

<b>NAC Kazatomprom JSC</b>	<b>S&amp;TPD</b>	<b>Coordination of scientific activity</b>
<b>Status: Effective</b>	<b>KND 06 ____ AA</b>	<b>Page 1 of 6</b>

## **Scientific and Technological Development of NAC Kazatomprom JSC**

### **Policy**

#### **1. Aim**

1.1. This Policy “Scientific and Technological Development” (hereinafter referred to as the Policy) is an internal document of NAC Kazatomprom JSC (hereinafter referred to as the Company), which defines the general principles, intentions and directions of activities in the field of scientific and technological development of the Company and subsidiaries, affiliates and jointly controlled enterprises of the Company (hereinafter – S&A).

1.2. This Policy is aimed at solving the problems of adapting existing industries to the constantly changing market conditions, developing and justifying adjustments to current and medium-long-term plans, minimizing production and financial costs.

#### **2. Scope**

2.1. This Policy applies to the activities of the Company related to the planning, monitoring and implementation of R&D, scientific and technical services, creation and commercialization of intellectual property, implementation of the results of completed R&D in the production of the Company, strategic direction of the Company in terms of scientific and technological development.

2.2. This Policy is advisory for all subsidiaries and affiliates.

#### **3. General Provisions**

3.1. This Policy was developed in accordance with the RoK Law dated 18 February 2011 No. 407-IV “On Science”, RoK Law dated 31 October 2015 No. 381-V “On commercialization of the results

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0.		Science and Technology Projects Director A. Omirgali  _____ 2020	Decision of the Management Board of NAC Kazatomprom JSC No. _____ dated ____ _____ 2020

of scientific and (or) scientific and technical activities”, the Decree of the RoK Government dated December 12, 2017 “Digital Kazakhstan State Program”, the Charter of NAC Kazatomprom JSC and internal documents of the Company, as well as international practice and recommendations of international regulatory and state bodies in the field of scientific and technological activities management.

3.2. Scientific and technological development of the Company is aimed at increasing the efficiency of implementation of Kazatomprom Development Strategy for 2018-2028.

#### **4. Terms and Definitions**

4.1. R&D Roadmap - an action plan for performing R&D from laboratory research to implementation in production. R&D Roadmap reflects the relationship between the critical system requirements of the R&D process and the R&D phases.

4.2. U3O8 - uranium nitrous oxide.

4.3. Intellectual property (IP) is the exclusive right of an individual or legal entity for the results of intellectual creative activity obtained as a result of research, development and technological work, and means of individualization of participants in civil circulation, goods, works or services.

4.4. Artificial intelligence is the property of intelligent systems to perform creative functions that are traditionally considered a human prerogative; science and technology of creating intelligent machines, especially intelligent computer programs.

4.5. Technology commercialization is an activity aimed at introducing into production and making a profit from technological developments, including activities for the active technology marketing.

4.6. Research, development and engineering works (R&D) are a set of works aimed at obtaining new knowledge and practical application when creating a new technology or a new product.

4.7. The Scientific and Technical Board of the Company (STB) is an advisory body under the Management Board of the Company created for the scientific and technological, information, analytical and expert support to the Company activities with three sections for each of the 3 (three) priority scientific and technological directions of the Company’s development in accordance with sub-clauses 5.2.1., 5.2.2. and 5.2.3. clause 5.2. of this Policy, with a pool of scientific experts and the Chief Scientific Secretary of the Company.

4.8. Scientific and technological development is an activity at the intersection of scientific and engineering activities. It covers scientific, engineering and implementation activities aimed at obtaining and applying new knowledge to solve technological and engineering problems, as well as to ensure the functioning of science, technology and production as a single system.

4.9. REM - rare earth metals.

4.10. RM - rare metals.

4.11. Technology transfer is the movement of technology using any information channels from one of its individual or collective carriers to another. Technology transfer includes the transfer or alienation of the exclusive right to the results of intellectual activity.

4.12. ECIP is an expert committee on intellectual property of NAC Kazatomprom JSC.

4.13. NFC - nuclear fuel cycle.

4.14. Digital and smart technologies are the technologies used to increase the production efficiency of enterprises, based on the presentation of information in digital form (Block-Chain, Big Data, Machine Learning, Artificial Intelligence, unmanned control, robotics, 3D printing, engineering, automation, etc.).

## 5. Principles of scientific and technological development

5.1. In pursuance of 2018-2028 Kazatomprom Development Strategy and in order to create the effective system of control, coordination and monitoring of the areas of scientific and technological development, the Company defines the following basic principles:

5.2. *The principle of systematic integrated approach to planning R&D topics and scientific and technical services* (hereinafter referred to as STS), *optimization of expenses for R&D and STS* through the concentration of resources on priority areas of development:

5.2.1. Extraction and processing of productive solutions, U3O8 extraction.

5.2.2. Geology, geo-technology, mining and development work, repair and restoration work on wells and associated recovery of RM and REM in uranium deposits.

5.2.3. High NFC technologies, production and processing of RM and REM.

5.2.4. Digitalization, automation and robotization.

5.2.5. Commercialization of intellectual property objects and transfer of technologies (commercialization of IP and transfer of technologies through the expert committee on intellectual property of NAC Kazatomprom JSC), and Knowledge Management.

5.3. *The principle of responsibility for the results of R&D and scientific and technical services* is the appointment of the Administrator, the Expert Coordinator and the Operator of the priority area of scientific and technical development of the Company and assigning to each of them the area of responsibility and competencies.

5.4. *The principle of achieving positive end results of R&D and scientific and technical services.* The performed R&D should focus on obtaining economic effect and scientific and technical services should bring the general positive results to the Company and S&A (life cycle of each R&D: idea → research / development → implementation). For each R&D, a Roadmap and a monitoring and control system for the R&D life cycle should be developed.

5.5. *The principle of collegiality and transparency in decision-making* on scientific and technological development is the creation of a Scientific and Technical Board with 4 (four) sections for each priority area in accordance with sub-clauses 5.2.1., 5.2.2., 5.2.3., 5.2.4. clause 5.2. of this Policy, commercialization of intellectual property objects and transfer of technologies through the Expert Committee on Intellectual Property in the priority area in accordance with sub-clauses 5.2.5. clause 5.2. of this Policy.

## 6. The purpose and objectives of scientific and technological development

6.1. The purpose of scientific and technological development is the search and implementation of technological innovations, initiation of scientific research and development, which includes the following objectives:

- Creation of a system for selection, assessment of R&D (technical and economic effect) and implementation of science-intensive, resource-saving, digital technologies and artificial intelligence technologies (both our own developments and the best world achievements) at the facilities of the Company in accordance with the Development Strategies/Plans of the Company and S&A, decisions of collegial bodies, as well as the results of technological audit of enterprises;

- Formation of a system for commercialization of intellectual property in order to increase the share of intangible assets in the authorized capital. In addition, a transfer of technologies both within the holding and the country and abroad;

- Increasing the contribution of new scientific/scientific and technical/technological/digital developments and artificial intelligence technologies to reducing the cost of production with the inclusion of indicators of scientific and technological development of the enterprise in the KPI of the S&A heads and responsible managers and employees of the Company;

- Effective management of production (technological) assets;
- Improving the quality of the environment (air, land, water) and radiation safety;
- Increasing the scientific and technical efficiency and competence of the employees of the Company and S&A.

## **7. Assignment of responsibility and competencies in priority areas of scientific and technological development**

7.1. The system for organizing scientific and technological development provides for the following assignment of responsibilities and competencies:

**7.1.1. The system administrator** (a specialized structural subdivision of the Company responsible for coordinating scientific and technological development with four positions of Chief Expert Coordinators in each priority area (in *Digitalization, Automation and Robotization* direction, the position is distributed among the Chief Expert Coordinators in the scientific section competence) and the Chief Scientific Secretary of the Company) is responsible for:

- Organization of fulfillment of this Policy and 2018-2028 Kazatomprom Development Strategy as part of fulfillment of the section "Contribution of new scientific developments to reduction of the uranium mining production cost and to of production efficiency";
- Methodological support and development of basic regulatory and technical documents for each area of scientific and technological development, their update;
- Administration and coordination of scientific and technological development for each priority area of development in the short (up to 1 (one) year) / medium (up to 3 (three) years) / long (more than 3 (three) years) term (carried out in coordination of basic solutions with STB);
- Organization of the work of the pool of scientific experts through the position of the Chief Scientific Secretary of the Company to ensure objective and independent examination of materials submitted for consideration and approval by the Scientific and Technical Board;
- Formation of a system for commercialization of intellectual property, as well as transfer of technologies in order to increase the share of intangible assets in the share capital of the Company and S&A;
- Development/implementation of advanced innovative digital technologies and completed scientific and technical/technological works and services, with mandatory calculations of economic efficiency;
- Management and preservation of scientific-technological and new knowledge, with publication of consolidated analytical information in public domains;
- Distribution/replication of completed scientific and technical/technological developments through commercialization and transfer of technologies;
- Monitoring and coordination of the activities of the Coordinators and Operators of the corresponding priority areas of scientific and technological development by the Chief Expert Coordinators in each specialized priority scientific area.

**7.1.2. Coordinator of the priority area** (Head of the specialized structural subdivision of the Company / Chief Expert Coordinator on each of 4 (four, except for clause 5.2.4.) priority areas of the Company's development (in accordance with clause 5.2.5. on commercialization of IP Objects and

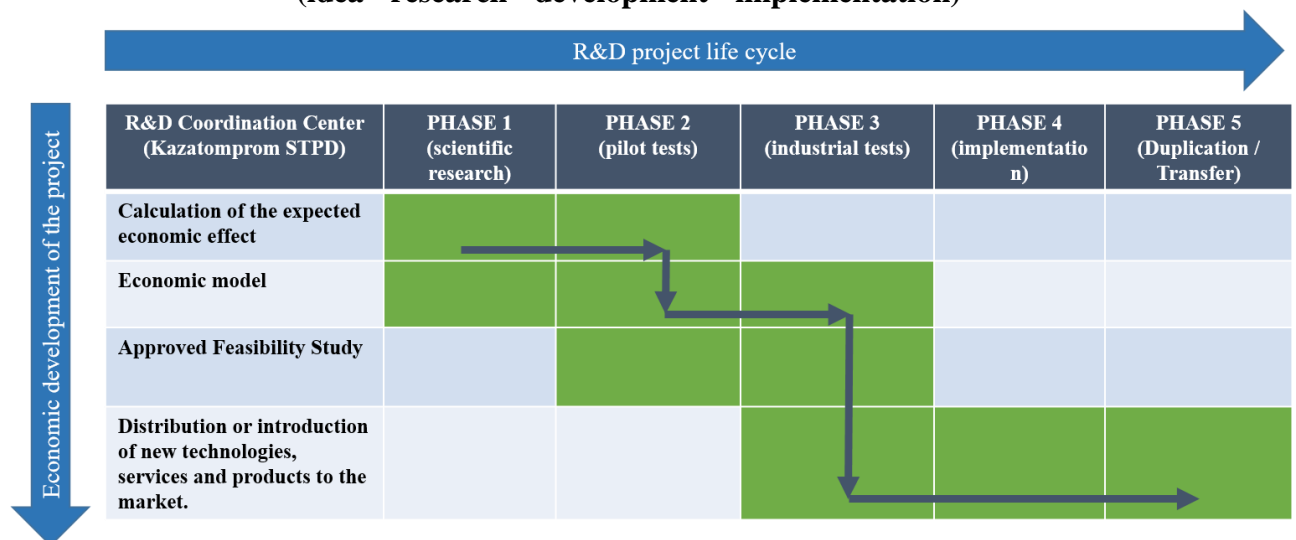
technology transfer - Chief Expert Coordinator for IP Objects) and a specialized structural subdivision) is responsible for:

- Coordination of R&D/STS processes of the Company and S&A, from planning to implementation (research/development, implementation), within the assigned priority scientific and technological development;
- Monitoring and control of the activities of the Operator of the priority scientific and technological direction and roadmaps on R&D projects;
- Participation in the management and monitoring of the STB activities in the relevant section of the priority scientific and technological development area and ECIP;
- Coordination in the field of intellectual property of the Company, obtaining new titles of protection, maintaining titles of protection valid, as well as commercialization of existing titles of protection of the Company.

**7.1.3. The operator of the priority area** of scientific and technological development (subsidiaries and affiliates and/or structural subdivision of the Company. The operator can simultaneously be an R&D/STS performer) is responsible for the following:

- Monitoring and control of planning and execution of works that are carried out at all stages of the R&D life cycle (from idea to implementation in production) in accordance with the given system:

#### Monitoring and control of R&D life cycle stages (idea - research - development - implementation)



- Development and monitoring of the roadmap for each performed R&D in accordance with the process of guaranteed development of the project in phases, with the roadmap being an integral part of each R&D agreement;
- Organization of the STB's work on the formation of a list of R&D / STS projects in the corresponding section of the priority scientific and technological direction for the current year/mid/long-term perspective and hearing the results of R&D (reports);
- Reasonableness of the draft terms of reference and compliance with the goals and objectives of the corresponding section of the STB of the priority scientific and technological area in agreement with the Chief Expert Coordinator of the priority area;
- Periodic reporting to the Coordinator and Administrator on the progress and results of R&D / STS;
- Formation, within its competence, of a scientific center/scientific school/center of competence in a priority area, as a special form of cooperation in scientific activity, including the generation and preservation of scientific and technological knowledge

accumulated in the process of R&D, as well as selection, development, training, advanced training, retraining, training of highly qualified scientific and technological personnel of the Company and S&A, both in the country and abroad, including those from among young specialists, children of employees, in order to develop the principles of succession in the Company and preserve scientific dynasties;

- Organization of ECIP work on formation of the issues related to the protection of intellectual property rights of the Company, and on the issues of transfer of the Company technologies.

## **8. Final Provisions**

8.1. The provisions of this Policy are implemented through the development of new and updating the existing internal regulatory and technical documents of the Company for scientific and technological development.

8.2. This Policy is subject to a regular assessment, revision and updating as necessary to reflect the changing conditions and new scientific and technical information.

8.3. The scientific and technological policy of the Company's subsidiaries and affiliates cannot contradict this Policy.

8.4. Stakeholders have the right to read this Policy at the Company's office located at No. 17/12, Green Park Business Centre, E-10 Street, Yessil district, Nur-Sultan, Republic of Kazakhstan. The electronic version is available on the official web site of the Company at [www.kazatomprom.kz](http://www.kazatomprom.kz)