



U.S. TRADE AND DEVELOPMENT AGENCY

EXECUTIVE SUMMARY

National Oil and Natural Gas Exploration and Production Database Project and Petroleum Information Service for Kazakhstan

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Executive Summary

KazakhOil, the National Oil and Gas Company of Kazakhstan, has commissioned a feasibility study to recommend an approach for its future management of petroleum and natural gas exploration and production data on a national level. This feasibility study is intended to support KazakhOil in improving its information management in line with international practices and modern technology application. This work is funded in part by a grant from the United States Trade and Development Agency, and through a cost share agreement with the Sarkeys Energy Center at the University of Oklahoma. Sarkeys Energy Center was selected by KazakhOil as the prime contractor to implement this study.

This Final Report includes a description of the feasibility study objectives and activities, as well as detailed analysis and recommendations. Among the other international studies conducted in parallel with our own, we cite one study concentrating on production monitoring (funded by TACIS), and a second concentrating on GIS and G&G data archival (funded by the World Bank). Each of these studies needs to be integrated carefully within KazakhOil's overall strategic plan for information management and computer technology acquisition. Therefore, we reviewed the preliminary findings and recommendations of those other studies in order to ensure, wherever possible, the compatibility and effective integration of our proposed strategy for KazakhOil.

The analysis in this Report is based on information provided by KazakhOil and its affiliate companies, predominantly Embamunaigaz. KazakhOil is solely responsible for the completeness and accuracy of information provided. In planning our work program for this project, we were advised by KazakhOil that Embamunaigaz is typical of the other upstream affiliate operating companies of KazakhOil with regard to its existing structure and design of information management and technology.

The major constraint we faced in successfully finalizing this feasibility study was the timely return of completed questionnaires that had been submitted on our behalf to various petroleum exploration and production data centers in Kazakhstan. This information is vital to formulating a design for an integrated Information Flow System that accurately takes account of data availability and the requirements of each participating enterprise that will support and/or draw information from the IFS.

Contents of the Feasibility Study

The feasibility study includes several distinct facets of analysis:

Advice on the functional design of an **Information Flow System (IFS)** for exploration and production data;

Recommendations for a **Production Monitoring System (PMS)** that will transfer essential well data on a daily basis from the field to the management of KazakhOil to support operations, planning, and investment decisions;

Advice on competitive technologies for a **Financial Reporting System (FRS)** to upgrade the accounting and planning processes of KazakhOil, and **general review of the legal framework for data management** in petroleum exploration and production in Kazakhstan - including data ownership, reporting, release regulations, and data sharing based upon international practice.

The overall information technology (IT) infrastructure that we propose takes account of KazakhOil's requirements for: (1) communications; (2) data acquisition; (3) visualization (including geographical, map-based systems); (4) databases and archives; (5) scientific and technical analysis; (6) commercial, transactional and operational systems; (7) decision-support systems; (8) back-office systems, and (9) reporting and data distribution. Apart from the design itself, we also considered the strategies and required effort for migrating current systems and practices to the new design. This analysis, therefore, addresses cost-justification aimed at a complete business case for the solutions described.

Findings and Recommendations

This project is part of a broader process under which KazakhOil is modernizing its technologies and operating practices to best bring them into line with the most advanced operating oil companies in the world. For this feasibility study, particular emphasis is placed on how information technology (IT) can be used to maximize the efficiency of the enterprise as a whole.

However, we also recognize that a successful IT solution must encompass three key areas: People, Processes and Technology. To summarize the current status of IT in KazakhOil, the following items strongly support this initiative:

A strong corporate commitment towards creating a modern, effective, vertically integrated oil company and a centralized IT strategy with accessible databases.

Data has been maintained carefully, albeit rarely in digital form, for most assets

Two other internationally funded parallel studies in support of KazakhOil also were undertaken in the past year; and there is a potentially strong synergy between them.

KazakhOil can draw on the support of competent local companies in the telecommunications and E&P data processing areas during the implementation of its programs.

There are, however, certain major challenges at present:

Information flow throughout the organization is poor. This is a weakness that could impair the decision-making ability of key executives.

Technical information for day-to-day operations is often lacking.

Significant amounts of hardcopy-to-digital conversion will be necessary.

There is relatively little application of computer hardware and software being utilized within the organization compared to similar institutions elsewhere in the world, and much of the available technology is currently obsolete.

Managers and personnel in many areas of work have not had the experience of computer usage on a daily or regular basis; therefore, computer based training programs will be an essential part of successful implementation. Hardware and software standardization and purchasing is uncoordinated.

Telecommunications and networking within KazakhOil currently does not approach the standard required for implementation of a major IT initiative.

The financial reporting systems in place provide only very limited capabilities for the user, and do not support the higher level financial and accounting analysis that is part of the broader and more efficient enterprise resource planning in use by major international oil companies.

The financial costs associated with implementing the programs discussed in this Report will be high, given the relatively low use of existing computer and telecommunications based technology at present within KazakhOil for geotechnical analysis and information archiving

and dissemination. A comprehensive long-term technology upgrade and modernization program may require some outside funding.

Ongoing internal KazakhOil studies and plans include modernization and upgrades of its telecommunications infrastructure; business process analysis; electronic document management, and networking. We recommend that these other initiatives should be pursued carefully and soon in an integrated manner, because most of the elements related to the Information Flow System (IFS) that we describe in this report will perform more efficiently once those systems are in place.

We propose that the EFS should consist of the following major elements: field SCADA; an accessible corporate database (with links to G&G archival and geotechnical computing); Geographic Information Systems (GIS); telecommunications and networking; Enterprise Resource Planning (ERP), and widespread data reporting and dissemination using internet technology. The overall layout of such a system is presented in this Report.

We also emphasize two possible major commercial services that may be derived from the IFS:

Petroleum Information Service that will meet the reporting requirements of KazakhOil and allow other operators and potential investors from the petroleum industry access to approved technical and other information on the area(s) of interest in modem digitized formats and reports, and

National Library of Petroleum Data, with links to the major geology and geophysics (G&G) archives in the country, for the benefit of KazakhOil staff, petroleum industry partners of KazakhOil, the Government Ministries to which KazakhOil reports, and other approved professionals interested in analysis of particular petroleum assets.

These services can be structured utilizing the corporate databases, geographic information systems (GIS), field data acquisition systems (SCADA), G&G archives, and distributed reporting subsystems created from the IFS.

Training is a major component of the long-term effort to upgrade and modernize the processes and technologies that support information flow within KazakhOil. We recommend that

KazakhOil consider establishing an Information Management Training Center, in association with its strategic plan for technology modernization. As distinct from other training units, this training center will specialize in instruction of KazakhOil management and personnel on the use of modern computer based technologies and methodologies that improve information management, including the more effective analysis, dissemination and archiving of geological, geophysical, economic and financial data throughout the organization. The objective of this center will be to facilitate the broad application of hardware and software, and to enable the KazakhOil staff to develop a greater degree of comfort in utilizing the new technologies. This encompasses both training and support services, and can draw from the core expertise that presently exists in the IT Department and other groups in KazakhOil.

We also have recommended and are making preliminary plans for an orientation visit to the United States by KazakhOil executives in association with the feasibility study. The intention of this trip is allow KazakhOil to meet with major companies in the international petroleum industry to learn first hand their strategies for selection, implementation and operation of similar corporate-wide IT programs. Additional meetings will be conducted with selected U.S. technology providers, and with agencies of the United States Government that have made major investments in modern petroleum exploration and production information management systems for geotechnical, economic, and accounting data.

The implementation of the technology programs outlined in this Report will provide far greater efficiency of operations within KazakhOil and its affiliate companies. At present:

- disproportionately large amounts of effort are expended in collecting, recording, and disseminating information, when compared to major international and national oil companies elsewhere, while not enough time is spent on conducting critical analysis ;
- the in-house resources (state-of-the-art technology tools) are not in place to allow for more accurate and rapid critical analysis of reserves, production, financial matters, and plans;
- information is in a form that is makes it difficult to effectively analyze on a timely basis, and

- senior executives and managers are forced to make business decisions, regarding both daily operations and the, future strategic direction of the company, with potentially incomplete and under-analyzed information.

The Information Flow System (IFS) will better support the decision process within KazakhOil at all levels of the company chain, and will facilitate changes that may occur over time in the restructuring of the company into a more competitive and financially viable petroleum organization. The systems designs that we recommend for a corporate Information Flow System, Production Monitoring System, and Financial Reporting System are compatible with each other, and are not vendor specific. KazakhOil will be able to select from among a number of competitive technologies and vendors for hardware and software supply (as described in the body of this Report) based on price and performance.