IMPLEMENTING ARRANGEMENT #1

UNDER

THE MEMORANDUM OF UNDERSTANDING

BETWEEN

THE UNITED STATES DEPARTMENT OF ENERGY

AND

THE RUSSIAN ACADEMY OF SCIENCES

ON

COOPERATION IN SCIENCE AND TECHNOLOGY

Title: GEOLOGIC ANALOGUES, MIGRATION AND ACCUMULATION OF RADIONUCLIDES IN GEOLOGIC MEDIA

Authority:

This Implementing Arrangement, which is subject to the provisions of the Memorandum of Understanding between the U.S. Department of Energy and the Russian Academy of Sciences on Cooperation in Science and Technology, signed on March 24th, 1999 (MOU) has as its goal the practical implementation of the MOU. It takes into account the results and recommendations of the U.S. Department of Energy / Russian Academy of Sciences Workshop "Science behind Safe Geological Disposal of Radioactive Waste" held October 19-2 1, 1999, in Moscow.

Objectives/Scope:

1. Investigation of the migration of radioactive and stable contaminants, their accumulation on geochemical barriers in different natural geologic media.

2. Investigation of conditions of physical and geochemical isolation of highly toxic radionuclides in crystalline rock massifs.

3. Investigation of natural and man-made mineral mixtures and minerals, suitable for reliable immobilization of highly toxic radionuclides.

4. Development of geological, geophysical, geochemical and hydrogeological

methods of site selection for long-term storage and separate disposal of intermediate and long -lived high level waste.

5. Chemical interactions of actinides in terrestrial ecosystems and transport phenomena: migration in geologic media, sorption/desorption phenomena, effects of biological activities and organic materials, colloid transport.

6. Actinides speciation in soils and water: solubilities and dissolution reactions, cbmplexation with inorganic and organic ligands, redox reactions, colloid formation.

7. Collection of fundamental thermodynamic data for actinides important in understanding contaminant transport.

8. Other areas as mutually agreed, such as engineered materials, long-term materials testing/modeling, geo-stability, and transport/pathway/dose models.

Expected Results:

1. Advancement in the understanding of complex radionuclide transport processes through studies of geological analogues, including both laboratory and field testing.

2. Development of durable waste forms that can be used for a variety of waste streams, including laboratory testing of waste form degradation and radionuclide mobilization.

3. Development of a thermodynamic database as applied to radionuclide migration.

4. New data on the physical and chemical properties of *in situ* underground waters which can be used for the analysis of the migration of stable and radioactive isotopes.

5. Fundamental data on solubility, complexation, and colloid formation of actinides in natural waters, sorption/desorption processes of actinides on various rocks of different degrees of weathering, kinetics and mechanisms of actinides migration in soils depending on types and genetic structure of latter, types of vegetation and other natural factors. These data will enable scientists to assess radionuclide migration at various nuclear waste repositories and, in particular, at the Yucca Mountain, PA Mayak, Krasnoyarsk MCP and others.

6. Data on actinides speciation in natural surface and ground waters as well as in bottom sediments, soils and suspension depending on genetic structure, chemical

Appendices

Please see attached Appendices under this Implementing Arrangement for detailed project descriptions, including funding arrangements.

FOR THE U.S. DEPARTMENT OF ENERGY:

Date: 15 May 2020

FOR THE RUSSIAN ACADEMY OF SCIENCES:

Date: 15/05/20