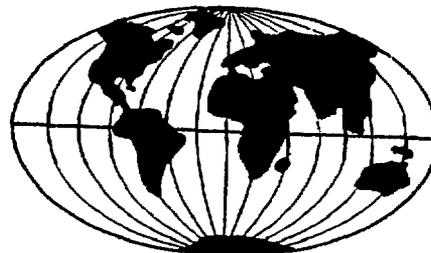


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VOLUME FOUR

CENTRAL ASIAN REPUBLIC ANNEXES MID-TERM EVALUATION OF THE CH2M HILL COMPONENT OF THE ENVIRONMENTAL POLICY AND TECHNOLOGY PROJECT

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TURKMENISTAN EVALUATION OF DELIVERY ORDER NO. 2 AND THE TURKMENISTAN PORTION OF DELIVERY ORDER 12

INTRODUCTION

The main feature of this project is the design and construction of a reverse osmosis plant for production of potable water in northern Turkmenistan. Located in a remote region in Taschautz Velayat, Turkmenbashi Rayon, the project was first outlined in the Aral Sea Action Plan of November 1993. Based on the Aral Sea Action Plan, a Memorandum of Understanding which contained a general description of the project was signed by the Turkmenistani Government and the US Government in February 1994. Following the MOU, a delivery order, which contained a scope of work and list of deliverables, was signed in May 1994.

The EPT Project was responsible for the design and construction of the plant, and will supply two years of chemicals and other commodities needed for plant operation. EPT is also responsible for verifying plant performance before handing it over to the government. The Government of Turkmenistan supplied some construction labor, was responsible for construction of a clean water holding tank, assisted with digging wells to supply water to the treatment plant, and allocated the land for the construction site. Originally, per the MOU, the GOT was to supply 15 trucks for water distribution and EPT was to supply 3 trucks. Actual procurement of vehicles for water distribution has been delayed pending the development and approval of the water distribution system.

A velayat-level hydrological agency is to be responsible for the operations and maintenance of the plant after it is handed over to the Turkmenistani government. The head of the agency, Mr. Arnold Sadovsky, is the decision maker regarding water distribution, employment of operators, and other operations and maintenance matters. Mr. Sadovsky reports to the Vice-Hakim in Taschautz, Mr. Chipanov. The Deputy Vice-Hakim in charge of construction, Mr. Japbar, is also keenly interested in the construction and operation of the plant.

EPT has also initiated a program in health education and sanitation to complement the engineering program. Its purpose is to assist local communities to solve the sanitation problems presented by the lack of clean water in the project area. The health education program will establish 8 demonstration centers in the Turkmenbashi region and an additional 8 centers in Taschautz. This is a community-based approach which relies on the local population to stimulate improvements in sanitation and health.

Harvard Institute for International Development, under its subcontract with CH, produced a report on water charges for the Turkmenbashi plant. Using estimated operations and maintenance and

water distribution data supplied by CH, the report estimates the unit costs of water production and the costs of delivering water. The purpose of the report is to provide a starting point for more serious discussion on the establishment of water charges for the long-term maintenance of the plant.

STATUS OF PROJECT TASKS

CH, in Delivery Order #2, focused on the relatively straightforward task of designing and constructing a water treatment plant for provision of safe drinking water to the mostly rural population of Turkmenbashi. The DO, with an original expiration date of September 1995, was extended until April 1996. While most of the engineering works have been completed, another extension of the DO will be necessary in order to carry out the remaining tasks in the areas of public health and sanitation, and development and implementation of a water delivery system.

Some of the deliverables in the DO have been eliminated or altered, according to CH management. However, no documentation of those changes was given to the evaluation team, though CH expects that official approval is forthcoming from USAID/Washington.

Following is the status of DO 2 deliverables as of early November 1995. Text in boldface are deliverables as stated in the DO.

Deliverable #1: Engineering design of a complete reverse osmosis (RO) plant including analysis of water distribution methods related to container types and/or truck hauling; and Deliverable #3: Construction of RO water treatment plant.

Plant design and construction is complete, though a final performance review is still to be done. The plant is producing water, and residents in and nearby Turkmenbashi come to the plant with tractors and tankers or other containers to retrieve water.

The water distribution plan has yet to be completed. The evaluation team reviewed a draft copy of a distribution plan two weeks after its visit to Turkmenbashi. It is not clear at this time how and when the plan will be implemented.

Development and implementation of the water distribution plan was delayed partly because there is some confusion among the GOT, USAID, and CH concerning provision of transportation equipment for delivery of water. The MOU states that the Government of Turkmenistan is to provide 15 trucks for water distribution while the US is to provide 3 trucks, yet, at the time of the evaluation, nothing had been procured. CH had tendered for purchase and delivery of John Deere tractors, but allowed the tender to expire because of this continued confusion. In the meantime, CH Turkmenistan Country Manager located in the U.S. wrote a draft plan for USAID/Almaty, CH/Almaty, and Turkmenistan government officials to consider.

Deliverable #2: Water pricing report

A cost-based water pricing report was completed by Michael Boyd of HIID, under HIID's subcontract with CH. The report computes the cost of water under various production and distribution scenarios. The data used for the study are not based on actual operations and maintenance of the plant or on actual distribution of water costs.

Deliverable #4: US based O&M training of 3 local RO operators.

Six operators received two weeks of training in operations of the RO plant in the United States during the summer of 1995.

Deliverable #5: On-site O&M training

On-site O&M training is currently being done with the six operators who received U.S.-based training. Staff of American Engineering Service, the subcontractor which constructed the RO plant, will remain in Turkmenbashi for six months (through March 1996) to provide on-the-job training to the local operators.

**Deliverable #6: Public health training and public health message; and
Deliverable #8: Construction of 1000 pit privies.**

EPT is in the process of developing a public health improvements implementation plan to include activities in health education and sanitary system improvements. Deliverable #8, construction of pit privies, will not be done. Rather, the project will assist local communities with sanitary system improvements to be found in the plan. There has been, however, no official modification of the DO #2.

Deliverable #7: Purchase and delivery of laboratory equipment for the local Sanitary and Epidemiological Laboratory.

Recommendations for purchase of lab equipment have been submitted to Almaty and are waiting final approval.

Delivery Order No. 12¹

Deliverable #1: Expand Distribution of Water from Reverse Osmosis Plant

This deliverable requires that CH complete a written plan that evaluates the equipment and institutional options available to expand the distribution system. Toward the end of this

¹ Annexes covering activities in Turkmenistan (DO2), Kazakhstan (DO7) and Uzbekistan (DO6) include DO 12 activities which take place in those respective countries. DO12 activities which take place in more than one CAR country are not included in the annexes. At the time of the evaluation, no action had been taken on any of these activities.

evaluation, CH submitted a draft water distribution plan, which included information on estimated numbers of beneficiaries, delivery locations, and equipment needs. The plan will be reviewed by local officials, USAID/Almaty and the USAID representative in Ashgabad.

Deliverable #2: Expand Operation and Maintenance Coverage

This deliverable includes at least two site inspections of plan performance and operator activities, additional spare parts, and additional in-country training. There has been no activity on this deliverable yet.

Deliverable #3: Sanitation Facilities Progress

With this deliverable, CH is required to submit a report that reviews progress on the sanitation facilities program in Tashauz Velayat. CH is currently preparing a plan for a grassroots public health and sanitation program which includes some construction of sanitation facilities. Action towards this deliverable will commence after the overall public health plan is approved.

ANALYSIS OF ACHIEVEMENTS AND PROBLEMS

Achievements:

- 1. Production of clean drinking water for as many as 100,000 people in the Turkmenbashi area is a significant achievement. Successful completion of the construction is a testimony to the resourcefulness and planning capabilities of CH2M Hill contract personnel.**

Working conditions in this remote area of Turkmenistan are difficult. Project staff lived in a barrack-like building, and needed to bring in most food and water during the construction period. Lack of proper sanitation and clean water, in addition to intense heat in the summer and arid conditions throughout the year, were key factors contributing to difficult working and living conditions.

The local population is enthusiastic about the provision of clean drinking water. In the project area, water is currently supplied by local agencies through pipelines, but this water is erratically delivered and not potable. While at the Turkmenbashi plant for a few hours one afternoon, we witnessed several tractors and tankers which came to the plant to obtain clean water for local collective farms. Some had obtained water previously, others came after hearing about the clean water from neighbors and friends. We would expect that the number of people coming to the plant to fill up tankers to expand rapidly in the near future.

- 2. CH has excellent working relationships with local counterparts. Through its work in Turkmenistan, CH has well represented USAID, and American's commitment to assist disadvantaged populations. The reverse osmosis plant is a showpiece of American technology and know how.**

Without exception, each government official who was interviewed for this evaluation was complimentary of the CH team and appreciated the commitment of USAID to assist in provision of clean drinking water. The reverse osmosis plant is a high profile project. The President of Turkmenistan inaugurated the plant in August, and at that time, indicated a willingness purchase several more for other parts of the country.

- 3. The health education and sanitation component of DO #2 is an appropriate means of empowering local communities to mitigate the risks of water borne disease caused by poor water quality and improper sanitation.**

The health education and sanitation component of DO #2 is an important complement to the engineering component of the project. It is designed to ensure that the beneficiaries use the RO plant water properly. It assists local communities with devising their own strategies to deal with sanitation.

The health education and sanitation component is a community based program. The initial activity of the program was a series of local workshops on health education. Participants included Public Health officials in Ashkabad, Tashauz, and Turkmenbashi, and local community leaders. Following the workshop, demonstration sites have been selected in Taschauz and Turkmenbashi. Demonstration sites in Turkmenbashi include a school, a kindergarten, a hospital, garage, and a cotton factory. The purpose of the workshops and demonstration centers is to help communities to understand and put into practice mechanisms to prevent the spread of water borne disease, to assist them with mobilizing their own resources, and devising their own strategies for solving sanitation problems.

The community based nature of this project component is a welcome improvement over the top-down system of health education that exists in Turkmenistan. EPT is currently in the process of developing, with the help of an expatriate consultant, health education and sanitation action plans to be implemented during the balance of the life of the project. The action plans include additional seminars for community groups and training of trainers, as well as procurement of locally made, simple equipment that can be used in demonstration centers for improved sanitation.

Problems

- 1. The hydrological agency has no experience with the operations and maintenance of a public utility. O&M and water distribution plans are not completed.**

With construction completed, CH will soon hand over the plant to local authorities for future operation. The local agency which will accept the plant is a hydrological agency whose experience is primarily in groundwater investigation and well drilling. It has had no experience in operations and maintenance of water treatment plants of any type, nor has it had experience with the issues usually associated with public utilities, including water distribution and establishment and collection of water charges.

At the time of our visit to Turkmenbashi, there was confusion among the trained "operators" of the water plant regarding their employment. One operator mentioned that he had not been officially hired (as of the first week of November) and he was working in the plant as a volunteer. He was not sure who would hire him, though he noted that one of the construction workers had told him that Mr. Sadovsky, the head of the hydrological agency would be his employer. In addition, some of the construction workers were confident that they would be assigned jobs as plant operators, though this does not seem to be the intention of the agency. A plant manager has yet to be assigned.

This confusion is symptomatic of lack of operations and maintenance experience of the hydrological agency. The concern of the evaluation team is that the full long term benefits of the RO plant will not be realized because the agency will be unable to attend to the full range of operations and maintenance activities required for sustained water production.

2. A plan for distributing water to beneficiaries has not been completed.

The three government officials interviewed by the evaluation team in Tashauz and Turkmenbashi, Mr. Kurovsky, Mr. Rideck, and Mr. Jabpar, noted that a water distribution plan had been developed by Mr. Sadovsky and a CH engineer. None of these men had access to the plan and were able to tell nothing about its content. The evaluation team was given a draft plan on its final day in Central Asia.

At present, water is collected by farms and other institutions in tankers. There is thus no guarantee that intended beneficiaries are receiving the water, and there is nothing to ensure that the water is not recontaminated during the time it is enroute to end users. In the absence of a plan, it will be difficult to alter the current ad hoc distribution system, that is, collection of water by those with tractors and tankers.

3. There has been little progress made toward introducing water charges for financing of the water reverse osmosis plant.

The HIID water charges report provides a good point of departure for discussions aimed at introducing water charges or plant financing. The evaluation team is nevertheless concerned that actual data on O&M and water distribution were not used to calculate the cost of water. In addition, the team noted that CH has no plans to initiate policy work to follow up on the HIID report to introduce the concept of water users' fees.

The hydrological agency that is to operate the water treatment plant has no experience in operation of a public utility. This combined with the fact that charges for drinking water are unheard of in Turkmenistan, implies that the entire system of water charges, including the mechanics of collecting the money, must be established. Thus there are two distinct but related levels of work to be done with regard to implementation of a water charges scheme: 1) at the national government level — introduction of the concept of water users' fees and to ensure that the government understands the advantages of such schemes; and 2) at the local level —

introduction of the mechanics of tracking water use per household or institution, billing, collecting, and finally planning the use of the fees.

4. **There is no plan for quality control and quality assurance for the water treatment plant.**

The team identified the following list of concerns related to the engineering and the operations and maintenance of the reverse osmosis plant.

- A. The final number of plant operators is not identified, and though six were trained in the United States by CH's subcontractor AES, the evaluation team is concerned that more trained operators will be needed. An operators schedule has not been developed.
- B. Operators and maintenance personnel have not been tested.
- C. The evaluation team is not clear about the hiring and training of electricians. In general, the employment pattern of the hydrological agency is unclear.
- D. Names of controls on panels are not in Russian.
- E. Pipes are not identified and are lacking arrows which show direction of flow.
- F. The water pumps lack shut-off valves, which means that tank water must be lowered for pump repair.
- G. The plant lacks equipment for removing the pumps. At present, laborers use two ladders.
- H. The clean water tank has a single chamber which means that the plant will be shut down if repairs are needed.
- I. There are no safety signs on chemical tanks and switch panels.
- J. The evaluation team found no established procedures in case of chemical spills.
- K. There is no hot water or dishwater to wash laboratory equipment.
- L. There is no properly equipped restroom in the building, and there is no place for washing hands. The plant has no sanitation or sewage equipment.

Recommendations

- 1. CH should engage the services of a consultant in public planning with experience in utilities management to work with the hydrological agency and local authorities, including managers of collective farms, to finalize the water distribution plan.

2. CH should ensure that the distribution plan includes measures to prevent contamination of drinking water from point of production to point of consumption.
3. The evaluation team recommends that CH hire a consultant with experience in public policy to work with the Turkmenistani government to develop and implement a plan for financing of the water treatment plant. The consultant should be experienced in working with host governments in a participatory manner, and have the capability to ensure that the government and the local population understand the need for water charges.
4. The evaluation team recommends that CH plan to work with the hydrological agency to settle the issues of labor deployment, operations and maintenance guidelines, management structure, etc.
5. The team recommends that USAID establish quality control and quality assurance measures. CH and USAID should address the engineering issues raised above.
6. The team supports the revised health education and sanitation program and recommends that it be fully funded and supported by USAID and the GOT.

CH2ANX4A.R44

UZBEKISTAN
EVALUATION OF DELIVERY ORDER NO. 6
AND THE UZBEKISTAN PORTION OF
DELIVERY ORDER NO. 12

INTRODUCTION

The overall objectives of the Environmental Policy and Technology (EPT) project are a) sustainable water management in the Aral Sea Basin, and b) reduced levels of urban and industrial pollution. The objective of USAID in the Central Asia Region (CAR) is to assist with mitigating the negative health effects of an unsafe environment in the Aral Sea Basin area by reducing the incidence of water-borne diseases.

The objectives of Delivery Order No. 6 in Uzbekistan are to improve the quality of water being used for potable purposes and increase the awareness of the linkage between public health and water, sanitation and hygiene practices. The geographic focus for implementation of DO #6 is Nukus and Urgench, two sizable cities along the Amu Darya.

The main achievements under DO #6 to date are:

- a) installation of chlorinators at the Nukus and Urgench water treatment plants, and;
- b) provision of laboratory equipment, reagents, manuals, and staff training for water testing laboratories at the two treatment plants and the Sanitation and Epidemiological Service laboratory in Nukus. Also, a sanitation and health education workshop was conducted in Urgench for local and regional government health care workers.

STATUS OF PROJECT TASKS

Delivery Order #6

Task #1: Water Treatment Plant/Distribution System Improvements.

- A) *Continue any investigations on water plant/distribution system improvements not completed in DO #4.*

CH investigated plant clarification and filter operation in July-August 1995. This resulted in a decision to install filter plant control panels. USAID/Almaty approved purchase of the panels during the week of November 5-11. Plans have been made for a team to inspect the transmission systems in August 1996.

An engineering investigation in July-August 1995 determined that new rechlorination equipment should be installed at distribution points in the Nukus transmission system. USAID also approved the proposed installation of rechlorination equipment during the week of November 5-11.

An engineering appraisal is tentatively scheduled for January 1996 to investigate a possible source for augmenting the supply of water to Nukus.

B) *Work with the staff of the water plants and related distribution systems to modify operations to improve treatment performance.*

CH conducted an assessment of staff training needs in July-August 1995. An extensive internship program is being designed for implementation in February 1996.

C) *Perform design work as necessary, produce procurement documents, and purchase needed equipment for the water plants and distribution system.*

Under EPT, CH has supervised the installation of chlorination systems for the Nukus and Urgench water treatment plants. This was done in August 1995. CH is currently designing plant clarification equipment for installation in February 1996. Plant filter controls have been ordered. Designs for chlorination equipment to be installed in the rechlorination plants of the Nukus transmission system have been prepared.

D) *Provide operation and maintenance manuals with Russian translations for the major equipment provided for the water treatment plants.*

CH has provided generic manuals to staff at the plants that show how to startup and operate the chlorination systems. CH is in the process of translating English manuals provided by Capitol Control Systems into Russian. The translated manuals must be submitted to Capitol Control Systems for approval prior to distribution to the treatment plants. The estimated completion date for the Russian manuals is January 1996.

Task #2: Laboratory equipment

A) *Purchase and delivery of laboratory equipment, and training of local SES laboratory staff in proper use of delivered equipment.*

CH purchased and delivered equipment to the SES laboratory in Nukus, and to the laboratories located in the treatment plants in February 1995. Follow-up training on operation and maintenance of the equipment was provided in August 1995. An assessment of additional equipment and reagent needs is scheduled for November 1995.

- B) *Provision of operation and maintenance document for all equipment supplied.*

Laboratory manuals in Russian and English have been provided.

Task #3: Health education and materials development

- A) *Purchase, delivery, and installation of demineralization units at selected sites in Karakalpakstan and Khorezm Oblast.*
- B) *Provision of operation and maintenance document in Russian to facilitate long-term demineralization unit maintenance requirements.*
- C) *Operation and maintenance training and public health education of staff at facilities where demineralization units are installed. (These could include, for example, hospitals, kindergartens and other state care facilities.)*

CH2M Hill recommended that plans to install 18 demineralization units under Task #3 should be dropped because the units are too expensive and would only benefit approximately 50,000 people. CH recommended improvements at the water treatment plants as a more cost-effective method of achieving benefits. USAID/Almaty has approved this change in the deliverables, but, there is no official modification. The MOU has not been amended.

- D) *Public health training of local SES officials, training of health education trainers, and promulgation of appropriately defined public health messages through mass media.*

CH conducted the first public health education program in Urgench in April 1995, and a follow-up workshop in October 1995. Seven local health and sanitation demonstration projects have been selected and a work plan is under preparation for submittal to USAID.

Delivery Order #12¹

Deliverable #1: Identify improvements to Water Transmission Lines

This is scheduled for August 1996.

Deliverable #2: End-of-Pipeline Chlorination

No action to date.

¹ Annexes covering activities in Turkmenistan (DO2), Kazakhstan (DO7) and Uzbekistan (DO6) include DO 12 activities which take place in those respective countries. DO12 activities which take place in more than one CAR country are not included in the annexes. At the time of the evaluation, no action had been taken on any of these activities.



Deliverable #3: Extended Operational Services

No action to date.

Deliverable #4: Sanitation Facilities

This deliverable calls for development of a sanitation program that will include community development, institutional changes, and construction of facilities. CH is currently developing a comprehensive plan for public health and sanitation. This grassroots program, which is being developed for Kazakhstan and Turkmenistan, as well, includes construction of cost-effective sanitation facilities.

ACHIEVEMENTS, PROBLEMS AND RECOMMENDATIONS

Achievements:

1. **The engineering tasks conducted under DO #6 have the potential of improving the quality of drinking water for a large population in Uzbekistan, if additional engineering works are done to address problems of high turbidity and recontamination in the transmission systems.**

Installation of equipment and improved operations at the Nukus and Urgench water treatment plants will improve the supply of potable water to approximately 400,000 people. This will contribute towards reducing the incidence of water-borne diseases. The potential beneficial impacts are highly significant, including reduced mortality and illness, and increased economic productivity resulting from improved health.

2. **CH has excellent working relationships in Uzbekistan. CH represents American commitment to development and improving the lives of disadvantaged populations. The work in the water treatment plants are an example of high quality American engineering and workmanship.**

Treatment plant managers and government officials see the installation of chlorinators and provision of laboratory equipment as a demonstration of American capability, technology, and commitment to do something concrete. Without exception, local government officials and plant managers and operators were enthusiastic and grateful for CH's efforts in Nukus and Urgench. CH and USAID have set a standard for other donor funded projects to follow.

3. **The health and sanitation program is a sensible and cost-effective means of achieving widespread health benefits.**

The grass roots approach of CH2M HILL to health education is enlightening to Government Health officers in the sense of showing that significant progress can be achieved with local

resources through preventive medicine. This promising approach to achieving systemic change in health care has been praised by other donors and expatriate health advisors.

Problems and issues

1. **The chlorination works at the treatment plants are not likely to be effective in reducing water-borne diseases for the following reasons: 1) the turbidity of the treated water is so high that it reduces the effectiveness of chlorination; 2) probable recontamination of the water in the transmission and distribution systems; and 3) unsanitary handling of water in households.**

High turbidity: The turbidity of the finished treated water is NTU 14 at the Nukus plant, and NTU 10 at the Urgench plant. The WHO guideline is 1.0 NTU and US EPA's standards is 0.5 NTU. The treatment plants presently follow GOST quality standards which allow a turbidity of approximately 20 NTU. Plant managers say that they cannot revise the turbidity standard, it must be done by the national government. High turbidity potentially prevents the chlorine treatment from eliminating pathogens. As noted in a EPT report:

Micro-biological organisms, such as bacteria and protozoa, can attach themselves to suspended solids and thus be protected from disinfection (chlorine) agents.... Thus while the plants produce turbid and minimally disinfected water that meets GOST standards, this finished water is very likely contributing to the acute public health problems in the delta.²

The result of high turbidity that the chlorine dosage must be much higher than normal to be effective, and, even if a high levels of chlorine is use, there is still danger that pathogens may be shielded from chlorine and will survive disinfection.

CH2M HILL has programmed activities to remedy this problem, including plans to reduce turbidity through improved operation of the filters and clarification systems. Also, they are presenting a water quality seminar in February to support international revision of water quality standards among all the CAR countries.

Recontamination: Although transmission systems are reported to be in good condition, they may be contaminated by bacterial slime as a residual effect of inadequate chlorination in the past. An engineering review of the condition of the transmission systems is planned for August 1996. Distribution systems in both Nukus and Urgench are old and leaky and thus susceptible to contamination. Japanese donors are studying the distribution systems in these two cities, and other urban areas as well.

² CH2M HILL, Field Report, Interim Field Investigations in Uzbekistan: Nukus and Urgench Water Treatment Plants, June, 1994, p. 2-2.

Indoor sanitation: Some hotels and buildings have interior plumbing, but most municipal water is delivered to communal standpipes. From there, water is hauled in containers to homes and stored in containers which are often unhygienic. Handling methods are also often inadequate to maintain good quality water. Therefore, even if water is potable at the standpipe, recontamination is likely to occur in homes. This problem is being addressed through the sanitation and health education program.

2. **The sustainability of the chlorination works is doubtful because operations and maintenance and procurement of chemicals is financed through the central government budget, and not water charges.**

There is no question of technical sustainability, but the problems of covering recurrent costs threaten the long term use of the chlorination works. The USAID representative in Tashkent said that despite their efforts to understand the government budgeting process, budget priorities are unknown. Nonetheless, he noted that allocating resources to the issue of financial sustainability would waste CH2M Hill resources.

3. **The work plan for DO 6 was inadequate at the time of the evaluation.**

The evaluation team was provided a partial draft work plan prepared by the Country Manager in Virginia dated July 27, 1995, for work in Uzbekistan under Delivery Orders 6 & 12. In his transmittal memorandum, the Country Manager notes that the draft is incomplete, focused on engineering activities, and does not divide the effort between DO 6 and DO 12. The draft needed to be checked for double counted expenses and over scheduling of people, and lacked good cost data until scoping work is completed in August 1995. Indicators and targets are not presented in the draft work plan.

The work plan for the sanitary and health education program under Task 3 is still under preparation.

Recommendations

1. With respect to the engineering works, CH2M HILL should assess and report on what other agencies are doing or intend to do, and what additional work needs to be done. This is especially important with respect to the transmission and distribution systems so that the installed works are effective towards reducing the incidence of water-borne diseases among the targeted population.
2. CH2M HILL should develop a definite work plan to wrap-up the engineering works in one year. They should also schedule periodic inspections to monitor performance. The work plan should be used to secure USAID official approval of changes in project deliverables.
3. USAID should extend the completion date for the sanitation and health education program, allowing two years for completing demonstration projects and the education program.
4. USAID should fully support the public health and sanitation program. CH2ANX4B.R44

KAZAKHSTAN
EVALUATION OF DELIVERY ORDER NO. 7
AND THE KAZAKHSTAN PORTION OF DELIVERY ORDER 12

POTABLE WATER DISTRIBUTION SYSTEMS AND PUBLIC
HEALTH IMPROVEMENTS FOR THE CITIES
OF ARALSK AND KAZALINSK

INTRODUCTION

The objective of Delivery Order (DO) 7 is to provide water distribution systems and public health improvements for the Kyzyl Orda Oblast and the cities of Aralsk and Kazalinsk. The delivery order was signed on August 19, 1994 and will expire on April 16, 1996. Delivery Order 12, which was signed on July 14, 1995, adds three new activities to the water systems activities already included in DO 7. DO 12 expires in January 1997.

This annex assesses the progress the project is making toward accomplishing the activities described in DO 7 and the Kazakhstan portion of DO 12. The annex also assesses the likelihood that these activities will have sustainable development impact.

OVERALL FINDINGS

The EPT contractor, CH2M Hill (CH), has initiated, and in some cases completed, several of the tasks in DO 7 and DO 12. These include the installation of chlorinators, provision of laboratory equipment, procurement of equipment for pump stations, and public health training. These tasks have been completed expeditiously and efficiently with high quality workmanship. The Kazakh engineers and public officials who are working with CH on this project appear to be well satisfied with CH's engineering accomplishments.

The contractor's sanitary health education activities in Kazakhstan are just beginning but appear to be well planned. The approach is sound and when planned activities are completed, this component of the project should result in significant and positive behavior change among intended recipients as well as systemic change in the way Kazakh institutions engage in sanitary education and preventive health activities.

There are several tasks called for in the DO that the contractor has not initiated and, in some cases, has made no plans to initiate. These include pipe repair and replacement, water meter installation, and a water pricing study.

From an engineering point of view, the most serious issue is that of leaking pipes which need to be repaired or replaced. The engineering work that the contractor has completed to date will have little or no impact on improved water quality unless the leaking pipes are repaired and replaced. In addition, the contractor's lack of attention to the issue of cost recovery, which was to be addressed through the water pricing and metering activities, raises questions about whether the government of Kazakhstan (GOK) will be able to operate and maintain the project's engineering improvements.

STATUS OF PROJECT TASKS

The evaluation team had some difficulty in assessing the extent to which the project was making progress toward the completion of its tasks. The reason for this was that, according to CH2M Hill, the deliverables for which CH was responsible were no longer the same as those in the Delivery Order. The contractor has not initiated, nor has it made plans to carry out, certain activities that are included in DO 7 and DO 12. Discrepancies also exist between CH's actual and planned deliverables and the Memorandum of Understanding concerning DO 7 between USAID/Almaty and the Government of Kazakhstan.¹

According to CH, the Government of Kazakhstan and USAID/Almaty have agreed to a certain number of changes in the deliverables. CH was able to provide documentation for some, but not all, of the changes that had, according to CH, been agreed to. However, none of these changes has been approved by the EPT contracting officer.

DO 7 does not expire until April 1996, so it is normal that not all planned activities have been completed. At the time of the field investigations for this evaluation, CH had not submitted to USAID a work plan for DO 7. Subsequently, CH has submitted a work plan to USAID. Although labeled as a work plan for DO 7, it also covers some tasks, such as well field rehabilitation, that are authorized not in DO 7, but in DO 12. There are also several tasks authorized in DO 7 and DO 12 that are not covered in the work plan. Of the DO 7 tasks that are covered, the last is scheduled to be completed in December 1996. Since DO 7 expires in April 1996, this means that an extension of the DO 7 expiration date until at least December 1996 will be needed in order for CH to complete its tasks. If the substantive recommendations in this evaluation are adopted, an extension beyond December 1996 will most likely be necessary. Less than one-quarter of the obligated funds in the delivery order have been spent, however, so an increase in funding may not be necessary.

¹ The Memorandum of Understanding closely parallels the DO, but provides more detail as to the responsibilities of each party — USAID/Almaty and the GOK — in the implementation of the project. There exist also some significant differences between the Memorandum of Understanding and the DO. In particular, the DO includes, while the Memorandum of Understanding does not include, provision for a water pricing report, activities designed to discourage use of water from the Syr Darya River, and activities connected with the municipal water treatment plants in the cities of Aralsk and Novokazalinsk.

It should be noted that CH2M Hill is not a signatory to the Memorandum of Understanding.

Following is the status of DO 7 and DO 12 (Kazakhstan) deliverables as of early November 1995. The task numbers refer to the numbers in the DO. The recently submitted work plan uses a different numbering system.

Delivery Order 7

Task #1: Upgrade Transmission Pump Stations²

This task involves replacing pumps, flanges, valves, pipes, electric panels and ancillary equipment at six pump stations on the federal water transmission pipeline. It also involves operations and maintenance (O&M) training of GOK staff as well as the preparation of O&M manuals.

CH has received and evaluated bids for the pumps, flanges and valves, has selected a U.S. supplier — Patterson Pump Company —, and has ordered the equipment. CH is preparing requests for bids for the electric panels. The GOK will be responsible for providing and installing all other equipment, such as pedestals and pump station pipes.

Patterson Pump Company will provide an O&M manual that will be translated into Russian by CH staff in Almaty. CH will provide O&M training once the pumps are installed.

All activities in this task are scheduled to be completed by March 1996.

Task #2: Distribution System Improvement/Extension³

This task involves 11 sub-tasks that can be conveniently collapsed into five categories:

- Pipe repair or replacement
- Water meter installation
- Installation of chlorination equipment
- Water pricing report
- Related tasks

Pipe Repair or Replacement

The DO called for CH to prepare an analysis of "proposed water distribution system expansions and line repair/replacements to be performed under this project in Aralsk, Kazalinsk, and surrounding areas." It also requires the contractor to "prepare a construction schedule...for the repair and construction of pipeline, booster stations, and watering points..." (page 6.) This was

² In the work plan table of contents, this is subtask 2B. In the work plan text, it is subtask 2A.

³ This task is also labeled task 2 in the work plan. However, as noted above, pump rehabilitation, which is a task in the DO, is a subtask of task 2 in the work plan. Also, not all of the DO 7 Task 2 subtasks are included in the work plan.

to be followed by the "purchase, delivery, and storage of pipe, fittings, etc." and the on-site inspection of pipe installation.

CH informed the evaluation team that USAID/Almaty and the GOK agreed that this task would not be carried out as planned. The work plan calls for an evaluation of the water distribution system for the cities of Aralsk, Kazalinsk, and Novokazalinsk and the provision of 1 kilometer of piping to the cities of Aralsk and Novokazalinsk.

It is not clear how extensive or thorough the planned evaluation will be. The evaluation team believes however, that, from a systems point of view, addressing the problem of leaks in the pipes is the most important task that should be undertaken — more important than any of the other engineering tasks that have been completed or are planned by CH2M Hill.

The evaluation team understands that the actual repair or replacement of leaking pipes is beyond the financial capabilities of this task order. We have also been told that the World Bank is investigating the possibility of making a loan to the GOK for the repair and extension of the pipeline. However, we believe that a thorough diagnosis of the extent of the damage to the pipes, both in the transmission and the distribution system, should be undertaken as the number one priority of DO 7. Without attention to this problem, the main cause of water contamination will not have been addressed. The reasons for this recommendation are provided in detail in subsequent paragraphs.

Water Meter Installation

The delivery order called for CH to equip the distribution system (presumably pump stations) with "metering and recording devices" and to equip "selected water delivery points (i.e., stand pipes)" with "meters/totalizers."

A memorandum received from USAID/Washington dated January 25, 1996 states that the "installation of water meters at the pump stations is proposed for next spring." However, there is no mention of this task in the CH work plan.

Installation of Chlorination Equipment

The DO calls for CH to install chlorination equipment at the Aralsk and Novokazalinsk water reservoir areas.

This task is nearly completed and has, in fact, gone beyond the original intention. By the end of November 1995, CH was due to have installed chlorinators not just in the two pump stations serving Aralsk and Novokazalinsk, but in six pump stations serving the federal transmission pipeline.

Water Pricing Report

CH was to prepare a water pricing report. The work plan indicates that CH does not intend to carry out this task.

Related Activities

Two other activities included in the DO under this task involve discouraging use of water from the contaminated Syr Darya River and work related to the municipal water treatment plants at Aralsk and Novokazalinsk.

Neither of these activities is in CH's work plan.

Task #3: Laboratory Equipment⁴

This task involved provision of water testing equipment to five SES laboratories in the Oblast and the training of laboratory staff in the use of the equipment. This task has been completed.

A related task involved the preparation of a manual in Russian on the operation and maintenance of the equipment. The manual has been completed, but because of some technical translation problems, revisions need to be made before the manuals are delivered to the laboratories.

Task #4: Health Education and Materials Development⁵

This activity involves public health training and promulgation of public health messages through mass media.

This activity is ongoing. An assessment of health education needs was completed in December 1994. An interagency public health seminar was held in Aralsk in May and a seminar is being planned for December involving the chief medical officers from the country's Oblasts. In the late summer and early fall of 1995, a consultant worked with the full-time public health specialist on the staff of CH/Almaty to prepare a public health and mass media plan. The consultant's report is not yet complete, but, according to CH it will include a mass media campaign involving newspapers, television, and radio; the training of public health personnel; the introduction of sanitary education into the curriculum of Kazakh elementary and secondary schools; and the establishment of eight sanitation demonstration centers — three in Aralsk and two in Novokazalinsk.

⁴ This is also Task 3 in the work plan.

⁵ This is also Task 4 in the work plan.

Delivery Order 12 (Kazakhstan)⁶

Task # 1 — Survey of Ground Water

This task involved a survey of ground water resources in the Berdykol and Kozaman well fields. The task has been completed and an analysis of the task is included in a subsequent section of this report.

Task # 2 — Well Field Rehabilitation

DO 12 requires that the contractor design a comprehensive rehabilitation plan for a total of up to 30 wells in the well fields. A March 1995 CH report recommended drilling 14 new wells. A July 1995 CH report recommended instead the "test redevelopment" of two wells followed by future "redevelopment of additional wells." In the summer of 1995, CH proceeded with the pilot rehabilitation of three wells. CH informed the evaluation team that it is planning to rehabilitate up to 30 new wells in the summer of 1996.

The current work plan, however, does not include plans for the rehabilitation of additional wells. The only activity remaining related to the well fields is the preparation of conceptual numeric aquifer model.

Task # 3 — Sanitation Facilities

The Contractor was to develop a sanitation program that would involve public education as well as equipment for technologies, including latrines, septic tanks, wastewater collection, and wastewater treatment.

As reported above, plans have been made and some activities initiated for sanitation education. The work plan makes no provision, however, for sanitation technology transfer.

THE POTENTIAL FOR PROGRAM IMPACT

The project is not completed, so only the potential for project impact can be measured. The evaluation team was impressed with the potential for project impact of the public health component of DO 7. In contrast, the team finds that the engineering work will have little measurable impact on water quality unless complementary measures are undertaken.

⁶ Task 1 and 2 of DO 12 are included in the CH work plan as Task 1, which is divided into three subtasks: 1A — Well field investigation, 1B — Hydrogeologic characterization, and 1C — Pilot Rehabilitation. Task 3 of DO 12 is not included in the CH work plan.

Annexes covering activities in Turkmenistan (DO2), Kazakhstan (DO7) and Uzbekistan (DO6) include DO 12 activities which take place in those respective countries. DO12 activities which take place in more than one CAR country are not included in the annexes. At the time of the evaluation, no action had been taken on any of these activities.

The Public Health Education Program of DO 7

The construction of the Saribulak-Aralsk pipeline, beginning in 1986, led to a decline in the incidence of water-borne diseases in Kyzl Orda Oblast. The following table, which presents data from Aralsk Rayon shows that most of the decline occurred in the first year, 1986, when the population first began benefitting from the cleaner water from the pipeline.⁷ Since 1986, the incidence of gastrointestinal problems has declined further although the number of cases of Hepatitis A has increased. Still, the numbers remain high, indicating that large elements of the population are still drinking contaminated water.

Table 1

**Incidence of Water-Borne Diseases in Aralsk Rayon
Number of Cases per 100,000 Population**

	1985	1986	1994
Hepatitis A	366	205	232
Gastrointestinal Problems	411	328	209
Typhoid	37	23	No data
Salmonella	33	11	No data
Dysentery	33	64	No data

As mentioned previously, the sanitary health component of DO 7 appears to be well planned and the activities that have already occurred have been well received. The team was impressed with several elements of the program. One was the emphasis on preventive health, rather than curative health. Another was the grass-roots approach that involved getting local participants to organize their own public health education activities. Another was the plan to develop curriculum on the sanitary use of water that could be included in elementary and secondary school programs. Still another was the plan to train Oblast level medical staff to become sanitary health educators.

This component of DO 7 focuses on health education dealing with water and sanitation. As such it complements other USAID/Kazakhstan health activities that have a broader scope. The evaluation team strongly supports this activity and recommends that USAID support and, if possible, expand it.

⁷ Previously, most of the population was obtaining its water from the river or from shallow wells.

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The Condition of Transmission and Distribution Pipes

The objective of DO 7 is to make improvements to the Aralsk-Novokazalinsk water transmission and distribution system that will reduce water shortages and improve water quality. The system pumps water from 40 wells in two well fields in the Saribulak area through a 232 km transmission pipes and into a network of distribution pipes that serve the towns of Aralsk and Novokazalinsk and rural settlements in Aralsk rayon and Novokazalinsk rayon. The distribution system is not yet completed. Only 150 km of a planned 550 km have been built in Aralsk rayon and only 40 km of a planned 436 km in Novokazalinsk rayon have been completed.⁸

From an engineering point of view, the main cause both of the shortages and of the sub-standard water quality is that there are a large number of leaks in the transmission pipeline, in the network of distribution pipes, and at distribution points (standpipes, faucets, toilets, etc.) The leaks in the system waste a tremendous amount of water and the holes in the pipelines also allow contaminated groundwater and sewage to enter the system, thus contaminating the relatively pure water that is being pumped through the pipeline from the well fields.

The magnitude of the water shortages caused by leaking pipes can be illustrated by data from the Aralsk rayon. The Federal Pipeline Authority estimates that the water needs of the 100,000 residents of Aralsk rayon are approximately 2,100,000 million gallons per day (mgd). This is based on an estimate of 20 gallons of water per person per day plus 100,000 gallons per day for institutional use (the salt factory, the hospital, etc.) Yet, the Federal Pipeline Authority pumps into the rayon 3 million gallons per day. This means that about one-third of the water that is being pumped into the rayon is leaking out of the system before it is used.

Leaving aside, for the moment, the problem of leaks in the main transmission pipe and in the distribution pipes, the evaluation team's personal observations in Aralsk led to the conclusion that the vast majority of standpipes, toilets, and faucets were leaking. Even a small number of leakages in pipes, taps, and faucets wastes a significant amount of water. A single leak of, say, 2 gallons per minute wastes 2880 gallons per day. Let us assume that each of the 2000 residences in Aralsk has a single leak in its plumbing system. This translates into a water wastage of 5.8 mgd, significantly more than the total amount pumped into Aralsk per day and, in fact, significantly more than the entire amount of water pumped from the well fields per day (3.4 mgd.)

The problem of water quality stems from leaks in the transmission and distribution pipes themselves. Laboratory tests indicate that contaminants are entering the system in a large number of places along the transmission line, which was built with low-quality pipes in 1986, and along the distribution system, which also has, for the most part, low quality pipes and has been constructed piecemeal over the last nine years.

⁸ The Aralsk-Novokazalinsk pipeline is one of five such pipelines that have been constructed in Kyzyl Orda Oblast. Four additional pipelines are planned for the Oblast.

The contractor's completed and planned engineering work consists of well field rehabilitation, upgrading the pumping system, and installing chlorinators. The well field and pumping system work is designed to increase water quantity. But as the data presented in the preceding paragraphs demonstrate, there would be far less need to increase water quantity even when the entire distribution system is completed if the leaks along the pipeline were repaired or the leaky pipes were replaced. Although the chlorinators are helpful with respect to the problem of water quality, they do not address the problems associated with turbidity which are caused by contaminated water seeping into the distribution system. Once again, the solution is to repair or replace the leaking pipes.

DO 7 estimated that 200 km of pipe would be needed to replace leaking pipes. At this point no one can be sure of the extent of the damage to the system although the evaluation team's personal observations indicate the damage is extensive. As indicated above, the evaluation team understands that it is beyond the financial capability of the contractor, given the funding obligated for DO 7, to actually repair or replace pipes. The contractor should, however, undertake a thorough evaluation of the extent of the damage and the location of leaks. Such an evaluation would provide the GOK with the information it needs to seek financing from the World Bank or another donor to address the problem of leakage. It would also provide a more thorough understanding of the amount of water wastage and of potential sources of contamination which could, in turn, affect the nature of the remaining work to be carried out by the contractor under this task order. Providing for additional pumping capacity from wells or from transmission line pumps does little good if the water is being pumped through a sieve.

Operations and Maintenance Costs of Engineering Installations

As explained above, the CH work plan does not include installation of water meters or the water pricing report that are called for in DO 7. CH did not explain why these deliverables are not included in the work plan. One plausible explanation is that the water pricing report is not included in the Memorandum of Understanding between USAID/Almaty and the GOK. Water pricing is a sensitive political issue in Kazakhstan at several levels. It is sensitive at the international level where headwater countries like the Kyrgyz Republic would like to charge downstream countries like Kazakhstan for the water provided by the Kyrgyz Republic's headwater rivers. It is also sensitive at the local level where the GOK has established a complicated water pricing system designed to subsidize the provision of water to households at the expense of industrial consumers and city administrations.

Kazakhstan is the only country among the three EPT countries in Central Asia that actually has an existing water pricing system although the system exists more on paper than in practice. In Aral'sk rayon of Kyzyl Orda Oblast, for example, the Federal Water Transmission Pipeline has four separate prices at which it sells water:⁹

⁹ Prices are quoted in the Kazakhstan currency, Tenge. At the time of the evaluation \$1 was equal to about 63 Tenge.

- 300 Tenge/cubic meter to industrial enterprises;¹⁰
- 200 Tenge/cubic meter to hotels and schools;
- 36 Tenge/cubic meter to the city administration;¹¹ and
- 2 Tenge/cubic meter to rural consumers.

The actual payment of water bills is more often the exception than the rule. In Aralsk, for example, the Federal Water Supply Pipeline had, at the time of the evaluation, received no payment from the Aralsk city administration for more than six months.

The Chief Engineer of Aralsk rayon has calculated that the cost of producing one cubic meter of water in Aralsk rayon is 27 Tenge. This means that, in theory, the S-N pipeline is making a profit on water sales to all but its rural consumers. The Chief Engineer was unable to answer questions about quantities of water provided to each category of consumer because:

- Although pumping stations are equipped with meters, almost none function; and
- Few if any consumption points (schools, factories, standpipes, etc.) are equipped with meters.

CH should include provisions for the water pricing study in a revised work plan. Having some notion of the cost of water and the likelihood that the Federal Pipeline will be able to recover its costs is critical to an assessment of the sustainability of CH's engineering improvements.

ANALYSIS OF FIELD OPERATIONS

The contractor has completed or is, at present, undertaking several field operations. These include well field rehabilitation, the installation of chlorinators, the upgrading of pumping stations, and the delivery of water laboratory testing equipment. The contractor is to be commended for completing or undertaking these activities under adverse conditions. This is particularly the case for the well field rehabilitation, which required that contractor personnel live in nomadic tents, called *yurts*, for nearly three months. For the most part these activities have been implemented expeditiously and efficiently.

There are, nevertheless, two issues with respect to field operations that merit discussion.

¹⁰ The only functioning industrial enterprise in Aralsk at present is a salt production factory.

¹¹ The cities manage their own distribution system. The Federal system is responsible for distributing water to rural settlements while the cities are responsible for distributing water to urban consumers. Some cities, like Aralsk, get all their water from the Federal pipelines while other cities, like Novokazalinsk, obtain some of their water from other sources, such as the Syr Darya River.

Well Field Rehabilitation

The Contractor has undertaken rehabilitation work of three wells. At the time of the evaluation, the team was informed that CH had plans to rehabilitate up to 30 additional wells in the two well fields from which water for the Aralsk-Novokazalinsk system is pumped. The work plan which we received after the evaluation field work was completed does not, however, contain plans for additional well field rehabilitation.

The contractor prepared two reports on the need for well field rehabilitation which contained somewhat contradictory findings. One found that new wells were not warranted while the other recommended the digging of 16 new wells. The two reports analyzed the need for rehabilitating some, but not all, of the wells. The reports also left a number of technical questions unanswered. These include:

- Are there any hazardous compounds in the well water?
- Which wells, if any, need sand filters?
- Why do the pH and water quality of some wells within the Kosaman well field (which presumably draw water from the same aquifer) differ significantly?
- Besides TDS, what are the water characteristics of the aquifer at the Berdycol well field?

If additional well field rehabilitation activity is to be undertaken, additional information should be obtained in order to justify this activity and, especially, to identify the best aquifer and which wells, if any, need rehabilitation. More importantly, the team believes that repairing or replacing leaking pipes should, as explained above, be a much higher priority than well field rehabilitation.

Inspection and Acceptance of Services and Deliverables

DO 7 states that "inspection and acceptance of services and deliverables required by this order will be performed by the USAID COTR...or his designee."

The Contractor has completed several engineering tasks, but, to date, USAID has not engaged impartial experts to carry out quality control or quality assurance of CH work prior to acceptance of the contractor's services and deliverables. The contractor has taken the initiative to obtain receipts for well field equipment and chlorinator installation from GOK officials and has transmitted these receipts to USAID. But the GOK officials signing these receipts are not necessarily qualified to vouch for the quality of the equipment and the equipment's performance.

PROJECT MANAGEMENT ISSUES

Several issues merit discussion.

Planning

As mentioned previously, at the time of the evaluation, CH had not submitted a work plan to USAID for DO 7 or DO 12. It should be noted that no work plan was required in DO 7, which was signed in August, 1994. A work plan was required for DO 12, however, which adds two new activities to DO 7. The work plan for DO 12 was to be submitted within 30 days of the effective date of DO 12, which was July 14, 1995. The evaluation team believes that the preparation of work plans should be normal part of project management, whether required or not.

The work plan which has now been submitted does not, as indicated above, cover all the activities in DO 7 or DO 12. Either the work plan should be revised to include these activities or the DOs should be modified to eliminate tasks that the contractor and USAID agree are no longer necessary.

The Pace of Implementation

The implementation of the activities of DO 7 is behind schedule. The pace of implementation has picked up in recent months, but it will not be possible to complete all planned activities by the current expiration date of April, 1996.

Financial Management

The budget for DO 7 is \$4,291,517 and the entire amount has been obligated. However, according to financial statements, less than \$1 million has actually been spent.

Delivery Order Management

At this point the work planning and the responsibility for the implementation of the tasks in DO 7 and the Kazakhstan portions of DO 12 appear to reside with a Kazakhstan "country manager" based in Washington. This individual is not, however, identified in the work plan.

The work plan does identify 4 task leaders and 4 subtask leaders. Three of the task leaders and all of the subtask leaders are based in the United States. The one task leader based in Almaty is the CH regional director, who is in charge of DO 7's public health education task.

The evaluation team believes that the responsibility for the preparation and management of work plans should reside with the regional office in Almaty. Technical and administrative oversight as well as financial management is properly retained in Washington. In addition, specific tasks can be assigned to people residing in the United States, but the responsibility for making these assignments should reside with a delivery order manager resident in Almaty, not a country manager residing in Washington.

Reporting

The Contractor's Regional Office in Almaty should be commended for keeping its Washington office and USAID informed of its progress on activities. Its reports are less adequate, however, in reporting on project progress against a consistent set of indicators and targets. Partially, this is due to the difficulties USAID and contractors have had in understanding and implementing USAID's new Management and Reporting System.

Relations with USAID/Almaty

The Contractor has good working relations with the office in USAID/Almaty which is directly responsible for environmental activities. However, the EPT program does not enjoy strong support from Senior USAID/Almaty management. The Mission appears to believe that the EPT program does not fit well into the Mission's strategic objectives. It also feels that the project is giving too much emphasis to engineering, not enough to policy reform and institutional development.

The contractor could do a better job of trying to fit the program into the Mission's strategic objectives. However, the Mission's luke-warm attitude toward the project is somewhat surprising given the strong support for the program by Vice-President Gore. The program is included in the Mission's 1994 Strategy Statement and related planning documents. More importantly, the Mission's attitude tends to undermine the morale and incentives of the USAID and contractor staff responsible for implementing the project.

Recommendations

1. CH should either revise its work plan and budget for DO 7 and the Kazakhstan portion of DO 12 to include the tasks it has not included or USAID should modify the DO 7 and DO 12 to eliminate tasks that are no longer required.
2. CH should undertake, as its number one priority, a thorough study of the condition of all pipes, including stand pipes, along the Saribulak-Novokuznetsk transmission and distribution system. The study should be aimed at determining the extent and location of water leakage in the entire system, should determine, once the leaks are repaired, how many additional well fields, if any, need to be rehabilitated to provide an adequate supply of water to the population served by the pipeline, and should conclude with a plan and a budget for repairing or replacing the damaged pipes.
3. If the study finds that the leakage is minimal and localized, CH should provide the pipe or other material to address the problem; if the leakage is beyond the financial capacity of DO 7, at least the study will have laid the groundwork for the Government of Kazakhstan to address the problem, perhaps with the assistance of other donors.

4. Because the evaluation team was unable to obtain, despite requests, data concerning the quality of water from each of the wells in the two well fields, we recommend that the water from each well be tested for pH fluctuation and for the presence of sand or other contaminants and that, depending on the results of this analysis, certain wells be capped and others be provided with sand screens.
5. CH should not install chlorinators in the Novokazalinsk treatment plant (a) because it will do little good (given the tremendous pollution of the water source) (b) and it will serve to encourage the use of water from the Syr Darya river.
6. Either USAID or the Government of Kazakhstan should engage the services of impartial experts to carry out quality control inspections prior to acceptance of CH engineering related tasks.
7. The revised work plan and DO modification should include a water pricing study aimed (a) at determining the unit cost of water (using various assumptions about system efficiency), (b) at analyzing the current pricing structure and billing system, and at identifying the constraints that need to be addressed in moving toward a system of full cost recovery from water users.
8. The revised work plan and DO modifications should fully support the public health demonstration centers and media campaign that are now in the planning stages.
9. The content of the sanitary health media campaign, workshops, and seminars should be more comprehensive, including not just proper use of water, but also water conservation and recycling and sewage disposal.
10. The demonstration centers should include inexpensive sewage disposal packages so that beneficiary populations begin to appreciate that proper sewage treatment has as much effect on sanitation and health as does proper water handling.
11. USAID should consult with CH to develop a revised set of targets that are consistent with the activities in the revised work plan while still maintaining their relationship to existing MRS indicators, and CH should include, in its monthly reports, statements that show how completed, current, and planned activities are contributing to target attainment.

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Annex 4C-14

CENTRAL ASIAN REPUBLICS EVALUATION OF DELIVERY ORDER 8

CENTRAL ASIA REPUBLICS REGIONAL WATER MANAGEMENT AND COOPERATION PROJECT

OBJECTIVES

Delivery Order No. 8 is designed to foster support for increased regional cooperation among the Central Asian Republics on the region's most pressing water problems. The goals for this work are two-fold: 1) to bring about policy dialogue and regional consensus on water problems; and 2) to leverage resources of other international donors providing assistance to Central Asia on the Aral Sea problem.

Activities to achieve the goals of DO #8 include: demonstration or research projects which focus on practical activities; seminars which provide fora for presentation, discussion, policy analysis and implementation; sustainable partnerships between water related agencies in the Republics and organizations such as the US Bureau of Reclamation which are intended to ensure long-term assistance and support to the CARs; a regional conference designed to present policy options based on analysis of work conducted under demonstration projects; provision of equipment and training; and cooperation and collaboration with other donors to leverage support for the region. Delivery Order No 8, unlike the other Central Asian delivery orders, has the explicit objective of achieving public policy reform and institution building. The net outcome of such regional cooperation is expected to be more efficient intercountry use of water resources and improved public health.

ACTIVITIES TO DATE

Twenty-two senior CAR officials from five countries participated in a study tour to the United States in May 1994. The group visited Washington, DC and the Colorado River Basin where water resource issues are similar to those faced in the Aral Sea Disaster Zone and its tributaries. The study tour centered around a series of interactive workshops on topics such as water law, policy and pricing, river basin management and operation, river basin compacts and treaties, and public involvement in solving problems.

CH has held three workshops covering the topics of information management, water management and policy, and price policy. The first workshop on information management was held in Tashkent, Uzbekistan in November 1994. Twenty-eight official delegates and 45 other representatives attended from five countries. The objectives of the information management workshop were: discover the available and needed hydrometeorologic, engineering, social and economic data for management of water resources in the Aral Sea Basin; understand the tools

of geographic information systems, satellite mapping, and remote sensing in providing water management data; review modelling methods for water quality and hydrologic processes; review developments in regional and river basin decision making support systems; recommend regional research programs for the Aral Sea Basin.

At this first workshop, criteria were established for the evaluation of proposals for partnerships and small subcontracts for research projects. Those criteria include: program relevance — does the proposal meet a practical need or application?; scientific merit — is the proposal good science and is there some prospect for applications and usefulness?; and structural merit — can the proposal be done within the allotted time, is the budget reasonable, and are there plans to use the results?. A total of 32 proposals were received and evaluated, and eight projects were recommended for funding.

The second workshop on water management and policy was held in Ashgabad, Turkmenistan in April 1995 for 24 official delegates and about 50 other representatives. The following six main topics were discussed: Water Resources Policy and Management, with particular reference to water resources in Turkmenistan and the Kara Kum Canal; Clean Water Standards in Central Asia; Pricing and User Fees, including papers on water pricing in Kazakstan and Turkmenistan; Regional Cooperation — Compacts and Treaties, including a case study of the Colorado River; and Water Management Policies and Applications. In Ashgabad, CH also accepted additional research grant proposals.

CH held the third workshop on water pricing in Bishkek, Kyrgyzstan on November 15-18, 1995. This workshop was strategically planned to follow-up on the Nukus Agreement of September 1995. This agreement, which was signed by all five Presidents of the Central Asian Republics, commits the Republics to making region-wide progress towards resolving the human and environmental consequences of the Aral Sea Disaster Zone.

The workshop in Bishkek was the first time representatives from the five CARs publically discussed the highly controversial topic of water pricing. About 60 representatives attended. Utah State University professors presented the theoretical bases for water pricing and cost recovery on water systems. This included cost recovery and water pricing for irrigation water, urban and municipal water, and hydropower valuation. USU professors and other EPT consultants, though maintaining a low profile during much of the conference, were able to relate many of the current CAR water problems to those encountered by the United States and other countries. Each of the five CARs presented their perspective on key water pricing issues. At the workshop, the CAR delegates agreed to establish a technical committee to develop a regional cooperation action plan to include the following:

1. Share experience with water pricing.
2. Experiment and share information on water measurement.
3. Development of technical analyses as a basis for water allocation.
4. Water pricing as a means of compensation for water quality.

The activities under DO No. 8 are done with full participation of local officials. CH established a working group to plan and carry out project activities. The group consists of delegates from the five CARs and such agencies as UNDP, World Bank, European Union, USAID, and the Interstate Council on the Problems of the Aral Sea Basin (ICAS). Also, USAID co-sponsored a water quality standards seminar along with World Bank and World Health Organization in Chimkent in June 1995.

STATUS OF DELIVERABLES

The following is a summary of the status of deliverables under DO No. 8.

Task A: Workshops: A minimum of three workshops to be completed by Summer 1995 on the following topics: 1) information management; 2) water management; and 3) agricultural management. The contractor shall establish a steering committee to assist in developing workshop topics and advising in workshop preparation.

- 1) The contractor shall develop a list of topics and potential participants for a minimum of three
- 2) The contractor will make or coordinate arrangements for the workshops, conduct the workshops, and prepare workshop conclusion reports (in both Russian and English).
- (3) technical workshops to be held in the fall of 1994 and spring of 1995 for up to fifty (50) participants per workshop.

Status: As summarized previously, CH has held three regional workshops, plus a workshop on water quality standards co-sponsored with other agencies. A fifth workshop on water quality is being planned for February 1996. CH has dropped agricultural management as a workshop topic, though no official modification to the delivery order has been requested or granted. The steering committee is functioning as intended.

The policy workshops and seminars are the primary means of achieving systemic change through the EPT project. USAID, through CH's implementation of DO #8, has been the most active donor in the area of regional cooperation on water problems. The workshops are the first opportunity for representatives of all the Republics to discuss water-related issues. USAID officials noted that the workshops provide a venue to support cooperation among the CARs and for improving relations among the CARs vis-a-vis Russia. CAR government officers and representatives of other agencies have unanimously praised the workshops. CAR official representatives note that the workshops are instrumental as means to achieving several intercountry policy goals including revised water quality standards, water sharing, and water pricing.

CH has yet to provide workshop summary reports were in Russian. CH intends to provide English and Russian translations for all papers presented at the water pricing workshop.

Task B. Applied Research

- 1) The contractor shall fund an applied research program on key topics in regional water management. This process shall include, but not be limited to, the following:
 - a) Establish process and criteria for support of research through a subcontracting mechanism (by January 1995).
 - b) Facilitate selection of research proposals and support for selected proposals (by March 1995).
 - c) Facilitate process of review and final acceptance by review panel of research (by January 1996).

Status: CH and the working group established criteria for selecting research projects at the first regional workshop in November 1994. Approximately 30 proposals have been screened and prioritized. A peer review committee and CH have approved ten projects for funding.

Funding has been delayed because USAID regulations prevent government agencies from being directly funded. The research has thus been delayed. CH is planning to contract with the researchers individually, rather than with their Government institutions.

Task C. Partnerships

Contractor shall develop, implement, and fund a partnership program in accordance with the framework discussed in the Scope of Work. This task shall include, but not be limited to the following:

- 1) Develop, in consultation with USAID/Almaty and USAID/Washington, criteria for partnerships.
- 2) Identify potential agencies and entities to be part of the partnership program and provide necessary financial and logistical support for establishment of partnerships.
- 3) Evaluate and recommend (and implement as appropriate) a CAR database evaluation and improvement project in support of the partnerships program; with particular emphasis on methods used to gather, analyze, and disseminate data on water quality and quantity.
- 4) Evaluate and recommend (and implement as appropriate) an electronic communication project that would provide Internet between U.S.-CAR partnership organization.
- 5) Compile a roster of professional contacts and addresses for actual or potential CAR-U.S. partnership organizations. Distribute contact lists.

Status: Plans have been made for three proposed partnership projects:

1. University of Texas and the Uzbekistan Engineering Institute to develop a water allocation model of the Amu Darya.
2. The Research Triangle (Durham, North Carolina) and three CAR institutes to apply a Danish water quality model called DAN/DIS.
3. Utah State University and the Kyrgyzstan Institute of Water Problems and Energy to work on water pricing and allocation. CH will try to include Tadjikistan and Uzbekistan into this project.

CH/Washington is currently negotiating contracts on the first two projects. Contract implementation has been delayed because CH has not proactively worked with USAID to resolve confusion regarding appropriate contracting procedures for the partnership program.

Task D. Regional Conference

- 1) Organize and conduct an International Conference (probably in Tashkent) for approximately 150 participants o/a January 1996 with published proceedings in Russian and English.

Status: The International Conference is intended to be a forum for presenting results of the applied research and partnership tasks. CH is scheduling the conference for the end of Delivery Order No. 8, (September 1996) so that the projects and partnerships have one year prior to the conference to complete the research. Since none of the planned research projects has begun, this schedule can not be met.

Task E. Strategic Support

The contractor shall develop a strategic support project in support of regional cooperation in general, and the partnerships program in particular. This shall include, but not be limited to, the following:

- 1) Identify Professional International Conferences that should be attended by CAR representatives.
- 2) Identify and organize CAR partnership organization training that may be beneficial to solving problems in CAR.
- 3) Identify International Professional Organizations that would be beneficial to the problem solving process in CAR. Identify and fund membership for CAR partnership organizations and key CAR individuals.

4) Identify major U.S. suppliers of water user related equipment that would be willing to donate equipment; and/or demonstrate equipment at either the workshops or international conference.

5) Investigate, and support, if feasible, a regional journal on water management subject. Particular attention shall be paid to augmenting existing regional publications to help foster regional cooperation on water management issues. Initiating new journals shall be considered if existing journals cannot serve the purpose of this sub-task.

Status: Nothing has been done on this task. CH intends to conduct this task only if funds are available after all other deliverables are completed.

Task F. Equipment

Contractor shall identify, procure, and provide equipment, software and operation manuals to support Tasks A through E. The specific pieces of equipment required under this delivery order are not currently known.

Status: No activity.

ACHIEVEMENTS AND PROBLEMS

Achievements

1. Through its public policy seminars, CH has brought together officials of the various governments and donors and expatriate experts to develop cooperative solutions to their common policy problems in water management, pricing and water quality.

Long lasting improvement in the Aral Sea region hinges on cooperative solutions among all five CAR countries. Regional cooperation is also needed to avoid potentially serious and explosive conflict over water rights between the small watershed countries of Kyrgyzstan and Tadjikistan and the much larger downstream users, Turkmenistan, Kazakhstan and Uzbekistan. The EPT regional cooperation seminars and workshops are the first opportunity for official representatives from all five CAR countries to work cooperatively towards solutions to these difficult problems.

2. CH has coordinated well with donor agencies, local government officials and other consultants. USAID, through EPT, is the recognized leader in fostering regional cooperation to solve some of the problems of the Aral Sea Disaster Zone.
3. There is a high level of official government participation in the implementation of DO No. 8.

Through the working group, CAR officials actively set research and conference agendas. Conferences, seminars and other activities under DO No. 8 thus reflect the most important CAR regional concerns. The expatriate advisors act as coaches and advisors, and are able to provide examples of solutions to similar regional problems found in other parts of the world. The participatory implementation style of DO No. 8 has led to a sense of ownership of the process and substance generated from the workshops and research activities.

Problems

1. The research and partnership tasks are severely behind schedule. This will significantly delay the proposed international conference.
2. No attention is being paid to the strategic support task. To be useful, activities under this task should be carried out concurrently with the policy workshops, research and partnership tasks.

Recommendations

1. Extend the completion date for the water policy program from September 1996 to April 1997 in order to allow sufficient time for completion of research projects. The international conference should be delayed until at least April 1997.
2. Revise the work plan to reflect the extended deadline.
3. Use the revised work plan as the basis for seeking modification of deliverables under Delivery Order No. 8.
4. Carry out activities under Task E. Strategic Support, concurrently with the rest of Delivery Order No. 8. To be effective, the strategic support should not be treated as an after thought.
5. Procure the equipment under Task F in a timely manner to support the policy steering committee, research projects and the partnership program.

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