

**Record of Meeting**  
**Joint U.S.-Russian Workshop on the**  
**Cobalt Dicarbolide Universal Extraction (UNEX) Technology**

Idaho National Engineering and Environmental Laboratory (INEEL)  
Idaho Falls, Idaho  
May 13-24, 2002

**Russian Participants:**

Valery Romanovsky, Khlopin Radium Institute (KRI)  
Mikhail Moshkov, KRI  
Igor Smirnov, KRI  
Vasily Babain, KRI

**U.S. Participants:**

Terry Todd, INEEL  
Scott Herbst, INEEL  
Jack Law, INEEL  
Dean Peterman, INEEL  
Troy Garn, INEEL  
Harold Blackman, INEEL  
Paul Kearns, INEEL  
Liliya Petrachenkova, Science Applications International Corporation (SAIC)  
Kevin Kelly, Thomas E. Albert and Associates, Inc.  
Sergei Silitchev, Thomas E. Albert and Associates, Inc.

**Background:**

The contract between the United States Department of Energy (DOE) and the V.G. Khlopin Radium Institute of the Russian Federation, "Applicability of the Russian Separation Technology to Processing of U.S. Radioactive Waste," is being implemented under the auspices of the Joint Coordinating Committee for Environmental Restoration and Waste Management (JCCEM). The purpose of the contract is to further develop the Cobalt Dicarbolide Universal Extraction (UNEX) process in order to optimize the flowsheet and to demonstrate the use of a regenerable stripping agent for the UNEX process.

The main objectives of the workshop were to perform a flowsheet test of the UNEX process with dissolved pilot plant calcine (non-radioactive), recover the stripping agent from the tests, and then perform a second flowsheet test using the recovered strip reagent from the first test. In addition to the testing, the results of testing performed at the Khlopin Radium Institute in FY02 and the scope of work for testing to be conducted in FY03 were discussed.

### **Workshop Activities:**

During the first week of the workshop, the UNEX solvent was prepared from stock chemicals (cobalt dicarbollide, polyethylene glycol, CMPO and sulfone). Batch distribution coefficient measurements were made with the fresh solvent and dissolved calcine feed solution, to determine the proper composition of the solvent. Flowsheet flowrates were determined from these data and adjustments to the feed pumps in the centrifugal contactor pilot plant were made. The stripping reagent was prepared and the concentration of strip reagent determined.

During the second week of the workshop, testing of the UNEX process on simulated dissolved INEEL high-level waste calcine was performed. The strip product from this test was collected, and regenerated. This regenerated strip reagent was then used in a second flowsheet test to demonstrate the efficacy of the regenerated strip reagent.

### **Preliminary Test Results:**

1) *First Flowsheet Test.* The following results were achieved.

99.995% Sr removal  
99.94% Cs removal  
>99.5% Ce removal  
47% Nd removal

2) *Second Flowsheet Test.* The following results were achieved.

99.998% Sr removal  
99.92% Cs removal  
>99.5% Ce removal  
43% Nd removal

These results confirm the effectiveness of the UNEX process, and in particular, demonstrate that the use of a regenerated strip reagent is equally effective as the original solution. The use of a regenerable strip reagent could result in significantly lower volumes of high activity waste generated from the UNEX process. Additional data on Pu and Am distribution ratios from samples taken during the test and later contacted in a laboratory with radiotracers will provide additional insight into the test.

During the final day of the workshop, discussions were held on the test results, lessons learned, FY03 work plans, and the potential for testing of the UNEX process at the Mayak Production Association.

Dr. Smirnov presented recent results on UNEX flowsheet tests performed at Gatchina and noted the similar positive results between the testing at this workshop and the testing at Gatchina and Zheleznegorsk. He also discussed recent calcine dissolution (aluminum calcine) results at KRI.

Dr. Babain presented results of tests performed at KRI to study different regenerable stripping agents. The results of his work show that various regenerable compounds are

very effective at stripping Cs, Sr, and actinides from the UNEX solvent.

Dr. Romanovsky presented an overview of the KRI to Drs. Blackman and Kearns, of the INEEL and discussed past and current KRI/INEEL collaborative efforts. During his presentation, Dr. Romanovsky informed the INEEL representatives of the recent visit to Russia by Under Secretary Card and the discussions that were held during that time. One of the areas of discussion, according to Dr. Romanovsky, was the potential collaboration between KRI, Mayak and the INEEL to perform large-scale UNEX testing at the Mayak production association.

Dr. Moshkov gave an overview of the international collaborations at the KRI.

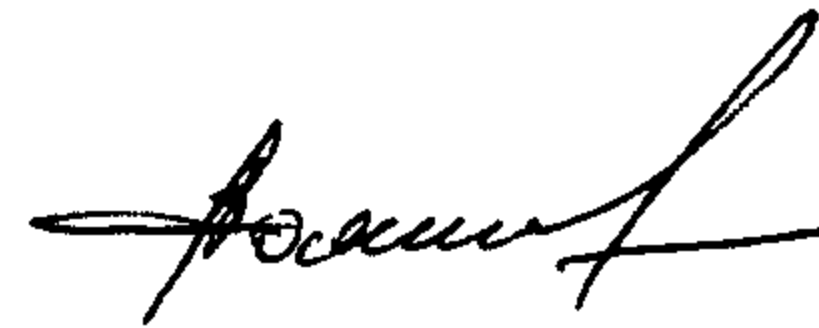
Signed:

For the U.S. side



Terry Todd  
INEEL

For the Russian side



Valery Romanovsky  
V.G. Khlopin Radium Institute