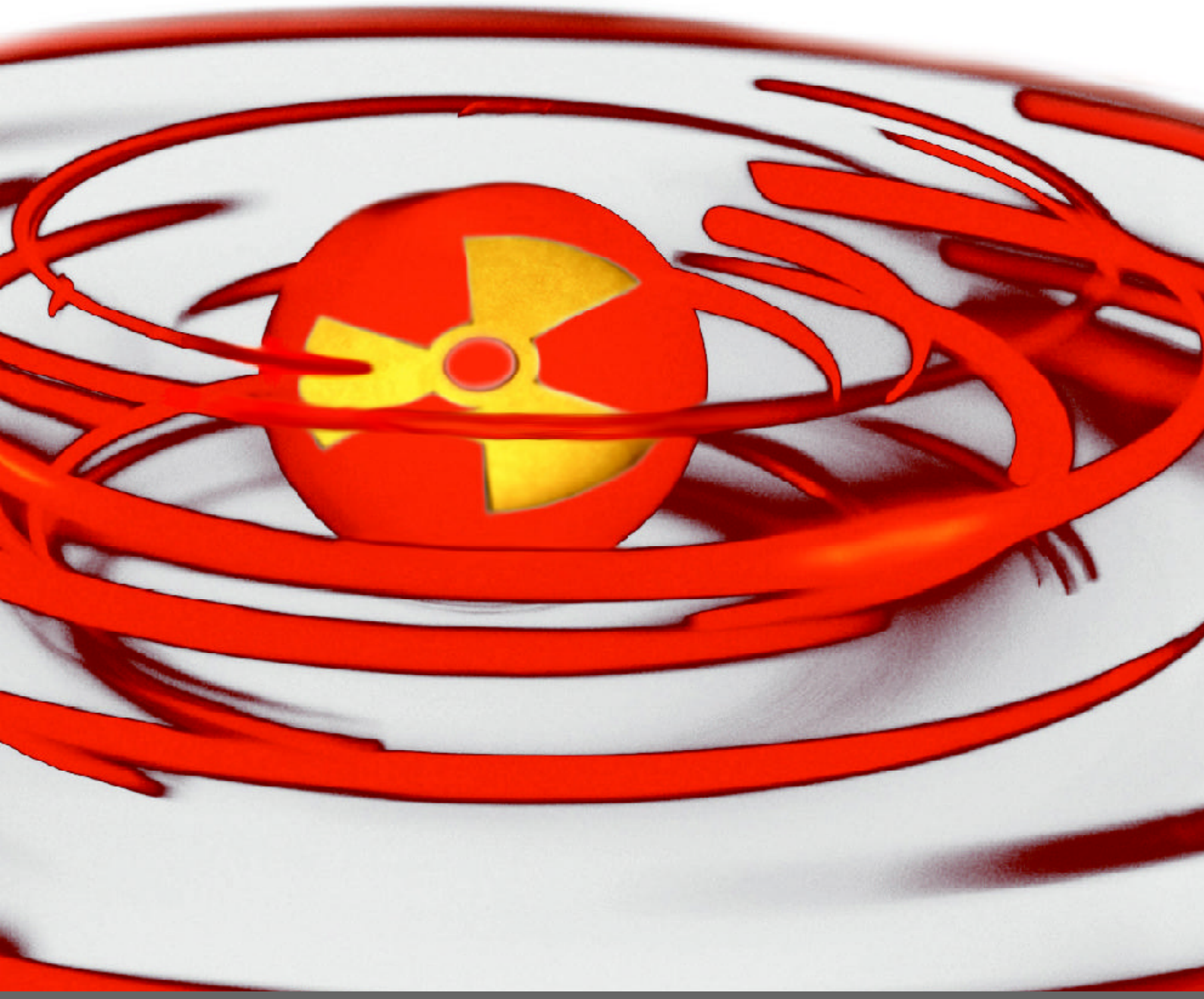
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH

PHYSICAL PROTECTION

of nuclear materials and nuclear facilities

Upgrading of nuclear facilities in the Russian Federation



„We want your life to be safe“.

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COMPANY PROFILE

GRS - Gesellschaft für Anlagen- und Reaktorsicherheit mbH - is a scientific-technical expert and research company. It provides interdisciplinary knowledge, advanced methods and qualified data for assessing and improving the safety of technical facilities and for further developing the protection of man and the environment from technical hazards and risks. GRS activities are mainly focused on the area of nuclear safety, where it is Germany's central expert institution.

GRS undertakes intensive co-operartion with various international partners and maintains close relations with foreign organisations. This involvement is manifested in many bilateral co-operation agreements and in the participation in numerous activities of the Organisation for Economic Co-operation and Development (OECD), the International Atomic Energy Agency (IAEA) and the European Union. Foremost of the international relations is the partnership with the French Institut de Radioprotection et de Sûreté Nucléaire (IRSN), which encompasses a broad range of common activities. RISKAUDIT, a joint subsidiary of GRS and IRSN, provides an interface to common customers. At the same time, it coordinates the activities of the European Technical Support Organisations (TSOs) for issues related to the safety of nuclear power plants in Eastern Europe.

GRS is a non-profit company. Its assessments are solely committed to the principles of science and technology. They are based on competence gained through own research and development activities, detailed prototype safety analyses, in-depth evaluations of operating experience, and many years of international co-operation.

GRS has about 480 employees (excluding subsidiaries). Around 320 of them are highly qualified engineers or scientists from different fields of engineering, physics, chemistry, geochemistry, geophysics, mathematics, computer science, biology, jurisprudence and meteorology.

Physical protection is one of the core competences of GRS.

CUSTOMERS

GRS is financed through contracts. The annual volume of contracts currently amounts to approximately Euro 50 million. Main customers are the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the Federal Ministry of Economics and Technology (BMWi), the Federal Office for Radiation Protection (BfS), and the Federal Ministry of Education and Research (BMBF). Other German customers are the authorities of the *Länder* (federal states), the Federal Environmental Agency, and the Foreign Office. The most important international customer is the European Commission.

SHAREHOLDERS

- Federal Republic of Germany (46 %)
- Free State of Bavaria (4 %)
- Land of North Rhine-Westphalia (4 %)
- Technical Inspection Organisations (TÜV) and the Germanischer Lloyd (together 46 %)

EXECUTIVE BODIES

- Meeting of shareholders
- Supervisory board (12 members), Chairman: Staatssekretär Rainer Baake, Vice-chairman: Prof. Dr.-Ing. Bruno O. Braun
- Managing directors: Dipl.-Phys. Lothar Hahn, Dr. jur. Walter Leder

More Information under www.grs.de

CORE COMPETENCE "PHYSICAL PROTECTION"

Physical protection is a typical interdisciplinary task. In principle, various disciplines have to be involved in the analyses and assessments so that the conclusive statements can be backed up under all conceivable aspects.

GRS disposes of the relevant human resources with the necessary qualifications. In particular, the core competence of GRS in the field of physical protection is based on the following:

BASIC KNOWLEDGE

GRS maintains databases containing information about the safety-related design and operational behaviour of nuclear facilities world-wide.

The behaviour of radioactive materials, especially nuclear fuels, is one of our major fields of work.

QUALITY AND METHODS OF WORK

Integral analyses and assessments are performed by way of consolidated interdisciplinary co-operation of our own experts from the relevant scientific disciplines.

CONTACTS

Intensive contacts and relations exist with German and foreign authorities, utilities and scientific institutions.

EXPERIENCE

GRS has long-standing experience with the evaluation of the operating experience with physical protection systems and is therefore in an excellent position to assess their long-term operation.

We have been gathering vast experience over many years in connection with the drafting of national requirements and guidelines as well as with the analysis of weak points related to physical protection.

Our experts are members on various international technical committees, e. g. at the IAEA.

SPECIAL KNOWLEDGE

We dispose of a very good regional knowledge of the countries concerned (mentality, structures, way of working), which is essential for effective co-operation.

Our experts are proficient in Russian and English.

INFRASTRUCTURE

Our Moscow Office is a contact point for Russian and other partners.

We dispose of state-of-the-art communication technology for fast data exchange (data network with link to Moscow Office, satellite telephone).

PRINCIPAL ASSIGNMENTS IN THE FIELD OF PHYSICAL PROTECTION

GRS is working successfully in the national as well as the international fields of physical protection.

The **national** activities can be divided into the support to federal authorities and the support to the state authorities within the framework of the supervision of nuclear facilities

Examples of the support to the federal authorities:

- Development of the philosophy and fundamental principles of physical protection
- Definition of the Design Basis Threat (DBT)
- Drafting of rules and guidelines for the physical protection of facilities
- Ad-hoc assessment of occurrences with relevance to physical protection

Examples of the support to the state authorities:

- Assessment of physical protection issues in licensing procedures
- Supervision of physical protection during the operation of facilities
- Periodical evaluation of devices and systems installed for physical protection

GRS is working closely together with several states and institutions in the **international** fields of physical protection.

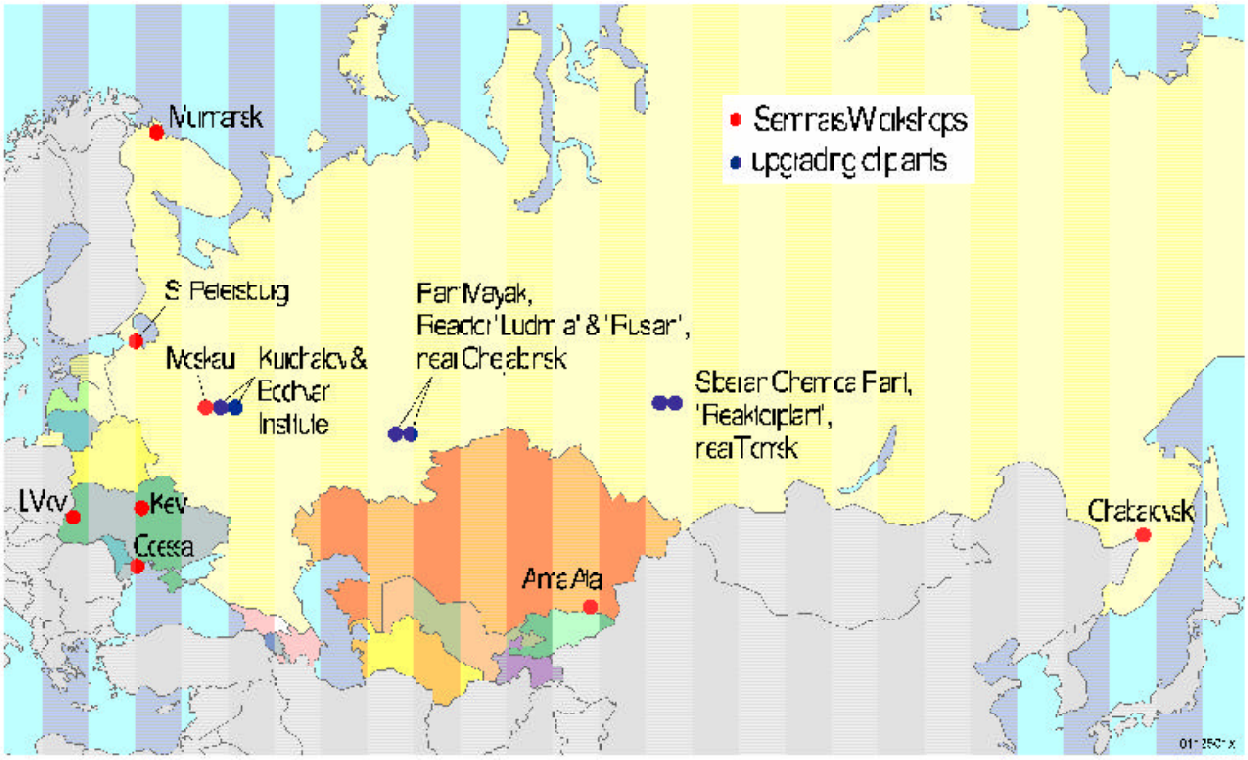
The bilateral activities concern e.g. the co-operation between FRG and France, Sweden, USA, Russia, Ukraine and Kazakhstan. Examples of bilateral activities are:

- Co-operation with IRSN, France
- Seminars on physical protection addressed to experts from CEEC and NIS
- Upgrading of the physical protection of nuclear material and facilities in the Russian Federation
- Information exchange within the framework of INMM

GRS is deeply involved in the multilateral activities of the IAEA. Especially in:

- Contribution to the development of the IAEA Convention on the Physical Protection of Nuclear Material
- Contribution to IAEA recommendations on physical protection such as INFCIRC/225
- IAEA seminars on physical protection in various countries
- Participation in IAEA IPAS missions

PROJECT SITES



Sites with GRS projects in the field of physical protection in the eastern region

TRAINING AND INFORMATION ACTIVITIES OF GRS IN RF

Seminars, workshops and on-site instruction are prereguisites for the implementation of safe physical protection systems.

Seminars are of a general nature and are organized especially for licensing authorities. For example, the following topics are addressed:

- National philosophies of safety and security
- Rules and regulations
- Procedures of the licensing and regulatory bodies
- Physical protection concepts of typical facilities

A more specific exchange of information and experience is started in **workshops** with e.g. the following topics:

- Meeting the requirements of the IAEA information circular INCIRC/225
- Fundamentals of physical protection
- Licensing and control of shipments of radioactive substances
- Licensing and control of nuclear facilities
- Suitability of systems of physical protection
- Methods for identifying and improving the weak points of older facilities

A further step in this co-operation is **on-site instruction**, with visits to nuclear facilities, to show and discuss the improvement of technical and personnel-related physical protection concepts and measures.

The seminars, workshops and on-site instruction conducted by GRS have contributed to:

- the implementation of the subject of physical protection into the newly installed atomic laws
- the formulation of an extensive framework of rules and guidelines
- the installation of an independent and well-informed supervisory authority
- the improvement of the physical protection of nuclear facilities with respect to the international physical protection goals, against the outer threat as well as the inner threat
- the development of a national DBT as a basis for physical protection concept and for the design of physical protection measures

UPGRADING OF NUCLEAR FACILITIES IN RF

A major topic of the joint GRS/Russian effort is the upgrading of Russian nuclear facilities by means of technical upgrading of the systems of physical protection. The sponsors of these projects, BMU and the Foreign Office, have stipulated that only plants of category I should be considered concerning the theft of nuclear materials.

PROJECTS

The VNIINM facility in Moscow, also known as the Bochvar Institute, was the first nuclear facility which was selected for this work: The Bochvar Institute is about 50 years old.

The second plant which was selected is a research institute of the Kurchatov Institute Moscow named “Gas Plant”. This plant is also about 50 years old.

The third plant designated for technical upgrading is a part of the big Mayak facility near Chelyabinsk. This plant has nearly the same age as the other two plants and is named “Reactor Plant”.

The first project in the “Reactor Plant” of Mayak concerns a facility called Ludmilla, a reactor to produce isotopes. The second project in this “Reactor Plant” is also a reactor for isotopes production, which is called Ruslan.

The fourth plant designated for technical upgrading is part of the big Tomsk 7 facility near Seversk. This plant is about 40 years old and is also named “Reactor Plant”.

In all the plants mentioned some physical protection measures have been carried out. They are no longer sufficient to meet the national and international requirements.

UPGRADING OF NUCLEAR FACILITIES IN RF

PROCEDURE

For each plant, a working group was put together from members of Minatom, partly Gosatomnadsor, the operator, the companies who were responsible to install the installations, and GRS. It was the special intention of GRS that all important activities should be done jointly to practice real co-operation.

For the analysis of the facilities, all relevant subjects were extensively reviewed and discussed in this working group. Upgrading measures were agreed upon by the operator and GRS.

For improving the physical protection of the plant, mainly the physical protection technology from the RF is applied. The experts from GRS have assured themselves that this technology meets the requirements. This evaluation was based on visits to the manufactures of the technical systems applied as well as on functional tests at the plants.

The use of Russian technology has the following advantages:

- Russian technology is designed for the prevailing climatic conditions of the country
- Equipment with Russian technology in the country is easy to maintain and repair
- Russian technology is inexpensive

After having carried out the planned measures, the plants and GRS jointly conducted inspections and operational tests. The cost of refitting technical components was mostly paid by Germany. Nevertheless, some installations, e.g. fission product monitors at the exits or new fences and detection systems at the perimeter, were financed by the Russian partners.

The physical protection concept was based on the following boundary conditions:

- The main objective is to prevent the theft of nuclear material of Category I.
- The Russian rules and regulations for physical protection have to be observed.
- Possible perpetrators are people who intrude into the plant from outside (Outer Threat) or fellow workers and external personnel, including guards (Inner Threat).
- Since the national Design Basis Threat has not yet been defined in Russia, it was necessary to define it for each plant in this co-operation.
- In establishing additional physical protection measures, the Russian concept of securing nuclear facilities by using military troops has to be taken into account. Furthermore, specifications e.g. by the Ministry of the Interior, for the design and construction of the perimeter have to be taken into account.
- A very important limiting factor for the upgrading of nuclear facilities in Russia are the available funds. It is always necessary to find a compromize between the requirements of the plant, the special wishes of the operators and the possibilities to finance such a project.

UPGRADING OF NUCLEAR FACILITIES IN RF

RESULTS

Through the joint work on the physical protection of special plants a common understanding for the following important points was reached among the participants of the working group:

- significance of systems which are relevant from the point of view of safety and physical protection
- weak points of the facility
- extensive physical protection concept
- realization of a physical protection concept with staggered measures – defense in depth
- implementation of modern physical protection techniques frequently as a compensation of personnel measures

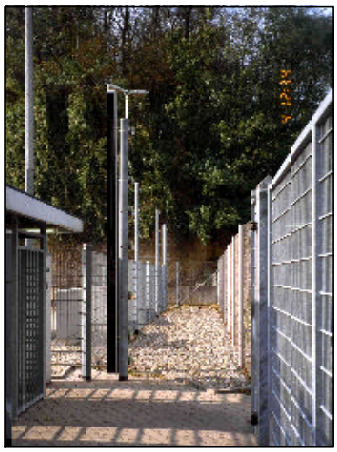
The most important result was reached by the improvement of the physical protection of the nuclear materials in the facility with the consequence that theft needs not be feared anymore.

Therefore the following exemplary physical protection measures have been implemented:

- modern technical detection systems around the facility, as well as automatic alarm verification systems and lighting
- access control systems at the entrances in the perimeter and to the protected zones
- detectors of nuclear materials at the exists of the plant
- security centers
- physical barriers at the border of the protected zones
- vehicle barriers at the exits of the perimeter
- surveillance systems inside of the protected area
- communication systems especially for the military troops

These measures have already been taken at the Bochvar Institute, the Kurchatov Institute “Gas Plant” and the “Ludmilla” reactor in Mayak. The other projects are scheduled for completion in 2003.

UPGRADING OF NUCLEAR FACILITIES IN RF



CONFIDENTIALITY

Each party shall be obliged to regard the information made available as confidential information and make it inaccessible to third parties. For this reason, the resulting presentation shall only be of a general nature, and thus detailed information cannot be given.

CONTRACT/AGREEMENTS

Germany, the Russian Federation and the NIS have been working closely together since 1992 in the field of physical protection of nuclear materials and facilities. This co-operative work is based on agreements between the German Federal Minister for the Environment, Nature Conservation and Nuclear Safety (BMU), the Ministry for Atomic Energy of the Russian Federation (Minatom) and the Federal Regulatory Authorities of the Russian Federation for Nuclear Safety and Radiation Protection (Gosatomnadsor). Furthermore, this co-operative work is also based on bilateral contracts between FRG and RF and on an agreement between the Federal Foreign Office of Germany and Minatom. These agreements and contracts are not subject to any time limits. GRS as the central organization for the field of physical protection in Germany was charged by BMU and the German Foreign Office with the performance of this co-operation.

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Upgrading of nuclear facilities in the Russian Federation

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