# Terminal Evaluation

## Asia

### 1. Outline of the Project

**Country:**
Kazakhstan

**Project title:**
Mini-Project Type Technical Cooperation for Continuation and Improvement of the Seismological Monitoring System for Earthquake Preparedness and Risk Assessment in the Region of Almaty City

**Issue/Sector:**
meteorological phenomena/Earthquake

**Cooperation scheme:**
Dispatch of Expert

**Division in charge:**
East,Central Asia,and the Caucasus Division, Regional Department II (East,Southwest,Central Asia,the Caucasus and Oceania))

**Total cost:**

**Period of Cooperation**
1 March 2000 - 28 February 2003

**Partner Country's Implementing Organization:**
IS MS-AS RK

**Supporting Organization in Japan:**
Building Research Institute, Geographical Survey Institute, Japan Meteorological Agency (JMA)

**Related Cooperation:**

#### 1-1 Background of the Project

In Kazakhstan, there were more than ten earthquakes that registered a magnitude of seven in the northern Tien-Shan region in the 19th century. The Almaty City is located in the southeastern part of the Tien-Shan region and has sometimes been hit by severe earthquakes (with a magnitude of 8.4 in 1889 and 8.2 in 1911). Preparing for another big earthquake, the seismonitoring system was equipped, but the equipment and techniques used were in decrepit condition. Therefore, the government of Kazakhstan requested the government of Japan the cooperation to dispatch a specialist team and donate equipment since Japan had accumulated a various experiences in the field of seismology.

#### 1-2 Project Overview

The project fostered the necessary personnel in fields of strong seismic motion observation, sensitive seismic observation and GPS observation so that the IS MS-AS RKcould gather seismic and GPS data and analysis with advanced methods continuously and effectively.

(1) Overall Goal

To urge IS MS-AS RK to make advanced research for earthquake preparedness and risk management on their own.

(2) Project Purpose

To urge IS MS-AS RK for continuous and effective seismic and GPS data collection and analysis with the improved seismological monitoring system.

(3) Outputs

1) To enable IS MS-AS RK staff (Observatory staff) to make advanced research for earthquake preparedness and risk management on their own.
2) To enable IS MS-AS RK staff (Observatory staff) to collect and observe seismic and GPS data at a more advanced level.

4) To enable staff of the observatory to report on the information of seismic activities to IS MS-AS RK accurately and efficiently.
5) To enable IS MS-AS RK staff to make an observatory report with more advanced levels of knowledge.
6) To enable IS MS-AS RK staff (Observatory staff) to analyze and accumulate seismic and GPS data collected by the improved seismological monitoring system.

(4) Inputs

Japanese side:

| | | | |
|---|---|---|---|
| Long-term Experts | 2 | Equipment | 117 million yen |
| Short-term Experts | 9 | Trainees received | 9 |

Kazakhstan's Side:

| | |
|---|---|
| Counterparts | 1 or more/Japanese expert |
| Equipment | |
| Land and Facilities | |
| Local Cost | 1.2 million tenge (1 million yen) |

## 2. Evaluation Team

**Members of Evaluation Team**

Team Leader/General: Yukihiko EJIRI, Director, First Program Division, Tsukuba Institutional Center, JICA
Evaluation of Technology (Strong Motion Observation): Toshiaki YOKOI, Seismologist, Chief Research Scientist, International Institute of Seismology and Earthquake Engineering, Building Research Institute
Evaluation of Technology (Sensitive Seismic Observation): Nobuo HAMADA, Director, Seismology and Volcanology Research Department, Meteorological Research Institute
Evaluation of Technology (GPS Observation): Tetsuro IMAKIIRE, Chief of Crustal Deformation Research Division, Geography and Crustal Dynamics Research Center, Geographical Survey Institute
Planning Evaluation: Yukiko MIZUNO, East, Central Asia and the Caucasus Division, Regional Department II, JICA
Evaluation Analysis: Yasuyuki KURODA, Institutional Development Center of Japan
Interpreter: Naoko OKABAYASHI, Japan International Cooperation Center (JICE)

**Period of Evaluation** 21 September 2002 - 3 October 2002

**Type of Evaluation:** Terminal Evaluation

## 3. Results of Evaluation

### 3-1 Summary of Evaluation Results

(1) Relevance

The national plan for disaster mitigation approved by the parliament of Kazakhstan in 2002 included the plan for earthquake disaster mitigation and referred to the importance of improvement in the administration capacity of Almaty city for earthquake disaster mitigation. Meanwhile, the top priority for the IS MS-AS RK was to depart from the observation system with the old equipment and to improve its research quality to the global level in the field of earthquake engineering. Therefore, the project was aimed at improving observation and analysis abilities of the ISMS-AS RK by replacing old observation equipment with new equipment and by acquiring techniques of data accumulation, management, maintenance and analysis, and that the IS MS-AS RK would obtain the ability to independently implement the observation and research at an advanced level. The threat of induced earthquake at oil and gas sites has recently been pointed out, and the importance of monitoring techniques has been growing. Therefore, the project is highly relevant to the needs of the IS MS-AS RK and the Kazakhstan government.

(2) Effectiveness

It is recognized, from the inspection on provided facilities and the interviews to the related personnel or the organizations they are working for, that technical and research staff of the IS MS-AS RK have acquired ample knowledge, techniques and advanced analysis techniques on the digital data to acquire and analyze the seismological data. The staff has become able to maintain and manage the provided equipment in the field of strong motion observation through the project. In the field of sensitive seismic observation, the IS MS-AS RK can manage the observation network without any problems. The staff of the IS MS-AS RK acquired the techniques of field observation, data analysis and crustal deformation analysis at the time of terminal evaluation. Therefore, there are bright prospects in terms of the accomplishment of the project purpose, and it is considered that the project was very effective.

(3) Efficiency

After the implementation of the project, the old strong motion observation equipment and a part of the sensitive seismic observation equipment at the existing stations in the Almaty area were replaced by modern equipment, and the GPS observation system was newly introduced. Not only the number of equipment, but also the models, specification and timing of deployment were appropriate for the project. Therefore, the majority of the provided equipment is successfully and continuously being operated. None of the difficulties of the operation staff replacement, the lack of budget and severe environment for data collection affected continuous operation of the new observation systems. In the field of GPS observation, the Kazakhstan side did not have experience on GPS data analysis and was not accustomed to the operating system of the equipment. It was hard for them to obtain the necessary techniques and utilized the software in the beginning. However, this problem was solved by the dispatch of experts in 2002. In the meantime, it should be pointed out that the selection of participants or the project among the personnel who were in charge of operation and data processing was not always appropriate.

(4) Impact

The project reinforced the IS MS-AS RK for upgrading the micro-zonation map of Almaty city for seismic hazard based on the strong ground motion recorded and for monitoring the information of seismic and crustal activities in and around the city of Almaty. The project will contribute to the earthquake disaster mitigation in Almaty city through the refinement of city planning, construction codes, diagnosis of existent buildings and so on, in addition to the planning for emergency response which will result in the supply of seismic resistant buildings and houses in the domestic housing market that is growing rapidly today. The project will also contribute to the development of the housing market in Kazakhstan. The improvement of the system in Almaty city for seismic risk management will guarantee the safety of the residents against earthquake disaster and protect the tax revenue from Almaty city that is a major part of the total tax revenue of Kazakhstan. Furthermore, the fear of foreign merchants and their hesitation of investment will be swept away.

(5) Sustainability

All data acquisition techniques for the strong motion observation, sensitive seismic observation and GPS observation have been firmly established among the staff of the IS MS-ASS RK. The IS MS-ASS RK is now able to continue the observation of seismological data after the completion of the project, using the updated equipment for observations. However, as the information of the new methodology for the advanced research is necessary for future study, the ability to access to the sources of information, such as the Internet and international journals, is indispensable. Meanwhile, the financial sustainability will be improved because Professor Nusipov has excellent managing abilities, and the Kazakhstan government is planning to allocate a budget to the IS MS-ASS RK. The new business of gathering data on seismic observation data collected and analyzed by the IS MS-ASS RK at about forty oil and gas sites will be brought about, which will contribute to the sustainability of IS MS-ASS RK.

### 3-2 Factors that promoted realization of effects

(1) Factors Concerning the Planning

N/A.

(2) Factors concerning the Implementation Process

N/A.

### 3-3 Factors that impeded realization of effects

(1) Factors Concerning the Planning

N/A.

(2) Factors concerning the Implementation Process

N/A.

### 3-4 Conclusion

The equipment provided by the Japanese side for establishing the strong motion observation network, sensitive seismic observation network and GPS observation network are all well utilized. Techniques in the field of strong motion observation and sensitive seismic observation have been rooted in the staff of the IS MS-ASS RK. It has become possible to accumulate and analyze the seismologic data on their own by utilizing the equipment provided by the Japanese side. This is the consequence of the cooperation in both software and hardware sides such as provision of observation equipment, dispatch of long and short-term experts and the training to the counterparts by the Japanese side being successfully organized. It is considered that this is the result of devoting efforts of all the relating staff of both parties. In conclusion, the project purpose, "the IS MS-ASS RK becomes to be able to carry out the acquisition and analysis of seismological data using the advanced observation facilities", has been fully achieved.

### 3-5 Recommendations

(1)It is indispensable to improve the research capability by training personnel and capacity building for sustainable development of the IS MS-ASS RK. Therefore, it is necessary to request relating organizations of Kazakhstan and JICA to consider prioritizing the Group Training Course "Seismology and Earthquake Engineering" in order to encourage the participation of Kazakhstan personnel. It is also necessary for JICA to support and cooperate as much as possible to implement a third-country training program/local in-country training expansively.

(2) It is recommended that JICA opens the way to accept Kazakhstan personnel as long-term participants who are able to get master's degree in Japanese universities in the future.

### 3-6 Lessons Learned

It is important to plan a project that has high potential to be implemented. The key to success is not only to accept the requests from the counterpart country, but to gather and analyze the necessary data about the counterpart country and to organize the realizable objectives and appropriate input plans. The Fact Finding Team should gather information on the scope of the budget, possibility to assure human resources, accepting the system and technical level of the counterpart and expected effects. It is also important to deliver appropriate equipment and facilities matched with the situation of the country, to select appropriate experts, to consider the timing of expert dispatch and to effectively utilize the group training in Japan. The experiences attained in the project can be a good reference for similar projects in the future.

In an expert team dispatch program, it is agreed to implement training for counterpart personnel in Japan. As there are some courses relevant to the cooperating contents in the group training, it is recommended to utilize the group training for the improvement of the capabilities of counterpart personnel.

### 3-7 Follow-up Situation

N/A.