

MFM Project

CONSOLIDATION OPTIONS FOR ATYRAU

by Kimley-Horn

Research Triangle Institute
1615 M Street, NW, Suite 740
Washington, DC 20036

Municipal Finance and Management
Project No. 5656
Contract No. CCN-0007-C-00-3110-0

April 1, 1996



P.O. Box 12194, Research Triangle Park, NC 27709-2194

BEST AVAILABLE

MUNICIPAL FINANCE AND MANAGEMENT PROJECT

An important aspect of the transition from a centralized political and economic political system to a pluralistic, democratic form of governance is the devolution of power to the local level, where citizens have a greater prospect of participating in government. Countries of the Newly Independent States (NIS) are at a very early stage in this transition:

- local authorities are still unpracticed in democratic processes;
- local authorities have not been fully empowered to govern; and
- local authorities lack many of the requisites of an effective democratic structure.

The Municipal Finance and Management (MFM) project is helping redress these deficiencies by strengthening those basic institutions of local government that promote openness, participation, and accountability.

The MFM project has three overall objectives:

- (1) Introduce municipalities in the NIS to the best available techniques and systems for municipal management, budgeting, and finance in the context of democratic local governance and a free market economic system.
- (2) Introduce automated management information systems to support this kind of local municipal management and governance.
- (3) Establish and conduct training programs locally and in the United States to orient our counterparts to the techniques and skills needed to make the systems work.

MFM is helping counterpart cities in Russia, Ukraine, Kazakhstan, and Kyrgyzstan in the following ways:

Building Expertise in Financial Management. Open and responsive systems of governance require accurate and credible financial data as a basis for citizen participation in decision making. MFM helps local professionals to develop expertise in sound financial management in the following ways:

- *Improving financial practices.* We are helping City Managers to identify and quantify municipal income, expenditures, and assets in order to produce realistic budgets and objective, auditable financial statements.
- *Access to the facts.* Once a budget reflects full information on revenues and expenditures, city managers can provide the public and all decision-makers with the necessary facts to allocate resources responsibly.
- *Public participation.* MFM encourages public hearings, focus groups, and task forces on municipal issues to widen the base of stakeholders in improving community life.
- *Introducing capital finance.* MFM experts are familiarizing city finance experts with the legal frameworks for issuing and selling municipal bonds and for enforcing covenants, all of which require open financial reporting.

Stronger Local Government and Citizen Empowerment. The MFM project is revolutionizing the approach to municipal-level decision-making, as we help cities make strategic decisions for the first time about their own finances and management. Because budget decisions on the delivery of basic public services profoundly impact the living conditions of city residents, MFM is fostering increased citizen attention to and influence on city spending priorities.

And MFM is not limited to finance and budget. It tackles municipal management in other important ways geared to making the city more responsive to the needs of people. Transportation improvement, capital improvements, local economic stimulation, strategic planning, personnel management, handling citizen complaints, conflict resolution, public relations and performance monitoring—all are areas where MFM is making an impact.

Demonstrating Democracy -- Seeing and Doing. Cities selected for MFM participation are interested in making the transition to democracy and a free market. MFM brings officials from each project city on study tours of US cities, where the practice as well as the theory of participatory government can be demonstrated. Participants observe American democracy and its market economy in action. On return home, these officials continue to advance those precepts through practical applications. MFM provides most project cities with their first experience in competitive purchasing, a practice so novel that in some places it has received television and newspaper coverage. Public hearings on budget, accountability in spending and openness in information sharing are intrinsic to MFM's finance and management.

Information is Power. Under the Soviet system, information was tightly held and controlled by the power elite. MFM cities are changing the old habit of hoarding information with the introduction of computers and computer networks, linking units of government to common databases and transforming the way information is handled.

The Economics of Democracy. For democracy to succeed, local government needs the support of its constituents. This support will not come if economic conditions do not improve; therefore, the MFM program in many cities has an economic development component.

Diffusion and Monitoring of Results. MFM's contributions to democratic and free market transition do not stop at the boundaries of the cities in which it works. In Ukraine, MFM is the key support to the nascent Mayor's Association, which recently sent 25 members to see how U.S. cities organize and lobby for their interests. Moscow, which has a powerful influence on general trends in Russia, sent its entire City Council to the U.S. to see democracy in action. Also in Russia, MFM stimulated the convening of a national conference of cities, and is providing direct support to conference discussions of democratic transition and "reinventing government."

MFM has set up a system of performance monitoring for all of its cities which clearly defines results in terms of democratization and progress toward adoption of a free market economy. Through this system, the successes and lessons of MFM will be captured and shared.

CONSOLIDATION OPTIONS

INTRODUCTION

Integral to Kazakhstan's transition to a decentralized governmental structure is the need to reorganize the administration and delivery of municipal services. Under the new national structure, the city and oblast have greater responsibility for planning, financing, building, and managing local services. As the city and oblast proceed along the course of decentralization, it will be important to reorganize services like water and wastewater utilities, housing, stormwater drainage, and the like, with the objectives of improving service delivery and getting the most from every investment.

With its Long-Range Development Strategy, Atyrau took an important step in identifying how it will improve infrastructure and municipal services in the metropolitan area. That strategy lays out major activities needed to improve the quality of life in Atyrau. The success of the strategy depends on many factors, but none more important than creating an effective municipal services delivery system.

The delivery of municipal services in the Atyrau metropolitan area is inefficient and ineffective. Municipal service organizations are overstaffed relative to the services they provide and utility rates are very high compared to customers' total income. Municipal services are unreliable and generally of poor quality. Atyrau needs an infusion of capital to correct many of its problems but it also needs to restructure its service delivery systems, starting with the way utility services are organized.

Local leaders will invest considerable time and energy in restructuring Atyrau's utilities. They face hard decisions regarding the form of reorganization. They must develop a comprehensive plan to implement restructuring. And, to recruit the leadership and investment needed for improvement, they must be able to prove their commitment to the long-term success of the reorganization.

BACKGROUND

Municipal services responsibility is divided among many organizations. The most fragmented services are potable water delivery (hot and cold tap water), sewage collection, and heat distribution. Centralized heat service can be phased out and replaced with home gas heating units or heating units dedicated to individual buildings. Building maintenance, also divided among several organizations, may be reorganized and placed under the control of housing cooperatives. Electrical and gas service are the responsibility, respectively, of a single electrical

power generation and transmission company, Atyrauenergo, and a single gas supply company, Alaugaz. Thus this report focuses mainly on concepts to reorganize the delivery of water and sewer service.

Consistent with the Long-Range Development Strategy, Atyrau will:

- Consolidate ownership, management, and operation of water and wastewater utilities.
- Put individual dwelling units on fully metered systems, making utilities available and controllable at the individual level and requiring residents to pay only for the utility services they actually use.
- Create housing cooperatives to take responsibility for maintenance and improvements in their apartment blocks, including heat; building and yard piping and wiring; roads, parking, and drainage; building maintenance; and playgrounds.

Service Delivery Organizations

There are more than a dozen organizations involved in delivering water, sewer, and heating service. These organizations include 6 municipal Repair Exploitation Units (REUs) and several industrial housing maintenance units (ZKOs) belonging to Joint Stock (JS) companies. The major ZKOs belong to the refinery, the fish plant, the chemical plant, the railroad, Embaoil, and other large industries. The REUs and ZKOs have similar organizational structures, including accounting, customer billing, system operation, maintenance and repair, inventory management, and general management. In addition the REUs are part of Gorzhilkomhoz (GZKH), and depend on GZKH for vehicles, equipment, accounting, etc. As municipal (REU) and private (ZKO) utilities are very similar, there is considerable redundancy in the staffing and operation of the REUs, ZKOs, GZKH, and Oblastzhilkomhoz (OZKH).

Primary utility service is provided by Gorvodokanal (GVK), Atyrauenergo (AE), and Water Treatment and Water Supply (WT&WS), a subsidiary of Uzhnefteprovod (UNP). Water Treatment and Water Supply pumps water from the Ural River, treats it and sells it within the metropolitan area. It sells about 80 percent to GVK and the remainder to 15 other companies and several nearby settlements. Gorvodokanal distributes water to the REUs and the ZKOs. Atyrauenergo generates electricity and heats water for district heating, distributing heating water throughout the metropolitan area to heat distribution stations which are operated by the REUs and ZKOs. Irrigation water for city landscaping is taken directly from the Ural River (untreated) by Embaoil's ZKO.

The water, wastewater, and district heating utilities bill OZKH and the ZKOs, which must pass charges on to customers. This unnecessarily duplicates accounting--compared to direct customer

billing, where a primary service utility would bill the end user directly. It also duplicates the handling of money (e.g., OZKH or the ZKO must collect bills from customers and then pay the electric company or one of the other primary service utilities).

Service Delivery Costs

Municipal service delivery charges are budgeted annually and are applied uniformly over the customer base served by REUs. Utility service charges for the ZKOs vary, depending on the ZKO, but are generally similar to REU charges. Oblastzhilkomhoz reports that 1995 costs exceeded 1995 budgets by about 25 percent for building maintenance. We could not determine if other services showed similar variations from budget.

Gorzhilkomhoz bundles municipal service charges (cold water, hot water, heat, sewer, and building maintenance) and charges them as apartment "rent." Atyrauenergo and Alaugaz bill apartment owners directly for electricity and gas. Table 1 summarizes typical charges for municipal services (Reference 1) and indicates the impact of those charges on an average family of four, with a monthly income of 8,000 tenghe, living in a 45-square-meter apartment. Lower income families and pensioners are protected from too large a financial burden by full or partial exemption from rent. The oblast and city have a rule stipulating that no one should pay more than 30 percent of income for utility and home maintenance services. The rule also exempts invalids, veterans, retired militia, large families, and pensioners from all rent.

A large portion of the population may be exempt from some or all utility fees. Based on the monthly costs shown in Table 1, before an apartment owner must pay a utility bill, the apartment owner's monthly income would need to exceed 7750 tenghe in the six winter months (with heating charges) or 3100 tenghe in the spring and summer months. These numbers beg the question of how utility rates are calculated and whether the rate structure was designed with an adequate allowance for customers who are exempt under existing rules--i.e., whether subsidies for exempt customers are truly built into the rates. A larger-than-expected number of exemptions could render the utilities insolvent. The issue of rent and exemptions is nearly moot at present, as many workers are not paid for months at a time and are unable to pay their rent.

Potable (Tap) Water

Five water lines connect the water and heat utilities with apartment blocks and individual apartments. Three lines are dedicated to providing tap water--two for hot tap water and one for cold tap water. One hot tap water line brings water to each apartment and the other recycles unused water, keeping the hot water circulating. Cold water is not recirculated, so there is only one line. At present many residents do not regard their tap water as "potable." They boil tap water for all drinking and cooking uses. For this discussion, however, we will refer to tap water as "potable."

Table 1. Municipal Utility Service Costs, December, 1995

Municipal service	Monthly rate, tenghe	Total monthly cost per apartment (a)	Monthly cost, percent of income (b)	Annual cost, percent of income (b)
Building maintenance, per square meter	8	360	4.5	4.5
Heating, per square meter	31	1395	17.4	8.7
Hot water, per person	136	544	6.8	6.8
Cold water, per person	3.54	14.2	0.2	0.2
Sewer, per person	2.7	10.8	0.1	0.1
Subtotal, "rent"	N/A	2324	29	20.3
Gas, per person	75	300	3.4	3.4
Electricity, per Kwhr (c)	2	300	3.4	3.4
Total municipal services cost	N/A	2924	35.8	27.1

- (a) Average apartment size is 45 square meters; average number of occupants is 4.
- (b) Median monthly income per dwelling unit is assumed to be 8000 tenghe (2 salaries).
- (c) Assuming 5 Kwhr per day (refrigerator, television, vacuum cleaner, and some lighting).
- (d) Based on 1995 rates (Reference 1).

Hot Water. Potable water is split at heat distribution stations (before entering residential and commercial service). A portion is heated for bathing, washing and cooking. As shown in Table 1, hot potable water costs roughly 38 times as much as cold potable water. This is about 2.7 tenghe per liter--comparable to the cost of heating water in individual water heaters for each apartment (as is done in many other countries). Given the frequency of service interruptions and the high level of hot water system maintenance and repair, Atyrau should begin a transition to individual water heaters and begin phasing out its inefficient, failure-prone district water heating system. Over time, as apartment water heaters are introduced, this approach will:

- Eliminate hot water distribution piping (only cold water will flow to apartments, where individual water heaters will heat only the water needed in each unit). This will simplify water utility operations and improve service standards.
- Eliminate district water heating and distribution plants, reducing maintenance and operation problems for the water service organization. Heating units and associated plumbing will become the responsibility of individual apartment owners.
- Support Atyrau's move to transfer accountability and control of utility consumption to individual apartment owners.
- Reduce the inefficiencies of the present recirculating hot water system, which wastes a great deal of energy (heat) to the atmosphere and soil.

Total Potable Water. According to OZKH records, residential potable water consumption (hot and cold water combined) is about 170 liters per capita per day (lcd), based on metered flow at several heat distribution stations. Assuming about half the water consumed is cold water (to eliminate the cost bias for heated tap water), then cold water consumption is about 85 lcd. This yields an effective consumer charge of about 0.0014 tenge per liter of cold water. This is equivalent to about USD 0.09 per thousand gallons and is very low compared to the cost experience of more than 1000 water utilities in the United States (Reference 2). Between 1989 and 1992, typical US water revenues were USD 1.11 per thousand gallons (a range of USD 0.89 to USD 1.66). The large difference between Atyrau's charges and US water industry experience suggests that either: 1) Atyrau's service delivery is very efficient, especially considering Atyrau's high expenditures for pipe replacement and high water losses, or 2) there are major differences in cost accounting methods. A significant factor in this difference could be relative labor costs between the USA and Kazakhstan, but this will be offset to a certain degree by the large water utility staffs carried by Atyrau's service organizations.

More than 50 percent of the water delivered to GVK is not accounted for. Water Treatment and Water Supply sells GVK an average of 64,000 cubic meters of water per day. Serving a population of about 180,000 people, this is equivalent to 356 lcd, more than double the 170 lcd rate of consumption. This means that GVK has an extremely large amount of unaccounted-for water. Unaccounted-for water can be attributed to a number of causes, including meter errors, unmetered withdrawals (fire fighting, landscape watering, and the like), and leaks. Although leaks most certainly contribute to the unaccounted-for water problem, it is doubtful that so much water could be lost through distribution system leaks, as the leaks would be so large as to create drainage problems. Although leaky building plumbing may also contribute to water loss, the 170 lcd measured by GVK includes all water leaving the heat transfer stations on the way to apartments. Identifying causes and correcting problems associated with unaccounted-for water could result in substantial reductions in water treatment and conveyance costs.

The water distribution system has low pressure and deteriorating pipes. The system will require at least five years' investment in pipe replacement in order to improve system reliability. It will require an investment in additional pumping and in-system storage so that it can meet international standards for pressure and flow. Thus water rates must increase in the short term, to cover capital replacements, and must remain at a higher level until the system is adequate.

Wastewater

Wastewater is collected from homes, apartment blocks, stores and industries by the same organizations which provide water service. A large portion of the area's wastewater is carried to disposal via trunk sewers, pumping stations, and force mains operated by Gorvodokanal. In addition several service organizations collect sewage from septic tanks and transport it to disposal. On the west side of the Ural River, Gorvodokanal provides wastewater treatment and land disposal. On the east side of the river, Gorvodokanal discharges a combination of treated and untreated wastewater onto undeveloped land; the east-side collection system takes treated wastewater from the refinery but the remainder of the wastewater is discharged untreated.

Gorvodokanal does not meter wastewater flows. Seventy to 80 percent of domestic tap water probably leaves the city as wastewater. But there is no estimate available on the amount of sewage added by industries with their own water supplies--the refinery and the electric power plant. Also there is no estimate of the amount of groundwater which infiltrates the sewer system or the amount of surface drainage which is diverted into the system. At 10.8 tenghe per month, sewer service charges are extremely low, probably due to a lack of treatment and an inadequate sewage conveyance system.

Atyrau needs to invest in additional sewers, additional sewage pumping capacity, and in sewage treatment. It also needs to invest in sewage sludge treatment and recycling or disposal. This will substantially raise the cost of sewer service. Improvement in sewage treatment and disposal may be a prerequisite to funding by the multilateral development banks.

Building Heating

Hot water for building heat is provided by Atyrauenergo, which distributes condensate from its steam-turbine electricity generation facility on the east side of Atyrau. In addition a new heating plant on the west side of Atyrau provides heat to the Avangard area. Heating water is transmitted throughout the metropolitan area to the REUs and ZKOs.

Heating water piping is mostly above ground. Although originally insulated, some piping has lost its insulation and some pipes leak hot water or steam, contributing to high energy costs and inefficiency. Heating water piping has a life of about 10 years, much shorter than reasonably should be expected. Pipe replacement probably constitutes a significant cost of service.

Heat service should be phased out and replaced with home gas heating units or heating units dedicated to individual buildings. The advantages of this include:

- Eliminating heat distribution piping. Individual heaters will heat only individual apartments or individual apartment buildings. Initially this will allow Atyrau to avoid installing new heat lines and heat distribution stations as new buildings are put on line. Later, as older buildings are upgraded, this will allow Atyrau to abandon older portions of the district heating system, getting rid of unsightly above-ground utilities, simplifying heating utility operations and improving service standards.
- Eliminating district heat distribution plants and thus reducing maintenance and operation requirements. Heating units and associated piping or ducting will become the responsibility of individual apartment owners or housing cooperatives.
- Supporting Atyrau's initiative to transfer accountability and control of utility consumption to individual apartment owners.
- Avoiding the inefficiencies of the present recirculating heating system, which wastes a great deal of energy (heat) to the atmosphere and soil--through a combination of radiant losses and steam leaks.

The investment in converting from centralized heat to individual heat units will occur over a period of years. The first units can be installed as unfinished apartment buildings are completed. This investment can be included in the apartment selling price and amortized with the apartment mortgage. This will relieve the heating utilities (AE and the REUs and ZKOs) of the need to fund central heat distribution system additions. When installed during apartment build-out, home heating units will cost about 60,000 tenghe per unit, but the cost will be partially offset by savings from the elimination of building heat distribution piping and radiators. Individual heating units should last about 20 years, longer than the average 15-year mortgage. The cost per apartment for gas heating will be about 1000 tenghe per month.

Finances

None of Atyrau's municipal service organizations is in healthy financial condition. Some have not been able to stay within their budgets. Most have had difficulty collecting accounts receivable. Many accounts receivable are several months in arrears. Several utilities have not been able to make payroll or purchase essential supplies and equipment for many months. The shortfall in utility revenues is tied to three principal issues--1) ability to pay: customers who cannot pay because their employers (companies and service enterprises) cannot meet payroll, 2) refusal to pay: customers who refuse to pay because of inadequate service, and 3) deferred

payment: commercial, industrial, and governmental customers which are struggling to remain solvent. Section 2 of this document addresses some ways Atyrau may improve service in the near-term and improve customer willingness to pay.

The industry-owned ZKOs are budgeted to lose money. Industry management apparently feels that it must subsidize workers' utility costs while delivering a higher level of service than the workers could get from the REUs. In addition WT&WS charges the ZKOs a substantial premium compared to what it charges GVK.

Water Treatment and Water Supply has an approved water "cost" of 6.24 tenghe per cubic meter (t/m^3). This includes 4.62 t/m^3 to recover all costs and 1.62 t/m^3 (35 percent of cost) for profit. But WT&WS only charges GVK 3.5 t/m^3 , charging its other 15 customers 30 t/m^3 to make up the difference. WT&WS wants to raise its "cost" to 6.74 t/m^3 based on recent cost experience.

As of January 1, WT&WS was carrying 100 million tenghe in overdue accounts receivable. Gorvodokanal owed 65 million tenghe and other companies owed 35 million tenghe (14 million of that belonged to Embaoil and 6.5 million belonged to Alaugaz).

Staffing

We were unable to obtain a complete set of numbers for utility staffing. Furthermore, where we could get numbers, it was seldom clear how duties are distributed among staff members. Table 2 shows the staff numbers we were able to obtain. Making best guesses about the remaining organizations, we estimate that 2000 to 2500 people staff the municipal organizations which serve Atyrau.

By western standards, it would be reasonable to expect that a city of 180,000 people would have a water utility staff of 110 to 210 people (Reference 2), depending on relative system efficiency and organizational structure. In Atyrau about 280 people are involved in water supply and treatment alone. Water distribution probably has an equivalent number of staff, if we could properly account for staff functions in each REU and ZKO. In addition, some portion of GZKH and OZKH management time is devoted to dealing with water matters and the ZKOs draw on their parent industries for equipment and extra staff for emergencies and special projects. We estimate that at least 500 people support the operation and maintenance of Atyrau's water system, or nearly 4 times the staff for a comparably-sized western system (130 people).

With regard to wastewater, we estimate that the staff devoted to operation and maintenance is also about 500 people. Although western wastewater systems typically have larger staffs than their water counterparts, Atyrau has very little wastewater treatment. Atyrau's sewage collection system, however, is old and in poor condition, requiring a high level of staff time.

With an investment in system improvements and equipment, Atyrau should be able to reduce

staff, raise wages, and realize a reduction in operating costs. With new capital expenses, however, water and sewer rates will need to increase. The net benefit from investment will be improved service.

Table 2. Utility Service Organization Staffing--March, 1996

Organiz ation	Total staff	Water staff	Sewer staff	Solid waste staff	Heating staff	Housing mainten ance staff	Number of people served
REU 1	170	0	60(a)	20	40	60(a)	23000
REU 2	150	80	10	30(b)	27	25	7576
REU 3							
REU 4	184	0(a)	0(a)	0(a)	37(a)	137(a)	16107
REU 5							
"Dostyk" REU							
GVK	96	30	66	N/A	N/A	(a)	180000
GZKH	20	(a)	(a)	(c)	(a)	(a)	n/a
OZKH	19	(a)	(a)	(a)	(a)	(a)	n/a
Embaoil							
Refinery	150(d)	(a)	(a)	(a)	(a)	(a)	30,000
Chemical							
Railroad							
Fish plant							
Building manage- ment 99							
WT&WS	280	(a)	n/a	n/a	n/a	n/a	180000

- (a) Staff duties overlap. There are no useful numbers on staff devoted to each category.
- (b) Janitorial staff only.
- (c) GZKH has "vacuum trucks" and garbage trucks in its "Transport" division. Related staff does not appear to be reflected in GZKH's staff numbers.
- (d) Does not include on-call support from other refinery departments.
- (e) Blank spaces indicate that organizations did not respond to our request for information.

Presidential Resolutions

There are two Presidential Resolutions which directly affect Atyrau's utilities. One resolution makes it possible for industries to divest themselves of non-performing assets like apartment blocks and utility services (ZKOs). The resolution does not, however, require municipal organizations to accept the industries' assets when offered. At least one Atyrau industry, the fish plant, is interested in exercising the option granted by the resolution.

The other Presidential Resolution required Kazakhstan's Anti-Monopoly Committees (AMC) to oversee utility rates and protect consumers from unreasonable charges. The Atyrau AMC is reportedly very focused on containing and/or reducing utility rates. It will be necessary for MSO leadership to work with the AMC to ensure that it understands the cost of raising service standards and the initial cost of consolidation.

INTERNATIONAL EXPERIENCE

There is a growing body of experience in reforming state-owned enterprises (SOEs) around the world (Reference 3). Atyrau can refer to that experience in selecting a good mechanism for reform.

Local leaders must answer several fundamental questions before they can begin the process of restructuring. These questions are:

- **Is Atyrau ready for substantive reform?** Reform must be politically desirable and politically feasible. (Do the leaders want it? Do the customers want it?) And the political leadership must be able to show that it has a long-term commitment to reform. The remainder of this document is based on the assumption that Atyrau is prepared to initiate substantial reform.
- **How can Atyrau best reorganize its natural monopolies?** The options include divestiture (privatization), transfer to a new or existing public organization, or contracting for services from the private sector. Atyrau's municipal services are already monopolistic. They are also fragmented. It is possible to consolidate the monopolies into more efficient organizations with better control of cost and service quality. The challenge is to select a form of monopoly which will work best in Atyrau.

- **What is the best way to get cost-effective service from a reorganized monopoly?**
How can Atyrau ensure managerial autonomy while ensuring reasonable pricing? Is there, or can there be, a credible contractual framework? Can service pricing be validated? Should Atyrau fully privatize services, contract with private firms to manage its services, or restructure its monopolies under continuing government management?

NATIONAL EXPERIENCE

Under a separate USAID contract, the International City/County Management Association (ICMA) is helping local leaders develop voluntary programs to improve the delivery and cost-effectiveness of municipal services (Reference 10). ICMA has inventoried problems and worked with local leaders to organize housing cooperatives and initiate municipal services privatization projects. ICMA's challenge is to inspire voluntary conversion to well-managed, cost-effective housing and municipal services. ICMA's experience gives many encouraging signs that Atyrau's strategy is on target.

Shortly after establishing independence, the national legislature granted apartment ownership to the people who occupied apartments at that time. The ensuing creation of apartment owners associations (housing cooperatives), in concert with the national government's initiative to recover actual utility service costs, has led to greater awareness of the true cost of municipal services and heightened interest in managing municipal services more efficiently. According to a computer model developed by ICMA, about 27 percent of apartment owners cannot afford the full cost of current utility fees. ICMA has validated the model with actual experience and data for the city of Semipalatinsk, where about 80 percent of the population lives in housing cooperatives.

Semipalatinsk is one of several cities which have begun to privatize services. The city has experimented with auctions and sealed bids, taking sealed bids for street lighting maintenance and building renovation; on one project, sealed bids resulted in a viable contract 32 percent below the city's estimate. Initial privatization projects have been so successful that the city wants to extend privatization to all procurement. Soon the city will privatize about a third of its 43 small district heating plants, which are characterized as having inefficient boilers, inefficient distribution systems, twice the necessary staff, and widespread theft of coal.

There are two very encouraging trends in the privatization ICMA is seeing. First, the privatization is being done by local businesses, converting municipal services managers and staff to private enterprise. Second, the move to privatization has been driven by housing cooperatives, which now collect all municipal service fees and make all utility payments on behalf of their members. Unfortunately, however, until Kazakhstan's cities can raise significant capital to renovate and upgrade their inadequate infrastructure, locally-owned privatization will not be able to deal with large capital-intensive projects; it is likely that outside investment and management

will be required and outside investors will demand adequate assurances of returns on their investments.

Atyrau's strategy calls for metering all water and gas services. Interestingly, Almaty has begun to install gas meters and water meters in an effort to improve accountability and responsibility for consumption. Water consumption has declined more than 65 percent in metered accounts.

CONSOLIDATION OPTIONS

In reorganizing utilities, particularly water and wastewater, the city should consider several options. In any option, the city should consolidate the water and wastewater utilities under a single organization or under a separate organization for each utility. That is, the city should combine water supply, treatment, and distribution under a single organization--incorporating everything now owned and/or operated by WT&WS, GVK, and the secondary distribution systems of the REUs and ZKOs. And the city should combine wastewater collection, treatment and disposal under a single organization, possibly the same organization as the one responsible for the water utility.

Atyrau has several consolidation options. These range from full governmental ownership and management to full private responsibility. Some options may be more attractive for certain services than for others.

Consolidation Benefits

Consolidation should produce many long-term benefits. A consolidated utility should:

1. Be able to operate Atyrau's utilities more efficiently, combining redundant functions, reducing staff, consolidating equipment, supplies, and support facilities--thereby reducing the cost to provide the present level of service. (Future service improvements, however, will raise the cost of service).
2. Adopt a common set of service delivery standards and uniform internal performance standards for accounting, fee structure, engineering design, construction, operation, maintenance, personnel, and administration.
3. Raise service delivery standards as it manages future replacement and expansion.
4. Be more accountable to its customers.
5. Be able to focus on its primary objective--delivering good utility service--rather than dilute management and staff resources on a wide range of services.

6. Be more capable of working constructively with the Anti-Monopoly Committee. A large, well-managed organization should be able to demonstrate and defend an adequate cost basis and work constructively with the AMC to set rates which combine better service with reasonable pricing. In fact a constructive, competent AMC could satisfy one of the critical success factors identified by World Bank researchers in assessing privatization projects (Reference 3). In addition, it should be more efficient for both the utility and the AMC when the AMC only has to deal with a single organization rather than multiple organizations.

Consolidation Barriers

To achieve consolidation, local leaders must deal effectively with several issues. These include:

1. Ensuring that Atyrau's citizens and leaders will support reform.
2. Demonstrating that the political leadership has a long-term commitment to reform.
3. Finding the best way to get cost-effective service from a reorganized monopoly.
 - a. How can Atyrau ensure managerial autonomy while ensuring reasonable pricing?
 - b. How can Atyrau offer prospective privatizers, particularly the international firms which can manage large capital investments, a credible contractual framework? Do the laws of Kazakhstan provide for equitable treatment of contracting parties? Do Kazakhstan's courts have experience in handling similar disputes fairly--from the perspective of potential privatizers?
 - c. How can service pricing be validated?
4. Dealing with the concerns of managers and supervisors regarding loss of position, influence, and title.
5. Dealing with staff concerns regarding loss of employment or reduction in wages.
6. Making good decisions when faced with inaccurate, incomplete, or nonexistent records regarding existing resources, finances, staffing, and management.
7. Identifying and allotting the money needed to accomplish consolidation.

8. Coping with public perceptions regarding consolidation. Customers served by ZKOs may be concerned that they will receive a lower level of service and those served by REUs may expect a sudden improvement in service. Many customers may expect service fees to be reduced after consolidation.

Options

Atyrau should benefit substantially from consolidation of its municipal services. But there are several ways to consolidate. Each has advantages and disadvantages. Table 3 summarizes a number of issues which local leaders must face in choosing an appropriate organizational structure.

Option 1: Consolidate into an Existing Municipal Organization--Public Ownership and Operation. In this option, the city or other public agency would own the entire utility system, including capital facilities, operating and maintenance equipment, offices, furniture, and rolling stock. The utility would be responsible for planning, designing and constructing system replacements and improvements; operating and maintaining the system; raising capital and repaying debt; setting rates, billing customers, and collecting revenues; purchasing equipment, materials, services and supplies; staffing and administration; and compliance with all pertinent laws and regulations. Although responsible for all these functions, the utility could follow the example of municipal utilities in other countries, procuring private services in disciplines which it cannot maintain on staff cost-effectively--for example, legal, engineering, and construction services.

The utility's monopoly can be balanced a combination of independent oversight and performance measurement. Oversight can be provided by a democratically-elected board of directors, by an appointed board, by national and local regulators (e.g., the Ministry of Ecology and the Anti-Monopoly Committee could fall in this category), or a combination of these. Performance measurement provides checks and balances through "benchmarking," and by goal-setting. For example, with "benchmarking," utility management can be held to standards which are consistent with the performance of similar utilities. With goal-setting, utility management can be held accountable for meeting pre-arranged goals (e.g., reduce the unit cost of delivered water by some reasonable, agreed-upon percentage each year over an agreed-upon period of years). To be effective, benchmarking and goal-setting must be tied to management compensation. With goal-setting it is also important to guard against goals which are too easily achieved or which sacrifice an important objective (like quality) for an equally-important objective (like cost reduction); the best way to do this is to set annual goals based on a long-range plan for utility improvement.

In this form of organization, Atyrau would still need to consolidate services aggressively. It will also need to restructure the merged organization. There will be little benefit in simply merging several existing organizations into a larger version of another existing organization.

Option 2: Consolidate into a New Private Organization--Private Ownership and Operation. In this option, the city could help set up a private organization with the same authority and responsibility outlined above or with a lesser degree of authority and responsibility. Scenarios which fit this option include:

- **BOT:** The city could enter into a contract with a private company to build, operate, and transfer (BOT) operation of the utility to the city after a prescribed period of years; in this scenario, the city would find the financing for capital improvements and own all water and wastewater facilities.
- **BOOT:** The city could contract with a private company to finance, build, own, operate, and transfer (BOOT) ownership and operations to the city at a later date.
- **BOO:** The city could contract with a private company to finance, build, own and operate (BOO) the system indefinitely (no schedule to transfer ownership back to the city).

In this option, the city could make an international tender and select a contractor or contractors competitively. In a BOOT, or BOO arrangement, the contractor would own the system--purchasing the existing system, including capital facilities, operating and maintenance equipment, offices, furniture, and rolling stock; the contractor would also be responsible for raising capital and repaying debt; setting rates, billing customers, and collecting revenues; In all three options (BOO, BOOT, BOT) the contractor would be responsible for planning, designing, and constructing system replacements and improvements; operating and maintaining the system; purchasing equipment, materials, services and supplies; staffing and administration; and compliance with all pertinent laws and regulations.

The contractor's performance could be measured regularly and compared with agreed-upon benchmarks or goals (like the performance of other utilities, the national rate of inflation, targeted savings, or the like). Both the city and the contractor could be protected by a contractual time limit for contract renewal, with renewal predicated on performance. Performance could also be ensured by national and local regulators (environmental, public health, and the Anti-Monopoly Committee could fall in this category), or a combination of these.

In this form of organization, the contractor would still need to consolidate municipal services aggressively. And city and oblast leaders must understand that they will undermine the contractor's ability to succeed if they interfere in business decisions regarding staffing, service franchise, or other bottom-line issues.

Option 3: Public Ownership and Private Contract Operation. In this option, the city could retain ownership, consolidate the system, and plan and implement system improvements

and expansion. The city could contract with a private company or companies to provide some of the services outlined above--for example, operation and/or maintenance.

Each of these options has strong and weak points, depending on how the city perceives its role and depending on the city's resources and ability to implement major system consolidation, fiscal change, organizational change, and capital improvements. Table 3 presents factors the city should consider when examining organizational options.

Action Plan

Atyrau's action plan should be viewed as a decision tree, with several key decisions dictating the course of subsequent activities. Following are important decisions facing Atyrau's leaders.

- Consolidation of the water and wastewater utilities.
- Upgrading system performance standards.
- Choice of consolidation option.
- Implementation schedule.

Immediate Actions. City and oblast leaders must begin restructuring and consolidating Atyrau's municipal services (REUs, GZKH, and OZKH). Even if Atyrau chooses to fully privatize its water and wastewater utilities, it is important to begin making the utilities as attractive as possible to potential bidders.

Atyrau should also include the ZKOs in its consolidation plans and help relieve the financial burden on industries which own those ZKOs. Atyrau also needs to take steps to improve service delivery and deal with service-related nonpayment.

Other Priority Actions. Other priority actions include:

- A detailed study to identify and prioritize technical solutions to the many problems facing the water and wastewater systems.
- Identifying alternative sources of financing.
- Developing a detailed organization plan--position descriptions, pay scales, performance standards, accountability measures, mission statement, authorizing documentation, etc.

Table 3. Municipal Services Management Options

Criteria	Public Ownership and Operation	Private Ownership and Operation	Public Ownership with Private Contract Operation
Financing	<ul style="list-style-type: none"> ● Republic funds ● MDB loan* ● Other loan ● Finance from revenue stream (i.e., include capital costs in user charges) 	<ul style="list-style-type: none"> ● Private capital ● MDB loan* ● Private capital joint venture (foreign capital) 	<ul style="list-style-type: none"> ● Private capital ● Commercial bank loan ● International investment fund ● EBRD loan ● Local government must fund for capital expansion
Customer cost	<ul style="list-style-type: none"> ● Adjustment to full cost recovery ● Potentially higher following initial adjustment ● Possible cost savings with improved efficiency 	<ul style="list-style-type: none"> ● Adjustment to full cost recovery ● Future costs potentially lower than cost of full public service (after initial adjustment) 	<ul style="list-style-type: none"> ● Adjustment to full cost recovery ● Future costs potentially lower than cost of full public service (after initial adjustment)
Competitiveness	<ul style="list-style-type: none"> ● No competition for operation and maintenance ● Full competition for construction ● Full competition for supplies and service 	<ul style="list-style-type: none"> ● Initial competition to purchase system ● Little or no competition after contract award ● Future negotiations with changes in system needs--opportunity to adjust problems ● Possible competition for supplies and service 	<ul style="list-style-type: none"> ● Initial competition to furnish services ● Possible competition for renewable contract ● Possible competition for supplies and service

(continued)

Table 3 Municipal Services Management Options (Continued)

Criteria	Public Ownership and Operation	Private Ownership and Operation	Public Ownership with Private Contract Operation
Implementability	<ul style="list-style-type: none"> ● May be slower to implement ● Difficult to consolidate under existing entity ● Legal, legislative, administrative, and financial arrangements ● Need time to organize new enterprise. 	<ul style="list-style-type: none"> ● May be faster to implement if Atyrau can guarantee funding ● Contracting authority may lie at higher government levels ● Feasibility study and/or master plan needed to attract privatizers ● Qualified privatizers have established management and administrative structures ● Contract must be guaranteed for "take or pay" 	<ul style="list-style-type: none"> ● May be fastest to implement if Atyrau can obtain funding ● Contracting authority may lie at higher government levels ● Feasibility study and/or master plan needed to attract contractors ● Qualified contractors have established management and administrative structures
Reliability	<ul style="list-style-type: none"> ● Need large capital investment ● Need to change operations practices ● Need to change maintenance management practices 	<ul style="list-style-type: none"> ● Major capital investment needed ● Reliability should be a measure of contractor performance 	<ul style="list-style-type: none"> ● Major capital investment needed ● Reliability should be a measure of contractor performance

(continued)

Table 3 Municipal Services Management Options (Continued)

Criteria	Public Ownership and Operation	Private Ownership and Operation	Public Ownership with Private Contract Operation
Local impacts	<ul style="list-style-type: none"> ● Need more management and technical expertise ● Staff realignment will be essential ● Probable staff reduction ● Must upgrade quality standards ● Need to invest in training ● Need to install performance measurement system 	<ul style="list-style-type: none"> ● Must import management and technical talent ● Will use local staff when local skills fit staff requirements ● Will probably operate more efficiently than public agency (thus fewer jobs) ● Some jobs will remain with local public utility (contract administration) 	<ul style="list-style-type: none"> ● Must import management and technical talent ● Will use local staff when local skills fit staff requirements ● Will probably operate more efficiently than public agency (thus fewer jobs) ● Some jobs will remain with local public utility (planning, capital projects, contract administration, and finance)

*"MDB loan" = Multilateral Development Bank loan; requires sovereign guarantee from Republic of Kazakhstan; an MDB is an international banking organization funded by member governments.

RECOMMENDATION

The most important factor in selecting an implementation plan is Atyrau's commitment to constructive change. City and oblast leaders must be convinced that change is needed. They must believe that they can achieve more cost-effective service through the implementation option they select. And they must be committed to making the selected option work. The decisions are theirs to make and the implementation will be theirs to carry out. Thus they need to understand their options and arrive at informed decisions. Based on discussions with the governor, the mayor, and the deputy governor for extraordinary affairs, I believe Atyrau's leadership is prepared to make the hard decisions and firm commitments needed for successful consolidation of municipal services.

We were unable to conclude discussions of implementation options onsite in Kazakhstan. The following Gantt charts illustrate two alternative consolidation scenarios and a recommended

scenario. The first scenario depicts a sequence of actions and decisions for consolidation into a publicly-owned and publicly-operated utility. The second illustrates the path to a single privatized utility. Both show the time required for implementation assuming a May 1 start date. The scenarios end with the creation of the utility. But there is much more involved in a successful transition to consolidated services (see above).

Implementation will require a concentrated effort from senior officials. It will be beneficial for local leaders to go through this text and the following Gantt charts to be sure they understand: 1) their options, 2) the decisions they face, 3) the time needed to implement the selected option, and 4) the support needed for successful implementation.

Scenario 1--Public Organization

One viable alternative is to consolidate the water and sewerage systems under a single public organization or a separate organization for water and a separate organization for sewerage. This can be done by selecting one (or two) of the existing public organizations and bringing all other organizations under its management. Or Atyrau can create a new public organization. As the consolidated utility must function much more efficiently than its predecessors, it may be simpler to create a new organization. Figure 1 shows a possible sequence of decisions and actions to implement a consolidation using a public organization as the platform.

Scenario 2--Private Organization

Another viable alternative is to consolidate under a private organization (or two organizations). The World Bank reports better experience with privatization vis a vis public consolidation (Reference 3). However, Atyrau does not yet have the financial support systems in place to make a full privatization attractive to international-class privatizers.

Recommended Scenario--Staged Privatization

Based on ICMA's observations, privatization is already beginning to work in other Kazakhstani cities. It is being implemented on a limited basis and it is attracting viable local businesses. In fact the local businesses are providing private employment opportunities for managers and staff members of the organizations which are being absorbed. Although these organizations presently do not have the capability to take on a one-step consolidation, it is possible that they will grow the capability with increased experience and opportunity. It is also possible that their successes will provide the municipal experience (financial, management, and administrative) needed to attract large international privatizers after a few years.

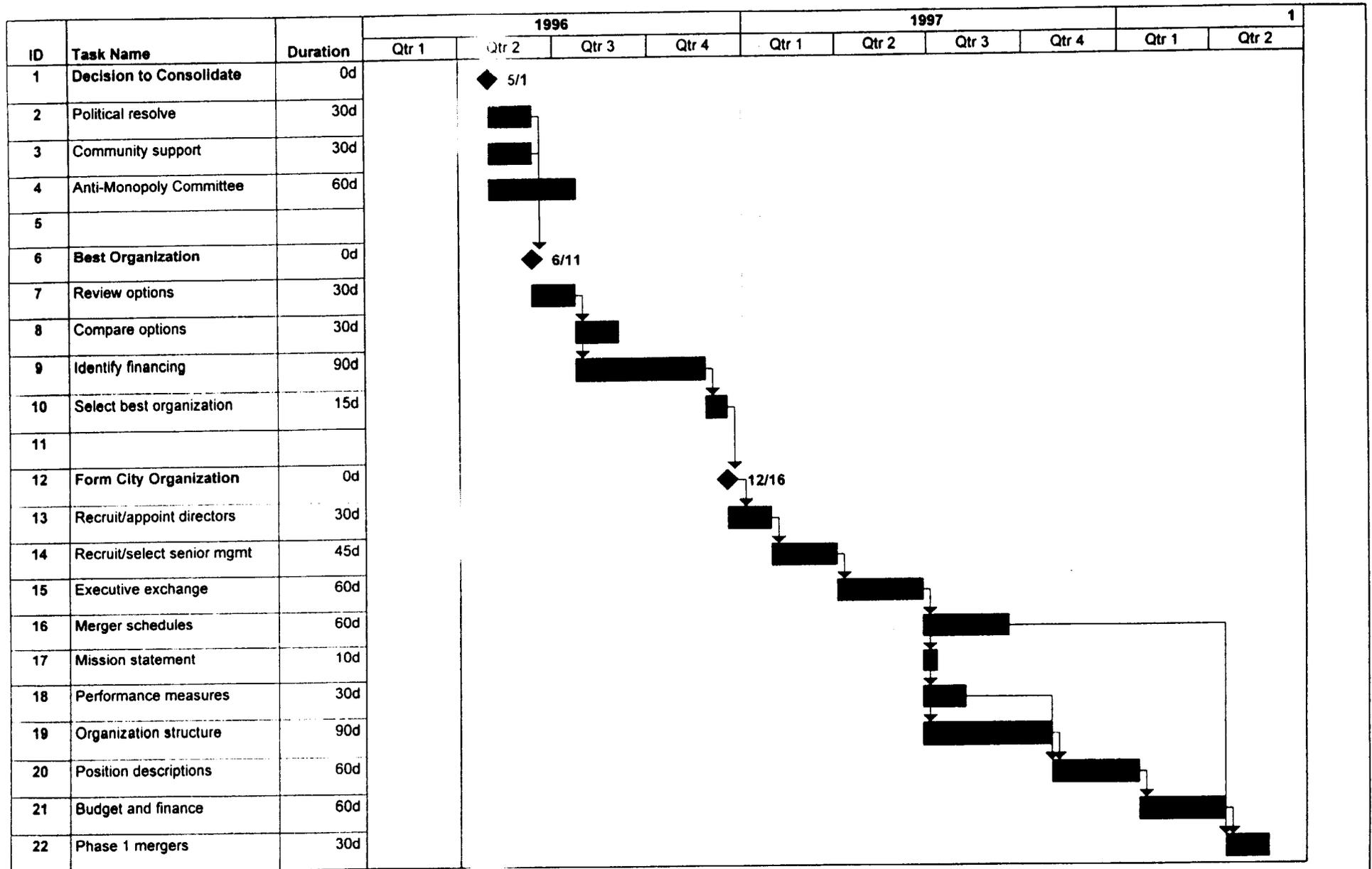
Figure 3 shows a possible sequence of decisions and actions to implement a staged privatization

program. The figure presents a generic sequence which can be adapted for multiple private offerings or for a single private offering (with the intent to expand the contract with a sole provider as milestones are met.) As with Figures 1 and 2, Figure 3 stops at the point where a privatizer has entered into a contract with Atyrau. Implementation will require a concentrated effort from senior officials. And it will be advisable for Atyrau to engage experienced consulting assistance in developing a more-detailed implementation plan, including the contracting strategy, terms of reference, selection criteria, and baseline. It will also be beneficial to have assistance in negotiating contract terms.

CONCLUSION

Atyrau is poised for a significant step in its transition to a free-market economy. The consolidation of municipal services delivery will be important in freeing available moneys (money already in the economy) for more productive purposes. Consolidation will also be essential to raising service standards and providing an adequate infrastructure for future economic growth and prosperity.

Atyrau's leaders have made and continue to make the commitments needed for a successful transformation of Atyrau's municipal services.



Project: Public Organization
Date: Mon 4/1/96

Task

Progress

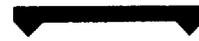
Milestone



Summary

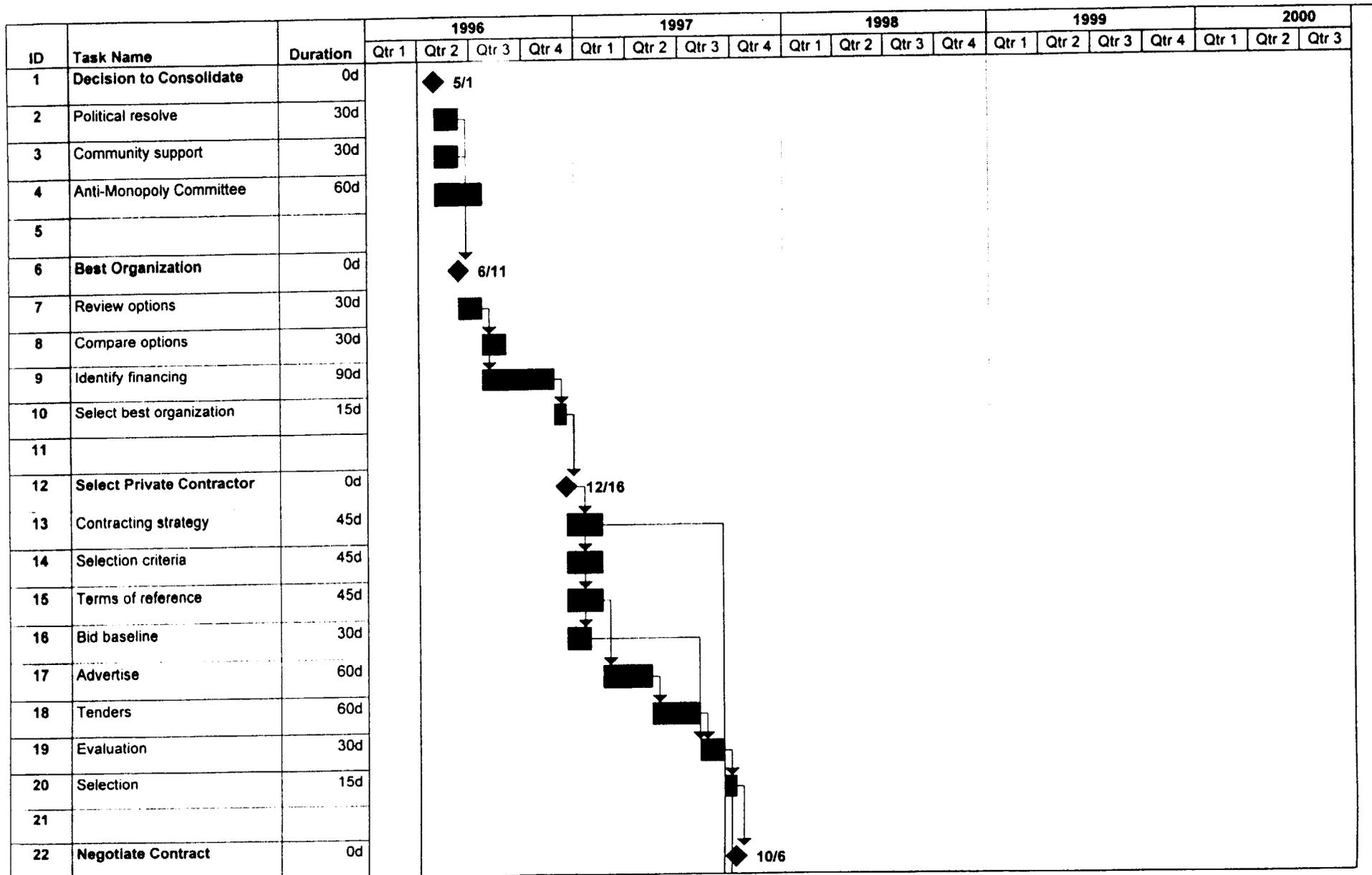
Rolled Up Task

Rolled Up Milestone



Rolled Up Progress



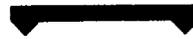


Project: One-Step Privatization
Date: Mon 4/1/96

Task



Summary



Rolled Up Progress



Progress



Rolled Up Task



Milestone

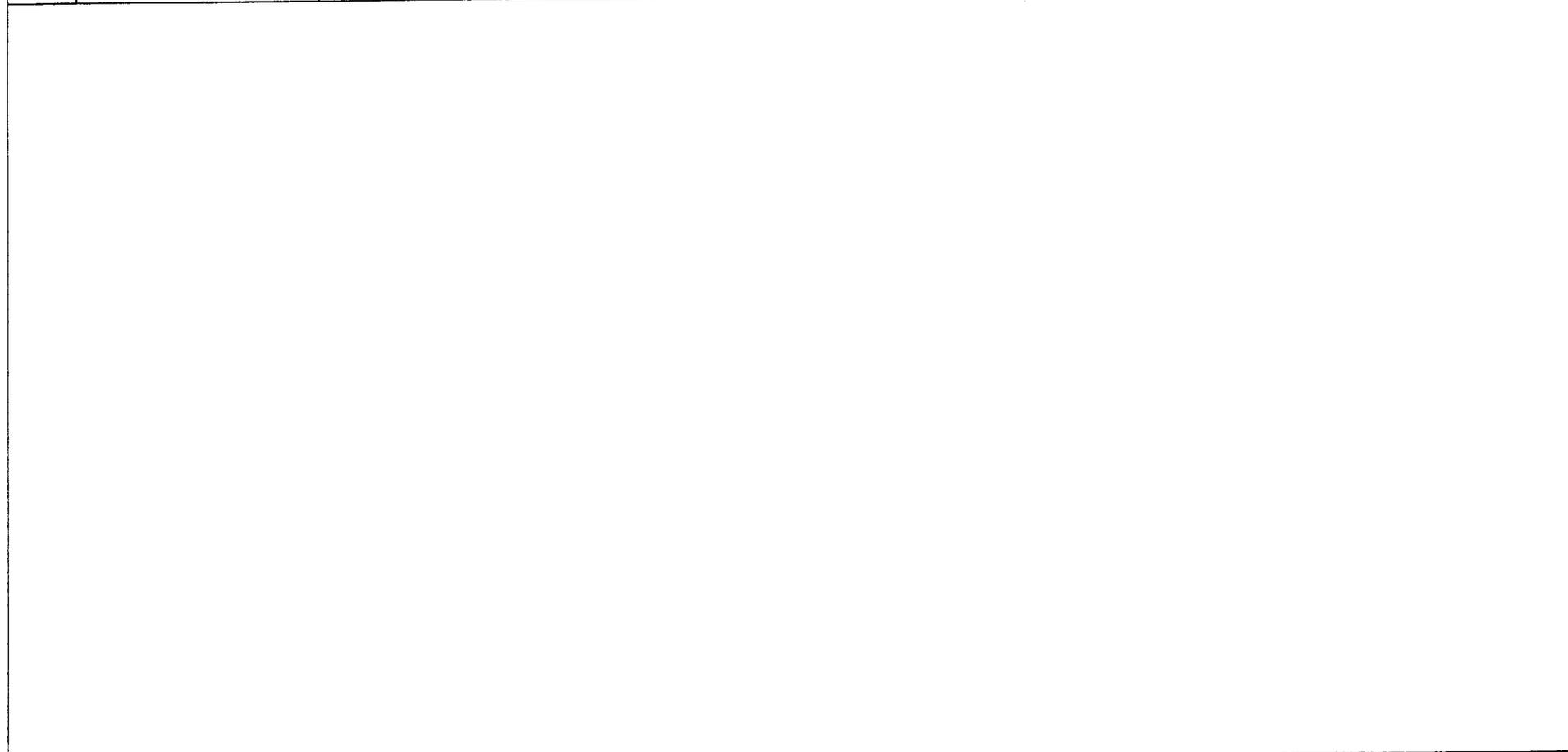


Rolled Up Milestone



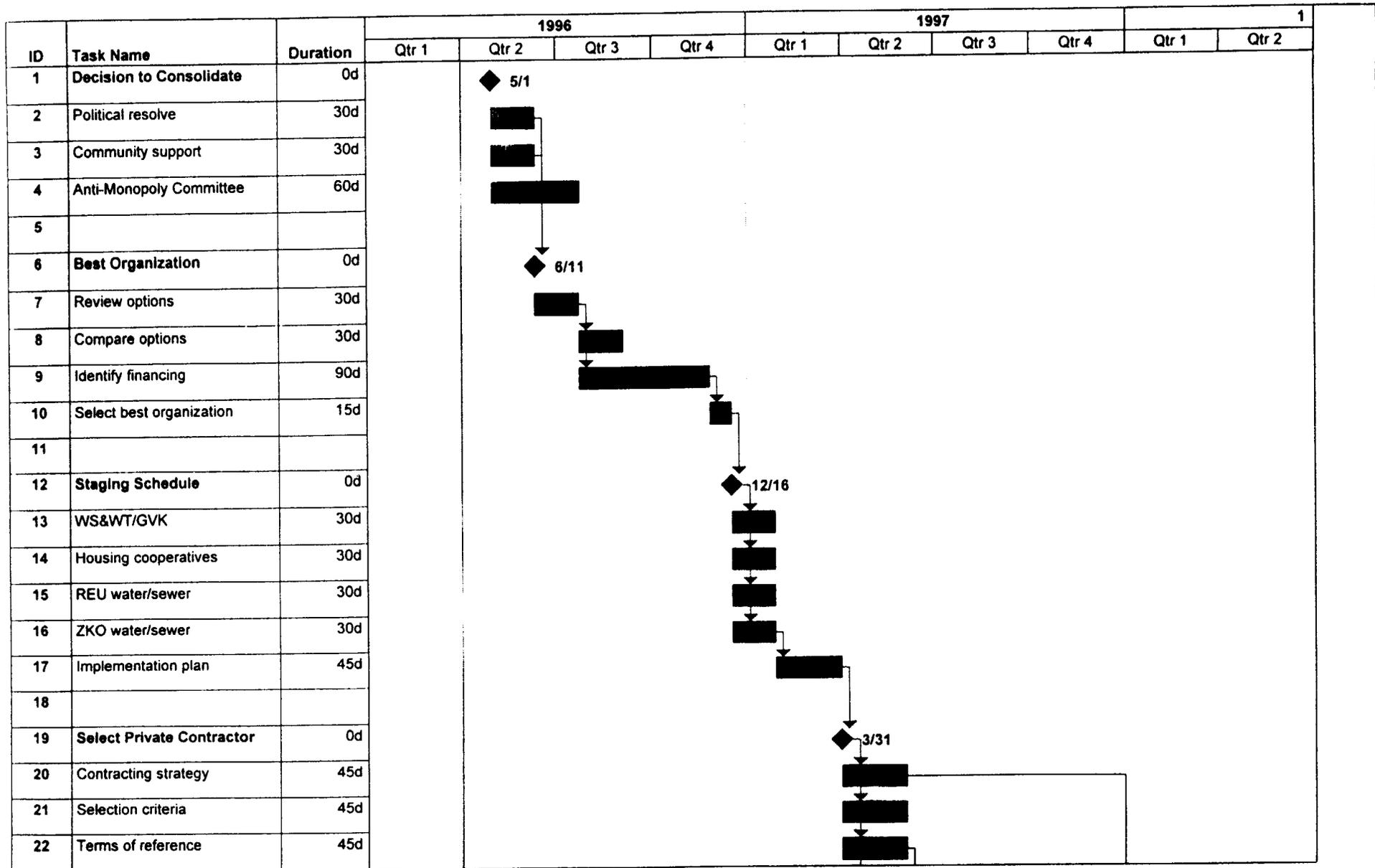
23

ID	Task Name	Duration	1996				1997				1998				1999				2000		
			Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
23	Contracting strategy	5d																			
24	Revised bid baseline	5d																			
25	Negotiations	60d																			
26	Endorsements	60d																			
27	Execute contract	0d																			



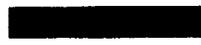
Project: One-Step Privatization Date: Mon 4/1/96	Task		Summary		Rolled Up Progress	
	Progress		Rolled Up Task			
	Milestone		Rolled Up Milestone			

27



Project: Staged Privatization
Date: Mon 4/1/96

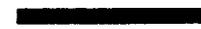
Task



Summary



Rolled Up Progress



Progress



Rolled Up Task

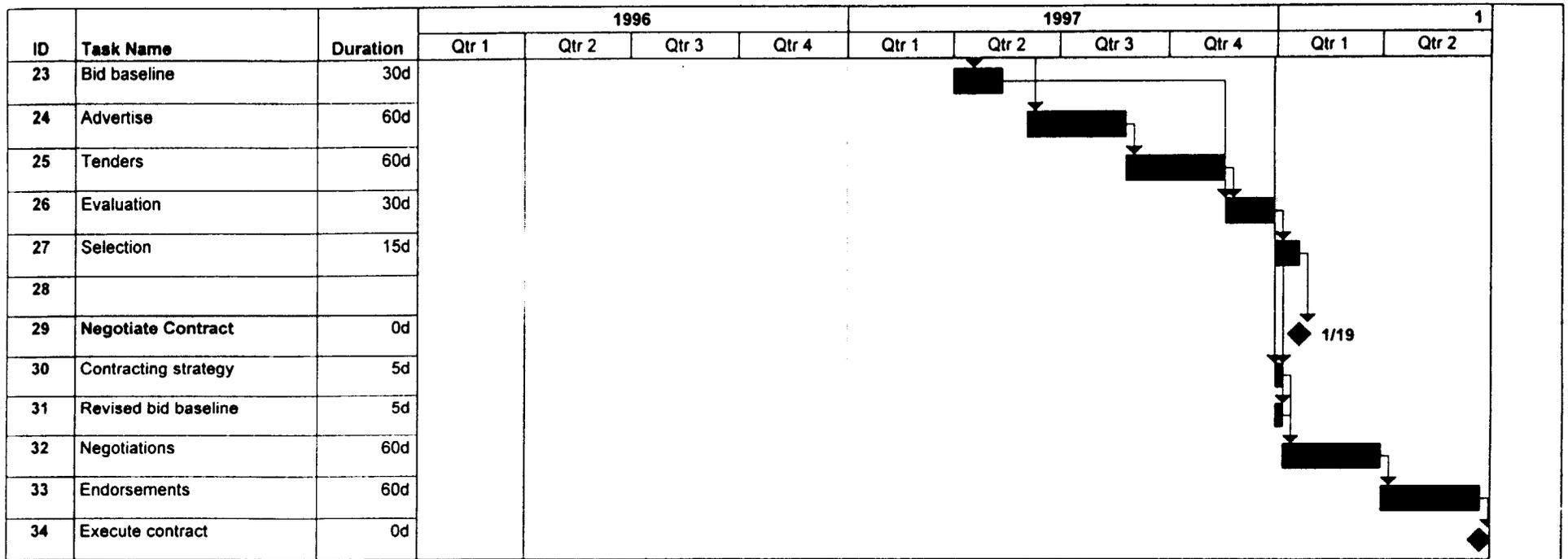


Milestone



Rolled Up Milestone





Project: Staged Privatization Date: Mon 4/1/96	Task		Summary		Rolled Up Progress	
	Progress		Rolled Up Task			
	Milestone		Rolled Up Milestone			

MUNICIPAL SERVICES TECHNICAL ISSUES

Hand in hand with the consolidation of municipal services, Atyrau must implement a program of water and sewer system replacement and upgrades. The purpose of the upgrades is to raise service standards and provide for Atyrau's continued growth. This program must be planned and budgeted in a way that it can be implemented efficiently by the newly-consolidated municipal service organization (MSO).

There are two kinds of system improvements: 1) those which should be made immediately and which will require a low level of investment (near-term improvements), and 2) those which require more detailed planning, design, and financing (long-term improvements). Improvements in the first category need not wait for the creation of a new MSO.

NEAR-TERM IMPROVEMENTS

Municipal services in the Atyrau area can be improved in the near-term. Although near-term improvements may not make a substantial contribution to long-term improvements, they can help to raise customer confidence in the utility delivery systems and can begin to raise system performance standards. Atyrau's municipal service organizations (MSOs) should begin making improvements where those improvements will meet near-term objectives.

Potable Water Delivery

It is not clear that Atyrau's potable water is fit for drinking. Many residents boil tap water before drinking it. For this discussion, we use the term "potable" to differentiate the water from heating water, which flows through a different distribution system from a different source.

There are two potable water delivery problems which can be addressed in the near-term:

1. Water, particularly hot water, often does not reach the upper floors of some apartment buildings. This is clearly a service deficiency but it is also a utility financial problem. Some customers use this as a reason not to pay their utility bills, contributing to a utility revenue problem.
2. Water supply is interrupted when water distribution pipes break or when equipment fails in heat distribution stations (small plants which heat a potable water sidestream for cleaning and bathing in apartment blocks).

Water Delivery to Upper Floors of Apartments. Water delivery probably fails because of low pressure, choked pipes, or a combination of the two. According to staff, some apartment building pipes are badly encrusted with internal deposits which restrict flow. Also, water pressure decreases with distance from the water treatment plant, and may be inadequate to reach the upper floors in many buildings.

Pipe encrustations probably occur as the result of internal corrosion, sediments in the system, or a combination of the two. In addition, as flow rates and velocities decrease at higher floors in buildings, deposits probably are not scoured out of pipes, aggravating the clogging problem. To determine the cause of encrustations and to prescribe proper corrective actions, it will be necessary to examine some choked pipes and analyze the chemical characteristics of the water in the distribution system. To determine the extent of encrustation problems it will be prudent to perform pressure testing to determine the adequacy of pressures at each floor in problem buildings. Testing, analysis and correction protocols can be designed and implemented quickly.

As soon as they identify the causes of pressure and flow problems, the MSOs may begin replacing bad pipes or installing booster pumping equipment to provide adequate local water pressure. When replacing building piping, they should consider the cause of existing problems and choose pipe materials which will help to avoid future problems. If the problem is due to internal corrosion, they should consider using plastic pipe. When providing booster pumping they should consider: 1) the capacity and condition of the pipe which will bring water to the booster pump and 2) the serviceability of the piping to which the booster pump will discharge; as much of Atyrau's piping is deteriorated, it may be necessary to upgrade portions of the distribution piping before booster pumps can be effective. Near-term piping improvements should be designed and constructed to be part of long-term system improvements. Near-term booster pump improvements, however, should be viewed as temporary; the correct placement and sizing of in-system pumping will require a detailed hydraulic analysis and design for the entire water distribution system.

Distribution System Failures. Atyrau's MSOs replace failed pipe frequently. The average life of Atyrau's potable water pipe is 5 to 7 years, considerably less than the 40 to 50 years Atyrau should be getting. High pipe replacement costs create a staggering, continual, financial burden which contributes to high user charges (Table 1 and Table 2). By contrast, pipes with reasonable life expectancies can reduce annual operating costs substantially.

Some pipe failures occur due to external corrosion but the MSOs have taken steps to get most water pipes out of the ground (out of corrosive soils) with little improvement in pipe life. In addition there is evidence that significant corrosion occurs inside the pipes. This leads to the conclusion that Atyrau should seriously consider an alternative type of pipe material for all future replacements and system expansions.

Table 1. Comparison of Pipe Replacement Costs, Steel vs Plastic, for Gorvodokanal

	Steel pipe	Plastic pipe
Total length, kilometers	348	348
Replacement life, years	6(a)	50
Length replaced annually, km	58(a)	7 (b)
Cost to replace failed pipes, million tenghe per year (c)	290	35
Five-year cost, million tenghe	1450	175

- (a) Gorvodokanal replacement budget has only received partial approval, so replacement demand is accumulating.
- (a) Assuming uniform replacement schedule (for comparison purposes only)
- (b) Assuming average installed cost of 5000 tenghe per meter (t/m) for all sizes and both types of pipe; based on recent experience of Gorvodokanal (8900 t/m for 2800 m of 400-mm pipe and 5000 t/m for 400 m of 150-mm pipe, 1996 budget). This is substantially different from the cost experience and 1996 budget of Water Treatment and Water Supply (1600 t/m for 10 km of 500-mm pipe, 1996 budget).

Table 2. Comparison of Pipe Replacement Costs, Steel vs Plastic, for WT&WS

	Steel pipe	Plastic pipe
Total length, kilometers	216	216
Replacement life, years	18(a)	50
Length replaced annually, km	12.5	4.3 (b)
Cost to replace failed pipes, million tenghe per year (c)	20	6.9
Five-year cost, million tenghe	100	34.5

- (a) Pipe lasts 10 years without repairs.
- (b) Assuming uniform replacement schedule (for comparison purposes only)
- (c) Assuming average installed cost of 1600 tenghe per meter (t/m) for all sizes and both types of pipe; based on the cost experience of Water Treatment and Water Supply (1600 t/m for 10 km of 500-mm pipe, 1996 budget) but substantially below recent experience of Gorvodokanal (8900 t/m for 2800 m of 400-mm pipe and 5000 t/m for 400 m of 150-mm pipe, 1996 budget).

Internal corrosion can occur when water is low in certain ions--the water becomes "aggressive" and accelerates the dissolution and oxidation of iron in the pipe. To determine the existence and nature of internal pipe corrosion, it will be necessary to examine some pipes and to analyze the chemical characteristics of the water in the distribution system.

If it is determined that pipe failures are partly due to internal corrosion, it may be possible to extend the life of newer existing steel water pipe. Aggressive water can be treated with chemicals which retard or prevent corrosion without a negative effect on potability.

In addition, the MSOs can begin replacing failed steel pipe with plastic pipe, beginning almost immediately, to reduce long-term operating and maintenance costs while dealing with short-term needs. Furthermore, plastic pipe should be easier to install, requiring less labor and less crew time per meter of installed pipe.

Sewer System

Atyrau's sewer system needs replacement pipes and pumps. Much of the equipment in sewage pumping stations is old and in poor condition. Sewers are often obstructed by debris (solid waste) which should not be getting in the sewers. Steel piping corrodes badly on the exterior of the pipe due to corrosive soils and, on the interior of the pipe, due to bacterial activity which forms sulfuric acid on the crown of the pipe.

Sewer Obstructions. A problem facing Gorvodokanal is sewer obstructions. To deal with debris (ranging from wood to dog carcasses), GVK has grinders in some of its sewage pumping stations. This increases maintenance requirements at the pumping stations. A simple solution to this problem is to raise solid waste collection standards, providing an appropriate, reliable method of disposal and educate the public about the problems they create by dumping debris in sewers.

Sewer Pipe Failures. Some of Atyrau's sewers are made of steel pipe. Like the water pipes, these sewers fail due to a combination of internal and external corrosion. The MSOs should begin replacing failed sewers with pipe which will resist corrosion.

LONG-TERM IMPROVEMENTS

Without a thorough analysis and master plan for improvement, it is not possible to make a detailed list of long-term improvements to Atyrau's water and sewer systems. There are several categories of improvements, however, which must be considered.

Water System

Before initiating a program of long-term improvements to the water system, Atyrau needs a water master plan. It is necessary to review both localized and system-wide demands, inventory existing piping and equipment, develop a system map, create a hydraulic model for the system, examine alternative ways to improve the system, and develop a detailed plan of action, with schedule, budget and priorities. A master plan is also needed to guide on-going pipe replacement so that future replacements will be consistent with long-term needs for greater flows and higher pressures.

Issues needing to be addressed in the water master plan include:

- System performance standards. Identify standards for treated water quality, minimum and maximum pressure, maximum flow rates, materials of construction, instrumentation and control.
- Unaccounted-for water. Identify and quantify the reasons that more than 50 percent of Atyrau's water never reaches the consumers.
- Normal demands. Identify reasonable demands in different parts of Atyrau, based on a better level of service. For example, it is important to estimate how much more water apartment buildings will use when fifth-floor renters have adequate water supply.
- High demands. Identify the maximum demands the system must meet during hot weather or during a fire.
- Pressures. Identify operating pressures needed to provide adequate fire service and adequate pressure to reach the tops of the highest buildings during high-demand days.
- Storage and pumping. Identify in-system storage and pumping needs for high demands.
- Distribution piping. Identify existing system deficiencies and future needs (pipes too small, pipes not connected in loops, areas not served). Lay out a system which will make best use of existing pipes but provide better service pressures and flows.
- Treatment. Identify water plant improvements needed to ensure a continuous supply of safe drinking water. Determine the feasibility of rehabilitating the older portions of the water treatment plant as compared with building replacement capacity. Identify treatment requirements associated with seasonal variations in

Ural River water quality.

- Schedule and budget. Prioritize improvements and develop a schedule and a budget to implement needed improvements.

Wastewater

Atyrau needs a wastewater master plan similar to the water master plan outlined above. The wastewater master plan should address present system deficiencies and future requirements for sewers, pumping stations, treatment works, and sludge disposal or reuse. Given Atyrau's need for a large amount of landscaping, sludge could be composted and converted into a soil amendment for use in planting trees and shrubs.

Atyrau's present wastewater disposal system is inadequate. Atyrau will need to address wastewater treatment and disposal as part of any environmental documentation required by multilateral lending institutions.

REFERENCES

ATYRAU METROPOLITAN AREA MUNICIPAL SERVICES CONSOLIDATION OPTIONS March 6, 1996

1. *Atyrau Oblast Utility Service Rates, October, 1995.*
2. *WIDB Water Industry Data Base: Utility Profiles*, American Water Works Association, 1992.
3. *Bureaucrats in Business The Economics and Politics of Government Ownership*, A World Bank Policy Research Report, Oxford University Press, 1995.
4. *Does Privatization Deliver? Highlights from a World Bank Conference*, Edited by Ahmed Galal and Mary Shirley, The World Bank, 1994.
5. *Issues for Infrastructure Management in the 1990s*, World Bank Discussion Papers, The International Bank for Reconstruction and Development/The World Bank, Arturo Israel, 1992.
6. *Resume of Existing Situation and Development Prospects of the City of Atyrau*, An unpublished staff briefing document, City of Atyrau, 1995.
7. *Assessment of Municipal Services Delivery*, USAID MFM Project, Research Triangle Institute, John Lisenko, May, 1995.
8. *Long-Range Development Strategy, City of Atyrau, Kazakhstan*. USAID MFM Project, Kimley-Horn and Associates (under contract with Research Triangle Institute), November, 1995.
9. *The World Bank Annual Report 1994*, The World Bank, August 2, 1994.
10. Personal communication, John Wegge, Director, International City/County Management Association, Almaty, Kazakhstan, March 15, 1996.