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INTERNATIONAL CENTER FOR ENVIRONMENTAL RESOURCES AND DEVELOPMENT

THE CITY UNIVERSITY OF NEW YORK

Convent Ave. at 138th Street

New York, NY 10031

FINAL REPORT

ON THE USAID PROJECT

PRIVATIZATIONSTRATEGIES FOR ENVIRONMENTAL AND ECONOMIC DEVELOPMENT IN MACEDONIA: MODULAR WASTEWATER TREATMENT

(Award No. 165-G-00-00-00108-00)

Project Period: August 20, 2000-October 30, 2003

TO:
US Agency for International Development
USAID Macedonia
Skopje, Macedonia

Repot Date: November 30, 2003

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The project, commenced in September 2000, had the main objective to address wastewater treatment problems throughout the country of Macedonia, especially in rural areas, by designing small-scale, cost-effective, modular wastewater treatment units, implementing their production using local resources, and promoting creation of an organization in the country that would take care of further production and implementation of such units.

Below, the CUNY's principal activities are outlined in chronological order.

Initial Development of the Project

In 2000, the CUNY team selected the appropriate technology for Wastewater Treatment Plants in Macedonia. The governing considerations for the scale and technology choices for wastewater treatment systems envisaged for Macedonia under this program were:

- the systems should be simple to operate and maintain;
- they should be cost effective;
- they should be suitable for use in a distributed manner in situations where central sewage collection systems are non-existent;
- they should be capable of being largely produced in Macedonia;
- potential demand for them is substantial, so that their local production and installation could form a viable nucleus for a private business activity.

These considerations led to the selection of systems, which use a combination of anaerobic and aerobic processing to produce a largely inert mineralized sludge and relatively clean water suitable for agricultural irrigation. These systems are intrinsically low maintenance, and have the potential to be cost effective when produced in quantity, and hence have the potential to be within the reach of small municipalities strapped for funds. Production of these types of units should be possible in Macedonia with a minimum of imported components. The specific system design this uses both aerobic and anaerobic processes. The Ecofluid polyethylene cone were to be purchased from Ecofluid, Inc., Kentucky that have demonstrated effective water treatment units of the above capacities. The main tank would be manufactured locally either in fiberglass or concrete. The sludge and circulation pumps and motors would be either imported or purchased locally, depending on availability.

Selection of Sites for the Pilot Projects

The following site criteria were developed in consultation with US AID for the demonstration project:

1. Sites must meet both physical and technical requirements for successful implementation of a demonstration unit to serve 2-300 persons. These requirements include: existence of a sewer system to deliver wastewater to the treatment unit; a suitable location for placement of unit, including both inflow and outflow considerations.
2. The placement of a unit at the site would be effective in treating the effluent being considered.
3. The site should serve a needy community that is itself clearly striving to improve its health and ecological situation and has the potential to become a role model for other communities in Macedonia.
4. There should be strong interest in the community to have a wastewater treatment demonstration system.
5. The community involved should demonstrate willingness and ability to effectively participate in the project implementation, through labor contributions, and if possible material contributions.
6. The community should demonstrate willingness and ability to ensure subsequent maintenance of the demonstration unit.
7. The site selected should have high visibility to promote publicity and interest in the use of such units. Appropriate site would include tourist locations and National Park area.

The priority list of potential pilot sites was then created in consultation with USAID and local partners (team). The sites selected on the basis of the above criteria included:

1. Labunista Town. This is a picturesque mountain town near Lake Struga. The townspeople, led by their mayor have been very aggressively trying to improve their environment. They have laid out and built a sewer system to collect wastewater from approximately half the town and bring it down the hill to the point where they hope to have, in the future, a large wastewater treatment station. he considerable funds that would be required for such purpose are presently not available. On part of the other half of the town, the town has built a sewage collection system for approximately 300 people, which terminates at a point on a hillside near the center of the town. From that point, the sewage presently runs untreated along an open channel running down in between the houses.

This situation would appear to offer a good opportunity for a demonstration unit of the type envisaged under this program. The demineralized sludge produced by the plant can be used directly outside the plant to fertilize and irrigate apple orchards on the slope below the proposed plant site that would be irrigated by the now cleaned water continuing to run down the open channel to the fields below. The situation is further enhanced by the very strong commitment of the Mayor and the local population to participate in implementing the project and ensure its maintenance thereafter. There is added credibility to the effectiveness of this offered participation, since the participants include a local company that was responsible for much of the existing sewage collection system.

An additional plus to this location is that it is in the immediate vicinity of a Uniplast production plants at Struga that produces large fiberglass tanks of the type that could be modified and used as the main component of the treatment unit.

2. Prespa Otesevo Resort. This is a high visibility lakeside resort with a luxury hotel as well as vacation homes and a hospital. This location has sewage collection where the effluent is presently discharged into the lake. There is very strong interest in establishing a wastewater treatment unit to alleviate the

pollution in the lake, which is having a very negative impact on tourism. The treatment plant required would have to have a capacity for at least 1800 persons, though the exact numbers have to be reviewed. There is also an adjacent hospital with about 200 persons, whose effluent could also be treated. This is also a potential site for a model plant, though the scale considerations need to be further investigated. Kayaking Route, Dam and Recreation Area. This location near Skopje is the site of a Kayak Club where international Kayaking events have been held. Because of the beauty of the area and its proximity to Skopje, it has high visibility. However, the local population is relatively low, approximately 100 persons. It is also not clear that there is an appropriate sewage collection system to feed the plant. Mavrovo Ski Resort.

3. This is an attractive mountain site. With a number of luxury hotels and both vacation homes and more modest homes. Sewage is presently discharged into a river feeding a reservoir lake. This is a high visibility resort with many visitors from Skopje. The size of unit required would be appropriate for a model demonstration unit, however, there is no existing sewer system that could bring effluent to a treatment plant.
4. Mavrovo Village. This is a mountain village in the vicinity of a well known.... Monastery. Effluent is discharged into otherwise pristine mountain streams. There is a strong need for wastewater treatment, however, there is no sewage collection in place to bring effluent to a treatment unit.
5. Saray Municipality. This is a town in the vicinity of Skopje. The town does not have any sewage collection system at present with a population over 18,000.
6. .Skopje: At the request of Skopje Mayor Penov, we visited location on river Serava in municipality Shuto Orizare . We were there with main architect Lenche Makarovska. The site did not have a sewer network connecting houses' sewer lines. All houses were emptying their sewers into an open channel river. This made it inappropriate for our unit.

   She suggested to research possibility to locate capacity in the area of the prison in Shuto Orizare and because of combined sewer with industrial waste from the prison, other treatment alternative for this site will be explored by the NGO that we are currently setting up.

7. Somokov: This site is a small town/village with 800 people. The town has created pipelines to connect all houses to the sewer system. The present sewer system is ending into a concrete septic tank next to a major stream river. The issues concerning this site included: very expensive site preparation (building a walkway bridge to cross the steam to the designated site for wastewater treatment. The distance between the septic tank and designated site for wastewater treatment unit was about 800 feet) and more importantly the designated site is privately owned at this time. All these combined makes the site inappropriate at this time for being the third site for our unit.
8. Kayaking Route, Dam and Recreation Area. This location near Skopje is the site of a Kayak Club where international Kayaking events have been held. Because of the beauty of the area and its proximity to Skopje, it has high visibility. However, the local population is relatively low, approximately 100 persons. It is also not clear that there is an appropriate sewage collection system to feed the plant.
9. Gevato: This site was recommended to us . However because at this time only 40 houses are connected to the main sewer line with the rest being on hold by the community, this rules out this community as our third site.

Consideration of all the above factors led to Labunista being the first choice at present as the site for a demonstration plant. Further examination will be needed to confirm that this is an appropriate choice before construction is undertaken.

Selection of Suppliers and Local Capacity Development

The primary production capabilities investigated concerned the production of the main holding tank. Two plastics companies in Struga and one in Kumanovo were visited. The Kumanovo plant is obviously not suitable for the production of tanks. The plants in Struga were: Polyplast a State Enterprise and Uniplast, a private enterprise. Both these companies are capable of producing fiberglass tanks of the capacity required, 30 cubic meters. Fortunately both are in Struga, near the prime candidate sites. One of these companies, along with a local contracting company could well form the nucleus of a joint venture for the commercial production in the future of wastewater treatment units of the type envisaged.

CUNY hired a local engineer, Biljana Kirovakova who is associated with the Civil Engineering Department of the Cyrill and Methodius University in Skopje. She became a full-time employee, and along with other part-time consultants, was in charge of procurement, custom clearing and other local activities.

Development of the First Pilot Project

In 2001, The CUNY team designed a low-maintenance wastewater system to meet the local requirements. This system was to be manufactured in Macedonia with a minimum of imported components. Details of the wastewater treatment system is also presented in the appendix C (Business Plan)

The selection of a site in Labunista for the treatment of sewage collected from an estimated 200-300 people was finalized during the CUNY field trip in February 2001. The site is readily accessible from a town road. Examination of local conditions necessitated a modification in the design of the unit to incorporate an equalization tank at the inflow.

The CUNY team prepared designs for the site preparation civil works, including concrete retaining walls, effluent interconnections, enclosure and covers for the system. Also needed and designed was an enclosed electrical supply system with appropriate safety breakers and switches. These were then discussed with the Labunista Municipality and the Municipal Architect to arrive at a plan for their implementation. The Municipality is to contribute the labor, while the Project would pay for material costs. An agreement was arrived at and signed by CUNY and the Labunista Municipality (Mayor) for the detailed execution of the project and allocation of costs.

The CUNY team initiated, during their February 2001 visit to Macedonia, the steps needed to register the CUNY Project activities with the Macedonia government authorities, to ensure compliance with existing legislation concerning foreign entities working in Macedonia. In addition, procedure to obtain construction permit at the site was planned and conducted by a local consultant.

Development of the Labunista Pilot Project

The public works in Labunista, under the supervision of the CUNY staff, started the site preparation for the unit. We also coordinated the manufacturing of tanks by Uniplast, Struga.

Our staff coordinated the delivery of tanks from Uniplast to the site. The tanks were inspected for leaks and then placed in the concrete retaining structure. The team made all necessary assembly and start-up of the unit. A local contractor provided all the necessary field excavation, construction, and assisted in the installation stage. The activities were planned in advance, to maximize support to the local economy.

Capacity Building and Sustainability

The CUNY team also held several meetings at Cyrill and Methodius Macedonian State University to integrate their faculty, staff and students in the project. In addition, to provide input and perspective from different areas, attempts and meetings were put together to establish a team of relevant experts and representatives from government, education and economic institutions.

To develop local capacities to ensure the sustainability of the project, we organized on-site training of local operators and engineering staff in all aspects of manufacturing and maintenance of wastewater units.

A detailed multitask Contingency Plan was then prepared to ensure execution of the Project in Labunista by Macedonian personnel even if CUNY personnel would be unable to visit Macedonia because of prevailing conditions.

Our local staff was supervising all aspects of the site preparation in Labunista. We also monitored the manufacturing of two plastic tanks by Uniplast, Struga to ensure high quality. The CUNY team also conducted monitoring of the deliveries of all needed components to Labunista. At the completion of the site preparation the tanks were delivered to Labunista and placed in the retaining concrete structure. The tanks were then again tested for possible leaks and repaired as needed. We then would be in a position to start up and stabilize the unit. The start-up procedure would provide us an opportunity to bring to Labunista the technicians from municipalities that will be potential future demonstration sites for the project to show them all the aspects of start-up and maintenance of the unit. We also intend to bring to the site a group of students from the Cyrill and Methodius University to provide them with on-the-job instruction of assembly and maintenance of the unit.

As a first step to introduce and educate citizens of wastewater treatment units, the CUNY team brought to the site an eight student team from the Cyrill and Methodius Macedonia National University, and the technicians assigned to work on the project from Recen Municipality, Vrutok Municipality, Hospital for Respiratory Diseases in Otesevo and Hotel Evropa, Otesevo.

The CUNY team, with the assistance of the supplier support team, underwent the training/demonstration of the start up procedure of the waste treatment system. The student team and the technicians from the invited municipalities and institutions have received a complete training in all aspects of the start procedure, unit monitoring and maintenance of the units of that type. The follow-up observations of the performance of the technicians from Labunista Municipality, trained on the project and involved in the maintenance of our first demonstration unit in Labunista, have shown their competence in all tasks related to the technical protocols for the maintenance of the unit. These conclusions validated our choice of low cost and low maintenance technology scheme for our waste treatment systems in Macedonia. Our staff coordinated the site development completion on the Labunista project.

Development of the Local NGO

Another important aspect of the project activities during that year was the development of the Macedonian non-government organization that will use the CUNY technology to produce, market and service waste treatment systems locally. Our team had many discussions with all the potential principals/partners in such a project, and many of them expressed an interest to form a team to work with us to develop an NGO to manufacture such units in Macedonia.

The CUNY team has successfully completed the initial process of selecting partner companies and personnel for the NGO that will be manufacturing, marketing and servicing the units in Macedonia. We also retained a local Macedonian lawyer (in late 2002 to early 2003) to register the NGO in accordance with the existing Macedonian legislation.

Development of the Pilot Project in Otesevo

The CUNY team has supervised the site preparation works in Otesevo undertaken by the Resen Municipality. Our team also conducted the final testing of the main tank in Struga and issued final instructions concerning its transportation to the Otesevo site. We also made some arrangements to organize a training seminar at the Otesevo site for technicians from Municipalities interested to install our waste treatment units.

The CUNY team has developed an engineering scheme to implement a wastewater treatment project in Otesevo. Based on the developed scheme, the team has drawn all the required technical documentation and filed it with all the appropriate regional and state authorities in Macedonia. The team has also secured a temporary construction permit to start the construction of the waste treatment system at the Otesevo site. We also made a substantial progress toward securing a final construction permit and expect it to be issued in the near future. The CUNY team has also supervised the manufacturing of the main plastic tank by Uniplast, Struga that was just completed. We also selected Granit, Bitola to execute all the concrete works for the project and assist Uniplast, Struga in transporting and installing the tank in Otesevo. The CUNY team has also made all the arrangement to procure all the needed components for the unit.

Training and Certification of Personnel to Sustain the Project

We also prepared teaching materials for the training seminar for maintenance technicians planned to organize during the start-up procedure at the Otesevo site. The CUNY team has completed the development of the program and teaching handouts for the training and certification seminar for the technicians from the municipalities interested to install the wastewater treatment systems. The seminar was conducted at the Oteshevo site on October 26, 2002. The seminar offered a mix of theory and hands on practical experience for the technical personnel that will be involved in maintenance and know-how of the waste-treatment units. Eleven Macedonian professionals participated in the seminar; four from Skopje, three from Resen, two from Bogovinje, and two from Vrotuk. They attended both theoretical and practical parts of the seminar. The two invited professionals from Labunishta never showed up. At the end of the day, certificates were given to all participants. The seminar was an important step in our overall plan to train sufficient technical staff for the maintenance of the units. All the certified technicians learned the operation of the wastewater treatment systems and will be able to maintain them in the future.

Problems with the Resen Municipality

At the time the system was turned over to the Resen Municipality, its Mayor signed an agreement to install the fence around the unit, to place a wooden cover on top of the tank, to complete the excavation of the cascading slope from the unit to Prespa Lake and dedicate one of the certified technicians to the maintenance of the unit. Our local staffers visited the site in November and December and reported no progress on all of the action items promised by the Mayor. They contacted the Municipality on numerous occasions and received a lot of promises but did not see any progress.

The construction of the wastewater treatment plant in Otesevo was completed and it became operational at the end of October 2002 (see Appendix A). The CUNY team was in the process of working with the Resen Municipality to complete several tasks on the project including erection of the fence around the unit, putting the cover on the unit's tank, digging the slope in the ground from the unit in the direction of the lake and planting the grass on the site. The completion of all these tasks was the responsibility of the Resen Municipality, in accordance with the agreement signed by the CUNY and the Municipality of Resen before we agreed to locate the wastewater treatment unit in Oteshevo in early 2002. Unfortunately, all our efforts to convince the Municipality to meet their contractual responsibilities were to no avail. The Municipality claimed that they did not have necessary funds to complete the tasks but assured us that they would be able to secure the funds in 2003. We had no other choice but continue our work with the Municipality of Resen to assist them in completion of the project.

Resolving the Situation in Labunista

During the same time period, we noticed that the wastewater treatment unit in Labunista has been put out of operation by the municipality. The team also continued its efforts to mediate with the warring fractions on the governing bodies of the Municipality of Labunista that were using the wastewater treatment plant in their Municipality as a proxy in their fight for the control of the Municipality. Unfortunately, all our efforts to reach an arrangement with these fractions and restart the plant in Labunista were not successful. On the advice of the Macedonia USAID team, that visited the CUNY project sites in the Municipalities of Labunista, Resen and Vrutok, the CUNY team continued its efforts to resolve the situation in Labunista, and organized several meetings with the officials from the Municipality as last ditch efforts to restart the plant in Labunista.

All CUNY team and USAID Macedonia staff efforts to restart the plant in Labunista were not successful. The Municipality at first was dragging its feet in selecting an alternative site for the plant in the village, and then simply changed its mind and refused to cooperate with the USAID project in relocating the plant. As of this writing, the situation with the plant in Labunista is still unresolved.

Activities on the Project in Vrutok

At the same time that the site construction and installation of the wastewater treatment unit was underway in Oteshevo, our team conducted another comprehensive site inspection of potential sites for unit number 3.

The CUNY team, in consultations with the USAID Macedonia, has selected the Vrutok Municipality as the site for the third demonstration unit, and started the preparation of all the required technical documentation for the site.

In 2003, the CUNY team prepared all needed technical documentation for the Vrutok site. The team has also secured all the required documentation for the site from the relevant Government bodies. The team continued its work with the Municipality of Resen to complete the site in Otesevo. Unfortunately, we had a very minimal success in this, because the Resen Municipality still did not receive the expected funds to complete the project.

In consultations with the USAID Macedonia, it was decided to discontinue the project activities at the Vrutok site and instead take more responsibility, including funding, for the completion of the site in Otesevo. To this end, the team has prepared tender documentation for interested parties in Macedonia to complete the needed construction for Otesevo site. We have received several offers and selected one from the KARAPANCEVSKI Company. The team has completed the preparation with Granit personnel to start the construction tasks in Otesevo, in June 2003.

Monitoring the Otesevo Pilot Project Performance

The wastewater treatment plant in Otesevo has been in operation since October 2002. The technology has proven itself as very robust. In spite of very unstable power supply in the area (this problem was later fixed by incorporating some minor changes in the electrical connection box of the plant), the unit recovered very fast without the change in the quality of the treatment process.

The maintenance of the plant has been provided by the local team of technicians from the Evropa Hotel, Otesevo. This local group has been trained and certified by the

CUNY-USAID project and supervised by the project Macedonia team. In our observations, the team has developed a competence level necessary for the successful maintenance of the plant. The team will be able to train the technicians for all the future wastewater treatment plants installations in Macedonia.

As part of our development of the local NGO, the project increasingly involved more NGO personnel in the process of monitoring of the Otesevo plant, in particular its maintenance, and also planned to complete the Prespa Lake Park site surrounding the plant in Otesevo.

The NGO personnel, in cooperation with the Resen Municipality, have developed a plan for the park site completion. After studying the plan and some revisions, the CUNY team has made a decision to engage the NGO as a general contractor for the Park site completion to better train them for their future task to design and install wastewater treatment plants in Macedonia.

Development and Construction of the Prespa Lake Park

The CUNY project has completed the Prespa Lake Park at the site of the Otesevo wastewater treatment plant in July and August 2003. The CUNY personnel has chosen to use the NGO personnel to be involved in all aspects of the Otesevo site completion to train them and turn them into a modern engineering consulting group capable of taking on a variety of water and wastewater treatment technology projects. In particular, the CUNY project trained the NGO personnel in the design of both wastewater treatment plant and potable water treatment technologies. Another important training aspect included actual local manufacturing of some of the plant's technological components, importing several of the required components and final assembly of the plant on site in Macedonia. The NGO personnel have also received on-the-job training in selecting appropriate plant sites, in preparation of the required technical documentation for competitive tenders and selecting a winning bid to start the construction of the plant. Performance monitoring and financial management of the project were also covered.

Local Sustainability Building and Project Transition to the NGO

To expand on the training of the NGO personnel, the CUNY project has chosen the NGO to conduct a rigorous sampling and testing procedure to monitor the performance of the Otesevo wastewater treatment plant. The testing procedures, including sampling of the wastewater at the Otesevo site and chemical and microbiological testing in the lab, commenced at the end of June and continued for the next three months.

In parallel to these activities, the CUNY project has organized a team of the NGO personnel to prepare two bids for the tender competitions to build a wastewater treatment plant with the capacity of 200 m^3 per day in the village of Podares, and also to build a water treatment plant with the capacity of 10 L/s in the village of Sakulica. The two bids wre in response to RFP announced by Lewis Burger Inc. as part of their USAID project called CSHI (Community Self Help Initiatives).The NGO team was assisted by the CUNY personnel in New York and an outside technical consultant. The bids preparation was a good training for the NGO staff. The staff learned all the critical skills required for these types of projects. Both NGO bids did not win the tenders, but the work of the NGO staff on these projects will be invaluable preparation for their future bids preparation.

In parallel with bids preparation, the CUNY team assisted the NGO staff in initiating the preparation of the business plan for the NGO future business activities. These activities include marketing, designing, installing and servicing wastewater treatment unit for the Macedonia market. The plan has been completed and is ready for distribution. See Appendix B for a copy.

After consideration for environmental impact study of the site, the NGO team assigned to monitor the performance of the Otesevo plant has completed the sampling protocol for the plant and the analysis of the samples and confirmed that the Otesevo wastewater treatment plant meets and exceeds all the technical requirements for the treated effluent. See Appendix C for laboratory reports indicating the efficient quality of the wastewater project.

During the last months of the project, the CUNY team concentrated on accounting of all the USAID equipment on the project and transferring it (as was agreed by USAID Macedonia) to the NGO (See Appendix D).

The CUNY team has also assisted the NGO in preparing for the ZELC Expo in November 2003, which will be a good marketing tool for the NGO wastewater treatment system. Part of this preparation included creation of marketing brochures, in English, Macedonian, and Albanian languages.

ATTACHED APPENDICES:

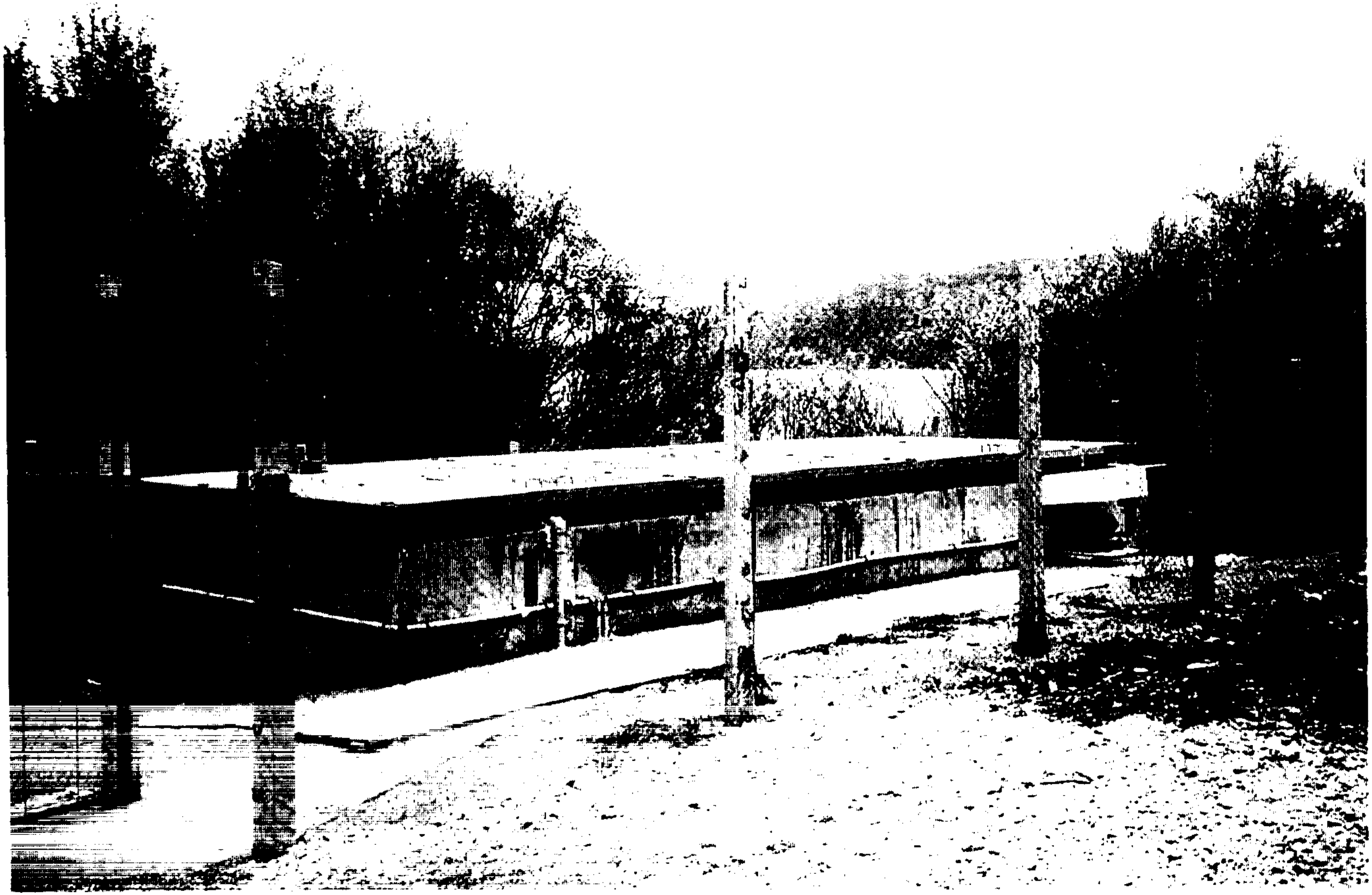
Appendix A- Picture of the completed installed unit in Oteshevo

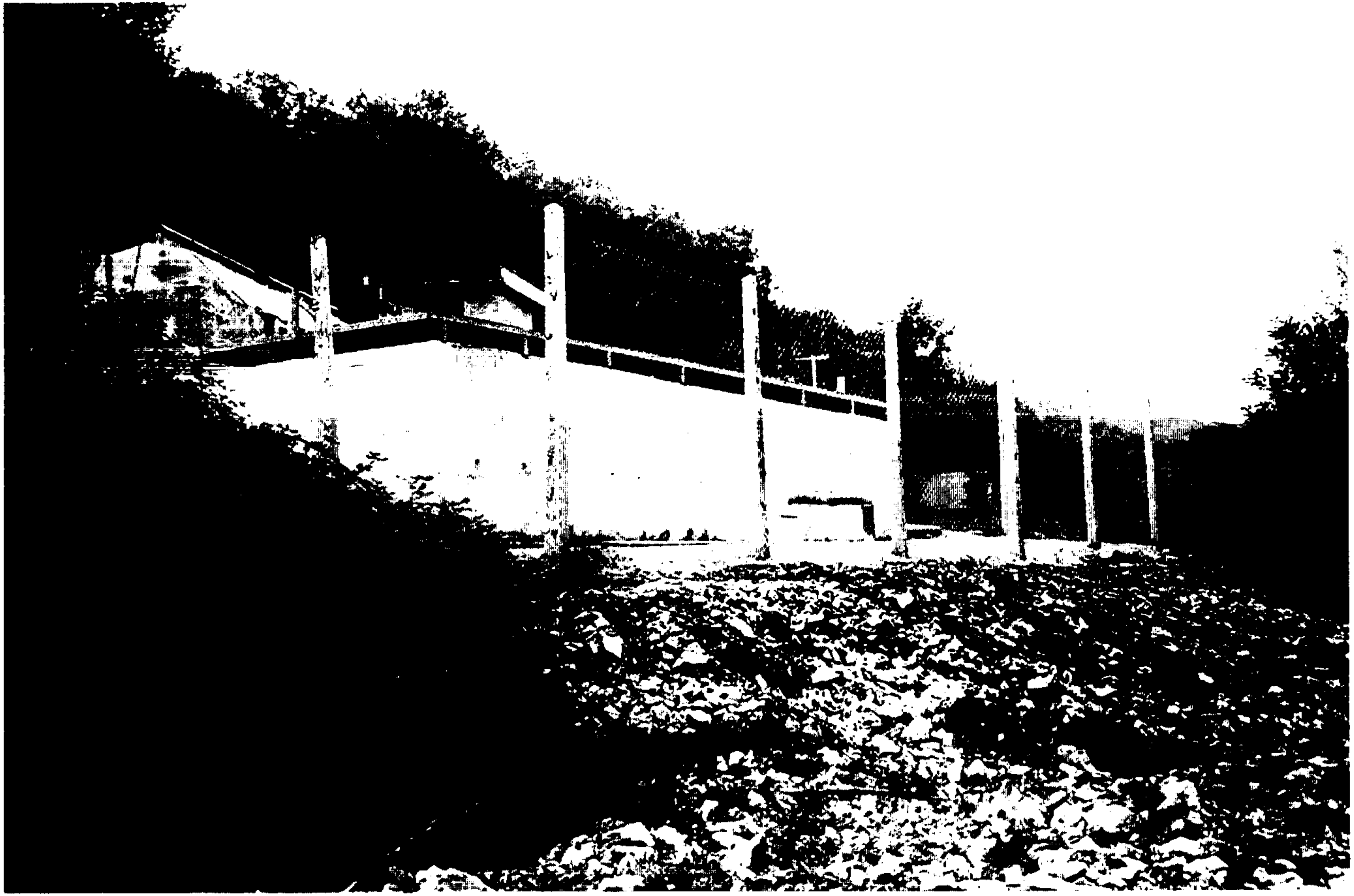
Appendix B- Business Plan for ECOTECH (NGO).

Appendix C- Laboratory Analysis report for Oteshevo Site

Appendix D- Equipment Disposition List

Appendix A- Picture of the completed installed unit in Oteshevo





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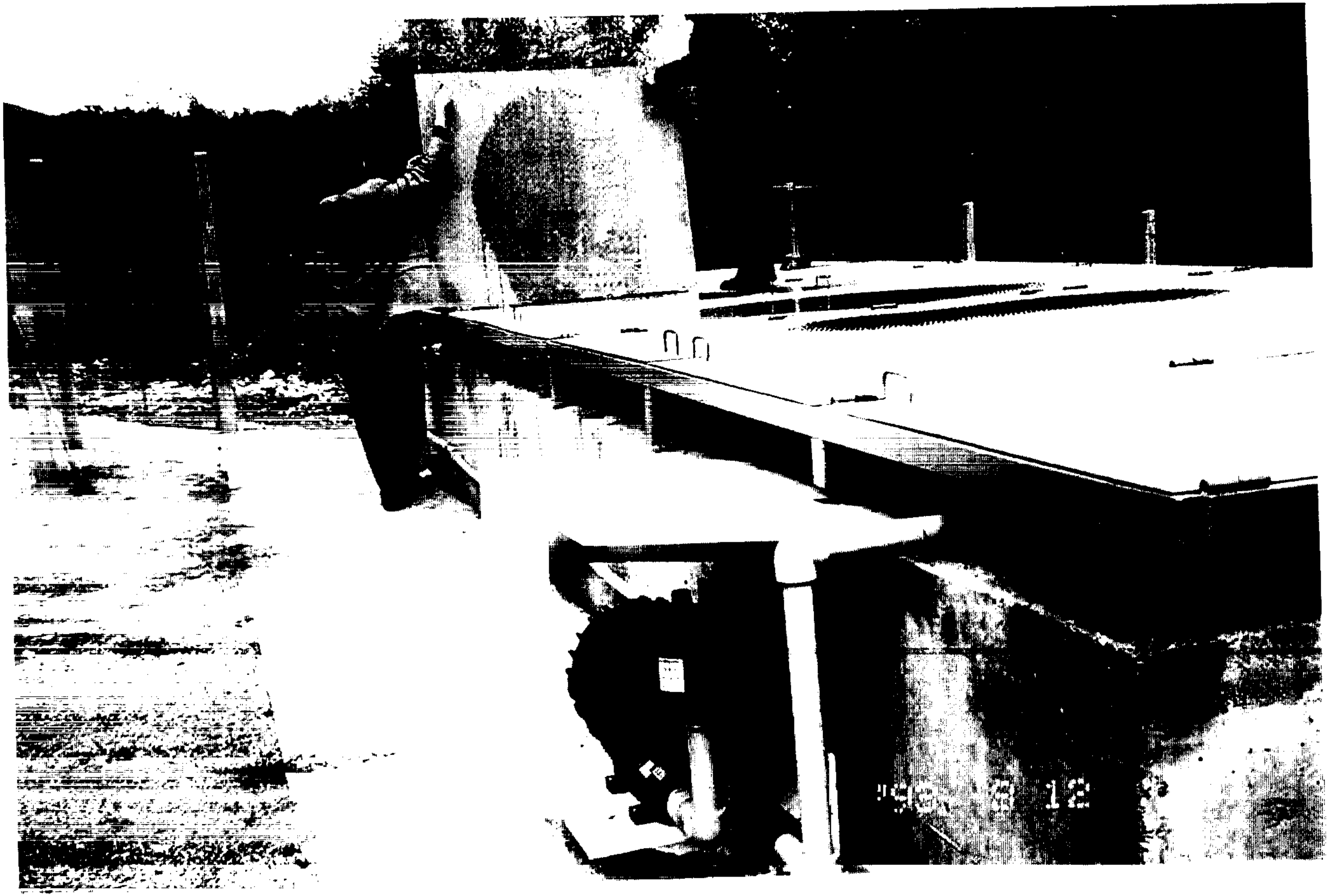

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Appendix B- Business Plan for ECOTECH (NGO),

Appendix B

"ECOTECH" – Association for Protection of Water and Environment

BUSINESS PLAN

(Also available in Macedonian language)

Skopje, October, 2003

I. EXECUTIVE SUMMARY

Establishment of the Association for protection of water and environment "ECOTECH" (October 2002) is part of the continuing activities in the Republic of Macedonia within the project with the International Center for Water Resources and Environmental Research, City University of New York. Financial support for realization of the project for construction of wastewater treatment facilities were provided by the United States Agency for International Development.

The project activities were concentrated on construction of small wastewater treatment facilities for municipalities of 300 inhabitants in the Republic of Macedonia, especially in rural areas.

Some of the goals of these projects were to:

- increase the environmental awareness;
- engage local labor;
- enhance economic development of the municipalities; and
- transfer the technology for the design, construction and maintenance of the system.

The project started in September 2000.

As part of the project, two wastewater treatment plants were installed in the municipalities of Labunista and Resen.

The ECOTECH will continue the CUNY-USAID project activities to assist the Macedonian municipalities in resolving their wastewater-related problems. This is particularly important in view of the transfer of responsibilities to local authorities (the process of decentralization), is to establish an institution that will cooperate with local human resources in implementing the projects in the areas in need of wastewater treatment.

The basic objective of ECOTECH is to monitor the environmental situation in Macedonia and mitigate any negative impacts. We envision the following priorities for our work:

- Monitoring water supply systems in the country;
- Wastewater the installed wastewater treatment facilities (quality control, efficiency enhancement, etc.);
- Maintaining sustainable infrastructures for potable water, wastewater and solid waste treatment plants;
- Analyzing ongoing management and sustainability problems;
- Monitoring potential hazards to water systems and assessing their environmental impacts;
- Organizing educational workshops and training courses for specialists in water treatment and for finance specialists, aimed in particular at obtaining funding and donations.

II. MANAGEMENT

ECOTECH is a non-governmental association established to carry out projects in the areas of environmental protection such as potable water protection and wastewater treatment.

The Association is governed by its Council and Managerial Board.

The Council consists of five members appointed by the President. The Council adopts the annual program and final financial documents.

The Managerial Board of three members conducts regular meetings, taking decisions for participation in bidding, accepting financial plans, and other activities in accordance with the statute of the Association.

The Managerial Board selects the President who is the signer of the accounts.

III. HUMAN RESOURCES

In order to carry out projects in the area of environmental protection (especially in wastewater management, water protection and solid waste management), the ECOTECH has at its disposal the experts in:

- finances;
- civil engineering;
- chemical engineering;
- technology;
- architecture;
- biology; and
- environmental protection.

The Association uses the services of a private accounting company. If needed, the Association cooperates with other companies like partners, forming a join venture.

IV. MARKETING

To better introduce the services that ECOTECH offers to our clients, we prepared a brochure about our Association. The brochures will be distributed to all institutions and individuals that might be interested. ECOTECH will also participate in the relevant fairs and conferences. The brochures will also be distributed through our seminars among representatives from municipalities, as well as among other interested parties, including potential donors.

The Association's attention is to connect donors with the potential beneficiaries of the ECOTECH services.

Based on the potential of the Association and on its development, we will research advance opportunities on foreign markets such as in Bulgaria, Montenegro, Albania, Romania, etc. To this aim, we will use our already established business contacts with institutions from those countries.

V. MARKET

The Republic of Macedonia has an area of 25,713 km^2, of which about 80% is mountainous. Some 2% of the territory is covered with water, with about 35 large and small rivers, 3 natural lakes, and 50 artificial lakes.

The population is more than 2 million, of which about 60% live in urban areas.

Of the 1533 villages in the country, 53% have less than 300 inhabitants. This is an important factor with respect to constructing small wastewater treatment facilities. Most of the villages are located near the water bodies. Since they have problems with wastewater collecting and treatment, they present a good market for small wastewater treatment plants.

The basic problem in environmental protection in Macedonia is the lack of a Cadastre of pollutants. Water resources are under permanent influence of potential pollutants coming with wastewater from housings and industries.

The reasons why Macedonia is an attractive market for small wastewater treatment plants are small financial capacities of the municipalities, problems with maintenance and sustainability of the constructed facilities, and also the big number of urban areas with less than 300 inhabitants.

Simple technologies for wastewater treatment plants are highly economically efficient for such market conditions. Practically speaking, the bigger infrastructures for wastewater treatment plants would not be efficient in Macedonia. The reasons for these plants not operating properly include bad management and scarcity of financial resources for their operation and maintenance.

VI. PROMOTIONAL ACTIVITIES

The technology of small wastewater treatment plants was presented at the municipalities fair in 2001, held in Skopje. The interest of municipalities was huge, but the main problem was deficit of funds on the local level of administration.

Besides, this technology was presented at the Conference of Mayors held in several cities in Macedonia. The aim was to promote the site at Prespa Lake as a center for training and education of specialists from municipalities, and to establish a researching center.

Such training and research center is needed in order to ensure quality control at the sites through ongoing analyses of the wastewater (by taking samples of it before and after treatment). ECOTECH will cooperate with other institutions, associations and companies in organizing seminars and workshops for representatives from municipalities and public enterprises.

The participation in the ZELS municipal fair and conference (November 2003) will also be used for promotion of this technology. ECOTECH is also planning, by way of further research, to improve the technology of wastewater treatment.

VII. SOLUTIONS FOR THE MODULE OF WASTEWATER TREATMENT PLANTS

There is a need for proper treatment of wastewater at many locations, both in rural and urban locations in Macedonia. Lack of these facilities is leading to the contamination of groundwater and springs, gravely affecting the environment.

CUNY International Center for Environmental Resources and Development (CUNY-ICERD) has started the implementation of a module of wastewater treatment plants, specifically made and adopted for Macedonian needs.

There are three prime types of wastewater treatment:

- Extended aeration;
- Anaerobic treatment;
- Physical/chemical processes.

The process of clarification using a simple anaerobic biofilter has proven to be a very efficient tool in elimination of BOD's in several lab studies. Without complicated mechanical aeration components, anaerobic filter may be the most suitable choice for wastewater treatment plants for the communities without enough economical and human resources. But because this process is still in the phase of exploring, its complete demonstration in the present time is not possible.

Typical physical/chemical processes include: riddling, coagulation, purification, filtration with granulate sieves, absorption of active carbon, disinfection and effluence of purified wastewater. This method is very efficient in the areas with cold climate, because of the small size of facility, manageability for switching on/off, and reliability. But operating and maintaining the sludge is problematic, and cost of the operation process is high.

As a result of this, the system is not widely used as compared with biological packages of wastewater treatment plants.

VIII. EQUIPMENT (Installation Start)

FACILITIES FOR WASTEWATER TREATMENT PLANTS

Equipment:

Components of the bio reactor:

- 1+1 submerge – sewer pump with level meters
- 1 Air blower
- 1 Mixer
- 1 Operational box

Installation:

The module wastewater treatment plant is installed according to the following steps:

- Identification and adaptation of the site for the plant;
- Connection of the inflow for the wastewater and outflow pipes;
- Installing of the air blower and timer;
- Securing the installation with a protective fence.

Start and Operation:

The system is starting with using the already active sludge. The good start procedure is with injection of the active sludge from the station with biological treatment. It cannot use biological treatment from the station with extended aeration that is out of function, has sludge not more than 150 ml/kg or not older than 20 days. Inappropriate sludge can significantly prolong the duration of the starting process. As much we use initial active sludge that is better for the starting process. The volume of the sludge cover (SSV) after we insert the sludge cover should be within 200-400 ml l.

In the procedure of starting equipment, the following steps need to be considered:

1) The entrance of the bottom side needs to be open, and the chambers filled with water. Water needs to be released in the aeration/nitrification zone.
2) The air blower needs to be turned on (the air in the pumps for air and aeration elements to be adopted).
3) The initial sludge needs to be filled into the zone for aeration nitrification. The sludge needs to be monitored (for not overflowing).
4) In this phase in the zone of de nitrification, the aeration process can take approximately 2-3 weeks. (It must be stopped if the sludge is overflowing in the zone of separation).

IX. PRODUCTION PROCESS AT WASTEWATER TREATMENT PLANTS

The process of extended aeration is the most usable process for small packages of wastewater treatment plants in the entire world. Packages of wastewater treatment plants with extended aeration are using aerobic microorganisms for elimination of BOD in the wastewater. In the zone of inflow, untreated water is first being purified (with mashes) to remove the dirt and other coarser elements, which later can be mixed with the recycled biological sludge (mainly from the active microorganisms) from the purifiers.

After that the wastewater is flooding into the zone of extended aeration where the process of aerobic effervescence of the sludge is taking place, which takes 20-40 days. In this zone, the biggest percentage of BOD is being eliminated from the water. At the end, the biological sludge is separated from the treated water, coming into the purifier. The treated water is chlorinated before it is released.

The sludge of the bottom is recycling back into the CUNY-ICERD module system for treatment of wastewater, which is very useful for small rural areas in

Macedonia. The proposed module system includes a reservoir for equalization and a rectangular bioreactor. The cylindrical reservoir for equalization is to stabilize unstable ingredients of the wastewater. The bioreactor is using MINICLAR™ chambers sedimentation and a system for aeration (Ecofluid Group ltd) for support of heterorganic carbon's oxidations, nitrification and denitrification.

The module system is designed for treatment of wastewater for 300 users based on the criteria presented in Table 1.

Table 1

Parameters	Units	Inflow	Outflow	Overflow
Code	l/mkd - users	100		
Average daily flow	m3/mkd den	30		
BOD_5	mg/l	600	15	25
COD	mg/l	1000	60	80
SS	mg/l	600	25	30
TKN	mg/l	120		
WH4 - N	mg/l		3	5

X. DESCRIPTION OF THE PRODUCT

The bioreactor is a rectangular polyester reservoir, locally produced, divided into several interconnected hydraulic chambers, in which mechanical absorption of debris is taking place, an anoxic (denitrification) zone, a zone for aeration (nitrification), and a zone for separation.

The effluent is regulated in chamber before bio aerator submerge pump with level control. The wastewater from the main outflow canal is first assembling in the chamber mentioned above – disjoint manhole from the outflow canal. The pumps installed in this chamber bring the effluent into the bio aerator. In the bio aerator, faster sedimentation of particles, mostly of inorganic origin, takes place on the bottom of the reservoir.

Figure 1 shows the diagram of the proposed module system for wastewater treatment.

XI. MONITORING AND EVALUATION OF THE WASTEWATER TREATMENT PLANTS

Evaluating the process of wastewater treatment, we are following the Monitoring Plan. In the Monitoring Plan for wastewater treatment plants, one of the prime steps is taking samples. After the system start-up, grab samples from the reactor and the effluent pipe will be collected at a frequency of one per 4 weeks until it reaches the pseudo-steady state. Once the system reaches the pseudo-steady state, grab samples from influent sewer pipe and effluent (discharge) pipe will be collected at a frequency of two times a week up to one month to yield monthly average removal of biodegradable organics, suspended solids, and nutrients.

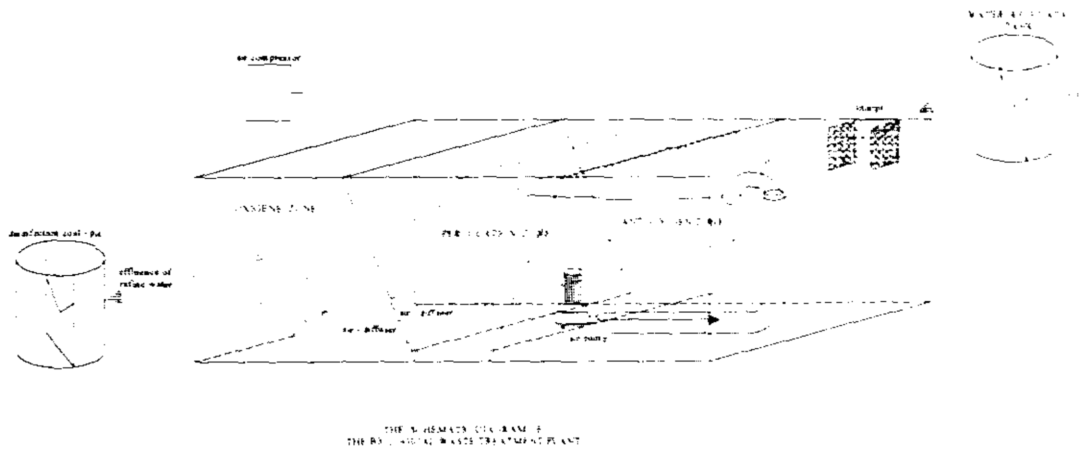


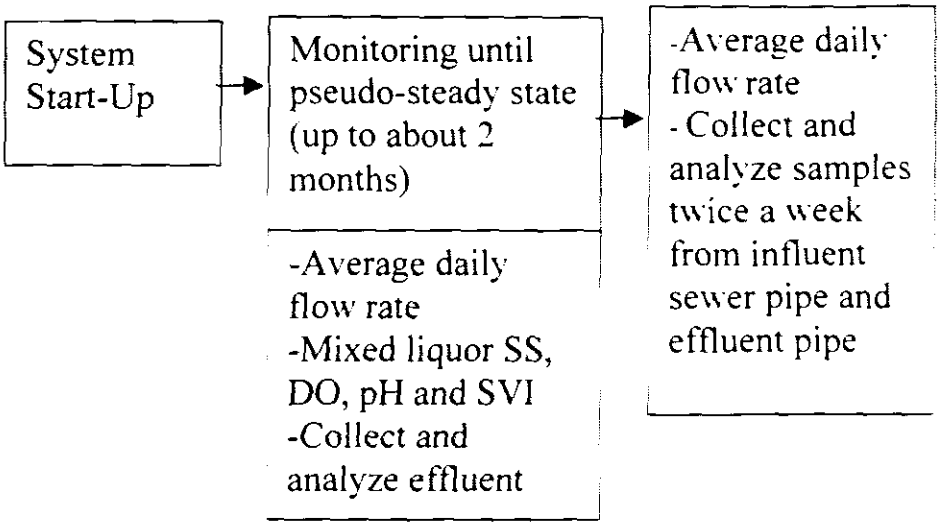
Figure 1

The actual number of months of sampling will depend on how fast the system approaches the pseudo-steady state. Overall schedule of the sampling plan is shown on the next page.

Evaluation Parameters

The following operational and water quality parameters are needed to evaluate the newly installed package plants in Macedonia.

- Daily average wastewater flow rate
- Influent (equalization tank) and effluent Total Suspended Solids (TTS, *Standard Methods* 2540G, or equivalent methods)
- Mixed liquor suspended solids in the reactor (MLSS, *Standard Methods* 2540G, or equivalent methods)
- Sludge Volume Index (SVI at 30 min)



Overall Sampling Plan

- Influent (equalization tank) and effluent 5-day Biochemical Oxygen Demand (BOD5, *Standard Methods* 5210B, or equivalent methods)
- Influent (equalization tank) and effluent Total Kjedahl Nitrogen (TKN, *Standard Methods* 4500-N org. or equivalent methods)
- Effluent Ammonia Nitrogen @ (NH4-N, *Standard Methods* 4500NH3, or equivalent methods)
- Influent (equalization tank) and effluent Total Phosphorous (TP, *Standard Methods* 4500-P, or equivalent methods)
- Dissolved Oxygen (DO, Membrane Electrode Method, Standard Method 4500-O, G)
- PH (*Standard Method* 4500-H+B, or equivalent methods)

*COD can be used in place of BOD5
@If feasible, also measure NO_2-N and NO_3-N

Sample Analysis

After the modular plant achieves pseudo steady-state operation, the above parameters will be monitored at least 2 times a week for a month and values will be averaged to give monthly average parameter values. For each sampling location, the grab samples will be collected and analyzed for the parameters at the associated frequencies.

The above parameters are critical in providing process performance evaluation and aiding in process control. Temperature, DO, and pH will be determined at each sampling location, in-situ. These three parameters will be measured every time samples are collected.

Following the USAID's regulations for environmental protection under paragraph 216.3(a)(8): "*to the extent feasible and relevant, projects and programs for which Environmental Impact Statements or Environmental Assessments have been prepared should be designed to include measurement of any changes in environmental quality, positive or negative, during their implementation*".

This will require recording of baseline data at the start. Environmental monitoring has three major phases:

1) Design of the monitoring plan
2) Plan implementation
3) Data analysis/dissemination

All these phases in the monitoring plan should be integrated with the mitigation plans. For the water and wastewater some of the most important environmental parameters and specific indicators to be measured are:

- **Quantity:** Rainfall amounts, river discharge, groundwater depth, aquifer extent, natural storage and drainage parameters.
- **Quality:** Chemical, physical and biological characteristics (e.g., pH, salinity, temperature, dissolved oxygen).
- **Reliability:** Seasonal, annual, high/low waters, recharge rates, availability of substitute resources. Variability of rainfall and climate.
- **Accessibility:** Access rights and conflicts.

XII. COST-BENEFIT ANALYSIS

OPERATING COSTS

per 1 m^3 of purified water, denars

No	Rn – current expenditures – costs		Ra – amortization costs
1	2		3
a	**TD management**		
	total costs for management.....Au	378,000.00	
	part of the costs for sewage and TP..K	1.50	
	au = K Au	**567,000.00**	

3'

b	**propelling power**			
	water quantity.... Q [l/sec]	0.77		
	increasing the waters....H+h [m']	5.50		
	pump coefficient....m=0.3-0.65	0.65		
	engine coefficient....m=0.65-0.85	0.75		
	energy price....Z[kWh]	3.00		
	working hours of pumping....n	12.00		
	annual costs per aggregate....e	21,000.00		
	ae=0.0170 . q (H+h) . 0.736 . n . 365 . zo 75 . hp .hm			
		133,446.58		
c	**auxiliary materials**			
	ae = 0.03 ae	**4,003.40**		
d	**for operative personnel**			
	time ...at	200.00		
	number of personnel...np	1.00		
	number of persons in one shift...a	1.00		
	shift coefficient....4.1 (7h)			
	shift coefficient....4.8 (6h)			
	shift coefficient average....4.5	4.50		
	an = at*1.2*1.10	1,188.00		
	np = a*K	4.5		
e	**for repairmen**	4,736,472.50	2.50%	118411.81
	ar = 1-3% (cost of the object)	**94,729.45**		
	ar = 0.2-0.5% (cost of the network)			
f	**Laboratory analyses**			
	min 10 analyses per year	**28,333.33**		
g	**equipment transportation**			
	atr =	**6,000.00**		
h	**unforeseen costs**			
	ao = 2-3% (of the maintains)			
I	**rinse out costs**			
	ap=	**600.00**		
		costs for 1 m³ of treated wastewater		
		1,123,978.99	242827.2	
		4.63	den m3	

According to the performed analysis of the annual costs at the modular station for 300 equivalent citizens, it was acknowledged that the cost of 1 m³ of purified water is 4.63 den. The burden for covering these costs will fall on the customers, and based on the amount of used water, the price of the wastewater treatment will be individually calculated.

XIII. COST ASSUMPTION

The accomplishment of the project started in accordance with the base parameters obtained by relevant institutions and direct recognizing of macro and micro locations.

URBAN CONDITIONS

The location of the Modular treatment station is at the coast of the Prespa Lake, very close to the tourist settlement Otesevo in the area known as Debela Suma. The treatment station will receive fecal water from the tourist settlement Otesevo because the two existing treatment stations have insufficient capacity. As to the storm water, its overtaking and drainage is foreseen by an open concrete channel (with rectangular cross-section).

COMPOSITION AND DESCRIPTION OF THE OBJECT

The modular treatment station comprises three interdependent objects:

a) Bioreactor
b) Tank for equalizing the wastewater inflow; and
c) House for protection of electrical equipment

A) BIOREACTOR

The bioreactor is situated on the water level and is connected by appropriate installations with the equalization tank and with the aeration blower located in the house for electrical equipment. The bioreactor is a rectangular fiberglass tank (produced locally) divided into several hydraulic cells, including the denitrification zone, the aeration zone (nitrification) and the separation zone. The fiberglass tank is situated in poll made of retaining wall of the bank constructed of stones and concrete, on the one side and of the newly constructed reinforced concrete construction, on the other side.

The newly designed reinforced concrete structure is composed of a reinforced concrete panel, 30 cm thick, on the bottom, and has a reinforced concrete wall, also 30 cm thick. The area between the reinforced concrete construction and the fiberglass tank, 1.5 m high from the bottom, is filled with 5-cm grit laying at the external reinforced concrete wall, and with 20-cm laying on the bottom and towards the retaining wall of the bank. The remaining space is filled with concrete. The roof of the bioreactor is made of steel profiles with box-like shape, 50x50x3 (cm) and a layer of corrugated sheet metal F-38/158. Above the zone of wastewater inflow into the bioreactor, there are two covers for the system operation and control that can be opened and have the same construction as the roof.

B) TANK FOR EQUALIZING THE INFLOW

The tank for equalizing the wastewater inflow has the function of primary water infiltration so that the bigger fragments of waste and solids could be retained. The tank is made of polyester basket with a grid in a reinforced-concrete manhole with 15-cm thick walls and bottom. The manhole is covered with reinforced-concrete covers with dimensions of 200x40x10 (cm). The tank is connected with the main outflow collector that provides wastewater inflow with the bioreactor. The tank is situated on a level higher than the bioreactor, and this enables natural outflow of the water by gravitation.

C) HOUSE FOR ELECTRICAL EQUIPMENT

The house for protection of the electrical equipment, constructed as combination of reinforced concrete and steel structure, is covered and closed on the perimeter with corrugated steel sheets F-38/158. The mounting floor panel is made of reinforced concrete with thickness of 20 cm. The steel structure is fixed with the reinforced-concrete structure by metal plates anchored in the reinforced concrete. The mounting steel structure is made of steel profiles with box-like shape, 50x50x3 (cm). The switch and command board are fixed to secondary steel profiles with box-like shape, 50x50x3 (cm).

Water appliances are dimensioned according to the needs of the Modular treatment station. To connect the treatment station with the sewage system, and the equalization tank with the bioreactor, as well as to provide by-pass for the overflow, 110-mm PVC pipes are used. The outflow of the purified water from the reactor is provided by a 200-mm PE pipe.

In order to secure the object from intentional and unintentional damages, a fence will be constructed, made of concrete balusters and grid in the first zone of the object.

The environmental influence of the construction of this object is positive. According to the analyses made, it is considered that the used water will have achieved the condition in which they were taken from the local nature.

HUMAN RESOURCES

In realization of this project we were cooperating with 7 experts, whose salaries, along with related expenses, are given in Table 2 in USD:

1) Finance manager
2) Civil Engineer
3) Architect
4) Chemical Engineer
5) Technology Engineer
6) Biologist

7) Environmental Engineer

Table 2

Permanent employees, person under number 1 position	12,187.00
Temporary employees under number 2,3,4,5,6 and 7	3,046.00
Transportation expenses (renting of vehicles)	4,615.00
Cost for project approvals	192.00
Total Expenses	20,040.00

Table 3 presents costs for the final implementation of the project, also in USD.

Table 3

Construction /fieldwork	10,735.00
Equipment (distributed and install) Ecotech – Czech Republic	14,255.00
Total Cost	24,990.00
TOTAL PROJECT COST	45,000.00

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Appendix C- Laboratory Analysis report for Oteshevo Site

ЈП "ВОДОВОД И КАНАЛИЗАЦИЈА" - СКОПЈЕ
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[illegible]

The City University of New York - Macedonia　USAID

[illegible] август 11. 2003
[illegible] август 15. 2003

[illegible]

Хемиска анализа на комунална отпадна вода

параметар		Влезна вода			Излезна вода		
pH		7			7,6		
к		423	$mScm^{-1}$		295	$mScm^{-1}$	
NH_4 - N		10,6	mg/l		0,2	mg/l	
Процент насатурација		0			14,83		
р-рен O_2		0	mg/l		4,78	mg/l	
Органски N по Kjeldahl		14,9	mg/l		3,6	mg/l	
BPK_5		125	mg/l		16.5	mg/l	
HPK		585	mg/l		80,1	mg/l	
Таложни матрерии за 30 мин.		3,5	ml/l		0,6	ml/l	
Нефилтриран остаток на 105 C °		380,25	mg/l		180,85	mg/l	
Суспендиран материјал		81	mg/l		15,6	mg/l	
Температура		23	C °		24	C °	
PO_4^{3-}		28,4	mg/l		11	mg/l	

[illegible]

[illegible]　[illegible]

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ЈП "ВОДОВОД И КАНАЛИЗАЦИЈА" - СКОПЈЕ
Центар за санитарна контрола и надзор
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тел :+389 91 361 689 факс:+389 91 362 901
e-mail : vik_lab@unet.com.mk
vik_cskn@unet.com.mk

The City University of New York - Macedonia USAID

[illegible] Avgust.22.03
[illegible] Avgust.28.03

[illegible] Waste water [illegible]

Chemical analyses of domestic waste water

		Inlet			Outlet		
pH		7			7,9		
κ		420	$mScm^{-1}$		322	$mScm^{-1}$	
NH_4 - N		7,8	mg /l		0,08	mg /l	
% Saturation		10,34			61,37		
D O		0,77	mg /l		4,81	mg /l	
T K N		9,9	mg /l		1	mg /l	
B O D_5		146,46	mg /l O_2		5,56	mg /l O_2	
C O D		620	mg /l O_2		65	mg /l O_2	
S V I		1	ml /l		0	ml /l	
TDR 105 ⁰		312	mg /l		185,6	mg /l	
T S S		22	mg /l		0	mg /l	
Temperature		27	C ⁰		26	C ⁰	
PO_4^{3-}		40,8	mg /l		14	mg /l	

Note

Analiza [illegible]

[illegible]

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The City University of New York - Macedonia

USAID

10.10.2003
16.10.2003

Chemical analyses of domestic waste water

		Inlet			Outlet		
pH		6,7			7,1		
κ		371	$mScm^{-1}$		338	$mScm^{-1}$	
NH_4 - N		4,3	mg /l		0,24	mg /l	
% Saturation		26,5			58,5		
D O		2,76	mg /l		5,79	mg /l	
T K N		8,8	mg /l		0,9	mg /l	
B O D_5		198,3	mg /l O_2		18,6	mg /l O_2	
C O D		420	mg /l O_2		63	mg /l O_2	
S V I		10	ml /l		0,1	ml /l	
TDR 105 ^{0}		2193,23	mg /l		220,8	mg /l	
T S S		1928,9	mg /l		26,8	mg /l	
Temperature		12	C ^{0}		14	C ^{0}	
PO_4^{3-}		29,6	mg /l		5,2	mg /l	

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The City University of New York - Macedonia USAID

11.20.03
11.28.03

Chemical analyses of domestic waste water

		Inlet			Outlet		
pH		7,22			7,36		
κ		328	$mScm^{-1}$		258	$mScm^{-1}$	
NH_4 - N		16	mg /l		4	mg /l	
% Saturation		22,6			61		
D O		3,62	mg /l		10,4	mg /l	
T K N		28	mg /l		7	mg /l	
B O D_5		45	mg /l O_2		18,5	mg /l O_2	
C O D		220	mg /l O_2		26	mg /l O_2	
S V I		0,1	ml /l		0	ml /l	
TDR 105 °		106,2	mg /l		52,9	mg /l	
T S S		28,5	mg /l		0	mg /l	
Temperature		16	C °		17	C °	
PO_4^{3-}		27,73	mg /l		5,13	mg /l	

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FROM :CUNY PROJEKT FAX NO. :+389 2 290 965 Dec. 01 2003 03:26PM P1

To Reza K.

ЈП "ВОДОВОД И КАНАЛИЗАЦИЈА" - СКОПЈЕ

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[redacted]

The City University of New York - Macedonia USAID

[redacted]	7.14.03
[redacted]	7.18.03

[redacted]

Chemical analyses of domestic waste water

		Inlet			Outlet		
pH		7			7,6		
κ		423	$mScm^{-1}$		295	$mScm^{-1}$	
NH_4 - N		10,6	mg /l		0,2	mg /l	
% Saturation		0			14,83		
D O		0	mg /l		4,78	mg /l	
T K N		14,9	mg /l		3,6	mg /l	
B O D_5		125	mg /l O_2		16,5	mg /l O_2	
C O D		585	mg /l O_2		80,1	mg /l O_2	
S V I		3,5	ml /l		0,6	ml /l	
TDR 105 ^{0}		380,25	mg /l		180,85	mg /l	
T S S		81	mg /l		15,6	mg /l	
Temperature		23	C ^{0}		24	C ^{0}	
PO_4^{3-}		28,4	mg /l		11	mg /l	

[redacted]

[redacted]

[redacted]

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Appendix D- Equipment Disposition List

LIST OF EQUIPMENT FROM CUNY PROJECT AND THEIR LOCATIONS

Item	Description	Location/Entity given to as of 31/10/03
1	Large Fiberglass wastewater reactor tank & equalizer	Labunishta Municipality
2	USBF Internal of Accessories (Diffusers, pump, pipes, gauges, cone)	Labunishta Municipality
3	Electrical components	Labunishta Municipality
4	Fence, gate, cover and outlet pipes for the unit	Labunishta Municipality
5	Prefabricated pump sump	Resen Municipality
6	Prefabricated large fiber glass wastewater reactor tank	Resen Municipality
7	Biological Reactor with internal accessories (Diffusers, pump, pipes, gauges, cone)	Resen Municipality
8	USBF Electrical components	Resen Municipality
9	Fence, gate, cover and outlet pipes for the unit	Resen Municipality
10	HP Color printer	Ecotech, NGO

List of CUNY Property funded by USAID and a Disposition Plan

Item	Description/Remark	Received form EAPS	In Possession As of	Recommended Disposition
		13.03.2001	30.10.2003	31.10.2003
COMPUTERS				
PC Dell Opti Plex	Pent.MMX 350 Mhz/100;15''Color	CUNY	CUNY	ECOTECH
PC Dell Opti Plex	Pent.MMX350 Mhz/100;15''Color	CUNY	FE	FE
PC Dell Opti Plex	Pent.MMX350 Mhz/100;15''Color	CUNY	FE	FE
Printer	Laser Jet 8120-6811	CUNY	CUNY	ECOTECH
OFFICE MACHINES				
Small copy machine	Canon	CUNY	CUNY	ECOTECH
Master telephone	Panasonic 8CBVG930693	CUNY	CUNY	ECOTECH
OFFICE FURNITURE				
2 small desks	Gray	CUNY	CUNY	ECOTECH
9 Desk driver sets	Gray, fit under desks	CUNY (2)	CUNY(1) FE(1)	ECOTECH (1)
6 Medium Bookshelves	Gray 3 shelves	CUNY(3)	CUNY(1) FE(2)	ECOTECH (1)
Metal file cabinet	Gray	CUNY	CUNY	ECOTECH
MISC OFFICE ITEMS				
Safe	Office safe with combination	CUNY	CUNY	ECOTECH
Coat rack	Black	CUNY	CUNY	ECOTECH

FE = Fund of Environment, which means that equipment left in the Fund of Environment when the office was moved on Maxim Gorki street

Remarks on the Equipment Left at the Fund for Environment (FE):

This is to confirm our Local Manager Mr. Ljupco Avramovski statement that the equipment was left in the Fund of Environment in period when a new general manager of the Fund of Environment was nominated. As a result, project offices were dislocate to a new address – Maxim Gorki Street. After several verbal communications requesting the return of the equipment with the new general manager of the Fund and the Minister for Environment and Physical Planning, the equipment was not delivered to the new project. The equipment is still in the Ministry for use.

Kh Reza

Reza Khanbilvardi
Project Director

31 - october - 2003
Date