ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT
Central Asian Regional Office

# UZBEKISTAN ACTIVITIES
# WATER SYSTEM IMPROVEMENTS PROGRAM

## GENERAL DESCRIPTION

The following is a summary of a series of field investigations conducted in the Aral Sea area of Uzbekistan since the summer of 1994 by CH2M-Hill field teams as part of the EPT program activities The purpose of these visits were to define and implement the activities which are included in the Memorandum of Understanding executed on 20 April 1994 between the Government of the United States and the Government of Uzbekistan

The U S Aral Sea program in Uzbekistan is intended "to provide water quality improvements and a complementary environmental education programs for critical populations in selected areas of Uzbekistan", as well as promote effective regional water management

The Nukus and Urgench water treatment plants are well designed, conventional water treatment plants that use the surface water from the Tuyamuyun Reservoir on the AmuDarya The plants were constructed in 1985 and each plant can produce 200,000 $m^3$/day of potable water The state of repair of the plants is generally good, however, some systems need upgrading with new equipment at both plants Finished water is pumped through long transmission lines to the city and rural areas Expansion of both plants is being considered by the Government of Uzbekistan

The plants are not producing potable water by international standards, i e , the World Health Organization (WHO) guidelines This is due to out-dated local standards that allow highly turbid and poorly disinfected finished water in the transmission system Microbiological contaminants such as bacteria may be present in the finished water which may cause acute (infectious) health problems to the population served by these plants Both plants have the unit processes and operations (i e , clarification, filtration, and chlorination) needed to achieve these standards Facility improvements needed for microbiological treatment include new chlorination (disinfection) equipment and upgraded laboratory equipment Improved operational methods and selected equipment are also needed to optimize clarifier and filter performance, and extensive operator training is being implemented

To assess the potential health impacts on the people receiving the treated water, the concentration of contaminants in the raw water needs to be established Once these concentrations are established, comparative risk assessment studies can be conducted to establish the threat to public health, and whether advanced treatment systems are needed Installation of new and upgraded treatment processes is not advised until risk assessment and treatment feasibility studies are completed

RECOMMENDATIONS

The following recommendations have been developed based on the EPT field investigations

* The Government should adopt WHO guidelines for potable water These guidelines should be carried out in a phased approach with Phase I improvements based on (a) eliminating contaminants such as bacteria that cause acute health problems, and (b) conducting engineering and risk assessment studies as leading to overall improvements to the regional water systems

* Specific improvements relate to the reduction of contaminants causing acute health problems should be based on reducing turbidity to 1 0 NTU and increasing disinfection to provide a "free" chlorine residual of 0 2 mg/l in the finished water, and conduct the following tasks

  - Install new chlorination systems at both plants that includes scales, evaporators, chlorinators, injectors, associated piping and valves, venting systems, alarm systems and safety equipment Two evaporators and four chlorinators (three 900 kg/day modules) per plant were provided with the associated training in August 1995
  - Provide new laboratory equipment and reagents that will ensure that plant processes are operating properly and efficiently This equipment and training was provided at each plant in February 1995 and additional materials will be provided in early 1996
  - Install chlorine systems at the Nukus and Urgench water distribution reservoirs
  - Install chlorine systems at the Chimbai and Kagieli Pump Stations in Karakalpakstan

* Provide limited equipment for physical immprovements to the clarification and filtration systems at both plants, that include the following

  - Coagulant transfer and feed pump systems and chemicals,
  - Polymer feed pump systems and chemicals,
  - Flow measuring devices at the radial clarifiers, and
  - Filter valve operational control panels

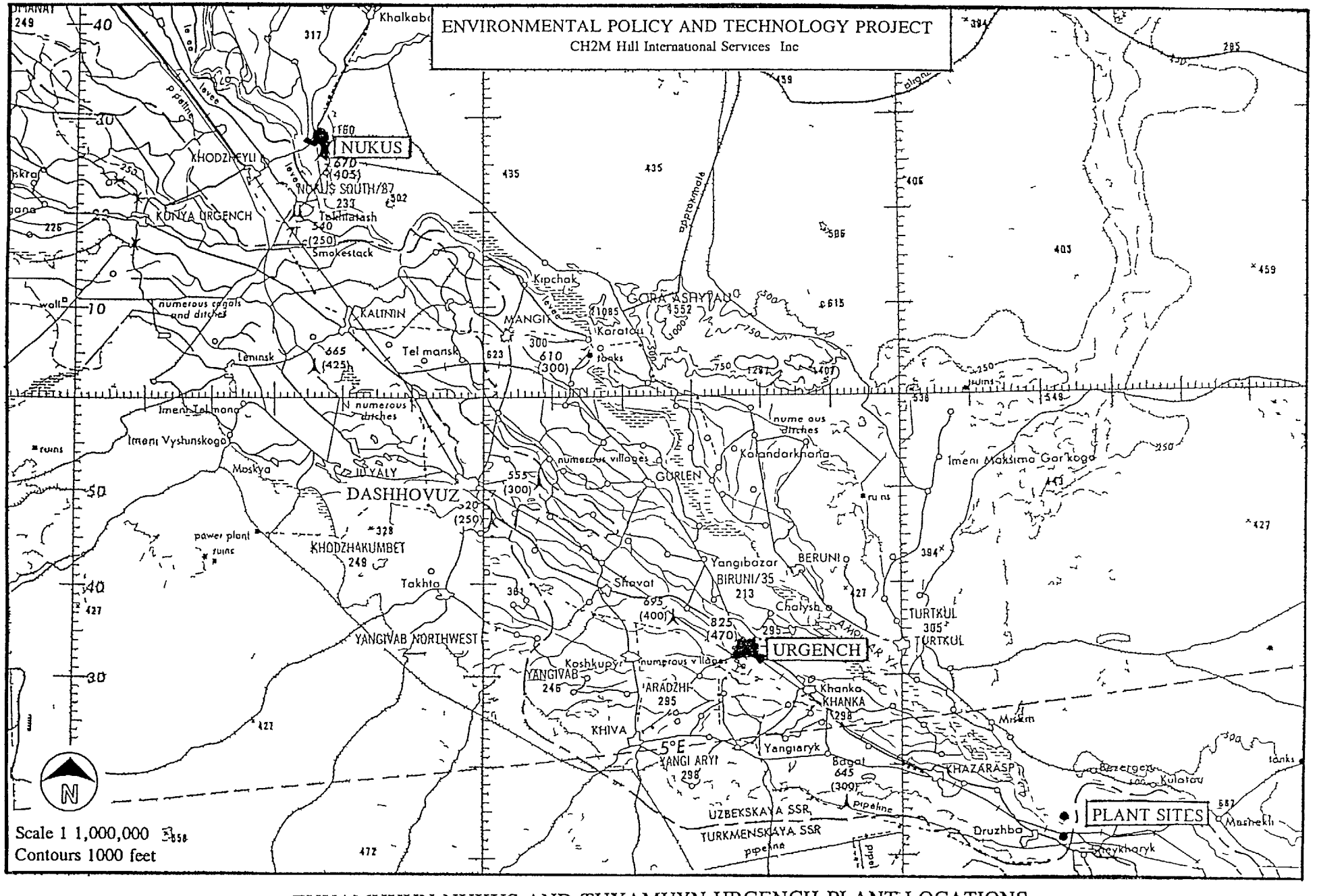
* Provide operator training to optimize the clarifiers, filters and other unit processes in order to meet the proposed new standards Operator training was provided during 1995, and extensive operations training will be provided in early 1996

* The Government should institute an annual budget to ensure adequate operation and maintenance of the plants including a reliable supply of chemicals and repair parts

* Conduct a risk assessment and advanced treatment feasibility study to determine if exposure levels from contaminants, such as pesticides and metals, in the raw water are great enough to justify adding advanced treatment processes at the plants

* Conduct an engineering study of the distribution system to determine how finished water from the plants is managed both in the transmission pipelines and in the distribution systems

December 1995




TUYAMUYUN-NUKUS AND TUYAMUYN-URGENCH PLANT LOCATIONS
Republic of Uzbekistan

ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT
Central Asian Regional Office

# UZBEKISTAN ACTIVITIES
# WATER QUALITY MONITORING PROGRAM

This is a summary of the water quality monitoring activities conducted in Uzbekistan as part of the Memorandum of Understanding executed between the Government of the United States and the Government of Uzbekistan on 20 April 1994

An Environmental Policy and Technology (EPT) field investigation defined several improvements at the Nukus and Urgench water treatment plants that could improve potable water quality being delivered to population in these cities One element was the procurement, installation and training of the laboratory equipment Analytical instrumentation and reagents were installed in laboratories to monitor water quality in the region which has potentially been linked to health issues in the regions around the Aral Sea

In February 1995, equipment and reagents were installed at the following facilities
- Nukus Sanitary and Epidemiological Services (SES) Laboratory,
- Tuyamuyun-Nukus Water Treatment Plant Laboratory, and
- Tuyamuyun-Urgench Water Treatment Plant Laboratory

The following recommendations were made for these laboratories

1 Compile comparative analytical data between the new and existing methodologies, and consider the revision of the current GOST standards to incorporate the World Health Organization guidelines for drinking water quality,

2 Provide the T-Nukus and T-Urgench water treatment plant laboratories with extended support to conduct the basic water quality analyses (e g , pH, turbidity, free chlorine, TDS and coliform bacteria) for monitoring the water distribution system,

3 Provide the Nukus SES laboratory with extended support for more advanced water quality analyses (e g , arsenic, lead, pesticides and herbicides) for regional water quality monitoring,

4 Develop a reagent supply system for the laboratories which utilize conventional chemicals, and assist in the certification of the instruments and methodologies, and

5 Implement a computerization program for the compilation of analytical data generated by each laboratory, and provide additional training of laboratory personnel

The Nukus SES Laboratory has been identified as the regional laboratory and will be assessed and provided with additional instruments for an expanded regional role A water quality data management program will be implemented to compile data, and a water control/quality assurance program will be developed

January 1996

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# REGIONAL COOPERATION IN WATER MANAGEMENT
# WATER QUALITY STANDARDS SEMINAR

The activities included in the Regional Cooperation in Water Management program is part of the U S Aral Sea activities supported by the U S Agency for International Development (USAID) in the Central Asia Republics by the Environmental Policy and Technology (EPT) project

In August 1994, EPT recommended the local water quality standards for drinking water be evaluated and revised to meet International guidelines The current GOST standards were promulgated in 1973 and 1984 in the former Soviet Union and have not been revised since that time EPT on-site testing at water treatment plants in the region indicated some serious revisions were needed For example, the current standard for turbidity is almost 18 times higher than the WHO guideline for equivalent turbidity units High turbidity levels interfere with the disinfection process at the treatment plants and present an immediate health risk to the population served

Recently, other international donor organizations such as the World Bank, the European Union Water Resources Management and Agricultural Production (EU WARMAP) program, the World Health Organization (WHO), and the United Nations Development Program (UNDP) have begun addressing similar issues and activities in the region In an order to collaborate with these efforts, USAID and the respective donor and regional organizations are coordinating activities on water quality issues The "Monitoring, Standards, and Criteria for Water Quality" seminar held in Chimgan, Uzbekistan in August 1995 is an example of a successful joint effort by these organizations

Representatives of the Executive Committee of the Interstate Council on the problems of the Aral Sea Basin (ICAS) and the Central Asian Scientific-Research Institute of Irrigation and Reclamation cooperated in the organizational and administrative work for the seminar A total of 50 participants from the Central Asian Republics and from international organizations attended the seminar

The original intention of the seminar was to focus primarily on drinking water quality issues, however, the scope was widened at the request of the local agencies to include water quality for agricultural use The updating of water quality standards is of great concern to the representatives of the Central Asian Republics A broad range of issues were addressed at the seminar and priorities were identified in three main areas water quality standards, water quality monitoring, and water quality management

The results of the water quality seminar clearly indicated the benefits of collaboration among the various international donor and regional organizations addressing the water management problems of the Aral Sea Basin

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ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT
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# REGIONAL COOPERATION IN WATER MANAGEMENT
# WATER PRICING SEMINAR

The activities in this program are part of the U S Aral Sea Program supported by the U S Agency for International Development (USAID) in the Central Asian Republics and implemented by the Environmental Policy and Technology (EPT) project The regional cooperation program began with a study tour to the United States in the spring of 1994 which recommended the priorities for the subsequent workshops which were information management, water resources management and agricultural management The Water Pricing Seminar is the fourth step in the Regional Cooperation in Water Management program The following is a summary of the workshop conducted in Bishkek, Kyrgyzstan in November 1995

The water pricing issue was recommended at the Water Management Workshop and this seminar was conceived to be a highly-focused discussion of water pricing issues Water pricing is a controversal subject due to the current trends toward market reforms in Central Asia and since each republic approaches this issue from a different perspective This seminar was the first opportunity for the representatives to assemble with this specific subject as their agenda The main objectives of the seminar was to begin a process of understanding these issues and establish a framework for resolving sources of conflict among the republics The seminar provided a forum for airing the individual concerns and approaches of each republic and offered the means for future discourse of these issues The seminar addressed the problems as well as the mechanisms by which they can be resolved

The seminar was conducted over three days and the agenda was organized in a systemic manner and included six topics (1) overview of water pricing strategies, (2) presentations of water pricing issues by each republic, (3) presentation of water pricing issues by usage, (4) comparative evaluation of key water pricing issues, (5) prioritization of water pricing issues, and (6) development of an action plan for addressing these issues

Many of the issues discussed during the seminar have both legal and economic implications Some of the concepts discussed include institutional oversight of water basin activities, legal framework for managing resources, allocation of resources among individual republics and the requirement to maintain a certain level of quantity and quality of water downstream

The workshop was conducted with open discussions by all participants, who included water ministers, policy makers and local authorities The main orgainzers of the workshop were the Institute of Water Problems and Hydroelectric Power of the Republic of Kyrgyzstan and the EPT project The 40 participants at the workshop were provided an opportunity for the representatives from the five republics to discuss their issues of water pricing in a framework of regional cooperation related to water policy Specialists in economics and water policy from Utah State University made technical presentations and assisted the process as facilitators

The participants enthusiastically endorsed the process and are collaborating on developing a partnership to address the specific issues raised during the seminar

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ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT
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# UZBEKISTAN ACTIVITIES
# SUMMARY OF EQUIPMENT INSTALLED IN 1995

## I MAIN ADMINISTRATION FOR HYDROMETEOROLOGY

A Computer Equipment (November 1994)
1 computer, and printer and accessories

## II NUKUS SANITARY AND EPIDEMIOLOGICAL SERVICES

A Laboratory Equipment (February 1995)
1 spectrophotometer,
2 reagents and training, and
3 draft laboratory operations manual

B Office Equipment (September 1995)
1 desk copier and cartridge

## III TUYAMUYUN-NUKUS WATER TREATMENT PLANT

A Laboratory Equipment (February 1995
1 water quality laboratory, and spectrophotometer,
2 portable and laboratory turbidimeter and pH meter,
3 conductivity/TDS meter, and MEL/MF laboratory,
4 related materials, supplies and reagents, and
5 training and draft laboratory operations manual

B Chlorination Equipment (August 1995)
1 two manifold assemblies, gagues, and vacuum regulators,
2 three chlorinators (1,800 kg/day),
3 two ejector assemblies, and chlorination piping,
4 chlorine emergency repair kit, and emergency shower/eye wash unit,
5 two self-contained breathing apparatuses, and
6 alarm systems, and spare parts and accessories

C Operations Training (March to July 1995)
1 on-site plant operation evaluations conducted (July and August 1994),
2 collaborated with the NET Water Management training in the US (March),
3 collaborated with the NET Water Operations training in the US (July), and
4 on-site operations training conducted (July and August)

SUMMARY OF EQUIPMENT INSTALLED IN 1995
(Continued)

IV TUYAMUYUN-URGENCH WATER TREATMENT PLANT

A Laboratory Equipment (February 1995)
1 water quality laboratory, and spectrophotometer,
2 portable and laboratory turbidimeter and pH meter,
3 conductivity/TDS meter, and MEL/MF laboratory,
4 related materials, supplies and reagents, and
5 training and draft laboratory manual

B Chlorination Equipment (August 1995)
1 two manifold assemblies, guages, and vacuum regulators,
2 three chlorinators (1,800 kg/day),
3 two ejector assemblies, and chlorination piping,
4 chlorine emergency repair kit, and emergency shower/eye wash unit,
5 two self-contained breathing apparatuses, and
6 alarm systems, spare parts and accessories

C Operations Training (March to July 1995)
1 on-site plant operation evaluations conducted (July and August 1994),
2 collaborated with the NET Water Management training in the US (March),
3 collaborated with the NET Water Operations training in the US (July), and
4 on-site operations training conducted (July and August)

V URGENCH OBLAST HEALTH CENTER

A Office Equipment (April 1995)
1 desk copier, cartridge, and paper

B Health Education Materials (April 1995)
1 miscellaneous materials

VI SANITARY AND EPIDEMOLOGICAL SERVICES

A Office Equipment (September 1995)
1 desk copier, cartridge, and paper

B Health Education Materials (September 1995)
1 miscellaneous materials

Note All materials identified were provided by USAID through the EPT project

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# UZBEKISTAN ACTIVITIES
# PROPOSED EQUIPMENT INSTALLATION IN 1996

## I STATE COMMITTEE FOR NATURE PROTECTION

A Computer Equipment (First Quarter 1996)
1 computer, and printer and accessories

B Laboratory Equipment (Second Quarter 1996)
1 water quality laboratory equipment,
2 related materials, supplies and reagents, and
3 training and laboratory operations manual

## II NUKUS SANITARY AND EPIDEMIOLOGICAL SERVICES

A Laboratory Equipment (First Quarter 1996)
1 additional reagents and training, and
2 revised laboratory operations manual

## III TUYAMUYUN-NUKUS WATER TREATMENT PLANT

A Laboratory Equipment (First Quarter 1996)
1 related materials, supplies, and additional reagents, and
2 training, and revised laboratory operations manual

B Chlorination Equipment (Second Quarter 1996)
1 spare parts and accessories, and
2 revised operations manual

C Operations Training (Second Quarter 1996)
1 on-site plant operations training, and
2 audio-visual equipment for training

D Operations Equipment (Second Quarter 1996)
1 remote filter control panels,
2 coagulation chemical (alum and polymer) feed systems, including mixing and transfer pumps, control panels, spare parts, and alarms,
3 tools and welding equipment, and
4 training, and operations manuals

E Office Equipment (First Quarter 1996)
1 desk copier,cartridge, and limited supply of paper, and
2 laptop computer, printer, and software

PROPOSED EQUIPMENT INSTALLATION IN 1996
(Continued)

F Treatment Chemicals (Third Quarter 1996)
1 limited supply of coagulation chemicals (alum and polymer), and
2 limited supply of disinfection chemicals (chlorine)

IV CITY OF NUKUS DISTRIBUTION SYSTEM

A Chlorination Equipment at Nukus Reservoir (Second Quarter 1996)
1 two chlorinators, related equipment and piping,
2 chlorine emergency repair kit, self-contained breathing apparatus,
3 alarm systems, spare parts, accessories, and
4 operator training, and operations manual

B Chlorination equipment, Chimbai and Kagieli Pump Stations (Second Quarter 1996)
1 two chlorinators, related equipment and piping,
2 chlorine emergency repair kit, self-contained breathing apparatus,
3 alarm systems, spare parts, accessories, and
4 operator training, and operations manual

V TUYAMUYUN-URGENCH WATER TREATMENT PLANT

A Laboratory Equipment (First Quarter 1996)
1 related materials, supplies and reagents, and
2 training, and revised laboratory operations manual

B Chlorination Equipment (Second Quarter 1996)
1 two evaporators,
2 spare parts and accessories, and
3 revised operations manual

C Operations Training (Second Quarter 1996)
1 on-site plant operations training, and
2 audio-visual equipment for training

D Operations Equipment (Second Quarter 1996)
1 remote filter control panels, and
2 coagulation chemical (alum and polymer) feed systems, including mixing and transfer pumps, control panels, spare parts, and alarms,
3 tools and welding equipment, and
4 training, and operations manuals

E Office Equipment (First Quarter 1996)
1 desk copier, cartridge, and limited supply of paper

PROPOSED EQUIPMENT INSTALLATION IN 1996
(Continued)

F Treatment Chemicals (Third Quarter 1996)
1 limited supply of coagulation chemicals (alum and polymer), and
2 limited supply of disinfection chemicals (chlorine)

VI CITY OF URGENCH RESERVOIR

A Chlorination Equipment (Second Quarter 1996)
1 two chlorinators, related equipment and piping,
2 chlorine emergency repair kit, self-contained breathing apparatus,
3 alarm systems, spare parts, and accessories, and
4 operator training, and operations manuals

B Laboratory Equipment (Second Quarter 1996)
1 Basic Water Quality Laboratory,
2 Turbidimeter, coliform kit
3 portable chlorimeter, pH meter, TDS meter,
4 miscellaneous laboratory equipment, and
5 training, and laboratory operations manual

VII NUKUS AND URGENCH HEALTH DEMONSTRATION PROJECTS

A Water System Materials (Second Quarter 1996)
1 limited supply of pipe and fittings, and related materials

B Health Education Materials (Second Quarter 1996)
1 Miscellaneous materials

VII PARTNERSHIPS AND APPLIED DEMONSTRATION PROJECTS

A Office Equipment (Second Quarter 1996)
1 computers, printers, software, and accessories for projects

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For more information please contact
Paul Dreyer Regional Director
Environmental Policy and Technology Project
CH2M-Hill International Services Inc
Ulitsa Abai 4, Suite 112 Almaty 480024 Kazakstan
Tel (7-3272) 654-695 or 645-951 Fax 646-849