
Zn [mg/l]	0.006 0.03	0.629 0.30	0.720 0.35	0.743 0.26	0.700 0.31	0.789 0.25	0.758 0.27	0.027 0.06	0.693 0.05	0.773 0.27
As [mg/l]	< 0.002 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Fecal [N/100]	15	0	110	0	0	0	0	20	0	0
Total [N/100]	2350	0	950	100	0	0	580	2100	0	1150
Fecal [N/100]	0	0	0	0	0	0	0	30	10	0
Total [N/100]	870	690	720	550	2320	3350	580	5220	1160	1740

BUENA VISTA

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	BUV-1	BUV-2	BUV-3	BUV-4	BUV-5	BUV-6
pH	4.17	4.61	4.11	4.41	4.68	4.40
	3.90	4.40	3.87	4.40	3.97	5.21
Cond. [µS/cm]	18.4	14.1	9.29	11.8	15.3	14.0
	27.1	19.7	10.6	20.0	14.2	77.4
Temp. [°C]	26.8	27.8	26.8	27.6	28.3	28.6
	30.0	27.9	28.5	28.1	27.8	28.2
Atc. [mg/l]	2.40	3.80	1.30	3.20	4.00	2.40
	6.25	25.0	5.0	13.8	12.5	61.2
Salinity	0.025	0.024	0.021	0.023	0.025	0.024
	0.031	0.026	0.022	0.027	0.024	0.059
Hardness [mg/l]	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4	< 17.4
Susp. Sol. [mg/l]	< 3	407	< 3	< 3	115	529
	11	44	< 3	375	39	296
COD [mg/l]	< 5	< 5	< 5	< 5	< 5	< 5
	< 5	< 5	< 5	< 5	< 5	< 5
BOD ₅ [mg/l]	< 4	< 4	< 4	< 4	< 4	< 4
	< 4	< 4	< 4	< 4	< 4	< 4
F [mg/l]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05
	0.12	< 0.05	0.06	< 0.05	< 0.05	< 0.05
NH ₄ -N [mg/l]	0.04	0.08	0.04	0.02	< 0.015	0.03
	0.03	0.12	0.05	0.74	0.04	0.02
NO ₂ -N [mg/l]	0.05	0.07	0.06	0.05	0.05	0.04
	0.08	0.07	0.07	0.04	0.02	0.06
NO ₃ -N [mg/l]	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23	< 0.23
Ca [mg/l]	0.59	0.21	0.15	0.60	0.06	0.50
	0.19	0.56	0.10	0.33	0.08	0.45
Fe [mg/l]	0.41	2.29	0.25	0.06	0.31	0.23
	0.18	0.43	0.20	0.22	0.07	0.27
Zn [mg/l]	0.038	0.810	0.020	0.830	0.794	0.818
	0.08	4.04	0.07	8.14	1.27	28.59
As [mg/l]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Hg [mg/l]	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Colibacteria						
Fecal [N/100]	90	0	105	0	0	0
Total [N/100]	3480	7500	3200	0	0	0
Fecal [N/100]	130	0	145	0	0	0
Total [N/100]	8120	560	6960	300	2320	1060

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SRV 1 - 15

Page 11

SANTA ROSA DE VIGO

Dry Season Results / Resultados de la Época de Sequía
Raining Season Results / Resultados de la Época de Lluvias

Parameter	SRV-1	SRV-2	SRV-3	SRV-4	SRV-5	SRV-6	SRV-7	SRV-8
pH	4.78 3.67	4.65	5.89	4.65	8.46 6.20	7.75 6.22	4.83 4.85	5.42 5.12
Cond. [μ S/cm]	30.3 133	54.4	162	57.4	250 78.1	103 26.4	19.1 16.5	43.5 58.1
Temp. [$^{\circ}$ C]	28.5 28.5	29.4	33.2	30.0	28.5 32.2	26.6 30.7	31.8 28.7	29.3 28.3
Alc. [mg/l]	11.4 20.0	5.7	24.0	7.8	90.2 27.5	58.8 15.0	8.6 13.8	15.8 11.2
Salinity	0.033 0.092	0.046	0.110	0.048	0.163 0.060	0.073 0.028	0.028 0.025	0.040 0.048
Hardness [mg/l]	< 17.4 < 17.4	< 17.4	< 17.4	< 17.4	< 17.4 78	< 17.4 46.4	< 17.4 25.2	< 17.4 43.6
Susp. Sol. [mg/l]	< 3 < 3	< 3	< 3	< 3	< 3 162	< 3 < 3	< 3 < 3	< 3 < 3
COD [mg/l]	< 5 < 5	< 5	< 5	< 5	< 5 29.6	< 5 < 5	< 5 < 5	< 5 < 5
BOD ₅ [mg/l]	< 4 < 4	< 4	< 4	< 4	< 4 16	< 4 < 4	< 4 < 4	< 4 < 4
F [mg/l]	< 0.1 < 0.1	< 0.1	< 0.1	< 0.1	0.12 < 0.1	0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1
PO ₄ -P [mg/l]	< 0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05 0.26	0.16 < 0.05	0.05 0.08	< 0.05 0.05
NH ₄ -N [mg/l]	0.13 0.03	0.03	0.08	0.03	0.06 0.15	0.22 0.07	0.03 0.06	0.03 0.03
NO ₂ -N [mg/l]	0.06 0.05	0.06	0.07	0.06	0.06 0.15	0.08 < 0.015	0.05 < 0.015	0.05 < 0.015
NO ₃ -N [mg/l]	< 0.23 5.63	3.06	7.82	2.40	< 0.23 0.76	0.24 < 0.23	< 0.23 < 0.23	0.86 2.67
Ca [mg/l]	3.41 9.57	5.45	13.69	4.89	5.42 7.45	28.99 0.54	0.74 0.56	5.38 3.60
Fe [mg/l]	0.90 < 0.08	0.60	0.06	0.21	0.56 2.63	0.06 < 0.08	0.09 0.18	0.25 < 0.08
Zn [mg/l]	0.015 0.06	< 0.005	0.017	0.023	0.011 0.06	0.220 0.06	0.899 0.17	0.096 0.06
As [mg/l]	< 0.002 0.002	< 0.002	< 0.002	< 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001	< 0.001	< 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria								
Fecal [N/100]	5	1450	2320	7000	2800	3500	230	440
Total [N/100]	5800	23200	13900	35000	28500	21000	1160	2900
Fecal [N/100]	11600				520	0	0	20
Total [N/100]	23600				13920	2320	4060	8120

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

SRV 1 - 15

Page 12

SANTA ROSA DE VIGO

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	SRV-9	SRV-10	SRV-11	SRV-12	SRV-13	SRV-14	SRV-15
pH	4.26 4.24	4.19 3.76	4.87 5.16	5.38 3.83	3.75	4.47	3.62
Cond. [$\mu S/cm$]	18.7 21.4	20.4 28.8	27.1 29.3	41.7 8.5	110	89.9	6.62
Temp. [$^{\circ}C$]	29.2 33.1	29.3 30.5	28.0 25.7	27.8 25.8	28.3	31.4	28.6
Alc. [mg/l]	2.5 6.25	< 2 5.0	13.2 23.8	21.0 11.2	16.8	28.8	8.75
Salinity	0.027 0.029	0.027 0.032	0.030 0.031	0.038 0.020	0.078	0.067	0.021
Hardness [mg/l]	< 17.4 26.6	< 17.4 < 17.4	< 17.4 25.0	< 17.4 < 17.4	71.4	71.5	< 17.4
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3	362	< 3
COD [mg/l]	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5	27.7	< 5
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4	17	< 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1	< 0.1	< 0.1
PO ₄ -P [mg/l]	0.07 < 0.05	< 0.05 < 0.05	0.13 < 0.05	0.07 < 0.05	< 0.05	0.19	< 0.05
NH ₄ -N [mg/l]	0.07 0.03	0.03 0.02	0.05 < 0.015	0.04 < 0.015	< 0.015	0.61	< 0.015
NO ₂ -N [mg/l]	0.08 0.02	0.05 0.03	0.06 0.02	0.05 0.05	0.04	0.25	0.04
NO ₃ -N [mg/l]	0.41 0.66	0.50 0.86	< 0.23 < 0.23	< 0.23 < 0.23	8.02	0.62	< 0.23
Ca [mg/l]	0.43 0.15	0.28 0.07	1.94 1.40	2.09 < 0.05	5.94	8.57	0.08
Fe [mg/l]	0.20 < 0.08	0.17 < 0.08	0.26 0.25	0.64 < 0.08	0.11	0.18	0.08
Zn [mg/l]	0.056 0.05	0.043 0.04	0.155 0.12	0.096 0.45	0.04	0.09	0.13
As [mg/l]	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	0.002	0.002	< 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001	< 0.001	< 0.001
Colibacteria							
Focal [N/100]	220	30	0	0			
Total [N/100]	5700	1700	1350	3640			
Focal [N/100]	10	10	680	0	0	10	0
Total [N/100]	3480	7540	15400	13900	20100	9860	16900

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

RIB 1 - 10

Page 13

RIBERALTA

Dry Season Results / Resultados de la Época de Sequía
Raining Season Results / Resultados de la Época de Lluvias

Parameter	RIB-1	RIB-2	RIB-3	RIB-4	RIB-5	RIB-6	RIB-7	RIB-8	RIB-9	RIB-10
pH	3.73 5.30	3.69 5.27	4.85 6.30	2.68 6.46	3.50 4.80	3.93 5.20	4.07 5.32	4.80 6.92	6.99 8.92	5.27 6.29
Cond. [μ S/cm]	67.5 74.4	27.1 60.6	13.1 9.14	49.0 21.1	411 417	56.8 81.0	70.7 109	14.4 31.2	1403 1608	233 383
Temp. [$^{\circ}$ C]	26.5 27.6	26.5 27.7	26.4 26.6	26.4 26.8	26.3 26.9	27.4 27.8	26.9 27.9	26.9 28.1	27.2 29.5	27.3 28.8
Alc. [mg/l]	< 2 6.25	< 2 12.5	6.4 6.25	28.5 11.2	< 2 5.0	2.0 5.0	2.4 5.0	4.8 17.5	216 225	16.0 26.2
Salinity	0.052 0.057	0.030 0.049	0.023 0.021	0.042 0.027	0.264 0.268	0.047 0.061	0.054 0.077	0.023 0.033	0.816 1.053	0.153 0.247
Hardness [mg/l]	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	44.8 < 17.4	38.5 < 17.4	30.9 27.8	29.3 < 17.4	< 17.4 23.9	280 235	50.2 64
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	58 18	< 3 < 3	< 3 < 3	39 8	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3
COD [mg/l]	< 5 15.0	< 5 75.5	< 5 < 5	< 5 7.6	< 5 < 5	< 5 7.5	< 5 < 5	< 5 < 5	< 5 12.9	< 5 < 5
BOD ₅ [mg/l]	< 4 8	< 4 34	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 7	< 4 < 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	0.55 0.44	< 0.1 < 0.1
PO ₄ -P [mg/l]	0.15 < 0.05	0.05 < 0.05	0.33 0.14	0.21 < 0.05	0.11 < 0.05	0.10 0.16	0.09 < 0.05	0.05 < 0.05	0.13 1.10	0.08 < 0.05
NH ₄ -N [mg/l]	0.16 0.03	0.05 0.03	0.16 0.21	0.09 0.05	0.93 0.26	0.11 0.45	0.07 0.03	0.04 0.04	0.03 0.03	0.04 0.03
NO ₂ -N [mg/l]	0.06 < 0.015	0.06 < 0.015	0.06 0.05	0.07 0.05	0.07 < 0.015	0.06 0.10	0.06 < 0.015	0.05 < 0.015	0.05 < 0.015	0.05 < 0.015
NO ₃ -N [mg/l]	4.49 4.51	0.81 3.12	0.73 0.30	< 0.23 < 0.23	29.1 26.9	3.84 5.08	5.17 8.16	0.46 0.85	0.44 0.67	6.18 4.84
Ca [mg/l]	0.56 0.37	0.38 0.33	1.15 0.28	12.08 0.45	3.51 2.62	0.84 1.72	1.30 1.23	2.50 6.69	68.39 95.88	12.74 22.20
Fe [mg/l]	0.12 0.08	0.09 < 0.08	0.54 0.41	0.37 3.14	0.08 0.09	0.12 0.94	0.20 < 0.08	0.09 < 0.08	0.70 < 0.08	0.07 < 0.08
Zn [mg/l]	0.081 0.04	0.076 0.05	0.071 0.07	0.066 0.05	0.063 0.03	0.061 0.07	0.073 0.03	0.068 0.04	0.105 0.11	0.120 0.07
As [mg/l]	< 0.002 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.005	< 0.002 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Focal [N/100]	290	220	770	920	210	1190	540	0	0	10
Total [N/100]	8700	7950	5220	6380	15860	26530	31280	45250	950	1740
Fecal [N/100]	40	0	4840	180	0	7540	210	0	0	70
Total [N/100]	4550	3480	16880	11050	6380	31100	6120	2320	4006	10640

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

TUM 1 - 12

Page 14

TUMICHUCUA

Dry Season Results / Resultados de la Epoca de Sequía
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	TUM-1	TUM-2	TUM-3	TUM-4	TUM-5	TUM-6	TUM-7	TUM-8	TUM-9	TUM-10	TUM-11	TUM-12
pH	4.10 4.51	3.80 5.51	3.98 4.93	3.40 5.53	4.15 5.02	4.67 5.31	5.15 5.76	3.95 6.08	4.67 6.08	7.09 7.65	7.65 8.84	4.84
Cond. [μ S/cm]	35.3 35.5	21.6 17.4	11.9 35.8	37.7 11.9	21.4 24.2	35.2 37.9	11.9 13.2	19.5 15.8	14.1 14.1	212 212	14.8 14.8	6.42
Temp. [$^{\circ}$ C]	26.0 28.6	27.1 30.8	28.2 29.2	28.4 29.5	28.6 28.3	28.3 29.6	28.8 31.5	29.0 29.2	30.0 30.0	28.8 28.8	31.3 31.3	30.5
Alc. [mg/l]	< 2 6.25	8.0 8.75	4.6 3.75	< 2 6.25	< 2 5.0	2.4 < 3	3.0 3.75	3.4 6.25	6.25 6.25	86.25 86.25	12.5 12.5	6.25
Salinity	0.034 0.035	0.027 0.027	0.023 0.035	0.038 0.023	0.028 0.029	0.035 0.037	0.023 0.025	0.027 0.025	0.025 0.025	0.140 0.140	0.026 0.026	0.022
Hardness [mg/l]	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	92.6 92.6	30.3 30.3	< 17.4
Susp. Sol. [mg/l]	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	11
COD [mg/l]	< 5 < 5	< 5 < 5	< 5 < 5	< 5 7.6	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	< 5 < 5	8.5
BOD ₅ [mg/l]	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4 < 4	< 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1
PO ₄ -P [mg/l]	0.05 < 0.05	0.06 < 0.05	0.05 < 0.05	0.06 < 0.05	0.05 < 0.05	0.06 < 0.05	< 0.05 < 0.05	0.05 < 0.05	< 0.05 < 0.05	0.08 0.08	< 0.05 < 0.05	< 0.05
NH ₄ -N [mg/l]	0.02 < 0.015	0.03 < 0.015	0.04 0.03	0.03 0.04	0.03 0.03	0.02 < 0.015	0.03 < 0.015	0.03 0.02	< 0.015 < 0.015	0.04 0.04	0.02 0.02	0.03
NO ₂ -N [mg/l]	0.05 0.15	0.05 0.14	0.06 0.14	0.05 0.16	0.05 0.16	0.05 0.15	0.05 0.15	0.05 0.15	0.17 0.17	0.23 0.23	0.17 0.17	0.13
NO ₃ -N [mg/l]	2.70 2.59	< 0.23 < 0.23	< 0.23 < 0.23	2.94 < 0.23	1.12 1.29	2.63 3.40	0.24 0.32	1.03 0.74	< 0.23 < 0.23	3.08 3.08	< 0.23 < 0.23	< 0.23
Ca [mg/l]	0.54 0.40	0.88 0.74	0.83 1.55	1.92 0.84	0.88 0.85	1.93 2.17	0.68 0.60	1.11 0.31	0.18 0.18	33.15 33.15	2.87 2.87	0.42
Fe [mg/l]	0.04 < 0.08	0.12 < 0.08	0.85 0.11	1.17 0.33	0.13 < 0.08	< 0.05 < 0.08	0.07 0.17	0.10 < 0.08	0.12 0.12	0.35 0.35	< 0.08 < 0.08	0.38
Zn [mg/l]	0.071 0.07	2.569 0.89	0.051 0.04	0.058 0.06	0.058 0.07	0.024 0.05	0.026 0.05	0.030 0.06	0.04 0.04	0.12 0.12	0.48 0.48	0.03
As [mg/l]	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 < 0.002	0.002 0.002	0.002 0.002	< 0.002 < 0.002	0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001
Colibacteria												
Fecal [N/100]	20	0	0	60	760	190	0	0				
Total [N/100]	9860	20	1900	19140	24160	14850	15500	11350				
Fecal [N/100]	0	70	0	0	0	0	840	0	0	2750	10	30
Total [N/100]	20860	18560	6380	3480	5380	2320	4640	19100	6960	29580	520	7540

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LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

CES 1 - 12

Page 15

CACHUELA ESPERANZA

Dry Season Results / Resultados de la Epoca de Sequia
Raining Season Results / Resultados de la Epoca de Lluvias

Parameter	CES-1	CES-2	CES-3	CES-4	CES-5	CES-6	CES-7	CES-8	CES-9	CES-10	CES-11	CES-12
pH	5.10 3.44	6.55 3.19	2.80 1.74	5.06 2.57	5.00 2.78	4.47 2.38		3.12 3.30	3.28 3.12	3.12 2.99	2.99 3.03	3.03
Cond. [μ S/cm]	44.9 71.4	34.2 9.37	6.08 7.09	95.4 30.0	32.0 31.1	8.25 6.39	22.3	19.1	31.7	46.6	17.1	17.2
Temp. [$^{\circ}$ C]	27.4 28.2	30.1 29.9	24.7 27.3	26.5 28.0	28.5 29.6	27.1 28.1	26.5	27.3	27.5	26.4	27.6	27.1
Alc. [mg/l]	10.0 22.5	17.4 10.0	<2 7.5	52.2 17.5	15.6 21.2	2.8 3.75	15.0	16.2	21.2	21.2	16.2	18.8
Salinity	0.040 0.055	0.035 0.023	0.019 0.021	0.069 0.032	0.033 0.033	0.021 0.021	0.027	0.026	0.033	0.040	0.025	0.025
Hardness [mg/l]	<17.4 22.9	19.1 20.3	<17.4 35.5	61.8 20.7	<17.4 17.4	<17.4 17.4	<17.4	20.9	24.1	24.6	19.3	<17.4
Susp. Sol. [mg/l]	<3 3	<3 3	<3 3	<3 3	<3 3	<3 3	<3	<3	<3	<3	<3	<3
COD [mg/l]	<5 5	8.4 15.6	<5 15.5	<5 5	<5 5	5.3 5	<5	<5	<5	6.0	<5	<5
BOD ₅ [mg/l]	<4 4	<4 9	<4 10	<4 4	<4 4	<4 4	<4	<4	<4	<4	<4	<4
F [mg/l]	<0.1 0.1	<0.1 0.1	<0.1 0.1	<0.1 0.1	<0.1 0.1	<0.1 0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PO ₄ -P [mg/l]	0.06 0.05	0.07 0.08	0.08 0.05	0.05 0.05	0.05 0.05	0.06 0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
NH ₄ -N [mg/l]	0.03 0.015	0.07 0.06	0.06 0.04	0.03 0.03	0.04 0.015	0.04 0.02	0.03	0.04	0.05	<0.015	0.04	0.04
NO ₂ -N [mg/l]	0.05 0.16	0.05 0.70	0.06 0.73	0.05 0.52	0.05 0.11	0.05 0.13	0.17	0.20	0.14	0.22	0.22	0.14
NO ₃ -N [mg/l]	1.72 2.74	<0.23 0.27	0.29 0.33	<0.23 0.48	<0.23 0.23	<0.23 0.23	<0.23	<0.23	<0.23	1.09	<0.23	<0.23
Ca [mg/l]	3.69 7.28	2.89 0.77	0.60 0.40	17.74 4.72	0.97 0.90	0.47 0.43	3.48	3.09	5.51	4.69	2.44	2.41
Fe [mg/l]	0.08 0.08	0.60 1.06	0.33 0.19	0.09 0.08	0.14 0.08	2.07 0.28	<0.08	0.30	0.25	0.14	0.27	0.34
Zn [mg/l]	0.036 0.04	0.029 0.05	0.036 0.08	0.091 0.05	3.165 0.41	0.078 0.05	0.82	0.62	0.56	0.44	0.65	0.45
As [mg/l]	<0.002 0.002	<0.002 0.002	<0.002 0.002	<0.002 0.002	<0.002 0.002	<0.002 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Hg [mg/l]	<0.001 0.001	<0.001 0.001	<0.001 0.001	<0.001 0.001	<0.001 0.001	<0.001 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Colibacteria												
Fecal [N/100]	80	50	10	10	0	190						
Total [N/100]	6960	2020	5540	2480	210	7150						
Fecal [N/100]	0	40	150	50	0	310	0	270	0	1440	10	0
Total [N/100]	5400	2900	8120	11500	100	7540	6960	12180	9860	19240	11020	9680

LABORATORIO MEDIO AMBIENTAL

Anexo 1: Comparison of Results / Comparación de Resultados

22.02.2002

GUA-1 - 10

Page 16

GUAYARAMERIN

Dry Season Results / Resultados de la Época de Sequía
Raining Season Results / Resultados de la Época de Lluvias

Parameter	GUA-1	GUA-2	GUA-3	GUA-4	GUA-5	GUA-6	GUA-7	GUA-8	GUA-9	GUA-10
pH	7.30 4.62	6.57 4.96	5.56 4.62	4.53 3.58	4.81 3.85	5.68 4.56	6.72 6.14	6.03 5.58	6.14 5.36	6.03 5.14
Cond. [μ S/cm]	40.3 10.0	133 156	8.91 8.86	19.2 25.0	38.3 77.5	7.58 10.7	16.2 17.7	9.23 13.3	9.15 13.8	9.30 9.84
Temp. [$^{\circ}$ C]	30.6 30.4	26.6 28.1	29.7 29.4	28.2 28.4	27.6 27.9	28.6 28.8	32.7 29.5	33.2 28.5	30.3 28.6	29.6 28.1
Alc. [mg/l]	22.8 7.50	14.8 20.0	4.6 6.25	< 2 7.50	2.60 6.25	4.4 6.25	8.8 16.2	5.0 8.75	4.8 3.75	4.6 6.25
Salinity	0.038 0.023	0.091 0.106	0.022 0.022	0.026 0.029	0.036 0.059	0.021 0.023	0.027 0.026	0.024 0.024	0.023 0.024	0.022 0.022
Hardness [mg/l]	21.2 < 17.4	34.1 21.2	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 18.9	< 17.4 28.6	< 17.4 < 17.4	< 17.4 < 17.4	< 17.4 < 17.4
Susp. Sol. [mg/l]	3 < 3	10 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3	< 3 < 3
COD [mg/l]	16.3 16.1	< 5 < 5	51.7 9.0	< 5 < 5	< 5 < 5	9.1 9.4	8.1 7.4	8.4 6.8	6.3 7.8	11.4 8.4
BOD ₅ [mg/l]	7 9	< 4 < 4	21 4	< 4 < 4	< 4 < 4	< 4 5	< 4 < 4	5 < 4	< 4 < 4	6 4
F [mg/l]	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1
PO ₄ -P [mg/l]	0.10 0.10	0.12 < 0.05	0.07 < 0.05	0.05 < 0.05	0.06 < 0.05	0.07 < 0.05	0.06 < 0.05	0.07 < 0.05	0.08 < 0.05	0.17 < 0.05
NH ₄ -N [mg/l]	0.07 0.06	0.08 0.03	0.03 0.03	0.03 0.03	0.05 0.02	0.05 0.02	0.05 0.03	0.04 0.02	0.04 0.03	0.05 0.03
NO ₂ -N [mg/l]	0.08 0.17	0.08 0.21	0.05 0.19	0.03 0.18	0.05 0.18	0.05 0.21	0.04 0.19	0.02 0.19	0.02 0.22	< 0.015 0.22
NO ₃ -N [mg/l]	< 0.23 < 0.23	6.18 6.0	< 0.23 < 0.23	< 0.23 0.96	3.08 5.10	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23	< 0.23 < 0.23
Ca [mg/l]	3.36 0.72	10.08 7.34	0.84 1.07	0.16 0.20	0.24 0.24	1.00 1.27	3.01 3.66	1.23 1.98	1.11 2.09	1.36 1.58
Fe [mg/l]	0.74 1.15	1.34 0.10	0.83 0.21	0.08 0.12	0.04 < 0.08	0.87 0.16	0.78 0.16	0.96 0.12	0.85 0.16	1.54 0.16
Zn [mg/l]	0.024 0.05	0.022 0.06	0.010 0.04	0.019 0.05	0.013 0.10	0.016 0.07	0.030 0.10	0.010 0.28	0.050 0.07	0.045 0.09
As [mg/l]	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 < 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002	< 0.002 0.002
Hg [mg/l]	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Colibacteria										
Fecal [N/100]	20	890	40	230	0	0	80	160	0	180
Total [N/100]	5800	8700	1270	2340	4640	1160	2610	2030	870	1160
Fecal [N/100]	550	20	40	30	50	60	0	0	0	10
Total [N/100]	2400	9760	100	2320	3480	14400	2800	2050	5220	1160

Limit Threshold Values and Guidelines for the Quality of Drinking Water

Límites Máximos Permisibles y Valores Guías para la Calidad de Agua

Parameter	Bolivian Norm NB 689 Norma Boliviana NB 689	Norm of the European Comm, Norma de la Unión Europea	Guidelines of the WHO Guías de la OMS
pH	6.5 – 8.5	6.5 – 9.5	-
Cond. [μ S/cm]	-	2000	-
Temp. [$^{\circ}$ C]	-	25	-
Alc. ^a [mg/l]	-	-	-
Salinity ^b	-	-	-
Hardness ^c [mg/l]	500	-	-
Susp. Sol. [mg/l]	-	-	-
COD [mg/l]	-	5	-
BOD ₅ [mg/l]	-	-	-
F [mg/l]	1.5	1.5	1.5
PO ₄ -P [mg/l]	-	2.2	-
NH ₄ -N [mg/l]	-	0.5	-
NO ₂ -N [mg/l]	-	0.03	0.9
NO ₃ -N [mg/l]	2.26	11.3	11.3
Ca [mg/l]	-	400	-
Fe [mg/l]	0.3	0.2	0.3
Zn [mg/l]	5	5	5
As [mg/l]	0.05	0.05	0.05
Hg [mg/l]	0.001	0.001	0.001
Coliforms			
Fecal [N/100]	0	0	0
Total [N/100]	0	0	0

Norma Boliviana NB 689, November 1996.

Guidelines for the Quality of Water for Drinking Water of the European Community, 80/778/EEC, 1980.

Guidelines of the World Health Organisation, WHO, 1985.