



THE PROGRAM OF SEISMIC SAFETY ENSURING IN KAZAKHSTAN



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The strongest earthquakes occurred in Kazakhstan in the past. Hardly more than a hundred years ago three strongest catastrophes took place in the Northern Tien Shan region where the city of Almaty is located:

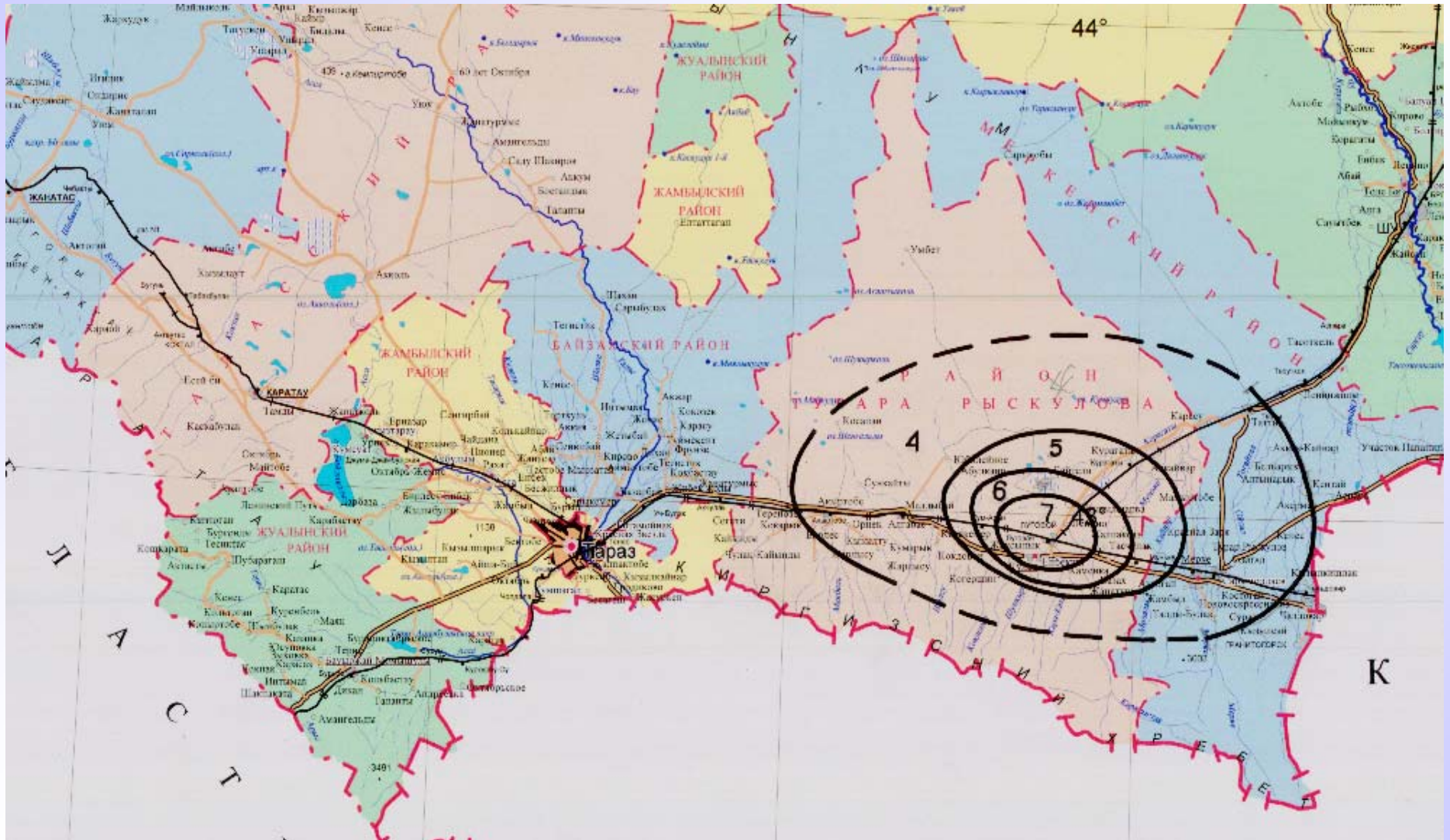
- the 1887 Vernenskoe earthquake (M 7.9)
- the 1889 Chilikskoe earthquake (M 8.3)
- the 1911 Keminskoe earthquake (M 8.2)

After 1990 the following earthquakes occurred in territory of the Republic of Kazakhstan. The intensity of these earthquakes in the epicentral zone was 7-8 according to the MSK-64 seismic scale.

Name of earthquakes	Intensity in epicenter
Zaisanskoe, 1990	8
Baisorunskoe, 1990	8
Tekelyiskoe, 1993	7
Lugovskoe, 2003	7
Syumbinskoe, 2003	7
In the Mountain Altai, 2003	8
Shalkarskoe, 2008	7

THE LUGOVSKOE EARTHQUAKE

23.05.2003



THE MOUNTAIN ALTAI EARTHQUAKE 27.09.2003





**THE MOUNTAIN ALTAI
EARTHQUAKE**
27.09.2003 - Eastern edge of a
landslide near Beltair village



THE 27.09.2003 MOUNTAIN ALTAI EARTHQUAKE - The shepherd house in the valley of the Taldura river, destroyed by falling of a stone



**THE 27.09.2003
MOUNTAIN ALTAI
EARTHQUAKE - One of
cracks in the valley of the
Chagan river**

THE SHALKARSKOE EARTHQUAKE

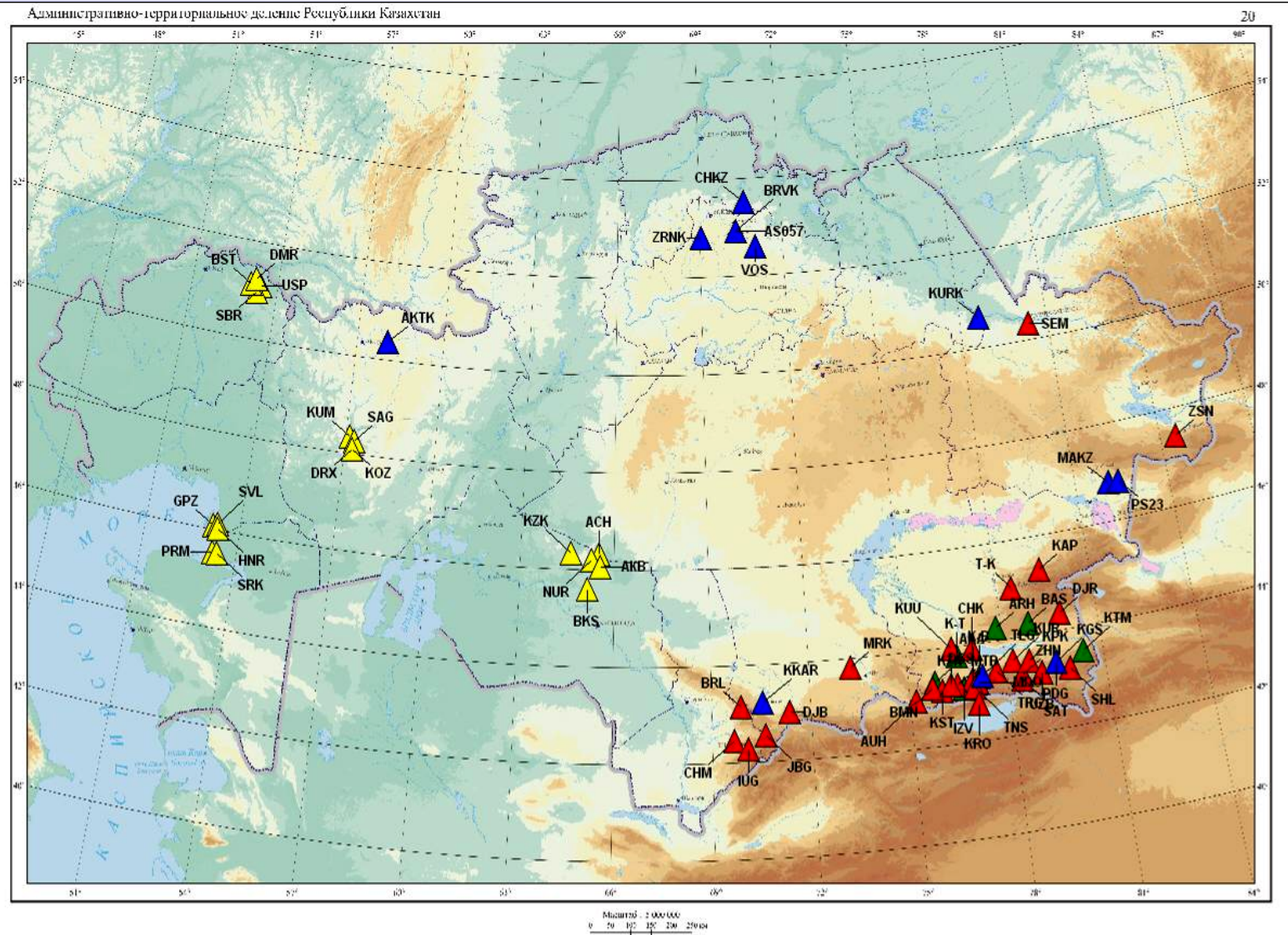
26.04.2008





THE 26.04.2008 SHALKARSKOE EARTHQUAKE - Destructions of buildings

Republican system of seismological observations



Monitoring system of the Institute of Seismology is a part of the Republican System of Seismological Observations and Earthquake Prediction.

Regular exchange of monitoring data is carried out with the International Seismological Centers of China (Urumqi city, Beijing city).

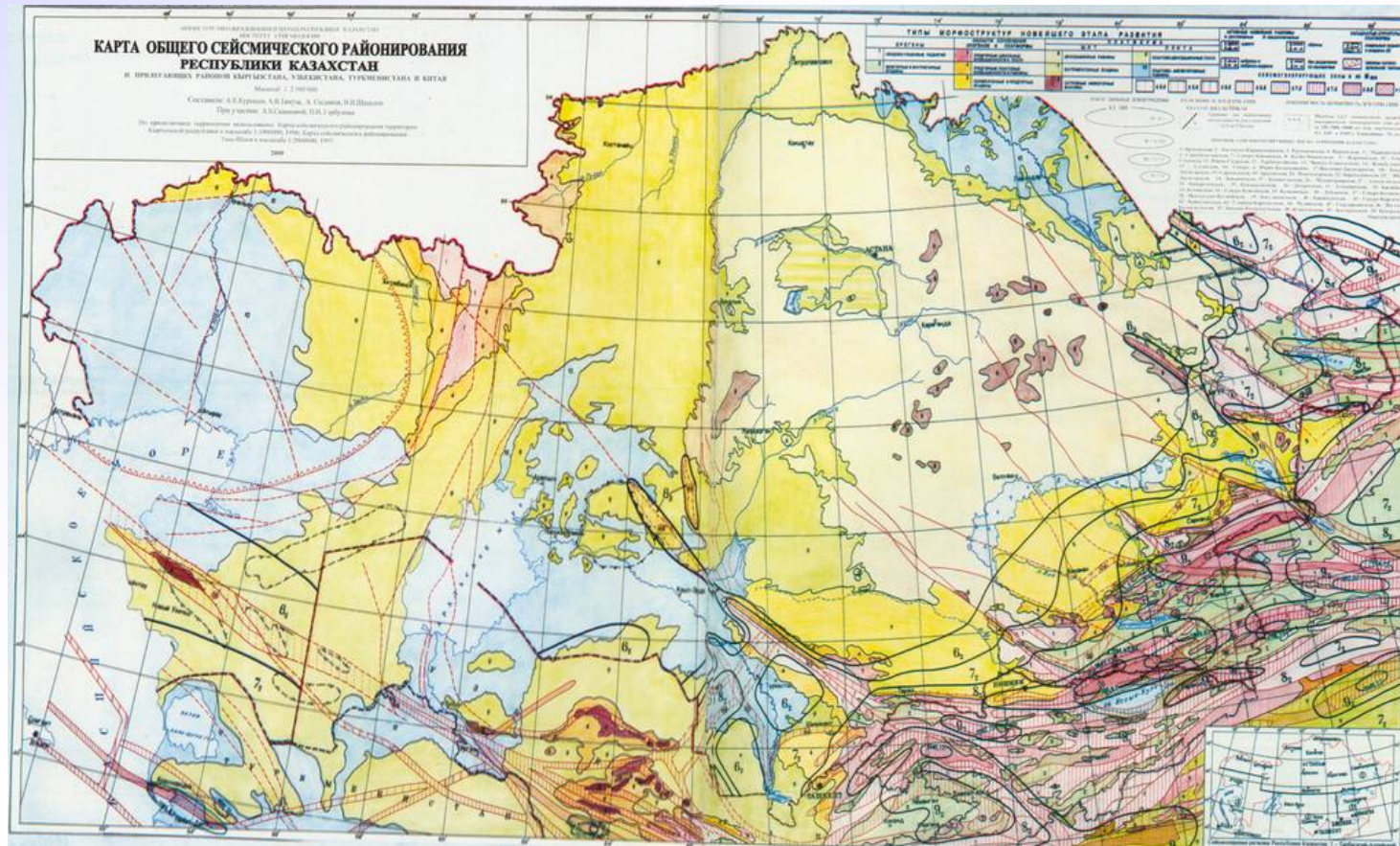
The methods of long- and intermediate-term earthquake prediction are developed.

The results of intermediate-term prediction are represented to competent and authorized structures of the Republic of Kazakhstan: the Security Council, the Committee for National Security, the Ministry for Emergency, the mayor of Almaty city and Almaty Province.

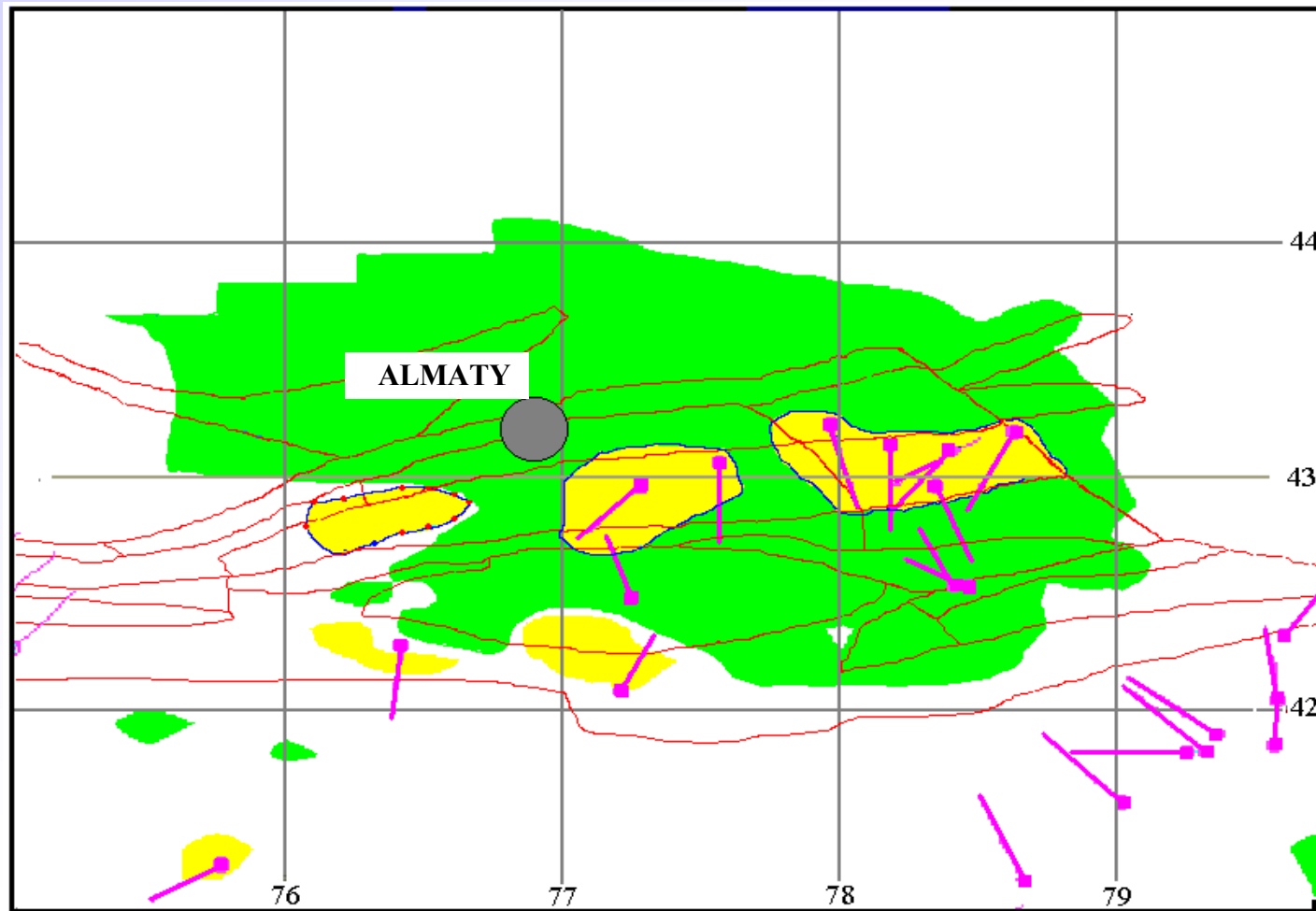
The MAPS

of general seismic zoning of the Republic of Kazakhstan as well as the maps of individual industrial regions and big settlements located in earthquake prone areas are developed.

The maps are included as an obligatory component in the Building Cods of the Republic of Kazakhstan.

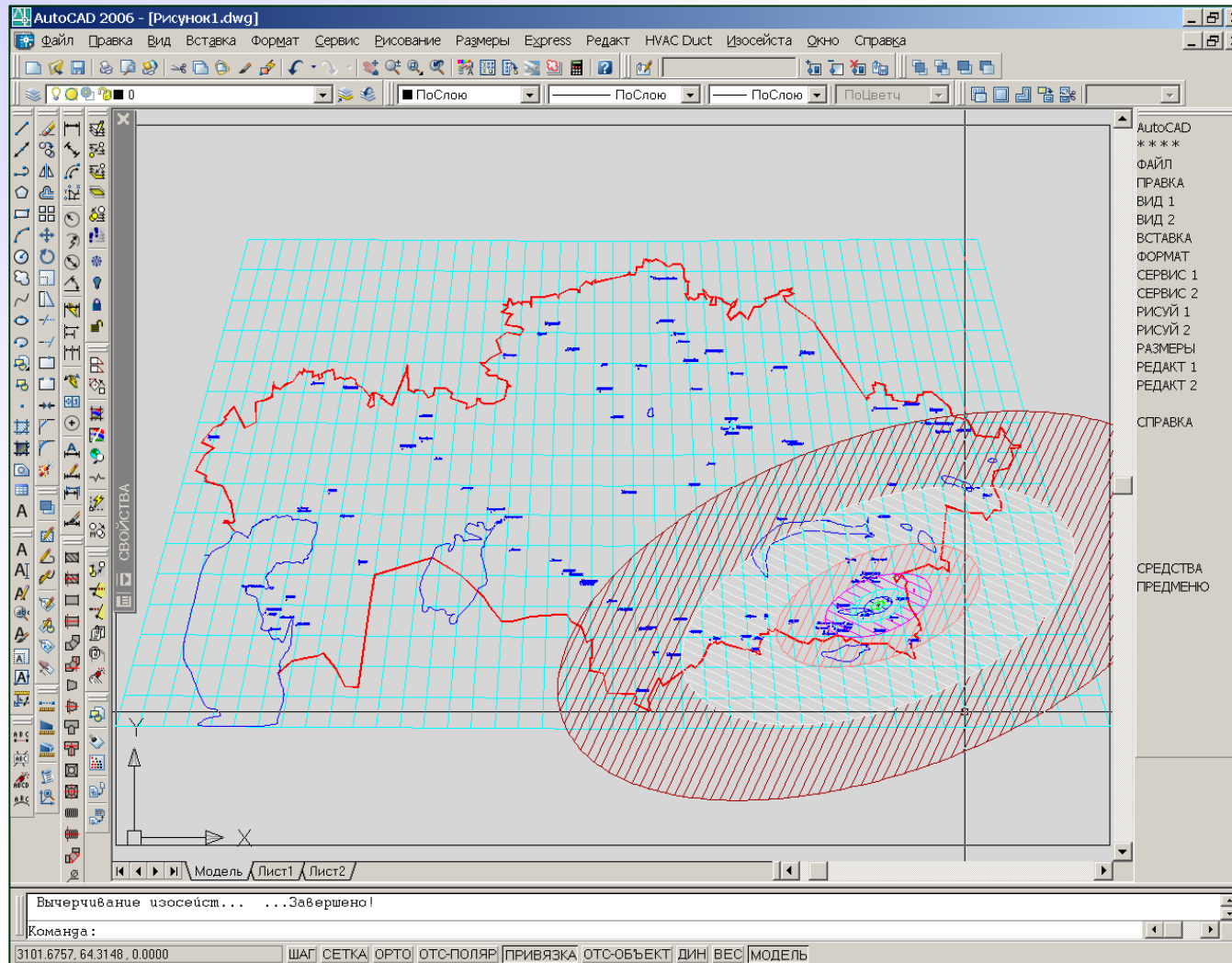


The areas of strong earthquake preparation determined on the base of long-term earthquake prediction



 - ZONES OF EARTHQUAKE PREPARATION

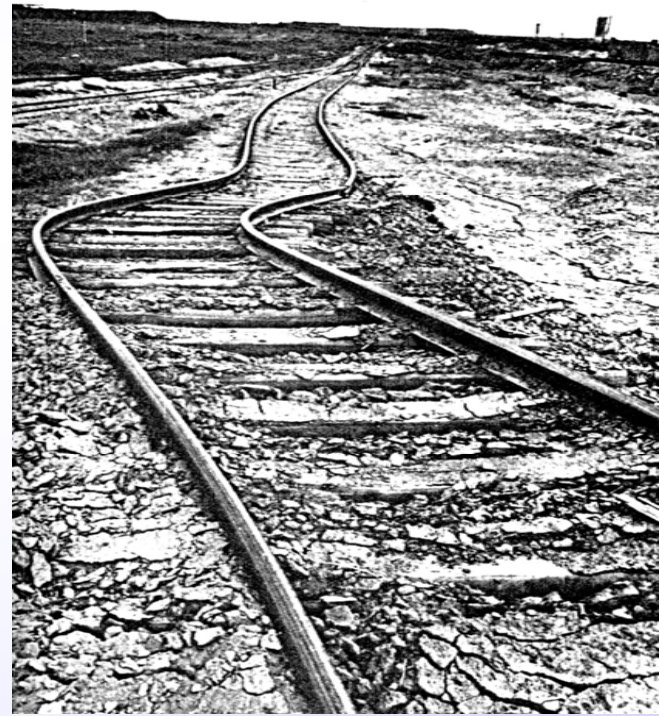
Prognostic isoseismals from the expected earthquake with the epicenter location to the southeast of Almaty city



Seismic hazard and risk assessment has been executed for:

- the construction site of a works in the Tengiz deposit
- the Atyrau oil refining works
- the route of the Zhanazhol-KS-13 gas pipeline
- the area of the Kashagan deposit arrangement
- the route of the Atasu-Alashankou oil pipeline
- the Ust-Kamenogorsk and Kapchagai hydroelectric power stations
- the Almaty thermoelectric power stations No1 and No2

The 01.08.1994 man-triggered earthquake near Zhezkazgan city



The 24.06.2005 man-triggered earthquake near Zhezkazgan city



International cooperation is carried out with seismological services, establishments, research institutes, public funds and organizations of the following countries:

JAPAN

1. JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
2. INTERNATIONAL INSTITUTE OF SEISMOLOGY AND EARTHQUAKE ENGINEERING
3. ASIAN CENTRE OF RISK REDUCTION NATURAL CATASTROPHES OF KOBE
4. GEOGRAPHICAL RESEARCH INSTITUTE OF KOBE

CHINA

1. STATE SEISMOLOGICAL BUREAU OF CHINESE PEOPLE'S REPUBLIC
2. SEISMOLOGICAL BUREAU XUAR CPR
3. DEPARTMENT OF INTERNATIONAL COOPERATION CPR
4. INSTITUTE OF GEODESIES AND CARTOGRAPHY SB XUAR
5. INSTITUTE OF PREVENTION OF NATURAL CATASTROPHES SB XUAR
6. GEOPHYSICAL INSTITUTE CSB CPR

RUSSIA

1. O.U.SHMIDT UNITED INSTITUTE OF THE EARTH PHYSICS OF RAS
2. SCIENTIFIC STATION OF THE INCORPORATED INSTITUTE HIGH TEMPERATURES OF THE RAS
3. INSTITUTE OF GEOPHYSICS OF THE SIBERIAN BRANCH OF THE RAS
4. INSTITUTE OF GEOPHYSICS OF URALSK DIVISION OF RAS
5. SCIENTIFIC RESEARCH INSTITUTE OF ECOLOGICAL SECURITY RAS
6. INSTITUTE OF INFORMATION COMMUNICATION PROBLEMS
7. VORONEZH POLYTECHNICAL UNIVERSITY
8. GEOPHYSICAL SERVICE OF THE SIBERIAN BRANCH OF THE RAS
9. INTERNATIONAL GEODYNAMIC CENTER (BISHKEK)

ORGANIZATIONS AND ESTABLISHMENTS OF USA AND THE EU

1. MASSACHUSETTS TECHNOLOGICAL UNIVERSITY
2. INDIAN UNIVERSITY
3. INSTITUTE OF THE EARTH SCIENCE UNIVERSITY OF JENA (GERMANY)
4. DEPARTMENT OF THE EARTH SCIENCE UNIVERSITY OF TRIEST (ITALY)
5. CANADA, company MDA, on training RADARSAT and InSAR

INSTITUTE OF SEISMOLOGY NAS OF KYRGYZSTAN

INSTITUTE OF SEISMOLOGY AS OF UZBEKISTAN

UNESCO

ISLAMIC REPUBLIC of IRAN, REPUBLIC OF MONGOLIA

The special help in development of seismic science of Republic of Kazakhstan was rendered by the Japanese Government. Due to scientific and technical cooperation with the Government of Japan represented by JICA, 15 accelerographs ALTUS-ETNA for strong motion observations, 6 high-sensitive digital seismic stations in Almatinskyi earthquake prone region and 4 stations for GPS observations have been installed.

On the instructions of the President of the Republic of Kazakhstan Nursultan Nazarbayev the Program of the Government of the Republic of Kazakhstan " Realization of measures directed on prevention and liquidation of the consequences of natural disasters, accidents and catastrophes" has been adopted.

The Program is figured on the period to 2012. The amount of annually planned financing is provided for 20 times increase in comparison with financing for 2008.

The Program provides for decision of the following tasks:

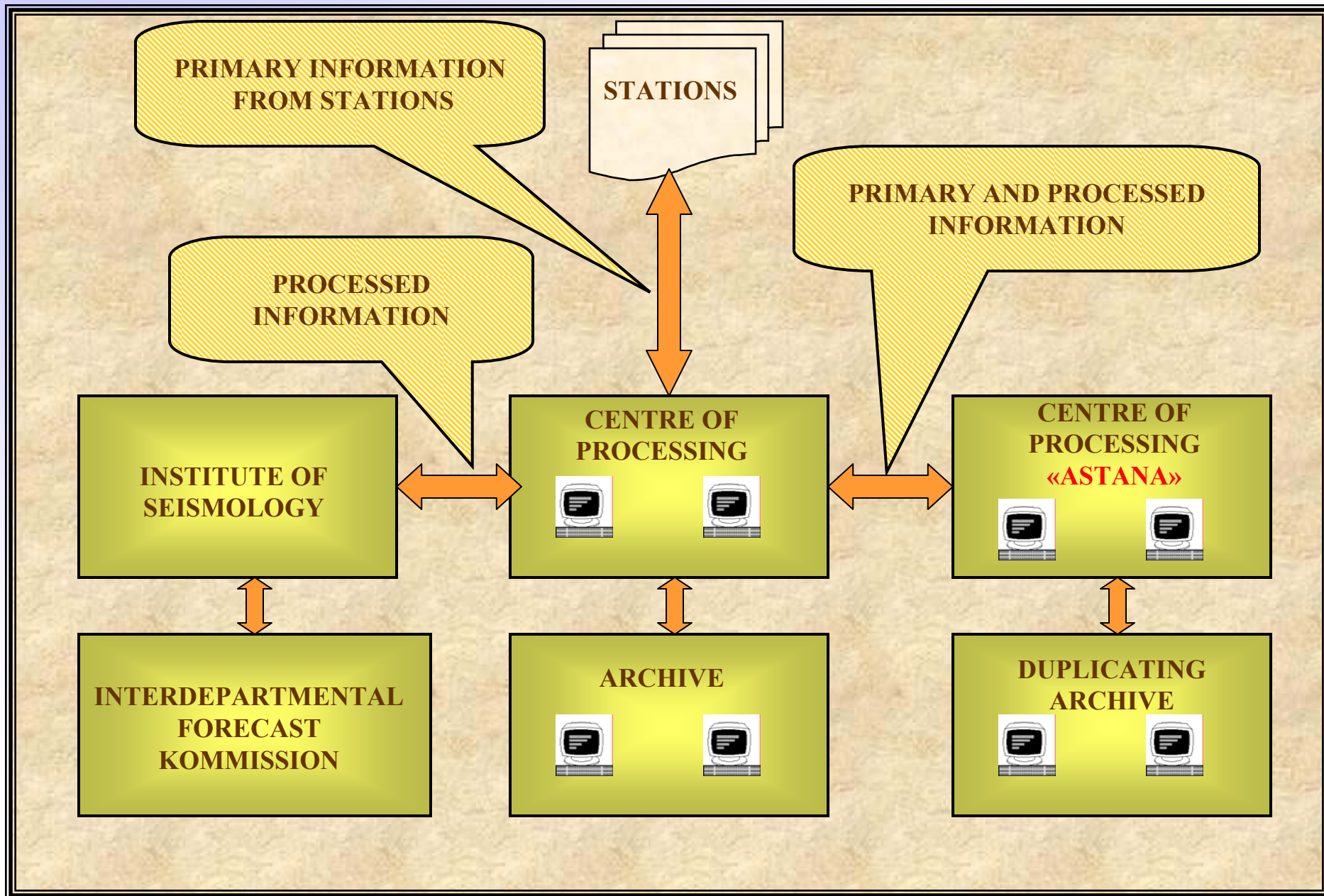
- Development of the new maps of general seismic zoning of the whole territory of the Republic of Kazakhstan attracting the last data.
- Development of the new maps of detailed seismic zoning for all provinces of the Republic of Kazakhstan (14 provinces).
- Development of the new maps of seismic micro-zoning for the city of Almaty and all big cities of the Republic of Kazakhstan located in earthquake prone areas.

- Seismic resistance survey of buildings and constructions and development of recommendations for seismic strengthening of schools, hospitals, historically valuable objects and life support facilities.
- Opening of new seismological stations all over the territory of the Republic of Kazakhstan.
- Creation of the State Seismological Monitoring System including underground, surface and space facilities, computation centers and regional observation centers and of the National Seismological Service covering all the territory of Kazakhstan.

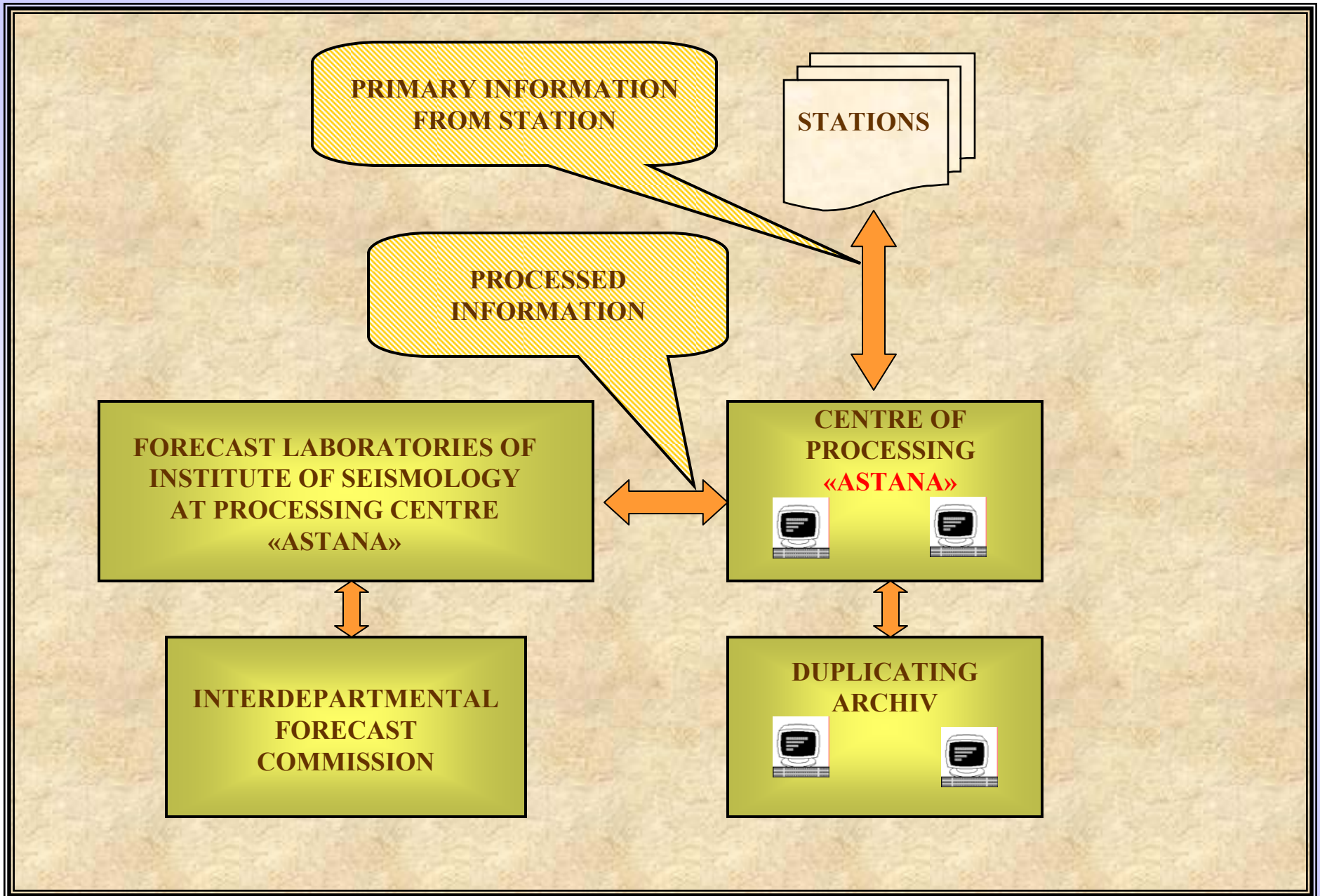
- Organization of geodynamical (seismological) monitoring and engineering-seismometric service at the objects of oil-and-gas and mining-and-smelting complexes as well as at nuclear stations under construction and design in the Republic of Kazakhstan.
- Development of recommendations for organizing a package of preventive measures during the threat of natural and man-caused disasters.
- Determination of exploitation and seismic reliability of strategic objects (hydroengineering structures, structures of oil-and-gas complex including western areas of Kazakhstan as well as objects of mining-and-smelting complex) and their seismic strengthening.

Creation of the duplicating Seismological Center in Astana city for case of destruction of the Institute of Seismology in Almaty due to a strong destructive earthquake.

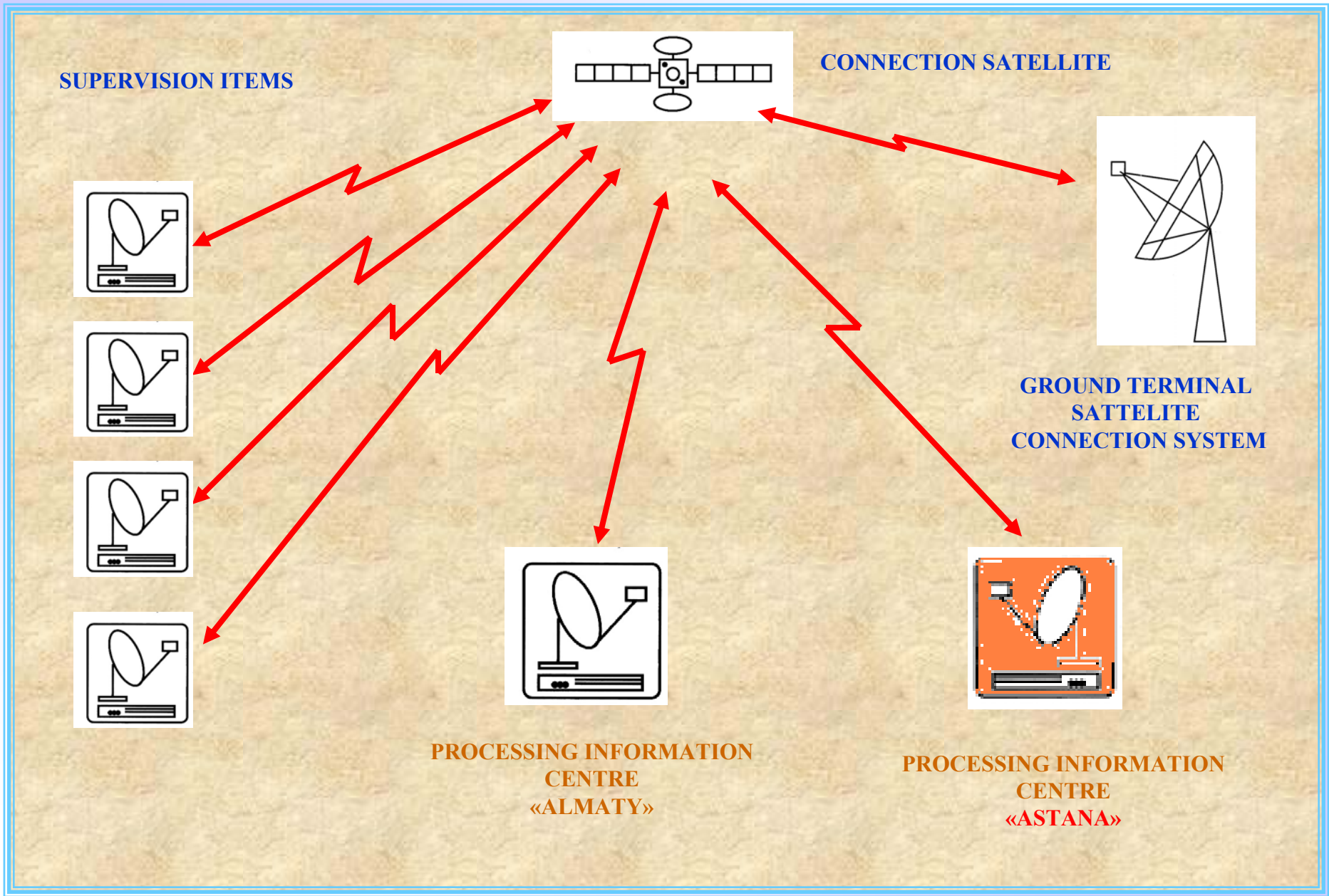
**THE CIRCUIT of TRANSFER of the SEISMOLOGICAL INFORMATION
AT USUAL MODE OF OPERATIONS**



**THE CIRCUIT of TRANSFER of the SEISMOLOGICAL INFORMATION
AT INFRINGEMENT of JOB of the BASIC CENTRE**



CONNECTION CIRCUIT WITH DUPLICATING CENTRE «ASTANA»



Thus during the coming three years it is planned to optimize the network of seismological observation in the Republic of Kazakhstan to a level of the best national standards and to increase seismic safety of the population.

**THANK YOU
FOR ATTENTION !**