

RECORD OF MEETING

Joint US-Russian Gubka Workshop/Demonstration at Zheleznogorsk, Krasnoyarsk, and St. Petersburg

June 2000

Official Representatives:

Russia: Dr. Albert Aloy (Khlopin Radium Institute, KRI), Konstatin Kudinov and Dr. Alexander Tretyakov (Mining and Chemical Combine, MCC), Prof. Alexander Anshits (Institute of Chemistry and Chemical Technology of the Siberian Branch of the Russian Academy of Science (RAS), ICCT).

U.S.: Dr. Suzanne Clarke (U.S. Department of Energy, DOE), Dr. Dieter Knecht and Dr. Troy Tranter (Idaho National Engineering and Environmental Laboratory, INEEL), Dr. Larry Burchfield (Fluor Hanford).

Interpreter: Dr. Yelena M. Merkulova

Participants: See attached Appendix for list of all participants.

Background: As was documented in the 1999 JCCEM meeting record of decision, the U.S. and Russian principal investigators agreed to conduct joint Gubka workshop-demonstrations in the spring of 2000 in the U. S. and in Russia, using Gubka to stabilize spiked simulant and actual radioactive solutions. The U. S. demonstration was held with Russian participation on March 6-10 at INEEL in Idaho Falls. The Russian demonstration was held on June 3-18 at three sites, the Mining and Chemical Combine at Zheleznogorsk (formerly Krasnoyarsk-26), the Institute of Chemistry and Chemical Technology at Krasnoyarsk, and the Khlopin Radium Institute at St. Petersburg.

Purpose: The overall purpose of the Russian demonstration was to demonstrate capabilities and testing at each site for using Gubka to stabilize problematic solutions, discuss interpretation of the test results, and plan future tests and potential new applications. Proposed specific objectives at each site included the following:

Institute of Mining and Chemical Combine (MCC), Zheleznogorsk, June 4-7:

1. Hot cell demonstration using Gubka to stabilize radioactive solutions,
2. Tour and evaluation of other laboratory test systems, including (a) the MCC microwave melter and (b) a unique high-temperature and high-pressure test system to measure Gubka

- performance under extreme temperature and pressure conditions, and
3. Discussions of (a) the design of future Gubka demonstrations, including stabilization by Gubka of separated HLW streams at the new US-Russian Tank Retrieval and Closure Demonstration Center, (b) the capability for MCC as a potential manufacturing site to produce large quantities of Gubka, and (c) other potential commercial applications of Gubka.

Institute of Chemistry and Chemical Technology (ICCT, Siberian Branch of Russian Academy of Sciences), Krasnoyarsk, June 8-10:

1. Demonstration of equipment for producing Gubka and the instrumentation for testing the Gubka samples, and discuss scale-up conditions,
2. Review of the ICCT test results and discussion of publications,
3. Discussion of new potential catalyst applications of Gubka to destroy some hazardous wastes,
4. Discussion of the patent issues and patent application, and
5. Demonstration and evaluation of other materials for potentially new applications to identify and propose to DOE additional international collaboration tasks.

Khlopin Radium Institute (KRI), St. Petersburg, June 10-18:

1. Demonstration of a new prototype Gubka treatment capsule using simulated solutions containing radioactive tracers,
2. Demonstration of the hot uniaxial press to produce a durable waste form after loading plutonium and americium on the Gubka samples,
3. Demonstration of capability for Gubka waste form testing,
4. Discussion of recent test results to stabilize simulated solutions, such as compositions related to the "cats and dogs" Hanford plutonium solutions,
5. Tour and evaluation of the KRI Gatchina hot cell facility, including a hot isostatic press with radioactive operation capability,
6. Discussion of other solution stabilization applications of Gubka, including stabilization of the high actinide fraction from HLW after separation, and
7. Tour and evaluation of a new high-Pu content glovebox laboratory at KRI, which is available for Gubka tests.

Major Results of the Workshop/Demonstration and Path Forward: All of the objectives described in the previous sections for each site were met. Laboratory demonstrations and tours at all facilities were extremely successful in demonstrating the current status of the testing and the capabilities for future testing. The demonstration at Zheleznogorsk was one of the few access visits granted by MINATOM to outside scientists to this formerly closed weapon's production site. The greatest potential benefit for future collaboration between the U.S. and Russia on this program will come out of the direct, face-to-face contact, discussions and interactions between the scientists of all institutions. Through formal tours, demonstrations, discussions during the work schedule and informal after-hours activities, future options for developing the Gubka technology to meet DOE needs were identified and will be proposed to DOE for consideration in the FY-2001 and beyond funded activities. Specific conclusions that were reached include the

following:

1. Agreement and protocol documents for establishing the patenting process for the Gubka material were proposed by the Russians for DOE's consideration and signed by the Directors of each Russian facilities. If accepted by DOE, these documents will provide the formal basis for JCCEM recommendation to proceed with a Gubka patent application.
2. In addition to the participation in the demonstration by scientists involved in previous Gubka testing and development activities, the U.S. delegation also included scientists representing DOE and the contractor from a potential customer-user site, Hanford. The demonstrations and interactions with both developers and users, as had been started in the U.S. March Demonstration, was instrumental in providing a clearer and more defined focus on the proposed direction of the future research and development program. This is an important step and will increase the probability for technology deployment.
3. A strategy for FY-2001 Gubka technology applications was recommended by both sides for DOE funding. For areas of interest to DOE sites, a scope of work will be proposed in several potential applications:
 - Hanford and INEEL routine laboratory waste solution stabilization testing, demonstration and deployment,
 - Demonstration stabilization tests of Hanford plutonium nitrate solutions containing minor organic constituents to test an alternative to the baseline process with a potential for alleviating some safety concerns,
 - Tests of new Gubka applications combining the highly porous matrix with selective adsorbents to trap specific isotopes out of the solution, with potential NMFA and Tanks Focus area applications,
 - Development and testing of new Gubka materials for specific application to treatment of various DOE sludges, solutions and precipitates,
4. The participants recommend future U.S.-Russian demonstrations in the U.S. at DOE sites, including Hanford and INEEL, for DOE and JCCEM consideration. Gubka technology applications of interest to DOE, including the items of the previous list, are recommended for these workshop-demonstrations.

Action Items:

1. Acceptance by DOE of the Gubka patent protocol and agreement as proposed by the Russian side.
2. A request should be made by DOE to MINATOM for providing the necessary Gubka patenting information for patent submittal under the agreement of JCCEM.
3. Acceptance by DOE of the proposed strategy for future Gubka testing and deployment and development of a scope of work under the available FY-2001 funding.
4. The extensive capabilities of the KRI Gatchina Hot Cells Facility have been used effectively in the past to support DOE research, development and demonstration activities. We recommend that DOE begin more extensive utilization of this facility and KRI personnel where beneficial in applications to the vast clean-up problems at DOE facilities such as Hanford, INEEL, and Savannah River.
5. The advantages of using the new US-Russian Tank Retrieval and Closure Demonstration Center should be more broadly evaluated by potential DOE customers, such as for DOE applications at Hanford and Savannah River tank waste retrieval and treatment.

The Record of Meeting was signed by:

For the U.S. side

Suzanne E. Clarke
U.S. Department of Energy

Dieter A. Knecht
Idaho National Engineering and Environmental
Laboratory

Troy Tranter
Idaho National Engineering and Environmental
Laboratory

Larry A. Burchfield
Fluor Hanford

For the Russian side

Albert Aloy
V.G. Khlopin Radium Institute

Alexander Tretyakov
Mining and Chemical Combine

Alexander Anshits
Institute of Chemistry and Chemical
Technology of the Siberian Branch of the
Russian Academy of Science

Appendix

JOINT US-RUSSIAN GUBKA WORKSHOP/DEMONSTRATIONS AT ZHELEZNOGORSK, KRASNOYARSK, AND ST. PETERSBURG, JUNE 2000.

Specific accomplishments, facilities visited, agenda and names of people contacted at each of the three sites visited listed below.

Institute of Mining and Chemical Combine (MCC), Zheleznogorsk, June 3-6

Accomplishments:

1. Hot cell demonstration using Gubka to stabilize radioactive solutions,
2. Tour and evaluation of other laboratory test systems, including (a) the MCC microwave melter and (b) a unique high-temperature and high-pressure test system to measure Gubka performance under extreme temperature and pressure conditions, and
3. Discussions of (a) the design of future Gubka demonstrations, including stabilization by Gubka of separated HLW streams at the new US-Russian Tank Retrieval and Closure Demonstration Center, (b) the capability for MCC as a potential manufacturing site to produce large quantities of Gubka, and (c) other potential commercial applications of Gubka.

Facilities Visited:

1. MCC Health Center Meeting Rooms
2. MCC Central Laboratories (in formerly secret mined mountain site)

Persons Contacted:

1. Konstantin G. KUDINOV, Deputy Chief Engineer, MCC;
2. Vladislav A. CHERKASSOV, MCC;
3. Alexander A. TRET'YAKOV, Head of Central Plant Laboratory, MCC;
4. Ludmilla F. MANAKOVA, MCC;
5. Sergey V. BERDNIKOV, MCC;
6. Eduard M. KOSTIN, MCC;
7. Maxim V. BURDIN, MCC;
8. Liliya V. SHATOVA, MCC;
9. Vyacheslav A. RUSANOV, MCC;
10. Georgy G. KRAYNOV, MCC;
11. Pavel V. MOROSOV, MCC;
12. Victor I. PAKHOMOV, MCC;
13. Sergey V. PODOYNITSIN, MCC;
14. Yury G. KRIVITSKY, MCC;
15. Alexander V. VASILYEV, MCC;
16. Nikolay V. PONOMAREV, MCC;
17. Alexander A. KANISCHEV, MCC;
18. Alexander Yu. MARKOV, MCC;
19. Alexander A. CHUBENKO, MCC;
20. Larisa V. ZYKINA, MCC;

21. Sergey I. BOGORODSKY, MCC;
22. Igor A. SUTYAGIN, MCC;
23. Sergey V. SVIRIDOV, MCC;
24. Albert S. ALOY, KRI, St. Petersburg;
25. Alexander G. ANSHITS, ICCT, Krasnoyarsk;
26. Galina P. KURYSHEVA, ICCT; Krasnoyarsk;
27. Tatyana A. VERESCHAGINA, ICCT, Krasnoyarsk;
28. Olga M. SHARONOVA, ICCT, Krasnoyarsk;
29. Irina D. ZYKOVA, ICCT, Krasnoyarsk;
30. Nikolay A. TIKUNOV, ICCT, Krasnoyarsk

Agenda:

Sunday, June 4

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| 1. | Welcome speech. Russian delegation introduction | K. Kudinov |
| 2. | American delegation introduction | D. A. Knecht |
| 3. | Agenda discussion | A. Tretyakov |
| 4. | Contractual activities status report on progress “Crystal porous matrix for actinide-containing solutions stabilization” | A. Aloy |
| 5. | Description of material used by Chemistry and Chemical Technology Institute | O. Sharonova |
| 6. | Report “Characteristic of MCC accumulated radioactive wastes and porous glass crystal matrix usage for their immobilization” | E. Kostin |
| 7. | Report “Liquid radioactive wastes immobilization into porous glass crystal matrix. Laboratory test results” | M. Burdin |
| 8. | Report “Characteristic and disposal of PNNL (Hanford) accumulated radioactive wastes” | US Delegation representative |
| 9. | Report “Characteristic and disposal of US National Engineering Laboratory (Idaho Falls) accumulated radioactive wastes” | US Delegation representative |

Monday, June 5

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| 1. | Central Plant Laboratory | |
| 2. | Solidification facility operation | A. Vasilyev |
| 3. | Facility operation for porous matrix saturation with liquid wastes and chemical stability research of solidified products | S. Manakov
M. Burdin |
| 4. | MCC Health Center | |
| 5. | Opinion review | |
| 6., | Invention “GUBKA” Joint patent | A. Anshits |

Tuesday, June 6

1. Report "Implementation at MCC of Tank Retrieval and Closure Demonstration Center" T. Albert
2. Opinion review, plan discussion, preparation and completion on Meeting MEMO

Institute of Chemistry and Chemical Technology (ICCT, Siberian Branch of Russian Academy of Sciences), Krasnoyarsk, June 7-9:

Accomplishments:

1. Demonstration of equipment for producing Gubka and the instrumentation for testing the Gubka samples, and discuss scale-up conditions,
2. Review of the ICCT test results and discussion of publications,
3. Discussion of new potential catalyst applications of Gubka to destroy some hazardous wastes,
4. Discussion of the patent issues and patent application, and
5. Demonstration and evaluation of other materials for potentially new applications to identify and propose to DOE additional international collaboration tasks.

Facilities Visited:

1. Scientist's Meeting House, Academic City, Krasnoyarsk
2. ICCT Laboratories, Krasnoyarsk
3. ICCT Administration Office, Krasnoyarsk

Persons Contacted:

1. Viktor G. Samoilov, Deputy Director, ICCT
2. Elena N. Voskresenskaya, Secretary on Science, ICCT
3. Alexander G Anshits, Head of Laboratory, ICCT
4. Olga M. Sharonova, Senior Researcher, ICCT
5. Tatyana A. Vereshchagina, Senior Researcher, ICCT
6. Galina P. Kurysheva, Senior Engineer, ICCT
7. Natalya N. Anshits, Researcher, ICCT
8. Irina D. Zykova, Engineer of Chemistry Department, Krasnoyarsk State Technical University (KSTU), Post Graduate Student of KSTU
9. Sergey N. Vereshchagin, Senior Scientist, ICCT
10. Nadezhda P. Kirik, Senior Researcher, ICCT
11. Larisa I. Kurteeva, Senior Researcher, ICCT
12. Alexander I. Levinsky, Senior Engineer, ICCT
13. Nina N. Shishkina, Researcher, ICCT
14. Svetlana I. Tsyganova, Junior Researcher, ICCT

15. Anatoley M. Kovalev, Senior Engineer, ICCT; Post Graduate Student of KSTU
16. Evgeney V. Rabchevsky, Senior Technician, ICCT; Student of KSTU
17. Sergey V. Kapustin, Technician, ICCT; Student of KSTU
18. Alexander A. Tretyakov, Chief of the Central Laboratory, MCC
19. Ludmila F. Manakova, MCC
20. Maxim V. Burdin, Engineer of the Central Laboratory, MCC; Post Graduate Student of KSTU

Wednesday, June 7

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| 1. | Welcome speech | V. Samoilov |
| 2. | Participants introduction | A. Anshits, Dieter
A. Knecht |
| 3. | Discussion of Meetings Program | A. Anshits |
| 4. | Agenda discussion | A. Anshits |
| 5. | Report “The characteristics of porous matrixes formed by sintering of cenospheres” | I. Zykova
A. Anshits
T. Vereschagina |
| 6. | Demonstration of samples of Gubka after etching with different media | |
| 7. | Discussion of requirements to porous matrixes of basic types.
Discussion of publications | |
| 8. | Demonstration and evaluation of other materials for potentially new application to help identify additional international collaboration tasks in the NMFA. | A. Anshits
General
discussion |
| 9. | Discussion of final documents of the Patent | T. Vereschagina |

Thursday, June 8

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| 1. | Demonstration of equipment for producing Gubka at test and the instrumentation for testing the Gubka samples | O. Sharonova
T. Vereschagina |
| 2. | Demonstration of salt localization in porous structure of a matrix | N. Kirik |
| 3. | Visit to the Institute of Chemistry and chemical Technology RAS | S. Vereschagin
L. Kurteeva
V. Kuzmin |
| 4. | Discussion and signing of final documents | A. Anshits
Dieter A. Knecht |

Khlopin Radium Institute (KRI), St. Petersburg, June 10-17

Accomplishments:

1. Demonstration of a new prototype Gubka treatment capsule using simulated solutions containing radioactive tracers,
2. Demonstration of the hot uniaxial press to produce a durable waste form after loading plutonium and americium on the Gubka samples,
3. Demonstration of capability for Gubka waste form testing,
4. Discussion of recent test results to stabilize simulated solutions, such as compositions related to the "cats and dogs" Hanford plutonium solutions,
5. Tour and evaluation of the KRI Gatchina hot cell facility, including a hot isostatic press with radioactive operation capability,
6. Discussion of other solution stabilization applications of Gubka, including stabilization of the high actinide fraction from HLW after separation, and
7. Tour and evaluation of a new high-Pu content glovebox laboratory at KRI, which is available for Gubka tests.

Facilities Visited:

1. KRI offices and meeting room, St. Petersburg
2. KRI Gatchina Hot Cell Facilities, Gatchina
3. KRI Gubka, Cold Crucible and Pu Glove Boxes Laboratories (Albert Aloy), St. Petersburg
4. KRI Technicium Production Laboratory (Romanovsky), St. Petersburg

Persons Contacted:

1. Alexander A. Rimsky-Korsakov, Director General, KRI
2. Eugeni B. Anderson, Deputy Director, KRI
3. Mikhail M. Moshkov, Chief of International Links Department, KRI
4. Albert S. Aloy, Head of Laboratory, KRI
5. Alexander A. Tret'yakov, Head of Central Plant Laboratory of MCC
6. Natalia V. Saposhnikova, Research Scientist, KRI
7. Tatyana I. Kol'tsova, Research Scientist, KRI
8. Boris Ya. Galkin, Deputy Director of radiochemical Department, Gatchina-KRI
9. Vadim A. Starchenko, Deputy Director of radiochemical Department, Gatchina-KRI
10. Eugeni S. Alekseev, Deputy Director of radiochemical building, Gatchina-KRI
11. Vladimir F. Saprikin, Head of Laboratory, Gatchina-KRI
12. Anatolii B. Kolyadin, Head of Gas-Purification Laboratory, Gatchina-KRI
13. Dmitriy N. Shishkin, Head of Analytical Laboratory, Gatchina-KRI
14. Vladimir M. Gurevich, Engineer, Gatchina-KRI
15. Alexander V. Strel'nikov, Engineer, Gatchina-KRI

Agenda:**Tuesday, June 13**

1. Meeting at the KRI
2. Discussion of the program of the workshop

3. Introductions at the KRI
4. Information about the KRI
5. Results of the visit to Krasnoyarsk
6. US specialists presentations about Hanford waste and reprocessing technologies
7. US specialists presentations about INEEL waste and ways of its management
8. Discussion of the last results of Gubka samples

Wednesday, June 14

1. Visit to the experimental complex of the KRI in Gatchina
2. Demonstration of test installation
3. Discussion of joint working plans

Thursday, June 15

1. Meeting at the KRI
2. Visit to the laboratory and getting acquainted with the fields of its work
3. Visit to the set of glove boxes of the laboratory
4. Demonstration of loading and drying of Gubka samples and Gubka column for the experiments under vacuum
6. Demonstration of hot isostatic pressurizing of Gubka samples to obtain the final stable product
7. Comparing the results of US and Russian tests

Friday, June 16

1. Meeting at the KRI
2. Determination of the possibility of Gubka utilization for the stabilization of small amounts of Hanford waste. Discussion of solutions compositions.
3. Summing up the results of the meeting. Compiling the Memorandum