

## **Development of the Engineering Infrastructure**

The engineering infrastructure of JINR is the basis for the operation of the Institute and for the implementation of its scientific programme. It is a complex system of interacting elements of which the most important are the following:

- support of the operation of the JINR basic facilities
- supply of energy resources
- availability of communication and telecommunication means
- safety.

### **1. Operation of the JINR basic facilities**

Currently, the basic facilities of JINR are under a programme of upgrade. The aim of this programme is to develop a modern experimental basis that will be attractive for Member States and the international scientific community. The main directions of this programme are described in the relevant scientific research chapters of the Seven-Year Plan. The upgrades of the basic facilities will bring out the Institute to leading positions in the world as a competitive international centre for nuclear physics and make it even more attractive for young talented scientists from Member States.

### **2. Supply of energy resources**

The main tasks of this subsystem are to provide the Institute with electric energy, heat, cold and hot water, liquid nitrogen, cooling and sewage systems. The development of these systems is implemented by the specialists of the Department of the JINR Chief Power Engineer, as well as in the frames of the upgrading of the JINR basic facilities. It is also worth mentioning JINR's special role in the supplies of electric power, water and heat for local consumers. More than 30% of consumers in the right-bank part of Dubna are using heat supplied by JINR structures, and for electric power and water supplies this figure makes about 50%.

#### **Electricity**

The main task of the development of the JINR electric energy supply is to increase its reliability category in order to ensure trouble-free operation of the basic facilities. New transformers will be launched at the two main step-down substations and the corresponding distributing gears will be constructed. It will allow sorting out the basic facilities into separate groups and considerably decrease the risk of hazardous failure of these facilities. Besides, it is planned to obtain additional power supply from the Moscow Canal to increase the reliability of the system.

The provision of stand-by electric supplies is also very important. It will be implemented with installing autonomous generators in the sites that are vitally important to the Institute.

#### **Heat and water**

To provide normal conditions for the operation of the Institute, it is necessary to continue work on the reconstruction of the pump-filter station, heat stations, heat and water networks; to replace, according to schedule, the outdated equipment and to automate technological processes. Installing modern equipment and use of blocks for commercial accounting of water and heat consumption will allow a considerable decrease of the Institute's costs on public utilities.

#### **Nitrogen workshop**

The main task of the nitrogen workshop of the Department of the JINR Chief Power Engineer is to supply liquid nitrogen to experimental installations and basic facilities. The development of the JINR basic facilities as well as the attraction of outside users will allow more efficient loading of the equipment at the workshop to make nitrogen production more profitable. But the main task for 2010–2013 is to transfer the production to energy-saving facilities.

### **3. Communication and telecommunication means**

To implement successfully the tasks envisioned in the JINR Road Map, it is necessary to develop all means of telecommunications. The development of the information and computing infrastructure, including the trunk line channels and the local network, is described in the corresponding chapters of this Plan.

#### **Telephone communications**

At present, the JINR telephone station (ATS-6) operates on the basis of the coordinate station ATSC 100/2000. The station provides service for approximately 5500 subscribers, including nearly 3800 JINR subscribers. The planned conversion of ATS-6 to the digital electronic equipment guarantees a considerable decrease of the operational costs and an increase in service quality, at the expense of the replacement of the analog communications to the digital ones. Besides, the costs of the inter-city and international communications will decrease considerably, at the expense of the IP-telephony technology.

### **4. Safety**

The issues of the safety policy include labour protection, industrial safety, management of natural resources, radiation, nuclear and fire security.

#### **Labour protection, industrial safety, management of natural resources**

The major task in labour protection is efficient preventive work to avert labour traumatism and profession-related diseases as well as emergency situations and accidents. To address this task, it is planned:

- to attest working places for labour conditions
- to replace, on scheduled basis, the outdated equipment (weight-lifting mechanisms, vessels operating under pressure, elevators, etc.) at dangerous sites
- to equip the industrial-sanitary laboratory with advanced and efficient measuring devices
- to improve information awareness system of the personnel and to promote the qualification of the leaders and specialists in labour protection, industrial safety and management of natural resources
- to dispose high-toxicity production wastes.

#### **Radiation and nuclear safety**

The task to minimize the radiation effect on humans and the environment comprises an increase of safety of the operating and planned nuclear physics facilities and provision of safety in handling nuclear materials (NM) and radioactive substances (RS). Besides, a system of strict registration and control of NM and RS, according to the federal laws, standards and regulations, is vital. To address these tasks, it is planned:

- to further develop the existing system of the individual dosimetry control at the JINR nuclear physics facilities, as well as to establish a system of control of the internal irradiation of the personnel
- to upgrade the existing radiation control systems (RCS), to elaborate new RCS at the radiation-hazardous sites of the Institute
- to purchase a mobile auto-radiological laboratory for efficient radiation reconnaissance
- to purchase equipment for NM and RS transportation and storage
- to develop an automatic system of radiation control for the JINR Central NM Stores
- to provide licensing and metrology for NM and RS accounting and control.

#### **Fire security**

The main task to provide fire security at JINR is to establish conditions for efficient precaution measures and fire prevention.

Fire protection of buildings and sites of JINR is organized and implemented by Fire Brigade FB-26 based on an agreement with the Institute. According to this agreement, it is necessary to equip the brigade with machinery and equipment.

It is planned to conduct a stage-by-stage upgrade of the operating systems of automatic fire alarm and fire-fighting, as well as to launch new modern systems involving in the process the specialists from the JINR station of the automatic fire fighting equipment.

To improve and maintain the proper level of the fire security at the Institute's sites, regular measures are necessary to make the buildings and constructions of JINR meet the established norms of fire security. These measures require adequate financing.

### **Financing (k\$)**

<b>Activities</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Bud- get- ary</b>	<b>Non- bud- getary</b>	<b>Total</b>
Electricity supply	1 600	1 600	1 000	100				100	4 200	<b>4 300</b>
Heat and water supply	6 900	1 500	1 300	1 300	1 400	1 000	800	2 500	11 700	<b>14 200</b>
Telephony	500							500		<b>500</b>
Radiation and nuclear safety	300	100	100	100	100	100	200	1 000		<b>1 000</b>
Labour protection and industrial safety	300	200	300	300	300	200	200	1 800		<b>1 800</b>
Fire security	200	300	200	300	300	400	400	2 100		<b>2 100</b>
<b>Total</b>								<b>8 000</b>	<b>15 900</b>	<b>23 900</b>