Appendix to the order of the

Chairman of the Science Committee

* + - 1. from "09" March 2021 No. 41-нж

Approved by order of the

Chairman of the Science Committee

from "01" March 2021 No.29-нж

**Competition documentation**

**for program-targeted funding for scientific and technical programs for years 2021-2023**

**1. General Rules**

1. The competition is held under targeted program funding for scientific and technical programs for years 2021-2023 (hereinafter referred to as the Competition), aimed at the implementation of the Messages of the President of the Republic of Kazakhstan to the people of Kazakhstan, the Strategy "Kazakhstan-2050", the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025 and other strategic and program documents.

The purpose of the competition is to solve strategically important state tasks through the implementation of scientific and technical programs.

1. This competition documentation for program-targeted funding for scientific and technical programs for years 2021-2023 (hereinafter referred to as the Competition Documentation) was developed in accordance with the Law of the Republic of Kazakhstan «On Science» dated February 18, 2011, the Regulation on National Scientific Councils, approved Decree of the Government of the Republic of Kazakhstan dated May 16, 2011 No. 519, the Rules for basic, grant, program-targeted financing of scientific and (or) scientific and technical activities, approved by the Government of the Republic of Kazakhstan dated May 25, 2011 No. 575, and the Rules for conducting state scientific technical expertise approved by the Resolution of the Government of the Republic of Kazakhstan dated August 1, 2011 No. 891.

3. Competition documentation was developed by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (hereinafter - the Science Committee).

4.The total amount of funding for years 2021-2023 is 16,990 million tenge. When broken down by years: 2021 - 5,662 million tenge, 2022 - 5,663 million tenge, 2023 - 5,663 million tenge, as recommended by the National Scientific Councils (hereinafter - NSС) and approved by the Higher Scientific and Technical Commission.

5. Type of research: fundamental and applied research.

**2. Names of priority and specialized scientific areas**

|  |  |
| --- | --- |
| **Priority directions, amount of funding** | **Specialized scientific areas** |
| **Rational use of natural resources, flora and fauna, ecology.** The volume of financing for 3 years - up to 1,650 million tenge | 1.1 Management of water, soil and biological resources1.2 Environmental monitoring and green technologies |
| **Geology, mining and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures.** The volume of financing for 3 years - up to 1,110 million tenge | 1.4 Integrated and waste-free use of mineral raw materials1.9 New multipurpose materials based on natural raw materials and industrial waste |
| **Energy and mechanical engineering.** The volume of financing for 3 years - up to 900 million tenge | 2 Alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources; |
| **Information, telecommunication and space technologies.** The volume of financing for 3 years - up to 1,950 million tenge | **3.1 Intelligent information technology**Intelligent control and decision-making systems (including in real time)Speech technology and computational linguistics.Pattern recognition and image processing.**3.3 Space technology**Monitoring and forecasting of space and geodynamic processes, natural resources and remote sensing of the Earth.Development of a scientific and experimental base for deep and near space research.**3.4 High performance computing technology**Geoinformation technologies and systems. |
| **Life and Health Science.**The volume of financing for 3 years - up to 4,500 million tenge | **5.2 Biotechnology in medicine:**5.2.1 Development of cell technologies and tissue engineering for medicine;5.2.2 Molecular, genomic, cellular and bioinformation technologies for the development of applied biology of personalized medicine;5.2.4 New technologies and biologically active substances for solving the problems of ante- and postnatal development, aging, prolongation of human life;5.2.6 Study of the prevalence and mechanisms of occurrence of infectious diseases dangerous and relevant for Kazakhstan, the development of effective means of their control, the development of alternative means of combating antibiotic-resistant microorganisms and drug-resistant viruses.**5.3 Development of domestic pharmaceutical science and industrial biotechnology:**5.3.1 Creation of new domestic, original, medicinal, diagnostic and prophylactic drugs and treatment methods for import substitution and development of the pharmaceutical industry in Kazakhstan;5.3.2 Technologies for obtaining valuable components from plant, animal and mineral raw materials using biotechnological methods;**5.4 SARS CoV-2 (COVID-19) and other potentially pandemic pathogens:**5.4.3 Development of means of therapy and specific prophylaxis in humans and animals. |
| **Social Sciences and Humanities Research.** The volume of financing for 3 years - up to 3,640 million tenge | **5.1 Fundamental, applied interdisciplinary research in the social sciences:**5.1.1 Social Science Current Issues and Interdisciplinary Research. 5.1.4 Actual problems of social modernization: demography, migration, quality of human resources, quality of life and social inequality, problems of employment and unemployment, scientific organization, regulation and labor safety.5.1.5 Research of topical problems of modern international relations, global, regional and cross-border geopolitical, geo-economic, geospatial processes.**5.3 Fundamental, applied, interdisciplinary research in the humanities:** 5.3.1 Spiritual Modernization and the Seven Facets of the Great Steppe. 5.3.3 Birthplace. National unity, peace and harmony.5.3.5 Historical and cultural heritage and spiritual values of Kazakhstan.5.3.6 Commonality of history and culture, literature and language, traditions and values. |
| **Scientific research in the field of natural sciences.** The volume of financing for 3 years - up to 1,700 million tenge | 8.2 Fundamental and applied research in physics and astronomy8.3 Fundamental and applied research in the field of chemistry8.5 Fundamental and applied research in biology |
| **National security and defense.** The volume of financing for 3 years - up to 1,540 million tenge | **1 Fundamental scientific research**1.1 General theory of national security of the state.1.2 Development of the military organization of the state.**2 Applied scientific research.**2.1 Providing information security.2.2 Research in military security and military art.2.3 Development of the military-industrial complex, weapons and military equipment, military space technologies.2.4 Countering terrorism and extremism, intelligence and counterintelligence activities.2.5 Ensuring the activities of law enforcement agencies.2.6 Ensuring biological safety. |

**3. Qualification requirements for a supervisor and research group, as well as other qualification requirements that contribute to ensuring the effectiveness of programs**

1. Accredited subjects of scientific and (or) scientific and technical activities, as well as autonomous educational organizations and their organizations, including as co-executors, have the right to take part in the competition for program-targeted financing.
2. The formed target scientific and technical program should be aimed at solving scientific and technical tasks. No more than one program can be approved for funding for each scientific and technical assignment.

A targeted scientific and technical program may include several subprograms aimed at solving specific problems within the framework of the target program. The division of the target program into subprograms is carried out based on the scale and complexity of the problems being solved, as well as the need for a rational organization of their solution with obtaining a specific result.

Implementers must ensure that the final results are achieved in accordance with the goals and objectives of the program.

The scientific supervisor of the scientific and (or) scientific and technical program (hereinafter - the program manager) must have experience in scientific and (or) scientific and pedagogical work for at least 5 (five) years, must be a citizen of the Republic of Kazakhstan and meet the following minimum qualification requirements:

– a Doctor of Philosophy (PhD) degree, or a doctor in the field, or an academic degree (doctor/candidate of sciences); at the same time, passing the procedure for recognizing the equivalence of diplomas obtained abroad is not required;

– the area of scientific research of the program manager and (or) his experience in research and (or) scientific and pedagogical work must correspond to the direction of the scientific program;

- experience in managing scientific projects and (or) programs is desirable.

**3. Program manager, must have for 2016-2020:**

**3.1 for industries in the field of natural, technical sciences:**

***for fundamental research:***

– at least 2 (two) articles and (or) reviews in peer-reviewed scientific journals included in the first three quartiles (Q1, Q2, Q3) of the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 50 (fifty).

***for applied research:***

– at least 2 (two) articles and (or) reviews in peer-reviewed scientific journals included in the Science Citation Index Expanded of the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

– or at least 1 (one) article in the above scientific publications and at least 1 (one) foreign or international patent included in the Derwent Innovations Index database (Web of Science, Clarivate Analytics).

**3.2 for the medical and healthcare industries:**

***for fundamental and applied research:***

– at least 2 (two) articles and (or) reviews in peer-reviewed scientific journals included in the Science Citation Index Expanded of the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

– or at least 1 (one) article in the above scientific publications and at least 1 (one) foreign or international patent included in the Derwent Innovations Index database (Web of Science, Clarivate Analytics).

**3.3. for industries in the field of social sciences and humanities:**

***for fundamental and applied research:***

- at least 2 (two) articles or reviews in peer-reviewed scientific journals indexed in the Social Science Citation Index, Arts and Humanities Citation Index or Russian Science Citation Index of the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 25 (twenty five);

or:

- at least 10 (ten) articles in journals recommended by the Committee for Quality Assurance in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan (hereinafter - CQAES) for publication of the main results of scientific research.

3.4. For the heads of scientific and scientific-technical programs, submitted according to the priority ***“9. National Security and Defense”*** and (or) containing information constituting state secrets and for official use, requirements 3.1, 3.2, 3.3 do not apply. For this category, the project manager for 2016-2020 must have:

- at least 8 (eight) articles in journals recommended by CQAES.

3.5 Articles or reviews in journals from the Web of Science databases (including Science Citation Index Expanded, Social Science Citation Index or Arts and Humanities Citation Index) and Scopus, only publications indexed (present) in these databases and having the type Article, Review, or Article in Press are counted. The quartile and percentile of the journal by CiteScore in the Scopus database is taken into account for the year of publication or the last one at the time of application. Articles and reviews published in journals, the indexing of which in the Scopus database at the time of application was discontinued for various violations (file "Discontinued Sources from Scopus" at https://www.elsevier.com/solutions/scopus/how-scopus-works/content) are ignored. Publications of program managers in publications recommended by CQAES are taken into account only if the URL of the web page on the original website of the journal where it is located on the Internet is given, or its Digital Object Identifier (DOI).

3.6 The following publications are considered equivalent to an article in a scientific journal recommended by CQAES:

– article or review in a foreign scientific publication indexed in the Web of Science and (or) Scopus database;

– or a patent for an invention or an act of implementation;

– or a monograph with the contribution of the scientific supervisor of the program at least 1 page, with the recommendation of the scientist or the scientific and technical council of the applying organization.

4. The group may involve no more than 30 (thirty)% (of the total number of members of the research group, not including the scientific supervisor) engineers from production who are citizens of the Republic of Kazakhstan and (or) foreign scientists. A foreign scientist must meet the requirements for scientific supervisors.

5. At least 30 (thirty)% of the members of the research group must be from among specialists, scientists, doctoral students and (or) undergraduates not older than 40 (forty) years, inclusive at the time of submission of the competitive application.

6. An individual (from among the members of the research group), including the heads of organizations, has the right to be a scientific supervisor in no more than one program, while his participation as a performer in other programs within the framework of this competition is not allowed.

7. An individual (from among the members of the research group) who is not a scientific supervisor has the right to be a performer in no more than one program within the framework of this competition.

All applications exceeding the requirements of clauses 6 or 7 of section 3 of this tender documentation and received later than others are subject to rejection.

8. Based on the results of the competition for program-targeted funding, the authorized body in the field of science can determine the head organization for the scientific, scientific and technical program, which supports its implementation and coordinates the activities of the executing organizations within the framework of the program being implemented. The parent organization is responsible for the implementation of the targeted scientific, scientific and technical program coordinated by it.

**4. Required documents for participation in the competition**

1. Certificate of state registration of a legal entity (for legal entities) or document, identity card / passport of a citizen of the Republic of Kazakhstan (for individuals);

2. A copy of the certificate of accreditation of the applicant - a subject of scientific and (or) scientific and technical activities;

3. Application for participation in the competition in the state, Russian and English languages (abstract, explanatory note and calculation of the requested funding) in accordance with Appendix 1;

4. Positive opinion of the local and (or) central commission on bioethics (for biomedical research on humans and animals).

5. An agreement on a contribution from a private partner (on partial provision of the program with the necessary resources, including financial, with the exception of applied research programs in the field of national security and defense, the use of atomic energy, social, humanitarian and social sciences), for basic research is desirable, for applied research is required, at least 1% of the total amount of the application for the entire period of the program.

**5. Requirements for the form and content of the application for participation in the competition for program-targeted financing of scientific, scientific and technical programs, the volume and conditions of the contribution from the private partner (s)**

1. An application for participation in the competition in the state, Russian and English languages is drawn up in accordance with Appendix 1. The content of the application text in 3 (three) languages must be identical. In case of discrepancy between the text drawn up in different languages, the text prepared in the state language will prevail..

2. The application must contain information on the implementation period of the program - 3 years (2021-2023).

3. The application must correspond to the selected terms of reference for research work within the framework of program-targeted funding in accordance with Appendix 2.

4. A participant applying for a targeted program ensures the participation of a private partner (s) with partial provision of the programs with the necessary resources, including financial, at least 1% of the total amount of the application for the entire period of implementation of the applied research program.

Confirmation of the intention of the parties is an agreement on a deposit in any form, indicating their terms of implementation and the amount of the deposit.

For every 5% of co-financing of the total cost of the program at the stage of its consideration by the national scientific council, 1 point is added, but in total no more than 4 points.

In cases of refusal of the private partner from the intention to contribute during the implementation of the program or the absence of an equivalent replacement, the funding of the program may be terminated by the decision of the National Tax Service.

5. Applications must comply with the principles and norms of academic and research ethics.

**6. Competition application process**

1. The applicant submits an application for the competition to the Science Committee in electronic form, certified by the electronic digital signature of the program manager and the applicant, as well as members of the research group who are citizens of the Republic of Kazakhstan, through the information system of the Center at the link: www.is.ncste.kz. The profile of the program manager in the information system of the Center must contain the author's identifiers (Scopus Author ID, Researcher ID, ORCID, if any) and a list of all publications required in clause 3 of section 3 of this tender documentation, with all the necessary information (DOI or URL). In applications where there is an indication of the place for printing - printing is required. In accordance with paragraphs. 12) clause 2 of the Rules for conducting state scientific and technical expertise, approved by the Government of the Republic of Kazakhstan dated August 1, 2011 No. 891, receives an individual registration number (hereinafter - IRN) in the information system of the Center.

*2. Applications are rejected and returned to the applicant according to the following criteria:*

1) lack of IRN at the NCSTE facility submitted for program-targeted funding;

2) non-compliance of the application with the requirements of the tender documentation (annotation, explanatory note, calculation of the requested funding, compliance with the structure of the explanatory note, calculation of the requested funding in the information system of the NCSTE and in the application must comply);

3) failure to submit the required documents according to the annexes of the tender documentation in full;

4) presence of facts of plagiarism;

5) the presence of facts of duplication of the topic or content of the NCSTE facility with previously submitted, but not approved for funding, or simultaneously submitted NCSTE facilities;

6) the participant of the competition for program-targeted financing of the certificate of accreditation of the subject of scientific and (or) scientific and technical activity;

7) lack of a positive opinion of the central or local commissions on ethics and bioethics (for biomedical research on humans and animals);

8) non-compliance of the scientific supervisor with the requirements of the tender documentation;

9) inconsistency of the expected results with the requirements of the tender documentation;

10) exceeding the number of submitted applications specified in clauses 6 or 7 of section 3;

11) failure to provide a deposit agreement by a private partner.

**7. Requirements for the expected results based on the results of the implementation of scientific and (or) scientific and technical programs**

1. Direct and final results of the program must fully comply with the selected terms of reference for research work within the framework of program-targeted funding.

2. And also, based on the results of the implementation of scientific and (or) scientific and technical programs for the entire period of the program implementation, the following minimum results should be obtained:

Must be published (at least 50% of the authors of articles and / or reviews / patents must be members of the research group without fail; the values ​​of the percentile and quartile in the international databases Web of Science and Scopus are indicated for the year of publication or at the time of consideration of the report):

***For industries in the field of natural sciences, technical sciences, medicine and healthcare:***

***-*** at least 2 (two) articles and (or) reviews in peer-reviewed scientific journals in the scientific direction of the program included in the 1 (first), 2 (second) or 3 (third) quartiles in the Web of Science database and (or) having a percentile CiteScore in the Scopus database at least 50 (fifty);

- either at least 1 (one) article and (or) reviews in peer-reviewed scientific journals included in 1 (first), 2 (second) or 3 (third) quartiles in the Web of Science database and (or) having a CiteScore percentile in Scopus database at least 50 (fifty), and at least 1 (one) foreign or international patent included in the Derwent Innovations Index database (Web of Science, Clarivate Analytics);

- either at least 1 (one) articles and (or) reviews in peer-reviewed scientific journals included in 1 (first), 2 (second) or 3 (third) quartiles in the Web of Science database and (or) having a CiteScore percentile in Scopus base at least 50 (fifty), and an implementation certificate indicating the achieved economic effect, the implementation mechanism with a breakdown of the work performed, or recommendations for implementation, or a filed application for a commercialization project (preferably).

***For industries in the social, human and military sciences:***

- at least 2 (two) articles and (or) reviews in peer-reviewed scientific journals included in 1 (first), 2 (second) or 3 (third) quartiles, Social Science Citation Index or Arts and Humanities Citation Index of the Web of Science database , and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

- at least 10 (ten) articles and (or) reviews in peer-reviewed foreign and (or) domestic publications (recommended by CQAES).

3. Scientific and technical products prepared as a result of the implementation of the program (*new technologies, methods, software, technical documentation, recommendations for solving problems, scientific and technical, experimental design and experimental industrial developments, geographical, geological, seismic and other maps, new materials , substances, equipment, drugs, means and others*) along with a title of protection, an act of implementation, recommendations for implementation, a license agreement, an application for a commercialization project can be presented in the form of documentary evidence certified by the head of the executing organization with the attachment of photos, videos, and other information.

4. The act of implementation must contain data on the achieved and (or) expected socio-economic effect.

5. When publishing scientific work, research results (articles, reviews, titles of protection, including patents, monographs, materials of conferences, forums and symposia, textbooks, etc.) obtained during and (or) after the completion of the program, the authors must necessarily refer to the program and the source of funding (Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan). *The text on funding in English-language publications should be as follows: "This research has been/was/is funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant No. BR00000000)", where BR00000000 is the IRN of the program.*

6. The right to publish the IRN, the name of the approved program and applicant, last name, first name, patronymic of the program manager, annotation of the application, expected results, and annotations of the results obtained for each year of the program implementation (in printed and (or) electronic form) without requiring the consent of the applicant and / or a program manager provided to the Center.

To popularize science, disseminate information about the results, increase the likelihood of their implementation and commercialization, a separate website should be created for each program, which should contain brief information about the program: relevance, goal, expected and achieved results, names of members of the research groups with their identifiers (Scopus Author ID, Researcher ID, ORCID, if any) and links to the corresponding profiles, a list of publications (with links to them) and patents; information for potential users, as well as other important information for the society. The information on the website should be updated regularly (at least 2 times a year). For each scientific publication within the framework of the program, information on its content and possible application should be published on its website and in social networks and (or) the media.

7. The results of scientific research obtained within the framework of the program are subject to mandatory state registration at the Center in accordance with the procedure established by law.

8. All reports on programs, including the results achieved, must be verified in the licensed borrowing detection systems (platform). Information about the performed check should be reflected in the reports.

9. Members of the research group within the framework of the implemented program, if necessary, can take part in international conferences or undergo foreign scientific training in leading foreign scientific centers and organizations or in foreign scientific laboratories.

**8. Funding the program**

1. The implementation of programs approved for funding must be carried out in the Republic of Kazakhstan.

2. Funds of targeted funding are distributed by the scientific supervisor of the program.

3. Funds of targeted funding to achieve the goals, objectives and expected results of the application must be directed to the types of expenses directly related to the conduct of scientific research specified in the application for participation in the competition for program-targeted funding of scientific and (or) scientific and technical programs, prepared in accordance with the Rules for basic, grant, program-targeted financing of scientific and (or) scientific and technical activities, approved by the Government of the Republic of Kazakhstan dated May 25, 2011 No. 575, and approved by the decision of the National Scientific Council.

4. Ineffective and unjustified use of targeted program funding is the responsibility of the applicant and the program manager, established by the legislation of the Republic of Kazakhstan.

5. The organization executing the programs is not allowed to withhold funds from targeted program financing.

6. The contract for the implementation of the program with the winners of the competition for program-targeted financing is concluded in the form according to Appendix 3, which may be amended and supplemented in accordance with the procedure established by law. The expected results of the program specified in the contract must comply with the schedule and expected results specified in the terms of reference for the program and the application.

7. The applicant ensures the maintenance of accounting and reporting on the program in the manner prescribed by law.

8. If the results of the program specified in the terms of reference are not achieved, by the decision of the NSС, the scientific supervisor is removed from participation as a scientific supervisor in subsequent competitions of the PTF announced by the Science Committee, until the results are achieved (the achievement of the results is notified to the Committee Science and Center), but not more than 3 years. In case of revealing facts of violation of scientific ethics (plagiarism and false co-authorship, duplication, misappropriation of someone else's data, fabrication and falsification of scientific data, etc.) or disapproval of the interim or final report on the program by the decision of the NSС, the head is suspended for 3 years from participation in subsequent competitions, announced by the Science Committee.

Appendix 1

to the Tender Documentation

for program-targeted financing

on scientific, scientific and technical

programs for 2021-2023

**An application for the implementation of a scientific, scientific and technical program within the framework of targeted program financing consists of the following parts:**

1) Annotation;

2) Explanatory note;

3) Calculation of the requested funding.

 **1. Annotation**

The abstract contains a brief description of the purpose of the program, the problems it is aimed at, the main approaches to research, the expected results, the relevance of the tasks solved as a result of the research for the purposes of socio-economic development on the scale of the Republic of Kazakhstan, specified in state strategic and program documents, the degree the impact of research results on the relevant branch of the economy, the sphere of public relations and (or) the branch of science, the practical significance of the research results, that is, the degree of their readiness for commercialization or in another capacity for solving urgent problems of socio-economic and scientific and technological development of the Republic of Kazakhstan.

The length of the abstract should not exceed 800 words.

 **2. Explanatory note**

 The content of the explanatory note includes the following (at the same time, tables, diagrams, diagrams, which are referenced in the application form, are included in the annex to the explanatory note, and are not taken into account when calculating the number of words in the relevant sections and the total number of pages of the application).

 **1. General information**

 1.1. Name of the topic of the scientific, scientific and technical program [no more than 20 words].

 1.2. A strategically important state task for the solution of which the program has been developed.

 1.3. Location of the program.

 1.4. Estimated start and end date of the program, its duration in months.

 1.5. Organization applying for the program.

 1.6. Executors of the program (indicate the name of all subjects involved in the implementation of the program).

 1.7. The requested amount of targeted program funding (for the entire duration of the program and by years, in thousand tenge).

 1.8. Keywords characterizing the industry and the direction of the program for the selection of independent experts.

 **2. General concept of the program** [no more than 750 words].

 2.1. Introductory part [no more than 200 words].

 A brief description of the idea of ​​the program and the main participants in the program are indicated.

 2.2. The purpose of the program [no more than 50 words].

 The goal is stated succinctly and specifically, must correspond to the theme of the program and the strategically important state task for the solution of which the program was developed, be achievable and reflect the nature of the solution that is expected to be obtained as a result of the implementation of the program.

 2.3. Program objectives [no more than 500 words].

 This section describes how to achieve the goal of the program through logically interrelated, sequential tasks. The list of tasks is given:

1) measurable indicators of solving the problem;

2) a brief justification of the role of each of the tasks in achieving the goal of the program and the relationship with other tasks and expected results of the program;

3) other important, in the applicant's opinion, parameters.

**3. Scientific novelty and significance of the program** [no more than 2,000 words].

This section includes the following information:

1) scientific groundwork for the development of the program, substantiation of scientific novelty with a mandatory review of previous scientific research carried out in the world and the Republic of Kazakhstan related to the topic of the program, and their relationship with this program (in the context, references to the literature used in the review, complete the transcript of which should be presented in section 8 ("Bibliography"), (if any, preliminary results and (or) results previously obtained by the applicant related to the topic of the program are indicated);

2) compliance of the program with the strategically important state task for the solution of which it was developed, the applicability of the results for solving a strategically important state task, the significance of the program on a national and international scale, the impact of the expected results on the development of science and technology, the expected social and economic effect;

3) scientific and technological needs justifying the importance of the program results (if available, include social demand and (or) economic and industrial interest, other supporting data);

4) the competitiveness of the expected results of the program, their comparison with the known existing analogues in the Republic of Kazakhstan and the world, the experience of solving similar problems in the world, its application within the framework of the program;

5) fundamental differences between the idea of ​​the program and existing analogues, or competing ideas. If an idea or a research result already exists in the world and (or) in Kazakhstan, it is necessary to justify why investments in the program are still profitable;

6) If one of the final results of the program is a product, it is necessary to describe the current state of the art in the subject area of ​​the program;

7) If the program is a continuation of the scientific research previously conducted by the applicant or contains elements of previously funded and completed scientific research, it is necessary to clearly and concisely state the relationship of the program with the previously conducted scientific research and its differences from them.

**4. Research methods and ethical issues** [no more than 1,500 words].

This section includes the following information:

1) a description of the main scientific questions and hypotheses of the program, the rationale for the research strategy and approaches, the types of research used in the program (descriptive, correlation and / or experimental), the sequence of research;

2) a brief description of the most important experiments;

3) a description of the research methods used in the program as a justification for the ways to achieve the set goals, their relationship with the goal and objectives of the program, among themselves;

4) methods of collecting primary (initial) information, its sources and application for solving program problems, methods of data processing, as well as ensuring their reliability and reproducibility;

5) conditions for registration and division of intellectual property rights to the research results (it is necessary to indicate which method of intellectual property protection will be chosen, justify the choice).

**5. Research team and program management** [no more than 2000 words].

The scheme of program management is described, including the procedure for interaction between the performers, ways of coordinating their work and making decisions on the implementation of the program.

The section also includes a description of the research group, indicating the data of at least 70% of the planned staff (key personnel). When describing the main personnel, the following are indicated:

1) the composition of the research group according to Table 1. (for members of the research group involved in the part-time program, the number of hours that they will spend on the program is indicated);

2) participation of foreign scientists in the program, indicating their brief resume, main scientific publications and achievements in the direction corresponding to the direction of the program, and their role in achieving the goal, objectives and expected results of the program;

3) participation in the program of young scientists (postdoctoral students, doctoral students, undergraduates), indicating their position and role in the implementation of the program, as well as the nature of the work performed, engineers from production can also participate in the program;

4) justification for the participation of each member in the research group, including foreign scientists, a brief summary of each member indicating education, degree / academic degree, academic title, work experience in the direction of the program, Hirsch index and links to the profile in the corresponding scientometric base (if available ), the main achievements justifying participation in the program, the direction and nature of the work of each member in the program, their role in achieving the goal and expected results of the program;

5) a description of the backlog of the members of the research group. Information about the main publications (if any - indicate the link to the publication in the appropriate database and / or Digital Object Identifier DOI) and available patents and other titles of protection of the scientific adviser and members of the research group of the program related to the topic of the program. Indicate how the claimed research is related to their previous research.

For the scientific supervisor of the program, all publications must be indicated that confirm his compliance with the requirements of the competition documentation, including with a citation index, quartile (percentile) of the publication and links to information about publications in the relevant scientometric databases (DOI). It is necessary to indicate which programs he managed during the 5 (five) years preceding the date of application, and what results were obtained within them.

Information about the publications of the main staff of the research group in the direction of the program (in total, at least 10 publications of the members of the research group) should be provided with a citation index and links to information about publications in the corresponding scientometric databases. The names of research team members should be underlined.

For additional personnel (up to 30% of the members of the research group who will be involved in the event of receiving program-targeted funding), their position and role in the program, the nature of the work performed and the approaches that will be used for their selection are indicated.

**6. Research environment** [no more than 1,000 words].

This section includes the following information:

1) substantiation of the participation of each performer in the program, based on their role, backlog and contribution to the achievement of the goal of the program, (the performers of the program are subjects of scientific and (or) scientific and technical activities participating in the implementation of the program during the entire period);

2) involvement of third-party organizations in the implementation of the program with justification of the need to involve each organization, a description of its role in the program, the nature of the work performed and the contribution to the achievement of the goal and expected results;

3) a description of the material and technical base available to the performers (equipment, devices, inventory, transport, buildings, structures, etc.), directly used for the implementation of the program, indicating the direction of its use and members of the research group who have skills to work with scientific and research equipment;

4) key domestic and international relations (collaborators and partners) used for the implementation of the program, indicating the nature and justification of their use, the use of the infrastructure of other domestic and foreign organizations (laboratories) with justification;

5) justification of mobility: (1) scientific trips and their impact on the implementation of the program, (2) periods of work on the basis of partner organizations and their impact on the implementation of the program. For each foreign business trip, the purpose, the expected result of the trip and the contribution of the performer to the achievement of the program goal are briefly indicated.

**7. Justification of the requested funding** [no more than 2000 words].

This section includes the following information:

1) Summary calculation for the program (budget) according to Table 2. The program budget is allocated by the scientific supervisor of the program in accordance with the work plan and cannot be directed to other items of expenditure not related to this program.

The article "Remuneration" indicates the costs to be paid as remuneration for work to members of the research group of the program, including postdoctoral students, doctoral students, undergraduates, as well as persons providing financial, economic and legal support, taking into account the individual income tax and mandatory pension contribution in accordance with Table 3. The calculation also takes into account the payment of vacation pay, except for payments of a compensatory and incentive nature.

The article "Business trips" indicates all costs associated with business trips within and outside the Republic of Kazakhstan directly related to research, including participation in conferences, seminars, symposia, trips to use the infrastructure of other organizations according to tables 4 and 5 (for tickets (auto, railway, air tickets) attach price offers from the websites of the serviced companies, a draft travel plan).

The article "Other services and works" indicates the costs of services purchased by the contractor from business entities, the result of which is necessary to achieve the goal of the program, including (1) services of scientific laboratories for collective use and other laboratories, (2) services of organizations of co-executors, ( 3) organizational fees for participation in conferences, seminars, symposia and others in accordance with Table 6 (for purchased goods, works, services, attach at least 1 (one) price offer and (or) price list). In the event that foreign scientists participating in the implementation of the program are members of the research group, the costs of their participation are reflected in the section "Remuneration".

The item "Purchase of materials" indicates all the costs of materials necessary to achieve the goal of the program, including chemicals, solvents, standard samples, laboratory consumables, spare parts for research equipment, fuels and lubricants and others according to table 7 (for purchased goods, works, services, attach at least 1 (one) price offer and (or) price list).

The article "Purchase of equipment and (or) software" (for legal entities) indicates the costs of purchasing equipment and software necessary to achieve the goal of the program in accordance with Table 8 (for purchased goods, works, services, attach at least 1 (one) price offers and (or) price list).

The article "Scientific and organizational support" includes expenses (1) for patenting scientific results obtained as a result of the program, (2) publication of research results (3) purchase of analytical materials in accordance with Table 9 (for purchased goods, works, services, attach at least 1 (one) price offer and (or) price list).

The item "Rent costs" indicates the costs of renting premises, equipment and machinery necessary to achieve the goal of the program, in the absence of appropriate premises for the applicant in accordance with tables 10 and 11 (for purchased goods, works, services, attach at least 1 (one) price offers and (or) price list).

The article "Operating costs of equipment and machinery" indicates the costs of utilities related to the implementation of the program, as well as the costs of maintaining premises, equipment and machinery directly involved in conducting research in accordance with Table 12 (for purchased goods, works, services, attach at least 1 (one) price offer and (or) price list) ".

The item “Taxes and other obligatory payments to the budget” indicates the expenses for the payment of social tax, social insurance and other obligatory payments to the budget according to Table 13.

2) Calculations for each expense item according to tables 3-13.

3) Brief explanations of the content and calculation of the amount of each item of expenditure with the obligatory justification of their need to achieve the goal, objectives and expected results of the program, as well as indicating the sources of information on prices, on the basis of which the corresponding item of expenditure was calculated.

The total of all items of expenditure represents the requested amount for funding and must be equivalent to the amount stated in paragraph 1.5. section "General information".

The program budget, submitted as part of the application, may be amended based on the decision of the National Scientific Council.

**8. Program implementation plan** [no more than 750 words]

The section includes a detailed, sequential work plan for the implementation of the program in the form of a Gantt chart or according to table 14.

The program implementation plan should be accompanied by brief explanations, justifying the significance of each activity for solving the corresponding problem, the cost of the activity in accordance with the program budget, indicating, at the applicant's discretion, other information necessary for a reliable assessment of the program by experts.

**9. Expected results of the program** [no more than 1,000 words].

The expected results provided by the program must not be lower than the results provided for in the scientific and technical assignment. In the interconnection, the results should provide a comprehensive solution that provides an impact on all aspects of a strategically important state task.

The results of the program are described with an indication of the quantitative and qualitative characteristics and the form of implementation. The substantiation of the result is given in accordance with the goal and objectives of the program.

Regardless of the requirements of the tender documentation, as a result of the implementation of the program, the following minimum results must be ensured:

1) publication of articles in international peer-reviewed scientific journals (presumptive editions for publishing the results of the program, citation index of the publication with reference to information about the publication in the corresponding scientometric base). Requirements for the number of articles based on research results are established in the tender documentation. Each article must contain information about the identification registration number and the name of the program under which it was funded, indicating program-targeted funding as a source.

2) publication of monographs, books and (or) chapters in books of foreign and (or) Kazakhstani publishing houses;

3) obtaining patents in foreign patent offices (European, American, Japanese), Kazakhstani or Eurasian patent offices;

4) development of scientific, technical, design documentation;

5) activities for the pilot implementation of the results of the program and (or) dissemination of knowledge and results obtained during the implementation of the program among potential users, the scientific community and the general public;

6) other measurable results in accordance with the requirements of the tender documentation and the specifics of the program. Additionally, the section indicates:

1) scope, target consumers, social, economic, environmental, scientific and technical, multiplicative and (or) other effect of each of the expected results in accordance with a strategically important state task, for the solution of which a program with justification has been developed;

2) the impact of the expected results on the development of the main scientific direction and related fields of science and technology;

3) applicability and (or) the possibility of commercializing the obtained scientific results.

4) other direct and indirect results of the program, indicating their qualitative and quantitative characteristics.

**10. Bibliography**

The section contains publications, references to which were indicated in paragraph 3 "Scientific novelty and significance of the program".

Each publication must contain the full name of the journal, edition number, year of publication, page numbers, full name of the article, names of all authors of the article.

***Application:***

1) a copy of the certificate or an extract from the order of the authorized body on the accreditation of subjects of scientific and (or) scientific and technical activities participating in the program as performers;

2) the composition of the research group by analogy with Table 1;

3) a work plan for the implementation of the program in accordance with Table 14;

4) a plan for contributing to the implementation of the program from the partner, by analogy with Table 15 (for applied research).

3. Calculation of the requested funding

The part “Calculation of the requested financing” is drawn up by analogy with tables 2 - 13, which justify the calculation of the amount of financing requested for the implementation of the program.

Explanations of the calculations are given in section 7 "Justification of the requested funding" in the section "Explanatory note".

Table 1 - Composition of the research group for conducting scientific research

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | Full name, degree/academic degree, academic title1 | Main place of work, position2 | Role in a project or program | Employment (full, part-time) | Project work period (months) |
| 1st year | 2nd year | 3rd year |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1 For members of the research group, whose data are not known at the date of preparation of the application and whose involvement is planned in the event of a grant, the word “Vacancy” is indicated in the column “Name, degree/academic degree, academic title”.

2For members of the research group who are not part of the main staff and who are not identified at the date of preparation of the application, a dash is indicated in the column "Main place of work, position". For postdoctoral students, doctoral students, undergraduates whose data is not known at the date of preparation of the application, the status (postdoctoral student, doctoral student, master's student, specialty and higher educational institution from which it is planned to attract the relevant workers to the research group is indicated in the column "Main place of work, position".

Table 2 - Consolidated estimated cost of the requested amount

|  |  |  |
| --- | --- | --- |
| № | Expense item name | Funding volume, thousand tenge |
| Total | 20\_\_\_ year(1st year) | 20\_\_\_ year(2nd year) | 20\_\_\_ year(3rd year) |
| 1. | Salary |  |  |  |  |
| 2. | Business trips: |  |  |  |  |
| 2.1. | within the Republic of Kazakhstan |  |  |  |  |
| 2.2. | outside the Republic of Kazakhstan |  |  |  |  |
| 3 | Other services and works |  |  |  |  |
| 4. | Purchase of materials |  |  |  |  |
| 5. | Purchase of equipment and (or) software (for legal entities) |  |  |  |  |
| 6. | Scientific and organizational support |  |  |  |  |
| 7. | Renting rooms |  |  |  |  |
| 8. | Equipment and machinery rental |  |  |  |  |
| 9. | Operating costs of equipment and technology used to carry out research |  |  |  |  |
| 10. | Taxes and other obligatory payments to the budget |  |  |  |  |
| **Total** |  |  |  |  |

Table 3 - Labor Remuneration

|  |  |  |
| --- | --- | --- |
| № | Position | Labor remuneration, tenge |
| 1st year | 1st year | 3rd year | Total (column 6 + column 10 + column 14) |
| Employment (full / part-time) | Rate, tenge per month | Number of months of work | Amount (column 3 × column 4 × column 5) | Employment (full / part-time) | Rate, tenge per month | Number of months of work | Amount (column 7 × column 8 × column 9) | Employment (full / part-time) | Rate, tenge per month | Number of months of work | Amount (column 11 × column 12 × column 13) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | Research team members |  |  | х |  |  |  | х |  |  |  | х |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1.1. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. | Additional staff |  |  | х |  |  |  | х |  |  |  | х |  |  |
| 2.1 | 2 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| …. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Total (column 1 + column 2) |  |  | х |  |  |  | х |  |  |  | х |  |  |

Table 4 - Business trips within the Republic of Kazakhstan

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Destination (name of the settlement, region) | Reimbursement rates for 1 person, tenge3 | Average annual number of man-days | Average annual number of people on assignment, people | Average cost of one round trip, tenge | Total,thousand tenge column 7 × (column 3 × column 5 + column 4 × column 6) + column 7 × column 8 |
| daily allowance (2 MCI) | rental of living quarters | for daily expenses | renting of living space |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1. | 20\_\_\_ year (1st year) |  | х |  |
| 1.1. |  |  |  |  |  |  |  |  |
| 1.2. |  |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year) |  | х |  |
| 2.1. |  |  |  |  |  |  |  |  |
| 2.2. |  |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year) |  | Х |  |
| 3.1. |  |  |  |  |  |  |  |  |
| 3.2. |  |  |  |  |  |  |  |  |
| … |  |  |  |  |  |  |  |  |
| Total (column 1 + column 2 + column 3) |  |  |  |

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3When calculating the amount of reimbursement of expenses to a posted worker, it is necessary to be guided by the Rules on business trips within the Republic of Kazakhstan of employees of state institutions, maintained at the expense of the state budget, approved by the Government of the Republic of Kazakhstan dated September 22, 2000 No. 1428 and the Government of the Republic of Kazakhstan dated May 11, 2008 No. 256 "On approval of the Rules for reimbursement of business travel expenses at the expense of budgetary funds, including to foreign countries"

Table 5 - Business trips outside the Republic of Kazakhstan

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Destination (country, city)4 | Expense item name5 | Cost, tenge | Average annual number of man-days | Average annual number of people on assignment, people | Total,thousand tenge (column 4 × column 5 × column 6) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 20\_\_\_ year (1st year) total | х | х |  |  |
| 1.1. |  | Round trip6 , tenge |  |  |  |  |
| Accommodation, tenge per day |  |  |  |  |
| Daily allowance, tenge per day |  |  |  |  |
| Visa expenses, tenge |  |  |  |  |
| Medical insurance, tenge |  |  |  |  |
| Total |  |  |  |
| … |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year) total | х | х |  |  |
| 2.1. |  | Round trip6 , tenge |  |  |  |  |
| Accommodation, tenge per day |  |  |  |  |
| Daily allowance, tenge per day |  |  |  |  |
| Visa expenses, tenge |  |  |  |  |
| Medical insurance, tenge |  |  |  |  |
| Total |  |  |  |
| … |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year) total | х | х |  |  |
| 3.1. |  | Round trip6 , tenge |  |  |  |  |
| Accommodation, tenge per day |  |  |  |  |
| Daily allowance, tenge per day |  |  |  |  |
| Visa expenses, tenge |  |  |  |  |
| Medical insurance, tenge |  |  |  |  |
| Total |  |  |  |  |
| … |  |  |  |  |  |  |
| Total (column 1 + column 2 + column 3) | х | х |  |  |

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4To be completed for each scientific trip outside the Republic of Kazakhstan in the corresponding year of the program

5The rates of reimbursement of daily expenses and the maximum rates of reimbursement of expenses for the hiring of hotel rooms to employees are calculated in accordance with the Resolution of the Government of the Republic of Kazakhstan dated May 11, 2008 No. 256 "On approval of the Rules for reimbursement of expenses for business trips at the expense of budgetary funds, including to foreign countries"

6When traveling abroad, transportation costs in foreign currency are reimbursed in the amount of the cost of an air ticket in the "Economy" class

Table 6 - Other services and works

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Name and brief description of the service | Executor | Service result | Unit of measurement | Quantity, units | Total, tenge |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 20\_\_ year (1st year) | х | х | х | х |  |
| 1.1. |  |  |  |  |  |  |
| 1.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
|  | Total |  |  |  |  |  |
| 2. | 20\_\_ year (2nd year) | х | х | х | х |  |
| 2.1. |  |  |  |  |  |  |
| 2.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
|  | Total |  |  |  |  |  |
| 3. | 20\_\_ year (3rd year) | х | х | х | х |  |
| 3.1. |  |  |  |  |  |  |
| 3.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
|  | Total |  |  |  |  |  |
| Total (column 1 + column 2 + column 3), thousand tenge | х | х | х |  |

Table 7 - Purchase of materials

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Name of the materials | Unit of measurement | Price per unit, tenge | 20\_\_\_ year (1st year) | 20\_\_\_ year (2nd year) | 20\_\_\_ year (3rd year) | Total cost, tenge (column 6 + column 8 + column 10) |
| Qty | Cost, tenge(column 4 × column 5) | Qty | Cost, tenge(column 4 × column 5) | Qty | Cost, tenge(column 4 × column 5) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Total: | х |  | х |  | х |  |  |

Table 8 - Purchase of equipment and (or) software (for legal entities)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Name | Manufacturer, model, main characteristics | Unit of measurement | Quantity, units | Price per unit, tenge | Total cost, tenge (column 5 × column 6) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 20\_\_\_ year (1st year), total |  | х |  |
| 1.1. |  |  |  |  |  |  |
| 1.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year), total |  | х |  |
| 2.1. |  |  |  |  |  |  |
| 2.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year), total |  | х |  |
| 3.1. |  |  |  |  |  |  |
| 3.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| Total: |  | х |  |

Table 9– Scientific and organizational support

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | Name of the Services | The result of the service, its main characteristics | Unit of measurement | Number of units | Total cost, tenge |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1. | 20\_\_\_ year (1st year), total | х | х |  |
| 1.1. |  |  |  |  |  |
| 1.2. |  |  |  |  |  |
| … |  |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year), total | х | х |  |
| 2.1. |  |  |  |  |  |
| 2.2. |  |  |  |  |  |
| … |  |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year), total | х | х |  |
| 3.1. |  |  |  |  |  |
| 3.2. |  |  |  |  |  |
| … |  |  |  |  |  |
| Total (column 1 + column 2 + column 3) | х | х |  |

Table 10 - Rental of rooms

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Name of the Services | The main characteristics of the rental object | Unit of measurement | Price per unit, tenge | Number of units | Total, tenge(column 5 × column 6) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 20\_\_\_ year (1st year), total | х | х | х |  |  |
| 1.1. |  |  |  |  |  |  |
| 1.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year), total | х | х | х |  |  |
| 2.1. |  |  |  |  |  |  |
| 2.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year), total | х | х | х |  |  |
| 3.1. |  |  |  |  |  |  |
| 3.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| Total (column 1 + column 2 + column 3) | х | х | х |  |  |

Table 11 - Rent of equipment and machinery

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| № | Name of the Services | The main characteristics of the rental object | Unit of measurement | Price per unit, tenge | Number of units | Total, tenge(column 5 × column 6) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 20\_\_\_ year (1st year), total | х | х | х |  |  |
| 1.1. |  |  |  |  |  |  |
| 1.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| 2. | 20\_\_\_ year (2nd year), total | х | х | х |  |  |
| 2.1. |  |  |  |  |  |  |
| 2.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| 3. | 20\_\_\_ year (3rd year), total | х | х | х |  |  |
| 3.1. |  |  |  |  |  |  |
| 3.2. |  |  |  |  |  |  |
| … |  |  |  |  |  |  |
| Total (column 1 + column 2 + column 3) | х | х | х |  |  |

Table 12 - Operating costs of equipment and technology used for the implementation of research

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Expenditures | Unit of measurement | Price per unit, thousand tenge | 20\_\_\_ year (1st year) | 20\_\_\_ year (2nd year) | 20\_\_\_ year (3rd year) | Total,thousand tenge (column 6 + column 8 + column 10) |
| Number of units | Price, thousand tenge | Number of units | Price, thousand tenge | Number of units | Price, thousand tenge |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Total |  |  |  |  |  |  |  |

Table 13- Taxes and other obligatory payments to the budget

|  |  |  |  |
| --- | --- | --- | --- |
| № | Tax calculations | Taxable payroll fund or taxable amount, tenge | Amount, tenge |
| Rate, % | 20\_\_\_ year (1st year) | Rate, % | 20\_\_\_ year (2nd year) | Rate, % | 20\_\_\_ year (3rd year) | Total(column 5 + column 7 + column 9) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1. | Calculation of Social Tax Expenses |  |  |  |  |  |  |  |  |
| 2. | Calculation of expenses for payment of social contributions to the State Social Insurance Fund |  |  |  |  |  |  |  |  |
| 3. | Compulsory social insurance contributions |  |  |  |  |  |  |  |  |
| 4. | Employer's compulsory pension contributions |  |  |  |  |  |  |  |  |
| 5 | Other obligatory payments to the budget: |  |  |  |  |  |  |  |  |
| 5.1. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name of tax or payment) |  |  |  |  |  |  |  |  |
| 5.2. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name of tax or payment) |  |  |  |  |  |  |  |  |
| 5.3. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name of tax or payment) |  |  |  |  |  |  |  |  |
|  | Total | х | х |  | х |  | х |  |  |

Table 14 - Implementation work plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| № | Name of tasks and measures for their implementation | Start date (dd/mm/yy) | Duration, months | Expected results of the program implementation (in the context of tasks and activities), completion form |
| 1st year | 2nd year | 3rd year |
| 1 | 2 | 4 | 5 | 6 | 7 | 8 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Table 15 - Partner Contribution Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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Appendix 2

to the Tender Documentation

for program-targeted financing

on scientific and technical

programs for years 2021-2023

# **Technical Task № 1**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. Name of a specialized area for a scientific, scientific and technical program** (further - the program)**:**Rational use of water resources, flora and fauna, ecology.Environmental monitoring and green technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Ensuring safety from the impact of extreme hydrological events (floods) in the territories of Northern, Central and Eastern Kazakhstan. |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - Development of conceptual frameworks for ensuring safety from the impact of extreme hydrological events (hereinafter - EHE) (floods) in the territories of Northern, Central and Eastern Kazakhstan based on the implementation of the principles of effective adaptive control systems.- Carrying out an inventory and identification of manifestations of EHE (floods) and objects subject to destructible impact.- Identification of the conditions for the formation and development of EHE.- Assessment of the spatial distribution of EHE (floods), with the determination of the degree of their danger.- Development of a map of the spatial distribution of floods in the territories of Northern, Central and Eastern Kazakhstan.- Assessment of the vulnerability of areas prone to OSH.- Assessment of flood risks. Development of a flood risk assessment map for Northern, Central and Eastern Kazakhstan.- Determination of complexes of scientifically grounded, management measures against the impact of EHE (floods).- Development of an algorithm for the prevention of floods.- Compilation of complexes of maps based on the used archival, field research, remote sensing and geoinformation technologies. |
| **3. Which points of strategic and program documents does it address:**1».Strategy" Kazakhstan-2050 ": a new political course of the established state" Message of the President of the Republic of Kazakhstan-Leader of the Nation N.A. Nazarbayev to the people of Kazakhstan, Astana, December 14, 2012.2. Decree of the President of the Republic of Kazakhstan dated July 21, 2011 No. 118».On approval of the Forecast scheme of territorial and spatial development of the country until 2020".3. Decree of the President of the Republic of Kazakhstan dated May 30, 2013 No. 577 "On the Concept for the transition of the Republic of Kazakhstan to a" green economy ".4. Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636».On approval of the Strategic Development Plan of the Republic of Kazakhstan until 2025 and invalidation of some decrees of the President of the Republic of Kazakhstan».5. Code of the Republic of Kazakhstan dated July 9, 2003 No. 481 "Water Code of the Republic of Kazakhstan".6. Law of the Republic of Kazakhstan dated January 6, 2012 No. 527-IV».On the National Security of the Republic of Kazakhstan".7. Resolution of the Government of the Republic of Kazakhstan dated September 14, 2004 N 965».On some measures to ensure information security in the Republic of Kazakhstan».8. Decree of the Government of June 29, 2020 "On approval of the State Program for Water Resources Management of the Republic of Kazakhstan for 2020 - 2030".9. Strategic plan of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan for 2017-2021. Approved by order of the Minister of EGiPR of the Republic of Kazakhstan dated 10.09.2019, No. 26.10. Strategic plan of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan for 2020-2024. |
| **4. Expected results.****4.1 Direct results:**-Developed conceptual position of the applied nature of ensuring safety from the impact of extreme hydrological events (EHE) (floods) in the territories of Northern, Central and Eastern Kazakhstan on the basis of the implementation of the principles of effective adaptive control systems.- Inventory and identification of manifestations of EHE (floods) and objects subject to destructive impact (5 regions, 64 districts, 23 cities of regional significance, the capital of the Republic of Kazakhstan, Nur-Sultan).- Identified conditions for the formation and development of EHE.- Assessment of the spatial distribution of EHE (floods) with the determination of the degree of their danger (5 regions, 64 districts, 23 cities of regional significance, the capital of the Republic of Kazakhstan, Nur-Sultan).- Development of a map of the spatial distribution of floods in the territories of Northern, Central and Eastern Kazakhstan with a total area of ​​1 million 276 thousand km2, within which there are more than 1000 settlements (15 specialized maps on the conditions of flood formation in 5 regions).- Assessment of the vulnerability of areas prone to OSH (5 regions, 64 districts).- Assessment of flood risks. Development of a flood risk assessment map for the territories of Northern, Central and Eastern Kazakhstan with a total area of ​​1 million 276 thousand km2, within which there are more than 1000 settlements (15 risk maps for individual regions, with a classification of settlements according to the degree of risk).- A set of scientifically grounded management measures against the impact of EHE (floods). Activities for 5 regions and affected settlements, taking into account the specifics of local conditions.- Algorithm for the prevention of floods.- A developed set of maps based on the used archival, field research, remote sensing and geoinformation technologies (at least 55 maps). |
| **4.2 Final result:**Developed recommendations to ensure safety from the impact of extreme hydrological events (floods) in the territories of Northern, Central and Eastern Kazakhstan.Improving the efficiency and reliability of decisions in the field of planning and operational management of natural risks associated with extreme hydrological systems by applying a systematic approach using modern geoinformation technologies and space monitoring data.**Target consumers of the results obtained:** Ministry of Emergency Situations, Ministry of Education and Science, Committee of Water Resources of the Ministry of Ecology, Geology and Natural Resources, Kazakh scientific organizations, universities, state republican and territorial organizations and institutions, various design organizations in the field of developing territorial schemes for the development of territories. |

# **Technical Task № 2**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. Name of a specialized area for a scientific, scientific and technical program** (further - the program)**:**Rational use of water resources, flora and fauna, ecology.Management of water, soil and biological resources. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Scientific substantiation and geoinformation and analytical support of sustainable drinking water supply to the population of the Republic of Kazakhstan at the expense of fresh groundwater resources.**2.1.1. To achieve this goal, the following tasks must be solved:**  - Assessment of the features of the formation, renewable and predicted resources of fresh and slightly saline groundwater in the Republic of Kazakhstan in conditions of climatic and anthropogenic changes.- Regional studies to identify, prevent, mitigate or eliminate negative processes affecting groundwater resources as a result of anthropogenic and natural-climatic influences.- Assessment of the security, state and prospects of using fresh and slightly saline groundwater resources for drinking water supply to urbanized and rural areas of the Republic of Kazakhstan.- Justification of prospective water demand and development of scenarios for sustainable drinking water supply to large and small cities, rural settlements- Justification of options for drinking water supply for urban and rural populations in emergencies of natural and man-made nature.- Development of scenarios for the management of fresh groundwater resources in the event of transboundary threats.- Justification of options for the transfer of fresh groundwater for drinking purposes to water-deficient regions.- Development of recommendations for the prevention, weakening or elimination of negative processes affecting groundwater resources as a result of anthropogenic and natural-climatic influences.- Justification of the organization of the state reserve fund of undeveloped explored deposits of fresh groundwater.- Justification of the organization and creation of underground reservoirs for the collection and storage of flood runoff and melt water.- Development and creation of a geoinformation and analytical subsystem of fresh groundwater resources of drinking quality for assessing, forecasting and making managerial decisions on their use and protection. |
| **3. Which points of strategic and program documents does it address:**1. General scheme of organization of the territory of the Republic of Kazakhstan, approved by the Decree of the Government of the Republic of Kazakhstan dated December 30, 2013 No. 1434. “The main resources of fresh groundwater (54%) are concentrated in the southern region. Deficiency of fresh groundwater resources is noted in Atyrau, North Kazakhstan, Mangistau, Kostanay and West Kazakhstan regions».2. Strategic development plan of the Republic of Kazakhstan until 2025, approved by the Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636Policy 6».Green" economy and environmental protection ". Task 5. Improving the efficiency of use and protection of water resources.3. Strategy "Kazakhstan-2050": a new political course of the established state. |
| **4. Expected results.****4.1 Direct results:**According to the results of the program, there should be:- the features of the formation, renewable and predicted resources of fresh and slightly saline groundwater of the Republic of Kazakhstan in the conditions of climatic and anthropogenic changes were assessed, including for: 7 hydrogeological regions; 8 water basins; 5 administrative regions; 14 administrative regions.- regional studies were carried out in 14 administrative regions of Kazakhstan to identify, prevent, mitigate or eliminate negative processes affecting groundwater resources as a result of anthropogenic and natural-climatic influences;- assessed the availability, state and prospects of the use of fresh and slightly saline groundwater resources for drinking water supply in 11 urbanized zones and rural areas of 5 administrative regions and 14 administrative regions of the Republic of Kazakhstan;- the prospective water demand was substantiated and scenarios of sustainable drinking water supply were developed for the capital of Nur-Sultan, 8 large, 12 large, 7 medium and 59 small cities, rural settlements of 14 administrative regions at the expense of explored operational reserves of fresh groundwater;- substantiated at least 3 options for drinking water supply for urban and rural populations in natural and man-made emergencies;- substantiated at least 5 options for the transfer of fresh groundwater for drinking purposes to water-deficient regions;- recommendations were developed to prevent, mitigate or eliminate negative processes affecting groundwater resources as a result of anthropogenic and natural and climatic influences in 14 administrative regions of Kazakhstan;- scenarios were developed for the management of fresh groundwater resources in the event of transboundary threats to water security;- substantiated the organization and creation of the state reserve fund of undeveloped explored deposits of fresh groundwater; underground reservoirs for collection and storage of flood runoff and melt water in 14 administrative regions of Kazakhstan;- developed and created a geoinformation and analytical subsystem of fresh groundwater resources of drinking quality for assessing, forecasting and making managerial decisions on their use and protection, including for: 7 hydrogeological regions; 8 water basins; 5 administrative regions; 14 administrative regions. |
| **4.2 Final result:**Scientific contribution to the implementation of research in the field of arid hydrogeology and fresh and slightly saline groundwater resources as the basis for ensuring sustainable drinking water supply for the population of the Republic of Kazakhstan in the long term.**Economic effect**: Substantiation of scenarios for the rational development of proven reserves of fresh groundwater, which in turn should contribute to an increase in the volume of available water resources during the implementation of state programs; attracting foreign investments, national companies and private enterprises in the implementation of projects of centralized drinking water supply systems for the urban and rural population; improving the conditions for water supply to regions with a shortage of underground drinking water.**Environmental effect of the Program**: The efficiency of the development of fresh groundwater, which, as a source of drinking water supply, has a number of advantages over surface water: groundwater, as a rule, has better quality, is more reliably protected from pollution and contamination, is less susceptible to seasonal and long-term fluctuations and in most cases, their use does not require expensive water purification measures.**Social effect of the Program**: Solving the problems of shortage of clean fresh water, increasing the coverage of the urban and rural population with centralized drinking water supply systems, practical application of scientifically based assessment and recommendation materials, ensuring public health, increasing the sustainability of water supply to the population and economic sectors, increasing national water security and sustainable development of the state.**Target consumers of the results obtained**: Subordinate organizations of the Ministry of Ecology, Geology and Natural Resources, akimats, national and private water management and communal companies, universities, design organizations, etc. |

# **Technical Task № 3**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. Name of a specialized area for a scientific, scientific and technical program** (further - the program)**:**Rational use of water resources, flora and fauna, ecology.Management of water, soil and biological resources. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Investigation of the modern structure of ichthyocenoses, determination of ways and possibilities of increasing the share of valuable fish species in them and the development of scientific recommendations for increasing the efficiency of stocking and increasing the fish productivity of fishery reservoirs. |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - Ichthyological monitoring of fishery reservoirs (lakes Zhaisan, Balkash, Alakol, Sasykol, Kapshagayskoye, Bukhtarma, Shardara reservoirs, Small Aral Sea, etc.) in order to determine the modern structure of ichthyocenoses, the proportion of commercially valuable and low-value fish species in them;- Investigation of the existing practice of stocking valuable species with juveniles, to determine its effectiveness and the reasons for the low commercial return from the introduced species, to develop ways and methods to increase the efficiency of reproduction measures;- Study of the modern practice of developing stocks of commercially valuable and low-value fish species and the development of measures for targeted fishing in order to develop the entire complex of ichthyofauna and recommendations for the targeted formation of the structure of ichthyocenoses with rational fishing;- Evaluation of the economic effect from the implementation of the program as a result of the development of scientifically grounded recommendations on the conduct of fishing and the interconnected stocking of water bodies with it;- Development of scientifically grounded recommendations on the conduct of fishing and the interconnected stocking of water bodies with the aim of increasing the efficiency of stocking and increasing the fish productivity of water bodies in Kazakhstan. |
| **3. Which points of strategic and program documents does it address:**1. Strategy "Kazakhstan-2050": New political course;2. The concept for the transition of the Republic of Kazakhstan to a "green economy", according to which "increasing the efficiency of the use of resources (water, land, biological, etc.) and their management", ".... new emphasis should be given on such issues as development of fisheries, aquaculture and reproduction of fish resources";3. Strategic plan of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan for 2017-2021, where one of the strategic directions is to ensure the protection, reproduction and rational use of flora and fauna, water resources, and specially protected natural areas;4. Convention on Biological Diversity, which aims at the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources, including through the provision of necessary access to genetic resources and the appropriate transfer of appropriate technologies with taking into account all rights to such resources and technologies. |
| **4. Expected results.****4.1 Direct results:**As a result of the implementation of the program, the following should be obtained:- systematized modern structure of ichthyocenoses of fishery reservoirs (lakes Zhaisan, Balkash, Alakol, Sasykol, Kapshagayskoye, Bukhtarma, Shardara reservoirs. Small Aral Sea, etc.), the share of commercially valuable and low-value fish species in them.- the results of studies to determine the advantages and disadvantages and, in general, the effectiveness of the existing practice of stocking valuable species with juveniles, the reasons for the low commercial return from the introduced species.- developed ways and methods to improve the efficiency of reproduction measures (recommendations, applications for a useful model on the methods of stocking water bodies).- the results of studies to determine the advantages and disadvantages and, in general, the effectiveness of modern practice of developing stocks of commercially valuable and low-value fish species.- developed measures for targeted fishing with the aim of mastering the entire complex of ichthyofauna and recommendations for the directed formation of the structure of ichthyocenoses with rational fishing.- developed scientifically grounded recommendations on the conduct of fishing and the fish stocking of water bodies interconnected with it (parallel with the release of juveniles, reclamation capture of predatory and low-value species, the optimal timing and place of release of juveniles on specific water bodies, stimulating measures for nature users for stocking and reclamation of fish, and others) in order to increase the efficiency of stocking and increase the fish productivity of water bodies in Kazakhstan (at least 7 recommendations).- the economic effect of the implementation of the program, followed by the emergence of profitable, stably operating fish-breeding complexes and farms, which will increase the number of fish farmers, and create preconditions for the development of rural areas and improve the living standards of the population in the regions, as well as increase the export potential of Kazakhstan.- development of 1 biological justification for stocking standards in the studied water bodies of the Republic of Kazakhstan. |
| **4.2 Final result:**Solving the tasks of the Strategic Plan of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan for 2017-2021, where one of the strategic directions is to ensure the protection, reproduction and rational use of flora and fauna, water resources, and specially protected natural areas.Conservation of biological diversity, reproduction of fish resources and other aquatic animals.**Economic effect**:An increase in the actual catch of fish from fishery reservoirs from 45 thousand tons (2020) to 65 thousand tons by 2030. Creation of new jobs and facilities for the production of fish products and their derivatives in the regions of Kazakhstan with an increase in the number of people employed in the industry up to 20%. Increase in investments in fixed assets of enterprises in the industry by increasing the attractiveness and stable development of the fish industry.**Scientific effect**:Optimal organization of fishing with the priority of preserving the number of valuable and reducing the number of commercially low value and optimal organization of stocking of water bodies with juvenile valuable fish species will lead to an increase in fish productivity of water bodies by 10-20%.The developed theoretical basis for the adoption of scientifically based management decisions by authorized bodies.Effective measures to reduce the negative impact of the already introduced species of aquatic organisms, allowing to increase the fish productivity of commercial species, incl. transboundary water bodies, which will provide high catches.Restoration of the number of valuable commercial fish for stocking, incl. rare and endangered species of fish, which should contribute to the fulfillment of the requirements and obligations of international treaties signed in the Republic of Kazakhstan.**Social effect of the Program**: Creation of conditions for effective implementation of state policy in the field of protection, reproduction and use of wildlife. Conservation and increase of stocks of fish and other aquatic animals, in order to improve the socio-economic situation in the studied regions of Kazakhstan, attract additional investments, increase production forces and employment of the population. |

# **Technical Task № 4**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. Name of a specialized area for a scientific, scientific and technical program** (further - the program)**:**Rational use of water resources, flora and fauna, ecology.Environmental monitoring and green technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of a scientifically based program for improving air quality in megacities (Nur-Sultan and Almaty) using modern research methods and modeling tools. |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- Investigation of the contribution of various sources of pollution to the concentration of fine PM2.5 particles in the atmospheric air for individual cities of Kazakhstan using chemical analysis of their composition and receptor modeling;- Study of the concentrations of various fractions of suspended particles (PM2.5, PM10), volatile organic compounds, heavy metals and polycyclic aromatic hydrocarbons in the air of individual cities of Kazakhstan;- Assessment of spatial and temporal changes in air pollutants in selected cities of Kazakhstan using established concentrations and data from the national network of ground-based monitoring stations;- Assessment of mortality, morbidity and economic damage due to air pollution;- Development of target air quality indicators based on the obtained data and model results;- Development of a science-based air quality improvement program using modern air quality modeling tools. |
| **3. Which points of strategic and program documents does it address:**State program for the development of education until 2025, item "Strengthening the potential of science".Concept for the transition of the Republic of Kazakhstan to a "green economy",Section 3.6 "Reducing Air Pollution".Strategy Kazakhstan 2050, paragraph “4. The health of the nation is the foundation of our successful future". |
| **4. Expected results.****4.1 Direct results:**- Detailed, scientifically grounded data on the contribution of various sources of pollution to the concentration of PM2.5 suspended solids in the atmospheric air of individual cities of Kazakhstan;- Data on the concentrations of various fractions of suspended particles (PM2.5, PM10), volatile organic compounds, heavy metals and polycyclic aromatic hydrocarbons in the air of selected cities of Kazakhstan;- Detailed scientifically grounded data on spatio-temporal changes, trends and driving factors of pollutants;- Values ​​of mortality, morbidity and economic damage due to air pollution in the cities of Nur-Sultan and Almaty;- Scientifically based air quality targets for the cities of Nur-Sultan and Almaty;- The results provided to the authorized body in the field of environmental protection for their assessment and implementation. |
| **4.2 Final result:**A scientifically based program to improve air quality for the cities of Nur-Sultan and Almaty using modern research methods and modeling tools. |

# **Technical Task № 5**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Geology, mining and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures.Complex and waste-free use of mineral raw materials. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Creation of scientific and practical foundations and innovative technological approaches in the development of new resource-saving, waste-free, highly effective technologies for thermal processing of industrial waste, solid domestic waste (hereinafter - MSW) and disposal of sludge from sewage treatment plants of the Republic of Kazakhstan. |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - Analysis of the known methods of thermal waste processing and disposal of sludge from sewage treatment facilities.- study of thermal processes and new technological methods when handling various wastes and sludge, which are constantly at the stage of evolution due to changes in the structure of material bonds, using the example of thermal processing of plastics, agricultural waste (tops, stems, manure) with the production of biogas, utilization of sludge and sewage sludge by pyrolysis, utilization of sludge and sewage sludge by means of thermo catalytic oxidation of sewage sludge in a fluidized catalyst bed.- improvement of methods with the use of new technological methods of thermal processing of waste and disposal of sludge.- approbation and optimization of modern highly efficient methods and new technological solutions for thermal processing of waste and disposal of sludge in production conditions.- solving the problem of aeration (air pollution from unpleasant odor) - up to 90%;- neutralization of the pathogenic effect of sewage sludge (WWS) - up to 90% and toxic effects - up to 70%- technological scaling of program results. |
| **3. Which points of strategic and program documents does it address:** 3.1. Strategy "Kazakhstan-2050": A new political course for the correct management of natural resources. New natural resource management system.3.2. Message from the President of the Republic of Kazakhstan to the people of Kazakhstan dated September 1, 2020 Task VII. Ecology and protection of biodiversity.3.3. New Environmental Code of the Republic of Kazakhstan (2019-2020). Disposal and recycling of waste. Introduction of advanced technologies to reduce emissions into the environment.3.4. Strategic development plan of the Republic of Kazakhstan until 2025. Reform 5, priority - Ensuring a basic quality of life in all regions. Objective: improving the environmental situation.3.5. State program for the development of education and science of the Republic of Kazakhstan for 2020-2025 Goal 2 "Increasing the contribution of science to the socio-economic development of the country", paragraph 5.2.3. To increase the effectiveness of scientific developments and ensure integration into the global scientific space.3.6. Development strategy of the Republic of Kazakhstan until 2050. The fifth challenge is global energy security. Alternative and green energy technologies. |
| **4. Expected results.****4.1 Direct results:**- optimization and testing of highly efficient methods and new technological solutions for thermal processing of waste and disposal of sludge.- an improved method of thermal waste treatment and disposal of sludge, using the latest effective technological solutions and methods.- Creation of a pilot plant for waste disposal at an economically feasible cost by selecting the WWS combustion mode together with other waste with a capacity of up to 25-50 kg/h.- creation of a base for technological scaling of program results. |
| **4.2 End result:****Scientific and technical effect**: - refined methods of collection, transportation, processing, utilization and disposal of sewage sludge together with other wastes;- by selecting the combustion mode of sewage sludge (WWS) together with other wastes, ensuring the complete destruction of all organic substances contained in the raw material;- proven technology for neutralization and utilization of sewage sludge (WWS). - the residue of the solid phase obtained after processing at an economically feasible cost should be an inactive, environmentally friendly product that can either be used in the production of building materials, or taken to landfills or free territories.**Scientific effect from the implementation of the program**:- the developed scientific and practical foundations and new technological approaches to the investigated methods of thermal disposal of waste and sludge of wastewater treatment plant landfills with an acceptable impact on the environment, and with the best economic indicators.- a change in the situation with the processing of industrial waste, solid waste and the disposal of sludge, as well as an effective reduction of sludge and a decrease in their final volume, improving the environmental situation through technological scaling.**Economic effect from the implementation of the program:**- the economic efficiency of the developed solutions due to a decrease in fees for a negative impact on the environment, additional profit from the sale of pyrolysis products, as well as the possibility of technological scaling at industrial waste landfills, as well as on sludge maps of sewage treatment facilities of the Republic of Kazakhstan.- the result achieved in reducing mandatory payments to the budget for emissions into the environment, mainly for above-established standards;- the achieved result in reducing the volume of actual emissions of pollutants up to 90%.- additional profit from the implementation of the WWS combustion mode together with other wastes - up to 15%.**Social effect of the Program:**- improving the ecological situation, minimizing the operation of industrial waste storage sites, solid waste landfills and sludge landfills.- solving problems associated with sewage sludge, which is almost completely stored on the territory of wastewater treatment plant landfills as a hotbed of bacteriological and toxicological danger.- solution of problems with unpleasant odors, by the method of thermal neutralization of sludge residue and released harmful gaseous products by burning them together with coal and other wastes.**Target consumers of the results obtained:** Research organizations, state and regional executive authorities of the Republic of Kazakhstan; manufacturing enterprises; city ​​sewage treatment facilities; agro-industrial and livestock complex; regional economic entities involved in the Green Economy and Urban Development Concept; population of cities and large settlements. |

# **Technical Task № 6**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Geology, mining and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structuresPolymeric materials with special properties. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of scientific and practical foundations and innovations for the creation of new weatherproof sealing materials and adhesives based on copolymers of unsaturated polyester resins with unsaturated carboxylic acids and amides for sealing small arms ammunition and artillery pieces, joints of combined products and metal structures in machine tool building and construction. |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - Detailing the mechanisms of radical copolymerization of unsaturated polyesters with monomers of hydrophobic and hydrophilic nature;- Establishment of the dependence of the rate of copolymerization reactions on the molecular weight of the original unsaturated polyester resins;- Establishment of theoretical laws of dependence of physical, mechanical and deformation characteristics of copolymers on the nature, structure of unsaturated polyesters;- Determination of physicochemical and dynamic properties of unsaturated polyesters in solutions of unsaturated polar and apolar vinyl monomers;- Study of the processes of curing unsaturated polyesters with solutions of vinyl monomers: total volumetric shrinkage, density, gelation time, exothermic curing peak, Barcol hardness, elongation, bending strength, temperature of the onset of thermal deformation;- Selection of the optimal polymer-monomer mixture with satisfactory sealing adhesive, water-permeable and heat-insulating properties;- Carrying out tests of sealants and adhesives for water-permeable and heat-insulating characteristics on metal and combined products;- Development of laboratory regulations for obtaining new sealants and adhesives. |
| **3. What points of strategic and program documents are decided by:**1. Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";2. Development Strategy of the Republic of Kazakhstan until 2050;3. Decree of the President of the Republic of Kazakhstan dated April 17, 2017 No. 462;4. Decree of the President of the Republic of Kazakhstan dated October 26, 2017 No. 569;5. Decree of the President of the Republic of Kazakhstan dated February 19, 2018 No. 637;6. Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);7. Concept for Kazakhstan's entry into the 30 most developed countries in the world;8. State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020). |
| **4. Expected results.****4.1 Direct results:**- Deciphered mechanism of radical copolymerization of unsaturated polyesters with comonomers of various natures in order to predict the properties of materials with a functional of practically valuable properties;- Established correlations between the molecular weight of unsaturated polyesters and the rate of the copolymerization reaction to control the curing processes;- Theoretical substantiation of the influence of the nature and structure of unsaturated polyesters on the physicomechanical and deformation characteristics of copolymers;- Established physicochemical, dynamic properties of polyesters in solutions of comonomers of various nature;- The mechanism of the process of curing unsaturated polyesters with solutions of vinyl monomers and the main characteristics of the process;- The developed formulation "unsaturated polyester-vinyl monomer" with the necessary sealing, heat and water permeability properties;- Results of testing new sealants and adhesives on real objects;- Laboratory regulations for obtaining new sealants and adhesives. |
| **4.2 End result:****Scientific and technical effect:** Creation of new sealants and adhesives, by researching the radical copolymerization of unsaturated polyester resins, based on available and cheap raw materials.Implementation of the results obtained in the production of new import-substituting products and materials.**Scientific effect:** New materials developed in the process of studying the mechanisms of the curing reactions of unsaturated polyesters in solutions of vinyl monomers.Developed sealants and adhesives that can serve as an alternative for imported products.A feasible contribution to the theory of polymerization processes, based on the detailing of these processes.**Economic effect:** Creation of new import-substituting products and materials to increase the local content in the products of enterprises of the Republic of Kazakhstan.Reducing the cost of the final product, which is in demand at the enterprises of the machine-building, defense and construction industries of the country.Reducing import dependence and increasing labor productivity by introducing domestic products that are in demand in production.**Social effect of the Program:** Integration of science and industry. Creation of new jobs, an increase in budget receipts of funds allocated for social needs. The influx of young specialists into science and high technology industries.**Target consumers of the results obtained:** Scientists, chemists, research organizations, higher educational institutions, government agencies and organizations, enterprises of the defense, machine-building and construction industries. |

# **Technical Task № 7**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Geology, mining and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures.New materials for multipurpose purposes based on natural raw materials and man-made waste. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Creation of scientific and technological foundations for the production of new types of sorbents, hetero-element-organic substances, fertilizers and composite materials, petrochemical products, from natural, phyto-raw materials and man-made wastes and the creation of a database for the production monitoring system and ecotoxicants in the resulting waste and intermediate products of various industries. |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- development and determination of optimal conditions and technological solutions for obtaining multipurpose materials for the ecological rehabilitation of disturbed lands and recommendations for the development of environmentally friendly technologies for oil production and refining; - carrying out large-scale and pilot-industrial tests of the developed technologies for obtaining, researching the effectiveness and developing scientifically grounded recommendations for obtaining materials with specified properties;- chemical-analytical study of the current state of the environment and assessment of the impact of waste on environmental components, and the development of industrial environmental monitoring systems;- development and improvement of green technologies for processing mineral raw materials and industrial waste into fertilizers, adsorbents and other substances and materials to improve soil fertility, obtain high-quality, export-oriented and environmentally friendly crop production;- targeted synthesis of highly pure inorganic substances for use in electronics, medicine, fine organic synthesis as catalysts, new polymer membranes and ion exchangers for industrial water purification, fundamentally new sorbents based on the effect of remote interaction of macromolecules and molecular imprinting, innovative polymeric materials with special properties others;- substantiation of green technology for obtaining monomeric, hetero- and organoelement substances, biologically active products, catalysts and materials for agricultural and medical purposes. |
| **3. What points of strategic and program documents are decided by:**1) Development Strategy of the Republic of Kazakhstan until 2050: A new political course for the correct management of natural resources;2) Message of the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan dated September 1, 2020 Task VII: Ecology and protection of biodiversity. Instruction of the Head of State to the Government of the Republic of Kazakhstan on the approval of long-term plans for the conservation and rational use of biological diversity, greening the country;3) Message of the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" (2019);4) State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020);5) Environmental Code of the Republic of Kazakhstan (with amendments and additions as of June 25, 2020);6) State program of industrial and innovative development for 2020-2025. |
| **4. Expected results.****4.1 Direct results:**- the technological basis of the "green" technology for processing mineral raw materials and industrial waste into fertilizers, catalysts, adsorbents, highly pure inorganic and other substances and organo-mineral materials.Establishment of technological foundations of green technology for processing brown coal and phyto-raw materials into organo-mineral fertilizers and polyfunctional compositions for effective plant nutrition, obtaining high-quality crop products by 20-25%, ecological rehabilitation of the territory of industrial oil production and processing by 15-20%, to ensure reduction of man-made waste by 10-15%;- technology for obtaining monomeric hetero- and organoelement substances and materials for agricultural and medical purposes, which increase efficiency (activity, decrease in toxicity, duration of action, etc.) up to 12-25% in comparison with the drugs used;- intellectual analysis "structure - physical and chemical properties - biological action - biosafety";- "green" technologies for the production of new organometallic complexes, carrying the potential of bioactivity, reducing the risk of overdose by microelements of the body and plants, and / or catalysts of organic reactions, increasing the conversion of initial reagents by 10-15%, and hydrogel systems based on synthetic and natural raw materials of biological and for technical purposes 2 and 5 times;- technologies of polymer substances and special-purpose materials, new sorbents based on the effect of remote interaction of macromolecules and molecular imprinting, new polymer membranes and ion exchangers for industrial water purification and selective extraction of ions of rare and rare-earth materials at least 10%;- the use of epoxy compounds and their derivatives should reduce the staging of the final products and increase the special properties due to the increased functionality of ion-exchange polymers, which makes it possible to efficiently sorb ions of rare, scattered and precious metals from aqueous solutions of hydrometallurgical production at least 5%; the final product yield should increase by 10-12%- innovative methods, new materials and technologies for the ecological rehabilitation of the territories of industrial oil production and refining will increase the production efficiency by 1.5-2 times;- a program of industrial environmental (chemical-analytical) control, monitoring and a set of measures for monitoring the state of the environment will increase the speed of chemical-analytical control by 2-5 times. |
| **4.2 End result:**- development of technological foundations for the creation of new monomeric and polymeric inorganic, carbo-, hetero- and organoelement substances and multipurpose materials for Kazakhstan; A scientific and scientific-practical basis for the synthesis and substantiation of the optimal parameters for obtaining energy-resource-saving, low-waste technology of fertilizers, nutrient compositions and multipurpose materials should be created, ensuring the improvement of environmental ecology, increasing soil fertility, food security of the state, obtaining high-quality, export-oriented crop production based on a new generation of nutritional compositions containing superhumates and phytocompounds. Through the introduction of innovative technologies for the integrated processing of natural, phyto-raw materials and man-made waste into highly effective fertilizers, the greenhouse effect should be reduced by 15-20% by reducing the rate of mineral fertilizers by 1.5-3 times and Kazakhstan's contribution to providing the world community with quality products nutrition, reduction of nitrates of food products 1.5-2 times of pesticides, by 15-20% of heavy metals and radioactive elements by 20-25%.- creation of scientific and scientific-practical bases for synthesis and substantiation of optimal parameters for obtaining energy-resource-saving, low-waste technology of multipurpose materials that improve the ecology of the environment; innovative technologies for the integrated processing of natural, phyto-raw materials and man-made waste into highly efficient import-substituting sorbents, fertilizers and composite materials;- expanding the range of chemical products with new science-intensive types of products and their use in phosphorus, oil, construction and other industries, as well as in agriculture and to solve environmental problems with the aim of scientific and technical modernization and industrial and innovative development of the economy of the Republic.**Economic effect:** Innovative technologies should ensure a decrease in the cost of production by 1.2-2 times and an increase in its quality indicators by 15-20%; an increase in labor productivity, in terms of the final product by 10-15%, ensuring an increase in the demand for products of related sectors of the national economy - chemical , oil refining and light industry, mechanical engineering, agriculture by 10-15%.- reduction of the cost of final products - polymer ion exchangers and membranes, availability of initial reagents. Ion-exchange membranes should make it possible to obtain 1 m3 of desalinated water on electrodialysis devices of a new generation with an energy consumption of no more than 1.0 kW/h, which is 2 times lower than on the well-known industrial membranes MA-40, 15-20%.- development of fundamentally new sorbents based on the effect of remote interaction of macromolecules and molecular imprinting, which makes it possible to increase the degree of extraction of the target metal up to 30-40% in comparison with the existing analogues.Environmental effect of the Program: Contribution to the development of green chemistry and technology, in particular, to the development of effective low-toxic preparations for agriculture by creating a scientific basis for obtaining pesticide preparations with IV class of toxicity.- using new types of energy, reducing the amount of carbon dioxide emissions into the atmosphere by 15-20%, nitrogen oxides by 5-10%, ensuring energy reduction by 17-20%, creating low-waste technologies and high-quality, export-oriented products.- improvement of the ecological situation in the region and rational economic use of natural resources, development of a "green economy" reduction of harmful emissions, reduction and recycling of waste, the emergence of environmentally friendly industries, increasing the investment attractiveness of the industry and the region;- solving the problems of waste disposal of mining enterprises with obtaining export-oriented commercial products and the problems indicated in the environmental maps of pollution of enterprises and regions, which allow to reduce the amount of harmful emissions and reduce the negative load on the environment.**Social effect:** Creation of additional jobs by introducing research results into production and improving infrastructure. |

# **Technical Task № 8**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Information, telecommunication and space technologiesSpeech technology and computational linguistics |
| **2. Purpose and objectives of the program:****2.1. Purpose of the program:**Development of linguodidactic foundations and linguistic IT resources to improve the culture of the Kazakh language as a language of interethnic communication.**2.1.1. To achieve this goal, the following tasks must be solved:** Formation of an orthological, linguodidactic and scientific-practical base for the functioning and development of the Kazakh language as the state language and the language of interethnic communication in digital format:- development of an applied synonymizer program for standard samples of a synonymous row of words in the texts of social and political discourse and public speech;- adaptation of historical texts for teaching aids for teaching Kazakh as a second language; development of a compact database of adapted historical texts, placement on an Internet resource;- development of an electronic database of Kazakh ethnographisms with audio-video accompaniment, found in educational texts teaching the Kazakh language as a second;- development of a grammatical electronic reference book of the modern Kazakh language;- development of an IT application for onomastics;- unification of the terminology of school educational texts and the development of an electronic dictionary of terminology for school textbooks;- orthology of lexical and phraseological units of texts of pedagogical discourse and placement of results on the Internet resource; Modernization of scientific systems of knowledge in Kazakh linguistics, formed by Akhmet Baitursynuly in the context of modernity:- development of a system of scientific knowledge on phonetics, phonology, formed by Akhmet Baitursynuly, posting the results on the website "Akhmettanu";- development of a system of scientific knowledge on morphology, word formation and grammar, formed by Akhmet Baitursynuly, posting the results on the website "Akhmettanu";- development of a system of scientific knowledge on terminology, formed by Akhmet Baitursynuly, posting the results on the website "Akhmettanu";- development of a system of scientific knowledge on the style and culture of speech, formed by Akhmet Baitursynuly;- collection of the scientific heritage of Akhmet Baitursynuly in domestic and foreign archives and the development of electronic versions of all his works;- development and creation of a site for "Akhmettanu". |
| **3. What points of strategic and program documents are decided by:**Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";State program for the implementation of the language policy of the Republic of Kazakhstan for 2020-2025;Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Decree of the President of the Republic of Kazakhstan dated April 17, 2017 No. 462;Decree of the President of the Republic of Kazakhstan dated October 26, 2017 No. 569;Decree of the President of the Republic of Kazakhstan dated February 19, 2018 No. 637;Order of the Government of the Republic of Kazakhstan dated March 13, 2018 No. 27-r;Message from the President of the Republic of Kazakhstan K. K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" (2019);Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020). |
| **4. Expected results.****4.1 Direct results:**Orthological, linguodidactic and scientific-practical basis for the functioning and development of the Kazakh language as the state language and the language of interethnic communication in digital format:- an applied program-synonymizer for standard samples of a synonymous series of words in the texts of social and political discourse and public speech;- a compact base of adapted historical texts for teaching aids for teaching Kazakh as a second language;- an electronic database of Kazakh ethnographisms with audio-video accompaniment, found in educational texts teaching Kazakh as a second language;- grammatical electronic reference book of the modern Kazakh language;- IT application for onomastics;- electronic dictionary of terminology of school textbooks;- orthology of lexical and phraseological units of texts of pedagogical discourse. Modernized scientific systems of knowledge in Kazakh linguistics, formed by Akhmet Baitursynuly in the context of modernity:- systems of scientific knowledge in phonetics, phonology, formed by Akhmet Baitursynuly;- systems of scientific knowledge on morphology, word formation and grammar, formed by Akhmet Baitursynuly;- systems of scientific knowledge on terminology formed by Akhmet Baitursynuly;- systems of scientific knowledge on the style and culture of speech, formed by Akhmet Baitursynuly;- site "Akhmettanu".**4.2 End result:**Expected social and economic impactThe implementation of the program should contribute to strengthening the role and expanding the function of the state language in the virtual space. The solution of scientific, practical and applied problems of the program should allow obtaining modern IT-developments in speech technologies and computational linguistics, which should be offered to the general user and serve to increase the linguistic culture of society, as well as increase the volume of digitized high-quality content in the state language.Economic efficiency. The developments obtained as a result of the implementation of the program should make it possible to reduce the energy intensity and time consuming processes associated with the use of the state language in various types of communication.**Target consumers of the results obtained:**- researchers-specialists in various fields of linguistics and computational linguistics; those wishing to learn the state language; representatives of diasporas and other ethnic groups of Kazakhstan; specialists who teach Kazakh as a mother tongue and another language (second, foreign); students, listeners of Kazakh language courses; employees of governmental and non-governmental organizations, etc. |

# **Technical Task № 9**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Information, telecommunication and space technologies.Development of a scientific and experimental base for deep and near space research. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Creation of a digital virtual environment designed to enhance the capabilities of astronomical research and provide services to external users. Development of methods for processing, storing and analyzing Big Data in astronomy for the study of objects in near and deep space.**2.1.1. To achieve this goal, the following tasks must be solved:**- Development of means of control of optical systems of experimental observational bases in the remote access mode;- Digitization of glass libraries of astronomical objects and their use in conjunction with modern photometric and spectral data;- Development of BigData and DataMining methods for studying space objects;- Modernization of computing power for storage, processing and analysis of Big Data;- Integration of astronomical data obtained from ground-based telescopes into a single environment and providing convenient access to them. |
| **3. What points of strategic and program documents are decided by:**1) The State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025, approved by the Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988. Goal 2: Increasing the contribution of science to the socio-economic development of the country: task 9. Strengthen the intellectual potential of science, task 11. To increase the effectiveness of scientific developments and ensure integration into the world scientific space.2) Strategic development plan of the Republic of Kazakhstan until 2025, approved by the Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636, the task is "Development of the scientific research system».3) The Law of the Republic of Kazakhstan "On Space Activities" (with amendments and additions as of 11.04.2019). Article 4. Directions of space activity: 2) exploration of outer space, planets and solar-terrestrial relations; 8) international cooperation of the Republic of Kazakhstan in the field of exploration and use of outer space for peaceful purposes. Article 5. Types of space activities for the creation and use of space infrastructure: 1) research and development work. Article 14. Scientific research in the field of space activities: 1. Scientific research in the field of space activities includes fundamental and applied scientific research, development work and space experiments aimed at providing scientific support for space activities and the development of new models of space technology and technology.4) Strategic plan of the Ministry of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan for 2020-2024, approved by order of the Minister of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan dated January 16, 2020 No. 13 / NҚ. Section 3. Priority directions of the sphere / branch development. Strategic direction 3. Development of the Aerospace industry, as well as coverage of the country with geodetic and cartographic information. Measures: development of a scientific and experimental base for deep and near space research.  |
| **4. Expected results.****4.1 Direct results:**- Modernized scientific and experimental base for deep and near space research:- Automated control of 2 optical telescopes for observations in remote access mode;- Control system for registration of images and spectra of space objects on 2 optical telescopes in the remote access mode;- Development of a software package for working with large multidimensional arrays of astronomical data of deep space objects;- at least 2 (two) (photometric and spectral) databases of the digitized glass library of astronomical objects;- at least 1 (one) computing cluster to provide a service for storing, processing and analyzing astronomical Big Data;- at least 1 (one) synthesized database obtained from ground-based telescopes, with the provision of convenient access to them for external users;- at least 1 (one) virtual observatory for the collection and transmission of observational data and computing services with convenient access for external users.- development of at least 1 (one) information website. |
| **4.2 End result:** **Scientific and technical effect:** Creation of a virtual observatory, an automated control system for optical means for conducting observations, a software package for working with large multidimensional arrays of astronomical data from deep space objects, providing for the receipt and continuous exchange of data with various observatories of the international astronomical community for the transition to a new effective scientific and the technical level of research in near and deep space.The development of methods and technologies for obtaining, storing, processing and analyzing data should give fundamentally new results in the study of near and deep space objects based on their high-quality astro-images from both Kazakhstani and foreign observatories.**Economic effect:** The program should be aimed at developing a scientific and experimental base for research in deep and near space. The results of the program should be of interest and need, both for the international scientific community and for the enterprises of the space industry of Kazakhstan for the control of outer space.**Social effect of the Program:** The creation of virtual observatories should contribute to the development of the digital infrastructure of the Kazakhstani space industry.**Target consumers of the results obtained:**Scientific organizations in the field of astrophysics, theoretical physics, undergraduates and doctoral students of higher educational institutions, employees of scientific centers for related research profiles, the Republican Center for Space Communications, as well as the observatory of the International Astronomical Union. |

# **Technical Task № 10**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Information, telecommunication and space technologies.Intelligent control and decision-making systems (including in real time). |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Development of a complex of intelligent information and communication systems for urban infrastructure, which involves improving the quality of life of citizens by improving transport infrastructure, improving the environmental situation, efficient use of energy resources and introducing data analytics principles for making management decisions in the Smart City concept.**2.1.1. To achieve this goal, the following tasks must be solved:**- Development of the direction of the shared economy (Sharing Economy) through the development of an intelligent information system for carsharing, which contains algorithms for tracking a car in permissible zones, driver information support systems, identification and verification of identity.- Creation of biotechnological systems for air purification using Internet of Things technologies, and further control of the level of air pollution in the city.- Development of an IT solution to optimize the heat and power system of Smart-Capital using machine learning methods to improve energy efficiency and reduce harmful emissions.- Development of information services for intellectual analysis of criteria for the sustainable functioning of the urban environment of the Smart Capital.- Development of an intelligent information system for telematics, scoring, personal identification, diagnostics, GPS tracking, payment processing systems, user support, cars and driving style tracking, user information support, parking space tracking.On the creation of biotechnological systems for air purification:- Development of biotechnological systems for air purification and their placement, and commissioning with built-in sensors to collect various information in real time.On the development of an IT solution to optimize the heat and power system:- development of a decision-making tool for the optimal selection of the composition of the generating equipment of CHPP for a day / a week ahead using rolling horizon, Risk Constrained Unit Commitment (RCUC), multi-parameter programming based on Industry 4.0 and Digital Twin concepts;- Development of a detailed mathematical model of a CHP and a city heating network based on the analysis of big data of telemetry devices for optimal operational management and development planning, loss reduction, determination of blind spots in the telemetry system, modeling of a stochastic consumption profile;On the development of criteria for the sustainable functioning of the urban environment:- Study of the features, improvement and adaptation of the SULPITER methodology to the city of Nur-Sultan to assess the criteria for the sustainable functioning of the urban environment- Development of an intelligent information system: collection and processing of unstructured data from various sources (including from city services), visualization services and data access level, interfaces (API) for interacting with external information systems;- Development of algorithms for data mining, predictive assessment and generation of recommendations on the criteria for the sustainable functioning of the urban environment. |
| **3. What points of strategic and program documents are decided by:** Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science", art. 27.Message from the President of the country K. K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" dated September 1, 2020. National plan for the implementation of the Address of the President of the country K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" dated September 1, 2020, Development of the education and science system, Meeting of the Government of the Republic of Kazakhstan dated September 9, 2020 "In the medium term, economic growth should becoming more and more "green". Therefore, the foundation for deep decarbonisation should be laid now. I instruct the Government, in cooperation with the scientific community and the private sector, to develop a package of proposals for "green growth".State program for the development of education and science of the Republic of Kazakhstan for 2020-2025. PP RK dated December 27, 2019, No. 988. The action plan for the implementation of the State Department of Education and Science of the Republic of Kazakhstan for 2020 - 2025. Objective 1: to strengthen the intellectual potential of sciencePPRK dated May 25, 2011 No. 575 "On approval of the Rules for basic, grant, program-targeted financing of scientific and (or) scientific and technical activities"State program of industrial and innovative development of the Republic of Kazakhstan for 2020-2025. PP RK dated December 30, 2019, No. 1050. Action plan for the implementation of the SPIID RK for 2020 - 2025. Task 4. Technological development and digitalization. Paragraphs 90 and 91 of the Action Plan for the implementation of the SPIID for 2020-2025.Law "On Ratification of the Paris Agreement" of the UN Framework Convention on Climate Change, confirmation of Kazakhstan's intention to reduce greenhouse gas emissions, President of the Republic of Kazakhstan N.А. Nazarbayev (2016).Strategy "Kazakhstan-2050: a new political course of an established state" by 2050 50% of the consumed energy in Kazakhstan should be supplied from renewable and alternative energy sources.National plan of Kazakhstan "100 concrete steps" (2015), steps 50 and 52: country priorities are the development of renewable energy sources, the introduction of a new tariff policy."Development strategy for the city of Nur-Sultan until 2050" (2019) and the master plan for the development of Astana until 2035 (2018) |
| **4. Expected results.****4.1 Direct results:**- Intelligent car-sharing information system, which contains algorithms for tracking a car in permissible zones, driver information support systems, identification and identity verification;- Suggestions for the selection of the optimal types of crops, which, when provided with proper care in an urban environment using the Internet of Things technology, can have the most positive impact on the environmental situation;- Optimal irrigation system, where the water supply must be completely independent, thanks to a fully automated irrigation system;- An integrated system using IoT technology to provide comprehensive information on the performance and condition of each individual biotech filter, as well as collect data on the environment in the surrounding area;- A model of the power system of Nur-Sultan with data from the fuel and energy balance for long-term planning of the development of the smart city power system;- An intelligent information system presented as a platform for cloud storage and processing of data with API access:- Adapted SULPITER methodology for assessing the criteria for sustainable development of the region, using data from the repository and evaluating various areas of impact.- API providing data to interested parties, by access level. |
| **4.2 End result:**Scientific and technical effect.The results of the Program should contribute to the implementation of the tasks of the SEED RK for 2020-2025, in particular, to strengthen the scientific potential of science and increase the effectiveness of scientific developments and have a positive direct impact on the following target indicators:- on the quality of research organizations;- The results of the program should provide an analysis of the current situation in the city and the adoption on its basis of management decisions on the development of the city.**Target consumers of the results obtained:** Economists, power engineers, computer developers, specialists in urbanism, urban planning, administration and employees of governmental and non-governmental organizations, local government and self-government bodies.The environmental effect of the Program is the development of environmentally friendly technologies. Residents of the capital, due to their involvement in heating savings and management concepts on the side of the consumer, should benefit in the form of reducing costs by up to 10% of current indicators.The economic effect of the Program is to improve the indicators of Nur-Sultan according to the United for Smart Sustainable Cities methodology (from 2020) to monitor the state of the city and comply with the Smart City concept to make more informed decisions and assess their impact on the development of the city. Installation of one biotechnological filter can replace planting from 50 to 100 mature trees, which, with the right approach, will have a significant effect of saving financial resources for planting and caring for plantings, and allocating land plots for eco-territories in the long term.**The social effect of the Program** - the adoption of balanced management decisions will increase the level of satisfaction of city residents with the policy of the authorities (social acceptance index). The development of environmentally friendly technologies, minimizing fuel consumption, reducing polluting emissions into the atmosphere (3 times) and improving air quality are a global trend and are especially relevant in large metropolitan areas, as it affects many people. |

# **Technical Task № 11**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Information, telecommunication and space technologies.Intelligent control and decision-making systems (including in real time).Pattern recognition and image processing.Space technologies.Monitoring and forecasting of space and geodynamic processes, natural resources and remote sensing of the Earth.High performance computing technologies.Geoinformation technologies and systems. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Creation of a web-based geoinformation service for operational monitoring of a quantitative assessment of the degree of soil salinity and degradation of agricultural land in the South of Kazakhstan based on remote sensing data of the Earth**2.1.1. To achieve this goal, the following tasks must be solved:**- To develop methods and algorithms for a quantitative assessment of the degree of salinization of saline soils of agricultural lands in South Kazakhstan based on ground measurements and remote sensing data.- To develop technologies for quantitative assessment of the degree of soil salinity in South Kazakhstan using remote sensing data of medium and high spatial resolution.- Analyze non-commercial satellite data and spectral indices;- Develop a methodology for assessing the degradation of agricultural land in the South of Kazakhstan based on data from remote sensing of the Earth- To develop a web-based geoinformation service for operational monitoring of a quantitative assessment of the degree of soil salinity and degradation of agricultural land in the South of Kazakhstan based on remote sensing data of the Earth. |
| **3. What points of strategic and program documents are decided by:**1. Strategy "Kazakhstan-2050""By 2030, Kazakhstan should expand its niche in the world market of space services and bring to its logical completion a number of launched projects. I mean the assembly and testing complex of spacecraft in Astana, the remote sensing space system, the national space monitoring system and ground infrastructure, the high-precision satellite navigation system"2. Strategic development plan of the Republic of Kazakhstan until 2025Priority “Building the Foundations for a New Economy”. This priority assumes the implementation of the following tasks:- development of people with digital competencies;- stimulating innovation;- development of a scientific research system.3. Strategic plan of the Ministry of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan for 2017-2021, approved by order of the Minister of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan dated December 20, 2019 No. 352 / НҚ:Section 3. Priority directions of the sphere / branch development.Strategic direction 3. Development of the aerospace industry, as well as coverage of the country with geodetic and cartographic information.4. Strategic plan of the Ministry of Education and Science of the Republic of Kazakhstan for 2017-2021, approved by order of the Minister of Education and Science of the Republic of Kazakhstan dated December 29, 2016 No. 729:3) Priority direction: "Formation of a modern system of training scientific personnel and strengthening scientific potential, the status of a scientist"4) Priority area: "Popularization of science and international integration"Section 3. Priority directions of development of the sphere / industryStrategic direction 5. Development of science5. Speech by the Head of State at the third meeting of the National Council of Public Trust on May 27, 2020.6. Resolution of the Government of the Republic of Kazakhstan "On approval of the State program for the development of the agro-industrial complex of the Republic of Kazakhstan for 2017-2021" dated July 12, 2018 No. 423.7. Message from the President of the Republic of Kazakhstan N. Nazarbayev dated January 31, 2017 "The third modernization of Kazakhstan: global competitiveness"8. Message from the President of the Republic of Kazakhstan N. Nazarbayev dated January 10, 2018 "New development opportunities in the context of the fourth industrial revolution».9. Message from the President of the Republic of Kazakhstan K.K. Tokayev from September 1, 2020 “Kazakhstan in a new reality. Time for action».10. Decree of the Government of the Republic of Kazakhstan "On approval of the State program" Digital Kazakhstan" dated December 12, 2017 No. 827 |
| **4. Expected results.****4.1 Direct results:**- development of a method for quantifying the degree of salinity of saline soils of agricultural lands in South Kazakhstan based on ground measurements and remote sensing data.- at least 4 (four) maps of the salinity degree of saline soils of agricultural lands in Turkestan, Almaty, Zhambyl and Kyzylorda regions on a scale of 1: 300,000, based on ground measurements and remote sensing data.- technology for quantitative assessment of the degree of soil salinity in South Kazakhstan using remote sensing data of medium and high spatial resolution.- a methodology for assessing the degradation of agricultural land in the South of Kazakhstan based on data from remote sensing of the Earth.- at least 2 (two) maps of the recommended diversification of agricultural land on an area of ​​10,000 hectares due to the methodology for assessing the degradation of agricultural land in Turkestan and Kyzylorda regions based on remote sensing data of the Earth.- at least 4 (four) maps of the territories of Turkestan, Almaty, Zhambyl and Kyzylorda regions recommended for use as irrigated agricultural lands on a scale of 1: 300,000, based on data from remote sensing of the Earth.- web-based geoinformation service for operational monitoring of quantitative assessment of the degree of soil salinity and degradation of agricultural land in the South of Kazakhstan based on remote sensing data of the Earth |
| **4.2 End result:**Scientific methods and technologies to supplement and support space monitoring for solving specific problems in the sectors of the economy.Development of competitive advantages (a beneficial effect on the development of the industry of future use, expansion of existing and the emergence of new products and markets, reducing the cost and improving product quality, increasing labor productivity, creating groundwork for the growth points of Industry 4.0, the Internet of Things).Improving the efficiency of planning the development of space systems based on calculations of direct and indirect results of the introduction of techniques in the sectors of the economy.Information security: independence in technological development from other countries, the use of domestic developments in the development of software and individual technologies for space monitoring.Environmental effect of the Program: Use of data obtained from space vehicles for solving problems of environmental protection, rational nature management, development of a "green economy", optimization of agricultural production.**Social effect of the Program:** Improving the social environment and improving the quality of life of the population, characterized by indicators of growth in the educational level of the population, promoting inclusive development (creating new technological solutions, developing creative industries and innovations),**Socio-economic effect:** Training of qualified scientific personnel for the space industry of Kazakhstan, as well as in the preparation of masters and doctoral students, the creation of new jobs, an increase in the profitability of the industry. |

# **Technical Task № 12**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Information, telecommunication and space technologiesHigh performance computing technologyGeoinformation technologies and systems |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Creation of a scientifically grounded technological scheme for geoinformation support (GIS) for the effective interaction of elements of the precision farming system in Kazakhstan, including with the use of nanopreparations based on fullerenols.**2.1.1. To achieve this goal, the following tasks must be solved:**- Research and assessment of the effectiveness of the use of well-known world technologies, software and hardware and equipment in the system of precision farming in the Eastern region of the Republic of Kazakhstan;- Remote research of the potential of agricultural land (on the example of two experimental peasant farms) based on space survey materials and from unmanned aerial vehicles (UAVs) with the subsequent creation of digital maps and digital models of the territory of the Eastern region of the Republic of Kazakhstan;- Agrochemical assessment of the state of soils in the region (on the example of two experimental peasant farms) with the introduction of a complex of modern information technologies for collecting, processing, analyzing and interpreting data;- Development of a scientific and methodological base based on the transfer of IT-technologies, software product and its testing on the basis of two experimental agricultural enterprises;- Development and application of new forms of drugs with a complex of useful functions based on fullerenol nanomaterials for the treatment of agricultural crops in order to ensure a significant increase in the efficiency and controllability of agricultural production of high quality plant products. |
| **3. What points of strategic and program documents are decided by:** The state program "Digital Kazakhstan", adopted by the Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827:- 4. Goals, objectives, target indicators and indicators of the results of the implementation of the program, Direction 1. Digitalization of sectors of the economy. Objective 3. Digitalization of agriculture;- 5. Main directions, ways to achieve the set goals of the program and appropriate measures. Digitization of agriculture.2) Message of the President of the Republic of Kazakhstan N. Nazarbayev to the People of Kazakhstan "New development opportunities in the context of the fourth industrial revolution" dated January 10, 2018:- the third task: "Smart technologies" - a chance for a breakthrough in the development of the agro-industrial complex.3) Strategic development plan of the Republic of Kazakhstan until 2025:- Reform 2. Technological renewal and digitalization. Priority: Technological renewal of industries and digitalization. Objective: development of infrastructure and elimination of barriers to digitalization. |
| **4. Expected results****4.1 Direct results:**- Recommendations for the use of the most effective IT technologies used abroad (at least 2 in the form of technological regulations) within the system of precision farming in Kazakhstan;- Scientifically grounded method of remote research of agricultural land on the example of two experimental peasant farms based on space survey materials and from unmanned aerial vehicles.- Digital maps and digital models of the territory of at least two experimental peasant farms in East Kazakhstan (with a total area of ​​at least 20,000 hectares);- The introduction of scientific developments in precision farming, confirmed by acts of implementation on experimental peasant farms (at least three);- A comprehensive information and analytical system for collecting, processing, analyzing data on the agrochemical assessment of the state of soils in the Eastern region (using the example of at least two experimental peasant farms);- Scientific and methodological base and technical documentation on the methodology for collecting and presenting primary data;- A predictive model for the use of new forms of drugs (nanomaterials of fullerenols) for the processing of crops on the basis of two experimental agricultural enterprises;- Hardware and software complex for calculating the efficiency and controllability of agricultural production of high quality plant products and its implementation on the basis of two experimental agricultural enterprises;- Production of three experimental samples of nano-preparations based on fullerenols (fullerenol-D, fullerenol-24 (C60 (OH) 24), derivatives of fullerene C60 with microelements (transition metals - Cu, Ni, Mn, Mo, etc.) for the treatment of agricultural crops crops for the purpose of high-quality and prolonged feeding of grain crops with microelements; |
| **4.2 End result:**Recommendations for the effective implementation of a precision farming system on experimental plots of agricultural enterprises in the Eastern region of the Republic of Kazakhstan.- Technical documentation for the manufacture, use and storage of experimental samples of nanocompositions;- Hardware and software complex for calculating the efficiency and controllability of agricultural production of plant products.Economic effect. The results of the program, contributing to bringing the agribusiness of Kazakhstan to a new level of digital management, monitoring agricultural processes, taking into account the development trends of the world culture of digitalization of farming.Indicators of impact on the economy: ensuring the development of competitive advantages, increasing crop yields by at least 15%, cost savings at least 20%.The ecological effect of the program: reduction of the level of soil pollution due to the differentiated application of fertilizers, plant protection products, timely and coordinated implementation of agrotechnical measures.**The social effect of the program:** improving the quality of life of the population, increasing the level of digitalization of agriculture, increasing the IT competencies of farmers, the introduction of IT technologies, "smart technologies" in the agriculture of Kazakhstan. |

**Technical Task № 13**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Scientific research in the field of natural sciences.Fundamental and applied research in the field of chemistry. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Development of a theoretical basis and practical foundations for the production of new highly efficient "smart" polymers based on unsaturated polyester resins: establishment of regularities of the "composition-property" relationship by varying the nature of polyesters and comonomers in the processes of radical copolymerization reactions, testing and development of recommendations for the use of "smart" -systems as moisture sorbents, nanoscale metal-polymer complexes and bactericidal materials. |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- Study of radical copolymerization of unsaturated polyester resins of various nature with a number of ionic copolymers;- Establishing theoretical regularities of the dependence of the properties of synthesized copolymers on the structure, composition and nature of the components of the participants in the reactions of chain polymerization;- Development of methods for carrying out a controlled reaction of radical copolymerization in the presence of modern agents of the chain transfer reaction of "RAFT-systems" by methods of addition - fragmentation;- Detailed study of "ideal", "damped" copolymerization in the mode of "living" chains during copolymerization of unsaturated polyester resins;- Study of the influence of external factors on the behavior of the synthesized copolymers in the "swell-collapse" mode;- Analysis of optimal conditions for the synthesis of nanoscale metal-polymer complexes based on noble metals and transition metals, unsaturated polyesters and their identification;- Study of the catalytic properties of metal-polymer complexes on model reactions and the establishment of ways to increase the yield of target products;- Carrying out medical and biological tests of the activity of metal-polymer complexes on strains of various microorganisms;- Development of recommendations and laboratory regulations for the production of highly efficient moisture sorbents, catalysts and medical materials. |
| **3. What points of strategic and program documents are decided by:**1. Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";2. Development Strategy of the Republic of Kazakhstan until 2050;3. Decree of the President of the Republic of Kazakhstan dated April 17, 2017 No. 462;4. Decree of the President of the Republic of Kazakhstan dated October 26, 2017 No. 569;5. Decree of the President of the Republic of Kazakhstan dated February 19, 2018 No. 637;6. Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);7. Concept for Kazakhstan's entry into the 30 most developed countries in the world;8. State program for the development of education and science in the Republic of Kazakhstan for 2020–2025 (2020). |
| **4. Expected results.****4.1 Direct results:**- Synthesis of copolymers based on (ethylene) -propylene maleinates (fumarates) with unsaturated carboxylic acids, amines, amides by radical (co) and terpolymerization reactions;- The established dependence "composition - properties" in (co) terpolymerization of unsaturated- A developed method for changing the degree and density of the spatial network of stimulus-sensitive copolymers based on unsaturated polyesters using RAFT agents.- The mechanism of "ideal" and "damped" copolymerization in the mode of "living" chains for a controlled reaction in order to purposefully synthesize copolymers with the required properties;- Extensive material on the susceptibility of "smart" -systems when the copolymer is exposed to the temperature regime, the ionic strength of the solution, additives of an organic solvent, the pH of the solution and electrical, electromagnetic pulses in the "swell-collapse" mode;- Methods for immobilizing nanometer-sized metals into a polymer matrix of copolymers of unsaturated polyesters to obtain stable metal-polymer complexes;- Biomedical testing of nanosized metals in a polymer matrix with bactericidal properties;- Laboratory regulations for the production of copolymers of unsaturated polyester resins with moisture-absorbing, catalytic and bactericidal properties. |
| **4.2 End result:****Scientific and technical effect:** A new method of obtaining new materials with moisture-absorbing, catalytic and bactericidal properties, based on the study of radical copolymerization of unsaturated polyester resins under controlled reaction conditions.The results of the program should contribute to the emergence of domestic products for use in agriculture, oil refining, electronics industry and medicine.**Scientific effect:** Conceptual approach and controlled reaction of copolymerization of unsaturated polyesters in order to control the properties of end products and obtain materials with a complex of practically valuable properties.The possibility of influencing the course of the copolymerization reaction by modern methods used in world practice, which makes it possible to combine a number of valuable practical properties in the final material.**Economic effect:** Creation of new highly efficient import-substituting products and materials in order to increase the local content in the products of enterprises of the Republic of Kazakhstan. Production of domestic moisture sorbents, metal-polymer complexes, bactericides, which are in demand in agriculture, at construction industry enterprises, in medicine, which help to reduce the cost of final products and increase labor productivity.**Social effect of the Program:** Development of new products contributing to the enhancement of the prestige of the scientific potential of Kazakhstan, the integration of science and industry.Creation of new jobs, an increase in budget receipts of funds allocated for social needs, an influx of young specialists into science and science-intensive industries.**Target consumers of the results obtained:** Scientists, chemists, agricultural enterprises, research organizations, higher educational institutions and organizations, agricultural enterprises, chemical industry. |

# **Technical Task № 14**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Scientific research in the field of natural sciences.Fundamental and applied research in the field of physics and astronomy. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Development of new experimental and theoretical methods, software for obtaining new fundamental constants in nuclear and radiation physics, high energy physics and cosmology for the development of world-class competitive technologies, including nuclear, as part of the implementation of the activities of the Roadmap for international cooperation between the Government of the Republic of Kazakhstan and European Center for Nuclear Research. Training of nuclear-competent personnel in order to strengthen the intellectual potential of the Republic of Kazakhstan in the field of natural sciences.  |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- Experimental and theoretical studies of the characteristics of exotic stable and radioactive nuclei.- Research and modeling of the effect of anomalously high plasticity of high-alloyed alloys irradiated to high damaging doses.- Development of a technique for searching for rare events of the decay of superheavy nuclei using phosphate glass detectors.- Development of technology for ion-plasma synthesis of superconducting compounds and study of the possibility of their use for the manufacture of tape superconducting windings.- Study of the structure of azimuthal-rapidity distributions of events obtained at the Hadron-44 facility and comparison with the data of the CMS detector.- Influence of flows of neutral and charged particles on atmospheric phenomena.- Comprehensive study of the fundamental properties of quark-gluon plasma in the framework of the ALICE project at the CERN Large Hadron Collider.- Axionic dark matter in the modified theory of gravity.- Fluctuations of secondary particles in interactions of relativistic nuclei "- Phase transitions of quarks to hadrons, hadrons to quark-gluon plasma and plasma to hadrons.- Study of cosmological models that describe the observed process of the accelerated expansion of the Universe.- Investigation of the problem of reconstruction of events from the data of track detectors of nuclear physics experiments using deep neural networks.- Development of a model and algorithms for distributed processing of large data arrays for management decisions in the processes of information support for CERN.- Training of highly qualified personnel in nuclear and radiation physics, high energy physics and cosmology. |
| **3. What points of strategic and program documents are decided by:**1) Goal 2: Increase the contribution of science to the socio-economic development of the country of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025, approved by the Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988, as well as the objectives of paragraphs 5.2.1. “Strengthen the intellectual potential of science” and 5.2.3».To increase the effectiveness of scientific developments and ensure integration into the world scientific space" of this program;2) The Law of the Republic of Kazakhstan, signed by President K.K. Tokayev dated October 9, 2019 No. 264-VI on the ratification of the Agreement on international scientific and technical cooperation between the Government of the Republic of Kazakhstan and the European Center for Nuclear Research, concluded in Geneva on June 29, 2018. |
| **4. Expected results.****4.1 Direct results:**- New data on the yields of the formation of exotic radioactive nuclei for nucleosynthesis in stars and the production of radioisotopes, to replenish the IAEA nuclear database "EXFOR".- New experimental data on the anomalously high plasticity of reactor steels irradiated with neutrons to high damaging doses, which makes it possible to extend the service life of operating nuclear power plants.- Software for automated processing of nuclear track images in glass after etching. Parametric dependence of the ion charge according to the measured characteristics of the tracks.- Calculated values ​​of azimuthal angles and pseudo-rates of events obtained at the Hadron-44 facility. Algorithms for working out the technique of the two-particle correlation function.- Model of the effective potential of interaction of particles of quark-gluon plasma. Data on the influence of nonequilibrium effects on heavy quarks in quark-gluon plasma.- New knowledge about the experimental manifestation of the phase transition of matter from the hadronic state to the quark-gluon plasma based on detailed studies of dynamic correlations and fluctuations in the distributions of secondary particles formed in interactions of nuclei of various degrees of asymmetry.- Development of the transition of hadrons to the state of deconfinement of quark-gluon plasma and the results of numerical calculations of the effect of viscosity and nonlinearity on the experimentally observed suppression of hadron jets with large transverse momenta.- Algorithms and programs for the reconstruction of events from the data of track detectors using deep neural networks.- Algorithms for distributed processing of large data arrays for management decisions. Model for predicting the dynamics of changes in the current process of information support. |
| **4.2 End result:**Economic and practical effect.Creation of a constant support base for expanding the list of technologies for the production of new radioisotopes for medicine and industry, for extending the life of nuclear power plants for various applications.Software for mechanisms for integrating sources of storage and processing of big data: automated processing of nuclear track images in glass after etching using deep neural networks; algorithms for distributed processing of large data arrays for management decisions and models for predicting the dynamics of changes in the current information support process.New developments in the technology of ion-plasma formation of superconducting coatings on a flexible carrier will create prerequisites for the development of industrial technology for the formation of long superconducting tapes.Own production in the Republic of Kazakhstan of superconducting magnetic systems for industry and medicine, in demand all over the world.Environmental effect of the Program: Study of the effects of cosmic ray fluxes on the atmosphere and magnetic fields of our planet, and their role in the observed process of global warming on Earth, which is extremely important for a long-term forecast of changes in global temperature on Earth.**Social effect of the Program:** Training of highly qualified world-class personnel. Strengthening existing scientific ties and creating a base to ensure the possibility of participation of scientists, engineers, students and technical specialists from the Republic of Kazakhstan in CERN research projects on a long-term basis. A set of new acquired knowledge of a fundamental and applied nature, intellectual potential providing the basis for the development and creation of completely new competitive technologies for industry, agriculture and medicine of the Republic of Kazakhstan. |

# **Technical Task № 15**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Scientific research in the field of natural sciences.Fundamental and applied research in the field of chemistry. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** - Creation of fundamental scientific foundations of "green" technologies for obtaining new multifunctional materials on the basis of deep processing of organomineral raw materials of Kazakhstan for purification of air, water resources, medicine and agriculture.- Development of a new method for producing activated carbon based on coke breeze with the creation of a mini-production.- Development of a new innovative plasma technology for cleaning flue gases based on the principles of microwave plasma with effective destruction of gas molecules and purification of air from harmful substances with the creation of a pilot plant.- Development of methods for obtaining multipurpose nanocomposite materials based on hydrocarbon raw materials for the treatment of wastewater and man-made soils. Creation of a pilot plant for the production of new composite materials.- Development of highly efficient electrocatalytic methods for obtaining practically important and valuable organic compounds and intermediates in the synthesis of medicinal substances.- Development of new polyfunctional pharmacologically active substances of antiviral, antibacterial and antioxidant action based on natural and synthetic N, S-containing heterocycles by methods of encapsulation with natural oligosaccharides, "click-chemistry" and microwave activation.**2.1.1. To achieve this goal, the following tasks must be solved:**- Get new fundamental scientific knowledge on the creation of innovative "green" technologies.- To manufacture a pilot plant for the production of activated carbon from coke breeze and to work out the technological parameters of its production. Conduct tests of the obtained carbon sorbents to determine their activity in water treatment processes. Develop technological conditions and recommendations for their introduction into production. Create a mini-production.- To establish the active factors of the plasma, to investigate the mechanisms of destruction of gas molecules in the conditions of microwave cold plasma, which affect the nature of physicochemical processes in the core. To develop a modular principle for constructing a planon technology to purify any volume of gas emissions by grouping individual modules in a technological complex. Create a pilot plant for the purification of industrial air mixture and implement it at one of the industrial enterprises of Kazakhstan.- To develop methods for obtaining nanocomposite materials based on hydrocarbon raw materials for use as sorbents, organic and inorganic ecotoxicants, fertilizers and soil structure-forming agents. To study the physicochemical characteristics of the created composite compositions. Conduct tests and develop technical conditions for their production at a semi-industrial plant. Create a mini-production.- To develop methods for the electrocatalytic production of aminoaromatic derivatives - intermediates in the synthesis of drugs using mono- and bimetallic electrocatalysts.- To develop new science-intensive and effective methods of obtaining polyfunctional pharmacologically active substances based on natural alkaloids, vitamins and their N, S-containing derivatives. To study the features of the structure and the mechanism of obtaining clathrate complexes using the methods of supramolecular nanostructured chemistry and microwave activation technology, corresponding to the concept of "green chemistry"; to study the mechanisms of reactions, the patterns of the relationship "chemical structure - pharmacological activity". Prepare recommendations for their in-depth testing. |
| **3. What points of strategic and program documents are decided by:**"State program for the development of education and science of the Republic of Kazakhstan for 2020-2025", namely:- p. 1. Increasing the global competitiveness of Kazakhstani education and science.- p. 2. Strengthening the intellectual potential of science.- p. 11. Increasing the effectiveness of scientific developments and ensuring integration into the world scientific space.2. Strategic development plan of the Republic of Kazakhstan until 2025, p. 2. Competitiveness of sectors of the economy - ensuring food security of the country and the growth of export-oriented environmentally friendly products, increasing resource efficiency.3. Environmental Code of the Republic of Kazakhstan dated January 9, 2007 No. 212-III, with amendments and additions as of November 9, 2020. |
| **4. Expected results.****4.1 Direct results:**- fundamental scientific foundations of "green" technologies for obtaining new multifunctional materials based on deep processing of organomineral raw materials in Kazakhstan.- methods for producing activated carbon, the technological parameters of activation on the created installation have been worked out and prototypes of carbon sorbents have been developed for testing their sorption activity. Technological conditions for the creation of mini-productions.- testing of new innovative plaron technologies for cleaning flue gases at industrial enterprises in Kazakhstan. Implementation of a pilot plant at one of the industrial enterprises of Kazakhstan.- new methods of obtaining nanocomposite materials based on hydrocarbon raw materials for use as sorbents, soil structure-forming agents and composite fertilizers.- mini-production of the most promising materials.- new electrocatalytic methods for obtaining intermediate products of known drugs, for example, p-aminophenol - the initial reagent in the synthesis of "paracetamol", which is in great demand during the coronavirus pandemic, etc.- nanoscale mono- and bimetallic catalysts for use in the processes under study, using modern physicochemical methods to study their structure and morphological features.- new polyfunctional biologically active substances of antiviral, antibacterial and antioxidant action based on natural alkaloids and their N, S-containing heterocyclic derivatives, vitamins by encapsulation methods using natural water-soluble oligosaccharides, "click-chemistry" methods and microwave activation.- assessment of the biological activity of the new synthesized compounds for antibacterial, antiviral and antioxidant activities, the establishment of new patterns of the relationship "structure-bioactivity". |
| **4.2 End result:**- scientific foundations of "green" technologies and methods for obtaining multifunctional materials;- a pilot plant for the production of carbon sorbents with an organized pilot mini-production with a capacity of at least 2 kg / day;- modular pilot plant of innovative plaron technology for cleaning industrial gases with a cleaning efficiency of up to 99%, with subsequent implementation into production;- Methods for obtaining hydrocarbon sorbent materials with a cleaning efficiency of 80-90% from heavy metals and technical conditions for their production;- electrocatalytic methods for obtaining intermediates in the synthesis of medicinal compounds with a yield of 90-95%;- 30 new polyfunctional pharmacologically active substances based on natural alkaloids and their N, S-containing heterocyclic derivatives, 3 methods of their encapsulation with natural water-soluble oligosaccharides under conditions of classical synthesis, microwave and ultrasonic activation, acts of bioscreening tests for antiviral, antibacterial and antioxidant properties.**Scientific effect:** Possibility of creating resource- and energy-saving, environmentally friendly technologies for obtaining a large number of multifunctional materials based on organic-mineral raw materials and existing waste in agricultural and industrial industries, which will have a significant impact on the development of fundamental chemical science in general and its individual areas.New scientific results with the use of "green" technologies - plasma plaron technology, fine organic synthesis of "double-drugs", "click of chemistry", electrocatalysis, microwave activation of chemical processes, allowing to comprehensively solve many fundamental scientific and technical problems in the rational use of natural resources, improvement ecological state of the environment and public health.**Socio-economic effect:** Import substitution and improvement of the environmental situation in the industrial regions of Kazakhstan. Innovative "green" technologies for obtaining multipurpose materials - as a reserve, which, with relatively small financial investments, can create thousands of highly paid jobs, significantly replenish the country's budget and increase the environmental safety of the region.**Target consumers of the results obtained:** Scientists and research organizations of a chemical profile, regional economic entities, representatives of small and medium-sized businesses, the population of urban and rural areas.  |

# **Technical Task № 16**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Scientific research in the field of natural sciences.Basic and applied research in the field of biology. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Development of an inventory of the animal world of the Northern Tien Shan to preserve the genetic diversity of animal resources.**2.1.1. To achieve this goal, the following tasks must be solved:**- Development on the basis of GIS technologies of the structure of an electronic base for the cadastre of the animal world of the Northern Tien Shan, including data on economically important recent and fossil species of wild animals with the aim of its free integration into other similar electronic systems (databases on related sections of science and economics), filling in the electronic cadastre with specific data obtained in the course of work.- Assessment of the current taxonomic composition of the fauna, the current state of populations of endemic, rare and endangered animal species and the dynamics of changes in the fauna of the Northern Tien Shan over the past 50-80 years.- Carrying out a taxonomic assessment of the fossil vertebrate fauna of the Northern Tien Shan, which is widely used in geology in the development of stratigraphic schemes, which are a predictive basis for geological surveying and prospecting for minerals.- Assessment of the economic and economic potential of the recent and fossil fauna of the Northern Tien Shan and the importance of modern species of wild animals for the stability of ecosystems and the preservation of local, regional and global biodiversity with the development of a strict classification of animal species falling into the category of "biological resource of the country".- Assessment of the current state of populations of the most economically important animal species classified as biological resources; retrospective analysis of the dynamics of their changes and forecast of the development of such populations for the next 20 years.- Development of recommendations and proposal of specific measures for the conservation, reproduction and sustainable use of the animal world of the Northern Tien Shan as a biological resource. |
| **3. What points of strategic and program documents are decided by:**1) The Convention on Biological Diversity, which aims at the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources, including through the provision of necessary access to genetic resources and the appropriate transfer of appropriate technologies with taking into account all rights to such resources and technologies.2) Strategy "Kazakhstan-2050": A new political course, which speaks about the correct management of natural resources and the most effective transformation of the country's natural resources into sustainable economic growth;3) Decree of the Government of the Republic of Kazakhstan dated January 5, 2005 No. 1 "On approval of the Rules for maintaining state accounting, cadastre and monitoring of wildlife in the Republic of Kazakhstan";4) State program for the development of education and science of the Republic of Kazakhstan for 2020 - 2025, approved by the Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988- Goal 2 "Increase the contribution of science to the socio-economic development of the country"- Clause 5.2.1».Strengthen the intellectual potential of science"- Clause 5.2.3».To increase the effectiveness of scientific developments and ensure integration into the world scientific space"5) Strategic development plan of the Republic of Kazakhstan until 2025 No. 636 dated February 15, 2018- Policy 6. Green Economy and Environmental Protection Objective 7 - Conservation of biological diversity - "within the framework of the national strategy for sustainable land management, work will continue on the implementation of strategic measures aimed at a systematic solution to the problem of land degradation and desertification"6) "Development Strategy of the Republic of Kazakhstan until 2050" Kazakhstan-2050 "- a new political course of the established state"- The sixth challenge is the depletion of natural resources; large-scale modernization of agriculture in the face of growing global demand for agricultural products)7) Message of the President of the Republic of Kazakhstan - Leader of the Nation N.A. Nazarbayev to the people of Kazakhstan, December 20128) Message of the Head of State "The third modernization of Kazakhstan: global competitiveness" dated January 31, 20179) The concept of the transition of the Republic of Kazakhstan to sustainable development for 2007-2024, approved by the Decree of the President of the Republic of Kazakhstan dated November 14, 2006 No. 216 (clause 3.4 - sustainable economic progress; 3.5 - environmental sustainability);10) Concept for the conservation and sustainable use of biological diversity of the Republic of Kazakhstan until 2030, 2015.- Priority 2. Goal 9. Conservation and restoration of agrobiodiversity.11) State program "Digital Kazakhstan" (dated December 12, 2017 No. 827, as amended by the Resolution of the Government of the Republic of Kazakhstan dated December 20, 2019 No. 949). |
| **4. Expected results.****4.1 Direct results:**- on the basis of GIS technologies, the development of the structure of the electronic base for the cadastre of the animal world, including data on recent and fossil species of wild animals of the Northern Tien Shan, as well as data on economically important species of regional fauna.- creation of an informative list of at least 500 species of recent and fossil fauna of the Northern Tien Shan according to the structure of the electronic database of the cadastre and based on the results of a survey of 20 model sites, an assessment of the taxonomic composition of the fauna, collection of data on 6 biological characteristics of species, according to the current state of populations of 30 economically important , as well as dominant and rare species of animals, and study of the dynamics of changes in the fauna of the Northern Tien Shan over the past 50-80 years.- formation and filling of the electronic cadastre of the animal world of the Northern Tien Shan obtained in the course of the work, using the latest advances in information technology and drawing up at least 50 maps of the distribution of animals in the project area.- preparation of a databank on electronic media and a web portal on the fauna of the Northern Tien Shan, which will be used in the future to replenish with new data; |
| **4.2 End result:**Developed cadastre of the Northern Tien Shan fauna based on GIS technologies.The results obtained should contribute to the implementation of an effective state policy in the management of valuable zoological resources.The result of the program should be the identification of the economic potential of especially valuable species of animals in Kazakhstan, which will give impetus to the development of domestic fundamental and applied zoology, as well as the use of the country's animal resources in medicine and veterinary medicine.The scientific and practical result of the implementation of the program should consist in the development of an effective method of management (accounting and control) of zoological resources in the Republic of Kazakhstan. The public availability of information on the animal resources of the Northern Tien Shan should make it possible to reduce the cost of finding and removing animals from nature for the development of various types of industrial technologies for medical, food, dyeing, etc. destination.The social effect is the development of "digital Kazakhstan" and information technologies in facilitated public access to scientific zoological materials, as well as the formation and involvement of qualified domestic personnel in the science-intensive process, in the growth of the educational level of the population, strengthening the staff of educational and scientific organizations, increasing the efficiency of environmental protection. events, increasing the potential of science in Kazakhstan, strengthening the integration ties between science and practice both within the country and in the international arena, as well as raising the international image of science in Kazakhstan. |

# **Technical Task № 17**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.Development of domestic pharmaceutical science and industrial biotechnology.Creation of new domestic, original medicinal, diagnostic and prophylactic drugs and treatment methods for import substitution and development of the pharmaceutical industry in Kazakhstan.SarsCoV-2 (COVID-19) and other potentially pandemic infectious agents.Development of means of therapy and specific prophylaxis in humans and animals |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of original domestic antiviral drugs based on biologically active compounds of plant and microbial origin for drug therapy and prevention of COVID-19 and influenza, conducting preclinical studies of developed antiviral drugs.**2.1.1. To achieve this goal, the following tasks must be solved:**1) Develop experimental models and select viral strains to assess the antiviral action of the investigated drugs.1.1 Using second and third generation sequencing technologies, carry out molecular genetic analysis of coronaviruses and influenza viruses circulating in the Republic of Kazakhstan for the targeted development of antiviral drugs.1.2 Create panels of viral strains to assess the antiviral action of the drugs under development.1.3 Develop experimental models for the study of antiviral drugs in in vitro and in vivo tests.2) To develop antiviral drugs based on biologically active compounds of plant origin, effective against coronaviruses and influenza viruses:2.1 To carry out screening of plant extracts of the flora of Kazakhstan for the presence of antiviral activity against coronaviruses and influenza viruses.2.2 To study the antiviral effect of selected plant extracts against coronaviruses and influenza viruses.2.3 Using high-performance liquid chromatography methods, obtain purified biologically active compounds with antiviral activity against coronaviruses and influenza viruses.2.4 Using the methods of high performance liquid chromatography and mass spectrometry, characterize the composition and structure of purified biologically active compounds.2.5 Assess the acute toxicity of the obtained biologically active compounds, select the least toxic drugs.2.6 In experiments "in vitro" to study the antiviral effect of biologically active compounds of plant origin and / or their compositions against beta-coronaviruses and influenza viruses.2.7 Using experimental models to study the therapeutic and prophylactic effect of selected herbal preparations against beta-coronaviruses and influenza viruses. 3) To develop antiviral drugs based on compounds of microbial origin, effective against coronaviruses and influenza viruses:3.1 Conduct screening of microbial preparations of various origins for the presence of antiviral activity against coronaviruses and influenza viruses, select promising drugs with antiviral action.3.2 Using the methods of high performance liquid chromatography and mass spectrometry, characterize the composition and structure of preparations of microbial origin with antiviral effect.3.3 Assess the acute toxicity of microbial drugs with antiviral effect, select the least toxic drugs.3.4 In experiments "in vitro" to study the antiviral effect of selected microbial preparations against beta-coronaviruses and influenza viruses.3.5 On experimental models to study the therapeutic and prophylactic effect of selected microbial preparations against beta-coronaviruses and influenza viruses.4) To develop production technologies and schemes for the use of experimental antiviral drugs effective against COVID-19 and influenza.4.1 To develop technologies for the production of experimental antiviral drugs effective against COVID-19 and influenza, to obtain experimental series of drugs.4.2 Select the effective doses of the developed antiviral drugs, study the dose-effect relationship.4.3 To work out the most effective drug regimens for the developed antiviral drugs.4.4 To work out the storage regimes, to study the stability of the developed antiviral drugs at various storage periods.4.5 Develop scientific and technical documentation for the production of antiviral drugs effective against COVID-19 and influenza.5) Conduct preclinical studies of experimental antiviral drugs effective against COVID-19 and influenza.5.1 Conduct a study of acute and subacute toxicity of experimental antiviral drugs.5.2 To study the allergenicity and local irritant effect of experimental antiviral drugs.5.3 To study mutagenicity, teratogenicity and reproductive toxicity of experimental antiviral drugs.5.4 Prepare a dossier based on the results of preclinical studies of experimental antiviral drugs. |
| **3. What points of strategic and program documents are decided by:**1. Strategy "Kazakhstan-50": (4) health, education and well-being of citizens of Kazakhstan.2. Message of the First President of the Republic of Kazakhstan dated January 10, 2018 "New development opportunities in the context of the fourth industrial revolution».3. Decree of the Government of the Republic of Kazakhstan dated December 26, 2019 No. 982 "On approval of the State Program for the Development of Healthcare of the Republic of Kazakhstan for 2020-2025"4. Order of the Minister of Healthcare of the Republic of Kazakhstan dated January 31, 2020 No. ҚР DSM-7/2020 "On Amending the Order of the Minister of Healthcare and Social Development of the Republic of Kazakhstan dated May 21, 2015 No. 367" On Approving the List of Socially Significant Diseases and Dangerous Diseases for others "(No. 17 - Coronavirus infection of unspecified localization - B 34.2). Registered with the Ministry of Justice of the Republic of Kazakhstan on February 3, 2020 No. 19966.5. An action program for the development of measures to counter and combat the coronavirus pandemic in the message of the World Health Organization (WHO) on the COVID-19 coronavirus pandemic of March 11, 2020. |
| **4. Expected results.****4.1 Direct results:**- Analysis of strains of coronaviruses and influenza viruses circulating in the territory of the Republic of Kazakhstan for the targeted development of antiviral drugs.- Creation of panels of viral strains to assess the antiviral action of the investigated drugs.- Development of experimental models for the study of antiviral drugs in in vitro and in vivo tests.- Screening of plant extracts of the flora of Kazakhstan for the presence of antiviral activity against coronaviruses and influenza viruses.- Data from a study of the antiviral action of selected plant extracts against coronaviruses and influenza viruses.- Isolation of biologically active compounds with antiviral activity from selected plant extracts, their characterization using methods of physicochemical analysis.- Results of studying the acute toxicity of biologically active compounds of plant origin with antiviral activity.- Study data in experiments "in vitro" of the antiviral action of selected biologically active compounds of plant origin and / or their compositions against beta-coronaviruses and influenza viruses.- Study data on experimental models of the therapeutic and prophylactic action of selected herbal preparations against beta-coronaviruses and influenza viruses - Screening of microbial preparations of various origins for the presence of antiviral activity against coronaviruses and influenza viruses.- Study data using the methods of physicochemical analysis of the composition and structure of preparations of microbial origin with antiviral effect.- Data from studies of acute toxicity of microbial drugs with antiviral effects.- Study data in experiments "in vitro" of the antiviral action of the selected microbial preparations against beta-coronaviruses and influenza viruses.- Study data on experimental models of the therapeutic and prophylactic action of selected microbial preparations against beta-coronaviruses and influenza viruses.- Development of technologies for the production of 2 (two) experimental antiviral drugs effective against COVID-19 and / or influenza, obtaining at least 10 experimental series of drugs.- Selection of effective doses and development of regimens for the use of 2 (two) experimental antiviral drugs effective against COVID-19 and / or influenza.- Development of storage modes and analysis of stability of 2 (two) experimental antiviral drugs at different storage periods.- Development of scientific and technical documentation for the production of 2 (two) experimental antiviral drugs effective against COVID-19 and / or influenza.Conducting preclinical studies of 2 (two) experimental antiviral drugs effective against COVID-19 and / or influenza, including:- study of acute and subacute toxicity of 2 (two) experimental antiviral drugs;- study of allergenicity and local irritation of 2 (two) experimental antiviral drugs;- study of mutagenicity, teratogenicity and reproductive toxicity of 2 (two) experimental antiviral drugs;Preparation of 2 (two) dossiers based on the results of preclinical studies on the developed experimental antiviral drugs.  |
| **4.2 End result:****Scientific and technical effect:** The results of the scientific and technical program obtained on the basis of the study of the antiviral action of biologically active compounds of plant and microbial origin will lead to the development of new drugs and technologies, including:- creation of 2 (two) new antiviral drugs effective against COVID-19 and / or influenza;- development of technologies for the production of 2 (two) new antiviral drugs effective against COVID-19 and / or influenza; - development of scientific and technical documentation for the experimental production of 2 (two) antiviral drugs effective against COVID-19 and / or influenza;- conducting preclinical studies of 2 (two) developed antiviral drugs effective against COVID-19 and / or influenza.The scientific effect of the implementation of the program is to gain new knowledge about the mechanisms and ways of the effect of biologically active compounds of plant and microbial origin on coronaviruses and influenza viruses, which is the basis for the creation of new effective medicinal antiviral agents.The economic effect lies in the development of domestic medicines to combat pandemic viral infections that can reduce direct economic losses from the incidence of COVID-19 and influenza, as well as indirect economic losses due to the introduction of quarantine measures and a decrease in business activity. The economic effect from the implementation of the program is also associated with the development of the domestic pharmaceutical business and a decrease in import dependence on foreign medicines.The social effect from the implementation of the program will consist in the creation of new effective domestic medicines that will reduce the incidence and mortality from COVID-19 and influenza, and improve the quality of health and life of the population of the Republic of Kazakhstan.**Target consumers of the results obtained:** Scientists, healthcare professionals, research organizations, government agencies and regulatory agencies; pharmaceutical companies, clinics, the scientific community, the population of the Republic of Kazakhstan. |

# **Technical Task № 18**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.Biotechnology in medicine.Molecular, genomic, cellular and bioinformation technologies for the development of applied biology of personalized medicine. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**  Improvement of diagnostics of pathologies of the nervous system, digitalization of pathomorphological and molecular genetic studies for the implementation of personalized medicine in the Republic of Kazakhstan.Creation of a centralized (unified) biobank of pathologies of the nervous system for conducting scientific research aimed at developing neuroscience, improving the quality and increasing life expectancy of neurosurgical patients in the Republic of Kazakhstan.**2.1.1. To achieve this goal, the following tasks must be solved:**- Automation of immunohistochemical studies and molecular genetic tumors of the central nervous system.- Introduction of digital technologies to improve the procedure for examining histological materials.- Study of the influence of environmental, climatic, genetic factors on the health of neurosurgical patients in the Republic of Kazakhstan.- Development of an improved depersonalized database of clinical, pathohistological, molecular genetic, neuroimaging data of neurosurgical patients who have agreed to store their biological samples and data in the biobank.- Development of standard operating procedures for the collection, storage, use and quality control of biological samples as part of the creation of a biobank of pathologies of the nervous system.- Research of new biomarkers of pathologies of the nervous system in order to create an expanded diagnostic panel of brain tumors.- Formation of new directions for scientific research in the laboratory of neurosciences aimed at improving the quality and increasing the life expectancy of neurosurgical patients in the Republic of Kazakhstan.. |
| **3. What points of strategic and program documents are decided by:**State program for the development of health care of the Republic of Kazakhstan for 2020-2025The main directions of the Program:5.4 Development of human capital, modernization of education, science.5.5 Improving health care delivery5.6 Creation of a single digital healthcare space5.8 Improving the investment climate in the healthcare industryAction plan for the implementation of the Program:53. Develop the market for biomedical research, including conducting international and multicenter research.54. Training of qualified scientific and medical personnel in personalized medicine (bioinformatics, medical genetics, pharmacogenetics, etc.), in master's, doctoral, postdoctoral programs.55. Creation of a biobank for clinical research in the field of personalized medicine with a big data base.66. Introduction of new and innovative technologies for the diagnosis and treatment of diseases in the framework of public and private initiatives.78. Ensuring the development and support of a targeted IT architecture for digitalization of healthcare.82. Creation of a repository of medical images of the republican level.Message from the Head of State K.K. Tokayev to the people of Kazakhstan. September 1, 2020V. Affordable and quality educationVi. Development of the health care systemIX. Digitalization is a basic element of all reformsThe concept for the development of e-health in the Republic of Kazakhstan for 2013-2020 approved by the Order of the Minister of Healthcare of the Republic of Kazakhstan dated September 3, 2013 No. 498.1.6. Tasks of e-health in the Republic of Kazakhstan1. assistance to the process of making clinical (medical) decisions;2. reduction in the number of medical errors;3. increasing the availability and improving the continuity of medical care;4. improving the quality of medical services;5. improving the quality and effectiveness of political, managerial and financial decisions;6. providing conditions for continuous professional development in the healthcare sector;  |
| **4. Expected results.****4.1 Direct results:**Updating the diagnosis of nervous system pathology to the level of international scientific research.Recommendations for conducting pathomorphological and molecular genetic studies of the pathology of the nervous system for doctors, researchers and students. Advanced diagnostic panel for brain tumor markers.Digitalization of pathomorphological and molecular-genetic diagnostics of nervous system pathology.Methodology, recommendations for digitizing data from other ICD-10 diseases.Creating a biobank. |
| **4.2 End result:****Scientific and technical effect:**- A centralized (unified) biobank of pathologies of the nervous system, as well as a neuroscience laboratory, for carrying out molecular genetic studies of both pathologies of the brain and the nervous system as a whole, which will lead to an improvement in the quality and prolongation of patients' life.- development of partnership research with leading scientists in the field of neuroscience, based on a centralized biobank.- reference laboratory for the diagnosis of brain tumors.- a basis for the development of molecular genetic studies of both pathologies of the brain and the nervous system as a whole.- expanded opportunities for scientific research with related scientific fields.- entry into the international research base (register of biobanks).  |

# **Technical Task № 19**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.SARS CoV-2 (COVID-19) and other potentially pandemic pathogens:Monitoring, epidemiological aspects and practical control measures. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** To determine the clinical, functional, immunological and genetic factors affecting the severity of the course of acute coronavirus infection COVID-19 and postcoid syndrome, in order to develop tactics for managing such patients forreducing the risk of complications and disability.**2.1.1. To achieve this goal, the following tasks must be solved:**- To determine the clinical and functional characteristics of patients with varying degrees of the course of the acute phase of COVID-19 and postcoid syndrome.- To study the immunological profile of patients with varying degrees of the course of the acute phase of COVID-19 and postcoid syndrome.- To study the genetic profile of patients with different degrees of the course of the acute phase of COVID-19 and postcoid syndrome.- Identify potential predictors of COVID-19 severity.- To identify markers that allow predicting the development of postcoid syndrome.- Based on the selected markers, develop a COVID-19 outcome scale to determine the tactics of patient management to prevent the development of postcoid syndrome. |
| **3. What points of strategic and program documents are decided by:**State program for the development of health care of the Republic of Kazakhstan for 2020-2025:- an increase in the life expectancy of citizens up to 75 years;- reducing the risk of premature mortality from 30 to 70 years of age from cardiovascular diseases.Clause 5.5 Improving the provision of medical care of the State Program for the Development of Healthcare of the Republic of Kazakhstan for 2020 - 2025:Measures to combat the main diseases leading to mortality are diseases of the circulatory system (strokes, heart attacks and others), respiratory diseases, oncological diseases, injuries, health care for children and mothers, neurological diseases, and in other clinical services includes: transfer and introduction of new and innovative technologies for the diagnosis and treatment of diseases within the framework of public and private initiatives |
| **4. Expected results.****4.1 Direct results:**- data from a comprehensive study of COVID-19 to determine the main characteristics of the course of the infection and its complications.- conclusions based on the results of studies to determine the clinical and laboratory characteristics of patients with complications after a coronavirus infection.- determination of the main risk factors, genetic and immunological predictors of complications after coronavirus infection.- to develop a genetic panel taking into account genetic and immunological predictors of the disease.- to develop a scale of COVID-19 outcomes to predict and determine various options for the course.- clinical criteria for postcoid syndrome after severe course of COVID-19.- to develop patient management tactics depending on risk factors and predictors of an unfavorable course of coronavirus infection.- a decrease in the rate of development of postcoid syndrome.- to develop new strategies of medical care based on prognostic criteria to improve the health of patients with postcoid syndrome in the long term.- improving public awareness of the causes, prevention of infection and complications of coronavirus infection.- development of clinical guidelines for the management of patients with postcoid syndrome. |
| **4.2 End result:****Scientific and technical effect:** Improving the prognosis and survival of patients with postcoid syndrome.**Scientific effect:**- a scale of the outcomes of the course of infection based on the data obtained from the study of the molecular, immunological and metabolic mechanisms of complications of COVID-19.- research results influencing the further development of research initiatives, such as the development of preventive vaccination, the creation of new drugs.- research results should be reported as oral and poster reports at domestic and international conferences.**Economic effect:** Effective distribution of budgetary funds allocated for the prevention and treatment of postcoid syndrome.**Social effect of the Program:** Promotion of a healthy lifestyle, increasing the scientific potential of Kazakhstan, improving the quality of life and health of the population by reducing the epidemiological burden. Formation and attraction of qualified domestic personnel in the knowledge-intensive process.**Target consumers of the results obtained:** Patients who have undergone COVID-19, as well as the entire population of the Republic of Kazakhstan. |

# **Technical Task № 20**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.Biotechnology in medicine:Development of cell technologies and tissue engineering for medicine. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of technology for cancer immunotherapy based on dendritic cells in combination with tomotherapy for the treatment of malignant, solid human tumors. |
| **2.1.1. To achieve this goal, the following tasks must be solved:**1. To develop new biotechnology of dendritic cells for the implementation of immunospecific functions.2. Evaluation of the effectiveness of immunotherapy of solid tumors using dendritic cells.3. Evaluation of the effectiveness of complex application of cancer immunotherapy using dendritic cells and tomotherapy.4. Studies of the effect of complex cancer immunotherapy and tomotherapy on metastatic foci in one or another oncopathology.5. To develop effective approaches to immunotherapy and tomotherapy of primary and metastatic malignant neoplasms of various organs.6. Study of circulating tumor cells in the blood before and after complex immunotherapy and tomotherapy in cancer patients. |
| **3. What points of strategic and program documents are decided by:**State program for the development of health care in the Republic of Kazakhstan for 2020-2025.The main directions of the Program:5.4 Development of human capital, modernization of education, science.5.5 Improving health care delivery5.6 Creation of a single digital healthcare space5.8 Improving the investment climate in the healthcare industryMessage from the Head of State K.Tokayev to the people of Kazakhstan. September 1, 2020Vi. Development of the health care systemIX. Digitalization is a basic element of all reformsThe concept for the development of e-health in the Republic of Kazakhstan for 2013-2020 approved by the Order of the Minister of Healthcare of the Republic of Kazakhstan dated September 3, 2013 No. 498.1.6. Tasks of e-health in the Republic of Kazakhstan- facilitating the process of making clinical (medical) decisions;- reduction in the number of medical errors;- increasing the availability and improving the continuity of medical care;- improving the quality of medical services;- improving the quality and efficiency of political, managerial and financial decisions;- providing conditions for continuous professional development in the healthcare sector.The main strategic priorities of the development program of the Republic of Kazakhstan until 2050 are the health of the nation. Biotechnology in medicine. Development of cell technologies and tissue engineering for medicine; Development of methods for complex treatment of malignant diseases using immunotherapy and tomotherapy. |
| **4. Expected results.****4.1 Direct results:**- new knowledge and solutions, the results of research, analyzes, theoretical research, modeling, obtained in the course of scientific and (or) scientific and technical activities;- the developed technologies of cancer immunotherapy in combination with tomotherapy should become innovative, technological solutions for the creation of a new method of treating various oncological diseases;- results of patent research;- scientific and scientific and technical foundations for the creation of new types of products and production methods (technologies);- algorithms, methods, techniques for solving various technical, technological problems;- individual technical and technological solutions for the creation of new types of products and production methods (technologies);- calculations and mathematical (software) models of phenomena, processes, technologies, etc.,- related to the objects of research, newly created normative, technical, methodological documentation;- recommendations for the implementation of newly created (investigated) methods, technical and technological solutions, technical requirements for the implementation of research results in real sectors of the economy.- developed technologies for cancer immunotherapy in combination with tomotherapy, which can become innovative, technological solutions for the creation of a new method of treating various oncological diseases;- scientific and scientific and technical foundations allowing to create 10 jobs for the implementation of biomedical and biotechnological production (technologies);- created 2 algorithms, methods for solving technical, technological problems;- 2 recommendations on individual technical and technological solutions for the creation of new types of treatment and production (cell technologies);- calculations and mathematical (software) models of phenomena, processes, technologies, etc.,- 2 recommendations for the implementation of newly created (investigated) methods, technical and technological solutions, technical requirements for the implementation of research results in real sectors of the economy. |
| **4.2 End result:** **Scientific effect:** 2 methodological recommendations presented to practical health care on the use of a new effective method of treating primary and metastatic solid malignant neoplasms (MNO).The positive results of the study should contribute to the opening of at least 7 new jobs for physicians and nurses to work in a new direction of scientific and clinical research in interventional oncology.Development of 2 clinical protocols for the treatment of patients with malignant neoplasms (MNO).Scientifically grounded scheme of complex immunotherapy and tomotherapy of primary metastatic oncological neoplasms.The developed technology allows to improve the immediate and long-term results of treatment of cancer patients with metastatic tumors.**Economic effect:** The developed technologies of cancer immunotherapy and tomotherapy in the complex treatment of cancer should allow a significant pharmaco-economic effect, reduce the use of anticancer chemotherapy drugs.**Social effect of the Program:** The scientific and technical program should significantly improve the quality of life of cancer patients, as well as increase their life expectancy.**Target consumers of the results obtained:** Ministry of Health of the Republic of Kazakhstan, oncological dispensaries, pharmaceutical industry. |

# **Technical Task № 21**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.Development of domestic pharmaceutical science and industrial biotechnology:Creation of new domestic, original, medicinal, diagnostic and prophylactic drugs and treatment methods for import substitution and development of the pharmaceutical industry in Kazakhstan. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of original drugs causing glucose-dependent oxidative cytotoxic stress in cancer cells for the treatment of malignant tumor types.**2.1.1. To achieve this goal, the following tasks must be solved:** - Creation of an effective drug that induces glucose-dependent oxidative cytotoxic stress in cancer cells.- Determination of molecular mechanisms of cancer cell death by induction of glucose-dependent oxidative stress.- Evaluation of the biosafety and effectiveness of the developed drug in animal models.- Identification of cancer types that are highly sensitive to the glucose-dependent oxidative drug by carrying out full profiling of cancer genomes.- Identification and validation of markers predisposing the sensitivity of various types of cancer to glucose-dependent oxidative drugs.- Preparation of a dosage form of a glucose-dependent oxidative preparation for its effective use in the clinic.- Conducting clinical trials of the first phase of a glucose-dependent oxidative drug to establish tolerance, safety, therapeutic effect, pharmacokinetic and pharmacodynamic characteristics and its initial indicators of efficacy in human trials.- Conducting clinical trials of the second phase of a glucose-dependent oxidative drug to assess the effectiveness and safety of the drug in a group of patients with certain cancers. |
| **3. What points of strategic and program documents are decided by:** 1. Strategy "Kazakhstan-2050" - Before the industry Strategy "Kazakhstan-2050" an important task has been set to provide every citizen with quality medical care within the framework of the implementation of priority 3. New principles of social policy - social guarantees and personal responsibility. - Principle 4, 4.1 key health priorities. And also according to the Strategy "Kazakhstan-2050", it is necessary to achieve the quality and safety of medical care by standardizing all production processes in medical organizations. It is required to develop and improve clinical protocols, standards of specialized services based on the introduction of the most effective and modern technologies and achievements of medical science.2. Strategic development plan of the Republic of Kazakhstan until 2025 approved by the Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636 - initiative 2.18 "Creating incentives for innovative activities of enterprises" and initiative 2.19 "Focus on human capital and support for young scientists".3. Strategic plan of the Ministry of Health of the Republic of Kazakhstan for 2017 - 2021 in Section 3. Priority directions of the sphere / industry, Strategic direction 1- Strengthening public health, Priority area 2 - “Improving the provision of medical services”, 2.5 Implementation of the National Drug Policy.4. Code of the Republic of Kazakhstan dated July 7, 2020 No. 360-VI "On people's health and the health care system" Section 5. Pharmaceutical activities, circulation of medicines and medical devices.5. Message from the President of the Republic of Kazakhstan to the people of Kazakhstan dated September 1, 2020 Task VI. Development of the health care system.6. Comprehensive plan for the development of the pharmaceutical and medical industry for 2020-2025, according to which the Head of Government instructed to scale up state support measures for the domestic pharmaceutical industry, especially in terms of stimulating clinical and preclinical trials.  |
| **4. Expected results.****4.1 Direct results:** - a developed oxidative preparation aimed at suppressing malignant types of tumors with increased glucose uptake. The effectiveness of the drug should initially be shown on cancer cells and tumors (mouse models of cancer).- conclusions on the study of molecular mechanisms that cause the death of cancer cells by induction of oxidative stress, determining factors in cancer cells, predisposing the sensitivity of various types of cancer to a glucose-dependent oxidative drug.- assessment of biosafety and effectiveness of the developed drug in animal models.- conclusions of studies to determine the types of cancerous tumors that are sensitive to the oxidative drug.- complete sequencing of genomes of the most sensitive types of cancer to a glucose-dependent oxidative drug. Types of oncogenic mutations leading to cytotoxic stress when administered with an oxidative drug.- markers predisposing the sensitivity of various types of cancer to an oxidative drug, determined by genomic profiling and functional studies.- manufactured dosage form of a glucose-dependent oxidative preparation for its use in the clinic.- clinical trials of the first phase of a glucose-dependent oxidative drug in accordance with the legislation of Kazakhstan, to establish safety tolerance, the presence of a therapeutic effect, pharmacokinetic and pharmacodynamic characteristics and its initial indicators of effectiveness in human trials.- clinical trials of the second phase of a glucose-dependent oxidative drug in accordance with the legislation of Kazakhstan, to assess the effectiveness and safety of the drug in a group of patients with certain oncological diseases. |
| **4.2 End result:****Scientific and technical effect:**- creation of an oxidative preparation aimed at suppressing malignant types of tumors due to the mechanism of increased glucose uptake by cancer cells.- creation of a basis for the introduction of a glucose-dependent oxidative drug into the clinic and treatment of patients with malignant types of tumors.- the effectiveness of the created drug in suppressing certain types of cancer, determined by clinical trials of the first and second phases,- genomic sequencing to identify malignant tumor types with high sensitivity to glucose-dependent oxidative drug and to identify genetic markers of drug sensitivity.- The results of the program should contribute to the creation of a new effective drug in the treatment of malignant types of tumors that has no analogues in the world.**Scientific effect:** Development of a new drug for the treatment of malignant types of cancer, the basis of which is a change in the metabolism of cancer cells, leading to an increased absorption of glucose, which is characteristic of malignant types of tumors.Creation of a glucose-dependent oxidative preparation for the selective suppression of malignant cancer cells.In parallel with pre-clinical and clinical studies, this program should also focus on studying the mechanisms of the cytotoxic effect induced by selective oxidative stress on these cancer cells.Economic benefit: Development of a new drug designed to effectively suppress malignant tumor types.The development and introduction of a new drug should improve the health of citizens of Kazakhstan and contribute to improving the well-being of the population.The demand for a new drug on a global scale, where oncologists and the pharmaceutical industry of Kazakhstan are directly interested in the introduction of a new drug for the treatment of cancer throughout the world.**Social effect of the Program:** A significant reduction in the number of bed-days, the period of rehabilitation due to the introduction of an effective domestic drug, which in turn will affect the economic performance of individual enterprises and the economic situation in general.Improving the quality of life, reducing disability, increasing the level of social activity of patients. Creation of new jobs, expansion of the market both due to internal demand and due to export, which allows increasing the income of employees of the pharmaceutical industry of the Republic of Kazakhstan.**Target consumers of the results obtained:** Ministry of Health of the Republic of Kazakhstan, Oncological dispensaries, pharmaceutical industry.  |

**Technical Task № 22**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life Science and Health.Biotechnology in medicine:New technologies and biologically active substances for solving the problems of ante- and postnatal development, aging, prolongation of human life. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of new methods of treating heart and respiratory failure using organ-replacing technologies.Development of a clinical protocol and introduction into clinical practice of methods for the treatment of heart and respiratory failure using organ-replacing technologies.**2.1.1. To achieve this goal, the following tasks must be solved:**- Analysis of the results of the use of organ-replacing technologies in the treatment of heart and respiratory failure;- Investigation of the restoration of organ function when using extracorporeal life support systems, as an organ-replacing aid, in case of heart failure;- Investigation of the restoration of organ function when using extracorporeal life support systems as an organ-substituting aid for respiratory failure;- Study of the restoration of organ function during implantation of an auxiliary device of the left ventricle), as an organ-replacing aid, in case of heart failure;- Study of the restoration of organ function during the implantation of a completely artificial heart, as an organ-replacing aid, in case of heart failure;- Improvement of the method of implantation of organ-replacing technologies to reduce complications in the treatment of heart and respiratory failure. |
| **3. What points of strategic and program documents are decided by:**Target indicators of the State Program for the Development of Healthcare of the Republic of Kazakhstan for 2020-2025:- an increase in the life expectancy of citizens up to 75 years;- reducing the risk of premature mortality from 30 to 70 years of age from cardiovascular diseases.Clause 5.5 Improving the provision of medical care of the State Program for the Development of Healthcare of the Republic of Kazakhstan for 2020-2025:Measures to combat the main diseases leading to death - these are diseases of the circulatory system (strokes, heart attacks and others), respiratory diseases, cancer, injuries, child and maternal health, neurological diseases, and in other clinical services - include:transfer and implementation of new and innovative technologies for the diagnosis and treatment of diseases within the framework of public and private initiatives. |
| **4. Expected results.****4.1 Direct results:**These studies should form the basis of practical protocols for the use of extracorporeal life support systems, operations for the implantation of left ventricular assistive devices and a completely artificial heart.As part of the study, innovative methods of treating patients with heart and respiratory failure using organ-replacing technologies should be developed.Method development should focus on the quality of new standards and guidelines for the treatment of heart and respiratory failure.Reducing the rate of postoperative mortality in critically ill patients with respiratory and/or heart failure by 30%.**4.2 End result:**The program should be aimed at achieving the HERH indicators for 2020-2025, increasing the average life expectancy to 75 years and reducing the risk of premature mortality from 30 to 70 years from cardiovascular diseases.The data obtained on the treatment of patients with heart and respiratory failure through the use of innovative technologies should provide the necessary information to improve the quality of tertiary care and the quality of life of patients in Kazakhstan and around the world.The results should lead to modernization and an increase in the share of innovative organ-replacing technologies in the health care system. |

# **Technical Task № 23**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Life sciences and health.Development of domestic pharmaceutical science and industrial biotechnology:Creation of new domestic, original, medicinal, diagnostic and prophylactic substances and methods of treatment for import substitution and development of the pharmaceutical industry in Kazakhstan.Technologies for obtaining valuable components from plant, animal and mineral raw materials using biotechnological methods. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** To develop highly effective medicinal substances based on pharmacologically active substances from plant materials with antiviral activity against COVID-19 and similar viral infections.**2.1.1. To achieve this goal, the following tasks must be solved:**1. Search and extraction of alkaloids, terpinoids, lactones and other related pharmacologically active substances from plant materials.2. Synthesis of pharmacologically active, antiviral medicinal substances from plant raw materials, identification of the obtained substances, study of their physicochemical and biological properties.3. Electrochemical modification of biologically active substances from plant raw materials (hydroxylation, methoxylation, ethoxylation, addition to their molecules of other functional groups that affect their biological and antiviral activity).4. Screening of plant extracts of the flora of Kazakhstan containing compounds with antiviral activity against coronavirus strains and other viral pathogens.5. Obtaining experimental antiviral substances based on pharmacologically active compounds from plant materials, effective against COVID-19 coronavirus and similar viral infections.6. Molecular genetic analysis and sequencing of virus strains circulating in the territory of the Republic of Kazakhstan and creation of a collection of virus strains to assess the antiviral action of alkaloids from plant materials.7. Development of experimental models for studying the antiviral activity of alkaloids from plant materials in in vitro and in vivo tests.8. Study of acute toxicity of pharmacologically active substances from plant raw materials with antiviral activity and selection of the least toxic substances.9. Study in experiments in vitro on cell cultures and in vivo on model laboratory animals of the antiviral action of pharmacologically active substances from plant materials and / or their compositions against SARS-Cov-2 and causative agents of similar viral infections.10. Development of regulations for the use of antiviral substances based on compounds of plant raw materials, effective against COVID-19 and similar viral infections.11. Development of production technology and a scheme for the use of developed antiviral substances from plant materials.  |
| **3. What points of strategic and program documents are decided by:**1. The World Health Organization on March 11, 2020 declared the outbreak of the new coronavirus COVID-19 a pandemic. Within the framework of this Program, the global problem of the whole world in the treatment and fight against coronavirus infection COVID-19 should be solved.2. The Address of the Head of State K.K. Tokayev to the people of Kazakhstan dated September 1, 2020 noted the development of a comprehensive program to combat the pandemic, in this regard, the development and production of medicinal substances from plant raw materials with antiviral activity is aimed at solving the strategic tasks of Kazakhstan to ensure biological safety.3. Decree of the Government of the Republic of Kazakhstan dated December 26, 2019 No. 982 "On approval of the State program for the development of health care in the Republic of Kazakhstan for 2020-2025". |
| **4. Expected results.****4.1 Direct results:**New knowledge and solutions obtained in the course of scientific research should be used to create new medicinal substances from plant materials with antiviral activity, including against the COVID-19 coronavirus.- obtaining alkaloids, terpinoids, lactones and other related pharmacologically active substances from plant materials.- synthesis of 5 (five) pharmacologically active, antiviral medicinal substances from plant materials, identification of the obtained substances and their physicochemical and biological properties were studied.- electrochemical modification of biologically active substances from plant materials and the addition of other functional groups to their molecules that affect their biological and antiviral activity).- screening of plant extracts of the flora of Kazakhstan containing compounds with antiviral activity against coronavirus strains and other viral pathogens.- development of 5 (five) experimental antiviral substances based on pharmacologically active compounds from plant materials, effective against COVID-19 coronavirus and similar viral infections.- molecular genetic analysis and sequencing of viral strains circulating in the territory of the Republic of Kazakhstan, as well as the creation of a collection of these strains to assess the antiviral action of alkaloids from plant materials.- experimental models for studying the antiviral activity of alkaloids from plant raw materials in in vitro and in vivo tests.- conclusions on the study of acute toxicity of pharmacologically active substances from plant materials with antiviral activity and the selection of the least toxic substances.- conclusions on the study in in vitro experiments on cell cultures and in vivo on model laboratory animals the antiviral effect of pharmacologically active substances from plant materials and / or their compositions against SARS-Cov-2 and pathogens of similar viral infections.- Regulations for the use of antiviral substances based on compounds of plant raw materials that are effective against COVID-19 and similar viral infections.- one database of nucleotide sequences of SARS-CoV-2 virus isolates circulating in Kazakhstan.- 3 (three) methodological recommendations: 1) on the whole genome sequencing of the SARS-CoV-2 virus, 2) on the study of the antiviral activity of medicinal substances from plant materials against the SARS-CoV-2 virus on cell cultures, 3) on the study of the ability of medicinal substances from plant materials to stimulate the production of endogenous interferons.- production technology and application schemes for the developed antiviral substances from plant materials. |
| **4.2 End result:****Scientific and technical effect:**Developed highly effective antiviral substances based on pharmacologically active compounds from plant materials, intended for drug therapy and prevention of COVID-19 and similar viral infections.New original domestic medicinal antiviral substances have been developed and which will reduce morbidity and mortality from COVID-19 and similar mass infections, and reduce import dependence on medicinal substances.The implemented results from the implementation of the Program, allowing to improve the sanitary and epidemiological well-being and biosafety of the country, reducing the country's dependence on imported medicinal substances.Contribution to the increase in the range of domestic medicinal substances and the development of the base of the domestic pharmaceutical industry.**Socio-economic effect:** Improving the health of the population of the Republic of Kazakhstan, reducing morbidity and mortality from massive viral infections, ensuring the sanitary and epidemiological well-being of the country.**Economic effect:** Reduction of direct and indirect losses from temporary disability of the population, as well as losses due to the introduction of quarantine measures and a decrease in business activity.  |

# **Technical Task № 24**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Energy and mechanical engineering.Alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Obtaining new data and developing technological foundations for solving urgent environmental, medical and materials science problems in the nuclear industry using the VVR-K nuclear research reactor.**2.1.1. To achieve this goal, the following tasks must be solved:**- Transmutation of long-lived radioactive isotopes contained in radioactive waste in the neutron flux of the WWR-K reactor, by the example of Co-60.- Modeling the processes of migration and fixation of radionuclides in natural and artificial geochemical barriers of radioactive waste disposal sites of the WWR-K reactor and uranium mining enterprises of the Republic of Kazakhstan.- Improvement of methods for reducing the volume of liquid radioactive waste from the WWR-K reactor and uranium mining enterprises using a complex of sorption-wave technologies to obtain industrial water and concentrates of valuable rare and rare earth elements.- Development of technological recommendations for the production of radioactive isotopes of rare earth elements at the VVR-K reactor.- Development of a method for the formation of color centers in semiprecious stones, stimulated by reactor radiation. - Development of a technique for effective measurement of low neutron fluxes at the WWR-K reactor using compact portable counters.- Studies to optimize the configuration of the WWR-K reactor core, aimed at improving its operational and experimental characteristics. |
| **3. What points of strategic and program documents are decided by:**Development Strategy of the Republic of Kazakhstan until 2050;The concept for the development of the fuel and energy complex of the Republic of Kazakhstan until 2030, approved by the Government of the Republic of Kazakhstan dated June 28, 2014 No. 724;State program for the development of education and science of the Republic of Kazakhstan for 2020-2025, approved by the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988.  |
| **4. Expected results.****4.1 Direct results:**- technological foundations for solving a number of technological, medical, environmental problems using the VVR-K reactor.- methods aimed at improving the operational and experimental characteristics of the WWR-K reactor, allowing to expand the scope of its application and create a favorable atmosphere for attracting domestic and foreign scientific and commercial groups to solve a whole class of scientific and technological problems.- technological foundations of radioactive waste management from nuclear power based on the VVR-K reactor and the transmutation of industrial radioactive waste in a neutron flux, which are aimed at solving an important problem of improving the ecological state in the Republic of Kazakhstan.- technological recommendations for the production of radioactive isotopes of rare earth elements at the VVR-K reactor, which will allow in the future to resolve issues related to the commercialization of activities and improving the quality of medical services for the population.- a method for the formation of color centers in semiprecious stones, stimulated by reactor radiation.- a developed technique for measuring neutron fluxes in the horizontal channel of the critical stand of the WWR-K reactor using large-area neutron counters, as a result of a series of experiments on registration and modeling of neutron fluxes.- calculation of a new configuration of the WWR-K reactor core with improved operational and experimental characteristics, justification of its safe operation.The tasks associated with conducting experiments on beams of charged particles should be aimed at measuring cross sections with an error not exceeding 15%, followed by a theoretical analysis of the obtained experimental data within the framework of computational programs based on modern nuclear models. |
| **4.2 End result:****Scientific and technical effect:** Solution of a number of specific scientific and technical problems, which in the future should become a technological base for new innovative developments.**Economic effect:** Improvement of the operational and experimental characteristics of the WWR-K reactor, which should lead to the development of science-intensive technologies in the Republic of Kazakhstan, to increase their competitiveness in the world market.Environmental impact. As part of the program, the problem of radioactive waste management should be considered, and technical solutions should be proposed to reduce their negative impact on the environment.**Social effect of the Program:** Development of technological recommendations for the production of radiopharmaceuticals at the reactor should significantly improve the quality of diagnostics and therapy (theranostics) of various types of diseases.The development of technological solutions for the disposal of radioactive waste, both from atomic energy and from industrial production, should make it possible to reduce the radiation load on the population.Preservation and development of scientific, technical and intellectual potential of the nuclear industry in the Republic of Kazakhstan.**Target consumers of the results obtained:** Scientists in the field of physical, chemical, environmental sciences, research organizations, medical institutions, subsoil users. |

**Technical Task № 25**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Energy and mechanical engineering.Alternative energy and technologies: renewable energy sources, nuclear and hydrogen energy, other energy sources. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development and development of innovative devices, materials and technologies to ensure the effective implementation and use of hydrogen energy.**2.1.1. To achieve this goal, the following tasks must be solved:**- development of a method for producing hydrogen and an installation for conducting applied research;- study of the structure and properties of sorption-active materials for hydrogen storage, depending on the conditions for their production;- determination of the influence of thermocyclic sorption / desorption processes on the stability of the operational properties of sorption materials for hydrogen storage;- development of a method for forming a solid oxide fuel cell;- design development and assessment of the peak characteristics of a solid oxide fuel cell. |
| **3. What points of strategic and program documents are decided by:**- Law of the Republic of Kazakhstan "On Science" dated February 18, 2011 No. 407-IV;- "Concept for the transition of the Republic of Kazakhstan to a" green economy ". Stage 2020-2030;- Strategic development plan of the Republic of Kazakhstan until 2025 dated February 15, 2018 No. 636. (Chapter 5. Evolutionary path: priority directions for the implementation of the Strategy "Kazakhstan-2050". Policy 2. Competitiveness of economic sectors, Objective 1. Strengthening the positions of basic industries in the world markets. Fuel and energy complex);- Order of the Minister of Energy of the Republic of Kazakhstan "On Approval of Target Indicators for the Development of the Renewable Energy Sources Sector" dated November 7, 2016 No. 478;- The Law of the Republic of Kazakhstan "On Energy Saving and Energy Efficiency Improvement" dated January 13, 2012 No. 541-IV;- Paris Agreement on Climate of November 4, 2016;- The Law of the Republic of Kazakhstan "On Supporting the Use of Renewable Energy Sources" dated July 4, 2009 No. 165-IV;- The Law of the Republic of Kazakhstan "On Ratification of the Charter of the International Agency for Renewable Energy Sources" dated March 22, 2013 No. 82-V;- The Law of the Republic of Kazakhstan "On Electricity" dated July 9, 2004 No. 588-II (Article 3. Goals and objectives of state regulation in the field of electric power industry, clause 6. Use and development of renewable and non-traditional energy sources);- Development Strategy of the Republic of Kazakhstan until 2050, Message of the President of the Republic of Kazakhstan - Leader of the Nation N.A. Nazarbayev to the people of Kazakhstan, Astana, December 14, 2012;- Decree of the Government of the Republic of Kazakhstan "On approval of the Concept for the development of the fuel and energy complex of the Republic of Kazakhstan until 2030" dated June 28, 2014 No. 724- Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" dated September 1, 2020;- Decree of the Government of the Republic of Kazakhstan "On approval of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020 - 2025" dated December 27, 2019 No. 988;- Order of the Minister of Energy of the Republic of Kazakhstan "On the Strategic Plan of the Ministry of Energy of the Republic of Kazakhstan for 2017 - 2021" dated December 28, 2016 No. 571;Green Bridge Partnership Program. Direction "Sustainable energy, its availability and efficiency".  |
| **4. Expected results.****4.1 Direct results:**- a method for producing hydrogen;- designed and built installation for applied research on hydrogen production;- a method of manufacturing new sorption-active materials for hydrogen storage;- experimental data on the influence of temperature and the number of charge-discharge cycles on the operational properties of hydrogen storage devices;- model samples of solid oxide fuel cell (SOFC) electrodes;- method of forming a solid oxide fuel cell;- evaluation of the peak characteristics of a solid oxide fuel cell. |
| **4.2 End result:****Scientific and technical effect:** The results of the program should form a scientific basis and contribute to the creation of new methods for the production and storage of hydrogen, as well as the creation of electrochemical devices operating on hydrogen, and their integration with power plants based on fuel cells. To develop a laboratory sample of solid oxide fuel cells (SOFCs) with a specific power of at least 0.3 W/cm2, which is at the level of the best world achievements. The implementation of the program should improve the qualifications and expand the area of ​​special knowledge of the operating and scientific personnel, and implement an effective training program for young specialists. Preparation of at least 5 masters and 2 Doctors of Philosophy (PhD).**Social and economic effect:** The results obtained within the framework of the program should contribute to the development of Kazakhstan in the field of hydrogen technologies, an increase in the efficiency of use and diversification of energy resources, and the further development of alternative energy. The practical application of the results of the program should contribute to the introduction of reliable, compact and safe sources of pure hydrogen in the economy of the Republic of Kazakhstan, the development of clean energy and the acceptance of the ideas of a hydrogen economy by the society.**Target consumers of the results obtained:** Scientists, engineers, scientific organizations, enterprises of the fuel and energy complex in the field of alternative energy. The results of the program implementation should be applicable in the field of hydrogen energy, nuclear and thermonuclear energy, as well as in the chemical industry, which widely uses hydrogen in technological processes. |

# **Technical Task № 26**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Historical and cultural heritage and spiritual values of Kazakhstan. |
| **2. Goals and objectives of the program** **2.1. Purpose of the program:** Study of the place and role of Ulus Jochi in the formation of the Kazakh statehood.**2.1.1. To achieve this goal, the following tasks must be solved:** - study of the ethnopolitical history of Ulus Jochi in 1206-1598; - formation of a database of all Kazakhstani historiography regarding the study of the history of Ulus Jochi;- study of the political elite of the Golden Horde: formation, structure and qualitative composition;- research on the ethnogenesis of Kazakhs;- preparation for publication of a collection of materials from Arab and Persian sources on the history of Ulus Jochi;- popularization of the history of Ulus Jochi through literature, art, cinema, regional and international tourism, national sports, television, media, etc. |
| **3. What points of strategic and program documents are decided by:**Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Message from the Head of State K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" dated September 2, 2019. http://www.akorda.kz/ru/addresses/addresses\_of\_president/poslanie-glavy-gosudarstva-kasym-zhomarta-tokaeva-narodu-kazahstana;Keynote article by K.Tokayev "Tauelsizdik barinen kymbat"https://egemen.kz/article/260146-tauelsizdik-barinen-qymbat;State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020). |
| **4. Expected results.****4.1 Direct results:**- an encyclopedia in Russian and Kazakh languages;- database;- a collection of translations in Russian and Kazakh languages. |
| **4.2 End result:****Scientific effect:**- contributing to the deepening of scientific knowledge about the history of Ulus Jochi;- expansion and deepening of interdisciplinary research on the history of Kazakhstan and the ethnogenesis of Kazakhs;- contributing to the increase in the level of education in the field of the history of Ulus Jochi of the general population as a result of the organization of conferences, seminars, online and distance courses and master classes, webinars, the publication of scientific articles, interviews in the media, and round tables;- contributing to the satisfaction of the interest of a wide range of readers in information of a historical nature regarding the history of Ulus Jochi.- the development of historical consciousness.**Economic effect:** Further development of the country's historical policy, meeting the needs of ideologists who need a scientific foundation in the development of political ideologies, specialists in the field of literature, history, culture, education, etc., as well as various social groups, the general public, striving for understanding and the development and study of the history of medieval Kazakhstan in connection with their professions and occupations.**Social effect of the Program:** Increasing and improving the scientific-theoretical and applied-practical significance of the research paradigm of the history of Kazakhstan in the field of medieval studies, as well as the development of the national school of historical and ethnological science;Solving the scientific, theoretical and practical tasks of the program contributing to the inventory, identifying the place and role of Ulus Jochi in the history of Kazakhstan's statehood as a factor of the "symbolic capital" of the nation. The results of the program should be the basis for increasing historical literacy in the field of medieval studies, forming new qualities of the nation that are in demand in the modern world;Materials of published works should be recommended to undergraduates and doctoral students studying in domestic universities in the specialties: "History", "Oriental studies", "Turkology". Research materials should be used in the development of a course of lectures on the political and ethnocultural history of the Golden Horde.**Target consumers of the results obtained:** Scientists, researchers-specialists in various fields of the humanities: historians, political scientists.  |

**Technical Task № 27**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:** **1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Historical and cultural heritage and spiritual values of Kazakhstan. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Comprehensive and interdisciplinary study of the issues of antiquity of the Kazakh steppes to form a holistic vision of national history; theoretical reconstruction of the historical environment and determination of the continuity of cultural and historical processes from the Stone Age to ethnographic modernity on the territory of Kazakhstan; formation of fundamental knowledge on historical and cultural processes on the territory of Kazakhstan, development of human resources of Kazakhstani archaeological science.  |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- Creation of advanced infrastructure and development of human resources for research and development;- Study of the problems of settlement of the territory of Kazakhstan by ancient people and the formation of archaeological cultures in the Stone Age, through the introduction into scientific circulation of huge collections of samples of the stone industry, collected since the 60s of the last century, but still not studied and representing a unique stone chronicle of the ancient history of the country.- Determination of the origins of archaeological cultures on the territory of Kazakhstan by studying the material and spiritual heritage of the era of the paleometal. Study of the paradigms of the succession of cultures of the Eneolithic, Paleometal and Early Iron Age periods. Determination of the ethno-socio-cultural foundations of the tribes of the paleometal era of the Kazakh steppes and the study of the processes of integration and assimilation of the tribes of the Bronze Age in Central Asia.- Revealing the features and patterns of the development of ancient paleoeconomics in the Kazakh steppes, as well as determining the place of the Kazakhstan mining and metallurgical centers of the paleometal era in the structure of the Eurasian metallurgical province.- Study of passionary, cultural, historical and ethnogenetic processes in the Kazakh steppes against the background of the interaction of equestrian cultures in antiquity and the Middle Ages. Study of the origin and development of the culture of the population of the Kazakh steppes in the early Iron Age. Study of political genesis, sociogenesis and cultural genesis of ancient and medieval Kazakhstan.- Research into the history and culture of the era of the Great Migration of Nations. Study of the ethnic history and ethnogenesis of the peoples who inhabited the territory of the Kazakh steppes on the basis of archaeological materials from ancient times to the late Middle Ages.- Study of cultural and historical processes in the era of the great Turkic kaganates and the formation of sedentary agricultural cultures. Study of the continuity of ancient cultures, states and ethnic groups from the Sakas to the ancient Turks and Kazakhs. Study of the interaction of the steppe and the city, the ancient Turks and their neighbors - Sogd, Iran, China, Europe.- Development of theoretical and methodological aspects of the functioning of statehood on the territory of the Kazakh steppes.- To reveal the prerequisites and conditions for the emergence of states on the territory of the Kazakh steppes in the ancient period. Determination of the stages and features of the formation of a state-forming people.- Issues of studying the problems of Ulug Ulus (Ulus Jochi), the system of government, territorial composition, ethnosocial structure. Issues of interaction of Ulug Ulus (Ulus Jochi) with neighboring countries of Europe and Asia, place in the system of Eurasian states and civilizations and contribution to the treasury of world culture. |
| **3. What points of strategic and program documents are decided by:**1. Program article of the First President of the Republic of Kazakhstan N.А. Nazarbayev Looking to the Future: Modernizing Public Awareness "/" Looking to the Future: Modernizing Public Awareness "// Egemen Kazakhstan. 12 April 20172. Program article of the First President of the Republic of Kazakhstan N.А. Nazarbayev "Seven Facets of the Great Steppe", published on November 21, 2018.3. Article of the President of the Republic of Kazakhstan K.K. Tokayev "Independence first of all" dated January 6, 20214. Strategic development plan of the Republic of Kazakhstan until 2025 (Reform 2. Technological renewal and digitalization. Task "Development of the scientific research system").5. State program for the development of education and science of the Republic of Kazakhstan for 2020 - 2025. Goal 2 "Increasing the contribution of science to the socio-economic development of the country", paragraph 5.2.3. Increase the effectiveness of scientific developments and ensure integration into the global scientific space6. Law of the Republic of Kazakhstan "On the protection and use of objects of historical and cultural heritage" dated December 26, 2019 No. 288-VІ ЗРК.7. Law of the Republic of Kazakhstan "On Science" dated February 18, 2011 No. 407-IV. |
| **4. Expected results.****4.1 Direct results:** - detailed archaeological maps of the monuments of the Stone Age of Kazakhstan with chronological periodization and cultural features, reflecting the ways of settlement and migration of ancient people of various ecological niches of Kazakhstan, through the introduction into scientific circulation of collections of samples of the stone industry collected by early research and rethought from the standpoint of the current state of science.- new source data on the cultures of the transitional stage from the Eneolithic (Botay culture, etc.) to the Bronze Age, as well as the revealed features of the evolution and trends in the general development of the culture of the most ancient tribes of Kazakhstan.- new data on passionate, cultural, historical and ethnogenetic processes in the Kazakh steppes against the background of the interaction of equestrian cultures in antiquity and the Middle Ages.- study of political genesis, sociogenesis and cultural genesis of ancient and medieval Kazakhstan.- conclusions on the study of funeral and memorial, settlement and urbanized monuments of the Kazakh steppes, from the Stone Age, Bronze Age, early and late Iron Age, antiquity and the Middle Ages.- answers to questions of the origin and development of cultures of the population of the Kazakh steppes in the early Iron Age.- systematized and analyzed materials of the era of migration of the peoples of Kazakhstan. - introduction into scientific circulation of data on the ethnic history and ethnogenesis of the peoples who inhabited the territory of the Kazakh steppes on the basis of archaeological materials from ancient times to the late Middle Ages.- theoretical reconstruction of paleoecology and paleoeconomics of different eras, based on laboratory and analytical work.- cultural and historical processes in the era of the great Turkic kaganates and the formation of sedentary agricultural cultures.- preconditions and conditions for the emergence of states on the territory of the Kazakh steppes in the ancient period.- stages and features of the formation of a state-forming people.- conclusions on the study of the problems of Ulug Ulus (Ulus Juchi), the system of government, territorial composition, ethnosocial structure.- interaction of Ulug Ulus (Ulus Jochi) with neighboring countries of Europe and Asia, place in the system of Eurasian states and civilizations and contribution to the treasury of world culture. |
| **4.2 End result:** **Scientific effect:** Introduction to scientific circulation of archaeological materials accumulated over many decades.The modernization of methodology should improve the quality of scientific work and overcome the fragmentation of historical research. Rethinking difficult periods in the history of Kazakhstan, the search for the historical continuity of phenomena and events to actualize in the era of sovereignty. Systematization and research of archaeological collections from the era of primitiveness to modern times, according to modern world requirements for humanitarian research.Processing and introduction into scientific circulation of at least 1,500 stone artifacts reflecting the stone industry of the Paleolithic and Neolithic times.Exploration of less than 20 Bronze Age settlement complexes with a detailed description of the accompanying inventory.Systematization of hundreds of burials and burial grounds of the Paleometal Age with the creation of a database of burial items.Research of less than 500 burial and memorial complexes of the era of early nomads with the creation of a classification of the inventory.Study and description of at least a thousand rock paintings of the Kazakh steppe from antiquity to the Middle Ages.Exploration of at least a hundred burial complexes and stone statues of the Turkic time.Research and digitization of archival data, including at least a thousand reports on archaeological research on the territory of the Kazakh steppe from 1946 to the modern period.**Economic effect:** Revealing the connection between the development of the national economy and the revival of traditional culture. The revival of a rich culture, the best traditions of the ethnic group, the provision of a beneficial effect on the further sustainable growth of the national economy.**Social effect of the Program:** The implementation of the program should make it possible to create a holistic historical picture of the development of Kazakhstan, based on the most modern methods of scientific research, in order to form the historical knowledge of society. The effect should be in the transfer of unique knowledge about the centuries-old history of our country to the general public through preparation for the perception of a wide audience of works.**Target consumers of the results obtained:** Educational and scientific organizations, culture, government agencies and authorized bodies, the media, representatives of small and medium-sized businesses, the population of urban and rural areas. |

# **Technical Task № 28**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:** **1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the Social Sciences and Humanities.Fundamental, applied interdisciplinary research in the social sciences.Research of topical problems of modern international relations, global, regional and cross-border geopolitical, geo-economic, geospatial processes. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Study of modern and forecasting potential trends in domestic and foreign policy in the medium and long term within the framework of the concept of a “hearing state” declared by the President of the Republic of Kazakhstan, in the field of national, regional and international security.**2.1.1. To achieve this goal, the following tasks must be solved:**- Formation of a unified ecosystem of political science research, for the implementation of the concept of "hearing state" in foreign and domestic policy;- Development of effective recommendations on the entire range of security spheres in the external and internal political spheres: foreign policy security; spiritual (ethno-confessional, cultural, linguistic, identity issues) security; information security; water security; demographic and migration security; quality of human capital, intellectual security;- Development of human capital: analysis and forecasting of the demographic and migration situation in the northern regions of Kazakhstan.- Study of the problems of strengthening regional security in the Caspian basin and stabilizing relations between the Caspian states during the post-signing of the Convention on the Legal Status of the Caspian Sea in 2018.- Study of ways to converge the political positions of the Central Asian states in the main areas of ensuring regional security, including in the energy, water, food, transport and communication spheres, in the field of migration and in matters of environmental protection;- Study of the corpus of questions of identity of the people of Kazakhstan, ethno-nationalism of the diasporas and the language issue in the context of the concept of "hearing state";- Conducting a comprehensive study of the development of regions in order to identify the local potential for their further socio-economic development;- Identification of problems and threats for the development of regions in the economic and social spheres, infrastructure, ecology and other spheres;- Development of recommendations on socio-political, cultural and educational aspects. |
| **3. What points of strategic and program documents are decided by:**Development Strategy "Kazakhstan-2050";Strategic development plan of the Republic of Kazakhstan until 2025;Messages of the President of the Republic of Kazakhstan; Military doctrine of the Republic of Kazakhstan dated 09.29.2017;The Law of the Republic of Kazakhstan "On the National Security of the Republic of Kazakhstan";State program for the development of education and science of the Republic of Kazakhstan for 2020-2025;State program of industrial and innovative development for 2020-2025;State program "Digital Kazakhstan" for 2018-2022;State program for the development and functioning of languages ​​in the Republic of Kazakhstan;Program articles by Elbasy N. Nazarbayev “Rukhani Zhagyru”, “Seven Facets of the Great Steppe”;Program article of the President of the Republic of Kazakhstan K.K. Tokayev "Abai and Kazakhstan in the XXI century». |
| **4. Expected results.****4.1 Direct results:**- Step-by-step recommendations and a set of related implementable, practice-oriented, short, medium and long-term perspectives on the creation of a unified ecosystem of research and development in the context of the “hearing state” concept, ensuring the unity of the country's security as an integrated expression of the security of the individual, nation and state.- Comprehensive recommendations on security: foreign policy security; spiritual (ethno-confessional, cultural, linguistic, identity issues) security; information security; water security; demographic and migration security; quality of human capital, intellectual security;- A set of measures for the demographic and migration situation in the northern regions of Kazakhstan, recommendatory measures to increase their migration attractiveness;- Predictive vision of trends in the field of strengthening security in the Caspian basin;- A set of step-by-step recommendations for new risks and challenges;- Creation of the Concept of e-democracy in Kazakhstan, characterized by the use of information and communication technologies as the main tool for collective and administrative processes at all levels of government.- Forward-looking recommendations for the role of international security structures - UN, OSCE, SCO, CSTO, CICA in resolving disputes and conflicts;- Theoretical calculations and recommendations for their application on the issues of the identity of the people of Kazakhstan;- Development of recommendations on the socio-political, cultural and educational aspects of the implementation of the concept of a "hearing state" in the external and internal political sphere. |
| **4.2 End result:**The expected scientific and socio-economic effect of the program should contribute to the expansion and strengthening of the possibilities for the implementation of an effective policy in Kazakhstan.The solution of the scientific, theoretical and practical tasks of the program should contribute to the strengthening of sovereignty; strengthening the security of the Republic of Kazakhstan: spiritual, informational, water, intellectual, demographic and migration, the quality of human capital; creating a loyal, tolerant, friendly environment for the successful implementation of national interests in the international arena. |

**Technical Task № 29**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied interdisciplinary research in the social sciences.Actual problems of social modernization: demography, migration, quality of human resources, quality of life and social inequality, problems of employment and unemployment, scientific organization, rationing and labor safety. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** A comprehensive study of the modern demographic situation in Kazakhstan, forecasting its further development, development of recommendations for the successful implementation of a long-term policy of national conservation.2.2 Research of demographic processes. Population structure.Based on the use of modern methods of demographic analysis, the description of the natural and mechanical movement of the population, the identification of the dynamics, mechanisms and determinants of demographic processes for the development and modeling of predictive scenarios of changes in the structure of the population and their consequences.2.3. Study of the influence of the development of various spheres of society on the demographic processes in the country.Explanation of the functioning of the demographic system under the influence of various factors in the development of society as a whole and in its individual spheres.Assessment of the importance of the demographic factor for the development of individual industries and areas of the life of society.2.4. Improving state policy in the field of demography and migrationMonitoring the implementation of state policy in the field of demography and migration over the years of Independence, to determine strategic directions for its improvement.**2.1.1. To achieve this goal, the following tasks must be solved:** - Study of the demographic structure of the population and its changes, taking into account all demographic phenomena: fertility, mortality, migration.- Determination of the scale and intensity of demographic processes in the country and by region.- Drawing up mid-term and long-term forecasts of the development of demographic processes in Kazakhstan and by regions.- Study of possible conditions for the development of the demographic situation in the country in order to develop effective measures to prevent the consequences of the implementation of negative and the fullest use of the potential of positive scenarios.- Study of the influence of the political and legal factor on the functioning of the demographic system.- Study of the influence of the political and economic factor on the functioning of the demographic system.- Study of the influence of the socio-cultural factor on the functioning of the demographic system.- Study of the influence of the natural and ecological factor on the functioning of the demographic system.- Study of the influence of the historical and geographical factor on the functioning of the demographic system.- Study of the impact of urbanization processes on the functioning of the demographic system.- Development of scenarios for the development of the social, economic and political situation under the influence of the demographic factor in order to develop effective measures to prevent the consequences of the implementation of negative and the fullest use of the potential of a positive forecast.- Research of management approaches and the political and legal framework for regulating demographic processes in Kazakhstan in a comparative perspective with the methods of state management of demographic and migration processes in foreign countries.- Conducting a demographic audit of government programs, assessing their impact on the intensity of demographic processes.- Identification of risks and opportunities in the implementation of the demographic policy of Kazakhstan, development of recommendations for the purpose of its improvement. |
| **3. What points of strategic and program documents are decided by:** - Strategy "Kazakhstan-2050", where the global demographic imbalance is indicated among the ten global challenges of the XXI century.The program is aimed at implementing such priorities as:- "Economic policy of the new course - comprehensive economic pragmatism based on the principles of profitability, return on investment and competitiveness",- "New principles of social policy - social guarantees and personal responsibility».- The State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025, namely, for the implementation of the program goal to increase the contribution of science to the socio-economic development of the country. |
| **4. Expected results.****4.1 Direct results:**- new conceptual knowledge about the level of study of demographic processes in world science and the implementation of modern methods for researching trends in the demographic development of the Republic of Kazakhstan.- systematization of demographic indicators and their comparison with the target parameters of programs for the demographic development of Kazakhstan.- maps of the demographic development of Kazakhstan in general and also in the territorial context.- improvement of methods and algorithms for modeling and forecasting the demographic situation for the development of measures for state regulation and timely response to challenges and problems. |
| **4.2 End result:****Scientific and technical effect:** The implementation of the program should contribute to the effective implementation of intellectual, analytical and methodological support for the development and successful implementation of a long-term policy of people-saving in the Republic of Kazakhstan, which should have the following economic, scientific, methodological and political effects:Scientific and methodological effect: Comprehensive knowledge about the current state of the methodological and theoretical content of demographic science in the world and tools for studying the demographic situation in Kazakhstan.The importance of the demographic factor on the development of Kazakhstan in the social, economic and political spheres.**Socio-economic effect:** The knowledge gained should contribute to the development within the framework of the relevant structures (ministries, departments, akimats) of effective measures to raise the standard of living, social mobility, education, health, income levels, employment, the number and quality of jobs, productivity, potential of promising areas of economic development.**Political effect:**The knowledge gained within the framework of the relevant structures should contribute to:- development of a new concept of demographic policy;- improvement of the existing normative legal documents in accordance with the goals of the development of the country's demographic indicators.- development of effective measures to maintain political stability, conduct political modernization, and improve the efficiency of public administration. |

**Technical Task № 30**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Spiritual Modernization and Seven Facets of the Great Steppe. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of methodological foundations for the study of the historical toponymy of the Great Silk Road, disclosure of the international significance of the IDP, the role and socio-cultural significance in the development of the Turkic civilization, reflection of the process of formation of the historical toponymy of the Great Silk Road in written monuments, in the formation of the spiritual and material culture of peoples connected by the transcontinental artery of the Great silk road.**2.1.1. To achieve this goal, the following tasks must be solved:**- a comprehensive interdisciplinary study of the historical toponymy of the Great Silk Road in the historical, historical-linguistic, cognitive and cultural aspects;- creation of the foundations of a new systemic toponymic concept of the Republic of Kazakhstan;- development of theoretical and methodological foundations for the study of Kazakh onomastic material and the organizational basis for describing Kazakh toponymy in Central Asia and the Republic of Kazakhstan;- development of theoretical and methodological foundations for the study of the Turkic onomastic material and the organizational basis for the study of the Turkic toponymy of the Great Silk Road in Central Asia, the Urals, Siberia, Altai; Mongolia;- determination of the scientific etymology of historical toponyms of the Great Silk Road on the basis of the regularity of the typological universal in onomastics;- identification of the facts of transonymization in the process of forming the historical toponymy of the Great Silk Road;- classification and analysis of specific toponymic terms and formants inherent in the historical toponymy of the Great Silk Road;- creation of a linguistic and ethnographic vocabulary of the Kazakh language;- creation of facsimiles and transliteration of texts of historical monuments;- creation of an alphabetical electronic card index;- writing a course of lectures (conducting video lessons and master classes on the historical toponymy of the Great Silk Road);- identification and description of important toponymic objects on the Great Silk Road, establishment of geolocation parameters;- creation of the foundations of the national Kazakh brand of the Great Silk Road - creation of a thematic electronic card index;- development of maps-schemes of routes and branches of the Great Silk Road;- Creation of teaching aids, recommendations and developments for guides:- Creation of 3D maps for especially important sacred objects;- Creation of 3D maps for especially important historical sites;- Creation of 3D maps for especially important objects of archaeological interest;- creation of QR codes for especially important sacred and historical sites;- creation of a documentary film (virtual image of nomadic culture, ethnography, everyday life and traditions); - creation of a site about the Silk Road and placement of electronic databases on this site. |
| **3. What points of strategic and program documents are decided by:**The program must be justified in the context of the goals and objectives set in the "Concept of state onomastic work in the Republic of Kazakhstan" (approved by the Government of the Republic of Kazakhstan dated January 21, 2005 No. 45).The implementation of the Program should allow the implementation of tasks, achievement of goals and indicators defined in the following strategic and program documents:Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";State program for the implementation of the language policy of the Republic of Kazakhstan for 2020-2025;Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Seven Facets of the Great Steppe" dated November 21, 2018;Decree of the President of the Republic of Kazakhstan dated April 17, 2017 No. 462;Order of the Government of the Republic of Kazakhstan dated March 13, 2018 No. 27-r;Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" (2019);Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020).Article of the President of the Republic of Kazakhstan K.K. Tokayev "Independence is the most precious thing». "Egemen Kazakhstan dated January 5, 2021". |
| **4. Expected results.****4.1 Direct results:**- the foundations of a new systemic toponymic concept of the Republic of Kazakhstan;- theoretical and methodological foundations for the study of Kazakh onomastic material and the organizational basis for describing Kazakh toponymy in Central Asia and the Republic of Kazakhstan;- theoretical and methodological foundations for the study of the Turkic onomastic material and the organizational basis for the study of the Turkic toponymy of the Great Silk Road in Central Asia, the Urals, Siberia, Altai; Mongolia;- replenishment of the fund of the Kazakh toponymic system with the material of the historical toponymy of the Great Silk Road;- geolocation of important toponymic objects on the Great Silk Road;- the basics of the national Kazakh brand of the Great Silk Road- a schematic map of the routes and branches of the Great Silk Road;- methodological manuals, recommendations and developments for guides:- 3D map of especially important sacred objects;- 3D map of especially important historical objects;- 3D map of especially important objects of archaeological interest;- QR code for especially important sacred and historical sites. |
| **4.2 End result:****Scientific effect:** Consideration of the historical toponymy of the Great Silk Road, in the cognitive and culturological aspect, which reflects the mentality, culture, worldview and worldview of the peoples of the creators of the toponymic system.Study of the topical task of today, which may become an impetus for the further development of Turkic onomastics.The positive influence of the obtained scientific results on the development of social sciences and humanities. The description of the historical toponymy of the Great Silk Road in the territory inhabited by the Turkic ethnic groups will significantly replenish and create the base of a full-scale Turkic onomasticon.Formation of theoretical and methodological foundations will facilitate further research of the Kazakh and Turkic onomastic material, reflecting the spiritual culture of the people, outline ways to create an organizational base for describing Kazakh and Turkic onomastics. The program should raise the global theme of studying the Great Silk Road.The conclusions and provisions of this study should be aimed at the lexicology and lexicography of the Kazakh language, the lexicology and lexicography of the Turkic languages, the history of Kazakhstan, Turkic studies, Kazakh linguistics, in comparative typological and etymological studies, in the compilation of onomastic dictionaries. The results of the historical and linguistic study of the historical toponymy of the IDP should lay the foundations for the achievement of a scientific etymology of a number of toponyms with a lost history of origin and obscured semantics. In general, the implementation of the Program should make a scientific contribution to the development of Kazakh linguistics, private and general onomastics.**Economic effect:** Targeting of the Provisions and materials of the Program and for the development of tourism in our country. Development of tourist routes along the Great Silk Road (automobile, horse, camel, walking); enrichment of knowledge about the Great Silk Road with scientific information; research materials as teaching aids and developments can be useful for guides; maps and diagrams of the Great Silk Road can serve as a guide when drawing up tourist routes.**Target consumers of the results obtained:** Kazakh scholars, Turkologists, historians, scientific research institutes of the social and humanitarian profile, teachers and students of historical and philological specialties of higher education, teachers and students of secondary schools. |

**Technical Task № 31**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Basic, applied, interdisciplinary research in the humanities:Spiritual Modernization and Seven Facets of the Great Steppe. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Comprehensive and interdisciplinary study of the heritage of outstanding personalities of the Great Steppe and Alash figures on the issues of statehood and the national idea, in the context of political modernization of Kazakhstan**2.1.1. To achieve this goal, the following tasks must be solved:** - to study the theoretical teachings of outstanding personalities of the Great Steppe about the value of "Mangilik El" ("Eternal Country") and its role in the formation of the national idea;- to conduct axiological studies on the meaning of the idea of ​​statehood and independence under the Kazakh Khanate and their role in the modernization of modern Kazakhstani society, including studies of the genesis, factors and conditions of development;- to study the views of the leaders of Alash on the independent Kazakh statehood, as well as the activities of the Alashorda government as a prototype of the independent Kazakh state at the beginning of the XXI century and its importance for the improvement of modern Kazakh statehood;- to explore the role of the ideas "Mangilik El", "Zheruiyk" and Alash in the formation of the Kazakh national idea;- to carry out a paradigmatic systematization of the heritage of the Great Steppe and the leaders of the Alash movement in ensuring the independence of the Kazakh state in the XXI century and the development of methods for its propaganda;- to prepare recommendations and concepts for the use of the heritage of outstanding personalities of the Great Steppe and Alash figures as a principle in the implementation of the national idea;- to develop principles, criteria and characteristics of the activity and contribution of individuals, and to conduct an analytical study of the socio-cultural aspects of the national idea;- to investigate the conceptual elements of the national idea, taking into account the teachings of the outstanding personalities of the Great Steppe and the leaders of Alash;- to conduct a historical and comparative analysis of the role of the individual in political modernization;-scientific interpretation and popularization of views, ideas and works of outstanding personalities of the Great Steppe and leaders of Alash;- to develop practical scientific recommendations for the implementation of the national idea and improvement of statehood in the context of the political modernization of Kazakhstan. |
| **3. What points of strategic and program documents are decided by:**• "Independence above all else" article of the President of the Republic of Kazakhstan K.K. Tokayev, 05.01.2021 // https://www.kazpravda.kz/news/prezident2/polnii-tekst-stati-tokaeva-nezavisimost-previshe-vsego• Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);• State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020).• Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" (2019);• “On measures to implement the pre-election program of the President of the Republic of Kazakhstan K.K. Tokayev “ Well-being for everyone! Continuity. Justice. Progress "and proposals received during the national action" Birge "/ Decree of the President of the Republic of Kazakhstan dated June 19, 2019 No. 27.• "On approval of the state program for the development of education and science of the Republic of Kazakhstan for 2020-2025" / Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988• "On approval of the Strategic Development Plan of the Republic of Kazakhstan until 2025 and invalidation of some decrees of the President of the Republic of Kazakhstan" / Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636• Instruction of the President of the Republic of Kazakhstan N. A. Nazarbayev at the opening of the Year of Youth on January 23, 2019 and the XVIII Congress of the Nur Otan party on February 27, 2019• "Constructive public dialogue is the basis of stability and prosperity of Kazakhstan" Message from the President of the Republic of Kazakhstan K.Tokayev• "New opportunities for development in the context of the Fourth Industrial Revolution", Message of the President of the Republic of Kazakhstan Nursultan Nazarbayev to the people of Kazakhstan dated 10.01.2018• "Growth of prosperity of Kazakhstanis: increasing income and quality of life" Message from the President of the Republic of Kazakhstan Nursultan Nazarbayev to the people of Kazakhstan dated 05.10.2018• Development Strategy of the Republic of Kazakhstan until 2050;• Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";Law of the Republic of Kazakhstan dated July 27, 2007 "On Education". |
| **4. Expected results.**- research of theoretical teachings of social and political thoughts of outstanding personalities of the Great Steppe about the value of "Mangilik El" ("Eternal Country") and its role in the formation of the national idea;- axiological studies on the meaning of the idea of ​​statehood and independence under the Kazakh Khanate and their role in the modernization of modern Kazakhstani society, including studies of the genesis, factors and conditions of development;- the results of the study of the views of the leaders of Alash on the independent Kazakh statehood and the activities of the government of Alashorda as a prototype of the independent Kazakh state at the beginning of the XXI century and its importance for the improvement of modern Kazakh statehood;- study of the role of the ideas of "Mangilik El", "Zheruiyk" and Alash in the formation of the Kazakh national idea, the paradigmatic systematization of the heritage of the Great Steppe and the leaders of Alash in ensuring the independence of the Kazakh state in the XXI century and the developed methods of its propaganda are considered;- prepared recommendations and concepts for the use of the heritage of outstanding personalities of the Great Steppe and Alash figures as a principle in the implementation of the national idea;- developed principles, criteria and characteristics of the activity and contribution of individuals, and analytical studies of the socio-cultural aspects of the national idea;- research of conceptual elements in the formation of a national idea and its revealed functional significance in the implementation of state policy;- study of the processes of political modernization and the implementation of the national idea, a historical and comparative analysis of outstanding political and state figures, and in particular, the role of the individual in political modernization;- scientific interpretation of worldview systems, views, ideas and works of outstanding personalities of the Great Steppe and leaders of Alash;- practical scientific recommendations for the implementation of the national idea and strengthening of statehood. **4.1 Direct results:** Recommendations on the improvement of state institutions and the formation of a national idea, taking into account the heritage of outstanding personalities of the Great Steppe and Alash figures in the context of political modernization of Kazakhstan.**4.2 End result:**Expected social and economic impactThe program should be aimed at the development of social and humanitarian thought, scientific research in the field of national historical personalistics, transformation and modernization of the state and society.**Economic effect:** the development of humanitarian knowledge and ideas should provide a powerful one for the further development of society and the state.**Social effect of the Program:** Modernization of public consciousness.**Target consumers of the results obtained:** Authorized state organizations for the implementation of the internal policy of the state, scientific and educational institutions, public development institutions and non-governmental organizations. |

# **Technical Task № 32**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):**Research in the social sciences and humanities**Basic, applied, interdisciplinary research in the social sciencesTopical issues of social sciences and interdisciplinary research. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** A systematic and comprehensive historical and ethnological study of the causes of famine in the early 20-30s of the twentieth century in Kazakhstan based on new sources and materials that have not been introduced into scientific circulation and the interpretation of previously identified historical facts in terms of new methodological principles in the context of the article of the Head of State “Independence is more expensive Total". |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - systematic research and full analysis of published sources: collections of archival materials, memoirs of eyewitnesses of events that exist in the public domain;- formation of a database of sources and literature on the topic of the program;- identification of archival materials and documents about the famine of the 20-30s of the twentieth century, in the republican and Russian archives, including closed access;- processing, systematization and analysis of the collected materials, their comparison, identification of the main causes, trends and consequences of mass famine;- Conducting a comparative analysis of the legislative framework of the USSR and, in particular, the Kazakh SSR and other union republics (Ukraine, Russia, Belarus), accompanying the entire process of collectivization, sedentarization, weaning, mass starvation and migrations;- Correspondence with all regional archives of the Russian Federation, RK regarding the receipt of archival files on the research topic;- organization of prospecting works in the regions of Kazakhstan with the involvement of domestic and foreign scientists and researchers of post-Soviet countries in order to identify the general characteristics of the consequences of famine in the 20-30s of the twentieth century;- the organization of search teams and the involvement of student youth, high school students, contributing to the formation of historical and patriotic consciousness. |
| **3. What points of strategic and program documents are decided by:**Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";State program for the implementation of the language policy of the Republic of Kazakhstan for 2020-2025;Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Decree of the President of the Republic of Kazakhstan dated April 17, 2017 No. 462;Decree of the President of the Republic of Kazakhstan dated October 26, 2017 No. 569;Decree of the President of the Republic of Kazakhstan dated February 19, 2018 No. 637;Order of the Government of the Republic of Kazakhstan dated March 13, 2018 No. 27-r;Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" (2019);Message from the President of the Republic of Kazakhstan K.K.Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020).Article of the President of the Republic of Kazakhstan K. K. Tokayev "Independence is the most precious thing" (2020) |
| **4. Expected results.**- results on the identification of archival materials and documents about the famine of the 20-30s of the twentieth century, in republican and Russian archives, including closed access (archives of the KNB, FSB);- scientific processing, systematization and analysis of the collected materials, their comparison, identification of the main causes, trends and consequences of mass famine;- a comparative analysis of the legislative framework of the USSR and, in particular, the Kazakh SSR and other Union republics (Ukraine, Russia, Belarus), accompanying the entire process of collectivization, sedentarization, weaning, mass starvation and migrations;- the results of work on the analysis of correspondence with all regional archives of the Russian Federation, the Republic of Kazakhstan regarding the receipt of archival files on the research topic;- the results of prospecting work in the regions of Kazakhstan with the involvement of domestic and foreign scientists and researchers from post-Soviet countries in order to identify the general characteristics of the consequences of famine in the 20-30s of the twentieth century;- adaptation of historical materials of teaching aids for teaching the history of Kazakhstan. |
| **4.1 Direct results:**- maps of mass graves after the famine of the Kazakh population;- replenishment of archives with new field materials;- a separate site for the collected materials;- publication of a collection of memoirs of witnesses to the famine;- publication of a collection of archival and written documentary materials;- publication of a collective monograph.**4.2 End result:**The results of the research should significantly improve the content of school and university textbooks and anthologies for the period of the new history of Kazakhstan.Edition of the anthology from previously unpublished and unknown archival and written sources.Development of a special course for undergraduates and doctoral students studying in the specialty "History".Electronic database of mass famine in the 1920s and 1930s.Replenishment of the database of archives of the Republic of Kazakhstan. |

# **Technical Task № 33**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the social sciences.Social Science Current Issues and Interdisciplinary Research. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Research and development of modern mechanisms for the implementation and assessment of the process of social modernization of the Republic of Kazakhstan**2.1.1. To achieve this goal, the following tasks must be solved:**- research and conceptual substantiation of social modernization as an integral part of the modern development of the Republic of Kazakhstan;- study of the dynamics of qualitative and quantitative changes in the social structure of Kazakhstani society, its transformation in the context of modernization;- determination of value orientations of society (secular and religious spiritual values) in the process of social modernization of Kazakhstan;- study of the practical role of the modernized consciousness of society for the further social renewal of the country;- development of modern mechanisms and technologies for the implementation of relevant transformations in the social policy of the Republic of Kazakhstan;- consideration of international experience of social innovations in the context of their adaptation to the conditions of social modernization in Kazakhstan;- proposal of objective criteria for the effectiveness of the social state model in Kazakhstan and their assessment in the process of social modernization;- development of scenarios and design of ways for further development of social modernization in the Republic of Kazakhstan;- introduction of an interdisciplinary approach in the analysis, design and adjustment of the model of social modernization in Kazakhstan;- identification of new topical paradigms for the study of problem areas in the process of social modernization in Kazakhstan.  |
| **3. What points of strategic and program documents are decided by:**Kazakhstan in a new reality: time for action. Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan on September 1, 2020.IV. Social well-being of citizens is the main priority "justifies the urgency of social modernization:" In general, we need a new social paradigm ... Here we need a fresh look, new approaches, reliance on international experience "X. Civic participation in state governance: "The success of all these reforms and transformations depends on our solidarity, patriotism, and civic responsibility».XI. New quality of the nation: "In unity and harmony, we will overcome all challenges and achieve all our goals».2) Constructive public dialogue is the basis of stability and prosperity in Kazakhstan. Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan on September 2, 2019.IV. A new stage of social modernization“In the social sphere, special attention should be paid to the following areas.Fifth. Further development of the social support system ”.3) Strategy "Kazakhstan-2050": a new political course of the established state. Message from the President of the Republic of Kazakhstan N.A. Nazarbayev to the people of Kazakhstan 2012.7. New Kazakhstani patriotism is the basis for the success of our multinational and multi-confessional society.4) Strategic development plan of the Republic of Kazakhstan until 2025. Approved by the Decree of the President of the Republic of Kazakhstan No. 636 dated February 15, 2018.2.3. Opportunities and challenges of the future:Megatrends and scenarios of global developmentChapter 3. Vision, growth model and development goals of Kazakhstan until 2025, key national indicatorsChapter 4. Critical Breakthrough Changes: Systemic ReformsReform 1. New human capitalReform 6. Modernization of public consciousness5) State program for the development of education of the Republic of Kazakhstan for 2011-2020. Approved by the Decree of the President of the Republic of Kazakhstan No. 1118 dated December 7, 2010.6) State program "Digital Kazakhstan". Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827.4th direction "Development of human capital" - the direction of transformation, covering the creation of the so-called creative society to ensure the transition to new realities - the knowledge economy.7) State program for the development of education and science of the Republic of Kazakhstan for 2020-2025. Resolution of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988.p.5.1.6. Formation of an intellectual, spiritual, moral and physically developed personality.8) Nazarbayev N.A. Looking to the Future: Modernizing Public Awareness. April 12, 2017.9) Nazarbayev N.A. Seven facets of the great Steppe. November 21, 2018.  |
| **4. Expected results.****4.1 Direct results:**- data on the dynamics of qualitative and quantitative changes in the social structure of Kazakhstani society, its transformation and determination of development trends in the context of modernization;- the revealed features of the social structure of the Kazakh aul and forecasts of its transformation in the conditions of post-industrial development;- description of the urbanization process and projected territorial development in the Republic of Kazakhstan, based on the process of social modernization;- the role of informal social groups in Kazakhstan, their classification and the possibility of influencing the processes of social modernization;- the impact of socio-demographic changes on the social structure of the Republic of Kazakhstan and the demographic map of the country for the future;- sociolinguistic features in the implementation of social modernization in Kazakhstan;- study of the state, dynamics and role of elites (central, regional and sectoral sections) in the process of social modernization;- value orientations of society (secular and religious spiritual values) in the process of social modernization of Kazakhstan;- technologies for managing the processes of social modernization based on the advanced international experience of social innovations and their management;- specific principles and criteria for assessing the process of social modernization in the center and at the local level;- present and predicted future problematic, conflict zones of the social process.- ways to harmonize and improve the efficiency of institutions responsible for social modernization in Kazakhstan;- the potential of the social capital of Kazakhstan in the context of the implementation of the "hearing state" as a dialogue between the authorities and society and proposed mechanisms for its actualization.  |
| **4.2 End result:****Social effect of the Program:** Implementation of research should be to concretize the process of social modernization.**Target consumers of the results obtained:** State institutions implementing social, cultural, educational, ideological policies, scientific and pedagogical communities, public organizations, creative unions. |

**Technical Task № 34**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Commonality of history and culture, literature and language, traditions and values. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Comprehensive and specific historical research and creation of a scientifically reasoned history of the North Kazakhstan region from ancient times to the present day, namely: North Kazakhstan in antiquity; land in the Saka era; in the Turkic period; during the period of the Golden Horde; during the period of the Kazakh Khanate; as part of the Russian Empire; Alash figures in the history of the Northern region; during the Soviet period; during the period of Independence.**2.1.1. To achieve this goal, the following tasks must be solved:**- identification and study of archaeological, ethnographic, museum materials for a comprehensive study of the ancient and medieval history and culture of the northern region of Kazakhstan (study of the sources of the identified and archaeological monuments Botai, Baykar, Ak-Iriy, Kyzyl-oba, etc.);- research based on a civilizational methodological approach, taking into account the interests of state and national policy;- study of the patterns of ethnopolitical, ethnosocial, geopolitical, cultural processes on the basis of historiographic research and archival materials;- determination of promising socially significant areas of development and study of the regional history of the North Kazakhstan region;- identification of the main blocks of poorly studied problems of the socio-economic development of the region;- study of the formation of the administrative, state border of Kazakhstan (northern regions);- determination of specific topics of study in the context of the regions of the North Kazakhstan region;- collection and processing of library, museum and archival data on the history of Northern Kazakhstan in the archives of the North Kazakhstan region, Omsk, Tyumen and other cities of the Russian Federation;- development of a list of great names of the Northern region in accordance with scientifically grounded criteria and the use of information about great names and personalities within the framework of scientific activities and propaganda of the cultural heritage of the Kazakh people;- study and research of the problems of onomastics and toponymy of the region in order to return the historical names. |
| **3. What points of strategic and program documents are decided by:**Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";The Law of the Republic of Kazakhstan "On the Protection and Use of Historical and Cultural Heritage" dated December 26, 2019 No. 288-VI ЗРК;Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Seven Facets of the Great Steppe";Development program of the North Kazakhstan region for the period 2021-2024Concept of Cross-Border Cooperation between Kazakhstan and Russia;Message from the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan "Kazakhstan in a new reality: time for action" (2020);The fundamental ideas expressed by the President of Kazakhstan K.K. Tokayev that “a genealogy written in the context of national interests will be able to awaken the consciousness of future generations and will allow preserving the memory of the nation”; in the article "Independence of Kazakhstan is the most precious thing" published in the newspaper "Egemen Kazakhstan" dated January 5, 2021. |
| **4. Expected results.**Raising the level of teaching staff, professional historians and undergraduates who are engaged in historical research on a regional scale;Optimization of local history research, which should contribute to raising students' interest in the history of their native land;Raising the level of historical consciousness of students of general education schools and students of higher educational institutions;Increasing the level of interest in the history of local history;Increasing the share of electronic and printed publications on regional history, educational and methodological literature.**4.1 Direct results:**- the formation of a scientific-methodological and scientific-practical base for the study of the history and culture of the Northern region in schools of the region;- the main archaeological sites of the region, aspects of the study of ethno and geopolitical history;- Reconstruction of socio-economic and ideological contexts at the "Settlement Botay", "Baikar", "Ak-Iriya", "Kyzyl-Oba";- scientific and methodological base for school textbooks on historical local history;- coordination of activities of scientific and local history organizations in the region;- modernization of scientific systems of knowledge on the history of Northern Kazakhstan;- identified general trends and features of the development of polyethnic and interfaith processes in Northern Kazakhstan at different stages of its historical development;- introduction into scientific circulation of new facts from sources and documents containing historical arguments about ethnic groups inhabiting and inhabiting the territory of Northern Kazakhstan in the past from ancient times to the present. |
| **4.2 End result:**Scientific-theoretical and scientific-practical research results should contribute to:- development of conceptual foundations of the study and determination of the relevance of the history of Kazakh statehood to the concept of statehood in the Strategy "Kazakhstan-2050";- expanding and deepening research on national history, regional history,- improving the methodological base in the development of programs for the development of Northern Kazakhstan;- publication of an updated collection of historical and cultural monuments of the North Kazakhstan region.Expected social and economic impactThe results of the program should be the basis for making adjustments to the study of the historical and cultural heritage at the republican and regional levels, its use as a basis for creating modern strategies and models for the development of social development. The implementation of the Program should allow to properly coordinate the work of authorized and local executive bodies, develop a mechanism for bringing the perpetrators to justice for causing damage to objects of historical and cultural heritage and, as a result, ensure their safety and effective use.Developed optimal models for including heritage in world information and tourist flows, allowing to take into account the tendencies and consequences of globalization and giving flexibility to the domestic system for the preservation and use of historical and cultural heritage.Training courses in local history and regional studies, preparation and implementation of educational programs for teachers of history and social studies; preparation of targeted programs for the preservation and use of historical and cultural heritage.Scientific effect from the implementation of the program: Development and improvement of the scientific-theoretical and applied-practical significance of research activities for the study of the history and culture of the Northern region of Kazakhstan.The results of scientific research should contribute to the consolidation of scientific and public centers and societies for the study of regional history.The economic efficiency of the results of the program should be aimed at the further development of the country's historical science, meeting the needs of specialists in the field of history, archeology, ethnology, ethnography, culture, education, etc.Target consumers of the results obtained:- Researchers-specialists in various fields of the humanities: historians, political scientists, sociologists, ethnographers, culturologists, terminology, onomasts, specialists in applied linguistics, turkology. |

**Technical Task № 35**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities. Fundamental, applied, interdisciplinary research in the humanities.Tugan zher. National unity, peace and harmony. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Creation of a scientific basis for the construction of historical consciousness and stable ideas in the Kazakh society about the formation of the modern Kazakh-Russian border**2.1.1. To achieve this goal, the following tasks must be solved:**- Search and study of empirical material: archival documents, periodicals of other types of historical sources on the topic of research.- Conducting field research in the border zone of Kazakhstan and Russia in order to study folklore and historical-toponymic material on a given problem.- Identification of the main changes in the characteristics of economic and cultural types of the Kazakh people in interaction with the newcomer population.- Study of migration processes in a given period, their causes and directions.- Study of intercultural interaction in the north-western region of Kazakhstan in this period.- Study of the history of the formation and functioning of new social and professional groups in the Kazakh society of the period under study.- Creation of popular science content and popularization of its results. |
| **3. What points of strategic and program documents are decided by:**1. Article of the President of the Republic of Kazakhstan K.K. Tokayev "Independence Above All" dated January 5, 2021.2. Message from the President of the Republic of Kazakhstan to the people of Kazakhstan dated September 2, 2019 Task I. Strengthening social harmony.3. Program article by Elbasy "Looking to the Future: Modernizing Public Awareness" dated April 12, 2017. Modernization of public consciousness and consolidation of society.4. Program article by Elbasy "Seven faces of the Great Steppe" dated November 21, 2018.5. Patriotic act "Mangilik El", adopted at the XXIV session of the ANC on December 15, 2014. |
| **4. Expected results.****4.1 Direct results:**- a scientifically grounded concept of the formation of the modern Kazakh-Russian border based on evidence-based facts.- popular science content for the formation of the historical consciousness of Kazakhstanis.- creation of 10 video lectures on the Kazakh-Russian border area.- coverage of scientific and educational content of the population of at least 70,000 people. |
| **4.2 End result:****Scientific effect:** Development of theoretical and scientific-practical approaches to the study of geopolitical, ethnopolitical and ethnocultural problems in the region.**Social effect of the Program:**- search and introduction into scientific circulation of documents on the problem under study, their popularization in society;- the creation of a stable public rejection of speculations on the topic of mutual territorial claims, the use of historical content in order to undermine national unity, peace and harmony in Kazakhstan.**Target consumers of the results obtained:** Humanities scientists, research centers, universities, Assembly of the People of Kazakhstan, the public. |

# **Technical Task № 36**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Historical and cultural heritage and spiritual values of Kazakhstan. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Comprehensive study of East Kazakhstan as a space for the formation and formation of the Turkic historical and cultural phenomenon and presentation of the results on the web platform. The program is complex, interdisciplinary in nature and should be implemented in several aspects: archaeological, ethnographic, linguistic, comparative legal and historical landscape.**To achieve this goal, the following tasks are supposed to be solved:**1) research of written, oral, archaeological sources, archival materials and artifacts on the history of the region, allowing to objectively assess the historical and cultural continuity of the pro-Turkic, Turkic tribes and the Kazakh people;2) study of the territory of East Kazakhstan as one of the centers of origin of the ancient metallurgy of the Great Steppe and accelerated technological progress at the present stage;3) collection and analysis of ethnographic materials, samples of oral folk art, reflecting the socio-cultural values ​​of different eras of historical time; design and implementation of an exposition and exhibition project based on the results of ethnographic research;4) on the basis of the analysis of the toponyms of East Kazakhstan, the identification of the processes of cultural continuity and interaction with other peoples;5) comparative legal analysis of the Karamolinsky herezhe and other decisions of the Biys congresses as sources of knowledge about the legal foundations of Kazakh society;6) development of tourist routes taking into account the sacred landscapes of East Kazakhstan;7) development and implementation of a multilingual web platform |
| **3. What points of strategic and program documents are decided by:**1. Strategy "Kazakhstan -2050" // https://zakon.uchet.kz/rus/docs/K970002030.2. Program article by Elbasy N.А. Nazarbayev "Looking to the Future: Modernizing Public Awareness" //https://www.akorda.kz/ru/events/akorda\_news/press\_conferen-ces/statya-glavy-gosudarstva-vzglyad-v-budushchee-modernizaciya-obshchestvennogo-3. Program article by Elbasy N.А. Nazarbayev "Seven Facets of the Great Steppe" // https://www.akorda.kz/ru/events/statya-glavy-gosudarstva-sem-granei-velikoi-stepi.4. Article of the President of the Republic of Kazakhstan K.K. Tokayev "Tauelsizdik barinen kymbat" // https://egemen.kz/article/260146-tauelsizdik-barinen-qymbat.5. State program "Digital Kazakhstan" // https://adilet.zan.kz/6. Decree of the President of the Republic of Kazakhstan dated December 28, 2015 No. 148 "On approval of the Development Concept of the Assembly of Kazakhstan (until 2025)" // https://online.zakon.kz/Document/?doc\_id=394259177. State program for the development of education and science of the Republic of Kazakhstan for 2020 - 2025. // http://adilet.zan.kz/rus/docs/P1900000988.8. Law of the Republic of Kazakhstan dated December 26, 2019 No. 288-VІ ЗРК"On the protection and use of objects of historical and cultural heritage" // http://adilet.zan.kz/rus/docs/Z1900000288.9. Concept for Kazakhstan's entry into the 30 most developed countries in the world // http://adilet.zan.kz/rus/docs/U1400000732. |
| **4. Expected results.****4.1 Direct results:**Comprehensive study of East Kazakhstan as a space for the formation and formation of the Turkic historical and cultural phenomenon;Development and implementation of a multilingual web platform (with a mobile application), which should provide free access to the following online services:- an electronic annotated reader.- archaeological map of East Kazakhstan.- virtual excursions in thematic areas.- virtual 3D tours along tourist routes.- illustrated interactive map by toponyms of the East Kazakhstan region.- training video course.- a mobile version of the service with support for a QR code.Popularization of knowledge about the history of East Kazakhstan in the global information space and ensuring the availability of new content through:- indexing pages for inclusion in Google, Yandex (Yandex) search results;- ensuring the results of visits to the web platform at least 3000 per year;- ensuring the number of downloads of documents: at least 500 per year.  |
| **4.2 End result:****Scientific and technical effect:** The results of the program should be aimed at popularizing the results of scientific research on the historical and cultural phenomenon of the formation and development of the Turkic world. Promotion of the historical and cultural heritage of East Kazakhstan as a regional brand at the national and international levels.**Scientific effect:** Introduction into scientific circulation of new sources on the history of culture of East Kazakhstan and new interpretations of sources known earlier. Development of scientific, practical and innovative approaches to the study of historical sources, materials of scientific conferences, scientific works of domestic and foreign researchers on the designated issues. The implementation of the program in the form of an electronic interactive service and a mobile application should make it possible to visually demonstrate the tangible and intangible monuments of the historical and cultural heritage of the Turks on the territory of East Kazakhstan.**Economic effect:** Increasing the tourist attractiveness of the territory of the East Kazakhstan region, creating conditions for the development of small and medium-sized businesses. Involvement and involvement of representatives of local government, industry, business structures, non-governmental organizations in the historical and local history activities.**Social effect of the Program:** The implementation of the Program should contribute to the development of national identity, the growth of interest in the history and culture of the homeland, to form and develop patriotism among young people in both the region and the republic as a whole.**Target consumers of the results obtained:** Schoolchildren and student youth, academia, educational organizations, government agencies and authorized bodies; representatives of small and medium-sized businesses, the population of urban and rural areas. |

# **Technical Task № 37**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Social Sciences and Humanities ResearchBasic, applied, interdisciplinary research in the humanitiesHistorical and cultural heritage and spiritual values of Kazakhstan. |
| **2. Goals and objectives of the program** **2.1. Purpose of the program:** Study of the place and role of the Pavlodar Priirtyshye in the formation of Kazakh statehood. Study of the processes of ethnocultural continuity in different historical periods, taking into account the ongoing intrastate modifications, an increase in the level of national identity, as well as the impact of foreign policy changes on the ethnic structure and geography of the population.**2.1.1. To achieve this goal, the following tasks must be solved:**- Study of the historical foundations of the formation of the population of the Irtysh region.- Reconstruction of the history of the region, the main events and processes of economic and socio-cultural development.- Study of the process of forming state associations (Kimaks, Kipchaks, Mongolian and post-Mongolian periods).- Study of the ethnogenetic continuity of the state forming the ethnic component in medieval states.- Study of the significance of the region in the economic functioning of the Kazakh Khanate.- Study of the significance of the Irtysh region in defending national interests during the period of colonization by tsarist Russia.- Study of the role of the Kazakh intelligentsia. |
| **3. What points of strategic and program documents are decided by:**The implementation of the Program should allow the implementation of the tasks, achievement of the goals and indicators defined in the following strategic and program documents:Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV "On Science";Development Strategy of the Republic of Kazakhstan until 2050;Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness";Message from the Head of State K.K. Tokayev to the people of Kazakhstan "Constructive public dialogue is the basis of stability and prosperity in Kazakhstan" dated September 2, 2019.http://www.akorda.kz/ru/addresses/addresses\_of\_president/poslanie-glavy-gosudarstva-kasym-zhomarta-tokaeva-narodu-kazahstana;Keynote article by K.Tokayev "Tauelsizdik barinen kymbat"https://egemen.kz/article/260146-tauelsizdik-barinen-qymbat;State program for the development of education and science in the Republic of Kazakhstan for 2020-2025 (2020). |
| **4. Expected results****4.1 Direct results:**- theoretical and methodological approaches to the formation of statehood on the territory of Kazakhstan.- patterns of the emergence of state associations and their continuity.- conditions and features of the addition of the state-forming component.- the results of research on ethnopolitical processes in the Irtysh region.- introduction into scientific circulation of data on the ethnic history and ethnogenesis of tribes from the Middle Ages.- conclusions on the study of issues of Kazakh statehood, the system of functioning, territorial framework and ethnic structure.- interaction of the region with adjacent territories in different historical periods. |
| **4.2 End result:**Expected social and economic impact.The implementation of the program should contribute to the development of the national school of historical and ethnological science, to use the potential of young scientists and researchers.The solution of the scientific, theoretical and practical tasks of the program should help to identify the place and role of the Irtysh region in the history of Kazakhstan's statehood as a fundamental factor of the nation. The results of the program should be the basis for increasing historical literacy in the field of medieval studies, forming new qualities of the nation that are in demand in the modern world.The economic efficiency of the results of the program should be aimed at meeting the needs of historians, specialists in the field of culture, archeology, etc., as well as various social groups, the general public seeking to understand and study the history of Kazakhstan.**Scientific effect:** The results of scientific research should contribute to an increase in scientific interest in the studied region, the training of qualified personnel in the field of the humanities.Social impact. The results of the Program should contribute to:- the formation of the historical consciousness of Kazakhstanis.**Target consumers of the results obtained:** Specialized researchers in various fields of history; scientists, employees of state institutions, cultural centers, museums, archives, as well as the general public of the Republic of Kazakhstan and foreign countries.  |

# **Technical Task № 38**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Basic, applied, interdisciplinary research in the humanities:Historical and cultural heritage and spiritual values of Kazakhstan. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:**Study of the history of Western Kazakhstan in the 18th-20th centuries, unknown pages of the life and activities of historical figures, events related to the history of the West Kazakhstan region of this period.**2.1.1. To achieve this goal, the following tasks must be solved:** - a study of the historical characteristics of the socio-economic situation in this territory in the 18th-19th centuries, a scientific study of diplomatic relations with tsarist Russia;- determination of a fundamentally new assessment of the commanding activities of Abulkhair Khan in the war with the Dzungars and the diplomatic mission with Tsarist Russia;- clarification of unknown historical information related to the autobiography and political activities of the rulers.- clarification of archival documents related to the national liberation movement led by Syrym Datula;- research into the history of the creation of the Bukey Horde, an assessment of the historical role of Bukey Khan and the reform activities of Zhangir Khan;- the national liberation movement of Isatay Taimanov and Makhambet Utemisov;- study of the socio-economic, socio-political situation on the territory of Western Kazakhstan in the second half of the 19th century and the beginning of the 20th century, justification as a historical fact of the formation of the Kazakh intelligentsia at the beginning of the 20th century. |
| **3. What points of strategic and program documents are decided by:**Bringing the program to life makes it possible to accomplish tasks, achieve goals and indicators defined in the following strategic and program documents:Law of the Republic of Kazakhstan No. 407-IV dated February 18, 2011 "On Science";State program for the development of education and science in the Republic of Kazakhstan for 2020-2025, 2020;Program article by Elbasy N. Nazarbayev "Looking to the Future: Modernizing Public Awareness" // Egemen Kazakstan, April 12, 2017;State program "Rukhani zhagyru", April, 2017;State program "Archive-2025", 2019; Message to the people of Kazakhstan of the President of the Republic of Kazakhstan K.K. Tokayev "Syndarly Kogamdyk Dialogue - Kazakhstanny Turaktylygy Men Urkendeuinin Negizi", // Egemen Kazakhstan, September 2, 2019;Message to the people of Kazakhstan of the Head of State K.K. Tokayev "Zhana zhadaydaky Kazakhstan: is-kimyl kezeni", // Yegemen Kazakhstan, September 1, 2020;Article of the President of the Republic of Kazakhstan K.K. Tokayev "Independence is the most precious thing", // Egemen Kazakhstan, January 5, 2021.  |
| **4. Expected results.****4.1 Direct results:**The research results are the basis for the publication of a unified scientific work on the history of Western Kazakhstan.**4.2 End result:****Scientific effect:** The introduction of new archival documents related to the history of the region into the scientific circulation contributes to the emergence of scientific conclusions around unknown, dubious issues of the history of the West Kazakhstan region of the 19th-20th centuries.**Social effect of the Program:** Revival of the historical consciousness of the majority, awakening a sense of patriotism in the younger generation and the formation of a respectful attitude towards the history of their native land.**Economic effect:** Drawing up a map of historical monuments, sacred places of the West Kazakhstan region and promoting the revival of domestic tourism.The delivery of archival documents, the discovery of historical exhibits contribute to the replenishment of the fund of the regional museum of local lore.Target users of the obtained results: Historians, scientific applicants in the history of Kazakhstan, history teachers in schools, colleges, university history teachers, schoolchildren, students. |

# **Technical Task № 39**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the social sciences and humanities.Fundamental, applied, interdisciplinary research in the humanities.Spiritual Modernization and the Seven Facets of the Great Steppe |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Conducting comprehensive archaeological research to expand the understanding of the outstanding city of Syganak, the capital of the Kazakh Khanate. Reconstruction of the main elements of the material and spiritual culture of the city, deepening information about the economic and socio-cultural ties between the outstanding cities of the Kazakh Khanate on the Great Silk Road. Popularization of the history of the ancient city as a stronghold of our independence and strong statehood. |
| **2.1.1. To achieve this goal, the following tasks must be solved:** - Carrying out targeted comprehensive research at the Syganak settlement (excavation with a total area of ​​1500 m3).- Study of the features of the building and city functions.- Determination of the ethnic composition of the population.- Revealing the role of the medieval Syganak in the historical formation of our state.- Deepening information about economic and socio-cultural ties between the outstanding cities of the Kazakh Khanate on the Great Silk Road.- Improvement of methods of research, processing and analysis of archaeological material, including using modern technologies and research.- Replenishment of museum expositions with artifacts found as a result of scientific research- Development of proposals for the preservation of Syganak as an object of historical and cultural heritage (recommendations for conservation, museification, development of a set of recommendations for the opening of an open-air museum, use as a tourist site).- Development of electronic versions and inclusion in a digital database of historical written, numismatic and other sources on the history of medieval Syganak. |
| **3. What points of strategic and program documents are decided by:**1. Law of the Republic of Kazakhstan dated December 26, 2019 No. 288-VI "On the protection and use of objects of historical and cultural heritage";2. State program for the development of education and science in the Republic of Kazakhstan for 2020-2025. Goal 2 "Increase the contribution of science to the socio-economic development of the country». Paragraph. Modernize and digitize scientific infrastructure. Clause 5.2.3. To increase the effectiveness of scientific developments and ensure integration into the global scientific space.3. The concept of cultural policy of the Republic of Kazakhstan, approved by the Decree of the President of the Republic of Kazakhstan dated November 4, 2014 No. 939. Clause 4.1. Preservation of the cultural code of the nation.4. Concept for the development of the tourism industry of the Republic of Kazakhstan until 2023, approved by the Government of the Republic of Kazakhstan dated June 30, 2017 No. 406. Clause 4».Revival of the Great Silk Road".5. Program "Mangilik El". Clause 6.1.1. Seven facets of the Great Steppe: the legacy and origins of the spiritual modernization of society6. Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Looking to the Future: Modernizing Public Awareness"7. Program article of the First President of the Republic of Kazakhstan N. Nazarbayev "Seven Facets of the Great Steppe". Item II. Modernization of historical consciousness.8. Article of the President of the Republic of Kazakhstan K.K. Tokayev "Independence is above all" dated January 5, 2021, according to which "the historical consciousness not only of historians, but also of the entire population, especially the younger generation, should be clear and firm».9. State program "Digital Kazakhstan". Clause 5.2. Transition to a digital state, within the framework of which it is planned to "create a network of virtual museums and transfer to electronic format all museum funds, ... significant elements of tangible and intangible historical and cultural heritage". |
| **4. Expected results.****4.1 Direct results:**- Comprehensive research at the Syganak settlement (excavation with a total area of ​​1500 m3).- Studied features of the building and functions of the city.- A certain ethnic composition of the population.- The role of the medieval Syganak in the historical formation of our state.- In-depth information about economic and socio-cultural ties between the outstanding cities of the Kazakh Khanate on the Great Silk Road.- Improved methods of research, processing and analysis of archaeological material, including using modern technologies and research.- Replenished museum expositions with artifacts found as a result of scientific research.- Developed proposals for the preservation of Syganak as an object of historical and cultural heritage (recommendations for museification, development of a set of recommendations for the opening of an open-air museum, use as a tourist site).- Developed electronic versions and inclusion in the digital database of historical written, numismatic and other sources on the history of medieval Syganak. |
| **4.2 End result:****Scientific and technical effect:** Real proposals for the protection, conservation, promotion of a historical monument; activation of the historical and archaeological movement at schools and local museums of local lore, the creation of an electronic information database on the archaeological monument.The results of the scientific and technical program obtained in the course of the research should contribute to the formation of a modern scientific type of thinking, including a complex perception of various aspects of the object under study, interdisciplinary research using various methods, including natural science, information, methods of archeology, cultural anthropology, and contribute to the development of domestic archeology ...Conducting research using the principles of the information approach, three-dimensional visualization and modeling, photographing objects using digital equipment, using GIS technologies.**Scientific effect:** The use of the latest combination of methods adopted by the world community to collect the factual base with the involvement of a wide range of specialists in the natural sciences. Development of proposals for museification and the use of monuments as an object of tourism. Creation of written, numismatic and other sources on the history of medieval Syganak converted into digital format and inclusion in a digital database.**Economic effect:** Development of the potential of Syganak as a tourist destination.**Social effect of the Program:** Attracting young qualified domestic personnel into the science-intensive process. Promotion and popularization of domestic, sacred tourism, the formation of a favorable image of our country.**Target consumers of the results obtained:** Researchers-specialists in various fields of history: anthropologists, museologists, numismatists, ethnographers, ethnographers, archaeological reserve museums, bodies for the protection of monuments, the Ministry of Culture and Sports of the Republic of Kazakhstan. |

# **Technical Task № 40**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Research in the Social Sciences and Humanities.Fundamental, applied interdisciplinary research in the social sciences.Social Science Current Issues and Interdisciplinary Research. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Scientific substantiation of the need for a phased transition to direct elections of local executive authorities from the point of view of efficiency and fairness of management: socio-economic and legal aspects.**2.1.1. To achieve this goal, the following tasks must be solved:**- Analyze the current system of elections of local executive bodies in the Republic of Kazakhstan (at the level of akims of rural districts) in order to improve its mechanisms;- Conduct a SWOT analysis of the system of elections to local executive bodies of the Republic of Kazakhstan and develop matrices of strategic alternatives;- To study international experience in the implementation and development of elections of local executive bodies in order to apply them in the conditions of the Republic of Kazakhstan;- Assess the efficiency and fairness of budget management in the context of direct election of akims of rural districts to improve the quality of life of the population (consider at the level of pilot cases: social development, etc.).- Determine an algorithm of actions to bridge the gap between domestic practice and the best foreign experience in holding direct elections;- Develop guidelines for work and interaction with elective positions in the civil service. |
| **3. What points of strategic and program documents are decided by:**1) Meeting of the Supreme Council for Reforms dated December 9, 2020;2) The fourth meeting of the National Council of Public Trust on October 22, 2020;3) Message of the President of the Republic of Kazakhstan to the people of Kazakhstan "Kazakhstan in a new reality: time for action" dated September 1, 2020;4) the Constitution of the Republic of Kazakhstan dated August 30, 1995;5) Constitutional Law of the Republic of Kazakhstan dated September 28, 1995 "On elections in the Republic of Kazakhstan";6) The Law of the Republic of Kazakhstan dated January 23, 2001 "On local government and self-government in the Republic of Kazakhstan";7) Concept for the development of local self-government in the Republic of Kazakhstan dated November 28, 2012. |
| **4. Expected results.**Based on the results of the study, a report should be provided on the direct and final results achieved through the use of the allocated funds.**4.1 Direct results:**- Results of studying the structure of the electoral legislation of local executive bodies in the Republic of Kazakhstan and abroad;- Identified strengths and weaknesses of the electoral system with a view to further political modernization of the country, as well as developed matrices of strategic alternatives for holding direct elections in the Republic of Kazakhstan;- Ways of adapting international experience in the implementation and development of direct elections of local executive bodies in the Republic of Kazakhstan;- Identified risks of budget management in conditions of direct election of akims;- Certain algorithms of actions to bridge the gap between domestic practice and the best foreign experience in direct elections;- Developed guidelines for work and interaction with elective positions in the civil service;- Developed educational and methodological complex for civil servants on work and interaction with elective positions in the civil service. |
| **4.2 End result:**Methodological and expert support of the process of implementation of direct elections of the system of local executive power of the Republic of Kazakhstan;Improving the efficiency of budget management in territories with the applied model of direct elections;Implementation of the "Hearing State" model through the implementation of a phased transition to direct elections of local executive authorities.**Scientific effect:**Application of the developed methodological recommendations and model of stakeholder interaction in the conduct of direct elections at the local level.Socio-economic impact:Development of direct election of local executive bodies in order to involve the population in the issues of territorial management:Ensuring a clearer division of power between the representative and executive body;Creation of an effective management system at the local level and promotion of the concept of "Hearing State";Increasing citizens' activity in the implementation of constitutional rights.**Target consumers of the results obtained:** Expert community, local executive authorities, civil society. |

# **Technical Task № 41**

# **for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):Humanities and Social Sciences ResearchFundamental, applied interdisciplinary research in the social sciences.Social Science Current Issues and Interdisciplinary Research.  |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Comprehensive interdisciplinary study of the problems of legal development of education, the system of protection of children's rights in the Republic of Kazakhstan and the development of recommendations that have theoretical and practical significance for improving the legal regulation of the education sector and the system of protecting children's rights based on the study of legislation and law enforcement practice of the Republic of Kazakhstan and foreign countries, including OECD countries.To achieve this goal, the following tasks must be solved:- research and assessment of the main stages of development of state and corporate governance in the field of education in the Republic of Kazakhstan; assessment of the prerequisites for the development of legislation and the current situation in this area in order to identify specific problems that need to be resolved;- development of new fundamental pedagogical and social scientific knowledge to create a systematic step-by-step legal development in the field of education and institutions for the protection of children's rights, taking into account digital educational technologies;- a comparative analysis of foreign experience of states in the field of education, including the experience of the countries of Finland, the Netherlands, Great Britain, Japan, Singapore, as well as other OECD countries, and states with a developed education system and institutions for the protection of children's rights;- study of the recommendations of various national and foreign experts (teachers, educational psychologists, sociologists, political scientists) in the field of improving the education system of the Republic of Kazakhstan;- study of the current legislation of the Republic of Kazakhstan in the field of education and institutions for the protection of children's rights for the presence of gaps, conflicts and other shortcomings of legal norms, as well as finding ways to resolve them;- research on topical aspects of violence and bullying against children: current state and assessment of state and legal policy;- study of the causes, risk factors, problems of adolescent suicide in the Republic of Kazakhstan and assessment of state and legal policy;- conducting sociological research in the development of the education system and the protection of children's rights;- research and analysis of international norms and standards in the field of legal regulation of the education system and protection of children's rights, including issues of the Republic of Kazakhstan's readiness to ratify the Optional Protocol to the UN Convention on the Rights of the Child, concerning the communications procedure;- development of specific proposals for improving the current legislation of the Republic of Kazakhstan in the field of education and institutions for the protection of children's rights;- preparation of amendments and additions to the current legislation of the Republic of Kazakhstan (comparative table) in order to eliminate and overcome existing gaps, conflicts and other shortcomings of legal norms. |
| **3. What points of strategic and program documents are decided by:**1. The Constitution of the Republic of Kazakhstan (adopted at the republican referendum on August 30, 1995) (with amendments and additions as of 03/23/2019).2. Message of the President of the Republic of Kazakhstan - Leader of the Nation N. Nazarbayev to the people of Kazakhstan "Strategy" Kazakhstan-2050 ": New political course of the established state" (Astana, December 14, 2012): 4. Knowledge and professional skills - key landmarks of the modern system education, training and retraining of personnel.3. Message of the First President "New development opportunities in the context of the fourth industrial revolution" dated January 10, 2018. Seventh task. Human capital is the basis for modernization. New quality of education.4. Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636 "On approval of the Strategic development plan of the Republic of Kazakhstan until 2025 and invalidation of some decrees of the President of the Republic of Kazakhstan" (as amended on September 10, 2019): Reform 1. New human capital, Priority "Education as the basis of economic growth"; Reform 2. Technological renewal and digitalization, Objective "Development of the scientific research system"; Reform 4. The rule of law without corruption, Priority "Improvement of legislation and provision of conditions for compliance with laws", Objective "Improvement of mechanisms for the protection of human rights and freedoms and property rights».5. Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988 "On approval of the State program for the development of education and science of the Republic of Kazakhstan for 2020 - 2025": Goal 1. Increase the global competitiveness of Kazakhstani education and science, education and training of the individual based on universal values ...6. Message of the Head of State to the people of Kazakhstan dated September 1, 2020».Kazakhstan in a new reality: time for action" - item 5 of the basic principles of basing a new economic course of the country: Development of human capital, investment in a new type of education.7. Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III "On Education" (with amendments and additions as of 01/08/2021).8. Law of the Republic of Kazakhstan dated August 8, 2002 No. 345-II "On the Rights of the Child in the Republic of Kazakhstan" (with amendments and additions as of 07.07.2020). |
| **4. Expected results.****4.1 Direct results:**- the proposed main stages of development of state and corporate governance in the field of education of the Republic of Kazakhstan;- new fundamental pedagogical and social scientific knowledge to create a systematic step-by-step legal development in the field of education and institutions for the protection of children's rights, taking into account digital educational technologies;- foreign experience of states in the field of education, including the experience of the countries of Finland, the Netherlands, Great Britain, Japan, Singapore and other OECD countries, as well as states with a developed education system and institutions for the protection of children's rights;- topical aspects of violence and bullying against children: the current state and effectiveness of state and legal policy;- condition, causes, risk factors, problems of adolescent suicide in the Republic of Kazakhstan and the effectiveness of state and legal policy;- the results of sociological research in the development of the education system and the protection of children's rights;- Compliance with international norms and standards in the field of legal regulation of the education system and protection of children's rights, including the issues of the Republic of Kazakhstan's readiness to ratify the Optional Protocol to the UN Convention on the Rights of the Child, concerning the communications procedure;- recommendations of various national and foreign experts (teachers, educational psychologists, sociologists, political scientists, lawyers) in the field of improving the education system and institutions for the protection of children's rights;- analytical information on the regulatory legal acts of the Republic of Kazakhstan in the field of education and institutions for the protection of children's rights for the presence of gaps, conflicts and other shortcomings of legal norms. |
| **4.2 End result:**- new fundamental scientific knowledge on the creation of a systematic step-by-step legal development in the field of education and institutions for the protection of children's rights, taking into account digital educational technologies;- specific recommendations on the use of foreign experience of states in the field of education, including the experience of the countries of Finland, the Netherlands, Great Britain, Japan, Singapore and other OECD countries, as well as states with a developed education system and institutions for the protection of children's rights;- an analytical report on the study of the current legislation of the Republic of Kazakhstan in the field of education, science and institutions for the protection of children's rights for the presence of gaps, conflicts and other imperfections in legal norms;- report of sociological research in the field of development of the education system and protection of children's rights;- analytical report on compliance with international norms and standards in the field of legal development of education and protection of children's rights, including on issues of violence and bullying against children, adolescent suicide;- specific proposals for improving the current legislation of the Republic of Kazakhstan for the systemic legal development of education and the system for protecting the rights of children;- legislative amendments (comparative table), which can be used in legislative work in the preparation of draft regulatory legal acts in order to improve the legislation of the Republic of Kazakhstan in the field of education and the protection of children's rights.**Scientific effect:** The possibility of a comprehensive systematic study of the legal development of education and the system of protecting the rights of children, which will have a direct impact on the quality and implementation of legal norms, and the formation of an effective legal framework in this area and certain areas of activity, a significant contribution to fundamental pedagogical, social sciences, the formation of and the development of legal science, in particular, the science of constitutional and educational law.New scientific results with the use of general scientific interdisciplinary research methods that make it possible to comprehensively solve many fundamental scientific and practical problems of developing human capital, increasing the competitiveness of Kazakhstani education and protecting the rights of children.**Socio-economic effect:** Improving the quality of Kazakhstani education at all levels of Kazakhstan due to 100% access of children to digital educational technologies by 2023.Reducing the number of crimes committed by minors or with their complicity.**Target consumers of the results obtained:** Scientists and research organizations of a legal, pedagogical, social profile, government agencies and authorized government bodies, local executive bodies, law enforcement agencies, ombudsmen, juvenile courts, human rights organizations, regional economic entities, representatives of small and medium businesses, urban and rural populations.  |

**Technical Task № 42**

**for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Information security assurance. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Creation and testing of a prototype of a national system for assessing risks and threats to national security of the Republic of Kazakhstan |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- Theoretical interpretation of the basic concepts used in assessing risks and threats to national security.- Research on modeling technologies for assessing risks and security threats at the global, regional and country levels.- Development of an information and analytical platform for assessing risks and threats to the national security of the Republic of Kazakhstan.- Formation of a list of trends, challenges and risks to the national security of the Republic of Kazakhstan.- Development of a simulation model of national security risks of the Republic of Kazakhstan.- Formation of a list of threats to the national security of the Republic of Kazakhstan based on the ranking of risks.- Assessment of threats to the national security of the Republic of Kazakhstan using a simulation model.- Development of a software application for an information and analytical platform for assessing risks and threats to national security of the Republic of Kazakhstan.- Organizational support of an information and analytical platform for assessing risks and threats to national security of the Republic of Kazakhstan.  |
| **3. What points of strategic and program documents are decided by:**Strategy "Kazakhstan-2050": a new political course of an established state. Item 6 "Consistent and predictable foreign policy - promoting national interests and strengthening regional and global security».Strategic development plan of the Republic of Kazakhstan until 2025. Objective: Development of a scientific research system». The existing system of scientific research will be reoriented to actively support technological modernization».National Security Strategy of the Republic of Kazakhstan.Message from the Head of State to the people of Kazakhstan dated September 1, 2020. Objective I: New model of public administration». In a rapidly changing world, the speed of decision-making is becoming a threat to national security". |
| **4. Expected results.****4.1 Direct results:**- Scientific and technical information on domestic and foreign achievements in the development of a conceptual framework for assessing risks and threats to national security.- The theoretical concept of the model for assessing risks and threats to the national security of the Republic of Kazakhstan.- Methodological documentation on the use of an information and analytical platform for assessing risks and threats to the national security of the Republic of Kazakhstan.- Training program for specialists of state bodies on working with an information and analytical platform for assessing risks and threats to the national security of the Republic of Kazakhstan. |
| **4.2 End result:** Scientific effect. A holistic understanding of the properties, features and patterns inherent in risks and security threats to assess their impact on the state of protection of the national interests of the Republic of Kazakhstan.Scientific and technical effect. Creation and application of an information and analytical platform for assessing risks and threats to the national security of the Republic of Kazakhstan to detect and predict factors that negatively affect the development of the country (using IT technologies).Socio-economic impact. Optimization of information and analytical work of state bodies in the field of ensuring the national security of the Republic of Kazakhstan. Development of resource support for the development and adoption of decisions in the strategic planning of directions and stages of the country's socio-economic development. Revealing at the early stages of social contradictions, other negative processes and phenomena that can affect the achievement of priorities and goals of state building.**Target consumers of the results obtained:** State bodies ensuring the national security of the Republic of Kazakhstan. |

**Technical Task № 43**

**for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Development of the military-industrial complex, weapons and military equipment, military space technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Creation and practical testing of a prototype of a radar station to improve the efficiency of protection of the State Border of the Republic of Kazakhstan on the Caspian Sea. |
| **2.1.1. To achieve this goal, the following tasks must be solved:**- to study foreign and domestic experience in the development and practice of using modern radar stations used to detect small-sized floating targets in conditions of intense interference from vegetation and waves;- to determine the list of characteristics of the radar, ensuring an increase in the efficiency of protection of the State Border of the Republic of Kazakhstan on the Caspian Sea;- to develop a tactical and technical assignment for the creation of a prototype of a radar;- to develop the hardware and software parts of the radar;- to develop design documentation for the radar;- to develop a program and methodology for testing the created radar sample;- to carry out field tests of the created radar prototype;- to create a scientific and technical laboratory for training specialists in the maintenance and use of the created radar, as well as innovative technical means of protecting the State Border of the Republic of Kazakhstan;- to develop guidelines and determine the tactics of using the created radar sample. |
| **3. What points of strategic and program documents are decided by:**1. Strategy "Kazakhstan -2050": New political course of the established state. Clause 5 Further strengthening of statehood and development of Kazakhstani democracy. “… It is necessary to carry out a large-scale reform of the Border Guard Service. The task is to radically increase the efficiency of its activities, to modernize the material and technical base». Item 6. Consistent and predictable foreign policy - promoting national interests and strengthening regional and global security».... Kazakhstan must strengthen its defense capability and military doctrine, participate in various mechanisms of defensive containment».2. Message from the President of the Republic of Kazakhstan to the people of Kazakhstan dated September 1, 2020 Task I. A new model of public administration».... In a rapidly changing world, the speed of decision-making is becoming a threat to national security». Objective II Economic development in new realities».... The most important task facing Kazakhstan is the full disclosure of its industrial potential».3. Strategic development plan of the Republic of Kazakhstan until 2025. Encouraging investments in applied research and innovation aimed at the development, transfer and adaptation of technologies will make the process of technological renewal continuous. The task "Stimulating innovation". For the long-term development of technologies, it is necessary that Kazakhstani companies not only import new solutions and specialists from abroad, but also create their own technological developments, including those aimed at adapting solutions popular in the world to the peculiarities of the country's market. The task "Development of the system of scientific research" The existing system of scientific research will be reoriented to actively support technological modernization.4. State program for the development of education and science of the Republic of Kazakhstan for 2020 - 2025. Goal 2 "Increasing the contribution of science to the socio-economic development of the country", paragraph 5.2.3. To increase the effectiveness of scientific developments and ensure integration into the global scientific space.5. Concept for Kazakhstan's entry into the 30 most developed countries in the world. Decree of the President of the Republic of Kazakhstan dated January 17, 2014 No. 732. Whereby,"... The development of the national innovation system will be implemented by increasing the efficiency of institutions of state support for research, development and their implementation, the development of intellectual and innovative clusters and optimization of the existing innovation infrastructure". |
| **4. Expected results.****4.1 Direct results:**- Calculation of the radar energy potential.- Hardware and software of the radar prototype.- Design documentation for the radar.- Developed CW radar prototype- Program and test procedure.- Act of testing the prototype of the radar.- Scientific and technical laboratory for training specialists in the maintenance and use of radar.- Methodological recommendations on the tactics of using a new radar in the protection of the State Border of the Republic of Kazakhstan. |
| **4.2 End result:** **Scientific and technical effect:**The results of the scientific and technical program should be aimed at creating effective domestic technical means capable of timely detecting violators of the State Border at sea.The results of the program should help to increase the scientific and technical potential of domestic developers and manufacturers.A new type of radar with export potential should appear.**Scientific effect:** Creation and practical testing of a prototype of a radar station for round-the-clock automatic detection and tracking of small objects against the background of vegetation, as well as the presence of interference from waves when locating sea targets, to increase the efficiency of protecting the State border of the Republic of Kazakhstan on the Caspian Sea.Creation of a scientific and technical laboratory for conducting experimental research in the field of improving technical means of protecting the State Border.**Economic effect:** Reducing the cost of a serial product, operating costs and reducing the time required to restore products (in case of their failure). Continuous improvement of tactical and technical characteristics during the life cycle of products; the possibility of integrating the product with other types of technical means of protecting the State Border; in export earnings.**Social effect of the Program:** Increasing the efficiency of guarding the State Border of the Republic of Kazakhstan; creation of high-tech jobs; training of highly qualified specialists in the field of radar; development of enterprises of the domestic defense-industrial complex.**Target consumers of the results obtained:** Border Guard Service of the National Security Committee of the Republic of Kazakhstan; military scientists; special units of power structures of the Republic of Kazakhstan; educational institutions of national security agencies. |

**Technical Task № 44**

**for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Development of the military-industrial complex, weapons and military equipment, military space technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of a software and hardware complex for automated planning of actions of troops (forces), development of new techniques and methods of conducting joint actions by the Armed Forces with other troops, as well as to ensure and conduct activities and combat training of military formations and military command and control bodies of the branches and services of the armed forces.**2.1.1. To achieve this goal, the following tasks must be solved:**- assembly and configuration of the software shell;- collection of data on tactical and technical characteristics (TTH) of weapons, forces and means of services and combat arms;- entering data and setting up mathematical calculations for the Administrator's workstation;- entering data and setting up mathematical calculations for modifying weather conditions;- data entry and adjustment of mathematical calculations for visualization of cartographic information;- data entry of a set of libraries;- creation of a package of documents for an automated workplace for trainee commanders of ground forces, aviation, anti-aircraft missile formations and air defense units, radio engineering units and subunits (air defense), control and communication systems (Management), electronic warfare troops (EW), engineering troops, radiation chemical and biological (RCB), material and technical support; - creation of a package of documents of symbols. |
| **3. What points of strategic and program documents are decided by:**"Strategy" Kazakhstan 2050 "Clause 6.4 Strengthening the defense capability. Assistance in solving the 2nd priority policy of the Strategic Plan 2025 "Technological Renewal and Digitalization". Implementation of paragraphs 56 of subparagraph 4 "introduction of domestic hardware and software for military systems». Clause No. 65 of subparagraph p/p 3 "improving the quality of training of military specialists and military scientific personnel by introducing modern teaching methods and technologies into the educational process, raising the level of educational, scientific and methodological work, professional training of the teaching staff"; p/n 5 "inclusion in the curriculum of educational materials for the study of trends in the development of military art and military organizational development, the experience of armed struggle, including the use of" hybrid "methods of struggle, with the participation of terrorist and extremist organizations, insurgent troops, private military and security companies, special operations forces "; p/n 6 "improving the educational and scientific laboratory base of military educational institutions, introducing simulators and simulators into the training process for developing skills and imparting practical skills to military personnel». Clause No. 66 p/p 1 "increasing the military scientific potential in the Armed Forces, other troops and military formations by increasing military scientific personnel"; p/n 3 "development of a research base, including laboratories for modeling military operations and military-technical areas"; p/n 5 "the use of leading specialists from other branches of science in the implementation of military scientific research", the Military Doctrine of the Republic of Kazakhstan, approved by the Decree of the President of the Republic of Kazakhstan dated September 29, 2017 No. 554. |
| **4. Expected results.****4.1 Direct results:**- Creation of a software and hardware complex should implement:- algorithms for automatic display of data of the initial and dynamic situation on an electronic map of the area in accordance with planning documents when scenarios are lost in the space-time range;- simulation and conduct of hostilities using the available means of warfare on an electronic map of a given area of ​​the terrain in real and computer time modes;- simulation of combat actions during multilevel, two-sided military games (command and staff exercises KShU) and solving situational tasks of the following categories.The software and hardware complex (PTC) should provide the user with a tool for independently creating models of forces and assets, both their own and the enemy, making adjustments to existing models, developing and playing their own tactics of warfare.**4.2 End result:**After the implementation of the program and the creation of the PTC SMBD, tools should be available that:- adapts to the whole variety of forms and methods of operational and combat employment of troops;- take into account informal initial data, which are the military art of commanders, tactical training of commanders, morale, fatigue of the personnel of the opposing sides;- are based not only on the method of correlation of combat potentials and allow simulating combat actions of tactically autonomous combat groups operating on a wide front and scattered areas without a clear line of combat contact between troops;- are able to visualize the results of modeling tactical actions with real reference to the terrain;The software and hardware complex should provide simulation of combat actions, during which certain situations are played out on an electronic map in real and machine time modes, and at the same time providing trainees with the opportunity to practice combat tactics.Increasing the efficiency of conducting exercises with the simultaneous possibility of reducing the number of exercises associated with the involvement of troops, weapons and military equipment without compromising the quality of the tasks being solved, through the creation and implementation into practice of the software and hardware complex of the system for simulating combat actions and supporting decision-making for combat tactical groups using elements of artificial intelligence.**Social effect of the Program:** Improving the quality of human capital, reducing injuries during military exercises and human losses during the conduct of hostilities.Environmental impact of the Program: Reducing environmental pollution by reducing the use of military equipment in peacetime.**Economic effect:** Significant savings in financial and other material resources allocated for the training and maintenance of the Armed Forces, which will allow them to be directed to the development of the army's combat potential. |

**Technical Task № 45**

**for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Development of the military-industrial complex, weapons and military equipment, military space technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** To develop and create a highly effective, integrated system for conducting information reconnaissance and electronic suppression of enemy systems.Based on the research results, methodological and technical solutions should be developed and proposed for the creation and organization of effective protection of state institutions, military facilities, weapons and military equipment, as well as military units located in places of permanent deployment, during exercises or during hostilities from attack. on them unmanned aerial vehicles.**2.1.1. To achieve this goal, the following tasks must be solved:**- to develop radio devices and electronic equipment for conducting passive electronic and optical reconnaissance using promising element base with programmable logic and new generation microprocessor systems;- to develop an algorithm and software for a complex of passive electronic and optical reconnaissance using technologies of software-defined radio systems and computer vision;- to create a broadband antenna-feeder system with a high directional action coefficient for a radio-technical reconnaissance path;- to develop a radio engineering path for generating signals with a given power for electronic suppression of control channels for unmanned aerial vehicles of the enemy (including the use by the enemy of "swarm systems of ultra-small UAVs");- to develop a tablet for real-time display of reconnaissance and radar information, with display of UAV coordinates;- to develop a mathematical model and automated information processing for making decisions on electronic suppression of enemy vehicles, and in some cases even on their forced landing. In the course of the research, issues of remote control of the complex should also be considered;- to develop a prototype of the complex, and after carrying out field tests, create a prototype of an information intelligence system and electronic suppression of UAV control channels;- based on the results of preliminary studies and scientific provisions, test the developed complex in real field tests, close to combat conditions.  |
| **3. What points of strategic and program documents are decided by:**The scientific and technical assignment fully meets the requirements of clause 6.4 "Strengthening the defense capability" of the Strategy "Kazakhstan 2050" and will contribute to the solution of the 2nd priority policy of the Strategic Plan 2025 "Technological renewal and digitalization".In accordance with the requirements of the National Security Strategy, ensuring - combat and mobilization readiness of the Armed Forces of the Republic of Kazakhstan; equipping with weapons and military equipment; further development of domestic subjects of the republic's defense-industrial complex. Continuation of work to improve the state military-technical policy and innovative development of the military-industrial complex, which corresponds to paragraph 48 of the "Military Doctrine of the Republic of Kazakhstan" |
| **4. Expected results.****4.1 Direct results:**- development of a completely new version of the antenna-feeder system, which will allow ensuring the coordination of the radio frequency spectrum of radiation of radio equipment of aircraft with the input circuits and the path of radio signal processing devices;- a prototype of the complex should include: antenna-feeder and optical devices; a device for processing radio signals and video images; a device for displaying reconnaissance information in real time, as well as a complex for electronic suppression of enemy vehicles.- development of a device for controlling the position of the optical complex and the electronic suppression complex for UAVs of any size, both in range and in height;- the development of software and the use of a promising element base with programmable logic and microprocessor systems should ensure automatic identification, capture of an object for tracking and issuance of a solution for its destruction.**4.2 End result:**Development of the latest innovative technologies to improve weapons and military equipment that contribute to strengthening the country's defense.The results of the program should make it possible to significantly increase the combat readiness of troops and their stability, and contribute to the further development of the scientific, experimental and laboratory base of the country's specialized universities.The economic effect of the implementation of this program should be due to the development of the machine-building and radio-electronic industry, the expansion of existing and the emergence of new sales markets for military products, a multiple decrease in the cost of products in comparison with its purchase, an increase in the ratio of efficiency/cost indicators.The ecological effect is due to the absence of harmful emissions, the use of environmentally friendly materials in the production, the emergence of waste-free production, a decrease in energy consumption in production, and assistance in the development of a "green economy".The social effect of the program is expressed in the creation of new jobs for highly qualified workers in the field of radio electronics and information technology, in the growth of the participation of scientists and engineers of civil and military universities in military projects. |

**Technical Task № 46**

**for research work within the framework of program-targeted financing for 2021-2023**

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| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Research in the field of military security and military art. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of innovative solutions in the interests of increasing the efficiency of decision support by the command and control bodies of the Armed Forces, other troops and military formations of the Republic of Kazakhstan in crisis situations using advanced geoinformation technologies, as well as guidelines for their implementation into the system of combat (operational) support of troops.**2.1.1. To achieve this goal, the following tasks must be solved:** - deployment of a laboratory of geospatial information;- organization of pilot production of prototypes of new types of geospatial products with their adaptation to the requirements and specifics of users, testing the functionality of their use in specific industries;technical improvement of technologies for the production of new types of geospatial information, reduction of the duration of the development cycle and organization of their production in the interests of combat support of the Armed Forces, other troops and military formations of the Republic of Kazakhstan.  |
| **3. What points of strategic and program documents are decided by:**Clause 6.4 "Strengthening the defense capability" of the Strategy "Kazakhstan 2050";2nd priority policy of the Strategic Plan 2025 "Technological Renewal and Digitalization";Military doctrine of the Republic of Kazakhstan;State program "Digital Kazakhstan". |
| **4. Expected results.****4.1 Direct results:**- laboratory for pilot production of prototypes of new types of geoinformation products (VR and AR technologies, maps on holographic, polymer and fabric bases, as well as analog 3D terrain models of high accuracy based on a digital terrain matrix) with their adaptation to the requirements and specifics of users, as well as testing functionality of their use;- a methodology for integrating innovative functionally-oriented military (dual) geoinformation technologies into a decision support system for military command and control bodies and mastering their pilot production;- technology for the production of prototypes of new types of geoinformation products must be protected by appropriate rights in accordance with the legislation of the Republic of Kazakhstan.The implementation of the program should make it possible to introduce into the combat support system of troops:- Augmented Reality (AR), which involves expanding the real physical world with visual effects through computer generated or extracted real sensory raw data such as sound, video, graphics or GPS data to improve the user experience;- Internet of Things (IoT), combined with modeling of additional data of the visible spectrum during remote sensing in near real time;- virtual reality (VR), which will allow the user to fully immerse themselves in an environment with the effect of presence;- 3D printing of a digital elevation model, an additive manufacturing technology used to create 3D solid objects. It should allow you to respond quickly and with high accuracy to changes in space, help to improve the efficiency of managerial decision-making in crisis situations..**4.2 End result:**Expected social and economic impactDevelopment and implementation of innovative technologies into the system of support and decision-making by military command and control bodies.The program should contribute to the implementation of the following measures to maintain the combat readiness of the Armed Forces, other troops and military formations.- development of the training material and technical base to improve the efficiency of decision-making in crisis situations, training in new ways of conducting combat operations (in settlements, mountainous terrain, etc.), which allow practicing exercises in the dynamics of combat;- improving the educational and scientific laboratory base of military educational institutions, with the introduction of simulators, simulators based on augmented (AR) and virtual reality (VR) technologies in the training process to develop skills and impart practical skills to military personnel;**Economic effect:** A multiple reduction in the cost of geoinformation products in comparison with its purchase. Improving the ratio of indicators: efficiency/cost.**Social effect of the Program:** Creation of new jobs for highly qualified workers in the field of geoinformation technologies, as well as the growth of scientific potential.Environmental effect of the Program: Absence of harmful emissions; processing of the final product of production, in contrast to the main production; use in the production of environmentally friendly materials; the emergence of waste-free production; reduction of energy consumption in production; assistance in the development of the "green economy". |

**Technical Task № 47**

**for research work within the framework of program-targeted financing for 2021-2023**

|  |
| --- |
| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Development of the military-industrial complex, weapons and military equipment, military space technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development of a complex that ensures the reception of ADS-B information transmitted by the aircraft system, its automatic processing with monitoring compliance with flight corridors and flyovers, border crossing control and flight schedules, output of processed information to visualization tools, as well as generating alarms and statistical reports.**2.1.1. To achieve this goal, the following tasks must be solved:** - development of a field ("military") version of the ADS-B receiver of information transmitted by the aircraft system, with increased resistance to climatic and mechanical factors, the presence of a backup power supply capable of operating autonomously for a long time;- development of a system for collecting information, including communication channels, transmission and switching;- development of a system for processing incoming data, carrying out automatic control of aircraft flight, generating statistical reports and issuing alarms. |
| **3. What points of strategic and program documents are decided by:**Priority Goal # 1 "National Security" of the "Kazakhstan 2030" Program.Goal 6.5 "Strengthening the national defense capability and military doctrine" of the Strategy "Kazakhstan 2050".Priority policy of the Strategic Plan 2025 "Technological Renewal and Digitalization". |
| **4. Expected results.****4.1 Direct results:**- a prototype of the field ("military") version of the ADS-B information receiver;- a prototype of the center for collecting information from ADS-B receivers;- software for automatic control of aircraft flight;- software for generating statistical reports and issuing alarms;- design documentation for the ADS-B receiver.The development of the complex will make it possible to equip the Air Defense Forces with a new means of technical control of the air situation.**4.2 End result:** A prototype of the complex.**Expected social and economic effect:** Development of a complex that will significantly expand the capabilities of the Air Defense Forces in organizing control of the air situation. Organization of new jobs for highly qualified workers in the field of radio electronics and information technology. |

# **Technical Task № 48**

# **for research work within the framework of program-targeted financing for 2021-2023**

|  |
| --- |
| **1. General information:****1.1. The name of the specialized direction for a scientific, scientific and technical program** (hereinafter referred to as the program):National security and defense.Development of the military-industrial complex, weapons and military equipment, military space technologies. |
| **2. Goals and objectives of the program****2.1. Purpose of the program:** Development and improvement of the technology of thermal spraying of coatings for the creation of high-quality protective and wear-resistant coatings on parts of weapons and military equipment operating in aggressive environmental conditions and operation in a combat situation.**2.1.1. To achieve this goal, the following tasks must be solved:**  - to study the existing understanding of the mechanisms of destruction of parts of weapons and military equipment from aggressive environmental factors and operating conditions in a combat situation and justify the choice of an effective method and material for coating;- research and development of the technological basis for preliminary surface preparation for thermal spraying to create high-quality adhesion;- research and development on their basis of technologies for obtaining high-quality coatings by high-speed spraying;- experimentally determine the optimal parameters of the spraying mode;- to carry out comprehensive studies to determine the physicochemical and service characteristics of the obtained coatings;- to apply the results of the work to create an industrial technology for applying protective coatings by the method of high-speed spraying. |
| **3. What points of strategic and program documents are decided by:**Strategy "Kazakhstan 2050" clause 6.4 "Strengthening the defense capability". Assistance in solving the 2nd priority policy of the Strategic Plan 2025 "Technological Renewal and Digitalization". In accordance with the clauses of the National Security Strategy, ensuring: combat and mobilization readiness of the Armed Forces of the Republic of Kazakhstan; equipping with weapons and military equipment; development of domestic subjects of the military-industrial complex. Clause 48 of the Military Doctrine of the Republic of Kazakhstan: improving the state military-technical policy; development of the military-industrial complex. |
| **4. Expected results.****4.1 Direct results:**- development of high-speed spraying technology, which makes it possible to obtain high-quality coatings to protect parts of weapons and military equipment from aggressive environmental factors and operating conditions of the combat situation.- optimization of the parameters of the spraying process, ensuring the application of a high-quality protective and wear-resistant coating;- optimal modes of surface preparation, as well as temperature conditions, spraying distance and other indicators ensuring high-quality adhesion of coatings;- development of regulatory, technical and methodological documentation;- recommendations on the procedure for using thermal spraying of coatings for the restoration of various parts of weapons and military equipment;**Target consumers of the results obtained:** Repair and restoration bodies that repair weapons and military equipment, as well as other industries interested in increasing the durability and protection of equipment parts, regardless of their purpose.**4.2 End result:**Expected social and economic impact- Development of technology contributing to the strengthening of the country's defense.- Reducing the cost of material, energy and labor resources, ensuring the reliable operation of the main mechanisms of weapons and military equipment, allowing to reduce downtime, improve the quality of products of weapons and military equipment.**Economic effect:** The developed high-speed spraying technology should significantly increase the wear resistance and, accordingly, the service life of the weapons and military equipment already in service, and ensure financial savings, allowing the released resources to be directed to the purchase of modern high-tech weapons and military equipment.Environmental effect of the Program: The introduction of thermal spraying technologies should contribute to solving environmental problems by intensively displacing galvanic, environmentally very dirty technologies from industry.**Social effect of the Program:** Contribution to the acquisition of new knowledge and the development of breakthrough technologies. |

Appendix 3

to the Tender documentation

for program-targeted funding

for scientific, scientific and technical

programs for years 2021-2023

**The Contract №\_\_\_**

**for program-targeted financing**

**Nur-Sultan "\_\_\_" \_\_\_\_\_\_\_\_\_\_ 20\_\_\_ year**

State Institution "Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan", hereinafter referred to as the Customer, represented by the Chairman Kurmangalieva Zh. D., acting on the basis of the Regulations on the Committee of Science, approved by the order of the Executive Secretary of July 10, 2019 No. 169-K and the order of the Minister of Education and Science of the Republic of Kazakhstan of December 25, 2019 No. 169-ж., on the one hand, and (for individuals). persons Full name/ for legal entities the legal name of the organization), hereinafter referred to as the Executor, in the person (only for legal entities The position of the head of the Full name), acting on the basis of (for individuals persons identity card/for legal entities legal document), issued/approved (for individuals persons issued by whom and from what date "\_\_\_" \_\_\_\_\_\_\_\_\_\_ year/for legal entities from "\_\_\_" \_\_\_\_\_\_ on the other hand, hereinafter jointly referred to as the Parties, on the basis of the Budget Code of the Republic of Kazakhstan of December 4, 2008, the Law of the Republic of Kazakhstan of February 18, 2011 "On Science", the Resolution of the Government of the Republic of Kazakhstan of May 25, 2011 No. 575 " On Approval of the Rules of Basic, Grant, program-targeted financing of scientific and (or) scientific and technical activities», Resolution of the Government of the Republic of Kazakhstan dated May 16, 2011 No. 519 "On National Scientific Councils", Order \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from \_ \_ \_ \_ \_ 201 \_ \_ \_ year No. \_ \_ \_ "On approval of the tender documentation for program-targeted funding for scientific and (or) scientific and technical programs for 2021-2023", order (s) of the Chairman of the Committee of Science of the Ministry of Education and Science (from \_\_\_ \_\_\_\_\_\_\_\_ 20\_\_\_ year # \_ \_ \_ for 8 priorities (select the required priority (s) "On Approval of the Decision of the National Scientific Council on program-targeted funding of scientific Research for 2021-2023", decisions of the National Scientific Councils on program-targeted funding under the priority "Indicate the implemented priority" (Protocol of the "\_\_\_"\_\_\_\_\_\_\_\_ 2020 year No.\_\_), have concluded this agreement (hereinafter referred to as the Agreement) on the following:

**1. Subject of the contract**

1.1. The Customer instructs, and the Contractor assumes obligations, to carry out scientific research (s), within the framework of the state order for the implementation of a scientific and (or) scientific and technical program under the budget program 013 «Applied scientific research in the field of health care and sanitary and epidemiological welfare of the population», specifics 156 «Payment for consulting services and research» for a total amount of \_\_\_\_\_\_\_ (amount in words) for the entire duration of the program, broken down by years:

within the amount of financing for 2021 - in the amount of \_\_\_\_\_\_\_\_ (amount in words);

within the amount of financing for 2022 - in the amount of \_\_\_\_\_\_\_\_ (amount in words);

within the amount of funding for 2023 - in the amount of \_\_\_\_\_\_\_\_ (amount in words), by priority: (indicate name) and by topic (s): 1) IRN «\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_» (indicate program topics of the corresponding priority for the organization).

1.2. The content and timing of the main stages of the implementation of a scientific and (or) scientific and technical program for targeted program funding are determined by the work schedule according to the Contractor's competitive application for targeted program funding.

1.3. The documents listed below and the conditions stipulated in them form this Agreement and are an integral part of it:

1) This Agreement;

2) Schedule (Appendix (s) 1.1-1. \_);

3) Report on the use of allocated funds (Appendix (s) 2.1-2. \_).

**2. Characteristics of scientific and technical products**

2.1 Characteristics of scientific and technical products by qualification characteristics and economic indicators are indicated in clause 2 of the calendar plan (s), in accordance with Appendices 1.1-1

**3. The total amount of the contract and terms of payment**

3.1. The total amount of the Agreement is \_\_\_\_\_\_\_ tenge (amount in words) for the entire duration of the program, broken down by years:

within the amount of financing for 2021 - in the amount of \_\_\_\_\_\_\_\_ (amount in words);

within the amount of financing for 2022 - in the amount of \_\_\_\_\_\_\_\_ (amount in words;

within the amount of funding for 2023 - in the amount of \_\_\_\_\_\_\_\_ (amount in words, including the cost of all costs associated with the performance of work, including all taxes and other mandatory payments to the budget, in accordance with the legislation of the Republic of Kazakhstan.

3.2 The Contractor's works are paid by the Customer in the following order: The Customer prepays 30% of the financing amount for the corresponding year, within 10 (ten) working days from the date of registration of this Agreement with the Treasury.

Subsequent payment is made with proportional deduction of the previously paid advance, in accordance with the financing plan for payments after the Contractor provides and the subsequent signing by the Parties of an act of work performed.

The final payment by the Customer under the Agreement at the end of the relevant financial year (first year, second year of the program implementation (interim)) is carried out in accordance with the financing plan for payments after the Contractor submits: a report on scientific and (or) scientific and technical activities, positive decision (s) of the National Scientific Councils, a report on the use of the allocated funds (Appendix 2.1-2.\_ to the Agreement), and the subsequent signing by the Parties of an act of work performed, in accordance with the requirements established by law.

The final payment by the Customer under the Agreement at the end of the relevant financial year (the third year of the program implementation (final)) is carried out in accordance with the financing plan for payments after the Contractor submits: a report on scientific and (or) scientific and technical activities, a conclusion of the state scientific and technical expertise, positive ( -s) the decision (s) of the National Scientific Councils, a report on the use of the allocated funds (Appendix 2.1-2.\_ to the Agreement), and the subsequent signing by the Parties of an act of work performed, in accordance with the requirements established by the current legislation. IIT is transferred to the Russian State University State Revenue Management for the Esil district of the State Revenue Department for the city of Nur-Sultan BIN BIK.

3.3. Funding source: Republican budget.

3.4. The contractor is obliged to ensure proper accounting and analysis of the actual cost of the work performed in the context of its stages, in the manner prescribed by law.

3.5. In accordance with subparagraph 40) of article 394 of the Code of the Republic of Kazakhstan dated December 25, 2017 «On taxes and other obligatory payments to the budget (Tax Code)», the Contractor is exempt from value added tax.

**4. The order of delivery and acceptance of works**

4.1. The contractors submit to the Customer an interim report on scientific and (or) scientific and technical activities (first year), the second year of the program implementation) no later than November 15 of the current reporting year in accordance with GOST 7.32-2017. Final reports on scientific and (or) scientific and technical activities - no later than November 1 of the current reporting year.

4.2. The Contractor submits to the Customer an interim report on the use of the allocated funds (first year), the second year of the program implementation) (Appendix 2.1-2.\_ to the Agreement), an act of work performed and the decision of the National Scientific Council no later than December 20 of the current reporting year.

The Contractor submits to the Customer a final report on the use of the allocated funds for program-targeted financing (third year - with a period of implementation of 3 (three years) (Appendix 2.1-2.\_ to the Agreement), an act of work performed, the conclusion of the State Scientific and Technical Expertise and the decision of the National scientific council no later than December 20 of the current reporting year.

The Contractor ensures the accuracy and legality of the information reflected in the report on the use of allocated funds for program-targeted financing.

4.3. When publishing scientific work, research results (articles, reviews, titles of protection, including patents, monographs, materials of conferences, forums and symposia, textbooks, etc.) obtained during and (or) after the completion of the program, the authors are obliged to order must refer to the received targeted funding indicating the IRN of the program and the source of funding (Ministry of Health of the Republic of Kazakhstan).

4.4. If, in the process of implementing a scientific and (or) scientific and technical program for program-targeted financing, it becomes clear that a negative result is inevitable or that further implementation of a scientific and (or) scientific and technical program is unreasonable, the Contractor is obliged to suspend them, notifying the Customer within five days after suspension of work.

In this case, the parties are obliged to consider the feasibility and directions of the continuation of the scientific and (or) scientific and technical program by obtaining a decision of the National Scientific Council.

4.5. Equipment, devices and (or) inventory purchased by state organizations under the program are assigned to their balance sheets.

**5. Responsibility of the parties**

5.1. In case of failure to fulfill the obligations stipulated by the Agreement, the parties are liable on the terms and in the manner prescribed by law.

5.2. In the event of failure to complete work on the scientific and (or) scientific and technical program within the timeframes specified in Appendix (s) 1.1-1\_ of this Agreement and clause 4.1 of the Agreement, the Contractor shall pay a penalty in the amount of 0.03% of the corresponding the current year of the scientific and (or) scientific and technical program for each overdue calendar day. In this case, the total amount of the forfeit (fine, penalty) should not exceed 10% of the total amount of the Agreement.

In case of non-performance and improper performance of the work stipulated by the work schedule (Appendix 1.1- 1.\_) of this Agreement, the Contractor shall pay a penalty in the amount of 0.05% of the amount of the corresponding current year of the scientific and (or) scientific and technical program to the income of the corresponding budget for each overdue calendar day.

To deduct the amount of the penalty, the Contractor and the Customer conclude an additional agreement to the Agreement.

5.3. In the event of non-fulfillment and improper fulfillment by the Contractor of work on the scientific and (or) scientific and technical program, the Customer has the right to stop funding them at any stage of implementation, based on the decision of the National Scientific Council.

5.4. Funds for program-targeted funding are distributed by the scientific supervisor of the program, appointed by the applicant for direct supervision of scientific and (or) scientific and technical programs, according to the application for program-targeted funding.

5.5. Funds of program-targeted financing are directed to expenses directly related to the implementation of a scientific and (or) scientific and technical program, in accordance with the requirements established by law.

5.6. In the event of ineffective and unjustified use of program-targeted funding, the Contractor is liable in the manner prescribed by law.

**6. Other conditions**

6.1. Monitoring of the implementation of the scientific and (or) scientific and technical program and their effectiveness, including on-site visits, as well as monitoring the effectiveness of the scientific and (or) scientific and technical program is carried out in accordance with the current legislation.

6.2. In the event of amendments to the Law of the Republic of Kazakhstan «On the republican budget for 2020-2022», in terms of reducing funds for the corresponding financial year allocated for the implementation of a scientific and (or) scientific and technical program, the Customer, based on the decision of the National Scientific Council, has the right to make corresponding changes to clause 3.1 of the Agreement, the schedule (Appendix 1.1-1. \_ of the Agreement).

6.3. The Agreement comes into force and becomes binding on the Parties from the moment of its registration with the territorial bodies of the Treasury of the Ministry of Finance of the Republic of Kazakhstan and is valid until «\_\_\_» \_\_\_ 20\_\_\_.

6.4. Scientific, scientific and technical programs and reports (intermediate and final) on their implementation are subject to mandatory state registration by the Contractor at the National Center for State Scientific and Technical Expertise (hereinafter referred to as the Center) in the manner prescribed by law, in accordance with the Rules of State Accounting for Scientific, Scientific and Technical projects and programs financed from the state budget and a report on their implementation, approved by order of the Minister of Education and Science of March 31, 2015 No. 149.

6.5. The Contractor is responsible for all claims of third parties.

6.6. The agreement is made in two copies, one copy for each of the parties, having the same legal force.

6.7. All changes and additions to this Agreement are formalized by additional agreements and signed by the first heads of the Parties.

**7. Legal addresses of the parties**

(cannot be placed on a separate page)

|  |  |  |
| --- | --- | --- |
| **Customer:**State Institution "Committee of Science of the Ministry of Education and Scienceof the Republic of Kazakhstan»Nur-Sultan, Mangilik El Avenue, 8 BIN 061 140 007 608 БИК KKMFKZ2A ИИК KZ92 0701 01 KSN 000 0000 Kbe 11 RSI "Treasury Committee of the Ministry of Finance of the Republic of Kazakhstan»**Chairman** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Full name** signature  | **Executor:**Legal name of the organizationLegal addressState, city, street, building numberBIN XXX XXX XXX …БИК XX XX XXИИК XXXX XXXX XXXX …Beneficiary code ХХХThe BANK without a branch and the cityPhone. Required (Executor 's number)**Position (without organization)****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Full name**signature (note-sign with a blue ballpoint pen, the stamp is clear) |  |

**(DETAILS WITH SIGNATURES CANNOT BE PLACED ON A SEPARATE PAGE)**

Attachment 1

to this agreement

No.\_\_ dated «\_\_\_» \_\_\_\_\_\_\_ 20\_\_

**CALENDAR PLAN**

Under contract No. \_\_\_\_\_ dated \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_20\_\_

**1. NAME OF THE CONTRACTOR** (legal entity or individual)

1.1. By priority: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fill in.

1.2. By sub-priority: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fill in.

1.3. On the topic of the program: No. \_\_\_\_ «\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_» Fill in.

1.4. **The total amount of the program** XXXXXX (digital value of the amount of the program) (in words) tenge, including with a breakdown by years, for the performance of work in accordance with clause 3:

- for 2021 - in the amount of XXXXXX (amount in words) tenge;

- for 2022 - in the amount of XXXXXX (amount in words) tenge;

- for 2023 - in the amount of XXXXXX (amount in words) tenge.

**2. Characteristics of scientific and technical products by qualification characteristics and economic indicators**

2.1. **Direction of work:** Fill in.

2.2. Scope: Fill.

2.3. Final result:

- for 2021: Fill in;

- for 2022: Fill in;

- for 2023: Fill in.

2.4. Patentability: Complete.

2.5. Scientific and technical level (novelty): Fill in.

2.6. The use of scientific and technical products is carried out by: Who? Fill in

2.7. Type of use of the result of scientific and (or) scientific and technical activities: Fill in.

**3. Name of work, terms of their implementation and results**

|  |  |  |  |
| --- | --- | --- | --- |
| Tasks code | Name of work according by the Agreement and the main stages of its implementation \* | Period of execution \* | expected result\* |
| Starting | Ending |  |
|  |  |  |  |   |
|  |  |  |  |  |
|  |  |  |  |  |
| Note: \* - indicates the works, terms and their results for 2021, 2022, 2023 for each year, according to the calendar plan of the competition application. |
|  |
| By Сustomer : **Chairman of** State Institution "Committee of Science of the Ministry of Education and Scienceof the Republic of Kazakhstan»\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Full name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **place for stamp** | From the Executor :POSITION "Organization name"\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Full name of the first head of organization **place for stamp of organization** Familiarized with:Scientific supervisor of the program \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Full name (signature) |

(Signatures cannot be placed on a separate page)

(Make a calendar plan separately for each topic of the program)

Attachment 2

to this agreement

No.\_\_ dated «\_\_\_» \_\_\_\_\_\_\_ 20\_\_

**REPORT ON THE USE OF ALLOCATED FUNDS FOR PROGRAM-TARGETED FINANCING**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| №  | Name of the cost item | The amount planned according to the estimate | Amount actually spent | Cost savings | Name of supporting documents | Note |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | Remuneration of labor |  |  |  |  |  |
| 2 | Business trips: |  |  |  |  |  |
|  | within the Republic of Kazakhstan |  |  |  |  |  |
|  | outside the Republic of Kazakhstan |  |  |  |  |  |
| 3 | Other services and works |  |  |  |  |  |
| 4 | Purchase of materials |  |  |  |  |  |
| 5 | Purchase of equipment and / or software (for legal entities) |  |  |  |  |  |
| 6 | Scientific and organizational support |  |  |  |  |  |
| 7 | Rental of premises |  |  |  |  |  |
| 8 | Equipment and machinery rental |  |  |  |  |  |
| 9 | Operating costs of equipment and equipment used for research implementation |  |  |  |  |  |
| 10 | Taxes and other mandatory payments to the budget |  |  |  |  |  |
|  | TOTAL | Total | Total | Total |  |  |

Note:

1) the report for each program and program is filled in separately;

2) the contractor is responsible for the accuracy of the information provided in accordance with the procedure established by law.

Head of the organization \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (signature) Location of stamp. Full name (if any)

Head of the Scientific program \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   \_\_\_\_\_\_\_\_\_\_\_\_\_

 (signature) Full name (if any)

Accountant-economist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (signature) Full name (if any)