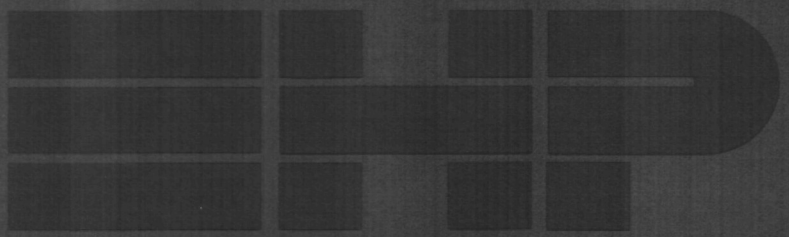

ENVIRONMENTAL HEALTH PROJECT

WASH Reprint: Field Report No. 437

Emergency Water and Sanitation Assessment for Tbilisi and Kutaisi, Republic of Georgia

Terrance M. Rahe, R.S.
Kenneth C. Choquette, P.E.

January 1994

Prepared for
ENVIRONMENTAL HEALTH DIVISION
OFFICE OF HEALTH AND NUTRITION

Center for Population, Health and Nutrition
Bureau for Global Programs, Field Support and Research
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U.S. Agency for International Development
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WASH and EHP

With the launching of the United Nations International Drinking Water Supply and Sanitation Decade in 1979, the United States Agency for International Development (USAID) decided to augment and streamline its technical assistance capability in water and sanitation and, in 1980, funded the Water and Sanitation for Health Project (WASH). The funding mechanism was a multiyear, multimillion-dollar contract, secured through competitive bidding. The first WASH contract was awarded to a consortium of organizations headed by Camp Dresser & McKee International Inc. (CDM), an international consulting firm specializing in environmental engineering services. Through two other bid proceedings, CDM continued as the prime contractor through 1994.

Working under the direction of USAID's Bureau for Global Programs, Field Support and Research, Office of Health and Nutrition, the WASH Project provided technical assistance to USAID missions and bureaus, other U.S. agencies (such as the Peace Corps), host governments, and nongovernmental organizations. WASH technical assistance was multidisciplinary, drawing on experts in environmental health, training, finance, epidemiology, anthropology, institutional development, engineering, community organization, environmental management, pollution control, and other specialties.

At the end of December 1994, the WASH Project closed its doors. Work formerly carried out by WASH is now subsumed within the broader Environmental Health Project (EHP), inaugurated in April 1994. The new project provides technical assistance to address a wide range of health problems brought about by environmental pollution and the negative effects of development. These are not restricted to the water-and-sanitation-related diseases of concern to WASH but include tropical diseases, respiratory diseases caused and aggravated by ambient and indoor air pollution, and a range of worsening health problems attributable to industrial and chemical wastes and pesticide residues.

WASH reports and publications continue to be available through the Environmental Health Project. Direct all requests to the Environmental Health Project, 1611 North Kent Street, Suite 300, Arlington, Virginia 22209-2111, U.S.A. Telephone (703) 247-8730. Facsimile (703) 243-9004. Internet EHP@ACCESS.DIGEX.COM.

WASH Field Report No. 437

EMERGENCY WATER AND SANITATION ASSESSMENT FOR TBILISI AND KUTAISI, REPUBLIC OF GEORGIA

November 30 to December 19, 1993

Prepared for the Bureau for
Europe and Newly Independent States, Office of
Development Resources, Environment and Natural Resources Division
U.S. Agency for International Development
under WASH Task No. 496

by

Terrance M. Rahe, R.S.
and
Kenneth C. Choquette, P.E.

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RELATED WASH REPORTS

Emergency Water and Sanitation Assessment and Action Plan for Yerevan, Armenia. WASH Field Report No. 396. May 1993. Prepared by Terrance M. Rahe, R.S. and Kenneth C. Choquette, P.E.

ABOUT THE AUTHORS

Terry Rahe is a registered sanitarian with a Master of Science in Microbiology (and Soil Science) and post-graduate work in environmental health with over 22 years of experience in various public and environmental health positions. Rahe has had extensive international experience including many hands-on assignments in disaster/refugee type situations. Most recently, Rahe has gone on two assignments for WASH including helping to set up the water and sanitation systems for the Kurdish refugee camps on Northern Iraq (as part of the OFDA/DART team), and in Parimarimbo, Suriname, Rahe did an assessment of urban and peri-urban practices for recommendations to prevent the spread of cholera through water, food, and sewage.

Ken Choquette has an M.S. in Water Resources (Civil Engineering) with almost 30 years of broad-based experience in engineering activities related to water and sanitation. Choquette is currently the Director of Health Engineering for the Iowa Department of Public Health where he directs state-wide activities for a wide range of environmental health programs. Choquette has a solid engineering knowledge of industrial and municipal sewage treatment facilities and public water supplies as well as knowledge of the type of public education campaigns that are effective in promoting public understanding and voluntary compliance in critical environmental health areas. Choquette has also worked extensively overseas including two years in Pakistan, two years in South Vietnam, and a range of short-term assignments in Sudan, Peru, Belize, and Guatemala.

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ACRONYMS

A.I.D.	U.S. Agency for International Development (Washington, D.C.)
CHW	community health workers
IDP	internally displaced person(s)
IOM	International Organization
IRC	International Rescue Committee
K-SES	Kutaisi Sanitary Epidemiological Station
lpd	liters per person per day
MSF Spain	*Medicos Sin Frontras Espana* (Doctors without Borders, Spain)
PVO	private voluntary organization
R-SES	Republican Sanitary Epidemiological Station
SES	regional Sanitary Epidemiological Station (94 regional)
USAID	U.S. Agency for International Development (overseas missions)
WASH	Water and Sanitation for Health Project

Currencies:

Russian Rubles (1200 Rubles = US$1.00 as of December 1993)

Ukrainian Coupons (30,000 Coupons = US$1.00 as of December 1993)

EXECUTIVE SUMMARY

Two WASH Project consultants conducted an assessment of water and sanitation needs in the Republic of Georgia from November 30 to December 19, 1993. The task included assessment of water supply systems, wastewater treatment, household sanitation, and disease detection and reporting capacity. The assessment focused on Tbilisi and Kutaisi, the two largest urban centers. Internally displaced persons (IDPs) fleeing internal strife have moved into these urban centers, taxing the infrastructure and occupying public buildings often not intended for residential use. All aspects of water and sanitation are adversely impacted by the continuing energy shortage. All observed conditions were worse in Kutaisi where energy is less available and the impact of the IDP population is greater.

Low voltage and "off-frequency" electrical problems have increased the failure rate in all water and wastewater system electrical motors. Materials for the repair of these motors are not available locally. Chlorination equipment is essentially inoperable and worn beyond repair. Equipment to maintain and repair these systems is insufficient, obsolete, and beyond repair.

Sanitary Epidemiological Stations are utilizing outdated methods and improvised equipment in an attempt to continue disease surveillance. Reagents are in short supply and are sometimes outdated. Frequent power failures cause tests to be discontinued as incubator temperatures drop to ambient.

IDP households are clearly the most vulnerable because of the high density of individuals living in facilities which were designed for hotel or resort use. Many of these units were constructed without heat, have been vandalized, and lack running water. Restrooms often also serve as kitchens.

Recommendations include providing repairs for electrical motors and pumps, replacement chlorinators, and sewer and water system maintenance equipment. A basic supply of material for microbiological express methods, reagents, and glassware is recommended.

A community health worker project is recommended to facilitate public health interventions among the IDP population. This project was developed with the International Rescue Committee staff in Tbilisi and Kutaisi. The project should have the capacity to implement household-level interventions in the event of a waterborne communicable disease outbreak.

In the attachments to the report, the reader will find documentation of disease incidence from the Sanitary Epidemiological Stations in Tbilisi and Kutaisi. There are also four lists of materials requested; the lists were prepared by the WASH consultants and public officials in the two cities. A proposal for the community health worker project is attached; the proposed budget is $183,240 for a 6-month program. A draft cost estimate has been prepared for the materials requested. The cost for equipment procurement is estimated at $705,210. In addition, cost of labor for equipment procurement and installation is estimated at $37,895. Other direct costs are $34,262. Thus the equipment costs total $777,367.

Chapter 1

BACKGROUND TO THE ASSIGNMENT

In late October 1993, the Environment and Natural Resources Division, Office of Development Resources, Bureau for Europe and Newly Independent States of the U.S. Agency for International Development received an appeal for an emergency assessment of short- and long-term needs in two major cities in Georgia, Tbilisi and Kutaisi. Two consultants were provided by the Water and Sanitation for Health Project (WASH) to assess and provide solutions to critical problems in water supply, sanitation, and housing.

In 1993, civil conflict occurred in the Republic's northwest region of Abkhazia in the Black Sea area. An estimated 150,000 refugees from the Svanetian Mountains moved to other areas of the country, including the major inland urban areas of Tbilisi, the capital, and Kutaisi (see Map 1). The conflict is ongoing and stems from long-standing territorial disputes relating to the establishment of an independent Abkhazia.

The consultants' assignment had a sense of urgency due to the likely health threat from loss of water supply. Key factors in the deteriorating situation include an influx of refugees, the upcoming winter conditions, substantial reduction in the supply of electricity and fuel, and serious economic problems in the country.

Both communities' housing consists mostly of highrise apartments with some single-family dwellings. Some areas of both communities have been without utilities for weeks. Unemployment is widespread. Wages are very low although basic food is available at a relatively low cost.

The scope of work for the emergency assessment team was as follows:

1. Assess conditions of water supplies (quantity and quality) and sanitary and housing facilities. (Perform a review of waterborne and sanitation/waterborne disease data and the disease reporting system.)

2. Provide recommendations for immediate and longer-range solutions and actions based on high-risk conditions observed.

Map 1: Republic of Georgia

Chapter 2

OBSERVATIONS

2.1 Tbilisi Municipal Services

Tbilisi has an estimated population of 1.5 million. It is situated on the Aragvi River, which flows through Azerbaijan to the Caspian Sea, and on the south slope of the Main Caucasian Mountains. Annual rainfall is 50 to 60 centimeters. Elevation ranges from 400 to 1,450 meters.

2.1.1 Water Supply

General Description

The two water sources are (1) the river which flows through a horizontal gallery system (80 percent of flow) located on both sides of the river and (2) the Zhinvali Reservoir gravity outlet to the city (20 percent of flow). Both sources are 50 km upstream from the city.

A rapid sand filtration plant is established for the 20 percent gravity flow from the reservoir. Water from the gallery system is pumped directly to distribution lines. A continuous chlorination system (gas) was included in the design for distribution. Maximum design capacity of the system was reported as 22 cubic meters per second. Actual flow (usage) rate could not be determined.

The Zhinvali hydroelectric reservoir is 50 km upstream from the galleries. The reservoir has a storage capacity of 520 million cubic meters and serves as a regional source for power, water supply, and irrigation. The drainage area is 1,900 square kilometers.

Storage and distribution are provided through 5 zones with 50 electric power lift stations (motors = 50 cycle, 3-phase, 6000/680/380 volt and pumps = 100-2000 hp). Ground storage tanks have a total capacity of 500,000 cubic meters. The city is served by 3,000 kilometers of distribution lines (50 to 1,600 mm diameter). (See Map 2.)

Observations and Deficiencies

Infiltration galleries (80 percent of flow). The galleries are in the sand and gravel adjacent to the river. A 50-hectare "sanitary zone" has been established in part of the immediate area of the galleries. The Water Resources and Ecology Institute reports that water sampling is routinely conducted with no indication of source contamination.

Sand filtration (20 percent of flow). The filter beds are in need of maintenance and reconstruction (see Photo 17). Backwashing is inadequate due to the lack of electrical power. Pipes and valves are deteriorating. Electric motors are in reasonably good condition, but

voltage drops and low cycles (46-47 Hz) reduce their life expectancy. Coagulant (alum) is not available. The WASH team thought that approximately 100 tons of coagulent per city would be sufficient for the next five months. However, the cost (approximately $4,000 for 100 tons), volatility of the Russian and Ukrainian currencies, and cost and difficulty of transport are severe impediments. Calcium/lime is available locally.

Chlorination. Gas chlorination equipment, located at seven pump stations (see Map 2), is deteriorated beyond repair. The seven units are bypassed and make-shift efforts to introduce chlorine are in place at some locations. Laboratory reports show consistent chlorine residuals in water at pumping stations, but testing by the consultants detected residuals at only one out of 8 or 10 locations.

The supply of chlorine gas was limited because it had to be ordered from outside of Georgia. The chief engineer indicated that because bacterial levels are "good" and with colder ambient temperatures, less chlorine is needed. This is not a traditional approach to the chlorination of drinking water.

Storage reservoirs. The capacity for storage appears adequate, but deterioration and leakage/water loss are evident. All storage reservoirs are ground storage of masonry construction.

Pump/lift stations. Pumps, electric motors, and pipes are deteriorating at all of the pump stations. An estimated 10 percent of the pumps are out of service due to "off-frequency" (46 to 47 Hz) voltage drops, and the frequent off-and-on cycles due to power shutdowns. Most stations provide limited pumping but are not providing design pressure to the distribution system due to the "off-frequency". Repair of electric motors is performed by the city, but no copper/insulation material is available.

One particular lift-station at the edge of the city, Bagebi station, has been shut down for the past two to three weeks. This station serves an estimated 100,000 people (20,000 of them refugees) in the three remote hill areas of Tskneti, Kiketi and Kodjori. Frequency reading at the station was 46.5 Hz (see Photo 13). Three pumps (800 kw/1000 hp) are unable to lift the 600 m elevation to the next station and the three hill areas. Pumps and electrical facilities are deteriorated. One new standby motor was on site; diesel-powered generator and switching were requested. (Large-volume diesel storage facilities are available.) Along with generators and switching, fuel must be secured for pumps to run from 4 to 12 hours per day. This was a very appropriate request since providing dedicated electric service to the pump station did not appear to be a good short-term solution. There is a plan that the gravity flow system could provide water only to Zone 1 (along the river) in case of complete failure of electric power.

Distribution lines. Lines are deteriorated and leaking throughout the system. One large break was observed with loss of about 300 to 400 gal./min. Many smaller breakouts were observed. The frequency of on/off cycles allows back-siphonage into the system. Operators and engineers report there are many leaks and breaks which are difficult to repair because of the lack of equipment. For example, they reported having only two sonic leak detectors that work. There are no backhoes or excavators for repair work.

Water losses are estimated by the chief engineer to be at 800 liters per person per day (lpd). This is about 400 percent more than would be expected in an average city in the U.S.About 25 percent of the system has service meters, but there is a real problem with maintenance. Some of the meters (ones from Azerbaijan) are not dependable.

Large cranes and excavating equipment were reported stolen or taken during the transition period when Georgia became an independent republic. In addition, backhoes and a communications walkie-talkie system should be provided. (See List 1.)

Laboratory monitoring. Ten water labs are in use but are poorly equipped. There is no heat in the building, and frequent power failures made working conditions difficult. Due to lack of transport, water sample collection from the distribution system (100 sites) cannot be performed routinely. For samples that are collected, records show an adequate system of testing and follow up. A review of equipment resulted in a list of needed materials for the laboratory.

The laboratory staff are clearly qualified and are very enthusiastic despite very difficult working conditions. They developed a list of equipment requests, specifically a kerosene incubator, a less-than-24-hour method for bacterial analysis, field chlorine test kits, and key supplies. These items should be provided on a priority basis.

2.1.2 Sewage Disposal/Wastewater Treatment

General Description

Sewage flows by gravity to large (3 m dia.) collectors situated along the river. Estimated flow is 700,000 cubic meters/day. At least 25 percent enters the river directly (see Photo 25); the rest flows by gravity downstream 30 km to a regional plant at Rustavi. There are no lift stations.

The plant is a 900,000 cubic meter/day capacity activated sludge system. Except for primary grit removal and settling, the flow is bypassed directly to the river. It appears that no flow is received from Rustavi. Metal industry, including magnesium processing, is the leading industry in Rustavi. Industrial waste is reportedly discharged directly into the river.

Observations

Collection Lines. Residents are frequently exposed to sewage. Major backups often cause sewage to flow into the streets of Tbilisi (see Photos 5, 6, and 20-24). Plugged sewers are evident, and it is obvious that very limited capabilities exist for cleaning and repairing breaks. These conditions pose a serious threat to residents. Assistance should be provided and given priority action. Only one backhoe/excavator is available, and rodding of sewers is limited to 15 m heavy wire that is manually operated. City-owned trucks for rodding and pressure cleaning were stolen or removed during the government transition.

At least 25 sewage point discharges to the river were observed (one amounted to 1 to 2 cfs). Contaminated river water is a problem but is not considered a significant threat to public health. (Note: according to a plant engineer, Azerbaijani officials have issued complaints.)

Sewage treatment plant. The plant obviously has major design and maintenance problems. There was no electrical power at the facility at the time of the visit (even though the nearby power plant, Gardabanni, was operating). Sludge pumps were broken down due to lack of parts, and electric motors serving pumps and compressors were in disrepair.

The plant lab supervisor gave a detailed and concise description of plant processes and lab/monitoring problems and needs. For example, she is unable to monitor heavy metals discharges from nearby processing plants because the lab lacks the necessary equipment. Her attitude, capabilities, and high professional standards were typical of the key officials the consultant met during the visit. For professional and humanitarian reasons, the lab must be provided with a metal analysis unit and a set of glassware.

2.1.3 Water Supply and Sewage System Management

Staff are well trained and very capable. There were over 2,000 staff members at the time of this assessment, but the ranks are diminishing and loss of key technical staff was reported. Salaries are almost nonexistent due to very limited budget and high inflation. As mentioned above, there is little fuel for field monitoring and repair. Communications equipment as well as other operating equipment was requested. List 1 represents requests and priorities prepared by the chief engineer/manager and one of the consultants. A generator, equipment to clean sewers, suitable work clothing for winter sewer repair work (insulated coveralls, rubberized boots, heavy gloves), lab equipment, and parts to repair electric motors are highest priority.

The head of Water and Sewer Services reported the existence of a priority plan for allocating electricity to pump stations. Implementing such a plan appears to present political problems for officials.

2.1.4 Republican Sanitary Epidemiological Station

The Republic of Georgia has a laboratory system which originated under the management of the Soviets. There are approximately 94 regional Sanitary Epidemiological Stations (SES) and one central Republican Sanitary Epidemiological Station (R-SES) which is located in Tbilisi. Tbilisi is the capital city of the Republic of Georgia and serves as a focal point for activities in all of eastern Georgia. The laboratory is equipped primarily with old equipment which is, for the most part, operational.

The R-SES is responsible for testing air quality, soil contamination, and chemical and microbiological water quality. A visit to the laboratory facilities indicated that modern equipment is available for testing a wide variety of environmental materials including air, water, and soil.

Microbiological materials and equipment for epidemiological testing are adequate but antiquated. All work is performed on pour plates common to microbiological water quality work of the 1960s. Only the microbiological equipment was being utilized at the time of the visit. About a dozen tests were underway. None of the autoclaves was being utilized, and only a few cultures were present in the incubators. The microbial water quality equipment appears to be in operational condition with the exception of one refrigerator. Several reagents are reported to be in short supply. On questioning, the staff did not indicate familiarity with membrane filter or other "Express Methods" such as the Colilert system.

The R-SES is equipped with a small 40 kw generator which allows operation of critical equipment during power outages. There is no backup to this generator. Fuel was reported as unavailable at the time.

The R-SES is attached to a local sewage treatment unit as are nine other facilities which are considered to produce extremely high pathogenic loads. These units were constructed only six years ago. The units consist of primary, secondary, and tertiary settling chambers. Settling of solids is followed by a chlorine contact chamber. A supply of chlorine sufficient for three months was reported to be on hand. Chlorinators are operational but all chambers were reported to be full. Such a condition renders the unit useless since the solids escape the chlorination zone untreated.

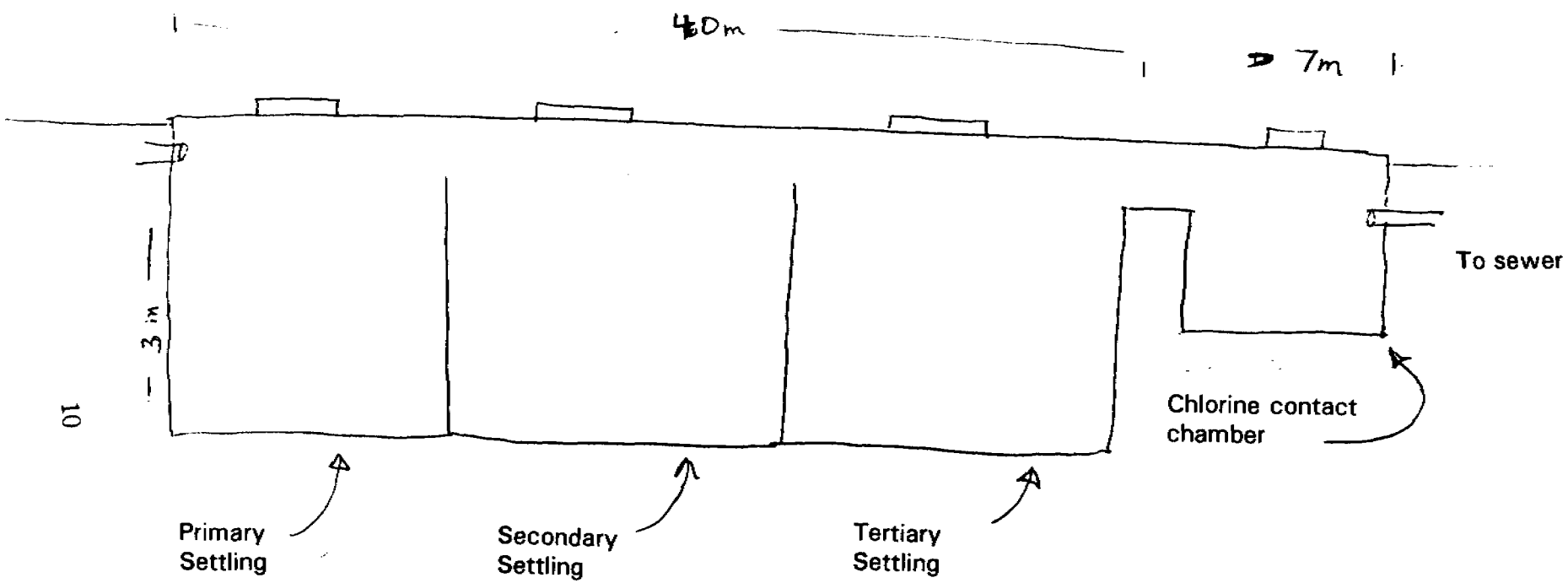
The failure of the units was due to lack of an operable pumper truck. The original design of the system included an incinerator to dispose of solids collected in the three settling chambers. The incinerator is not operational, and any solids removed from these units must be disposed of at the municipal landfill. A schematic of the local treatment unit serving the infectious disease hospital, sepsis center, and R-SES is included as Figure 1.

2.1.5 Epidemiological Reporting

Epidemiological information was secured from the R-SES (Exhibit 1) and the Kutaisi SES (Exhibit 2). The R-SES data reflects records maintained for all of the Republic of Georgia; the Kutaisi data represents only the data from that city. In addition, data from a limited study conducted in five Kutaisi polyclinics which serve primarily internally displaced persons (IDPs) was secured from Medicos sin Frontras-Spain (Exhibit 3).

These data have limited usefulness due to internal conflicts, increased use of private doctors for whom no reporting system appears to exist, decreased communications, and the general reduction in the ability of the epidemiological teams to reach the site of an outbreak to conduct investigations. The lack of some reagents, use of old methods, and difficulty in getting samples to the laboratory further complicate and distort the data.

The data appear to support earlier studies which indicate that waterborne diseases such as hepatitis, although decreasing in numbers, are a continuing problem. Decreases in rates on Exhibits 1 and 2 are questionable based on the issues raised above. In addition, observations, interviews, and investigations conducted as part of this study do not indicate any active or



All chambers estimated at 7m in width.

Figure 1

Local Sewage Treatment Facility, Tbilisi

passive mechanisms which could explain decreased incidence rates. Michael Elikeshivili, deputy chief doctor of the R-SES, agreed that the decreases were due to the conditions outlined above (hindrances to reporting and data collection) and not to any actual decreases in the disease incidence.

Interviews with the R-SES indicated that numerous outbreaks of waterborne disease occurred in both eastern and western Georgia. A summary of some of the outbreaks follows:

1991: Gargara, Apkhezia. Acute intestinal diarrhea, 331 cases: 145 verified, 107 biologically confirmed.

1992: Tbilisi, Nadzelederi district. Acute intestinal diarrhea, 87 cases reported (no follow up).

1993: Tskeltubo, Kuteisi. Acute intestinal diarrhea, 100 total cases reported (no follow up).

Dusheti region (east Georgia). Acute intestinal diarrhea, 49 cases reported (no follow up, outbreak in progress).

Rusteri, near Tbilisi. Acute intestinal diarrhea, 15 cases, (follow up in progress, outbreak continuing).

Investigation of these outbreaks is limited by the energy shortage which interferes with operation of R-SES equipment, such as incubators, and transportation required to investigate and verify the nature and extent of a disease outbreak. It can be assumed that investigation of other non-waterborne diseases is limited by the same factors.

A brief narrative prepared by the director of the R-SES is included as Exhibit 4. This narrative explains to some extent the limitations of the existing structure of water system surveillance and reinforces the key role played by the R-SES in the established monitoring network.

2.1.6 Household Water and Sanitation

Internally displaced persons (IDPs) have been housed in government-owned buildings. Many of these buildings were intended for short-term recreational visits. They are not equipped with heat, cooking, or sanitary facilities. Other IDPs have been placed in hotels where restroom facilities are provided. These facilities are being used for both sanitary and cooking purposes.

Three resort areas above Tbilisi have also been used for resettlement of IDPs. These areas do not receive water because of inadequate electrical power. Additional discussion regarding the reasons for difficulties with this portion of the Tbilisi municipal system can be found in Section 2.1.1. The staff of the water bureau reported the combined population of these resort areas to be approximately 100,000, with the population of IDPs estimated at about 20,000. Records compiled by the International Rescue Committee indicated approximately 200 IDPs in these areas. A visit to the mayor of Tskneti indicated 2,000 IDPs in that village.

As a result of infrequent delivery of water from the municipal system, the three hill areas, Tskneti, Kiketi, and Kodjori, rely on local water sources such as springs. These sources are

evidently adequate to supply current needs based on the team's observation; there were no waiting lines at the water points. Local residents were observed carrying water from these locations in buckets. One watering point consisted of a hose leading to a galvanized tub from which water was bucketed. Another watering point is shown in Photo 11.

One of these areas, Tskneti, was visited with the local city officials. Tskneti is a region which has historically served as a summer resort center near Tbilisi. The residences are frequently single story small structures of approximately 800 to 1,000 square feet. There are also a large number of motel-like accommodations intended for daily or weekly use. These government structures are the ones that have been used by the refugee settlement committee for housing IDPs.

The summer population of this region is usually 4,500, and the winter population, about 2,000. There are now about 2,000 IDPs in the area, effectively doubling the population. Many homeowners have moved into their recreational homes to provide security. Reports claim that water from the municipal system is infrequent, and power even more infrequent. A second gravity system, which appears to predate the municipal system, also distributes water throughout the region. The exact source of the water was not determined.

The team visited one household in this region. Separate sanitary and cooking facilities were available. Many of the units in this area were constructed without a source of heat, since they were intended for summer occupancy only. The city administrator indicated that this condition was typical of IDP housing in the area. A total of five resort areas exist in this general region and conditions in these areas are assumed to be equivalent to those observed in Tskneti.

2.2 Kutaisi Municipal Services

Kutaisi has a population of 280,000 (including 30,000 refugees). It is situated on the Rioni River in western Georgia and has a more humid climate than the eastern area where Tbilisi is located. Elevation ranges from 100 to 1,500 m.

Kutaisi is located 195 kilometers (115 statute miles) west of Tbilisi. Geography, history, and the current internal conflicts make Kutaisi the key urban center of western Georgia. The cities of Kutaisi and Tbilisi are separated by a mountain pass which rises to approximately 3,000 foot. Snow in this area can effectively stop land travel from December through February. The WASH team attempted to reach Kutaisi on December 6 but had to return to Tbilisi. A second attempt two days later was successful. For security concerns, all travel is by convoy.

2.2.1 Water Supply

General Description

Capacity of the water supply system is 3,000 cubic meters/hour, with actual capacity of 900 cubic meters/hour when power is on. The system of fed by two sources. The first is the river at a point within the upper limits of the city, providing 25 percent of flow, with a sand filtration

system constructed in the 1930s. The second source represents 75 percent of the flow and comes from groundwater, supplied through two well fields and individual well houses located 10 km southwest of the city. The 75 wells are 10 to 12 inches in diameter, with depths of 100 meters. Well water is pumped directly to the system. The well field is away from any industrial area; a protection zone seems to have been established. Chlorination equipment was part of the original design for both sources. Storage and distribution is via four main storage reservoirs, with 500 km of 16 to 160 mm lines. There are 30 main pump stations (and 20,000 private pumping units).

SPECIAL NOTE: The head of the Kutaisi Water Department reported that for the past two to three weeks, most of the city had no water. There was no power or water during the team's 3-day visit.

Observations and Deficiencies

Sand filtration. The inlet from the river is located near filter beds and the only lab. Beds and settling tanks are deteriorated. Half of the system is inoperable.

At the time of the consultants' visit, water was not being pumped to the beds due to lack of power. The operator reported that the beds are also not operated when turbidity of the river is high, as was the case on the date of the visit. Because of housing development upstream and with obvious poor sewage disposal immediately upstream, this source needs much better filtration treatment and chlorination. The inlet from the river needs to be relocated further upstream. The consultant recommended not using this source until better protection is provided.

The coagulant-AL2(SO4)3-has not been available. As mentioned in Section 2.2.1, coagulant is costly and transport extremely difficult, if not impossible. Filters are used without the coagulant when the river quality is up and there is power (not very often). When river quality is poor, river water is not used and the system relies on well water.

Chlorination. The gas chlorination feeders, located at the filter plant and at the two large pump stations at the two well fields, are not operating. Chlorine gas was available from Azerbaijan but difficult to acquire due to transport and currency.

The team observed a makeshift connection of chlorine to the reservoir at the well field pump station (see Photo 8); a large loss of chlorine gas was evident.

Well fields. Of the 75 wells, 52 were inoperable due to burned out well pump motors and mechanical failure of pumps. None of the 23 remaining were operating at the time of the visit, due to power shutdown. There appears to be power available two or three hours a day, for two or three days each week. Some transformers (36,000 v down to 6,000 v) at the well needed oil and repair. Copper pump cables were gone (stolen) along with other electrical materials.

Priority requests were made for new submergible pumps and for spare parts (copper wire) (see List 3). The motors/pumps and materials (copper) for repairs are essential. "Off"-cycle power

(47Hz to 48Hz) and voltage fluctuations are continual problems and the main cause of motor failure through overheating.

Storage reservoirs. The reservoirs are deteriorated and need repair. Some leakage is evident. (Capacity is not a major problem.)

Pump/lift stations. Off-cycles and power shutdowns are the main problem. Electric motors have failed, and there are no spare parts for repairs. Pump repairs are performed by a local company, but copper wire and insulation materials for rewinding/repair are not available.

A high priority request was made for copper to repair of both well pump motors and lift pumps (see List 3).

As of December 1993, an elevated area of the city had not received water for a month. About 100,000 people (15-20,000 refugees) live in this area. Residents of this area resort to alternative water sources, for example, an old abandoned well located on the grounds of the Bagrati Cathedral. To use this well, each resident must bring a bucket and rope to reach the water. The bucket is set in the dirt when the well lid is removed and is then lowered to reach the water, approximately 15 meters from the surface. This water source is clearly compromised by the methods used to draw water. Wells such as this can be the source of massive outbreaks of disease once they are contaminated. The city has two water trucks (6,000 liters capacity), and some water is transported to the elevated area. The city staff has received threats and complaints, particularly from people this area. Physical security of city workers is clearly a concern. The consultant witnessed a heated argument between a representative of the "elevated" area and the chief engineer.

Distribution lines. Old, deteriorated lines were observed. Many broken lines are evident. The city has no excavating equipment; leak detection equipment was requested and is clearly needed. Back-siphoning of contaminated water is probably happening due to constant on/off water pressure.

A waterborne disease outbreak occurred in a residential area where there was a large sewer break. The head of Water and Sewer Services described the drinking water which was contaminated by sewage: "The water turned cloudy and smelled." The disease outbreak was confirmed by the local epidemiological laboratory.

Water quality/laboratory. A system for collecting and analyzing drinking water was set up, but limited fuel, lab supplies, and power failure have significantly limited the water lab's capabilities. Records show that bacterial contamination at times is confirmed.

Chlorine residual was not detected by the consultants during the visit. It is clear that water should not be used for drinking without precautions.

Action to correct causes of contamination are limited by lack of fuel, lab equipment, supplies, and chlorine residual testing of the system. An incubator and lab supplies are needed, as are field chlorine test kits.

2.2.2 Sewage Disposal/Wastewater Treatment

General Description

Gravity sewage collectors and lines lead out of the city 15 km along the river. Treatment is by mechanical system (bar screen and primary settling). There are no lift stations; the system uses gravity flow only. It serves 70 percent of the city. The remaining raw sewage goes directly to the river.

Observations and Deficiencies

Mechanical plant. The plant was not visited due to time constraints. In view of conditions observed in other areas and reports from officials, the plant is in deteriorated condition and bypasses much of the flow directly to the river.

Collection system. Broken lines and direct discharges of raw sewage to the river are evident. (See sewage-related disease outbreak described in Section 2.2.1.)

Ability to repair broken lines is a high priority concern. A list of requested equipment was prepared (see List 3).

2.2.3 Water and Sewage System Management

The loss of key staff due to low pay is a serious problem. The effectiveness of new motors, spare parts, etc. will be limited if support for staff is not included. The manager, Mr. Chirhladze, felt strongly about this issue.

Professional staff and field workers are essentially receiving no pay. It is obvious that the city and its residents cannot count on provision of such a crucial commodity as safe water by unpaid staff. Workers are preoccupied with concern about how their families will be provided with food and heat. They also lack heavy work clothes, which are essential in cold conditions. Provision of suitable (insulated, sturdy) work clothes would allow workers to perform repairs with less exposure to sewage and other hazards.

Ten dollars per month (specifically designated) for 600 staff for the winter months could be provided with minimum assurances that the pay get into the hands of each employee. A PVO such as the International Rescue Committee could audit the program.

2.2.4 Kutaisi Sanitary Epidemiological Station

Telephone links between Kutaisi and Tbilisi depend on power being available in both cities at the same time and, of course, both telephone services being operational. PVOs with teams in both locations indicate that the conditions outlined above exist only once or twice each week. All calls require booking several hours in advance. These conditions effectively isolate many of the time-sensitive activities in these two cities. Timely epidemiological surveillance in Kutaisi, which relies on laboratory services in Tbilisi, is highly unlikely.

A brief tour of the Kutaisi Sanitary Epidemiological Station (K-SES) indicated that there are major barriers to reliable, accurate, and timely disease surveillance. Among the difficulties confronting the staff are lack of power to operate incubators, lack of or expiration of chemicals/medias/supplies, and inoperative equipment. A list of specific remedial needs is included as List 4. The director of the K-SES, Dili Kubolatzi, made it clear that a complete laboratory kit is needed. The staff is familiar with the membrane filter method; they routinely used the technique until a fire in the Soviet factory which supplied the membranes halted production.

The laboratory has only two operational incubators which must be readjusted to achieve the third temperature when needed. Systiene, a component of Diphtheria media, is exhausted and unavailable to the K-SES staff. Only one autoclave is available for the preparation of media; the second unit has been cannibalized to provide parts to maintain the operational unit. Microscopes are worn and unserviceable. There are no provisions for operation of the laboratory in the absence of electrical power. If power is lost for more than a few hours, testing must be started over with new water samples.

Selected epidemiological data collected by the K-SES during the years of 1991, 1992 and year to date 1993 (November) are included in Exhibit 2.

2.2.5 Household Water and Sanitation

The WASH team visited several different collective housing and resort facilities in the Kutaisi area to assess household water and sanitation conditions among the IDP population. The International Rescue Committee team provided guidance and insight into the conditions at the sites described below. Collective housing facilities consist of hotels, apartment houses, and other public buildings in an urban setting. Resort facilities are government-owned housing located beyond the reach of public utilities; the resort areas are peri-urban in nature. All residents at all locations indicated that they are without heat and that lights are unusual. Some IDPs have been given wood-heating stoves by the International Rescue Committee. Stoves remain unusual in the collective housing facilities.

The Tbilisi Hotel and the Kutaisi Music School are two facilities that exemplify collective housing in the Kutaisi area. The Tbilisi Hotel residents reported that water is available for two hours or less each day, and then only to the lowest floor. The third floor occupants did not recall how long it had been since there was running water on their floor. Only one side of the building has toilet facilities in the rooms, the balance of the rooms must use the restroom facilities at the end of the hallway. Restrooms located in the rooms are being used both as kitchens and bathrooms, in some cases by multiple families in each unit. The restrooms located at the end of the hallways had reportedly been vandalized by the Russian military. There were few remaining fixtures. Used 55 gallon drums served for water storage. This water is used for flushing the remaining squat plate holes.

The Music School is occupied by approximately 260 IDPs. Water availability in this four-story building is reportedly the same as in the Tbilisi Hotel. There is only one restroom on each

floor. Additional restrooms have been constructed approximately 70 meters from the building. The facilities were operational at the time of the team's visit; however, recent problems were reported. Fecal material was abundant outside the restrooms, particularly behind the structure.

The team visited the Rioni Tourist Center and the Imedi 93 facility to see sites which are more peri-urban in nature. These facilities are located about 5 kilometers outside Kutaisi. The fate of wastewater from these facilities is unknown. Residents did not believe that the wastewater from these facilities flows to the municipal system. They also said they receive little water from the municipal system.

The Imedi 93 provides housing for approximately 77 IDPs; more reportedly attempt to move in daily, but there is no room. Outdoor toilet facilities were constructed near the center of a group of wooden structures originally designed for summer recreational use. The facilities are only partly operational. One squat plate is plugged, and the melting snow runs into the facility creating a lake. Upon questioning, the IDPs had no idea about how to correct the problem. Fecal material is abundant on the ground near this facility.

The Rioni Tourist Center facility provides housing for 150 refugees (45 families). The facility also reported the daily arrival of additional refugees seeking shelter. Make-shift toilet facilities have been built over what appears to be a large diameter well. Fecal material is scattered at various locations on the street and in the wooded areas. The IDPs were observed salvaging building materials from uninhabitable units to repair and improve the occupied buildings. Waste wood from these operations is used for heating.

These descriptions are representative samples of the conditions observed in other locations. Clearly, the water and sanitation conditions, combined with the crowding present in all the facilities observed, are conducive to the rapid transmission of communicable diseases in general.

Chapter 3

CONCLUSIONS AND RECOMMENDATIONS

At the end of this report, several exhibits and lists delineate the specific items requested and recommended to meet current needs—for the short and longer range—in Tbilisi and Kutaisi. An estimate is provided in Exhibit 6 for equipment recommended in this report. The cost for equipment procurement, including shipping and insurance, is estimated to be $705,210. In addition, cost of labor for equipment procurement and installation is estimated at $37,895. Other direct costs are $34,262. Thus the equipment costs total $777,367. The cost of the proposed CHW project is an additional $183,240.

3.1 Tbilisi

3.1.1 Drinking Water and Sewage Disposal System

Conclusions

The poor condition of the water distribution system and the many observed sewer and waterline breaks present a high risk of contact with sewage and infectious diseases. Backflow into the water system is very likely. Water quality monitoring capabilities are quite limited. *Water should be boiled before drinking* or use for reconstituting formula or foods.

In general, water is available about 50 to 60 percent of the time, but there are some areas that receive water less frequently. One area with 100,000 population (and 20,000 refugees) has not received water for long periods due to the absence of power.

Direct human contact with raw sewage in the streets is very evident. This is a greater problem in Tbilisi than in Kutaisi because Tbilisi has more operational pumping stations and more water to leak out of the waste disposal system. Broken lines and plugged sewers result in discharges from the sewers. Working conditions (pay and equipment) for professionals and laborers need to be addressed if foreign assistance is to be effective.

Recommendations

The following short-term actions are recommended in descending order of priority. Details are given in List 1 and Exhibit 7 (draft cable from USAID/Georgia to A.I.D./W).

Short-term actions

1. Sewer repair and unplugging equipment (backhoes, excavators, etc.)

2. Two 1,200 kw diesel-powered generators (with fuel supply) and switching equipment for operating pumps from 4 to 12 hours per day.
3. Chlorinators and field test equipment; incubators and lab equipment for metals analysis
4. Parts for repair of electric motors and pumps (copper and insulation)
5. Insulated work clothes, gloves, and rubberized boots suitable for winter sewer repair
6. Coagulants for sand filtration plant
7. Minimum pay for workers

Long-term priorities

1. Constant energy (eliminate off-cycle, voltage drops, and power failures). Come up with a dependable electrical system, including energy conservation.
2. Total redesign/reconstruction of the water and sewer plants and lines.

3.1.2 Republican Sanitary Epidemiological Station

Conclusions

Laboratory capabilities. The R-SES is equipped for a wide variety of air, water, and soil testing. The R-SES is the primary entity responsible for investigation of outbreaks of communicable diseases in the Republic of Georgia.

A significant amount of laboratory equipment, such as atomic absorption units and flame ionization equipment, was observed. This equipment is not being used since the industrial activity which calls for this work is not functioning. The equipment was reported to be in operational condition. Sufficient equipment is available to conduct laboratory testing for most inorganics (i.e., heavy metals and nutrients) and organics (i.e., volatile and semi-volatile). Simple colorometric equipment for field screening of materials was nonexistent.

Equipment for microbiological testing is antiquated. As a result the staff is restricted to methods which are laborious, slow, and in some cases less accurate than those used in better equipped laboratories. Glassware, i.e., Petri plates, is in short supply. Equipment and supplies for Colialert and membrane filter methods are not present. These methodologies can be used to reduce sample processing time by 50 percent and also to reduce the required incubation time for some tests from 48 to 24 hours. The absence of chemicals restricts the range of tests which can be run and requires chemical substitutions for some tests which reduces accuracy and reliability. Standard reference texts, such as *Standard Methods for the Examination of Wastewater*, are not available to the microbiologists in the R-SES. The staff requested technical assistance to train them in the use of any new equipment provided as part of this project.

Recommendations

The material and supply lists were developed in conjunction with the respective MOH officials responsible for each area. A supporting letter of request is included as part of List 2, and List 4 is designed specifically for Kutaisi.

The R-SES serves as a central clearing house to receive and distribute microbiological and chemical testing supplies. Requests for microbiological materials, chemical reagents, test equipment, and glassware were received separately. Highest priority must go to the microbiological testing materials. (See Priority 1, List 2, items 41 on.) If there is a serious waterborne disease outbreak, it will be these materials which are most critical. (Some of these materials will be issued to the SES in Kutaisi; additional materials specific to the needs in the Kutaisi lab are listed in Section 3.2.2.) requested below. Second priority should be given to the field kits (HACH), since they provide rapid or instant diagnostic capability for the R-SES staff in the investigation of waterborne outbreaks.(See Priority 2, List 2, items 1-40.) Third priority should go to chemical reagents, some of which have significant value in microbiological diagnostics. (See Priority 3, List 2, items 1-65.) Fourth priority should be placed on the HACH screening equipment, some of which will be used to test water quality during disease outbreaks. Glassware and other equipment should also receive fourth priority. (Priority 4, List 2, items 1-21.) A large amount of improvised glassware is presently on hand. While this is not standard professional equipment, it is serviceable.

3.1.3 Household Water and Sanitation

Conclusions

No mechanisms or programs for disease intervention at the household level are evident in the existing PVO/NGO community or within the Georgian Ministry of Health. Contingency planning, health education materials, and household-level disease intervention programs are not evident. In the past, such planning for disease prevention was viewed as an admission of failure on the part of health officials.

The IDPs clearly form a group which is vulnerable to disease outbreak due to crowding, poor sanitary conditions, and limited logistical capability created by their displacement in the civil unrest in Georgia. The use of common restrooms, which usually serve both as restrooms and kitchens, the shortage or lack of adequate water, and general weakening of these people brought on by their dislocation all contribute to the potential for the rapid spread of communicable diseases of all types.

The International Rescue Committee is currently supporting the IDPs directly with clothing, stoves, and building repairs. IRC has historically been successful at operating community health programs in similar settings.

Recommendations

Short term actions. Strong support for the Community Health Worker proposal included in Exhibit 5 is recommended. The estimated budget for the six-month program is $183,240. This proposed project was developed in the field with the International Rescue Committee. The project can be quickly implemented and would have an immediate impact on the spread of communicable disease within the IDP community. The addition of a network of community health workers in the IDP community would facilitate health education, immunizations, coordination of building repairs, and other IDP support functions.

3.1.4 Health Education

Conclusions

No evidence of an organized health education program was observed in the Republic of Georgia. Television was presented by the Ministry of Health as an effective health education medium. The consultants saw television presentations in Tbilisi by the Ministry regarding immunizations. Television is not an effective medium for reaching the IDP population since television sets are not readily available. The deteriorating energy situation further erodes its effectiveness throughout Tbilisi. Due to the general absence of electrical energy outside Tbilisi, television is useless as a form of communication in those areas.

Recommendations

The Ministry of Health needs to reassess its health education program and examine a broader range of strategies to meet current needs of its citizens. Traditional communication media, such as television, have become less and less effective. With the loss of reliable energy, a new approach to health information is required.

Two potential approaches exist. The first would be to work with and fund the existing Ministry of Health staff to revise the existing attitudes and approaches. The second alternative would be to select one of the existing technical institutes involved with health or education and fund the development of a new approach.

The latter approach is recommended if the Ministry of Health will support it. Ministries have historically relied on input from their respective institutes for the development of both product and policy.

3.1.5 Epidemiological Reporting

These conclusions and recommendations apply to both Tbilisi and Kutaisi.

Conclusions

Historically, reporting of communicable diseases has been part of the local polyclinic operation. This reporting has been significantly impacted by the changes over the past few years.

There is a reported shift by most Georgians from the use of the polyclinics to private doctors. While private doctors are still expected to report communicable diseases to the local SES, no real mechanism for surveillance has been established. The recent conflict, absence of reliable communications, and inability of the R-SES staff to follow up on outbreaks when they are reported make current communicable disease information unreliable and, in some cases, misleading.

Recommendations

Short term actions. The existing epidemiological reporting system should be replaced with a new reporting system that recognizes the realities of post-Soviet Georgia. This system should include the newly privatized medical professionals and recognize the limitations imposed by current political instability and poor communications links. Historically, the MOH staff have had a strong aversion to reporting disease incidence; in the past, any such action on the part of a health official resulted in adverse personal and/or professional consequences. Any new data collection system must take this impediment into consideration. The selection of an organization such as a technical institute is one possibility for overcoming this problem.

USAID currently has a project underway to establish such a case reporting system. This activity should be given high priority, since the existing system is limited in its ability to detect and control communicable disease outbreaks.

3.2 Kutaisi

3.2.1 Drinking Water and Sewage Disposal System

Conclusions

The shortage of water (meeting only 15 to 20 percent of overall needs) and absence of water in most areas of the city present a serious condition. The water distribution facilities and the sewage disposal system are in poor condition and represent a high risk of bacterial contamination to drinking water.

For the past month (November-December), a large area of the city was without any drinking water. This area contains an estimated population of 100,000 people, of which 20,000 are reportedly refugees. The frequent on-off power conditions create prime conditions for backflow of sewage into the water supply from the broken sewers and leaking water lines. The lack of chlorine residual in the distribution system is an additional factor which increases risk.

The high health risk due to contaminated drinking water is confirmed by the waterborne disease outbreak which occurred where sewage actually mixed with drinking water. Action should be taken to reduce the high probability of recurrence. *Water should be boiled before drinking* or for reconstituting formula or foods.

Another risk factor is direct human contact with sewage in the streets and residential areas. Substantial quantities of sewage flows directly into the river. This condition has potentially adverse impacts on downstream users and others who are in contact with the river water.

Recommendations

Kutaisi should get the most immediate attention because there is less energy, heat, and water than in Tbilisi. The following recommendations for the water system are listed in the order of importance. Additional detail is contained in List 3 and cable (Exhibit 7). The following priorities are based on health risk assessment of conditions observed. The recommended actions and priorities were made jointly by the consultants and key public officials. Management officials specifically asked that a U.S. technician accompany materials that are provided (a) to see that the materials are actually delivered and (b) to provide technical assistance in their use.

Short-term actions

1. Supply spare parts and submersible pumps to replace and repair inoperative units on well pump motors and lift pumps
2. Replace chlorinators and provide field chlorine test kits
3. Provide insulated work clothes, gloves, and rubberized boots suitable for winter sewer repair
4. Provide mechanized sewer cleaning equipment
5. Additional pay for professional staff and workers during the winter months
6. Lab incubator and glassware
7. Coagulant for sand filtration plant (a new plant is needed for more effective coagulant action.

Long-term actions

1. Provide constant electrical power to pumps; eliminate off-cycle and shutdowns. Come up with a dependable electrical system, including energy conservation.
2. Redesign and reconstruct entire water and sewer system with relocation of the river inlet further upstream.

3.2.2 Kutaisi Sanitary Epidemiological Station

Conclusions

The K-SES is the key disease surveillance facility for the urban area of the city. This area has a high number of IDPs and represents one of the largest population centers in the republic.

Kutaisi is effectively isolated from the capital city by winter storms, security concerns, and lack of reliable telephone communications.

At present the SES microbiology laboratory is operating but is not capable of providing reliable and accurate test results. The greatest problem at this facility is intermittent availability of power. Additional problems are created by the lack of adequate and appropriate equipment. Basic equipment, such as incubators, is inoperative.

Many reagents normally used are outdated or exhausted. Supplies for membrane filter analysis are not available. Standard reference materials are not available. Basic capabilities could be restored with a modest amount of equipment, supplies, and technical assistance.

Recommendations

Short-term actions

Equipment and supplies identified in List 4 will provide the Kutaisi Sanitary Epidemiological Station with minimum capabilities in the detection, investigation, and control of communicable disease outbreaks within its jurisdictional limits. A share of the equipment listed above (see List 2) for the Republican SES will be distributed to the Kutaisi lab as well.

3.2.3 Household Water and Sanitation/Health Education

Conclusions

The most difficult and adverse housing conditions observed were those in the collective housing centers (old hotels) and the peri-urban resorts in and near Kutaisi. The buildings were in poor condition due to vandalism, even before IDPs were placed in them. The absence of suitable or operational sewage disposal facilities was reflected in significant quantities of fecal material throughout these facilities. The dilapidated restroom facilities were used for both sanitary and food preparation purposes.

Neither the local government nor the PVOs/NGOs reported any activity oriented toward health education in these facilities. The International Rescue Committee is currently assisting IDPs directly by providing clothing, stoves, and materials for housing repairs. The IRC appears to have the background, capacity, and trained field staff to facilitate community health work in this setting.

Recommendations

Short-term actions. The Community Health Worker project proposed by the International Rescue Committee (see Exhibit 5) should be implemented. This organization is already well established in the IDP community and is capable of implementing this proposal quickly and effectively.

Long-term actions. The Ministry of Health needs to reassess its health education program and examine a broader range of strategies to meet current needs of its citizens. Traditional

communication media, such as television, have become less and less effective. With the loss of reliable energy, a new approach to health information is required.

Two potential approaches exist. The first would be to work with and fund the existing Ministry of Health staff to revise attitudes and approaches. The second alternative would be to select one of the existing technical institutes involved with health or education and fund the development of a new approach.

The latter approach is recommended if the Ministry of Health will support it. Ministries have historically relied on input from their respective institutes for the development of both product and policy.

3.2.4 Epidemiological Reporting

See Section 3.1.5. The same conclusions and recommendations apply to both Tbilisi and Kutaisi.

PHOTOGRAPHS

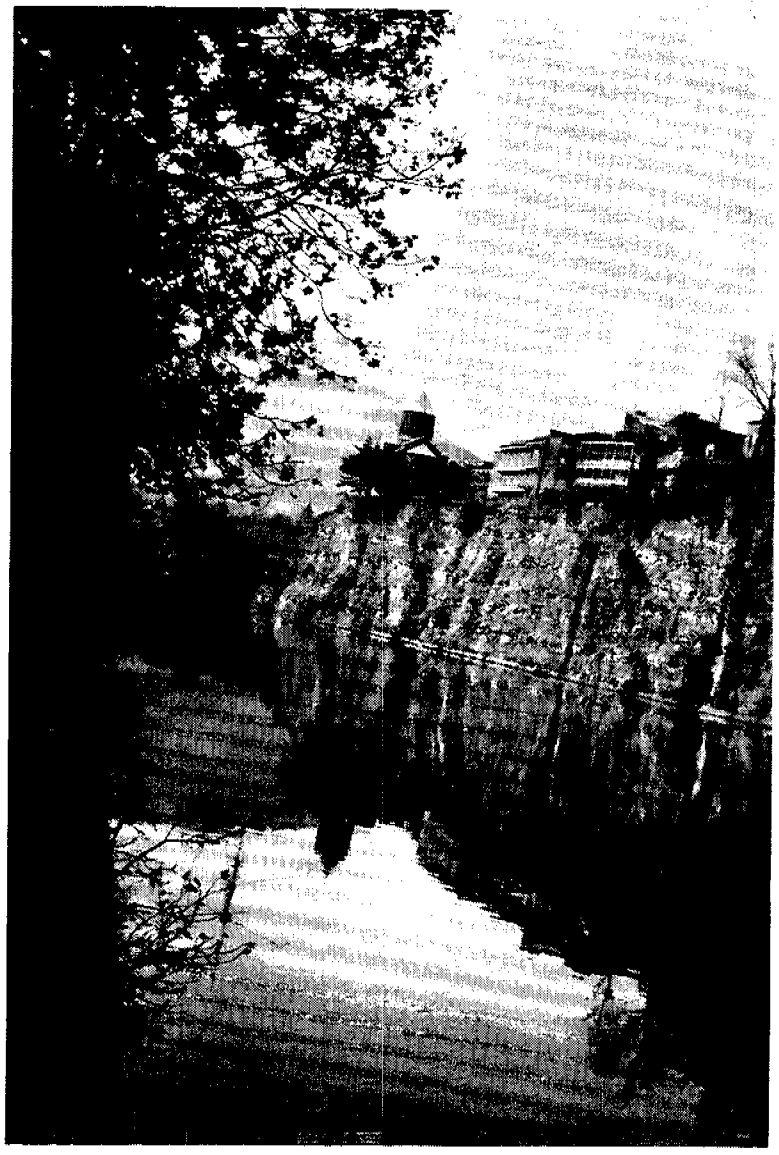


Photo 1: Tbilisi waterfront

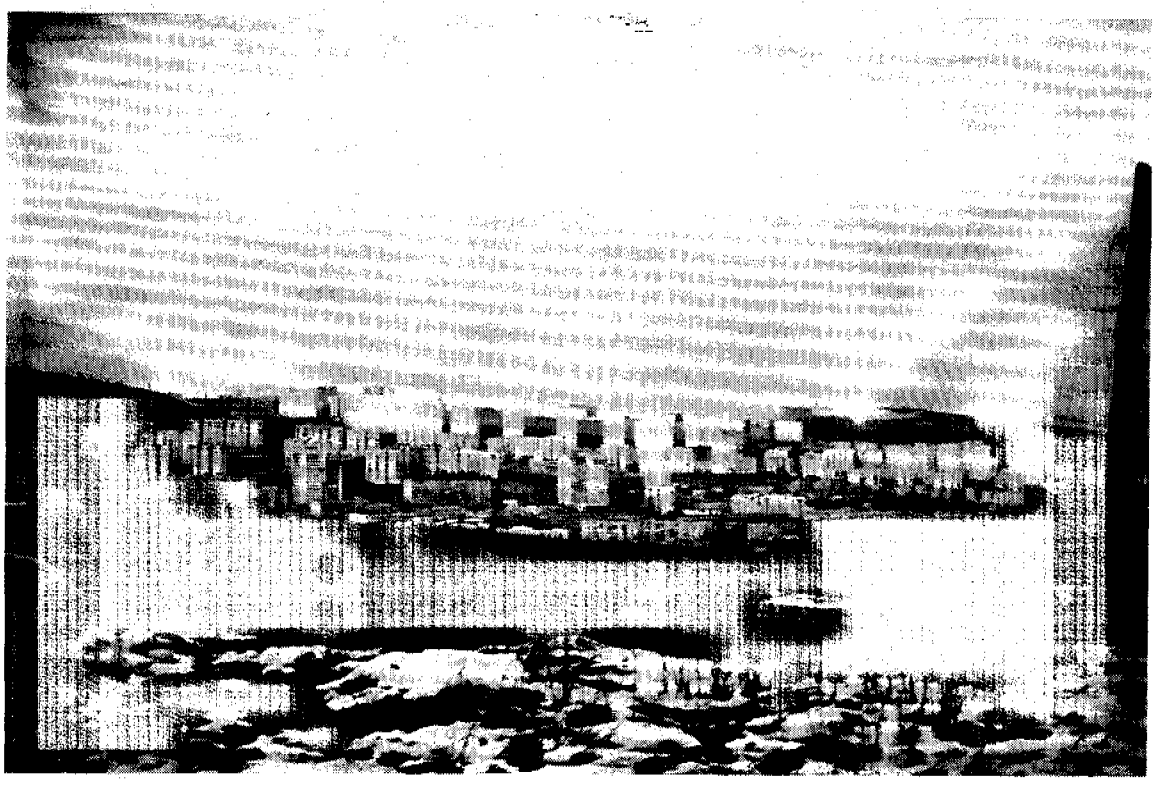


Photo 2: Typical highrise housing

Photo 3: Carrying water

Photo 4: Keeping warm

Photo 5: Water leak/broken line in street

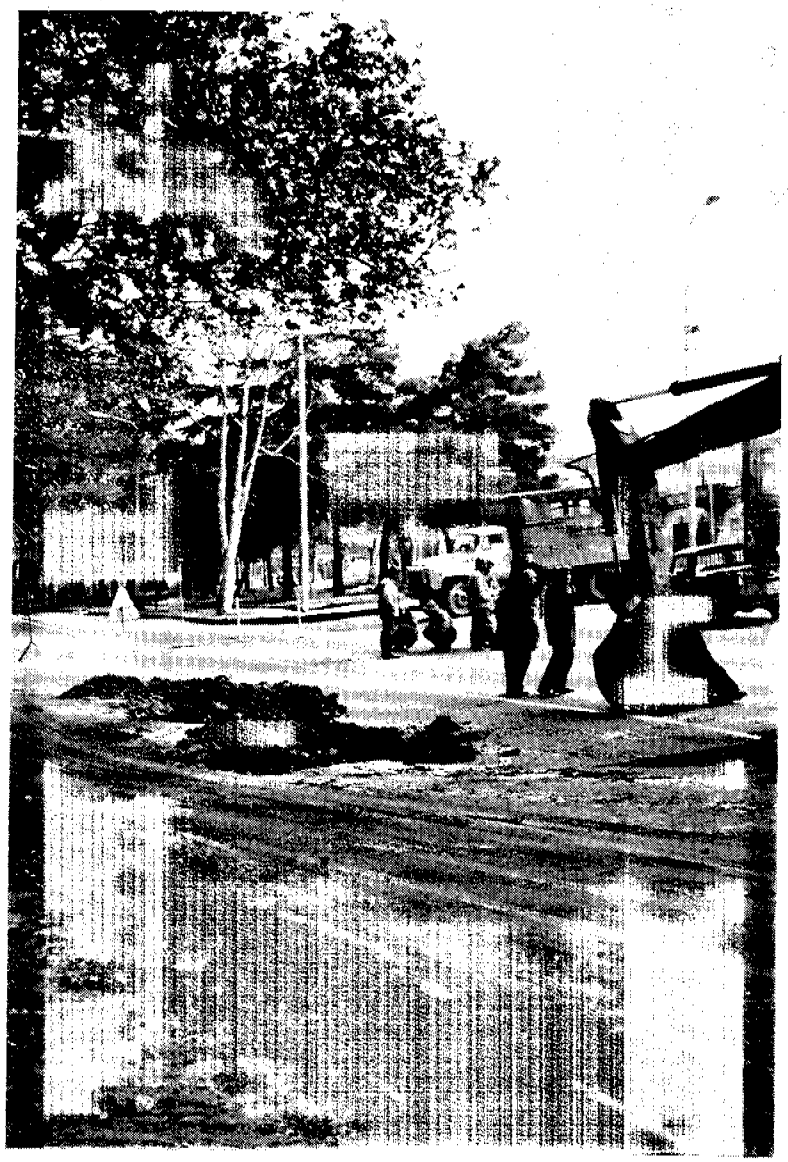


Photo 6: Repairing broken water lines

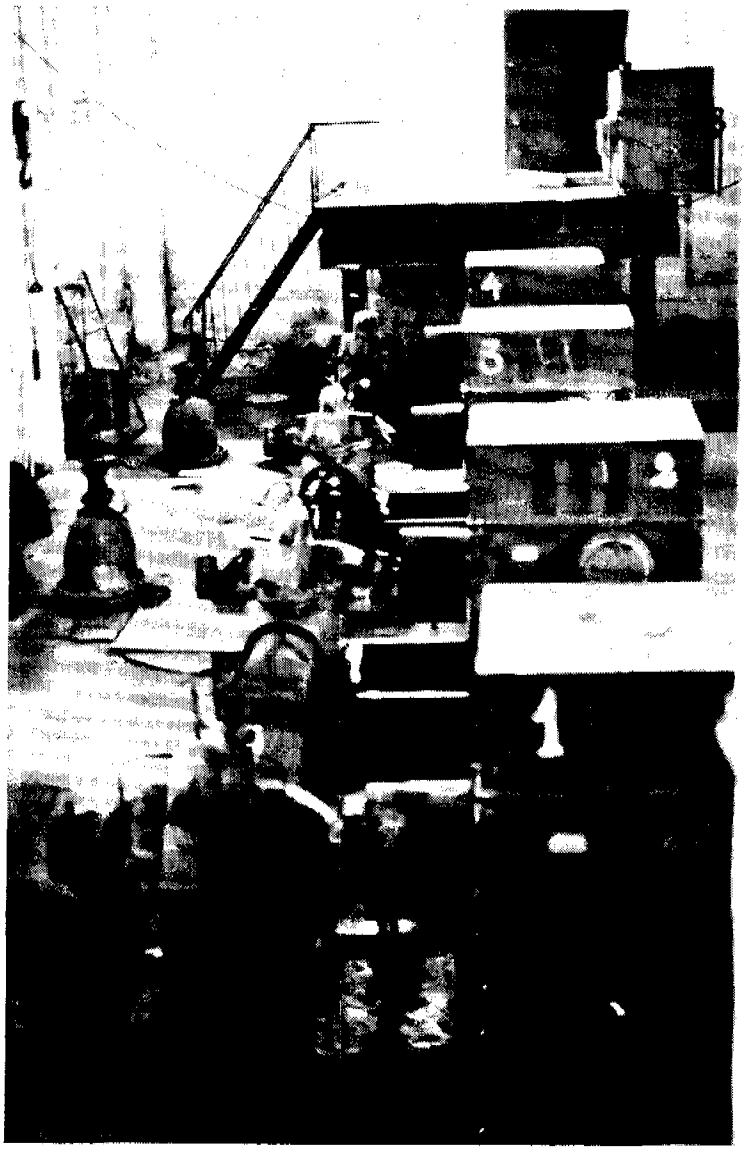


Photo 7: One out of four pumps is working

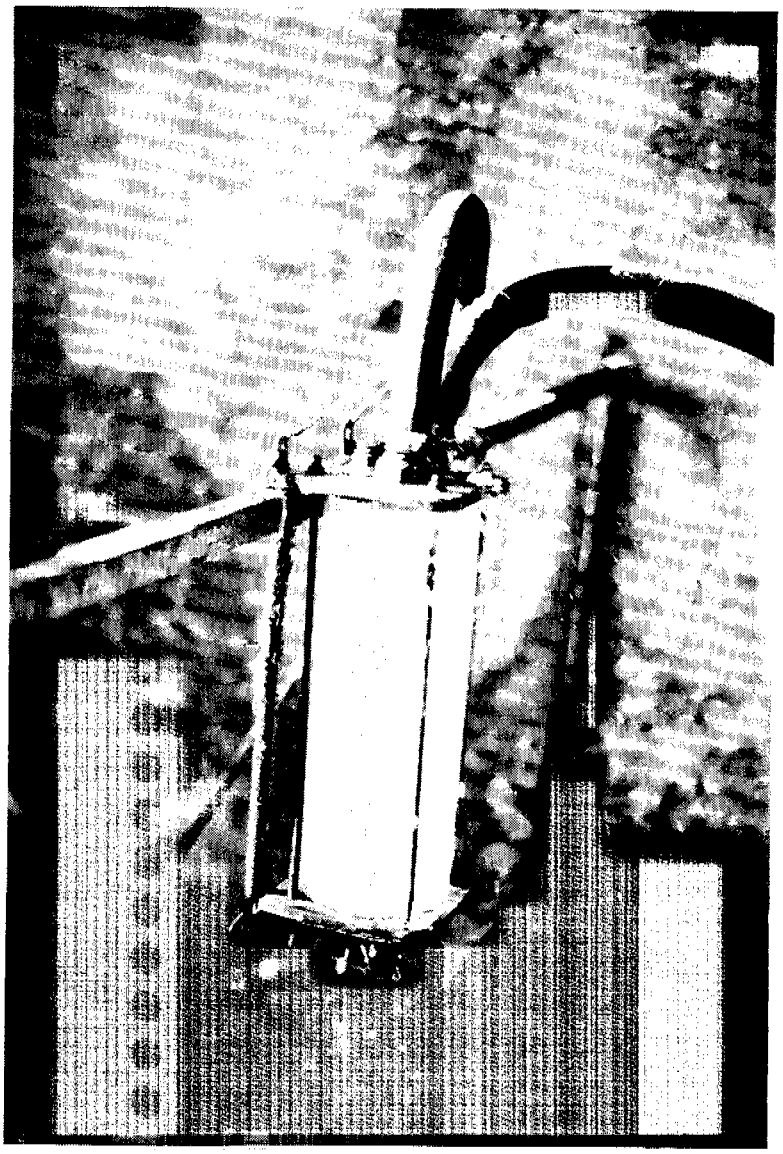


Photo 8: Improvised chlorinator—Kutaisi Water System

Photo 9: Example of motor destroyed by "off-frequency" operation—Kutaisi Water System

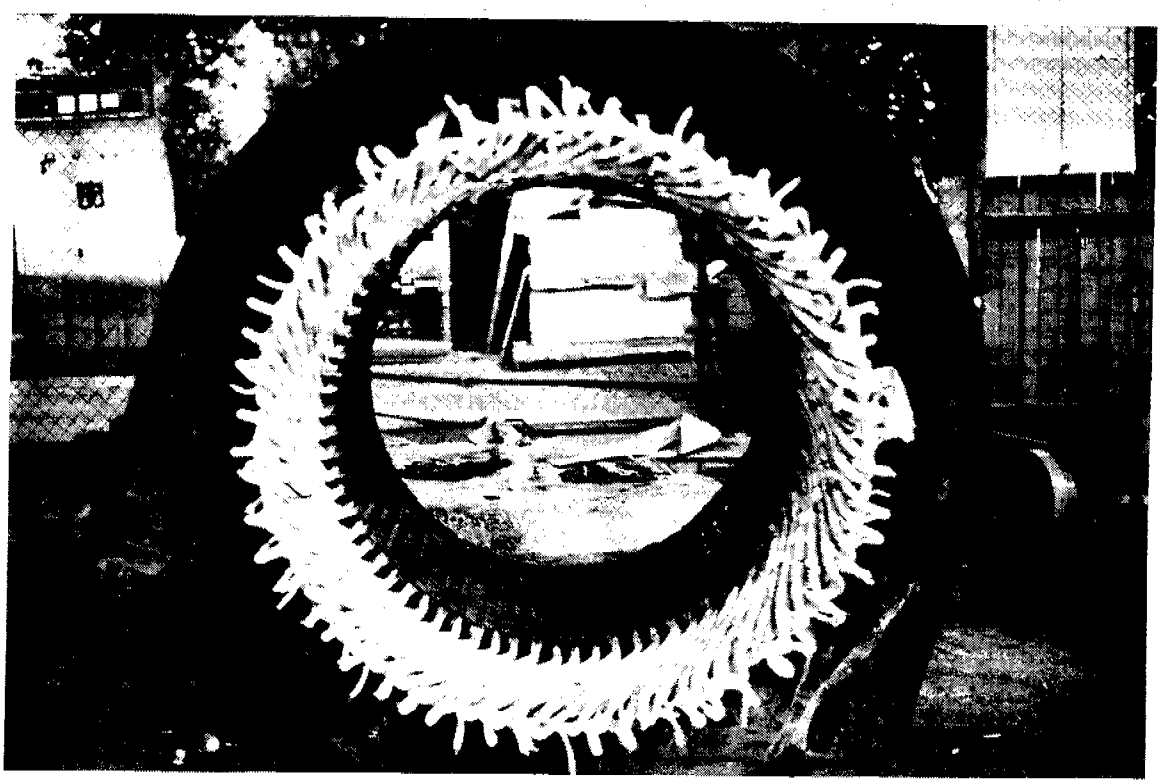


Photo 10: 2000 hp motor under repair

Photo 11: T. Rahe inspecting water point from mountain spring

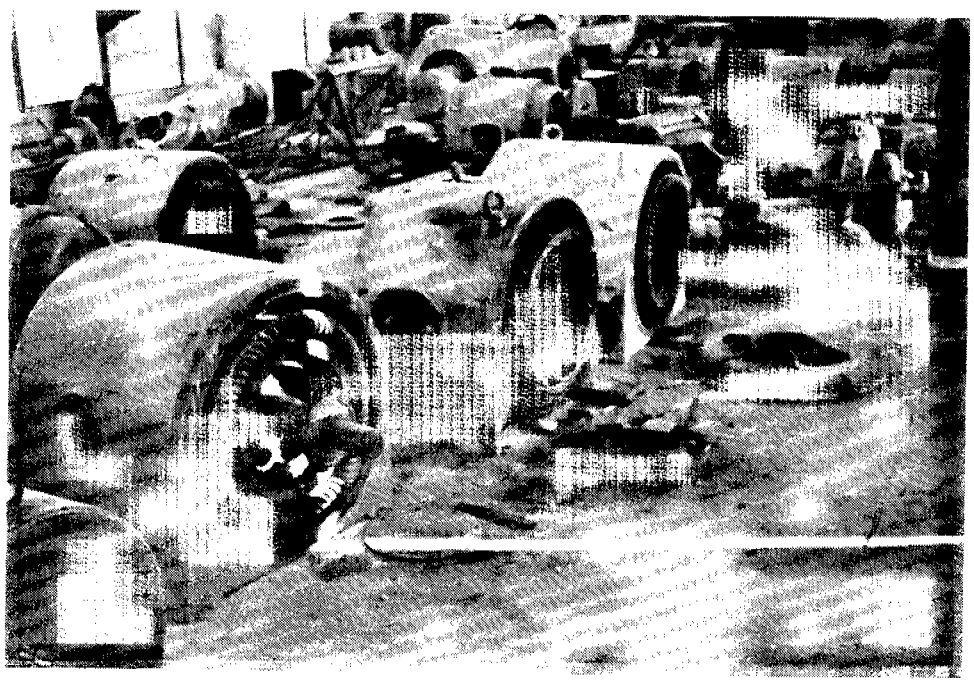


Photo 12: Motors undergoing repair—Tbilisi Water System

Photo 13: Off-cycle (46.5Hz) operation at Bagebi lift station—
Tbilisi Water System

Photo 14: Chlorinator—beyond repair

Photo 15: Water lab staff

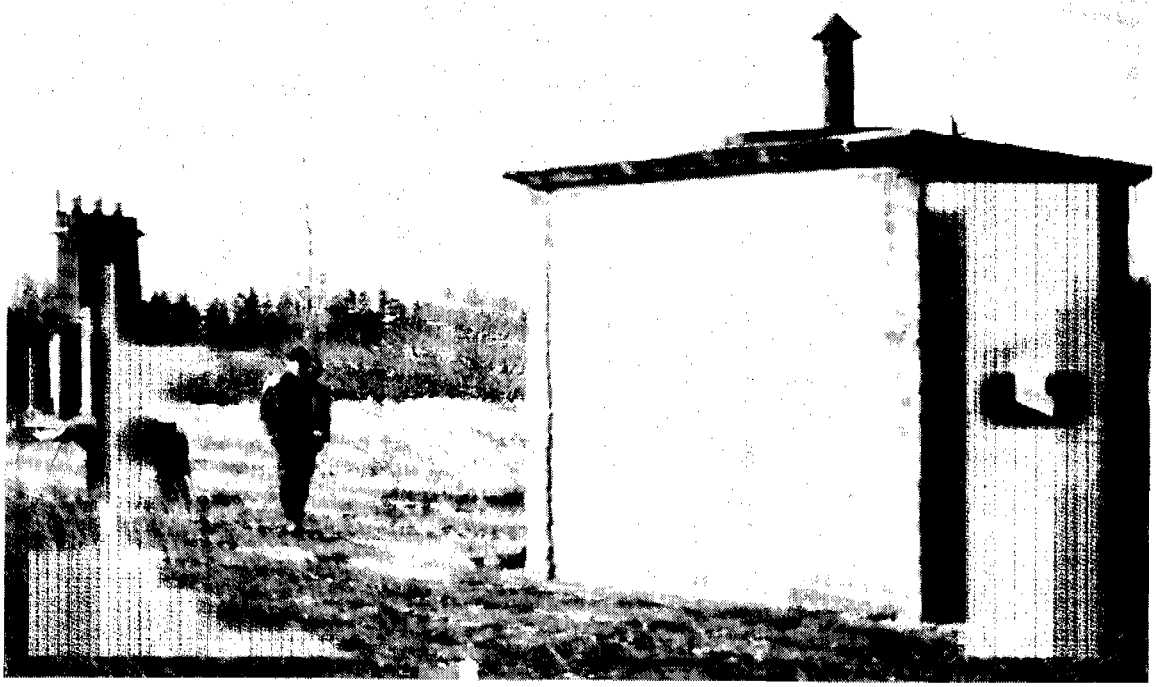


Photo 16: Well site and transformer—Kutaisi

Photo 17: Filter beds in poor condition

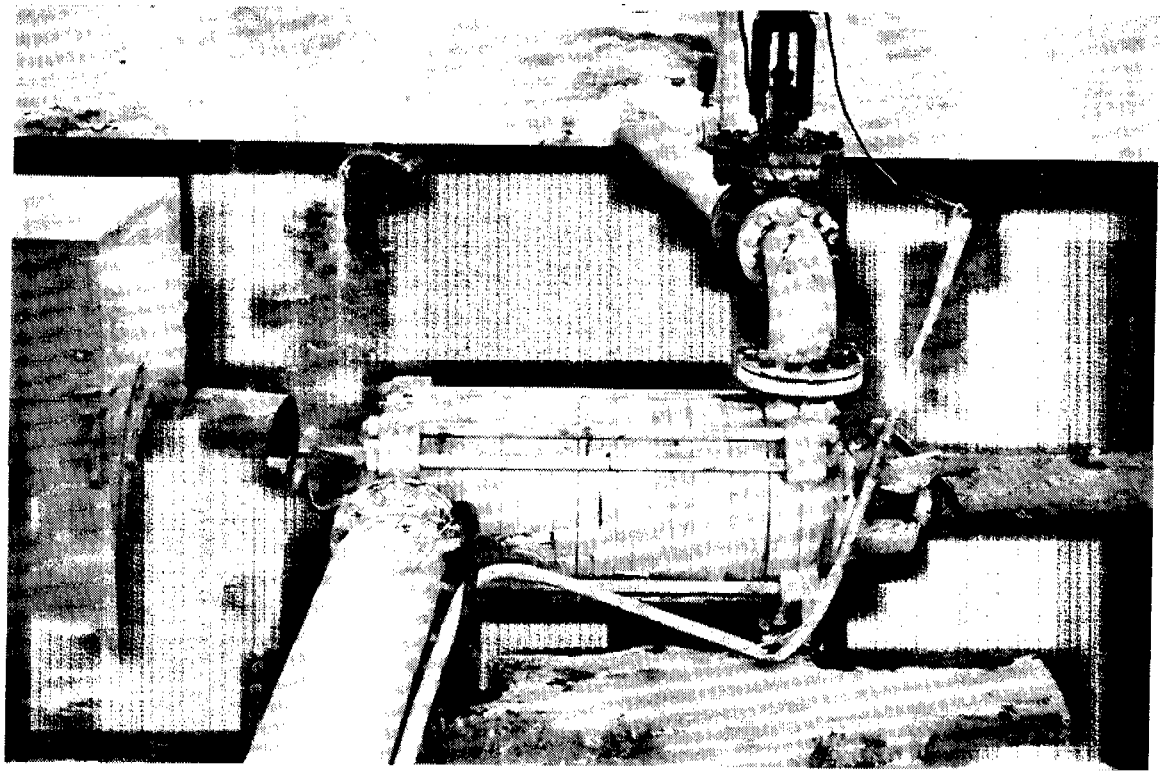


Photo 18: Bagebi station lift pump (600 m head)

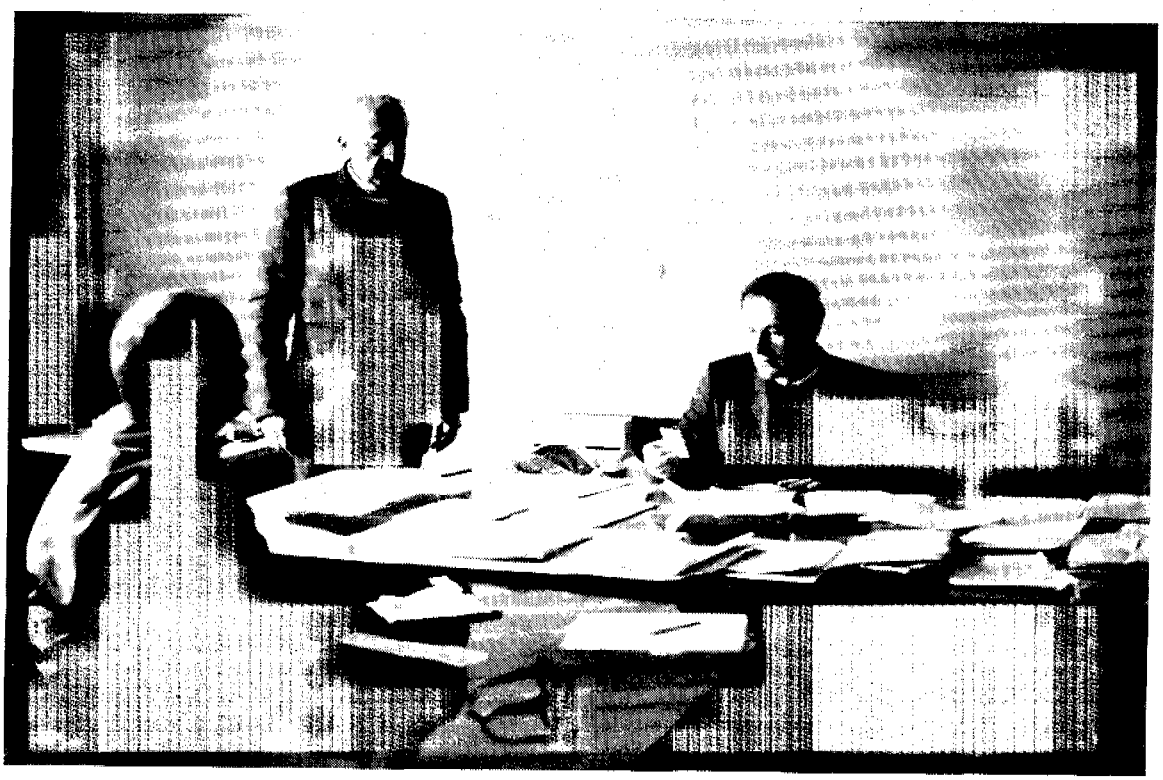


Photo 19: K. Choquette meeting with engineer and mayor (Kutaisi)

Photo 20: Unplugging sewer (a)

Photo 21: Unplugging sewer (b)

Photo 22: Unplugging sewer (c)

Photo 23: Street superintendent discussing equipment needs with laborers

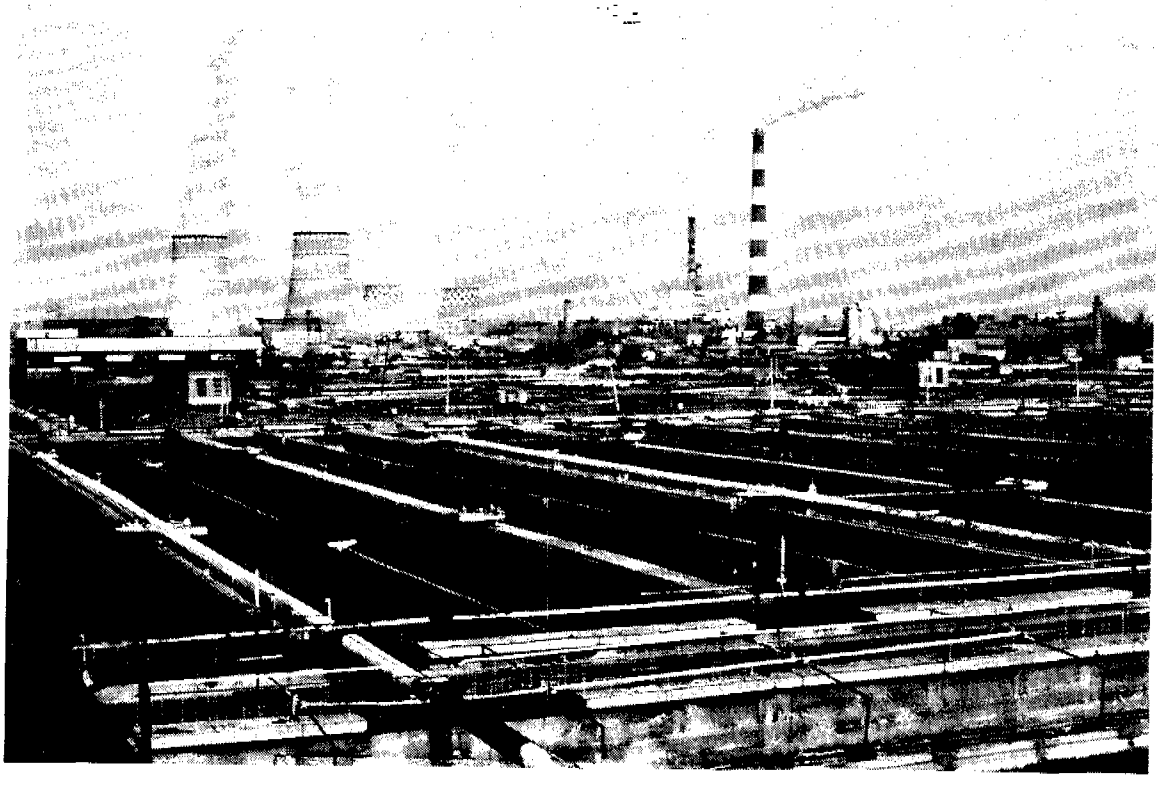


Photo 24: Tbilisi—Regional Sewage Plant (foreground)
Regional Power Plant (background)

Photo 25: Sewer lines discharging to river, Tbilisi

Photo 26: Use of dug well by residents near Bagrati Cathedral in Kutaisi (area without water for 22 days)

Photo 27: Outside restrooms serving IPDs at the Kutaisi Music School

Photo 28: First floor restroom, Tbilisi Hotel, Kutaisi

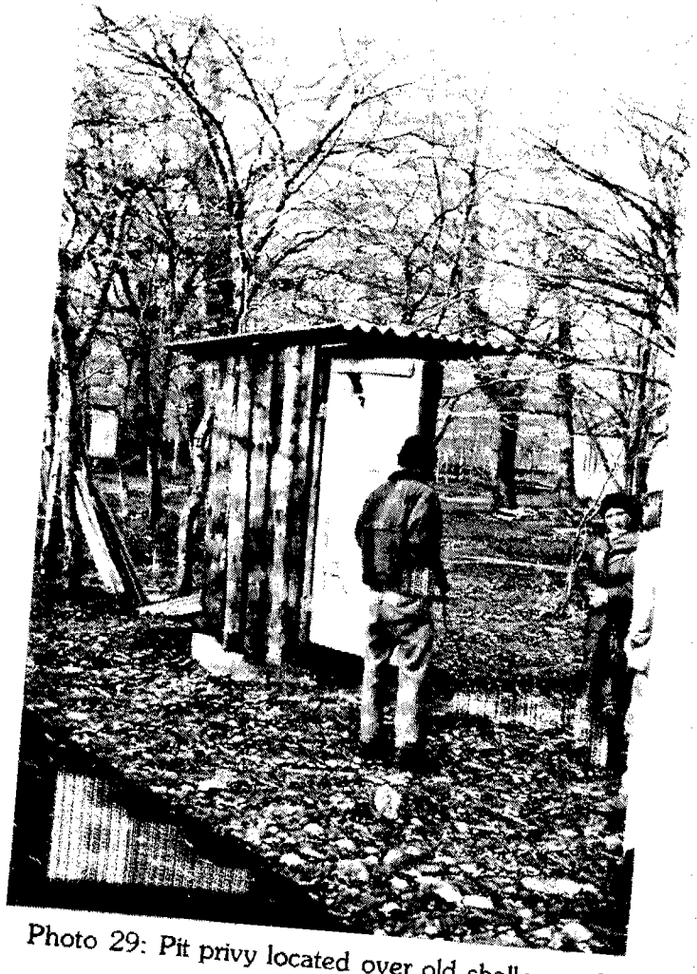


Photo 29: Pit privy located over old shallow well

Photo 30: Pit privy base with top of well casing

Photo 31: Outdoor restroom facilities at Imedi 93 near Kutaisi

Photo 32: Mountain people

Photo 33: Interpreter and displaced person

Photo 34: The WASH team—Choquette, Bloom (USAID), and Rahe

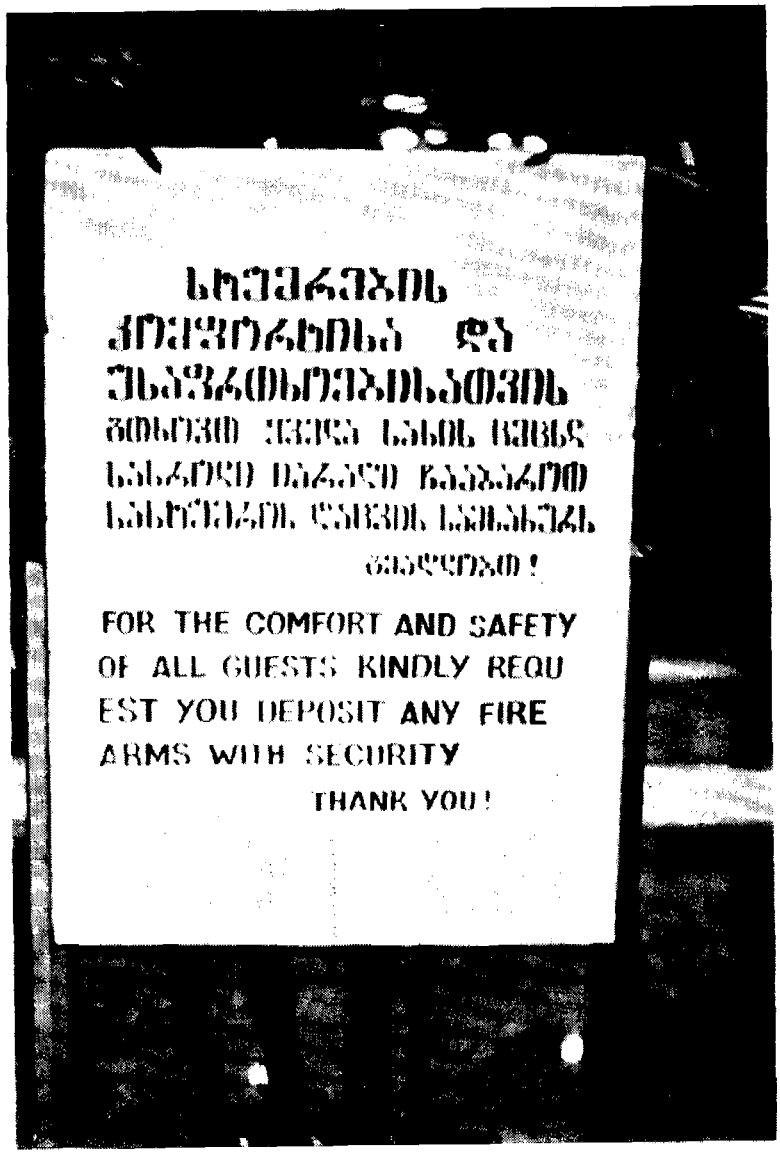


Photo 35: Metechi Hotel lobby sign

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Tbilisi

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Medona Tarbenadze	Deputy Head of the Sanitary Epidemiological Services of Georgia
Tbilisi Water and Sewer	
Juxa Tsartseidze	President
Shota Trapoidze	Chief Engineer
Vaja Basilashvili	Energy Chief
Nugzar Gavasheli	
Kvirikaskvili Perida	Lab Chief
Tsotne F. Mirtskhoulava	Director, Research Institute of Water Management and Engineering Ecology
Soso Elisbrashvili	Mayor, Community of Tskneti

Kutaisi

Teimurar Shashiashvili	Mayor
Onise Ugrekhelidze	Vice Mayor
Tariel Svanadze	Chief Sanitary Doctor
Nugzar Tsamtishvili	Sanitary Doctor
Kutaisi Water and Sewer	
Otar Chirhladze	Head
Leri Kokhreidze	Chief Engineer
Kvririkasrvili Perida	Head of Water Supply Lab

Other

International Rescue Committee	
Paul Heinzen	Field Doctor, Tbilisi
Paula Dickey	Kutaisi
Marty Leishman	Kutaisi
Medicos Sin Fronteras Espana (MSF-Spain)	
Javier Cañada Zavranz	Medical Coordinator

CARE

S.K. Sharma	Unit Administrator, Tbilisi
D.K. Mohapatra	Warehouse Manager, Kutaisi

USAID Georgia

Peter Bloom	Acting Director

Dr. George Gamelaury Center for Computer and Information Technology Tel: 88 32-383-571 or 88 32-224-237	Driver/translator

MATERIALS REQUESTED

Tbilisi

LIST 1

LIST OF EQUPMENT FOR TBILISI WATER AND SEWAGE SYSTEM

Wed Dec 15, 1993

Approx. 1200 Rubles = US$1.00 (December 1993)

N	Name Technic. char.	Quant.	Price. mln.Rub.	Total mln.Rub	Maker	Expl. Date
0 *	Diesel fuel	600 tons/year				
1 *	Excavator 0.4 m³ on wheels, E3322	2	8	16	Russia Kalinin	1983-85
2 *	Excavator 0.5 m³ on wheels, E3441	2	9	18	Ukraine Kiev	1986-87
3 *	Excavator 0.25 m³ E32621	10	5	50	Ukraine Kiev	1988
4	Crane, 16 tons KS2257	1	25	25	Russia	not av.
5 *	Crane, 10 tons KS3575, telescope (10 m)	1	20	20	Russia Ivanovo	1989
6 *	Emergency truck for accidens RVM-2	5	10	50	Russia	1986-89
7	same RVM-1	5	10	50	Russia	1986-89
8 *	Truck with sewage pump and tank KO-502	5	12	60	Russia not av. Arzamas	
9 *	Truck for washing sewage pipes KO-505	5	12	60	Russia not av. Arzamas	
10*	Truck for transp. of pipes KrAZ-255L or MAZ-509 with trailer GKB-9383	1	15	15	Russia	not av.
11*	Diesel generator for Bagebi pump station Two 1200 KW – Mobil 6000 V, 50 Hz with Fuel (12 months) Tanks Sync switching	2				not av.

11	*Fuel for gener. 24 h dur. 3 month	...tons				
12*	Lab. for express test of water quality	5				not av.
13*	Hand held transivers with central stat. 30 km range	100				not av.
14*	Clorinator (220/380V) LONI-100 productivity	10	0.1	1	Russia	1983-85 renovat
	~~100 kg~~	~~3~~	Same as Generator			
	50 kg	~~2.5~~				
	30 kg	5				
15*	Oil disconnector device - cell KM-1F, K-47 (set of 3 phase with control unit) 630-1000 amp. 6000 V	70	0.8	5.6	Ukraine Zaporojie Russia Samara	1983-85 renovat
16*	Coagulant	200 tons/year	0.016	3.2	Ukraine Sumi	not av.
17*	Pumps(all motors 50Hz)					
	*CNS-300/600 with motor 800kW 1500 rev/min, 6 kV, (300 m^3/h, 600m head)	3	0.8	2.4		since 1986
	D-2000-21 with motor AZ-3555-6, 160 kW, 1000 rev/min, 400 V	2	0.8	1.6		1978-85
	D-2000-100 with motor A13-59-6, 800 kW 1000 rev/min, 6 kV	2	0.8	1.6		same
	D-3200-75 with motor A13-59-6	2	0.2	1.6		same
	D-3200-33 with motor A12-39-6, 320 kW, 1000 rev/min, 6 kV	1	0.8	0.8		same
	D-4000-95 with motor SDN-2-16-49-6 1250 kW, 6 kV, 1000 rev/min	1	0.8	0.8		same
	D-5000-32 with motor SDN2-16-56-10, 1000 kW 600 rev/min, 6 kV	2	0.9	1.8		1978-85

	D-6300-80 with motor SDN2-17-56-8, 2000 kW 750 rev/min, 6 kV	1	0.6	0.6		same
	*CN-400-105 with motor AZ-315M-4, 250 kW 1500 rev/min, 6 kV	1	0.5	0.5		same
	*CN-400-210 with motor A12-32-4, 400 kW 1500 rev/min, 6 kV	1	0.7	0.7		same
	*CN-1000-180 with motor SD12-52-2, 600 kW 1500 rev/min, 6 kV	1	0.075	0.075		same
18	*Copper frames for restoring motors A114-4, 320 kW, 1500 rev/min, 6 kV	130	0.010	1.30	Ukraine	renovat
	*A12-58-8, 630 kW, 750 rev/min, 6 kV	150	0.010	1.5	Ukraine Kharkov	renovat
	*A-13-59-6, 800 kW 1000 rev/min, 6 kV	70	0.02	1.4	same	same
	SDN15-64-6, 2500 kW, 1000 rev/min, 6 kV	100	0.03	3	same	same
	*SDN13-42-8, 400 kW, 750 rev/min, 6 kV	150				
	SDN2-16-56-10u3 1000 kW, 600 rev/min, 6 kV	200				
	*A12-52-10, 250 kW, 600 rev/min, 6 kV,	200				
	A103-6, 160 kW, 1000 rev/min, 400 V	500				
19	Submersible pumps EVC-12-160-65, (10 inch, 160 m³/h, 65 m head) with motor 45 kW, 3000 rev/min, + cable 50-60 m	10	0.1	1	Ukraine	1987-88
	EVC-10-120-60, with motor 32 kW, 3000 rev/min,	10	0.1	1	Sevastopol	
20	Motors about 100kW 1000 to 3000 rev/min or copper wires: 0.31 mm² - 500 kg 0.35 mm² - 500 kg	15	0.2	3	Ukraine Kharkov	1988

Kurlais: Specs

*V also: copper "frames" for rebuilding motors (See cable.)

	0.50 mm² - 800 kg 1.16 mm² - 1000 kg					
21	High voltage cable ASB 10-3 x 240 (Aluminum, 10 kV, 3 x 240 mm²)	3 km	3	9	Russia Perm	1985 renovat
22	Low voltage cable ASB1-3 x 150+1 x 75 (Aluminum, 1 kV, 3 x 150mm² +1 x 75mm²)	3 km	2.5	7.5	Russia	1983
23	Oil disconector element VMG-10, 630 amp.	15	0.05	0.75		spare
	TOTAL			416.4 mln Rub.		

General director of "Tbiltskalkanal"

Yu. Tsartsidze

good man!
very dedicated
& the and staff know
what they are doing!!
Ken C

Tbilisi water supply lab

LIST OF EQUIPMENT FOR THE CHEMICAL AND BAKTERIOLOGICAL LABORATORY OF TBILISI MUNICIPAL WATER SUPLY SYSTEM

Wed Dec 15, 1993

✓(1)	Kerosene Incubator	2	
1.	Dry air sterilisator	~~10~~	pieces
2.	Microscope	5	"
3.	Filtering system for the bacteriological analysis	20	"
4.	Autonomic (kerasin) termostate	10	"
✓(5)	Membrane filters	60,000	"
6.	Drier	10	"
✓(7)	Device for residual chlorin tests in field conditions	30 ~~100~~	"
8.	PH meter	10	"
✓(9)	Heavy metal content measuring system	2 ~~10~~	" one for water lab and one for sewage Treatment Lab.
10.	Water clearity measuring system (simple)	10	"
✓(11)	Water double distilator	1 ~~5~~	"
✓(12)	Glass and tubes for the chemical laboratory	1 ~~7~~	sets

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General director of "Tbiltskalkanal"

Yu. Tsartsidze

1,0.1.3;

მუნიციპალური საწარმო "თბილწყალკანალის" ქიმიურ-
-ბაქტერიოლგიური ლაბორატორიისათვის საჭირო
მოწყობილობა

№№ რიგ.	დ ა ს ა ხ ე ლ ე ბ ა	ზომის ერთეული	რაოდენობა
I	2	3	4
I.	მშრალი აეროსტერილიზატორი	ცალი	I0
2.	მიკროსკოპი	"	5
3.	ბაქტ. ანალიზისათვის საფილტრავი მოწყობილობა	"	20
4.	თერმოსტატის გამხურებელი	"	I0
5.	მემბრანის ფილტრები	რამდენიმე შეკვრა	60000 ც. I წლისათვის
6.	მაშრობი კარადა	ცალი	I0
7.	საველე პირობებისათვის ნარჩენი ქლორის განმსაზღვრელი მოწყობილობა	"	I00
8.	PH.- მეტრი	"	I0
9.	მძიმე ლითონების განმსაზღვრელი მოწყობილობა	"	I0
I0.	სიმღვრივის განმსაზღვრელი /რაიმე მარტივი მოწყობილობა	"	I0
II.	წყლის ორმაგი გამოხდის მოწყობილობა	"	5
I2.	ქიმიური ლაბორატორიისათვის სხვადასხვა ჭურჭელი	კომპ.	7

მუნიციპალური საწარმო
"თბილწყალკანალის" გენერალური
დირექტორი - ი.ცარციძე

99-77-94

П Е Р Е Ч Е Н Ь

технических средств необходимых "Тбилводоканалу" для минимально-удовлетворительной работы эксплуатационных служб

№	Наименование, техническая характеристика	кол-во	ориентир. цена единицы млн.руб.	всего млн.руб.	страна-город производ.	Срок ввода в эксплуатацию
1	2	3	4	5	6	7
)	Экскаваторы 0,4 м3 ЭО-2621 на пневмоходу	2	[illegible],0	10,0	Россия г. Калинин	с 1988-95гг.
)	Экскаватор 0,5 м3 ЭО-5441 " — " — .	2	[illegible],0	[illegible],0	Украина г. Киев	с 1996-97гг
)	Экскаватор 0,25м3 ЭО-2621 " — " —	10	5,0	50,0	-"-	с 1998 года
.	Автокраны Грузоподъемн. 16тн. КС2257	I	25,0	25,0	Россия	нет в эксплуат
)	-"- 10тн. КС3575 с выдвижной стрелой	I	20,0	20,0	Россия г. Иваново	с 1999г.
)	Аварийный автотранспорт водопровода РБМ-2	5	10,0	50,0	Россия	с 1996-99 гг
.	-"- -"- РБМ-I	5	10,0	50,0	Россия	с 1996-99.г
)	Спецавтотранспорт на шасси КАЗ					
◆	Ассенизационные ГО-502	5	12,0	60,0	Россия г. Арзамас	в наст. вр. нет в экспл
	-"- -"- Ассенизационные ГО-505	5	12,0	60,0	Россия г. Арзамас	в наст. вр. нет в экспл
.	Трубовоз на шасси автомобиля КрАЗ-255Л или МАЗ -509 с прицепом роспуском ПТ-9[illegible]	I	15,0	15,0	Россия	не имеется
)	Масляк генераторов для насосной батареи 2000 ÷ 3500 1шт. 6000 в 50 горч.	I				нет в эксп

1	2	3	4	5	6	7
1.	Экспресс лаборатория для проверки качества воды *см. дополнит. список.*	5			США	нет
3.	Микрорадиостанции ручные для диспетчерской и аварийных служб с радиусом действия 30 км. с центральным пультом	100			США	нет в экспл.
4.	Дозатор хлора ДОКИ-100 *производительность.* *100 кг - 3 шт 50 кг - 2 шт 30 кг - 5 шт*	10	0,1	1,0	Россия	требует замены каждые два года
5.	Высоковольтное распределительное устройство для НРП Сагуремо, Ячейки ЕК-19 или К-47 *от 630 а до 1000 а.* 6000 V	70	0,8	5,6	Украина Запорожье Россия Самара	требуется для замены старого НРП находящегося в экспл. с 1955-65гг.
6.	Алюминиевый сульфат Коагулянт для очистки воды	200т.	0,016	3,2	Украина г. Сумы	требуется каждый год
7.	Насосы для головных сооружений водопровода					
	ЦНС-300/600 с двигателем 800 квт-1500об/мин *6000 в.*	3	0,8	2,4		с 1986г.
	Д-2000-21 с двиг. АВ-3555-6 160квт 1000 об/мин. *1000 в.*	2	0,8	1,6		с 1978/85гг.
	Д-2000-100 с дви. АВ-59-6 800квт 1000 об/мин *6000 в*	2	0,8	1,6		-"-
	Д-3200-75 с двиг. АВ-59-6 1000квт 1000 об/мин *6000 в*	2	0,8	1,6		-"-
	Д-3200-35 с двиг. АВ-59-6 520квт.1000об/мин. *6000 в.*	1	0,8	0,8		-"-
	Д-4000-95 с дви.СДН-2-16-49-6 1250квт 1000 об/мин. *6000 в.*	1	0,8	0,8		-"-

[	2			
2.	Экспресс лаборатория для проверки качества воды	5	США	нет в экспл.
3.	Микрорадиостанции ручные для диспетчерской			

2	3	4	5	6	7
Д-5000-32 с двиг. СДН2-I(-56-I0 I000кВт 600 об/мин. 6000в.	2	0,9	1,7		с 197?-?5 г.
Д-6300-?0 с двиг. СДН2-I?-56-? 2000 кВт.750 об/мин. 6000в	I	0,6	0,6		-"-
ЦН-400-105 с двиг. А?-315М-4 250 кВт.1500 об/мин. 6000в.	I	0,5	0,5		-"-
ЦН-400-210 А12-32-4 400кВт. 1500 об/мин. 6000в.	I	0,7	0,7		-"-
ЦН-I000-I?0 с двиг. СДН2-52-2 600кВт.1500 об/мин. 6000в.	I	0,75	0,75		-"-
Секции для ремонта эл. двигателей А2Н4-4 320кВт1500об мин. 6000в.	I30	0,0I0	I,5	Украина г.Харьков	требуется для ремонта эл. двигателей
-"- А12-5?-? 630кВт. 750 об/мин. 6000в.	I50	0,0I0	I,5		-"-
А-I3-5?-6 800кВт 1000 об/мин. 6000в.	70	0,02	I,4		-"-
СДНI5-64-6 2500кВт. I000 об/мин. 6000в	I00	0,03	3,0		-"-
СДН13-42-8 400кВт 750 об/мин. 6000в	I50				// //
СДН2-16-56-10у3 1000кВт - 600об/мин 6000в	200				
А12-52-10 250 кВт - 600 об/м. 6000в	200				
А103-6 160 кВт - 1000 об/м 4006	500				
Погружные насосы ЭЦВ-I2-I60-65 с двиг.45кВт.3000об/мин	I0	0,I	I,0	Украина	с 197?-?г.
ЭЦВ-I0-I20-60 с двиг. 32 кВт. 3000 об/мин.	I0	0,I	I,0	Севастополь	с 197?-?г.
Электродвигатели до I00 кВт. I000 ÷3000 об/мин	I5	0,2	I,0	Украина г.Харьков	с 197?г.

эмс эмаль провод 0,3 мм² - 500 кг
0,35 мм² - 500 кг
0,5 мм² - 800 кг
1,16 мм² - 1000 кг

1	2	3	4	5	6	7
21.	Высоковольтные кабели АСЕ 10-3х240	км.	3,0	1[illegible],	Пермь	с 19[illegible]г. для кап.ремонта эл. сетей
22.	Низковольтные силовые кабели АСВГ-6	150+1х75 км	5 км.	7,5	Россия	с 19[illegible]г. для кап. ремонта эл. сетей
23:	Масляные выключатели ВМГ-10 630в	15	0,05	0,75		для эксплуатационных нужд
	Б С Г О в млн. рублях			416,4		

73

Генеральный директор "Тюльводоканала" [signature] К. Гаршидзе

21. Высоковольтные кабели силовые АСБІ-3Х І50 $\frac{1}{8}$ І х 75 3

LIST 2

REPUBLICAN SANITARY EPIDEMIOLOGICAL STATION, TBILISI

საქართველოს რესპუბლიკა
ჯანმრთელობის დაცვის
სამინისტრო

თბილისი, 380060, კ. გამსახურდიას გამზ. 30
ტელ: 38-75-10, ფაქსი: (8832) 389802
ტელექსი: 212223 LAZER SU

REPUBLIC OF GEORGIA
MINISTRY OF HEALTH

Tbilisi, 380060 K. Gamsakhurdia av. 30
Tel.: 38-75-10 Fax: (8832) 389802
Telex: 212223 LAZER SU

№ 02/35-191

17. 12. 1993

US AID Mission

Mr. Peter Blume
American Ambassy
Tbilisi. Georgia

Dear Mr. Blume.

We have to inform you that there is very complicated political and economic situation in Georgia at present. The country faces a lot of social problems.Epidemiological situation is one of them.
94 regional laboratories carry out epidemiological control in the country. The most important of them are Tbilisi Central and Kutaisi epidemiological laboratories. For the lack of neccessary equipments and reagents the level of laboratorial investigations doesn't meet presented requirments. The low level of efficiency of the methods of investigation often faces us with the threat of spreading epidemics.
We are forwarding to you the list of needed equipments and reagents for Tbilisi and Kutaisi epidemiological laboratories. These materials and equipments will increase the efficiency and precision of laboratorial investigations. It will allow us to discover and establish causes of disease in due time.
Please accept our most cordial thanks for your wish to help us in very hard times for Georgia.

Sincerely yours

G.Mchedlishvili
Deputy Minister

List of required annaratus from the catalogue of HACH products for Analysis.

Priority #2 Priority #1 copy 4

№ №	Name of apparatus	Quantity	Catalogue No
1	2	3	4
1.	Complete DIEL/2000	40	20.
2	DR-100 Colorimeter, cat. №41100-01, 41100-24, 25, 27, 02, 22, 03, 06, 28, 07, 26, , 08, 21, 09, 10, 43, 48, 11, 45, 46, 41, 29, 01, 12, 13, 14, 15, 49, 44, 02, 05, 04, 47, 23, 16, 17, 18, 42, 19, 20	6	28.
3.	Alcalinity, Model AL-DT, cat.№20637-00	15	146
4.	Bromine. Model L-P Cube, cat.№21940-00	8	147
5.	Carbon Dioxide. Model C.8-DT, cat. №20641-00	8	147
6	Chloride CD-51, cat. №2086-01, Model S-P, cat. № 1440-01	40	148
7.	DP-700 Colorimeter	80	11
8.	Cianide. Model CyN-3, cat. №2010-02, Model DR-100, cat. №41100-07	10	150.
9	Fluoride-paccet Colorimeter, cat.№46700-05, Model Amyhc, cat. №41100-02	3	151
10	Loio Rande Chromium DR-100 Colorimeter, cat №41100-03; Reartivi cat. №41100-03	3	149
11	Formaldehyde - Model FM-1, cat. №22672-00; Model FM, cat. №21831-00	3	151
12	Iron. Model IR-21, cat. №22993-00; Model IR-88, cat №1464-01	6	154

1	2	3	4
13	Hydrogen sulfide, Model HS-WR. cat. No 2238-01	5	153
14	Free Copper DR-100 Colorimeter, Cat. No 41100-06	6	150
15	Iodine-Direct-reading, Long-path Cube, cat. No 21939-00	3	154
16	Molybdate. Model MO-2, cat. No 14193-01	3	155
17	Amonia. Model Ni-8, cat. No 2241-00, Model OR-100 cat. No 41100-01	10	156
18	Opiophosphate. Model PO-19 8, cat. No 2048-01, model PO-14, cat. No 1475-00	15	161
19	Digesdall, Digestion apparatus and analitical System 23130-21 230V, 50/60 Hz, 29074-00 safety shield	40	68
20	Saturation Extract Kit, cat. No 18400-00	40	166
21	Lead DR-100 Colorimeter cat. No 41100-48; Reagent Set, cat. No 23450-00, resuppiy cat. No 41100-48	4	155
22	Ammonia, Model N-18 Colorimeter, cat. No 2241-00, Cube cat. No 22669-00	6	156
23	High Rande Nitrate DR-100 Colorimeter cat. No 41100-12; Model Ni-12, cat. No 14081-00	80	157
24	Nitrite-Color Cube, cat. No 20596-00; Model OR-100, cat. No 41100-14.	80	157
25	Dissolved Oygen OX-2P, cat. No 1469-00	80	158
26	Ozone DR-100 Colorimeter, cat. No 41100-47	6	160

1	2	3	4
27	Wide-Range pH, Model 17-N, cat. No 1470-11	80	160
28	Orthophosphate, Model PO-19-N, cat. No 2248-01	15	161
29	High Range silica, Model Si-5, cat. No 14554-00	10	162
30	Sulfate, Model SF-1, cat. No 2251-00	80	163
31	Model Su-DT, cat. No 20633-00	10	163
32	Tannin/Lignin, Model Ta-3, cat No 1934-01	6	164
33	Water-in-Oil, Model WO-01, cat. No 22343-00	80	164
34	Wasteioater Treatment plant lab, Model STPl-WKT, cat. No 1887-03	60	177
35	EC-1000	5	6
36	DR-2000	10	6
37	Combination nitrate-Elektrode	30	6
38	MO-42	4	7
39	Cl-17 Chlorine Analyser	80	10
40	Model 2100 A and Ratio Turbidimeters ind 1790	20	12

Priority #1 High Priority ↓

41	COLILERT MPN, cat. No. W1100	3000	
42	Long Wavelength (365 nm) ultraviolet lamp, cat no NO WL 160		
43	Color and fluorecccence comparator-Cat NO N102		
44	E Coli (ATCC 25922, 11775, os eguivalent)	Continues on following page	
45	K pneumonia (ATCC 4997 os eguivalent)		
46	P. Aeruginosa (ATCC 10145, 27853 os eguivalent)	2 act.	
47	Heterophic plate count (HPC	80	125

Priority 1 List 2

Annually water tests are held on the above mentioned components on the average

p NN 1, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 20, 21, 25, 31, 34, 35, 37 — 50.000 analysis;

p NN 2, 7, 16, 17, 27, 28, 30, 39, 40 analysis 60.00

p NN 6, 18, 19, 22, 23, 24, 26, 29, 32, 33, 36, 38, 40 — 70000 Analysis.

Microbiological — 70.000 analysis.

Quantity and type of reagents to be determined From above data.

Membrane Filtration Equipment (1 set)

1 ea Gelman Tripple manifold		
3 ea Filter Funnel magnetic	13529-00	
1 ea Filter membrane (package)	13530-01 (200 membranes/box)	
3 ea Flask, Filtering (1,000 ml)	546-53	
1 ea Forceps, Stainless steel	21411-00	
300 Petri Dish with pad	14717-99 (100 packs)	30,000 total
50 Pipets 1-ml disposable	20926-45	
50 Pipets 11-ml disposable	20926-48	
2 Vacuum Pump, hand operated	14283-00	

Pour Rite Ampoules - media

m-Endo (Total Coliform Presumptive)	23735-20	1500 packs of 20 ea
Lauryl Tryptose (LT) (confirm TC)	21623-15	666 Packs of 15 ea
m-FC (Presumptive Fecal Coliform)	23732-20	600 packs of 20 ea
EC medium Tubes (Confirm FC)	14104-15	300 Packs of 15 ea
m-TGE w/TTC indicator	24284-20	200 Packs of 20 ea

#3

Chemical Reagents and dishes with catalog Hach's for need Repablick Sanepidemstation of Ceeorgea

These reagents are necessary for working on equipment the SES of Georgia already has.

Chemical Reagents

No	Named	Index	quantity
1	2	3	4
1.	4-Aminoantipirine	7130-26	500g.
2.	4-Aminopyridine	14411-26	300g.
3.	Ammonia Nitrogen 1 solution	14555-23	300g
4.	Ammonium Acetate Cas. No. 631-61-8	7064-01	1 kg
5.	Ammonium Hydroxide Cas. No. 1336-21-6	106-31	1 kg
6.	Ammonium Molybdate	1933-17	1 kg.
7.	Ammonium Persulfate Cas. No. 7727-54-0	112-01	1 kg
8.	Ammonium Phosphate Cas. No 7783-28-0	23418-53	500g.
9.	Murexide Indicator Powder Pillow	22789-63	500g
10.	Arsenic standard solution	14571-42	500g.
11.	Ascorbic Acid	14577-99	1 kg.
12.	Barbituric Acid cas. No. 67-52-7	1467-26	2 L.
13.	Barium chloride Cas. No. 10326-27-9	114-01	2 kg
14.	Beryllium standard Solution	22402-49	500g
15.	Bicarbonate Phosphorus	20691-00	1 kg
16.	Baric Acid Cas. No. 10043-35-3	14817-66	1 kg.

1	2	3	4
17.	Bromphenol blue indiator Powder Pillow	14550-99	500g.
18.	Brucine Sulfate Cas. No. 4845-99-2	715-22	1 kg
19.	BUFFERS: PH standardi- Zation $P_H = 4.01$ — $P_H = 10$	from 22269-95 at 12221-17	45 piece
20.	Ammonium Acetate buffer solution	23371-53	500g.
21.	Cadmium - Cas.No. 7440-43-9	14436-25	100g.
22.	Azide dextrose broth	24055-01	500g
23.	Bil Esculin Azide Agar	24058-01	2kg.
24.	Brilliant Green bile broth	—	500g.
25.	Bromcresol Green Cas. No. 76-60-8	261-21	500g
26	Chloramine T cas. No. 127-65-1	723-29	2kg.
27.	Isopropyl Alcohol	12276-28	1 L
28.	Lactose	23251-34	2kg
29.	Calcium Carbonate Cas. No. 471-34-1	420-01	2kg
30.	Calcium chloride Cas. No. 10043-52-4	7114-34	2kg.
31.	Chloroform cas. No. 67-66-3	14458-17	5 L.
32.	Chromate	24385-00	1kg.
33.	Cobalt chloride Hexahyd-	19.5-14	500g.

1	2	3	4
34	Copper	22 796-00	200g
35.	Copper sulfate cas. No. 7758-99-8	127-01	1 Kg.
36.	Cresol Red Cas. No. 1733-12-6	266-22	500g.
37.	Carmine - Cas. No. 72989-90-8	720-53	1 kg.
38.	Dithizone - Cas. No. 60-10-6	736-84	1 kg.
39.	Formaldehyde - Cas. No. 50-00-0		1 L.
40.	Glycerin - Cas. No. 56-81-5	2431-34	3L
41	Glycol	24469-00	1L.
42.	Ethylene Glycole Cas. No. 107-21-1	2039-16	1 kg.
43.	Hydrogen Peroxide	24491-00	3L
44.	Hydroxylamine Hydrochloride	2416-34	1 kg
45	Indigo Carmine Cas. No. 860-22-00	11182-53	500g.
46.	Irone - Cas. No. 7439-89-6		300g.
47.	Magnesium chloride Cas. No. 7791-18-6	6114-34	1 kg.
48.	Manganous Sulfate Powder Pillow	1071-68	1 kg
49.	Molibdate Reagent Powder Pillow	21073-69	1 kg
50	Nicotinic Acid - P	22781-24	1 L
51.	Ozone Reagent	25160-25	0,5 L
52.	Potassium Bromide	11270-34	500g.

1	2	3	4
53.	Potassium chloride	764-01	1 kg.
54.	Potassium cyanide	767-14	500g
55.	Potassium fluoride	7079-34	500g
56.	Potassium permanganate	769-05	1 kg.
57.	Potassium persulfate	883-01	1 kg.
58.	Propylene Glycol	14860-42	1 kg
59.	Silver Nitrate	173-14	3 kg
60	Sodium bicarbonatte	776-01	3 kg
61.	Sodium Azide	775-26	1 kg
62.	Sodium Acetate	178-01	1 kg.
63.	Sodium Citrate	7093-34	1 kg
64.	Zince Acetate	794-53	1 kg
65.	Zirconiume oxichloride	797-23	500g.

Chemical dishes #4

No	Named	Index	quantity
1	2	3	4
1.	Glasses:	22 382	100 piece
		1080	"
		500	"
		22 761	"
2.	Bottels:	621	50 —"—
		20 660	"
		20 539	"
		20 662	"
		7156	"
		20 661	"
		23 184	"
3.	Bottels:	20 671	50 —"—
		20 670	"
		20 664	"
		591	"
4.	Bottels:	7139	50 —"—
		20 667	"
		22 617	"
		20 668	"
		7137	"
5.	Bottels brush	620	50 —"—
		20 669	"
		21 901	"
		22 414	"
		687	"
		685	"
		991	"
6.	Burets:	681	100 —"—
		14 059	"
		14 681	"

1	2	3	4
7.	Cap Cell:	14 868	100
		20 980	"
		627	"
8.	Cylinder:	20 885	100
		20 643	"
		20 880	"
		21 190	"
9.	Demineralizer bottle		
	10 ml	2172-38	100
	25 "	2172-40	"
	50 "	2172-41	"
	100 "	2172-42	"
	250 "	2172-46	"
	500 "	2172-49	"
	1000 "	2172-53	"
10.	Desicator Grease	22 383	10
		20 888	"
11.	Detergent dispensep	22 412	100
		23 123	"
		22 380	"
		22 374	"
12.	Filter, Paper, Folded		
	1000	22633-00	100
	500	22633-56	"
13.	Flasks, Erlenmeyer, Glass.	505-40	100
		505-53	"
		20896-41	"
		20896-53	"
		1082-43	"
		1082-49	"

1	2	3	4
14.	Flasks, Volumetric, Class A		
	10 ml	14574-38	100
	25 "	14574-40	"
	50 "	14574-41	"
	100 "	14574-45	"
	200 "	14574-46	"
	500 "	14574-49	"
	1000 "	14574-53	"
15.	P_H - Pocket Pal Tester	44350-00	50
16.	Floc, Jar, Wagner Type	41170-00	50
17.	Pipets:		
	0,10 ml	20934-00	100
	0,20 "	20935-00	"
	1,00 "	20936-35	"
	2,00 "	20936-36	"
	5,00 "	20934-37	"
	10,00 "	20934-38	"
	25,00 "	20934-40	"
18.	Spoons, Measuring		
	0,05	492-00	100
	0,10	511-00	"
	0,20	638-00	"
	0,50	907-00	"
	1,00	570-00	"
19.	Stopper, Neoprene, solid.		
	2 cm	14808-02	200
	5 "	14808-05	"
	8 "	14808-08	"
	3 "	14804-03	"
	7 "	14804-07	"

1	2	3	4
20.	Tongs, beaker	568-00	50
		569-00	"
21.	Stopwath	14645-00	10

Handbook Standard Methods for the Examination of water and wastewater. – 5 piece.

LIST 3

KUTAISI SANITARY EPIDEMIOLOGICAL STATION

Kenneth Choquette
adviser of
Water And Sanitation
For Health Project

Dec 9, 1993

Dear Mr. Kenneth

Because of the heavy economic conditions in the Republic of Georgia hard problems arose in the municipal sphere of the city Kutaisi. Especially a difficult situation was created in the water supply of the city. Shortage of funding does not permit to change the pumps damaged by the long exploitation of the system. at present the productivity of the water supply of the city has decreased to 40%, which causes stoppage and interruption in the drinking water feeding. The population of the city receives water during 2-2.5 hours every third day and there are regions of the city where the inhabitants do not get drinking water at all through water supply network during few weeks.

The absence of financing and necessary pipes did not permit to change the old network. This causes great losses of water as well as the pollution of the network through infiltration from sewage and as a result the danger of the outbreak of epidemic diseases. The absence of necessary equipment prevents to discover the places of the damaged water pipes.

The water analysis in the laboratories for its fitness is carried out on a low level. Because of the absence of apparatus and installation and the lack of the chlorination installations chlorination is performed primitively and it is impossible to observe the drinking water standard.

The sewerage is deteriorated in the city. The length of the streets exceeds 200 kilometers while only 40% is sewed. The improvement of sanitary conditions and its organization is hindered because of the lack of funds and pipes. The cleaning of the sewerage network is performed primitively as we do not have special machines and installations

It is very difficult to regulate the process of attracting and keeping specialists in the offices of water supply and sewerage as the salaries are as low as 1.5 - 2.0 dollars a month, which does not even satisfy the minimal needs for the fools supply.

After informing the above mentioned facts we ask you for a help that you might propose to the American government to consider on the point of its agenda to allot adequate funds for the solution of the water supply of the city or if possible to send equipment, machines and mechanisms, apparatus and materials according to the enclosed list.

We guarantee the use and security of the installations and equipments.

We thank you in advance for your attention and help.

With greatest respect

Vice Mayor of Kutaisi Onise Ugrekhelidze

The list of necessary equipment and materials for Kutaisi water supply and sewage systems *

Wed Dec 15, 1993

The productivity of souses:

Partskhanakanebi - 1500 l/sec;
Mukhiani - 1500 l/sec;
Tchoma - 350 l/sec;
Gumati - 50 l/sec.

Tchoma (See Tbilisi specs.)

1. Motors 380 Volt, 75-200-250 kW, 50 Hz - 10 of each - 30 total.
2. ~~Artesian~~ submersible motors - ecw-10 380 Volt, 40-45 kW. 65 m head, 120 m³/hr, 10" - 40 total
3. Motor ~~pieces~~ Submersible ecw-12 380 Volt, 165 m³ / h. 45-65 kW - 60 total 65 m head.
4. Pump - un-11 20 piece, motor 630 kW., 6 kV.
5. Vacuum pump wwn-12 30 kW. motor 850 rev/min, 6 pieces.
6. Wires for ecw-motors emal coated, area: 0.45; 0.63; 0.55; 0.76; 0.96; 1.56 mm² (200 kg).
7. Cable for ecw-motors, erea 4.5 mm², type pwdp and pwdp 3.75 - 3.50 mm².
8. Uniform. Coveralls, insulated 60 (M - ..., L - ..., XL - ... pieces), coveralls, ... ( )
9. Rubber boots - 300 pares.
10. Rubber uniform for sewage workers - 50 pieces.
11. Mobile water quality analysis lab - 1 piece.
12. Sewage washing machine - 1 piece.
13. Water machines 10 pieces - 800 liter gas / day.
14. Hidden water leakage detector - 2 pieces.
15. Underground pipeline and well serching equpment - 2 pieces.
16. Water meters from d-15 mm to d-250 mm.
17. Differential manometer d-1200, 100, 600, 500, 300.

Ukraine currency is carbovanets or coupons.

30,000 coupons = US$1.00 (December 1993)

18. Coaguliant $Al_2(SO_4)_3$ 120 tons / month, 1500 ton / year; Ukraine, Zaporojie ditrict, town Polog, price for 1 ton 1000000 carbovanets.

19. Clor in containers 800 kg, Azerbaijan, town Sumgait, price .... quantity ....

20. dnp-300, set of instruments.

21. Stones for inner diameter from 32 to 50 mm - 100 pieces.

22. 220 V lamps: 100 w.- 2000 pieces,
150 w.- 2000 pieces,
300 w.- 2000 pieces,
500 w.- 2000 pieces,
1000 w,- 2000 pieces.

23. Luminicent lamps: 40 w.- 2000 pieces,
80 w.- 2000 pieces.

24 luminicent lamps: 250 w.- 1000 pieces,
400 w.- 1000 pieces.

25. Calculators / computers -20 pieces.

26. Constructors table set - 1 piece.

27. Pipes: d-15 mm - 5 km,
d-20 mm - 7 km,
d-32 mm - 10 km,
d-40 mm - 5 km,
d-50 mm - 10 km,
d-75 mm - 2 km,
d-80 mm - 3 km,
d-100 mm - 5 km,
d-125 mm - 2 km,
d-150 mm - 3 km,
d-200 mm - 3 km,
d-250 mm - 3 km,
d-300 mm - 2 km,
d-350 mm - 3 km,
d-400 mm - 2 km,
d-500 mm - 1 km,
d-600 mm - 500 m

28. Laboratory

HCL	39 l,
Tech. spirit	20 l,
Agar	10 kg,
Endo	3 kg,
Pepton	10 kg,
Glukose	3 kg,
KI	3 kg,

Photo electric calorimeter	1 piece,	
PH - meter	1 piece,	220 V/ 50 Hz
Autoclave	1 piece,	
Incubator + generator 3KW	1 pieces.	

29. 12 V accumulators for transiver st55 - 20 pieces.

Cables for Power Services

1. asb - 3 x 50 - 10 km (aluminum, coated with led)

2. asb - 3 x 70 - 2500 m

3. Aluminum lines: as - 120 mm - 15 km (for masts)
   as - 35 mm - 20 km

4. Copper well cable wpw - 50 mm. 15 km

5. Insulator materials for motor repare
   Kiper tape 2 km, 25 mm
   Lak material 5 rolls 5 x 500 mm
   PVC insulator tape 50 kg

6. Transformator oil - 10 tons

7. Turbin oil - 5 tons

8. Radio communication meens (transivers)- 15 set, frequence 37325 KHz

Chlorinators - 10 sets (Same as Tbilisi)
25 - 50 kg/day

Pumps: cns - 300 x 120 - 5 pieces,
cns - 300 x 160 - 4 pieces,
cns - 300 x 180 - 4 pieces.

Electric Pumps

Name	Brand Type	Suply m /h	Raise m Head	El.motor power	Price 1990	Maker
1. Consol monobloks	4 km-12	90	34	12	380.00	Kotaisk pump plant
	6 km-12	162	55	19	420.00	
	km-100-80-150	100	32	11	400.00	
	km-80-50-200	50	50	11	360.00	
2. Console	4 K 6	90	87	55	200.00	
	4 K 12	162	55	32.1	180.00	
	8 K 12	288	55	40.0	200.00	
	4 K-6 pm	90	87	55.0	250.00	
3. Multi-stage pump with sections	6 ms-7+8	175	387	264	890.00	Yasnogorsk
	6 ms-7+10	175	430	293	955.00	
	6 ms-7m+9	175	387	264	1000.00	
4. Mine newtral water pumps	cns-38-100	38	100	21.5	540.00	
	cns-38-180	38	180	38.5	760.00	
	cns-38-200	38	200	43.0	820.00	
5. For sewage	sm150-125-315/4	55	32	45		
	sm250-200-400/3	222.2	50	250		
	sm200-150-500/4	111.1	80	200		
	sm250-200-400/6	147	22	75		
	sm100-55-200/2	34.7	47.5	37		

წყლისა და საზოგადოებრივი ჯანმრთელობის
დაცვის პროექტის კონსულტანტს

ბატონო ქენედ!

საქართველოს რესპუბლიკაში შექმნილმა მძიმე ეკონომიურმა მდგომარეობამ უმძიმესი პრობლემები გაუჩინა ქ.ქუთაისის კომუნალურ სფეროს. განსაკუთრებით რთული მდგომარეობა შეიქმნა ქალაქის წყალმომარაგებაში. ხანგრძლივი ექსპლოატაციის შედეგ მწყობრიდან გამოსული ტუმბოების შეცვლა ვერ ხორციელდება საჭირო ნაწილების უქონლობის გამო. აღნიშნულის შედეგად წყალსადენის წარმადობა 40 პროცენტამდე შემცირდა. რაც გახდა მიზეზი იმისა, რომ მოსახლეობას იგი მიეწოდება დიდი შეფერხებებით, ყოველ მესამე დღეს 2,0÷2,5 საათის ხანგრძლივობით, ამასთან არის უბნები სადაც მოსახლეობას წყალსადენის ქსელის საშუალებით კვირეების მანძილზე ვერ ეწოდება სასმელი წყალი.

უკანასკნელ წლებში წყალსადენის ძველი ქსელების შესაკეთებელი სამუშაოები არ განხორციელებულა საჭირო ფინანსირების და მილების უქონლობით. ეს იწვევს. როგორც წყლის დიდი რაოდენობით კარგვას, ასევე ფილტრაცია-ინფილტრაციით ქსელების დაბინძურებას და ეპიდემიურ დაავადებათა საშიშროების შექმნას. წყალსადენის მილების დაზიანების ადგილების აღმოჩენას აბრკოლებს სათანადო მოწყობილობის არ ქონება.

დაბალ დონეზეა წყლის ლაბორატორიული ანალიზების ჩატარება და მისი ვარგისიანობის დადგენა, რადგან არ გაგვაჩნია აპარატურა-მოწყობილობები, ხოლო საქლორატორო დანადგარების არ ქონების გამო იგი პრიმიტიულად ხორციელდება და შეუძლებელია წყლის სტანდარტის დაცვა.

მოუწესრიგებელია ქალაქის კანალიზირების საქმე. მის ქუჩების საერთო სიგრძე 200 კილომეტრს აჭარბებს და კანალიზირებულია მხოლოდ 40ა. ნაწილების და მილების არ ქონება აბრკოლებს სამუშაოების განხორციელების და სანიტარული მდგომარეობის გაუმჯობესების საქმის მოწესრიგებას. პრიმიტიულად ხორციელდება კანალიზაციის ქსელების გაწმენდა, რადგან არ გაგვაჩნია სპეციალური მანქანა-მოწყობილობები.

ძალზე ჭირს წყალსადენის და კანალიზაციის სამსახურებში სპეციალისტების მოზიდვისა და დამაგრების დარეგულირება ხელფასების სიმცირის გამო, რაც თვეში I,5-2,0 დოლარს არ აღემატება და იგი კვებისათვის საჭირო თანხის მინიმუმსაც კი ვერ აკმაყოფილებს.

გაცნობებთ რა ზემოაღნიშნულს, გთხოვთ გაგვიწიოთ დახმარება და ამერიკის მთავრობის წინაშე დასვათ საკითხი რათა ქალაქის მოსახლეობას წყალმომარაგების პრობლემის მიზნით გამოყოფილი იქნას შესაბამისი

ტანჩები ან შესაძლებლობის შემთხვევაში მოგვეწოდოს მოწყობილობები, დანქანა მექანიზმები, აპარატურა და მასალები თანდართული სიის შესაბამისად.

ვიოლეტული მოწყობილობების, აპარატურის, დანქანა-მექანიზმებისა და მასალების მოხმარებისა და დაცვას უზრუნველყოფთ.

წინასწარ გიხდით მადლობას ყურადღებისა და დახმარებისათვის.

პატივისცემით

ქ. ქუთაისის ვიცე-მერი თ. ჯგუფუ თინისე უგრეხელიძე

Mayor → 9.12.93წ.

ქუთაისის წყალკანალტრესტში დეფიციტური მასალებისა და მანქანა-დანადგარების სია

წყალსადენის სათავე ნაგებობათა წარმადობები:

ფარცხანაყანები – I500 ლ/წმ.

მერიამი – I500 ლ/წმ.

ჭომა – 350 ლ/წმ.

გუმათი – 50 ლ/წმ.

ჭომის წყალსადენის უბანი

I. ძრავები 380 ვოლტზე 75-200-250 კვტ. სიმძლავრის – I0-I0 ცალი სულ 30 ც.
2. ეცვ-I0 380 ვოლტი 40-45 კვტ.– 40 ცალი
3. ეცვ-I2 380 ვოლტზე I65 $м^3$/სთ. 45-65 კვტ.სიმძლავრის – 60 ცალი
4. უნ-II ტუმბო – 20 ცალი ძრავი 630 კვტ. 6 კილოვოლტზე
5. ვაკუმ ტუმბო ვვნ-I2 30 კვტ. ძრავით 850 ბრ/წთ. –6 ცალი
6. მავთულები ძრავის ჩასახვევად ემალირებული კვეთები 0.45 0.53 063 0.55 0.56 0.76 0.96 I.35 I.32 I.40 I.50 I.56 $мм^2$
6. ეცვ ძრავების ჩასახვევი კაბელი კვეთით დიამეტრი 4.5 $мм^2$ ტიპი პვდპ და პვდპ 3.75 – 3.50
7. სპეც.ტანსაცმელი – I00 ცალი
8. ვალინკები – 300 წყ.
9. სპეც.ტანსაცმელი კანალიზატორებისათვის გარეზინებული – 50
I0. გამზომი ა/მანქანა სპეც.ლაბორატორია I ცალი
II. კანალიზაციის ჩამრეცხი მანქანა – I ცალი
I2. წყლის მანქანები I0 (ტ.) – 800 ლ.ბენზ.დღეში
I3. ხელსაწყო წყლის ფარული ქსელების მოსაძებნად – 2ცალი
I4. ხელსაწყო მიწისქვეშა კომუნიკაციების მილების და ჭის თავების მოსაძებნად – 2 ცალი
I5. წყალმზომები დ-I5 მმ.-დან დ-250 მმ-მდე
I6. დიფმანომეტრები დ-I200 დ-I00 დ-600 დ-500 დ-300
I7. კოაგულიანტი $Al_2(SO_4)_3$ I20 ტონა თვეში I500 ტონა წელიწადში უკრაინა ზაპოროჟიეს ოლქი ქ.პოლოგი ფასი I ტ. I000000 კარბოვანეცი
I8. ქლორი კონტეინერებში 800 კგ. აზერბაიჯანი ქ.სუმგაითი ფასი რაოდენობა
I9. სახარატო ჩარხი დნპ-300 ინსტრუმენტების კომპლექტი
20. სალესი ჩარხის ქვები შიგა დიამეტრით 32 და 50 მმ-დე – I00 ცალი
2I. ნათურები 220 ვოლტზე I00 ვტ. – 2000 ცალი
I50 ვტ. – 2000 ც.
200 ვტ. – 2000 ც
500 ვტ. – 2000 ც.
I000 ვტ. – 2000 ც.

22. ალმინისირებული ნათურები 40 ვატი - 2000 ცალი
80 ვატი - 1000 ცალი
23. ნათურა ალმინისირებული დრე -250 ვტ. - 1000 ცალი
400 ვტ. - 1000 ცალი
24. კალკულატორები ელ.გამთ.მასწავლები - 20 ცალი
25. აკუმულატორი 12 ვოლტიანი რაციებისათვის 55 - 20 ცალი
26. კონსტრუქტორის მაგიდა თავისი მოწყობილობით - 1 ცალი
27. მილები დ-15 მმ - 5 კმ.
დ-20 მმ. - 7 კმ.
დ-32 მმ. - 10 კმ.
დ-40 მმ. - 5 კმ.
დ-50 მმ. - 10 კმ.
დ-75 მმ. - 2 მმ.
დ-80 მმ. -3 კმ.
დ-100 მმ. - 5 კმ.
დ-125 მმ. - 2 კმ.
დ-150 მმ. - 3 კმ.
დ-200 მმ. - 3 კმ.
დ-250 მმ. - 3 კმ.
დ-300 მმ. - 2 კმ.
დ-350 მმ. - 3 კმ.
დ-400 მმ. - 2 კმ.
დ-500 მმ. - 1 კმ.
დ-600 მმ. - 500 მ.
28. ლაბორატორია
მარილმჟავა - 39 ლ.
სპირტი ჰიდროლიზური - 20 ლ.
საკვები ავარი - 10 კგ.
ენდწო - 3 კგ.
პეპტონი - 10 კგ.
ვერცხლა - 3 კგ.
კალიუმის იოდი - 3 კგ.
ფოტოელექტრო კოლორიმეტრი - 1
პეჰაშის ცამწყობი - 1
ავტოკლავი ვკ-30 - 1 ცალი
სტერილიზატორი - 1 ცალი

კაბელები ენერგო სამსახურისათვის

1. ასბ- 3+50 - 10 კმ.
2. ასბ-3+70 - 2500 მეტრი
3. ხაზები ალუმინის ას-120 მმ^2- 15 კმ.
ას-35 - 20 კმ.

4. წის კაბელი სპილენძის
   ვპვ-50 მმ. 15 კმ.
5. საიზოლაციო მასალები
   კვერილენტა - გრძ.მეტრი 2 კმ.
   დაკოტკანი - 5 რულონი
   იზოლენტა პბვ - 50 კგ.
6. ტრანსფორმატორის ზეთი - 10 ტონა
7. ტურბინის ზეთი - 5 ტონა
8. კავშირგაბმულობის სამუშაებები რაციები - 15 კომპლექტი სიღრმით 37325 მ

სულ. 3 სნ - 300×120 — 5 ს.
სნ - 300×160 — 4 ს.
სნ - 300×180 — 4 ს

№№	ნაწარმის დასახელება	მარკა	ტიპი	მოწოდება კუბ.მ/სთ.	აწევა მ.	ელ.ძრავის სიმძლავრე	ფასი 1990 წ.	დამამზადებელი ქარხანა
1.	კონსოლური მონობლოკები	4კმ-12		90	34	12	380.00	კოტაისკის ტუმბოს ქარხანა
	-"-	6 კმ-12		162	55	19	420.00	-"-
	-"-	კმ-100-80-150		100	32	11	400.00	-"-
	-"-	კმ-80-50-200		50	50	11	360.00	-"-
2.	კონსოლური-	4კ6		90	87	55	200.00	-"-
	-"-	4კ12		162	55	32.1	180.00	-"-
	-"-	8კ-12		288	85	40.0	200.00	-"-
	-"-	4კ-6მ		90	87	55.0	250.00	-"-
3.	მრავალსაფეხურიანი სექციონური ტუმბოები	6 მს-7+8		175	387	264	890.0	იასნოგორსკის ტუმბოს ქარხანა
	-"-	6 მს-7+10		175	430	293	955.0	-"-
	-"-	6 მს-7მ+9		175	387	264	1000.0	-"-
4.	შახტის ნეიტრალური წყლის ტუმბოები	ცნს-38-100		38	100	21.5	540.0	-"-
	-"-	ცნს-38/180		38	180	38.5	760.0	-"-
	-"-	ცნს-38-200		38	200	43.0	820	-"-
5.	საყოფაცხოვრებო და საწარმოო გაბინძურებული წყლების დასაწნეხებისათვის	სმ-150-125-315/4		55	32	45		-"-
	-"-	სმ250-200-400/3		222.2	50	250-		-"-
	-"-	სმ200-150-500/4		111.1	80	200		-"-
	-"-	სმ250-200-400/6		147	22	75		-"-
	-"-	სმ100-65-200/2		34.7	47.5	37		-"-

LIST 4

KUTAISI SANITARY EPIDEMIOLOGICAL STATION

List of the Materialsy Necessary for the Bacteriological Laboratory of Kutaisi SES

All 220 volt

1. **Autoclave** . . . . . Large, Minimum 4 Cu Ft Capacity. Steam/recycle
2. **~~Thermostats~~ for Incubators** Pg 136 CAT NO 22815-02 3ea
3. **Cotton plugs maker machine** Substitute tin Foil, heavy duty OR/ AUTOCLAVABLE TEST TUBE CAPS 16mm ID 1 ea
4. **Dryer Case for Sterilization** Pg 132 CAT NO 24630-02
5. **Inactivator** DO NOT ORDER
6. **Binocular Microscope** Pg 137 CAT NO 24970-00 microscope 2ea
   24969-10 10x Phase Annulus 2 ea
   24969-40 40x phase Annulus 2 ea
   24978-00 100x Phase Contrast 2 ea
7. **Common Microscope** NOT IN EACH CAT. 8x TO 90x Fisher NO S19535-3, TWO ea.
8. **Test-Tube Racks** Pg 139 CAT NO 24070-00 20 each
9. **Test-Tubes for MPN** Pg 140 CAT NO: 21628 CAT NO: 20960 10 packages 72 ea 720
10. **Pitri-Plates** DO NOT ORDER
11. **Throat Swabs** Wooden shaft, Cotton tip
12. **Membrane Filters (complete set)** (AS IN Yerevan and or As Listed on Tbilisi List)
13. **Media (for various diseases)** (will be Provided thru Tbilisi List) (DO NOT ORDER)
14. Kerosene Powered incubators To save key Cultures when Electrical power is out. Interior Needs to be 12"X12"X24" high

Bacteriological Laboratory

Head of the
K. Manania
8.12.93

15 Microscope Slides 12-544-1 1gross
Cover slips 12-548C 1PK
Slide box 03-450-5 3 ea

1e Colilert MPN W-200 Plus Transfer Pipets (2cc, 10cc)
30 ea W-200 UNITS
UV lamp Cat NO. WL 160
Comparator CAT NO W 102
Test Tube racks 10 ea

List 4

[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]
10. [illegible]
11. [illegible]
12. [illegible]
13. [illegible]

[illegible]

8/XII-935.

Exhibit 1

The Dynamics of Infectious Diseases (Tbilisi SES)

N	Name of Disease	abs.N		incid.rate per 100,000		9 months	
		1991	1992	1991	1992	1992	1993
1.	Typhoid	47	35	0.87	0.64	30	18
	Paratyphoids	1	8	0.01	0.14	1	1
2.	Dysent.Biol.conf.	1770	1363	32.95	25.14	1078	786
3.	Salmonella	724	364	13.48	6.71	319	227
4.	Diarrhea conf.	982	659	18.28	12.15	522	485
5.	Diarrhea unconf.	11311	6362	210.61	117.37	5201	3416
	Tot.N of intest. infections	14063	8384	261.4	154.6	6801	4687
6.	Pertussis	335	148	6.23	2.73	120	131
7.	Meningococ.infec.	45	25	0.83	0.46	14	40
8.	Measles	352	115	6.55	2.12	65	321
9.	Infec.Hepatitis	9669	8058	180.04	148.66	5479	4398
	Serum Hepat. B	1995	1715	37.14	31.64	1303	1029
	Hepatitis A	7674	6343	142.89	117.02	4176	3369
10.	Upp.respir.infec.	382018	280766	7113.39	5181.85	182606	179542
11.	Influenza	50500	22562	940.33	375.37	12039	29130
12.	Dog bite	-	-	-	-	-	-
13.	Syphilis	-	-	-	-	-	-
14.	Tuberculosis	741	255	13.7	4.7	183	104
15.	Salmonella carr.						
16.	Sepsis (<1yr)	-	-	-	-	-	-
17.	Dysentery carr.	36	34	6.70	6.27	19	17
18.	Pedicul.(Louse)	1072	353	19.96	6.51	720	112
19.	Mumps	893	260	16.6	4.79	-	-
20.	Tetanus	2	3	0.03	0.05	1	5
21.	Malaria(imported)	2	1	0.03	0.01	-	-
22.	Chicken Pox	-	-	-	-	-	-
23.	Scarlet Fever	367	141	6.83	2.60	-	-
24.	Rubella	602	254	11.2	4.6	-	-
25.	Typhoid carr.	-	-	-	-	-	-
26.	Rabies	1	8	0.01	0.14	3	3
27.	Acute Gonorrhea	2012	1422	37.46	26.23	1178	4 2 0
28.	Scabies	329	531	6.12	9.8	207	485
29.	Infec.Mononucl.	-	-	-	-	-	-
30.	Trichinosis	249	252	4.6	4.77	-	-
31.	Siberia Cat.Dis.	13	37	0.27	0.68	36	1
32.	Brucellosis	240	180	4.46	3.32	150	160
33.	Diphtheria	7	3	0.13	0.05	1	4
34.	Polio	6	-	0.11	-	-	-

Exhibit 2

The Dynamics of Infectious Diseases (Kutaisi SES)

N	Name of Disease	1991	1992	1993 11 month
1.	Typhoid	2	2	2
	Paratyphoid	-	-	-
2.	Dysentery	23	39	45
	Biologically confirmed	17	19	36
3.	Salmonella	73	57	50
4.	Etiologically confirmed Diarrhea	112	96	95
5.	Etiologically unconfirmed Diarrhea	403	305	230
6.	Pertussis	21	2	2
7.	Meningococcal infection	-	1	2
8.	Measles	3	-	11
9.	Infectious Hepatitis	303	209	109
	Serum Hepatitis	35	19	12
10.	Upper respiratory infections	21360	8912	6920
11.	Influenza	1048	90	855
12.	Dog bite	1096	920	818
13.	Syphilis	38	38	44
14.	Tuberculosis	24	27	17
15.	Salmonellosis carriers	10	3	7
16.	Sepsis in infants (<1 year)	-	-	-
17.	Dysentery carriers	2	6	3
18.	Pediculosis (Louse)	24	6	1
19.	Mumps	28	3	1
20.	Tetanus	-	-	1
21.	Malaria	-	-	-
22.	Chicken Pox	170	61	20
23.	Scarlet Fever	4	1	2
24.	Rubella	28	1	14
25.	Typhoid carrier	-	-	-
26.	Rabies	-	-	-
27.	Acute Gonorrhea	209	126	85
28.	Scabies	6	7	127
29.	Infectious Mononucleosis	6	-	-
30.	Trichinosis	2	-	8
31.	Siberia Cattle Disease	-	6	-

Exhibit 3

Kutaisi—5 Polyclinics, January to November 1993
57,500 children, 0-15 years of age, 59,228 visits

Diagnosis	Number	Percent
Acute respiratory	22,375	38.7%
Painful bronchitis	8,028	13.5%
Bronchial pneumonia	8,285	14.0%
Helminthosis	5,943	10.0%
Gastroenteritis	3,553	6.0%
Sepsis	829	1.4%
Painful intestinal infection	1,362	2.3%
Other	9,180	15.5%

Source: MSF Spain, Kutaisi: Javier Cañada Zarranz, Medical Coordinator.

Exhibit 4

NARRATIVE FROM THE R-SES EXPLAINING THE PROBLEMS WITH WATER SYSTEMS IN THE REPUBLIC OF GEORGIA

Fifty-five percent of the town population and five percent of the village (rural) population are receiving water from a centralized drinking water system. The remainder receive water from non-centralized systems.

In the Republic of Georgia, 1,575 water systems are operating. Some of the systems are under the "Utility Union," some are under the "Saksoplsupply" union, and the rest are under various other organizations.

Seventy-two percent of the water system draws on springs (water goes through filters), from artesian bore-holes; 28% is from open water reservoirs. Almost all of these systems lack the necessary complex of purification. We should also add to this list those water systems that take water from caves or fractions and also need the purification system. About 55 percent of the water systems have very old equipment.

Most of the existing water systems have no laboratory control because of the lack of laboratories. Even if they exist, their controls are lower than state standard requirements, once more because of the lack of necessary equipment. That is why the necessary and required perfect laboratory control is held only occasionally or selectively by the central Sanitary Epidemiological Section of the Ministry of Health.

Exhibit 5

Proposal for Community Health Workers
Republic of Georgia
Tbilisi and Kutaisi

Introduction
IRC envisions a public health and sanitation program for Tbilisi and Kutaisi which will rely on national staff with expatriate guidance for the initial six months. Georgia has the expertise, training and knowledge to provide this service provided they are assisted with resources and organizational support.
Community Health Workers (CHW's) will be full time employees. Their backgrounds will be in sanitation, health and/or social services. They will possess excellent communication skills; English fluency not required. They will report directly to IRC Sanitation or Public Health staff. There will be a two week training program.
CHW responsibilities will include:
Identify and monitor internally displaced persons (IDP's) in an assigned geographical area in both organized and unorganized situations.
Assess health and sanitation conditions in organized and unorganized housing and make recommendations for improvement, i.e., survey water sources, survey EPI coverage, etc.
Identify and advocate for especially needy IDP's, i.e., widowers, single parent families, families with many children, etc.
Liaize with IRC staff, other NGO's and government offices to solve problems encountered.
Institute regular health and sanitation educational sessions.
Meet regularly with refugee committee heads to offer guidance on organization of refugee matters, etc.
Organize special interest groups for potential income generating purposes, for childcare and/or other household job sharing responsibilities, etc.
Conduct regular growth monitoring of children under 12 years of age.
Assure quality and quantity of water availability.
Provide written reports on a weekly basis.

It is anticipated that within six months, the program will be able to continue without IRC expatriate supervision.

See attached bugdet.

Budget for 6 month CHW program

CHW (50)	$250./mo	$75,000.
CHW Training/materials	$100./CHW	$5,000.
Water testing kits/supplies		$5,000.
Chlorine tablets		$5,000.
Distribution cost		$2,500.
Procurement cost		$2,500.
Expatriate staff (2)	$2000./mo.	$12,000.
Translator (2)	$200./mo.	$2400.
Driver (2)	$100./mo.	$1200.
Fuel (20 liter/day at $.70)		$5040.
Vehicles (2)	$10,000.	$20,000.
Office Rental (2)	$500./mo.	$6000.
Office Furniture (2)	$2000.	$4000.
Office Supplies (2)	$1000.	$2000.
Photocopier (2)	$2000.	$4000.
Computer (2)	$3000.	$6000.
Printer (2)	$1500.	$3000.
Space Heater (2)	$300.	$600.
Equipment Maintenance (2)	$5000.	$10,000.
Domestic Phone (2)	$2000.	$4000.
Fax Cost (2)	$2000.	$4000.
Postage (2)	$2000.	$4000.
		Total $183240.

Exhibit 6

SUMMARY OF EQUIPMENT COSTS,
PROVIDED BY CAMP DRESSER & MCKEE INTERNATIONAL

EXHIBIT 6

These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to the equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical and general equipment compatibility and suitability be verified by the authors and/or the local municipalities in the Republic of Georgia.

In order to expedite this equipment procurement, and due to the unusual and compelling urgency of the project, advertisement in the Commerce Business Daily should be waived. Written quotations from multiple vendors is the recommended method for equipment procurement.

Listed below are the items included in Exhibit 6:

1. Estimated Equipment Costs
2. Estimated Raw Labor Costs
3. Estimated Direct Costs
4. Chlorination System Specification
5. Chlorine Test Kit Specification
6. Hydraulic Bucket Machine Specification
7. Laboratory Equipment Specification
8. Leak Detection Equipment Specification
9. Portable Generator Specification
10. Sewer Rodding Machine Specification
11. Submersible Pump Specification
12. Winter Work Clothing Specification

REPUBLIC OF GEORGIA
EMERGENCY EQUIPMENT PROCUMENT
EQUIPMENT COSTS

EQUIPMENT DESCRIPTION	EQUIPMENT QUANTITY	EQUIPMENT COST PER UNIT	TOTAL EQUIPMENT COST	SHIPPING AND INSURANCE *	TOTALS
Chorination Units	20	11,000	220,000	22,000	$242,000
Chlorine Test Kits	40	65	2,600	260	$2,860
Submersible Pumps	30	2,200	66,000	6,600	$72,600
Coliform Test Kits (200/kit)	40	500	20,000	2,000	$22,000
Laboratory Equipment	N/A	100,000	100,000	10,000	$110,000
Sewer Bucket Machines	2	55,000	110,000	11,000	$121,000
Leak Detectors & Pipe Locators	2	2,250	4,500	450	$4,950
Portable Generators	2	12,000	24,000	2,400	$26,400
Winter Work Clothing	60	150	9,000	900	$9,900
Sewer Rodding Machines	4	20,000	80,000	8,000	$88,000
Misc. Equip. Required in Field	N/A	5,000	5,000	500	$5,500

NOTES:

TOTAL ESTIMATED EQUIPMENT COSTS $705,210

1. Equipment costs include all accessories and two years of spare parts
2. * This is an estimated shipping cost of 10%

REPUBLIC OF GEORGIA
EMERGENCY EQUIPMENT PROCUMENT
ESTIMATED LABOR COSTS

	TASKS (All Tasks in Days)				RAW LABOR COSTS	
POSITION	EQUIPMENT PROCUREMENT IN USA	EQUIPMENT INSTALLATION IN GEORGIA	DEBRIEFING CLOSE-OUT	TOTAL DAYS	DAILY RATE	TOTAL
Project Manager	3	1	1	5	$260	$1,300
Environmental Engineer	35	25	5	65	$200	$13,000
Public Health Specialist	0	19	2	21	$240	$5,040
Mechanical Engineer (Equipment Review)	3	0	0	3	$320	$960
Chlorination Technician	1	19	1	21	$320	$6,720
Translator - United States	30	0	0	30	$275	$8,250
Translator - Georgia	0	42	0	42	$50	$2,100
Home Office Support	1	1	1	3	$175	$525

TOTAL ESTIMATED RAW LABOR COST $37,895

REPUBLIC OF GEORGIA
EMERGENCY EQUIPMENT PROCUMENT
ESTIMATED DIRECT COSTS

DESCRIPTION	UNITS	UNIT RATES	TOTAL
Round-trip Airline Tickets	3 each	$5,00O	$15,000
Hotel and Meals	63 person/days	$249 per Day	$15,687
Car Rental	21 days	$75 per Day	$1,575
Misc. (visa, taxis communications)	N/A	N/A	$2,000

TOTAL ESTIMATED DIRECT COSTS $34,262

SECTION 11234

CHLORINATION SYSTEM

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to the equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Manufacturer shall provide vacuum operated, solution feed chlorination systems for export that will be retro-fitted into existing chlorination systems at potable water distribution stations and pump stations in the Republic of Georgia. Furnish all materials, equipment and incidentals required for twenty (20) chlorination systems as specified herein.

B The chlorination systems shall be delivered to the Owner's port of departure in the United States no later than sixty (60) days after the placement of the order.

1.02 SUBMITTALS

A Submit to the Engineer three copies of shop drawings, system piping and wiring diagram, and other descriptive material of all equipment to be furnished under this section.

B Submit to the Engineer certifications that shows compliance with this specification

C Submit to the Engineer within seven (7) business days of the placement of the order three copies of all operation and maintenance instructions.

1.03 QUALITY ASSURANCE

A The chlorination system equipment manufacturer(s) shall have experience in the design and manufacture of equipment of similar size and capacity and shall present proof of

successful operations involving each piece of equipment furnished. All chlorination equipment and accessories shall be designed, manufactured and shipped in accordance with the best practices and methods.

B Equipment shall be manufactured by Capital Control Company, Inc. of Colmar, PA; Wallace & Tiernan Inc. of Belleville, NJ or equal.

1.04 SYSTEM DESCRIPTION

A All of the equipment specified herein shall be furnished by a single manufacturer and shall be in complete conformity with these Specifications. All of the equipment specified herein is intended to be standard equipment for use in a chlorination system and shall include but not be limited to the following:

1. Horizontal gas manifold and all accessories capable of connecting to 40 kg and 1000 kg chlorine cylinders.

2. Manual gas feeder system that consists at a minimum of the following:
   a. Vacuum regulator
   b. Inlet filter
   c. Lead gasket positive yoke cylinder clamp

3. Automatic switch over module

4. Flow rate indicator and manual rate adjusting valve

5. Remote ejector and check valve assembly

6. Water inlet assembly

7. Miscellaneous associated equipment required for the proper operation of the system, including but not limited to valves, couplings, pressure switches, fittings, gages, etc.

1.05 DELIVERY, STORAGE AND HANDLING

A All equipment shall be crated with packing material suitable for overseas air shipment in accordance with all International Air Transport Association (IATA) regulations.

B All equipment shall be furnished in containers clearly identified with indelible markings as to their contents.

C All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from

the time of shipment until installation is completed and the equipment is ready for operation.

D Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

E The finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.

F Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.

1.06 MAINTENANCE

A Tools and Spare Parts

1. Special tools required for normal operation and maintenance shall be supplied for each piece of equipment furnished.

2. Each piece of equipment shall be furnished with two (2) years of the manufacturer's recommended spare parts to include at the minimum the following:

   a. Chlorine gas filters.
   b. Lead chlorine cylinder gaskets.
   c. Miscellaneous tubing and gaskets.

3. All tools and spare parts shall be furnished in containers clearly identified with indelible markings as to their contents. Each container shall be packed with its contents protected for storage. All tools shall be furnished in steel tool boxes.

PART 2: PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A These specifications are intended to give a general description of what is required, but do not cover details of construction which may vary in accordance with the exact requirements of the equipment as offered. They are, however, intended to include the furnishing, shop testing and delivery of all materials, equipment and appurtenances for the chlorination equipment as herein specified, whether or not specifically mentioned in these Specifications.

B All necessary accessory equipment and auxiliaries required for the proper functioning of the chlorination system

incorporating the highest degree of standards for the specified type of service shall be furnished by the chlorination system supplier whether or not specifically mentioned in these Specifications.

2.02 CHLORINATION SYSTEMS

A Chlorination systems to be furnished shall be a vacuum operated, solution feed type and shall automatically control chlorine gas in response to a 0 to 5 Vdc signal proportional to pump discharge rates. A manual adjustment shall be provided to regulate dosage of chlorine during the flow pacing operation. Each unit shall also be capable of full manual operation.

B The chlorinators shall be designed to ensure maximum safety for operating personnel. The chlorine gas control system shall operate under vacuum to prevent gas leakage.

C All chlorination equipment shall be constructed entirely of materials resistant to the corrosive attack of chlorine gas.

2.03 FLEXIBLE CONTAINER CONNECTORS

A Two (2) flexible container connectors shall be provided for chlorination each system. Each flexible container connector shall be constructed of 3/8-in (9.5 mm) O.D. cadmium plated, dichromate dipped, copper tubing, 6-ft (1.8 m) long. Each connector shall be provided with an isolating valve and a header valve, constructed of brass.

B Each connector shall be provided with an isolating valve constructed of aluminum silicon bronze and a header valve constructed of brass.

C The connector shall be Capital Control Model No. R-100 or equal.

2.04 MANIFOLD

A Manifolds, where required, shall be constructed of 1-in (25 mm) schedule 80 seamless carbon steel, Type S, ASTM A-106 and shall be suitable for use with dry chlorine liquid. Fittings shall be 3000 pounds forged steel Grade A-105. The manifold shall provide connections a suitable distance apart for use with one hundred pound chlorine containers.

B The manifolds shall contain all required unions and fittings to fit metric chlorine tank fittings. Yoke clamp shall be steel plated with an epoxy coating

C Manifolds shall be Capital Controls Model No. BM-120-4 or equal.

2.05 CHLORINE GAS STRAINERS (FILTERS)

A There shall be furnished chlorine gas strainers (filters) for each chlorination system. The strainer shall be designed for use with chlorine gas and provided with easy disassembly for servicing. The filters shall be designed to remove ferric chloride and other impurities from the gas.

B The filter shall consist of two chambers. The lower chamber shall act as a trap for liquid impurities. The upper portion shall have a removable filter cartridge especially designed to "plate out" ferric chloride and to trap other particulate matter.

C The filter shall be constructed of high tensile strength cast iron with the screen tested to a pressure of 300 psi. The filter shall be Capital Controls Model No. R-1256 or equal.

2.06 GAS FEEDER

A The gas feeder shall be capable of feeding up to 4 kg per hour and shall be constructed entirely of materials resistant to the corrosive attack of chlorine gas.

B Connection sizes shall be as follows:
1. 5/8 inch diameter vacuum connection
2. 3/8 inch diameter vent connection
3. 1.5 inch diameter ejector outlet connection

C The gas feeders shall be Capital Control Company Inc. Advance Series 200 Model 203CL or equal.

2.06 EJECTOR AND CHECK VALVE

A Ejectors shall be constructed of high impact plastic and stainless steel bolts able to withstand a maximum backpressure of 140 psig.

B Line valves for liquid or gaseous chlorine shall be forged steel globe valves having bolted bonnet, OS&Y, Hastalloy "C" disk, disk stem ring and body seat ring and stem. Packing shall be of teflon. Valves shall be tested at 300 psi with air under water.

C Ejectors shall be Capital Controls Model No. EJH220C or equal and shall be constructed entirely of materials resistant to the corrosive attack of chlorine gas.

2.07 GAS CONTROL VALVE

A Maximum capacity shall be 4 kg per hour and shall be constructed entirely of materials resistant to the corrosive attack of chlorine gas.

B Control valve shall have a visual display of 0 to 100% of valve capacity with a power "on" switch.

C Control valve shall be capable of receiving a 0 to 5 Vdc signal input at 240 volt, 50 hertz.

D Control valve shall be Capital Controls Model Series 1410 or equal.

2.08 CHLORINE LEAK REPAIR KIT

A Furnish two chlorine emergency repair kits with each chlorination system. The chlorine emergency kit shall be designed to handle leaks which could occur in one ton or one hundred pound chlorine containers. Kit shall be Type "B" and shall be of the type specified by the Chlorine Institute.

2.09 SURFACE PREPARATION AND SHOP PRIME PAINTING

A Prior to prime coating, all metal surfaces of the equipment within the chlorination system shall be thoroughly clean, dry and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the Engineer.

B All metal surfaces except factory finished equipment surfaces and those obviously not to be painted such as aluminum and stainless steel shall be shop primed with two coats of Tneme Series 23 or equal.

2.10 TUBING, CLAMPS AND OTHER ACCESSORIES

A All tubing used shall be constructed entirely of materials resistant to the corrosive attack of chlorine gas.

B All clamps, bolts and other accessories used shall be stainless steel and resistant to the corrosive attack of chlorine gas.

END OF SECTION

SECTION 11002

CHLORINE TEST KITS

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish forty (40) portable chlorine test kits to measure the free residual of chlorine in a water distribution system.

B The chlorine test kits shall be delivered to the Owner's port of departure in the United States no later than thirty (30) days after placement of order.

1.02 SUBMITTALS

A For chlorine test kits and accessories to be furnished, the manufacturer shall submit three copies of the following to the Engineer within seven (7) business days after placement of order:

1. Literature and drawings describing the equipment and showing all important details of operation

2. Certifications that shows compliance with this specifications.

1.03 QUALITY ASSURANCE

A All chlorine test kits and accessories shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The chlorine test kits and accessories shall be designed, constructed and shipped in accordance with the best practices and methods.

B The test kits shall be HACH Model CN-70 of Loveland, CO or equal.

1.04 DELIVERY, STORAGE AND HANDLING

A All test kits shall be packed in containers which are closely identified with indelible markings on containers. The packing materials shall be suitable for overseas air shipment and shall be in accordance with the International Air Transport Association.

B All test kits shall be properly protected so that no damage or deterioration shall occur during a prolonged

delay from the time of shipment until the test kits are put into operation.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for one year period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the closest office to the Republic of Georgia or the manufacturer's international service department that will have reagents, spare parts, and operation and maintenance servicing.

PART 2 : PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The equipment covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily when installed.

2. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B Chlorine test kits and accessories shall consist of the following items:

1. Chlorine Test Kits: Test kits shall measure the free residual chlorine of potable water at detection limits down to one (1) part per million. Each test kit shall have sufficient reagents to conduct at least 500 tests per kit. All reagents shall have a minimum of shelf life of year from date of delivery.

2 Accessories: Each test kit shall be provided with a suitable, non breakable container to store the test kit, reagents and instructions.

END OF SECTION

SECTION 02788

HYDRAULIC BUCKET MACHINE

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish two (2) hydraulic powered two piece sewer bucket machines with accessories for cleaning blockages from sewer lines ranging in size from 6 inch diameter up to 24 inch in diameter.

1 The bucket machine shall have the capability of removing blockages consisting of unusually heavy root growths, hardened grease or scale, trash and other debris.

2 The bucket machines shall be capable of pushing and/or pulling buckets, brushes, and other accessories to clean and remove obstructions from sewer lines.

B The bucket machines shall be deliver to the Owner's port of departure in the United States no later than sixty (60) days after placement of order.

1.02 SUBMITTALS

A For all bucket machines to be furnished, the manufacturer shall submit three copies of the following to the Engineer within seven (7) business days of the placement of the order:

1. Literature and drawings describing the equipment and showing all important details of construction and dimensions.

2. Certification that shows compliance with this specifications.

3. Operating and maintenance instructions including the manufacturer's recommended spare parts list.

B A manufacturer representative who has complete knowledge of proper operation and maintenance of the bucket machine shall be available to instruct representatives of the Owner and the Engineer on proper operation and maintenance.

1.03 QUALITY ASSURANCE

A The bucket machines shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The units shall be designed, constructed and shipped in accordance with the best practices and methods.

B The bucket machines shall be furnished by Sreco Flexible, Culver City, California Model No. 37HP-XTL Truck Loader/Pull-In or equal.

1.04 MAINTENANCE

A The bucket machines shall be equipped with the manufacturer's recommended spare parts sufficient to last for a minimum of a two year period.

B The bucket machines shall be equipped with all specialty tools required for normal operation.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for two years period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the nearest offices to the Republic of Georgia that have spare parts and operation and maintenance servicing or the manufacturer's international service department.

1.06 DELIVERY, STORAGE AND HANDLING

A All equipment, accessories, and spare parts shall be crated with packing material suitable for overseas shipment in accordance with the International Air Transport Association.

B All equipment, accessories, and spare parts shall be packed in containers which are closely identified with

indelible markings on containers. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged period of delay from the time of shipment until the equipment is put into operation.

PART 2: PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The equipment covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily.

2. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B The bucket machine shall comprise of loader and pull-in components and the following items:

1. Trailer: The trailers for both the loader and puller components shall be constructed from heavy duty 12.5 cm (5-in) structural steel channel and all welded frame. Torsion type suspension shall allow for on and off road travel. The towing end shall be equipped with a heavy duty, retractable stabilizer with a swivel wheel. The trailer shall be equipped with fenders high quality pneumatic rubber tires and wheel axle and bearings. The trailer shall be equipped with stop, directional, and tail lights. The trailer shall also be equipped with a lockable tool and accessory box.

2. Loader Engine: The gasoline engine for the loader component shall be two cylinder air cooled with a minimum of 37 hp, 2 cylinder. Engine shall have electric start,two speed transmission start-stop switch and alternating charging system.

3. Battery: The manufacturer shall provide 70 amp. batteries for each unit with one spare battery for each unit.

4. Equipment: The bucket machine shall be equipped with 8 inch and 15 inch roller assembles with wide flange platforms, anti-back lash upper rollers, and bucket flippers.

5. Cable: The manufacturer shall provide the following heavy duty non-fraying steel cables:

   1000 ft. - .50 inch diameter
   500 ft. - .25 inch diameter

6. Accessories: The manufacturer shall furnish the following accessories with each machine:

   - Heavy Duty Buckets - 6", 8", 10", 12", 15", 18", 22", and 24"
   - Porcupine Brushes - 6", 8", 10", 12", 15", 18", 22", and 24"
   - Sealed beam, rotating amber beacon
   - Safety chains
   - Footage meter

END OF SECTION

SECTION 11600

LABORATORY EQUIPMENT AND SUPPLIES

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility and suitability be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish all laboratory equipment, supplies and accessories as specified herein.

B The laboratory equipment, supplies and accessories shall be deliver to the Owner's port of departure in the United States no later than sixty (60) days after placement of order.

1.02 SUBMITTALS

A For all equipment and materials to be furnished, the supplier shall submit three copies of the complete list of equipment and supplies including catalog cuts, data sheets and other pertinent information including the manufacturer's printed instructions for operation and maintenance of equipment, where applicable.

B Certifications that show compliance with this specification.

1.03 QUALITY ASSURANCE

A All laboratory equipment, supplies and accessories shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed and shipped in accordance with the best practices and methods.

1.04 DELIVERY, STORAGE AND HANDLING

A All materials, equipment and accessories shall be packed in containers which are closely identified with indelible

markings on the containers. The packing material shall be suitable for overseas air shipment and shall be in accordance with all IATA regulations with special attention to IATA hazardous material shipment regulations.

B All materials, equipment and accessories shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defects for a two year period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the closest office to Armenia, or the manufacturer's international service department that will have reagents, spare parts and operation and maintenance servicing.

PART 2: PRODUCTS

2.01 LABORATORY EQUIPMENT AND SUPPLIES FOR KUTAISI LABORATORY

A The below scheduled items have been described by the HACH Company 1992-93 International Catalog and are referenced by either I.D. number or page number. References to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and is not to be considered proprietary. In all cases any comparable and equivalent approved equipment and supplies will be acceptable.

Description	I.D. Number	Page	Quantity
Incubator (Dri-Bath)	22814-02	136	3
Automatic Autoclave	24630-02	132	1
Binocular Microscope	24970-00	137	2
10X Phase Annulus	24969-10	137	2
40X Phase Annulus	24969-40	137	2
100X Phase Annulus	24978-00	137	2
Microscope Slide (gross)	12-544-1		1
Cover Slips	12-548-5		3

Slide Box	03-450-5		5
Test Tube Rack	24070-00	139	20
Magnetic Filter Funnel (47 mm Pad Size)	13529-00	135	6
Absorbent Pads With Dispenser (1,000 count)	14918-00	138	1
Filter Membranes (200 count)	1350-01	134	5
Filter Manifold	24861-00	135	1
Vacuum Pump	14697-00	138	1
Graduated Cylinders	2172-53	212	5
Flasks (package of 4)	20898-79	220	5
Volumetric Flasks (package of 6)	14574-79	221	3
Pipets (package of 12)	2106-68	229	5

B The below scheduled items have been described by the ENVIRONETICS May 1992 catalog. References to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and is not to be considered proprietary. In all cases any comparable and equivalent approved equipment and supplies will be acceptable.

Description	I.D. Number	Quantity
Colilert Economy Pre-dispensed MPN	W200	20 cases
Comparator MPN	W102	40 Each
Pocket U.V. Fluorescent Lamp	WL160	4 Each

2.02 LABORATORY EQUIPMENT AND SUPPLIES FOR TIBILIS LABORATORY

A The below scheduled items have been described by the HACH Company 1992-93 International Catalog and are referenced by either I.D. number or page number. References to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and is

not to be considered proprietary. In all cases any comparable and equivalent approved equipment and supplies will be acceptable.

Description	I.D. Number	Page	Quantity
Incubator (Dri-Bath)	22814-02	136	3
Automatic Autoclave	24630-02	132	1
Binocular Microscope	24970-00	137	2
10X Phase Annulus	24969-10	137	2
40X Phase Annulus	24969-40	137	2
100X Phase Annulus	24978-00	137	2
Microscope Slide (gross)	12-544-1		1
Cover Slips	12-548-5		3
Slide Box	03-450-5		5
Test Tube Rack	24070-00	139	20
Magnetic Filter Funnel (47 mm Pad Size)	13529-00	135	6
Absorbent Pads With Dispenser (1,000 count)	14918-00	138	1
Filter Membranes (200 count)	1350-01	134	5
Filter Manifold	24861-00	135	1
Vacuum Pump	14697-00	138	1
Graduated Cylinders	2172-53	212	5
Flasks (package of 4)	20898-79	220	5
Volumetric Flasks (package of 6)	14574-79	221	3
Pipets (package of 12)	2106-68	229	5

B The below scheduled items have been described by the ENVIRONETICS May 1992 catalog. References to specific manufacturers is for the purpose of establishing a quality

or parameter for specification writing and is not to be considered proprietary. In all cases any comparable and equivalent approved equipment and supplies will be acceptable.

Description	I.D. Number	Quantity
Colilert Economy Pre-dispensed MPN	W200	20 cases
Comparator MPN	W102	40 Each
Pocket U.V. Fluorescent Lamp	WL160	4 Each

C Provide two (2) benchtop 10 inch sterilizers. The sterilizer shall have touch pad controls, stainless steel chamber, and data logger. The sterilizer shall ne Barnstead catolog number L-10750-01 240 VAC model or equal.

2.03 LABORATORY EQUIPMENT AND SUPPLIES FOR TIBILIS WATER SUPPLY LABORATORY

A The below scheduled items have been described by the HACH Company 1992-93 International Catalog and are referenced by either I.D. number or page number. References to specific manufacturers is for the purpose of establishing a quality or parameter for specification writing and is not to be considered proprietary. In all cases any comparable and equivalent approved equipment and supplies will be acceptable.

Description	I.D. Number	Page	Quantity
Incubator (Dri-Bath)	22814-02	136	2
Test Tube Rack	24070-00	139	20
Magnetic Filter Funnel (47 mm Pad Size)	13529-00	135	6
Absorbent Pads With Dispenser (1,000 count)	14918-00	138	1
Filter Membranes (200 count)	1350-01	134	5
Filter Manifold	24861-00	135	1

Vacuum Pump	14697-00	138	1
Graduated Cylinders	2172-53	212	5
Flasks (package of 4)	20898-79	220	5
Volumetric Flasks (package of 6)	14574-79	221	3
Pipets (package of 12)	2106-68	229	5

B. Provide two (2) portable testing laboratorys for heavy metal detection. The portable laboratory shall be a HACH DREL/2000 or equal. Provide sufficent reagents for a two year period.

PART 3: EXECUTION

3.01 PRODUCT SHELF LIFE, WARRANTY AND SERVICE

A Product shelf life of perishable supplies and reagents and time-dated equipment shall be a minimum of twelve (12) months or 90% of the specified shelf life at the time of acceptance of material by the Project.

B Manufacturers of equipment items which include guarantees and/or warranties of their products shall furnish a written statement that the time period of these services will start upon installation of the equipment to the satisfaction of the Engineer.

END OF SECTION

SECTION 11001

LEAK DETECTION EQUIPMENT

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish two (2) electro-sonic water leak detectors, two (2) electronic pipe locators and all accessories required to locate water leaks in buried conduits at depths down to 4 meters.

B The leak detection equipment shall be delivered to the Owner's port of departure in the United States no later than thirty (30) days after placement of order.

1.02 SUBMITTALS

A For electro-sonic water leak detectors, electronic pipe locator and accessories to be furnished, the manufacturer shall submit three copies of the following to the Engineer within two (2) business days after placement of order:

1. Literature and Drawings describing the equipment and showing all important details of construction and dimensions.

2. Certifications that shows compliance with this specifications.

3. Operating and maintenance instructions including the manufacturer's recommended spare parts shall be furnished.

B A manufacturer's representative who has complete knowledge of the proper operation and maintenance of the leak detection equipment shall be available to instruct representatives of the Owner and the Engineer on proper operation and maintenance.

1.03 QUALITY ASSURANCE

A All electro-sonic water leak detectors, electronic pipe locator and accessories shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The electro-sonic water leak detectors and accessories shall be designed, constructed and shipped in accordance with the best practices and methods.

B Equipment shall be furnished by HEALTH Consultants of Houston, TX or equal.

1.04 MAINTENANCE

A The electro-sonic water leak detectors, electronic pipe locator and accessories shall be equipped with the manufacturer's recommended spare parts sufficient to last for a minimum of a one year period.

B All spare parts shall be packed in containers which are closely identified with indelible markings on containers. The "packing" materials shall be suitable for overseas shipment.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for one year period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the nearest office to the Republic of Georgia that have spare parts and operation and maintenance servicing or the manufacturer's international service department.

1.06 DELIVERY, STORAGE AND HANDLING

A All equipment shall be crated with packing material suitable for overseas air shipment in accordance with the International Air Transport Association regulations. All containers shall be identified with indelible markings on the crates.

B All equipment shall be properly protected when packed so that no damage or deterioration shall occur during a prolonged period of delay from the time of shipment until the equipment is put into operation.

PART 2 : PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The equipment covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily when installed.

2. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B Electro-sonic water leak detectors, electronic pipe locator and accessories shall consist of the following items:

1. Electro-sonic Water Leak Detectors: Detecting system shall consist of battery operated amplifier and belt mounted receiver with internal fixed filtering capable of amplifying the complete range of leak noise frequencies ranging from 10 Hz to 6 KHz. The unit shall also have a direct contact microphone with a minimum of eight feet in extensions, a ground microphone withy handle, two (2) microphone cables, and a sound protection headset.

2. Electronic Pipe Locator: Locating system shall consist of electronic transmitter and receiver. Transmitter shall be battery operated with a nominal power output of 300-600 mW operating at an output frequency of 82.230 kHz. The receiver shall have complete automatic sensitivity adjustment and control. The receiver shall be battery operated with digital read-out including directional arrows including a push button depth indicator with a maximum depth reading up to 375 cm.

3. Accessories: Battery chargers (240 V), one extra battery, carrying cases and instruction manuals shall be provided for each piece of equipment.

END OF SECTION

SECTION 11383

PORTABLE DIESEL GENERATOR

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility and suitability be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish two (2) portable diesel powered 12 KV generators and all required accessories to provide standby power for water supply pumps.

B Each generator shall be required to provide standby power for one water supply pump. Each generator will be hard wired into the pumps local operating panel.

C The operating conditions for the generators will be in unheated water pump stations, constructed of concrete block, and located in rural areas of the Republic of Georgia.

D The diesel generators shall be delivered to the owner's port of departure in the United States no later than sixty (60) days after placement of the order.

1.02 SUBMITTALS

A For generators and accessories to be furnished, the manufacturer shall submit three copies of the following to the Engineer:

1. Literature and Drawings describing the equipment and showing all important details of construction and dimensions.

B Certifications that shows compliance with these specifications.

C Operation and Maintenance Data

1. Operating and maintenance instructions including the manufacturer's recommended spare parts list.

1.03 QUALITY ASSURANCE

A All generators and accessories shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The generators and accessories shall be designed, constructed and shipped in accordance with the best practices and methods.

B Equipment shall be furnished by ONAN of Minneapolis, MN Model No. 12.5 RDJC or equal.

1.04 MAINTENANCE

A The generators and accessories shall be equipped with spare parts sufficient to last for a minimum of a two year period.

B The generators shall be equipped with all the special tools required for the normal operation and maintenance of the equipment.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for a one year period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the closest offices to the project in the Republic of Georgia or the manufacturer's international service department that have spare parts and operation and maintenance servicing.

1.06 DELIVERY, STORAGE AND HANDLING

A All equipment, accessories, and spare parts shall be crated with packing material suitable for overseas air shipment in accordance with the International Air Transport Association (IATA) regulations.

B All materials classified as hazardous materials shall be labeled and packed in accordance with IATA regulations.

C All equipment, accessories, and spare parts shall be packed in durable containers which are closely identified with indelible markings on the containers. All equipment, accessories, and spare parts shall be properly protected so that no damage or deterioration shall occur during a

prolonged delay from the time of shipment until installation and the equipment is ready for operation.

PART 2 : PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The equipment covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily when installed.

2. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B Generators shall meet the following specifications:

1. The generators shall be 12 KV diesel powered generators.
2. The generator shall be cable of providing three phase 380 volt power at 50 hertz.
3. The generators shall be skid mounted with vibration isolators.
4. The generator's engine shall 4 cycle be liquid cooled.
5. The generator shall be equipped with a battery powered 12-volt electric start and a 2 amp trickle battery charger.
6. The generators shall be equipped with the following control panel elements:

    a. Ammeter (one per phase)
    b. Three phase voltage selector switch
    c. Frequency meter
    d. AC voltmeter
    e. Running time meter

7. The generators shall be equipped with the following alarm elements:

    a. High engine temperature
    b. Low oil pressure
    c. Overcrank

d. Overspeed
e. Low coolant temperature

8. The generators shall be equipped with critical grade exhaust silencers.
9. The generators shall be equipped with block heaters.

C The following spare parts shall be provided:

1. Provide two worth of manufacturer's recommended spare parts including filters, spark plugs and spare battery.

D The following accessories shall be provided:

1. Provide a custom fit canvas or vinyl cover for each generator.

END OF SECTION

SECTION 02744

SEWER RODDING MACHINE

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical, and general equipment compatibility and suitability be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish four (4) hydraulic powered sewer rodding machines with accessories for cleaning blockages from sewer lines ranging in size from 100 mm (4 inch) up to 1500 mm (60 inch) in diameter.

1 The machine shall have the capability of removing blockages consisting of unusually heavy root growths, hardened grease or scale, trash and other debris.

2 The machine shall be capable of pushing, pulling and rotating either a 7.8 mm or 9.4 mm (5/16-in or 3/8-in) diameter sectional rod to clean and remove obstructions from sewer lines.

B The sewer rodders shall be deliver to the Owner's port of departure in the United States no later than sixty (60) days after placement of order.

1.02 SUBMITTALS

A For all sewer rodding machines to be furnished, the manufacturer shall submit three copies of the following to the Engineer within seven (7) business days of the placement of the order:

1. Literature and drawings describing the equipment and showing all important details of construction and dimensions.

2. Certification that shows compliance with this specifications.

3. Operating and maintenance instructions including the manufacturer's recommended spare parts list.

B A manufacturer representative who has complete knowledge of proper operation and maintenance of the sewer rodding machine shall be available to instruct representatives of the Owner and the Engineer on proper operation and maintenance.

1.03 QUALITY ASSURANCE

A Sewer rodding machines shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The rodding units shall be designed, constructed and shipped in accordance with the best practices and methods.

B Equipment shall be furnished by Sreco Flexible, Culver City, California Model No. HS516 TR or equal.

1.04 MAINTENANCE

A The sewer rodding machine shall be equipped with the manufacturer's recommended spare parts sufficient to last for a minimum of a two year period.

B The sewer rodder shall be equipped with all specialty tools required for normal operation.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for two years period free of charge to the owner for any replacement parts and labor.

B Manufacturers shall list the nearest offices to the Republic of Georgia that have spare parts and operation and maintenance servicing or the manufacturer's international service department.

1.06 DELIVERY, STORAGE AND HANDLING

A All equipment, accessories, and spare parts shall be crated with packing material suitable for overseas shipment in accordance with the International Air Transport Association.

B All equipment, accessories, and spare parts shall be packed in containers which are closely identified with indelible markings on containers. All parts shall be properly protected so that no damage or deterioration

shall occur during a prolonged period of delay from the time of shipment until the equipment is put into operation.

PART 2: PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The equipment covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily.

2. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B The sewer rodding machine shall comprise of the following items:

1. Trailer: The trailer shall be constructed from heavy duty 12.5 cm (5-in) structural steel channel and all welded frame. Torsion type suspension shall allow for on and off road travel. The towing end shall be equipped with a heavy duty, retractable stabilizer with a swivel wheel. High quality pneumatic rubber tires and wheel axle and bearings shall be provided. The trailer shall be equipped with a lockable tool and accessory box.

2. Engine: The engine shall have a minimum of 18 hp, gasoline engine, 2 cylinder, air cooled. Engine shall have electric start, start-stop switch and alternating charging system.

3. Control Panel: Sewer cleaning functions and controls shall be capable of operation from one position at the operator's station. The control panel shall consist of:

- push button electric start and on/off switch.
- locking throttle control

- o single lever control for rod push and pull and reel rotation direction. The control lever shall have the ability to control each function separately, or both functions simultaneously.
- o Rod travel adjustable pressure control.
- o Rod travel pressure gauge.
- o Reel rotation adjustable speed control.
- o Ammeter
- o Rod speed control adjustment.
- o Sealed beam, rotating amber beacon.

4. Rod Reel and Drive: The rod reel and drive system shall be of single unit construction designed to rotate the reel and the drive head with the rod rotation, eliminating rod stresses caused by a stationary system.

   The rod storage reel shall be capable of holding 305 meter of 7.9 mm (1000 feet of 5/16-in diameter) or 244 meters of 9.5 mm (800 feet of 3/8-in diameter) sectional sewer rod.

5. Hydraulic System: Tank with a minimum of 114 liters (30 gallon) reservoir, the tank shall be bolted to frame and be removable for servicing. A minimum rating of 2000 psi operating pressure. Dual hydraulic gear pumps with 3635 l/s (15 gpm) rating on each pump.

6. Shrouding: Steel shroud with access doors shall be provided to house all the equipment for transportation and safe storage.

7. Accessories: The manufacturer shall furnish the following accessories with each machine:

   - o 18 feet (5.5 meters) Fleximetallic rod guide house (trailer mountable)
   - o Assembly wrench 7.9 mm (5/16-in) Rod
   - o Assembly turning wrench 7.9 mm (5/16-in) Rod.
   - o Lower rigid rod guide and rope.
   - o Pick-up rod recovery tool.
   - o Square bar corkscrew 10 cm (4-in)
   - o Square bar corkscrew 15 cm (6-in)
   - o Square bar corkscrew 20 cm (8-in)
   - o Square bar corkscrew 25 cm (10-in)
   - o Square bar corkscrew 30 cm (12-in)
   - o Round wire corkscrew 3.75 cm (1.5-in)

- Round wire corkscrew 7.5 cm (3-in)
- Round wire corkscrew 10 cm (4-in)
- Auger, 10 cm (4-in)
- Auger, 15 cm (6-in)
- Auger, 20 cm (8-in)
- Auger, 25 cm (10-in)
- Pilot bullet tool
- Spear point cutter, 4.5 cm (1 7/8-in)
- Spear point cutter, 10 cm (4-in)
- Porcupine, turn type 15 cm (6-in)
- Porcupine, turn type 20 cm (8-in)
- STD. Root Saw, 7.5 cm (3-in)
- STD. Root Saw, 10 cm (4-in)
- STD. Root Saw, 15 cm (6-in)
- STD. Root Saw, 20 cm (8-in)

END OF SECTION

SECTION 11319

SUBMERSIBLE PUMPS

PART 1: GENERAL

1.00 These are preliminary specifications and are intended to be used for general reference only. All specific details pertaining to equipment installation and compatibility found in this preliminary specification were provided by the authors of this report and the local municipalities in the Republic of Georgia. It is recommended that electrical, mechanical and general equipment compatibility be verified by the authors of this report and/or the local municipalities in the Republic of Georgia.

1.01 SCOPE OF WORK

A Furnish 30 submersible pumps factory tested and ready for operation and with all accessories as specified herein.

B The submersible pumps shall be delivered to the Owner's port of departure no later than sixty (60) days after placement of order.

1.02 SUBMITTALS

A Copies of all materials required to establish compliance with the specifications shall be submitted to the Engineer within seven (7) days of placement of order. Submittals shall include at least the following:

1. Certified shop and erection drawings showing all important details of construction and dimensions.

2. Descriptive literature, bulletins and/or catalogs of the equipment.

3. Data on the characteristics and performance of the pumps. Data shall include guaranteed performance curves, based on actual shop tests of duplicate units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift and horsepower. Curves shall be submitted on 8-1/2-in by 11-in sheets.

4. The total weight of the equipment including weight of the single largest item.

5. A complete total bill of materials for all equipment.

6. A list of the manufacturer's recommended spare parts for two years with the manufacturer's current price for each item. Include gaskets, packing, etc. on the list.

7. A statement indicating bearing life.

8. Complete data on motors.

B Operation and Maintenance Data

1. Copies of an operating and maintenance manual for each size pump shall be furnished to the Engineer within seven (7) days of placement of order. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

2. A technical representative, from the respective pump manufacturer, who has complete knowledge of proper operation and maintenance shall be provided for one day to instruct representatives of the Owner and the Engineer on proper operation and maintenance of the equipment.

1.03 QUALITY ASSURANCE

A Multiple pumps of the same type to be furnished under this Section shall be the product of a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of submersible pumps.

B Submersible pumps shall be furnished by Goulds Pumps Inc., Seneca Falls, NY, Johnson Pump Company, Glendora, CA or equal.

B The rated horsepower of the drive unit shall be such that the unit will not be overloaded nor the service factor reduced when the pump is operated at any point on the pump's capacity curve. If, due to the slope of the pump's performance curve, a drive unit of greater horsepower than specified is required to meet this condition, the pump will be considered for approval only if any and all changes in electrical work, etc required by such a change will be provided at no additional cost to the Owner and be to the satisfaction of the Engineer.

1.04 MAINTENANCE

1. One set of all special tools required for normal operation and maintenance of the equipment shall be provided for each pump.

2. The pumps shall be equipped with spare parts sufficient to last a minimum of a two year period. The following spare parts shall be provided at a minimum for each pump:

   a. One extra set of mechanical seals for each pump

   b. One complete sets of gaskets, "0"-rings, etc for each pump

   c. Complete motor unit including coupling

   d. One set of pump radial and thrust bearings

   e. One set of impellers

1.05 GUARANTEE

1. The manufacturer shall guarantee their equipment against any defect for a two year period free of charge to the owner for any replacement parts and labor.

2. The manufacturer shall list the closest office to the Republic of Georgia or the manufacturer's international service department that have spare parts and maintenance servicing.

1.06 DELIVERY, STORAGE AND HANDLING

1. All equipment, accessories, and spare parts shall be crated with packing material suitable for overseas air shipment and in accordance with the International Air Transport Association (IATA) regulations.

2. All materials classified as hazardous materials shall be labeled and packed in accordance with IATA regulations.

3. All equipment, accessories, and spare parts shall be packed in durable containers which are closely identified with indelible markings on the containers. All equipment, accessories, and spare parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation and the equipment is ready for operation.

PART 2: PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered.
2. Unless otherwise specified herein, the pump shall conform to ANSI/AWWA E101 Part B Submersible Pump Standards.

3. For all units that shall be furnished all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not shall be furnished as required for an installation incorporating the highest standards for the type of service.

4. Each pump shall be designed for deep well operational levels indicated within these specifications.

5. Brass or stainless steel nameplates giving the name of manufacturer, the rated capacity, head, speed and all other pertinent data shall be attached to each pump and each motor.

6. The motor shall be provided with plug-in cable terminal with replacement gasket design to assure a waterproof connection and reduce the hazard of cable damage during shipment and installation.

7. All electrical materials and equipment shall be Underwriters Laboratories Inc. listed or Factory Mutual approved and NEMA rated.

2.02 SYSTEM DESCRIPTION

A All of the equipment included herein is intended to be standard for submersible use in deep potable water wells.

B The submersible pumps for 12 inch diameter deep wells shall be as follows:

1.	Number of Pumps	15 each
2.	Well Diameter	12 inch
3.	Rated capacity at normal operating capacity	160 m3/hr
4.	Total head	65 meters
5.	Minimum motor power	45 kW

6. RPM 3000
7. Cable length 60 meters

C The submersible pumps for 10 inch diameter deep wells shall be as follows:

1. Number of Pumps 15 each
2. Well Diameter 10 inch
3. Rated capacity at normal operating capacity 120 m3/hr
4. Total head 65 meters
5. Minimum motor power 32 kW
6. RPM 3000
7. Cable length 60 meters

2.02 PUMP CONSTRUCTION

A Pump Unit Construction

The submersible pump bowl assembly shall be of the multistage type with mixed flow impellers. Each intermediate bowl stage shall be fitted with a bronze and/or fluted rubber sleeve type water lubricated bearing and an impeller. The impellers shall be bronze or stainless steel of the enclosed type and shall be secured to the impeller shaft with bronze or stainless steel collects. Each impeller shall be mounted with a with a stationary replaceable wear ring. An impeller wear ring is optional. The impeller shaft shall be of proper size to carry the motor horsepower and shall be constructed of stainless steel. The top case of the bowl assembly shall contain a long bronze and/or rubber water lubricated sleeve bearing a thrust bearing to carry up-thrusts during pump start-up and a discharge hose adapter NPT screwed 2 inches in diameter. A strainer and water intake shall be built into the lower part of the bowls in which shall be mounted a bronze and/or rubber water lubricated guide sleeve bearing. The stainless steel shaft shall protrude through the strainer and shall be equipped with a coupling of the splined and keyed type for the connection to the submersible motor. The strainer shall be stainless steel with a smooth inlet transition into the first stage. The impellers shall be accurately machined and balanced and securely locked on the pump shaft.

B Materials

Pump Bowls	Cast iron with vitreous enameled flow passages
Impellers	Bronze or stainless steel
Pump Shaft	Stainless steel

Pump Bearings	Water lubricated bronze and/or fluted rubber
Motor Adapter	Bronze, cast iron or stainless steel
Strainer	Stainless Steel
Pump-Motor Shaft Coupling	Stainless steel
Cable Clamps	Stainless steel
Cable Guard	Stainless steel
Cable Terminal	Bronze or stainless steel

C The pumps, with their appurtenances and cable, shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 75 meters. The pumps shall receive a factory test to determine that each unit operates satisfactorily and that all seals are properly in place, under the above specified submerged conditions.

D All wetted parts shall be shop primed with a PVC epoxy. Exterior of pumps, in addition to above, shall receive a chloric rubber finish coat.

2.03 ELECTRIC MOTOR

A The motor shall be of the completely enclosed type for continuous duty underwater operation. The motor shall be 3 phase, 50 hertz, 380 volt, AC power with full voltage starting. maximum starting current shall have a service factor of at least 1.10. the motor wetted parts shall be constructed of stainless steel. Motor shaft and coupling shall be constructed of stainless steel. Continuous duty type thrust bearings shall be provided for both upward and downward thrust. The motor shall be equipped with a mechanical end faced shaft seal, located in the top of the motor where its shaft extends through the motor housing. Bronze sleeve bearings shall be provided at each end of the rotor. The oil filled motor shall be filled with a high di-electric strength mineral oil and the oil shall be circulated throughout the motor for cooling the rotor, starter winding and bearings. Bronze sleeve bearings shall be provided at each end of the rotor. The motor shall contain a balance tube and pressure equalization chamber to obtain a hydrostatic balance between the water outside and the oil within the motor and a permanent supply reservoir of oil.

B Furnish with the pump a continuous length of submersible power cable 75 meters in length for each pump. Cable sizing shall conform to National Electrical Code specifications for pump motors. Cable entry to each pump shall be designed for submersible pump applications. The cable shall be detachable with a waterproof plug-in connector and shall be removed for shipment. A stainless steel cable guard shall protect the cable along the pump bowel assembly. The cable shall be enclosed in an outer neoprene jacket, synthetic rubber, or plastic jacket which shall be impervious to water.

C All rotating parts shall be accurately machined and shall be in as near to perfect rotational balance as practical. The mass of the unit and its distribution shall be such that resonance at operating speed is avoided. Excessive vibration shall be sufficient cause to reject equipment.

PART 3: EXECUTION

3.01 INSPECTION AND TESTING

A Factory Test

1. The pumps shall be factory tested as follows: each pump shall be hydrostatically tested at 100 psig internal pressure and 30 psig external pressure. Motor and cable insulation shall be tested for moisture content and defects before and after the above tests. Manufacturer shall submit written report with the details and results of the tests.

2. Controls shall be factory tested and documentation of the test shall be submitted.

3. No equipment shall be shipped until all of the above test results are received.

END OF SECTION

SECTION 11010

WINTER WORK CLOTHING

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish sixty (60) insulated work coveralls, sixty (60) pairs of rubber overboots, and sixty (60) pairs of work gloves suitable for outside winter work clothing for municipal workers.

B The clothing and boots shall be delivered to the Owner's port of departure in the United States no later than thirty (30) days after placement of order.

1.02 SUBMITTALS

A For the winter work clothing to be furnished, the manufacturer(s) shall submit three copies of the following to the Engineer within seven (7) business days after placement of order:

1. Literature describing the winter work clothing.

2. Certifications that shows compliance with this specifications.

1.03 QUALITY ASSURANCE

A All winter work clothing shall be furnished by a manufacturers who is fully experienced, reputable, and qualified in the manufacture of the item to be furnished. The winter work clothing shall be manufactured and shipped in accordance with the best practices and methods.

1.04 DELIVERY, STORAGE AND HANDLING

A All winter work clothing shall be packed in containers which are closely identified with indelible markings on containers. The packing materials shall be suitable for overseas air shipment and shall be in accordance with the International Air Transport Association.

B All winter work clothing shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until the test kits are put into operation.

1.05 GUARANTEE

A The manufacturer shall guarantee his equipment against any defect for one year period free of charge to the owner for any replacement parts and labor.

PART 2 : PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A General

1. The winter work clothing covered in these specifications shall be manufactured by reputable concerns having long experience in the production of such items. The winter work clothing furnished shall be designed, constructed and installed in accordance with the best practice and methods and shall operate satisfactorily when utilized

2. All winter work clothing shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be adapted for the work to be done.

3. These specifications call attention to certain features, but do not purport to cover all details of construction of the units.

B Insulated work coveralls shall consist of durable, tear resistent fabric. The legs and seat of the coveralls shall have reinforced stitching. The coveralls shall have two way brass zipper located for center front operation. The coveralls shall have a minimum of two back pockets, two side pockets, and two front breast pockets. The coveralls shall be orange in color and shall be provided in the following sizes:

20 each Medium
20 each Large
20 each Extra Large

C Overboots made to go over conventual shoes shall consist of natural rubber with a knit interior lining with a minimum height of 17 inches. A top strap with buckle shall be provided on each boot. The boot sole shall be shall be cleated for traction. The boots shall be yellow in color and provided in the following sizes:

15 each Size 9
15 each Size 10
15 each Size 11
15 each Size 12

D Work gloves shall be constructed of 2.5 to 3 ounce cowhide leather. Gloves shall have a gaunlett cuff with gunn-cut grip. The back shall be cotton with a leather knuckle wrap. The gloves shall be a neutral color and provided in the following sizes:

20 each Medium
20 each Large
20 each Extra Large

END OF SECTION

Exhibit 7

DRAFT CABLE FROM USAID/GEORGIA TO A.I.D./WASHINGTON FOR SHORT-TERM PRIORITY NEEDS

SUBJECT: ENERGY AND WASH TEAMS PRELIMINARY RECOMMENDATIONS

REF:

1. ENERGY AND WASH TEAMS ARE CURRENTLY COMPLETING FIELD WORK ON SCHEDULE. WASH TEAM FINDS WATER AND SANITATION CONDITIONS WHICH CONSTITUTE A HIGH RISK OF DISEASE. GREATER RISK WILL DEVELOP IN FUTURE IF ENERGY CONDITIONS INCLUDING LOW FREQUENCY, LOW VOLTAGE, INTERMITTENT SERVICE, ETC. CONTINUE. MOST SERIOUS CONDITIONS OBSERVED BY WASH TEAM ARE IN KUTAISI AND WESTERN GEORGIA IN GENERAL. WASH AND ENERGY TEAMS PROPOSE FOUR POINT APPROACH.

A. MECHANICAL AND MATERIALS SUPPORT/REPAIR FOR INCREASED WATER QUANTITY.
B. IMPROVED MAINTENANCE OF WATER SUPPLY AND CAPABILITY IN DETECTION OF DISEASE TO ASSURE WATER QUALITY.
C. INTERVENTIONS FOR HIGH DENSITY URBAN AND PERI-URBAN IDP POPULATIONS WHICH ARE FREQUENTLY WITHOUT ADEQUATE WATER AND SANITATION.
D. IMPLEMENTATION OF SECURE ELECTRIC POWER SUPPLY.

THE FOLLOWING RECOMMENDATIONS CONSTITUTE ONLY THE HIGHEST PRIORITY WASH TEAM ITEMS. ENERGY TEAM HAS REVIEWED WASH ISSUES RELATED TO ENERGY AND OFFERS SUPPORT.

2. MECHANICAL AND MATERIALS SUPPORT TO ASSURE INCREASED WATER QUANTITY.

KUTAISI:

COPPER WIRE AND INSULATION FOR RE-WINDING ELECTRICAL MOTORS DAMAGED BY POOR POWER QUALITY. SPECIFICATIONS:

SIZE(MM2) AMOUNT(KG)

SUBMERSIBLE PUMPS FOR WELLS, SPECIFICATIONS: 15 (SEVEN-10" & EIGHT-12"), PUMPS, 45KW, 380V, 3PHASE, 100M HEAD

COAGULANT FOR SAND FILTERS, SPECIFICATIONS: 30 TONS AL2 (SO4)3.

TOOLS AND CLOTHING FOR WATER SUPPLY WORKERS, SPECS:

CHLORINATORS, SPECS: 8 GAS CHLORINATORS (LIKE YEREVANS- NO BOOSTER PUMPS), FOUR-25 KG/DAY & FOUR-50 KG/DAY)

FIELD CHLORINE KITS, SPECS: 50 FREE RESIDUAL, NONBATTERY OPERATED KITS.

LEAK DETECTORS, SPECIFICATIONS (1 AS PROVIDED IN ARMENIA):

TBILISI

GENERATORS FOR SECURE POWER SUPPLY, SPECIFICATIONS: TWO 1000KW, DIESEL POWER (FUEL MUST BE SECURED), 6000V, 50 CYCLE, 3 PHASE

CHLORINATORS, SPECS: TWELVE GAS CHLORINATORS (LIKE YEREVANS-NO BOOSTER PUMPS) SIX-25 KG/DAY & SIX-50 KG/DAY

COPPER WIRE AND INSULATION FOR MOTORS, SPECIFICATIONS:
COPPER BAR STOCK FOR REWINDING ELECTRIC MOTORS
MOTOR SIZE AMOUNT

LAB EQUIPMENT: SPECIFICATIONS CHLORINE TEST KITS: 150 AS ABOVE.

COAGULANT, SPECS: 30 TONS AL2(SO4)3

OTHER REQUESTED ITEMS ARE IN FULL REPORT

3. IMPROVED DISEASE DETECTION AND ASSURANCE OF WATER QUALITY.

KUTAISI:

INCUBATOR, SPECIFICATIONS: 2EA, MINIMUM 8 CUBIC FOOT CAPACITY, 220 VOLT., TEMPERATURE RANGE 25C TO 45C WITH SHELVING AND RECORDING THERMOMETER

INCUBATOR, SPECIFICATIONS: KEROSENE POWERED, 25C TO 45C RANGE 5EA.

MEMBRANE FILTER EQUIPMENT, SPECIFICATIONS: COMPLETE EQUIPMENT AND SUPPLIES FOR 4-FILTER MANIFOLD INCLUDING VACUUM PUMP 220 VOLT. ALL FILTERS AND MEDIA MUST BE INCLUDED. (SEE ARMENIA SPECIFICATIONS EXTRA SUPPLY OF 30,000 MEMBRANE FILTERS, COLI-

ALERT MPN, 200 TUBE UNITS. ADEQUATE FOR 4000 TESTS. ALL MATERIALS, LISTED AS REQUIRED BUT NOT PROVIDED MUST BE INCLUDED. (PROVIDED AS PART OF ARMENIA PKG)

ADDITIONAL REQUESTS AS PART OF FULL REPORT

TBILISI:

NOTE: EQUIPMENT LIST NOT AVAILABLE. WILL BE PROVIDED AS PART OF FULL REPORT.

FOLLOWING EQUIPMENT WILL BE REQUIRED:
MEMBRANE FILTER EQUIPMENT (AS ABOVE)
COLI-ALERT MPN (AS ABOVE) ADEQUATE FOR 20000 TESTS
REQUEST FOR 140 KW GENERATOR SHOULD BE ANTICIPATED.

4. FOCUS ON HIGH DENSITY URBAN AND PERI-URBAN IDP POPULATIONS WITHOUT ADEQUATE HOUSEHOLD WATER AND SANITATION.

WASH TEAM HAS IN HAND A PROPOSAL FROM INTERNATIONAL RESCUE COMMITTEE (IEC) FOR COMMUNITY HEALTH WORKER PROGRAM. PROPOSAL ADDRESSES HIGHEST RISK INDIVIDUALS LIVING IN PUBLIC BUILDINGS IN URBAN AREAS AS WELL AS PERI-URBAN AREAS NEAR TBILISI AND KUTAISI. OUTLINE OF PROPOSAL WILL BE FAXED TO USAID, WASH, AND IRC I5DEC93. THIS IS CONSIDERED AN URGENT ACTION ITEM. WORK SHOULD BEGIN ON OR BEFORE 1JAN94.

PRELIMINARY ENERGY TEAM REPORT IN SEPARATE CABLE.

1. SAKENERGO IS DEVELOPING MONTHLY GENERATION (HYDRO & THERMAL) AND LOAD PROFILES. HAVE PROMISED TO DELIVER 12/15.
2. SAKENERGO HAS AGREED TO PROVIDE EVIDENCE SHOWING THAT LINES ARE ARRANGED TO PRIORITIZED SERVICE TO LOAD. HAVE PROMISED TO DELIVER 12/15.