Obninsk, 1955: The World's First Nuclear Power Plant and "The Atomic Diplomacy" by Soviet Scientists

Hiroshi Ichikawa*

Abstract

The first nuclear power plant in the world went into operation at Obninsk, a southern suburb of Moscow, in July 1954. One year later, the Academy of Sciences of the Union of Soviet Socialist Republics (USSR) held a large-scale international conference, the Session of the Academy of Sciences of the USSR on the Peaceful Use of Atomic Energy, as an international stage to demonstrate their scientific achievements in nuclear science and technology. Soviet scientists subsequently challenged the United States' nuclear advancement at the First United Nations International Conference on the Peaceful Use of Atomic Energy at Geneva. Could the Soviet scientists succeed in gaining international acceptance and prestige? Could they gain self-confidence? Drawing for the most part on previously classified archival sources in Russia, this paper tries to shed new light on these questions.

Key words: Nuclear development, Soviet Union, Peaceful use of atomic energy, Obninsk, the Geneva Conference in 1955.

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* Professor at the Graduate School of the Integrated Arts and Sciences, Hiroshima University, 1−7−1 Kagami-yama, Higashi-Hiroshima, 739−8521, Japan. E-mail: ichikawa@hiroshima-u.ac.jp

Research for this paper has been supported by the grant-in-aid from the Japan Society for the Promotion of Science (JSPS) [Basic Research: type C. Project No. 253503810] for FY2013−2015, "The Atomic Energy in the Eastern Block" (leader: Ichikawa, Hiroshi); the grant-in-aid from JSPS [Basic Research: type C. Project No. 16K01164] for FY2016−2018, "Internationalization of Nuclear Research in 'the Eastern Block'" (leader: Ichikawa, Hiroshi); and the grant-in-aid from JSPS [Basic Research: type B. Project No. 15H03257] for FY2015−2017, "A Study on the Images of 'Peaceful Use of Nuclear Energy' in Europe and America during the Cold War" (leader: Kido, Eiichi). The author only partly utilizes here his earlier work published in Japanese [Ichikawa, Hiroshi, "Soren-ban 'Heiwan no tameno Genshi' no Tenkai to 'Higashi-gawa' Shokoku, soshite Chûgoku (The Development of the Soviet Version of 'Atoms for Peace', 'the Eastern Block' and China,") Ed. by Katô, Tetsurô and Igawa, Mitsuo, *Genshiryoku to Reisen: Nihon to Ajia no Genpatsu Dônyû* (*Atomic Energy and the Cold War: Introduction of Atomic Power Stations into Japan and Asia*), Tokyo: Kaden-sha, 2013, pp. 143−165]. The author wishes to thank Mr. Vitalii Yur'ievich Afiani, Ms. Irina Georgievna Tarakanova (the Archive of Russian Academy of Sciences), Dr. Wolfgang Matz (Helmholtz Zentrum, Dresden-Rossendolf), and Professor Toshihiro Higuchi (Georgetown University) for their scientific support, as well as Professor Yakup Bektas (Tokyo Institute of Technology) for his help.

1. Introduction

Paul Josephson, a well-known historian who has long been engaged in the history of Soviet science, stated in his well-received book, *Red Atom* (2005) that the Obninsk Atomic Power Station, the "site of the first reactor to produce electricity for a national grid in 1954," beat "any United States efforts to commercialize nuclear power by four years."[1] He went on to say,

> The Obninsk power station was a propaganda coup for the Soviet Union. It demonstrates the peaceful intensions of the nation on the heels of President Dwight Eisenhower's address to the United Nations calling for shared nuclear know-how in medicine, agriculture, transportation, and power generation for the benefit of all humankind.[2]

The success of the Obninsk Atomic Power Station caused further difficulties for the US government, which "had been perplexed at the not so successful realization of the 'Atoms for Peace' address by President Eisenhower."[3]

On July 1–5, 1955, the Academy of Sciences hosted a large-scale scientific conference in Moscow called the Session of the Academy of Sciences of the USSR on the Peaceful Use of Atomic Energy (hereafter, the Session).[4] With many foreign scientists invited, it was an international stage to debut the Soviet-made nuclear reactor built for peaceful purposes—which was the first such reactor in the history of mankind—and to demonstrate the achievements of Soviet science. The Session was immediately followed by the well-known First United Nations International Conference on the Peaceful Use of Atomic Energy (hereafter, the Conference) held in Geneva on August 8–20 of the same year, in which the Soviet scientific achievements in this area rivaled those of the United States.

Nevertheless, historians have rarely discussed the Session prior to the Conference, the efforts that the Soviet Union put into the paired events, and the self-awareness that Soviet scientists acquired through these events. Some exceptions include David

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[1] Paul R. Josephson, *Red Atom: Russia's Nuclear Power Program from Stalin to Today*. Pittsburgh, Pa.: University of Pittsburgh Press, 2005. p. 2.

[2] *Ibid.*,

[3] Tsuchiya, Yuka, "Aizenhauâ Seiken-ki niokeru Amerika Minkan Kigyô no Genshiryoku Hatsuden Jigyô heno Sannyû (On the Entry of American Private Enterprises into the Atomic Power Generating Business)" in Ed. by Katô, Tetsurô and Igawa, Mitsuo, *Genshiryoku to Reisen: Nihon to Ajia no Genpatsu Dônyû* (*Atomic Energy and the Cold War: The Introduction of Atomic Power Stations to Japan and Asia*). Tokyo, Kaden-sha, 2013, p. 69.

[4] The texts of the presentations read there were later published in a five-volume proceedings; Akademiya Nauk SSSR, *Sessiya po Mirnomu Ispol'zovaniyu Atomnoi Energii* (The Academy of Sciences of the USSR, *The Session on the Peaceful Use of Atomic Energy.*), 1–5 Iyulya 1955g., T.1–5, Izd-vo AN SSSR, Moskva, 1955.

Holloway's and John Krige's comments concerning both events. Holloway referred to them in his well-accepted monograph, *Stalin and the Bomb* (1994). He pointed out that the conduct of the Session and the positive participation of Soviet scientists in the Geneva conference were backed by their strong desire to reestablish international liaisons with Western scientific communities and internationalize Soviet science after the long interval of more than two decades since the repressions in the 1930s. He mentions the initiative to prepare for these paired events taken by Igor Kurchatov, the leader of the Soviet nuclear development as a whole, who believed "that Soviet nuclear physics was suffering from unnecessary secrecy and from the lack of contact with Western physicists."[5] Under the assumption that the internationalization of scientific activities is often based upon some nationalistic intentions, John Krige concludes that, "The Atoms for Peace Conference in Geneva in 1955 was such a panopticon,"[6] i.e., an arena for scientific intelligence gathering for both sides of the Cold War.

However, neither Holloway nor Krige clarified the consequences of the Session and the Conference in the context of Soviet scientists due to the shortage of research information regarding this topic. Krige says, "We do not know how Soviet scientists and their administration used the information they got from the British and the Americans in Geneva to strengthen and reorient their national nuclear programs."[7]

Drawing for the most part on previously classified archival sources in Russia, this paper tries to shed new light on these paired events, the Session and the Conference. At first, we will briefly examine the first Soviet reactor for commercial use at the Obninsk Atomic Power Station,[8] particularly with respect to its origin, and then examine the reactions of Soviet scientists to the intelligence on the Western scientific achievements in the field of nuclear science gathered through these two conferences.

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[5] David Holloway, *Stalin and the Bomb.* New Haven, CT: Yale University Press, 1994. p. 352: In addition to such a prominent scientists' ambition to earn international recognition, an outstanding historian of science in today's Russia, Vladimir Vizgin (1936–) suggests the significance of their intention to keep the civil nuclear development apart from direct governmental control, as was seen in the case of military nuclear development, and put it under their own control. See, Vladimir Vizgin (trans.by Hiroshi Ichikawa), "V-3. Soren-ban *Heiwa no tame no Genshi* no Kagaku Akademî niokeru Sutâto." Ichikawa, Hiroshi (ed.), *Kagaku no Sanbô Honbu: Rosia/ Sovieto Kagaku Akademî nikansuru Kokusai Kyôdô Kenkyû* [Vladimir Vizgin, "V-3. The Academic Start of *the Peaceful Atoms* in Soviet Union." in Ed. by Hiroshi Ichikawa, *The General Staff of Science: An International Joint Study on Russian/ Soviet Academy of Sciences*]. Sapporo: Hokkaidô Daigaku Shuppankai, 2016) pp. 398–407.

[6] John Krige, "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence," *Osiris*, 21, no. 1 (2006) p. 167.

[7] Ibid., p. 179.

[8] Paul Josephson shows the details of that reactor (*op. cit.*, in note 1. pp. 25–28).

2. The Unit "AM"

2.1 A Submarine Reactor Out of Water

The decision to develop an atomic engine for a submarine for the first time in the Soviet Union was made at a meeting of the First Main Directorate held on February 11, 1950,[9] which was then in charge of the Soviet nuclear project. They could not, however, gain any essential technical information from the US or other Western countries due to their very rigid control and restriction on information distribution in the midst of the Cold War. In such circumstances, the chief reactor designer, Nikolai Dollezhal' (1899–2000), worked with other designers on a plan to minimize a graphite reactor in terms of the scale and weight and load it onto a submarine. Dollezhal' explains the reason for their choice of a "solid" reactor as follows: they aimed "to exclude the phenomena which might be caused by a 'liquidized' reactor."[10] The graphite reactor that they aimed to develop was codenamed the unit "AM."[11]

In retrospect, such an attempt was destined to fail. The policy change from the utilization of a graphite reactor for a submarine engine to that of a light water reactor (and a liquid metal cooled fast neutron reactor) was ultimately confirmed in the Proclamation of the USSR Council of Ministers dated July 28, 1953.[12] It seems, however, that the infeasibility of their initial attempt had become clear long before that proclamation. As early as March 28, 1950, Major General and First Deputy Chief of the First Main Directorate, Avraamii Zavenyagin (1901–1956), and Academic Secretary of the Scientific and Technical Council of the Directorate, Boris Pozdnyakov (1903–1979), made a

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[9] Pod red. V. A. Sidorenko i dr., *K istorii ispol'zovaniya atomnoi energii v SSSR*, *1944–1951* (*Dokumenty i materialy*) (*Toward the History of the Utilization of Atomic Energy in the USSR —Documents and Materials—*). Obninsk, GNTs Fiziko-energetichekii institute, 1994, pp. 126–127.

[10] N. A. Dollezhal', *U istokov rukotvornogo mira* (*Zapiski konstruktora*) (*At the Sources of the Man-made World —Memoirs of a Designer—*). 2-e izdanie, Moskva, Izdatel'stvo GUP NIKIET, 1999. 148–149, 217: Even in the very primitive stage, some of his colleagues like Savelii Feinberg (1910–1973) and Isai Gurevich (1912–1992) had already begun a trial for the development of a light water reactor. The plan codenamed "Malyutka" was, however, long suspended due to passivity of the upper levels of government which wanted to concentrate all the potentials on making nuclear bombs (Pod red. Sidorenko i dr., *op. cit.*, (note 5) pp. 107–113; A. P. Aleksandrov, *Akademik Anatolii Petrovich Aleksandrov: Pryamaya rech'*. *—Academician Anatolii Petrovich Aleksandrov: Plain Speech.*—Moskva, Nauka, 2001), pp. 127–128.

[11] Pod red. Sidorenko i dr., *op. cit.*, in note 5. 127: The codename "AM" is often referred to as an acronym standing for "Atom mirnyi (Atom peaceful)." Sonia Schmid insists that "AM" "originally referred to naval applications ("naval atom" or *atom morskoi*)" (Sonia D. Schmid, *Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry.* Cambridge, Massachusetts: The MIT Press, 2015, p. 46). It seems, however, that each of such interpretations belongs to a sort of hindsight or a myth created *ex post facto*. As for the codenames of the early nuclear reactors designed by Nikolai Dollezhal' and his Institute, Nauchno-issledovatel'skii i konstruktorskii institut energotekhniki (NIKIET; Scientific Research and Design Institute for Energy Technology), see Pod red. V. K. Ulasevicha, *Sozdano pod rukovodstvom N. A. Dollezhalya…: O yadernykh reaktorakh i ikh tvortsakh* (Ed. by V. K. Ulasevich, *Created under the Leadership of N. A. Dollezhal'…: On Nuclear Reactors and Their Creators*). Moskva, Izd-vo GUP NIKIET, 1999.

[12] V. N. Mikhailov i dr., *Atomnaya otrasl' Rossii* (*Atomic Branch of Russia*). Moskva, IzdAT, 1998. p. 68.

proposal under their joint signature to the Directorate to settle on a plan to utilize atomic energy for the sake of the national economy. The fact that very detailed numerical indexes of the design of a new reactor for this purpose were enclosed with the proposal[13] suggests that definite progress had been made on the design works for this type of nuclear reactor. Their proposal was accepted by the government. The Proclamation of the USSR Council of Ministers No. 2030-788 dated May 16, 1950, titled "On the scientific research, design and experimental activities concerning the utilization of atomic energy for peaceful purpose," combined with its supplements issued on July 8, 1950, marked a new age of atomic energy in the Soviet Union.[14]

2.2 "AM" and the Political Leadership

On November 10, 1949, approximately only two months after the first explosion test of the Soviet atomic bomb, the Soviet representative to the United Nations, Andrei Vyshinskii (1883–1954), referred to the non-military use of atomic energy for the first time in the international arena of the Fourth General Assembly of the United Nations, saying,

> In the Soviet Union we utilize atomic energy not for increasing the stock of atomic bombs. … We are utilizing it for the sake of our interests of economic and managerial character. We will make good use of atomic energy in order to crush the mountains, change the river streams, irrigate wasteland and, thus, open our way for a new life in the places where mankind had hardly stepped into.[15]

This speech, which was the first official remark made by the Soviet political leadership on the peaceful use of atomic energy, was in part anti-American propaganda and in part a self-serving justification for the Soviet atomic bomb, the weapon which the Soviet Union had earlier denounced as "the most serious international crime against the human being" at a meeting of the UN Atomic Energy Committee on June 19, 1946, where it proposed the total prohibition of making and using any atomic bomb.[16]

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[13] Pod red. Sidorenko i dr., *op. cit.* (note 5) pp. 134–137.

[14] *Ibid.*, 140–142, 146–147: Lev Kochetkov (1930–), a major specialist who had been in charge of operating that reactor for a long time, confirmed the fact of this conversion of the purpose of the "AM" development project in front of a camera of NHK (Nihon Hôsô Kyôkai, a TV broadcasting agency of Japan) reporters. The interview was taken in September 18, 2014. The TV program including that scene was broadcasted on November 30, 2014 in Japan, under the title, "Kakuno *Heiwa Riyô*: Shirarezaru Mô-hitotsu no Tôzai Reisen (The Peaceful Use of Nuclear Power: Another Unknown Cold War)."

[15] Cited in V. Vovulenko, "Vstpitel'naya stat'ya (Introductory Article)" //Dzh. Allen, *Atomnaya energiya i obshchestvo* (A Russian version of James Allen, *Atomic Energy and Society*—New York, International Publishers, 1949—). Moskva, 1950. pp. 5–19.

[16] Maeshiba, Kakuzô, Genshiryoku to Kokusaiseiji: Kyôzon ka Kyômetsu ka (Atomic Energy and the

Therefore, it seems that the Soviet political authority, rather than condemning the reactor designers, welcomed the unforeseen emergence of a plan to use the nuclear reactor for a "peace purpose," which by then had already become useless for the initial purpose of building a submarine engine. On October 5, 1952, a year and two months earlier than the "Atoms for Peace" address made by US President, Dwight Eisenhower (1890–1969), a Politburo member, Georgii Malen'kov (1902–1988), spoke highly of the peaceful use of atomic energy at the first day of the meeting of the Nineteenth Convention of the All-Union Communist Party (Bol'sheviki):

> The discovery of methods to produce atomic energy is the most important progress in Soviet science these days. Our science and technology overthrew the monopolizing status of the United States in this area, causing some serious damage to the war arsonist that tries to intimidate and threaten other peoples by taking advantage of their monopoly of the secrets of atomic energy production and atomic weapons. The Soviet state that has learned to produce atomic energy is actually very interested in the utilization of this new energy for peaceful purposes and for the people.[17]

2.3 "AM" and Scientists

It must also be taken into consideration that some leading Soviet scientists had already urged the political authorities to develop non-military use of nuclear power since the days immediately after the end of the Second World War.

The first Soviet scientist that appealed to the government agencies to develop nuclear power for peaceful use was a famous physicist, Pyotr Kapitsa (1894–1984), a Nobel Prize laureate in Physics in 1978. His proposal is assumed to have been made as early as in the autumn of 1945. On October 26, 1945, it was announced at a meeting of the Technical Council (later renamed the Scientific and Technical Council and placed under the First Main Directorate) that a proposal about "the Peaceful Atom" made by Kapitsa was to be considered at the "Special Commission under the State Defense Committee."[18] This commission was then headed by a Deputy-Primer and Politburo member, Lavrentii Beriya (1899–1953), who supervised the Soviet nuclear development project. It was later dissolved in February 1946 and its function was transferred to the Council of Ministers. Determined, Kapitsa also sent a letter offering his proposal to another Deputy-Primer and Politburo member, Vyacheslav Molotov (1890–1986), on

International Politics: Coexistence or Co-extinction?), Tokyo, Tôyô-Keizai-Shimpô sha, 1956. p. 69.

[17] G. M. Malenkov, «Ochyotnyi doklad Tsentral'nogo komiteta VKP(b) XIX s"ezdu partii (The Report of the Central Committee of All-Union Communist Party -Bol'shebiki- to the XIX Congress of the Party)». http://stalinism.ru/dokumentyi/materialy-xix-s-ezda-vkp-b-kpss.html?tmpl=component&print=1&page=

[18] Pod red. Sidorenko i dr., *op. cit.* (note 5), pp. 13–14.

December 18, 1945.[19] Three months later, on February 12, 1946, the Soviet nuclear project leader, Igor Kurchatov (1903–1960), who was later called the "Atomic Tsar," sent a report addressed to Stalin suggesting a rosy near future of the application of atomic energy to technology, chemistry, biology and medicine.[20] In addition, on April 22, 1946, President of the Soviet Academy of Sciences, Sergei Vavilov (1891–1951), sent Beriya (through his deputy, Vasilii Makhnyov–1904–1965–) a "memorandum on the organization of research activities related to atomic nuclear energy in various fields of science and technology."[21]

What is the most noteworthy here is that Kruchatov placed a very strong emphasis on the desirability and adequacy of control over the project by the Academy of Sciences. He says the following in his report dated February 12, 1946:

> In accordance with this [initiation of the peaceful atom project—*Ichikawa*], the USSR Academy of Sciences should be delegated authority to organize the studies on the application of nuclear power and the radioactive materials in technology, chemistry, biology and medicine, as an issue of primary significance and to mobilize the scientists who have not worked on nuclear power yet.[22]

In the Soviet era, even during its Stalinist period, the Academy of Sciences kept its autonomy to some extent, often carried out negotiations with the political authorities, and sometimes provided scientists with "shelter" against political power intervening in science.[23] In the atomic project, however, a governmental agency affiliated with the USSR Council of Ministers, namely the First Main Directorate, directly organized research and development activities, mobilizing a large number of scientists. That was a serious encroachment upon the organization of the Academy; indeed, the Leningrad Physical Engineering Institute—from which many research fellows, including Kurchatov, were mobilized—fell into functional insufficiency.[24] The Academy of Sciences could not remain unconcerned with further encroachment upon its organization. In addition to this, on December 21, 1945, Kapitsa was removed from his post in the "Special Commission," in the Technical Council, and in other organizations (he only retained his full membership in the Academy of Sciences) due to a feud with Beria mainly over the freedom of publication of research results. Kapitsa was forced to confine himself in his own house

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[19] *Ibid.*,

[20] Pod red L. D. Ryabeva, *Atomnyi proekt SSSR: dokumenty i materialy* (*The Atomic Project of the USSR: Documents and Materials*). T. II. Kn. 2. M. Sarov, Nauka- VNIIEF, 2000, pp. 428–436.

[21] *Ibid.*, p. 434.

[22] *Ibid.*, p. 434.

[23] As for the unique history of Russian/ Soviet Academy of Sciences, see Ichikawa, ed., *op. cit*. (note 5).

[24] Rossiiskii gosudarstvennyi arkhiv sotsial'no-politicheskoi istorii (Russian State Archive of Socio-Political History; RGASPI), Fond (F.) 17, Opis' (Op.) 133, Delo(D.) 171, 2–3.

(dacha).[25] This incident made many leading scientists afraid of possible interferences from political authorities. Therefore, it was desirable for scientists to try and put a big scientific project of the state under their own direct control as a way to protect themselves from the interference of political power. On the other side, considering the time and effort required to manage a big new project that was lacking urgency, the Party and government preferred entrusting such a burdensome project that only had ideological significance to an existing organization, i.e., the Academy of Sciences. Thus lobbying by scientists bore fruit: the division of labor between the Academy of Sciences in charge of "the peaceful use" of atomic energy and the government in charge of nuclear weapon development was formalized in the Proclamation of the USSR Council of Ministers dated December 16, 1946, titled "On the development of scientific research activities on the atomic nuclear study and the utilization of nuclear energy in technology, medicine and biology."[26] The main parts of Sergey Vavilov's proposal were adopted in this proclamation.

2.4 The Real "AM"

The Obninsk Atomic Power Station, whose reactor reached the critical state on June 27, 1954, was the first commercial nuclear power plant in the whole world and thus attracted worldwide attention. During the decade following its opening, the plant accepted about 39,000 visitors, including approximately 7,200 foreigners from 65 countries.[27]

In total, 157 holes, each of which had a diameter of 65 mm, were dug vertically with each pitch arranged so as to form an equilateral triangle of 120 mm on each side on the surface of the graphite foundation molded into a cylindrical form of 3,000 mm in diameter and 4,600 mm in height. The reactor required at least 550 kg of fuel, including 27.7 kg of uranium-235; uranium enriched to 5% was used as the fuel.[28] The reactor went critical in 1954, but reached its full capacity only in 1960. That reactor was equipped with a secondary water circle in the cooling system, which reduced thermal efficiency. The control rods filled with boron-carbide in stainless steel tubes were so insufficient in heat resistance that it also became necessary to induce cooling water even into the control rods. Without the cooling water, due to the low airtightness of the control rods, air would have entered the space between the tube and the neutron-absorbing material, and then some tubes would have become so heat-expanded due to high temperatures that they would have been damaged. Such a situation also occurred with the fuel rods. The

[25] Alexei B. Kojevnikov, *Stalin's Great Science: The Time and Adventures of Soviet Physics*. London: Imperial College Press, 2004, pp. 123–146.

[26] Pod red. Ryabeva, *op. cit.* (note 16), T. II, Kn. 3, 2002, pp. 93–97.

[27] A. M. Petros'yants, "Desyatiletie yadernoi energetiki (A Decade of Atomic Energetics)," *Atomnaya energiya* (*Atomic Energy*). Tom 16 Vyp. 6, 1964. p. 480.

[28] D. I. Blokhintsev, N. A. Dollezhal' i A. K. Krasin, "Reaktor atomnoi elektrostantsii AN SSSR (The Reactor of the Atomic Power Station of the USSR Academy of Sciences)." *Atomnaya energiya* (*Atomic Energy*). Tom 1 Vyp. 1, 1956, pp. 10–14.

engineers had to pay close attention to the airtightness of the fuel rods. Nevertheless, a fuel rod rupture accident occurred in 1959.[29]

Although that nuclear reactor had a heat-generating capacity of 30 megawatts, its electrical power generating capacity was only 5 megawatts. Therefore, as Lev Kochetkov later testified in the interview mentioned before, this reactor was an experimental rather than a reactor intended for commercial use.[30] However, the reactor had enough appeal to win the praise of many political leaders of the world, especially from Asia; Obninsk' visitors included Jawaharlal Nehru (1889–1964), the first Prime Minister of independent India, along with his daughter Indira Gandhi (1917–1984) (in 1955), Sukarno (1901–1970), the President of Indonesia (in 1956), Ho Chi Min (1890–1969), the President of the Democratic Republic of Vietnam, Kim Il Sung (1912–1994) from North Korea, and others.[31]

3. The Session of the USSR Academy of Sciences on the Peaceful Use of Atomic Energy

3.1 Hasty Invitations

After the death of Stalin in March 1953, thanks to a slight and passing thawing of tension in the Cold War, Soviet scientists' international ties began to rapidly and significantly expand. While 114 Soviet scientists in total went abroad as members of delegations or in individual capacities within the framework of the USSR Academy of Sciences in 1953, the number of overseas visitors increased to 175 in 1954 and then to 481 in 1955. During the same period, the number of foreign scientists who visited the Soviet Union at the invitation of the Academy of Sciences increased almost four times (from 93 to 362).[32]

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[29] G. N. Ushakov i dr., "Opyt eksplyuatatsii Pervoi d mire atomnoi elektrostantsii AN SSSR (Experience of Driving the First in the World Atomic Power Station of the USSSR Academy of Sciences)." *Atomnaya energiya* (*Atomic Energy*). Tom 16 Vyp. 6, 1964, pp. 485–488.

[30] As for the interview, see the note 10.

[31] State Scientific Centre of the Russian Federation—Institute for Physics and Power Engineering named after A. I. Leypunsky, *The First in the World Nuclear Power Plant* (*To the 60-th Anniversary of Commissioning*). Obninsk, 2014, pp. 190–191: The United States dropped the atomic bombs not on Germany but on Japan and repeated hydrogen bomb tests in the Pacific Ocean region. In short they had never used nuclear weapons toward any white (Caucasoid) people. That fact was a threat for some of the leaders of Asian countries, like Nehru, who felt the racist trend in the US nuclear strategy. They became deeply interested in the problems related to nuclear science and its development in the countries other than the United States (See, Matthew Jones, *After Hiroshima: The United States*, *Race and Nuclear Weapons in Asia*, *1945–1965*, Cambridge University Press, 2010).

[32] The Archive of Russian Academy of Sciences (Hereafter, A RAN), Fond (F.) 579, Opis' (Op.) 18 (1955), No. 6. 4: As for rigid confidentiality of scientific research which obstructed international exchanges of scientific knowledge for a long time in the Soviet Union, a commission was formed with a physicist, Nikolai Dobrotin (1908–2002) in chair in the meeting of the Presidium of the USSR Academy of Sciences on May 28, 1954 to make a new proposal to the Academy on the criteria of confidentiality in scientific research. Eventually, on September 2, 1955, the USSR Council of Ministers adopted a proclamation for the substantial relaxation of foreign travels and other overseas exchanges of scientific information by scientists and other specialists (ARAN F. 2, Op. 6, D. 170. 197).

In such an exciting circumstance, the USSR Academy of Sciences held the Session on the Peaceful Use of Atomic Energy on July 1–5, 1955, only three months after a conference on theoretical physics was held.[33] The Academy sent invitations to influential scientific institutions of various countries, including the Royal Society, Acadēmie des Sciences, Max-Planck-Gesellschaft, the Science Council of Japan (日本学術会議), and others mainly through the formal diplomatic channels. They also sent the invitations directly to leading scientists, such as Patrick Blackett (1897–1974), John Cockcroft (1897–1967), Niels Bohr (1885–1962) and his son, Aage (1922–2009), Werner von Heisenberg (1901–1976), Chandrasekhara Venkata Raman (1888–1970), Robert Oppenheimer (1904–1967), Harold Urey (1893–1981), Ernest Laurence (1901–1958), Fransis Perrin (1901–1992), Lev Kovarsky, Sakata Shôichi (坂田昌一; 1911–1970), Yukawa Hideki (湯川秀樹; 1907–1981), and others.[34] Almost all of them, however, could not accept the invitations due to insufficient time for preparation. The Royal Society replied to the Soviet Union Ambassador to the United Kingdom on June 27, 1955 as follows: "Dear Ambassador, It is with very great regret that I have to let you know that the time at our disposal has proved too short for us to arrange a suitable small delegation to the Conference on the Peaceful Uses of Atomic Energy which is about to start in Moscow on the 1st July."[35] The National Research Council of Canada answered in the name of President E.W.R. Steacie on June 30, 1955, addressing their response to Aleksandr Nesmeyanov (1898–1980), then President of the Soviet Academy of Sciences: "I wish to … express my sincere regret that for the reasons given it is impossible for us to accept your very kind invitation to participate in the Session of the Academy on the Peaceful Uses of Atomic Energy."[36] Ernest Lawrence replied in a letter dated June 22, 1955 to Norair Sisakyan (1907–1966)—who was then a correspondent member of the Academy of Sciences playing an active role in the field of international relations—as follows: "As I have not been able to rearrange my schedule at this late date in order to come over for the sessions, I am all the more regretful in the view of the splendid program."[37] Heisenberg replied, "I am sorry that other tasks of mine prevent me from taking part in the Session."[38] The Science Council of Japan received a telegram from Nesmeyanov on June 10, 1955, proposing dispatch of a representative to the Session, who would be accommodated as a guest for two weeks. Yoshio Fujioka (1903–1976), who eventually participated in the Session, looked back to those days and reflected thusly:

[33] A. N. Nesmeyanov, "Introductory remarks to the Session of the Academy of Sciences of USSR on the Peaceful Use of Atomic Energy on July 1st 1955." in Akademiya Nauk SSSR, *Sessiya … op. cit.* (note 4), p. 9.
[34] ARAN F. 579, Op. 1, No. 19. 153–162.
[35] ARAN F. 579, Op. 1, No. 20. 4.
[36] Ibid., 122.
[37] Ibid., 112.
[38] Ibid., 153.

> In order to go to Moscow until July 1, tremendous procedures and the shortage of funds for travels made it difficult for the Science Council to dispatch any representative to the Session. Fortunately, however, I had been already scheduled to attend the Board of the International Physics Conference which was to be held in Switzerland in mid-July. In addition to this, it was pure chance that I was Chair of Committee on Atomic Energy of the Council. Therefore, they [some members of the Science Council of Japan—*Ichikawa*] said that it was better for me to take part in the Session in Moscow on my way to Switzerland.[39]

The expansion of international activities by the Academy of Sciences, however, was not matched by the improvement of organizational work in this area. A tremendous amount of bureaucratic tasks, lack of clear organization, and inexperience as a whole led to delay and inopportuneness in decision-making in every level of the Academy. Late arrivals of the Soviet delegations to international conferences and delayed replies to the requests and proposals from foreign organizations occurred very often in those days.[40]

3.2 The Disparate Guests

In spite of such an inadequate arrangement, the Soviet Academy gathered a total of 41 foreign guests from 20 countries. Among those participants were Bertha Karlik (1904–1990; Austria), Erich Schmid (Austria), Tirane, Shqiperi (Albania), Kha Maung Maung (Myanmar, then Burma), Sandor Salay, Istvan Covach (Hungary), Eberhard Leibnitz (1910–1986; German Democratic Republic; hereafter, the GDR), Heinz Barwich (1911–1966; First Director of Central Institute for Nuclear Physics of the GDR; later immigrated to Western Germany in 1964), Wilhelm Macke (1920–1994; GDR), Jan Hendrik de Boor (Holland), Mahmud Ahmed (Egypt), Tagdich Shankar, Khanolkar Vasantra, Megnad Saha (1893–1956), Damodar Dharmananda Kosambi (1907–1966), Rudrendra Kumar Pal (1902–1991; India), Hisabi Mahmud (Iran), Benjamin Bloch (1900–1959; Israel), Siwabessy Gerrit (1914–1982; Indonesia), Arne Lundby (1923–1991; Norway), Thorbjorn Sikkeland (1923–2014; Norway), Teunis Johan Barendregt (1920–1991; Norway), Pawel Szulkin (1911–1987; Poland), Nilsl Doniel Fontel (1901–1980; Finland), Vaclav Votruba (1909–1990), Cestmir Simane (1919–2012), Jan Urbanez, Jaromir Maly (Czechoslovakia), Sigvard Eklund (1911–2000; Sweden; later Secretary-General of the International Agency of Atomic Energy from 1961–1981), Stig Melker Claesson (1917–

[39] Fujioka, Yoshio, "Suisen no Ji (Recommendatory Address)," in *Soren Kagaku Akademî*, *Genshiryoku Heiwa Riyô Kaigi Hôkoku Ronbun Shû* (*Kôgaku Bukai*), [The Academy of Sciences of the USSR, *The Session on … op. cit.* (note 4) The Engineering Section: Japanese Version], Tokyo: Maruzen, 1956. No page number.

[40] ARAN F. 579, Op. 18, No. 6. 4–9.

1988; Sweden), Savic Pavle Savic (1909–1994; then Yugoslavia), Drago Grdenic (1919–; then Yugoslavia), Yoshio Fujioka (Japan), Wang Ganchang (王淦昌; 1907–1998; China), Cheong Gun (丁根; North Korea), and others.[41] Some of them were already familiar to Soviet scientists; Erich Schmid had once worked together with several Soviet physicists and chemists in Germany. Pavle Savic stayed in the Soviet Union during World War II as a member of the Yugoslavian military mission. Heinz Barwich had been engaged in a Soviet research project related to nuclear development in Georgia for a long time and was awarded the Stalin Prize. Istvan Covach from Hungary had been captured and sent to a war prisoner camp in Krasnoyarsk for nine months from 1945 to 1946. Cheong Gun studied as a graduate student in Leningrad from 1948 to 1952 and passed his qualifying exams to become a candidate for a doctorate. Furthermore, some participants had pro-Soviet views; Bertha Karlik was an activist in an Austrian peace movement, while Covach from Hungary and Shui Yuigu from China were communists.[42]

Of course, the organizers of the Session were the most pleased with Barendregt's (a scientist from Norway) admiration for the achievement of Soviet science. Judging from the achievements made by the United States in the field of atomic research that Barendregt was familiar with, he spoke more favorably of the Soviet achievements.[43] The organizers were, however, somewhat annoyed by some other guests that were difficult to deal with. Saha and Kosambi from India did not show much interest in the presentations at the Physics Section. Kosambi seemed not to be interested in the Session at all. At last, on July 3, he asked the organizers for relief from the duty to attend the Section on the occasion of Dr. Shankar's arrival at Moscow and also offered his own paper about feudalism in India and the ancient history of India.[44] His specialty was so far from physics. Savic and Grdenic also showed little interest in the presentations. They spent almost all day long at the entrance hall talking with Soviet scientists. On July 2, these Yugoslavian scientists dropped away from the Session, explaining that they would go to the Institute for Physics Problems and the Institute for Organic Chemistry.[45] Some delegates, including Lundby, Sikkeland, Barendregt from Norway, and Maung Maung Kha from Myanmar, enjoyed strolling in the town instead of attending the Session.[46] However, they alone should not be blamed. Simultaneous interpretation into English was available only in the Physics Section. The interpreters very often received a text just before a presentation, and they often had to interpret from page proofs. Some foreign participants who knew the Russian language repeatedly pointed out the errors in the

[41] ARAN F. 579, Op. 1, No. 19. 44, 59, 145–150,.
[42] Ibid., 36, 38, 40–41, 44 and 59.
[43] Ibid., 38.
[44] Ibid., 53.
[45] Ibid., 54.
[46] Ibid., 56.

simultaneous interpretation.[47] Fujioka later wrote that the simultaneous interpretation tended to "be interrupted repeatedly."[48]

3.3 Excursion to Obninsk

The excursion to the Obninsk Atomic Power Station by bus took place on July 6, the day after the closing of the Session. During the observation of the atomic power plant, all the scientists that came from abroad showed great interest in the devices and works of the station. Wilhelm Macke from the German Democratic Republic eagerly wanted to take as many photographs of the nuclear power plant as he could, and ultimately took a total of 180–200 pictures. Yoshio Fujioka from Japan was also eager to take photographs and looked as if he were always waiting for a chance to enter the places where foreigners were not invited. Sigvard Eklund (1911–2000; later the Director of the International Atomic Energy Agency, 1961–1981) from Sweden annoyed the guides with a large number of detailed questions and eagerly sketched the location of the station, the main hall, the uranium blocks of the reactor, and the uranium rods. He tried to make his notes and drawings more accurate with assistance from Claesson and other delegates. Betha Karlik from Austria, who complained about the United States interfering with her trip to the Soviet Union, concentrated on taking notes in German of her observation of the station.[49]

Of course, almost all foreign guests admired the Soviet achievements in the field of atomic science and technology. It is, however, difficult to separate clearly sincere admiration from mere lip service. Even Fujioka, who repeatedly expressed admiration, refused a request of the Soviet journal, *Nauka i Zhizn*' (*Science and Life*) to write an article about his impression on the Session as well as a request for an interview from a correspondent of a news agency, TASS (Telegrafnoe agenstvo Sovetsrogo Soyuza).[50] Western scientists were apparently cautious, fearing that they might be blamed by their governments and the public for possible involvement in pro-Soviet propaganda. Eklund seemed to be somewhat skeptical about the Soviet inclination toward giant projects like nuclear development at the cost of ordinary people's welfare. On the way back from the excursion, Eklund expressed his surprise at a stark contrast between the huge successes of the USSR in the field of nuclear construction and the impoverished views of villages, poor road conditions, and humble clothes of the inhabitants in the outskirts of Moscow.[51]

The Soviet interpreters, Petrovskaya and Racheev, became aware of the suspicious behavior of some foreign guests. At midnight after returning from the atomic power

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[47] Ibid., 61.

[48] Fujioka, op. cit. (note 35).

[49] ARAN F. 579, Op. 1, No. 19. 71, 74–75: It seems that the participants were shown a film describing the operation of the Obninsk Atomic Power Station during the Session before the excursion (Ibid., 52).

[50] Ibid., 52–53.

[51] Ibid., 70.

plant, two Swedes and three Norwegians stayed together and compared their observations from visiting the station. They persuaded Fontell from Finland to join them. In the following day, he slept in the morning, saying that he could not sleep all night. Bloch from Israel was allegedly also involved in that work.[52] And then, Eklund hurried away from the Soviet Union to return to his own country on the morning of the 9th.[53]

Judging from the abovementioned fact, the Foreign Affair Division of the USSR Academy of Sciences, which was in charge of the reception of foreign participants to the Session, considered it reasonable to assume a group of foreign scientists from the capitalist countries were collecting and processing all information that they managed to get through the Session and the excursion. Eklund's early departure could be explained well if it were supposed that he had been required to give the Western camp information about the institutes working in the field of nuclear physics that they observed in the Soviet Union. His rushed departure might be associated with the Geneva Conference. The Foreign Affair Division regarded Eklund as the central figure around whom Swedes, Norwegians, Finnish, and possibly other members of capitalist countries grouped.[54]

4. Soviet Scientists Meet Big Science: The First United States International Conference on the Peaceful Uses of Atomic Energy Held in Geneva

The First United Nations International Conference on the Peaceful Uses of Atomic Energy was held in Geneva, Switzerland from August 8–20, 1955, gathering approximately one thousand and four hundred representatives from 73 countries. In addition to these enrolled representatives, about one thousand and five hundred observers also took part in the Conference. More than nine hundred journalists were sent from a variety of countries to cover the Conference.[55]

Seventy out of a hundred and two applications from the Soviet Union, including Ukraine and Belorussia, were accepted as the presentations to be read in the plenary meeting and various sections of the Conference. The number of their presentations exceeded those of the United Kingdom (65), France (61) and Canada (12).[56] A featured presentation by Dmitrii Blokhintsev (1907–1979), "The First Industrial Atomic Power

[52] Ibid., 73: The importance of "an awareness of foreign scientific developments" was emphasized in the Western camp from the early days of the Cold War. For example, Krige pointed out the fact that "The use of international scientific exchange as an instrument of scientific intelligence gathering was officially promoted and sanctioned in the classified appendix to a report prepared by a panel established by Lloyd Berkner [1905–1967; a geophysicist—*Ichikawa*] at the request of the State Department. Titled *Science and Foreign Relations*, and partially released in May 1950, the Berkner report insisted that an awareness of foreign scientific developments was crucial to the progress of American science" (Krige, *op. cit.*, in note 6. p. 166).

[53] ARAN F. 579, Op. 1, No. 19, 76.

[54] Ibid., 74–76.

[55] ARAN F. 694, Op. 1 D. 101. 3.

[56] ARAN F. 2, Op. 6, D. 201. 9, 98.

Station of USSR and the Course of Development of Atomic Energy" (jointly with N. A. Nikolaev), attracted a great deal of interest from the audience.[57] A film describing the Obninsk Atomic Power Station received stormy applause.[58] The Presidium of the Soviet Academy of Sciences later proudly reported.

> The Soviet delegation at the International Conference was able to convincingly demonstrate the substantial progress and the achievements of Soviet science and technology in the field of the use of nuclear energy for peaceful purposes. The high scientific level of the reports of the USSR presented at the Conference, the readiness of Soviet scientists to share their experiences with scientists from other countries for the peaceful use of nuclear energy and the individual contacts which were established by the Soviet scientists with the foreign scientists at the Conference helped to raise the prestige of Soviet science and boast the authority of the Soviet Union.[59]

However, it must be taken into consideration that the Geneva Conference provided an arena for scientific intelligence gathering for both sides of the Cold War, as emphasized by John Krige,[60] and in this sense it was an extension of "a battlefield" in the Cold War. The Western camp headed by the United States took the initiative to organize the Conference. A French communist, Frédéric Joliot-Curie (1900–1958), was not allowed to participate in the Conference. No scientist was invited from the People's Republic of China or the German Democratic Republic, whereas some scientists from Taiwan (Republic of China) were allowed to participate.[61] The US delegation, consisting of such eminent scientists as Walter Zinn (1906–2000), Isidor Isaac Rabi (1898–1988), Hans Bethe (1906–2005), Victor Weisskopf (1908–2002), and others, and who were accompanied by Chairman of the US Atomic Energy Commission, Lewis Strauss (1896–1974), and eight senators,[62] overwhelmed the Soviet delegation in several ways. They accomplished this with the amount of their presentations (170[63]); with the demonstration of driving a real experimental heterogeneous type 10,000-kilowatt class nuclear reactor[64] installed in the exhibition hall of the US pavilion; and with their other impressive exhibitions. Ironically, in their demonstration of the nuclear reactor they showed the

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[57] ARAN F. 694, Op. 1 D. 101. 7–8.
[58] ARAN F. 2, Op. 6, D. 201. 106.
[59] Ibid., 9–10.
[60] Krige, op. cit. (note 6), pp. 165–168.
[61] ARAN F. 694, Op. 1 D. 101. 3–4: The hostile atmosphere compeled the United States to withdraw the reports sent by the Taiwanese scientists from the proceedimgs (Ibid., 3–4).
[62] Ibid., 96.
[63] Ibid., 98.
[64] Ibid., 11.

Cherenkov effect to the observers, which was discovered by the Soviet scientists![65] Krige concludes, "The presentation of the U.S. reactor in Geneva was a masterpiece of marketing."[66] In conversation with some Soviet representatives, an American scientist expressed his indifference toward the construction of nuclear power stations due to the cheap and abundant coal resources in the U.S.,[67] which made a stark contrast with the Britons' enthusiasm for atomic energy expressed in John Cockcroft's speech at the conference, who was then the Director of the Atomic Energy Research Establishment.[68] Thus, the Soviet effort to build the first nuclear power station was somewhat sidestepped.

The Presidium of the Soviet Academy of Sciences could not help acknowledging their defeat, saying,

> The Conference also revealed that in a number of areas of peaceful uses of nuclear energy research and, especially, experimental works are conducted in the United States much wider than in the USSR. So was the development and creation of new types of experimental reactors, high-energy and high-voltage-current particle accelerators, new building materials and radiations in industry, agriculture, biology and medicine.[69]

Expressing a similar feeling, a physical chemist, Viktor Kondrat'ev (1902–1979) stated as follows: "Here it has been fairly told that in the United States the application of atomic energy for peaceful purposes is being developed more widely and the works are being done at a higher tempo."[70] A metallurgist, Aleksandr Samarin (1902–1970), softened Kondrat'ev's remark thusly,

> I would like to continue the remark of Academician V. N. Kondrat'ev in another aspect. … These [presentations read by the Soviet scientists at the Conference—*Ichikawa*] are the reports which were made by the 'landing' groups, i.e. very small groups of very qualified scientists. The scope of the development of the works on the peaceful use of nuclear energy is wider in our country, in my opinion, than in the United States.[71]

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[65] ARAN F. 2, Op. 6, D. 201. 105.
[66] Krige, *op. cit.*, in note 6. p. 175.
[67] ARAN F. 2, Op. 6, D. 201, 117.
[68] Ibid., 100.
[69] Ibid., 10.
[70] Ibid., 138.
[71] Ibid., 139–140.

5. Conclusion

Heinz Barwich, the first Director of the Central Institute for Nuclear Physics (Zentralinstitut fűr Kernphysik) in the GDR, was regarded as "a friend of the Soviet Union" and as a sympathizer of Soviet socialism who had spent ten years in the Soviet Union and preferred the "socialist" style of talks. However, he did not choose a graphite-moderator type of reactor for the first research reactor in the GDR; instead, he chose a light-water moderator-coolant type reactor. He was proud of the fact that "our research reactor differs substantially in a number of characteristics from the reactor model which was already taken into operation 15 years ago by American researchers and recently taken into operation by Soviet researchers for the first time."[72] We must take into consideration that the development of a light-water reactor was still a big challenge at that time. What is more, the GDR aimed to construct heavy water reactors, and then, fast-breeder reactors as a main method of settlement of the energy issues in those days[73]. In other words, the graphite reactor was already not very attractive and somewhat out-of-date for the GDR ambitious scientists. Even "friends of the Soviet Union," like Barwich, could not have been very satisfied with the Unit "AM" at the Obninsk Atomic Power Station, which Barwich observed at the actual site.

The absence of a number of eminent scientists due to the poor arrangement by the Academy of Sciences and other Soviet agencies and the attendance of some not very earnest participants who were not so interested in the achievements of Soviet science made the Session somewhat unsuccessful. In addition to this, the Session provided an occasion for some Western scientists who were skeptical or critical of the Soviet Union to take advantage of the unguarded openness of the Soviet scientists. Eklund and others gathering information in Moscow was another embarrassment.

At the Geneva Conference, the US delegation overwhelmed Soviet scientists, and "the atomic diplomacy" practiced by Soviet scientists thus came to a bitter end.

(Received on 7 March 2016; Accepted on 1 May 2016)

[72] Heinz Barwich, "Über den Forschungsreaktor der DDR und seine Ausnutzungsmoeglichkeiten," in Heinz Barwich et al., »*Das zenralinstitut für Kernphysik am Beginn seiner Arbeit* «. Berlin: Akademie-Verklag, 1958, p. 8.

[73] Mike Reichert, »*Kernenergiewirtschaft in der DDR. Entwicklungsbedingungen*, *konzeptioneller Anspruch und Realisierungsgrad* (*1955–1990*) «. St. Katharinen 1999, pp. 153–176.