

**TITO'S PROLIFERATION PUZZLE: THE YUGOSLAV
NUCLEAR PROGRAM, 1948-1970**

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ABSTRACT

Throughout the research period for the purpose of writing this dissertation, during a number of conversations I had with my colleagues and friends and regardless of the country I visited, one question was inevitable: Was Yugoslavia making the atomic bomb? The short answer to this question is YES. The long answer, embedded in scholarly debates about the nuclear weapons proliferation problem is what this dissertation aims to provide. Key research questions which guide my analysis and anchor it in these debates are why countries aspire to develop their nuclear arsenals and how do they do it?

The research presented in this dissertation provides a detailed analysis of the long and arduous evolution of a nuclear program in a developing country which desired to break out of the backwardness, join the elite club of great powers and play among the equals in Cold War political games and competitions. Starting this journey in the late 1940s without a single precondition for success except a sheer determination, by the mid-1960s Yugoslavia managed to master the most sensitive technologies, only to completely dismantle the entire nuclear program after the ratification of the Non-Proliferation Treaty in 1970. Important discovery is that in the interplay of various incentives that fueled both the desire for nuclear weapons in Yugoslavia and their eventual renunciation, the most potent were security concerns. This notion provides an additional argument in support of the neorealist theory, in which state security ranks on the top list of motives in the decision of a state to build the atomic bomb, although the complete explanation for both decisions is not that straightforward.

Without underestimating all the effort, sacrifices and commitment built into the development of the Yugoslav nuclear program, this study reveals that the initial low starting point was not an impossible puzzle to solve. Reading this conclusion in the opposite direction, the real discovery is that it was exactly this commitment, based on the insatiable thirst for independence, the ‘logic of independence’ as defined in this study, which kept the project rapidly evolving. This is wider category than the state security concerns, and represents an important characteristic of the Yugoslav state-system, having a dual quality of adding a fresh perspective in the existing debates and emphasizing the importance of historical analysis in non-proliferation studies.

Related and equally important is the realization that a small and underdeveloped nation armed with necessary determination can bend the rules powers, exploit all the loopholes and even create new ones, take advantage of global conflicts and play one superpower against the other to its own benefit. This notion brings a lot of agency back to lesser powers or small nations, which is particularly important considering that the Yugoslav experience played out within the Cold War context, when all ‘Big Powers’ were practicing much more caution in dealing with small nations than in periods of relative calm.

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I was fortunate enough to be involved in a number of research initiatives of the Wilson Center's Nuclear Proliferation International History Project (NPIHP), led by two brilliant professors and wonderful persons, Leopoldo Nuti from Roma Tre University and Christian F. Ostermann from the Wilson Center. My participation in the NPIHP's Nuclear History Boot Camp summer school in 2015, gave me an opportunity to present my research and exchange ideas with preeminent nuclear historians, David Holloway, Martin Sherwin and Joseph Pilat, who generously

extended their support in form of suggestions, comments but also warnings about potential obstacles I could encounter during my research. It was a sheer luck that I returned to the Nuclear History Boot Camp in 2017, this time as one of coordinators and once again had a privilege to enjoy fruitful discussions and conversations with them and entire NPHIP team of instructors.

The NPHIP also supported my research in the Archive of the International Atomic Energy Agency (IAEA) in Vienna, as well as in the National Archive of India (NAI) and Nehru Memorial Museum & Library (NMML) in New Delhi. The research in these archives significantly expanded my primary source base, helped me open a number of new questions and perspectives, and to better frame some of my initial hypotheses and conclusions. I also thankful to professional and dedicated staff of these archives, without whose support and advices my research in their respective institutions would have never been so fruitful.

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Introduction

Starting from scratch: The historical problem and research scope

“- Do you know Danica, what is ‘Vinča’?

- Well, I heard about it...

*- You have heard of ‘Vinča’ as you have heard of Madagascar,
but this is our biggest nuclear center!’¹*

On November 19, 2010, more than 8,000 nuclear reactor fuel elements with some of them containing highly enriched uranium (up to 80 percent), densely packed in a heavily protected convoy of sixteen shipping containers loaded on heavy trucks, departed from the nuclear institute in Vinča (near Belgrade, Serbia) around 2:30 a.m. on its four weeks long journey to its final destination in Mayak, Russia. This was the so-called “Vinča Project”, organized under the auspices of the International Atomic Energy Agency in Vienna (IAEA) as its “largest technical cooperation endeavour ever.” The aim of the project was to remove dangerous fuel which posed a security and environmental hazard for Serbia. This once largest nuclear institute in Yugoslavia was now a sad symbol of a country long gone and its ambitious designs for a brighter future.²

Back in the late 1950s, the “Vinča Project” used to elicit quite different emotions and concerns, since it included the construction of the largest nuclear reactor

¹ “Balkanski špijun” [The Balkan Spy], Dušan Kovačević, Božidar Bota Nikolić (dirs.), 1984.

² Greg Webb, IAEA “Massive Operation Safely Secures Serbian Nuclear Fuel in Russia,” December 22, 2010, <https://www.iaea.org/newscenter/news/massive-operation-safely-secures-serbian-nuclear-fuel-russia> (accessed on March 12, 2021).

in socialist world, outside the Soviet Union and China. Yugoslavia initiated the nuclear program already in 1948 through the establishment of the central Boris Kidrič Institute of Nuclear Sciences [*Institut za nuklearne nauke Boris Kidrič* – IBK] in Vinča (near Belgrade, Serbia), followed in quick succession by two other institutes, Jožef Stefan Institute [*Institut Jožef Stefan* – IJS in Ljubljana (Slovenia) in 1949 and Ruđer Boković Institute [*Institut Ruđer Boković* - IRB] in Zagreb (Croatia) in 1950. Exploiting the country's position as a communist renegade and the loopholes in the gradually evolving global security system of the bipolar world, the Yugoslav nuclear establishment acquired the necessary technology, equipment and financial backing from both of the Cold War superpowers, and simultaneously cooperated extensively with a number of other countries, predominantly Norway and France. In this process, the country's allegiance continuously shifted between the East and the West, much like its foreign policy. By the mid-1960s Yugoslavia managed to develop the complete nuclear fuel cycle technology, from the uranium mining to the production of weapons-grade plutonium, even though the initial capacities were quite limited. However, by 1970 when Yugoslavia ratified the Non-Proliferation Treaty (NPT), the country's nuclear program was in tatters.

In the early post-war period nuclear energy was somewhat naively or overenthusiastically imagined as a solution for all future energy needs, and a potential cure for many diseases, as captured in the very popular phrase - "peaceful use of nuclear energy." Yugoslavia heavily exploited this period of nuclear enthusiasm as a justification for their own ambitions, and their efforts to obtain the necessary nuclear technology were easily disguised and explained to foreign partners as the only solution for the expected energy shortage in their ambitious plans for industrialization. At the same time, hidden behind this narrative and the continuously voiced concerns

in international forums over the problems in the global security system caused by the proliferation of nuclear weapons, the Yugoslav nuclear establishment already in the late 1950s secretly developed three different plans for the construction of the atomic bomb. Not surprisingly, the fastest and the cheapest option was eventually pursued, the so-called “plutonium path.”

The Yugoslav nuclear program (both civil and military) evolved over a period of some twenty odd years in the Janus-faced international environment where sensitive nuclear technology and weapon designs were shrouded with great secrecy, but at the same time coupled with growing political and public support for the worldwide “peaceful use of nuclear energy”. This principle was extended to the cooperation between the two superpowers on the one hand, and the aspiring nations on the other, in which their nuclear ambitions were silently and often successfully undermined through carefully designed non-proliferation policies and programs of technical support. This “Great Nuclear Game” was played on the ideological and political battlefield between the East and the West, riddled with the Cold War confrontations (Korean or Vietnam War, Cuban Missile Crisis), where the two blocs developed, shared and exchanged nuclear material, technology and weaponry among their member countries as a specific political or strategic bargaining chip. The situation was further complicated by a myriad of other Cold War political and military alliances and treaties which existed alongside the NATO and the Warsaw Pact (SEATO, ANZUS, NAM, Arab League, etc.) with continuously changing and overlapping membership, military strategies or political agendas.

Meanwhile, in the late 1940s and early 1950s when no international control of the proliferation of nuclear technology actually existed, the race for “the bomb” produced several new nuclear powers in relatively quick succession (Great Britain

1952, France 1960, China 1964). The fear that the nuclear arms race was reaching “supercriticality”, epitomized in the John F. Kennedy’s famous prediction given in 1962 that by the 1970s there will be 15-25 nuclear weapon states, was one of the driving motives behind the painful and gradual construction of the global non-proliferation mechanisms. This mechanism was most visible in the establishment of the International Atomic Energy Agency (IAEA) in 1957 and its eventual rise to prominence. The crowning jewel of this process was the Non-Proliferation Treaty (NPT) of 1968. Equally important was the shift in the global public opinion, where the comprehension of the destructive potential of the already existing nuclear arsenals sparked many popular movements and the general attitude against future nuclear proliferation, with equally strong voices for a complete worldwide nuclear disarmament.

Through an empirically based historical approach, this dissertation analyzes why the Yugoslav nuclear project was initiated, how it evolved, and why it was eventually abandoned, within the wider context of the proliferation of the nuclear weapons during the Cold War. The importance of the Yugoslav case lies in the fact that during the Cold War this country was developing its nuclear potential at a crossroad of influences of the USA, USSR, and the Non-Aligned countries. This position allowed Yugoslavia to exploit these conflicts to its own benefit, but also made the Yugoslav nuclear project somewhat unique, at least considering the possibility for tapping into the material and intellectual resources regardless of Cold War political borders. Consequently, this case study offers great potential for understanding not only the Yugoslav perspective on the proliferation of the nuclear weapons, but also of the two superpowers.

I will focus on the period from 1948 until 1970 when Yugoslavia ratified the NPT but also formally dissolved its Federal Nuclear Energy Commission [*Savezna komisija za nuklearnu energiju* – SKNE]; the only uranium mine in the country had been shut-down already in 1968. Subsequent attempts to revive the Yugoslav nuclear program, especially after the Indian “peaceful nuclear explosion” of 1974, were highly ineffective and produced only several top ranking and top secret meetings, followed by some very basic plans without proper elaboration or implementation, which is why this period will not be included in my dissertation.

Focusing on the Yugoslav case, this dissertation aims to explore which global and internal political circumstances the aspiring countries considered as critical for the initiation of the nuclear weapons program, what were the main difficulties in this process, what options were available to circumvent them, and what were the most evident fault lines in the global security system or the emerging non-proliferation regime. This type of historical analysis is usually avoided by the scholars predominantly due to the unavailability of the adequate primary sources which are considered as top secret in majority of countries and the small number of cases to date, but also because the perspective of the superpowers or the existing nuclear powers is the common point of departure. Combined with the fact that the political and other social scientists dominated this field of research in the last couple of decades, the existing scholarship on nuclear proliferation is often based on highly theoretical contemplations based on a few selected historical facts. This approach sometimes leads to misleading and distorted estimates or policy advices, although historians can also be accused for a similar sin of being immersed almost exclusively in their own academic circles without much communication or exchange of ideas with colleagues

from other disciplines. This scholarship and related problems will be reviewed later in the introduction.

My analysis of the development of the Yugoslav nuclear program will be anchored by two large historical problems that are the central pieces of the past, present and future nuclear proliferation puzzles: why did certain countries decide to pursue the atomic bomb, and how was this decision realized. Both these problems are dynamic, flexible and in constant interaction and will be explored in my dissertation both from a global and national perspective and within the Cold War context. Therefore, the main research questions I intend to pursue are formulated and designed with the aim to reflect several dimensions of the Yugoslav nuclear program which continuously overlap and intersect within the historical period and the Yugoslav position and role.

Considering the reasons why the Yugoslav nuclear program was initiated, and why it was eventually abandoned, I will analyze how important this program was for the country's national security, and what was its potential as a political deterrent. My second line of questioning will be related to the importance of the atomic bomb in the domestic political debates and power struggles. How united or contested were different Yugoslav politicians, institutional, bureaucratic or parochial interests in supporting or opposing the effort to construct the bomb? Finally, I will analyze the importance of the Yugoslav nuclear program for the creation of Yugoslav national identity. In what way did the changing attitude of the international community toward nuclear proliferation between the late 1940s and the late 1960s, both institutional and public, affect Yugoslavia's need for the creation of its identity of a nuclear power? How important was the creation of the nuclear power identity considering Yugoslavia's struggle for a leading position in the NAM?

Focusing on the process of gradual development of the Yugoslav nuclear program I will start with the global perspective, scrutinizing the effectiveness of the American and the Soviet (non)proliferation policies in Yugoslavia and what countermeasures were employed by the country's nuclear establishment to bypass them. What were the results of the transfer of nuclear technology through the international cooperation (Atoms for Peace, the CERN, or the IAEA projects) or the bilateral agreements between Yugoslavia and various countries? Were these exchanges helpful or harmful for the Yugoslav ambitions and plans? Related to that, what were the results of the Yugoslav independent development of various technologies, and were there enough scientists in the country to support the ambitious nuclear program? What were the possibilities for the commercial use of the nuclear technology in Yugoslavia, and how prepared or capable the country's industrial sector was to support the nuclear program?

Literature Review

Nuclear proliferation was one of the most studied topics in security analyses during the Cold War. However, the vast majority of scholarship starts and ends with the American point of view, while other perspectives are seldom investigated. Furthermore, the existing scholarship is predominantly based on the American archival material which additionally limits the analytical scope. Further limitations stem from the fact that the political and other social scientists took the early lead in this field of study and kept it ever since, usually with the top-down perspective. This problem is evident even in the works of the most recognized scholars, such as

Kenneth Waltz and Scott Sagan,³ while even the most contemporary authors conform to the proven pattern. One of the most telling examples is the Matthew Kroenig's book on the problems of nuclear proliferation in Iran.⁴

The most relevant exception to this general rule are David Holloway's seminal work on the construction of the Soviet atomic bomb and the development of the strategic nuclear arsenals in which he offers an in-depth historical analysis, even though at the time of his research the access to the Soviet archives was highly restricted.⁵ Several authors followed this model and offered accounts on different national programs.⁶ Another important exception is George Perkovich's historical account on the Indian effort to acquire nuclear weapons which offers balanced analysis based on the limited amount of available sources.⁷ The same problem affected Soviet and Russian scholarship: other books on the Soviet nuclear programs published in English traditionally focused almost exclusively "on two subject areas: arms control and strategic nuclear doctrine", as less classified areas of study.⁸ These restrictions on the Soviet sources were relatively recently lifted and followed by the voluminous publication in Russian of the documents and personal correspondence

³ Scott Sagan and Kenneth Waltz, *The Spread of Nuclear Weapons: An Enduring Debate*, New York: W. W. Norton & Company, 2012³

⁴ Matthew Kroenig, *A Time to Attack: The Looming Iranian Nuclear Threat*. New York: Palgrave Macmillan, 2014.

⁵ David Holloway, *Soviet Union and the Arms Race*. New Haven: Yale University Press, 1983; David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939-1956*, New Haven and London: Yale University Press, 1994.

⁶ Thomas Jonter, *The Key to Nuclear Restraint: The Swedish Plans to Acquire Nuclear Weapons during the Cold War* (London: Palgrave Macmillan, 2016); Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Stanford California: Stanford Security Studies. An Imprint of Stanford University Press, 2012);

Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998);

⁷ George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation*, Berkeley: University of California Press, 1999

⁸ Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and the Fall of Russia's Strategic Nuclear Forces 1945-2000*, Smithsonian Books, 2002 (2014 reprint), Preface (kindle edition); Jerome M. Conley, *Indo-Russian Military and Nuclear Cooperation: Lessons and Options for U.S. Policy in South Asia*. Lanham, Maryland: Lexington Books, 2001.

related to the Soviet nuclear program.⁹ However, these editions of published sources offer very limited analytical explanation. On the other hand, the most recent scholarship on the Soviet nuclear program offers some important insights on the developments on the other side of the Iron Curtain, and is based on the relevant Soviet-era documents, even though this area of research is still in its infancy.¹⁰

Scott Sagan, one of the leading authorities in this field of study, published some time ago a groundbreaking article in which he emphasized that the problem of proliferation is more complex than it was generally considered, yet very few authors, including him, followed his suggested theoretical approach.¹¹ Francis Gavin also loudly criticized more recently the same problem from the perspective of the historian, although he can be accused for the same sin as Sagan.¹² Another problem in his approach is that he is focused exclusively on the reasons why certain countries decide to acquire nuclear weapons, while other aspects of nuclear programs are not part of his investigation. However, in the past couple of years, several scholars were inspired by his suggestions and challenged the conventional wisdom related to the problem of the nuclear proliferation. Rather than focusing on the security concerns or potential of the atomic bomb as a political deterrent, they offer a more balanced views and fresh approaches, even though the problem of the top-down perspective generally remains. The most prominent authors in this “renaissance” in scholarship on the nuclear

⁹ L. D. Rjabev, *Atomnyj proekt SSSR: dokumenty i materialy*; [v 3 t.], Moskva: Rossijskaja Akademija Nauk 1999-2010

¹⁰ Zaloga, *The Kremlin's Nuclear Sword*

¹¹ Scott D. Sagan, “Why do States Build Nuclear Weapons – Three Models in Search of a Bomb”, in: *International Security*, 21, No. 3, Winter 1996/1997, 54 – 86.

¹² Francis Gavin, *Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca and London: Cornell University Press, 2012).

proliferation are Gabrielle Hecht, Etel Solingen, Jacques Hymans, and Matthew Fuhrmann.¹³

The Yugoslav nuclear program is hardly ever included in this analytical framework. Only a few scientific articles and book chapters examine it and even then usually from a very broad perspective, with general overviews or highly condensed summaries.¹⁴ The only exception, but one that proves the rule, is Jacques Hymans's work, which does offer interesting and often intriguing analyses based on well-designed research questions and original theoretical structure, although he often focuses is on a very narrow topic and always without proper empirical evidence from Yugoslavia.¹⁵

Considering the existing scholarship from the former Yugoslav countries, several individual articles and a couple of monographs or autobiographies have been published in previous decades, although their value stops on the informational level,

¹³ For theoretical contemplations about the aforementioned "renaissance", please refer to Scott D. Sagan, "Two Renaissances in Nuclear Security Studies," Introduction to H-Diplo/ISSF Forum, No. 2 (2014), "What We Talk About When We Talk about Nuclear Weapons," Issforum.org, June 15, 2014, <http://issforum.org/ISSF/PDF/ISSF-Forum-2.pdf> (accessed on April 28, 2021)

Gabrielle Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge, Mass.: MIT Press, 2012); Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA: MIT Press, 1998); Etel Solingen, *Nuclear Logics: Contrasting Paths in East Asia and the Middle East*, Princeton: Princeton University Press, c2007; Jacques E. C. Hymans, *The Psychology of Nuclear Proliferation: Identity, Emotions, and Foreign Policy*, Cambridge, England: Cambridge University Press, 2006; Jacques E. C. Hymans, *Achieving Nuclear Ambitions: Scientists, Politicians, and Proliferation*, Cambridge, New York: Cambridge University Press, 2012; Matthew Fuhrmann, *Atomic Assistance: How "Atoms for Peace" Programs Cause Nuclear Insecurity*, Ithaca: Cornell University Press 2012.

¹⁴ Among very few examples is Matthew Fuhmann, *Atomic Assistance: How "Atoms for Peace" Programs Cause Nuclear Insecurity* (Ithaca; London: Cornell University Press, 2012)

¹⁵ Toshihiro Higuchi, Jacques E.C. Hymans, "Materialized internationalism: How the IAEA made the Vinča Dosimetry Experiment, and how the experiment made the IAEA", *Centaurus*, 2021: 1-18; Jacques E. C. Hymans, "Proliferation Implications of International Civil Nuclear Cooperation: Theory and a Case Study of Tito's Yugoslavia", in *Achieving Nuclear Ambitions: Scientists, Politicians, and Proliferation*, Cambridge, New York: Cambridge University Press, 2012, 157-203. The rest of the scholarship on Yugoslav nuclear program follows the mentioned pattern - Andrew Koch, "Yugoslavia's Nuclear Legacy: Should We Worry?", in: *The Nonproliferation Review*, Spring-Summer 1997, 123-128; William C. Potter, "Tito's Nuclear Legacy", in: *The Bulletin of the Atomic Scientists*, March-April 2000, 63-70.

making them closer to secondary sources.¹⁶ This situation had changed during my own research, when an ambitious monograph was published by a Serbian historian, Dragomir Bondžić.¹⁷ The author is a seasoned and dedicated researcher, and his book confirms this. His research is based on basically all available sources in Serbia, and some from other former Yugoslav republics and the same estimate can be made about his use of existing scholarship and literature. On the other hand, Bondžić's methodology is heavily influenced by a positivist tradition, which severely limits his analytical scope. Consequently his conclusions and contribution to the field make parts of his book more interesting as a review of literature or different archival collections, than a historiographical analysis proper. A much bigger problem is that he does not deliver his promise given in the title of the book, not offering a word about Yugoslav nuclear policies, but focuses instead on gradual evolution of the country's nuclear program. Besides filling these gaps and providing a transnational instead of national perspective, as well as different conclusions, in my own research I used this book as a useful tool for attesting comparatively my own research and conclusions.

An important, yet often unheeded addition to the “nuclear” scholarship comes from historians and other social scientists who analyzed the development of science in general and nuclear physics in particular during the vibrant 20th century. Beside the

¹⁶ The most valuable monographs are *Pola veka Instituta Vinča, 1948-1998* [Half a Century of the Vinča Institute, 1948-1998], Belgrade 2000, and Miloš Jevtić, *Razgovori sa Vinčancima* [Conversations with the ‘Vinčians’] (Beograd: Institut za nuklearne nauke “Vinča”, 1998). Autobiographies of the two scientists who helped to establish and were in different periods in charge of the Yugoslav nuclear project offer some original evidence, though still without any particular details - Stevan Dedijer, *Špijun koga smo voljeli: autobiografija* [The Spy Whom We Loved: Autobiography], Zagreb, Beograd, Sarajevo: V.B.Z., 2011; Pavle Savić, *Nauka i društvo* [The Science and the Society], Beograd: Srpska književna zadruga, 1978. The single article published so far is - Vladimir Knapp, “Jugobomba – što je istina? Prilog raspravi” [Yugobomb – What is the Truth? Addition to the Debate], *Međunarodne studije* 12, no. 3/4 (2012): 133-154.

¹⁷ Dragomir Bondžić, *Između ambicija i iluzija. Nuklearna politika Jugoslavije 1945-1990* [Between Ambitions and Illusions. Nuclear Politics of Yugoslavia, 1945-1990] (Beograd: Institut za savremenu istoriju, Društvo istoričara Srbije „Stojan Novaković“, 2016)

more general, but still relevant works on this topic,¹⁸ there are several books that cover particular topics focusing on the phenomenon of intertwining of nuclear physics with politics.¹⁹ Valuable additions to this scholarship come from a variety of autobiographies or accounts of scientists involved in construction of nuclear weapons.²⁰ While these works are, expectedly, often riddled with biased accounts, they nevertheless provide indispensable information from the keen-eyed observers who were involved in many top secret nuclear projects on both sides of the Cold War divide.

Furthermore, there is a growing body of literature from various disciplines that focus on other topics related to the history of various nuclear programs. Kate Brown's book (*Plutopia*) offers a transnational history of nuclear disaster at the local level in the USA and the USSR, successfully linking urban planning, popular culture, scientific research, public health, and labor history.²¹ This book is very important for understanding the delicate differences and similarities in the American and the Soviet nuclear programs and in that respect could prove as an important testing tool for my analysis of the Yugoslav case study which tried to take the best from both sides. Another important contribution comes from Zeman and Karlsch's work on the history of European uranium production in East Germany and Czechoslovakia, essential for

¹⁸ John Krige and Dominique Pestre (eds.), *Companion to Science in the Twentieth Century*, New York, London: Routledge, 1997, 2003

¹⁹ Sean Johnston, *The Neutron's Children: Nuclear Engineers and the Shaping of Identity*. Oxford: Oxford University Press 2012; Robert Walker and Helmuth Trischler, *Physics and Politics: Research and Research Support in Twentieth Century Germany in International Perspective*, Stuttgart: Franz Steiner Verlag, 2010; J. M. Bird, *Scientists in Conflict: Hans Bethe, Edward Teller and the Shaping of United States Nuclear Weapons Policy, 1945-1972*, Claremont, CA: Regina Books, 2009; Paul Josephson, *Red Atom: Russias Nuclear Power Program From Stalin To Today*, University of Pittsburgh Press, 2005; Daniel Kevles, *The Physicists: The History of a Scientific Community in Modern America*, Cambridge, Mass.: Harvard University Press, 1995

²⁰ Richard Feynman and Ralph Leighton, *Surely You're Joking, Mr. Feynman! (Adventures of a Curious Character)*, New York: W. W. Norton & Company, 1997 (reprint); Lawrence Badash, *Scientists and the Development of Nuclear Weapons*, Prometheus Books, 1995; Victor Weisskopf, *The Joy of Insight: Passions of a Physicist*, New York: Basic Books, 1992; Andrei Sakharov, *Memoirs*, New York: Alfred A. Knopf, 1990

²¹ Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford and New York: Oxford University Press, 2013)

the Stalin's nuclear ambitions, but which also offers an insight on the functioning of these "state within a state" facilities.²² Taking this concept to a logical conclusion, Hecht's account of uranium mining in Africa adds the global dimension to the importance and the problems in obtaining this source materials for nuclear explosives, and scrutinizes "nuclearity" as a term which defines "a nation, a program, a technology, a material, or a workplace," thus presenting a transnational perspective to this field of research.²³

Within this general analytical framework the nuclear-aspiring countries are perceived almost exclusively as passive agents, subjected to the political interplay between the superpowers, or as so-called "rogue countries," self-exiles from the global security system and potential sources of regional or global political instability, without proper or any empirical evidence from these countries. Based on the Yugoslav experience, this dissertation shows that the nuclear-aspiring countries are very much active and successful in confronting the pressures coming from the superpowers or international institutions, their nuclear projects are almost never confined within their national borders, and that they are potential significant contributors in the design of the global security system. The research presented in this dissertation provides a useful model for future research, not only as yet another case study in a growing body of nuclear history scholarship, but also one that closes the gap between the majority of existing studies which vantage point is limited to the American perspective and aiming to provide clear-cut policy solutions, and equally traditional historical research which provides well-researched analyses without any ambition regarding policy making activities.

²² Zbynek Zeman and Rainer Karlsch, *Uranium Matters: Central European Uranium in International Politics, 1900-1960*, Budapest and New York: Central European University Press, 2008

²³ Gabrielle Hecht, *Being Nuclear: Africa and the Global Uranium Trade*, Cambridge, Mass.: MIT Press, 2012, 14.

On sources

Researching the Yugoslav nuclear history has a nominal benefit that very few scholars can enjoy, the overwhelming quantity of primary sources. This is not to say that similar volumes do not exist elsewhere, as they necessarily do, particularly in countries with highly developed nuclear programs. The original characteristic in the Yugoslav case is that the country does not exist anymore and there are few vested interests remaining when it comes to access to documents which once were highly classified, and the same is often true with foreign archival sources about Yugoslavia. This statement needs some qualification, which will be provided, but here it is important to stress that such an availability is a nuclear historians' dream come true, but also a brewing nightmare.

The central collection of primary sources is located in the Archive of Yugoslavia [*Arhiv Jugoslavije* - AJ] in Belgrade. This is the collection of documents produced by the Yugoslav Federal Nuclear Energy Commission [*Savezna komisija za nuklearnu energiju* - SKNE], which was the central institution which managed the country's nuclear program in the period between 1955, when it was established, and 1970 when it was dissolved. The collection comprises of well over 400 boxes of documents, or some 60 meters in archival terminology, densely packed with different reports, letters, blueprints and many other types of documents, all arranged on the principle of provenance or of organic structure. The SKNE collection proved to be invaluable in my research and will continue to be the core of my at least some of my future projects, but it is also a labyrinth difficult to navigate.

The principle of provenance, while a legitimate approach in archival practice, in the case of a secretive highly bureaucratic socialist institution presents a challenge to a researcher. Combined with the several changes in its internal structure throughout

the given period, not to mention changes of strategies for the development of the Yugoslav nuclear program, the research in this collection proved to be very labor-intensive and time-consuming, which included reading through volumes and volumes of minutes from endless meetings, ‘drafts of proposals for preliminary projects’ and all of their iterations, often multiplied in different bodies and sectors of the SKNE, to name but a few most obvious obstacles. Nevertheless, once these obstacles are navigated, the SKNE collection is a veritable treasure trove of information about the Yugoslav nuclear program.

These materials were supplemented by the collection of the Yugoslav Federal Executive Council [*Savezno izvršno veće*] or the Yugoslav Federal Government, as well as with the collection of the Cabinet of the President of the Republic [*Kabinet Predsednika Republike*], colloquially known as “Tito’s archive”, among others, all housed in the Archives of Yugoslavia and considerably larger than the SKNE collection. These additional collections did reveal very valuable information, but these were equally scattered among different sections, making any research again equally time-consuming. The underlying moral is that scholars researching nuclear history, instead of often expressed complaint about the lack of sources, should rather “grateful for the vast winnowing process which, over the years, has put at [their] disposal a manageable corpus of historical facts,” if I may borrow Carr’s words once again.²⁴

Another important source was the Diplomatic Archive of the Ministry of Foreign Affairs of Republic of the Serbia [*Diplomatski arhiv Ministarstva spoljnih poslova Republike Srbije - DAMSPRS*], which houses all the documents produced by the Yugoslav Ministry of Foreign Affairs, mostly from the period since 1945. This is yet again an incredibly rich depository of primary sources, but with many underlying

²⁴ Edward H. Carr, *What is History?* (Harmondsworth: Pelican Books, 1987²), 14-15

obstacles, similar to those experienced in the Archives of Yugoslavia, although with a very significant difference. The Diplomatic Archive never had a single sector or institution dealing specifically with problems in the ‘nuclear sphere’, and existing sources are scattered in collections dedicated to different countries or international organizations, which unsurprisingly made any research very time-consuming, but with very important and valuable information I managed to collect.

Among similar archives in former Yugoslav republics, the Croatian State Archives [*Hrvatski državni arhiv* - HDA] was particularly interesting since it houses the collection of the infamous Directorate for State Security [*Uprava državne bezbednosti* – UDB], or the Yugoslav secret police, which is otherwise unavailable in Belgrade where the access is still restricted. The collection of the UDB in the Croatian State Archives is restricted to documents of the UDB of the Republic of Croatia, but it nevertheless provided invaluable information, particularly regarding personal files of several high-ranking Yugoslav nuclear scientists, more precisely of Stevan Dedijer, once leading figure of the Yugoslav nuclear program. There are other two passing comments that can be made. The research in the UDB archives also provided me with deeper understanding of how Yugoslav nuclear institutes operated on a daily basis, but also of the level of control the secret police had over their operations. It can also be argued that the experience made me blissful in my ignorance of their work on a state-wide level, hoping that it also made me somewhat competent in my understanding of related deeper historical processes.²⁵

Among foreign archives, fortuitous yet highly desired visit to the National Archives of India (NAI) in New Delhi was an important and very productive

²⁵ Carr, *What is History?*, 14-15.

experience.²⁶ Based in the complex of government buildings in the central part of the city, the National Archives in India houses the collection of the Indian Ministry of External Affairs (MEA), arguably one of the most important collections of documents for Cold War international history. While it would be expected that the sheer amount of available materials would overwhelm even the most experienced researchers, the records have already been put through the ‘winnowing process’ and made available to researchers in a limited scale, being organized in so-called “transfer lists” of documents, or “specific trenches” of materials “that were declassified and deposited at the NAI at a given time”, making researchers ignorant about those documents that remain classified.²⁷

The importance of the materials I managed to gather at the National Archives of India lie in the fact that it allowed me to compare the views on Yugoslavia and their nuclear ambitions from a perspective of a formal ally, but also a competitor for leadership within the Non-Aligned Movement and an important player on the Cold War political stage. In addition, it allowed me to contrast and compare materials I collected in archives of former Yugoslavia, while I also found many expert analyses on different topics and a significant volume of information otherwise unavailable elsewhere.

Finally, the Archives of the International Atomic Energy Agency (IAEA) in Vienna encompasses all aforementioned experiences and comments made about the availability, quality and amount of sources. As an archive of a highly specialized international organization, particularly dedicated to a full range of question in the realm of nuclear science, policies and both covert and public diplomatic activities,

²⁶ Marko Miljković, “Sourcing India’s Cold War: From Nehru to Gandhi,” Wilson Center, Nuclear Proliferation International History Project, <https://www.wilsoncenter.org/indias-archives>, February 15, 2017 (accessed on January 12, 2021).

²⁷ Miljković, “Sourcing India’s Cold War: From Nehru to Gandhi”

“the holdings of the IAEA Archives represent one of the most desirable collections of documents related to the history of nuclear weapons and the proliferation of nuclear technology,” although it is also a fact that “this archival material is extraordinarily difficult to access, due to a variety of practical and administrative obstacles.”²⁸ Returning to the story that opened this discussion, most of the countries which cooperated with the IAEA since its establishment in 1957, still exist and huge majority of them do not allow access to researchers to the most sensitive documents. Once again, this does not stand for the Yugoslav files which allowed me to gather information about the Yugoslav nuclear program from yet another perspective.

Piecing together this complex puzzle of different perspectives and topics and transferring it into a functional narrative was no easy task, but it also allowed me to appreciate the complexity of the topic. This complexity applies not only to the case study I investigated, but even more the complexity of the field of research which often is overlooked by researchers. The experience proved to be also vital for getting but a sense of how such an important national project evolved amidst the Cold War context of espionage and overall secrecy, but also to appreciate the heroisms, dedication and sometimes even great sacrifices of those early pioneers of nuclear science, all of which I tried to capture and transfer through the analysis presented in this dissertation.

Why and How: Contemplations on Theory and Methodology

The phenomenon of nuclear proliferation has indeed puzzled generations of scholars ever since the dawn of the atomic age. However, a single theory of a nuclear proliferation has not been crafted so far, and it seems that it will not be any time soon.

²⁸ Marko Miljković, “The Researchers' Guide to the IAEA Archives,” Wilson Center, Nuclear Proliferation International History Project, <https://www.wilsoncenter.org/publication/researchers-guide-to-the-iaea-archives>, January 20, 2016 (accessed on January 15, 2021)

Instead, this field of study is somewhat saturated with different schools of thought and several more focused theories which explain only certain cases or certain aspects of a single case.²⁹ Even though it could be argued that this situation reflects the complexity of the nuclear proliferation, the problem of a small number of existing cases that can be tested, and the general lack of the empirical evidence, it does not change the fact that these difficulties made the proliferation debate increasingly abstract and at the same time enhanced the importance of the analytical tools of political scientists, maybe even more than it otherwise would.

Unlike a great majority of political and other social science scholarship that dominates this field of study, historical analysis in general does not strive for the creation of almost universal explanations or arguments which can be extended to other similar cases. On the other hand, the results of the detailed historical analysis can be a valuable addition to the existing stockpile of nuclear proliferation theories, both as their testing ground and a source for their revisions. This is one of expected contributions of this dissertation.

Considering Yugoslavia's political position immediately after the Tito-Stalin split of 1948 and the first Soviet nuclear bomb testing in the following year, the reason Yugoslavia pursued the nuclear weapons option seems a bit too obvious. However, as the Yugoslav international political position changed and its foreign policy goals shifted in the next two decades, so did the motives for the support or abandonment of their project. All these changes of policies can be summarized in one question: why did Yugoslavia want the atomic bomb?

²⁹ According to Hymans, two most prominent schools of thought are Realist, which focuses on the security demands as a cause of proliferation, and Idealist in which the key motive for proliferation is the state's perception of the bomb's utility and its symbolism. Jacques E. C. Hymans, "Theories of Nuclear Proliferation: The State of the Field", *The Nonproliferation Review*, vol. 13, no. 6 (2006), 455-465.

Equally important was the Yugoslav drive for acquiring and implementing the necessary nuclear technology. While the fact that such options were continuously pursued during two decades is yet another confirmation of the country's desire to achieve the status of nuclear power, the choice of the available and eventual creation of new channels for transfer of the sensitive technology shows that Yugoslavia was successfully exploiting the Cold War divisions as an active player in a global field of nuclear science and technology. This raises the second important question: how did they do it?

The first group of my research objectives is primarily based on Scott Sagan's theoretical approach to the analysis of the reasons why certain countries decide to build nuclear weapons. In order to avoid the confinements of the traditional approach which focuses on the national security considerations in determining the cause of nuclear proliferation, Sagan offers two additional analytical frameworks of nuclear proliferation. They include "the domestic policy model," or the importance of nuclear weapons in domestic political struggles, and "the norms model" in which nuclear weapons or restraint on their acquisition are understood as powerful symbols of country's identity and modernity.³⁰ However, Sagan suggests that these are three alternative models, stressing that "different historical cases are best explained by different causal models," with only mentioning the possibility of their coexistence and correlation in a single country.³¹ In my own research, I employ all of these three models as simultaneous and overlapping circles of motives, continuously testing them against the Yugoslav experience, even though a caution has to be made that their importance during the given time-frame continuously changed.

³⁰ Sagan, "Why Do States Build Nuclear Weapons?", 55.

³¹ *Ibid.*, 85.

Answering why certain states decide to build nuclear weapons is indeed a central question in the nuclear proliferation puzzle, which has particular importance in scholarship dedicated to serve as a source of future policies. However, after the positive decision has been made, answering the question of how this decision is implemented is equally important for understanding the reasons for success or failure of nuclear programs in different countries, and is indispensable for understanding the weak points of such projects. Furthermore, understanding what internal and external obstacles existed in the process of development of the nuclear programs and how these obstacles were avoided will offer additional insights for explaining the changing attitude of the Yugoslav nuclear bureaucracy towards the atomic bomb.

Expanding Sagan's three-model theory to the question *how* nuclear programs in aspiring countries evolve, I employ my own four additional factors. The "technology factor" focuses on the problem of autonomous development of nuclear technology but also on the problems in implementation of foreign technology; the "scientific base factor," in which the question of the availability and education of scientists and technicians for the development of a nuclear program is scrutinized; the "industrial capacity factor" under which the country's industrial capability to support the development of the nuclear program is analyzed; and the "non-proliferation policy factor" which takes into account the political or legal obstacles in the international political sphere and their impact on the development of the nuclear program, as well as the possibilities of avoiding them.

The two suggested clusters of models (*why* and *how*) are also interconnected in an intricate network of various motives, actors and material or technical capabilities working often in opposite directions, and in a different hierarchy, while continuously changing their position in this hierarchy, depending on the period and evolution of the

nuclear program itself. In that respect, avoiding a single-theory approach in my dissertation will prove beneficial since it will allow me to fend off problems of a measurement error, where certain or many aspects of an analyzed case may lie outside of an overarching theory. An additional reason to avoid a single theory approach is that the story of the Yugoslav nuclear program needs to be first introduced to the body of global nuclear history scholarship where it is expected to provide a significant contribution as a fresh case-study, a test-bed for equally fresh theories or comparative research and an evidence of analytical capabilities and values of a historical research proper.

Sagan himself noticed that the complexity of the nuclear proliferation puzzle is the reason why his “models” are designed and presented in an informal sense of the term, since some flexibility in their use as analytical tools is unavoidable, and that “theoretical frameworks” could be a more precise term.³² However, both terms are inadequate since in historians’ analytical tool-box they have much more rigid definitions and structure to be employed the way they are in this dissertation. In order to maintain proper focus in my analysis, but at the same time allow for enough flexibility, I would rather speak about distinctive “vantage points” or “search lights” which allow me to focus my research and analysis on particular aspects of the Yugoslav nuclear program, and leave enough space to illuminate their mutual interactions and intersections. Or, if I may employ E. H. Carr’s “fisherman” metaphor, “models” in my analytical approach are used as different fishing tackles, each chosen depending on the part of the ocean I intend to fish, and the kind of fish I want to catch.³³ This allow more flexibility in asking and answering various questions, which

³² Sagan, “Why Do States Build Nuclear Weapons?”, 55.

³³ Carr, *What is History?*, 23.

is a necessity considering the complexity of the nuclear proliferation in any given country and in any given period.

Utilizing this analytical approach which especially voices the problem of multicausality of nuclear proliferation, applying it and testing it against the Yugoslav case study also necessitated a multidisciplinary approach. Theories of international politics, policy creation, technology transfer, industrialization and modernization, national identity and social elite creation, depending on the availability of the sources, research questions or perspective, are used as important tools which will allow me to approach my research objectives from several different angles and provide more detailed explanations of the processes and phenomena conceived and played out in the international political arena, and which directly or indirectly affected the Yugoslav nuclear program and ambitions of the country's nuclear establishment.

Even though this analytical approach is applied on the Yugoslav case study, I employ predominantly a transnational methodological approach which will allow me to place it in a broader context of various actors and their interplay on the national and the international level, presenting Yugoslavia as an active player in the global process of nuclear proliferation during the Cold War. I also use the comparative analysis to enhance and support my conclusions, whether in comparing the effectiveness of the USA, USSR and the European non-proliferation policies employed in Yugoslavia, or in comparing certain aspects of the Yugoslav nuclear program with the experiences of other similar countries.

In order to avoid the conventional high politics approach, I instead focus on the intermediaries in the nuclear program: the motives and actions of the most prominent persons of the Yugoslav nuclear establishment who were usually the top

ranking politicians or military officers; the role of the scientists whose knowledge was effectively appropriated by the state, but who at the same time often performed the role of the decision makers; the Yugoslav nuclear program itself, as the linchpin between the Yugoslav nuclear policies and the country's industrial and scientific complexes; and the Yugoslav state (political establishment) which continuously fought the pressures and enjoyed support from the two superpowers and its partners among the Third world countries.

In the first cluster of questions (*why*) the main unit of analysis is necessarily the Yugoslav state, though not as a secluded island caught in the battle of the two Cold Warriors, but instead as a player which responds to the changes produced by that battle and the country's internal development which relied heavily on the battle's outcome. This opens a new perspective on nuclear programs in general which are too often analyzed in the confinement of the state security framework. Finally, the Yugoslav nuclear program as the main unit of analysis, rather than Yugoslavia as a state, is employed in the second cluster (*how*). This approach offers more possibilities to perform in-depth investigation of the relations established with other countries' similar activities and international institutions throughout the evolution of this program which intersected the national or the Cold War political boundaries.

Sovietization Happens

In the period immediately after the Second World War, foreign observers considered Yugoslavia as the most loyal ally and possibly the best copy of the Soviet Union. The Communist Party of Yugoslavia [*Komunistička partija Jugoslavije*, KPJ] was the first among the Communist parties within the newly established Soviet sphere

of influence in Eastern Europe to take absolute power in the country, soon followed by the signing of the Contract on Friendship, Cooperation and Mutual Assistance with the USSR in April 1945.³⁴ According to Berend, both “Yugoslavia and Albania deliberately introduced Soviet-type regimes and non-market economies *in a most orthodox way* [emphasis added].”³⁵ The new Yugoslav constitution, adopted already in early 1946, showcased a deep resemblance to the Soviet constitution of 1936, even though some adaptations to the Yugoslav political, economic and social circumstances were also evident.³⁶ Not surprisingly, the constitution anticipated the creation of “a general economic plan” for which the Federal Planning Commission was hastily set up in following months.³⁷ Consequently, in April 1947, Yugoslavia once again broke new ground and became the first among European socialist countries to adopt the unbending Five-Year Plan of industrial development, “based on the Stalinist pattern of administrative planning and centralized management”.³⁸ Paving the way for other countries of people’s democracies, the Yugoslav first Five-Year Plan was based on “forced accumulation and industrialization”, where the preference for heavy industry “served military preparation.”³⁹ Stressing the country’s unabated loyalty to the Soviet Union, this was quickly followed by the official rejection of the Marshall Plan by the

³⁴ Vladimir Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia: From World War II to Non-Alignment* (London, New York: I.B. Tauris, 2016), 23. Radina Vučetić, *Koka-kola socijalizam: amerikanizacija jugoslovenske popularne kulture šezdesetih godina XX veka* [Coca-Cola Socialism: Americanization of the Yugoslav Popular Culture during the 1960s] (Beograd: Službeni glasnik, 2012), 49. Tito and the KPJ were in control of the capital city of Belgrade from October 1944, with gradually expanding even beyond the prewar Yugoslav borders by May 1945. This situation was formally confirmed in the elections in November 1945, where the KPJ won a landslide victory.

³⁵ Ivan T. Berend, *An Economic History of Twentieth-Century Europe: Economic Regimes from Laissez-Faire to Globalization* (New York: Cambridge University Press, 2006), 154.

³⁶ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 38.

³⁷ Martin Schrenk, Cyrus Ardalan, Nawa A. El Tataway, *Yugoslavia: Self-Management Socialism and the Challenges of Development* (Baltimore and London: The John Hopkins University Press, 1979), 23.

³⁸ Dijana Pleština, *Regional Development in Communist Yugoslavia* (Boulder, San Francisco, Oxford: Westview Press, 1992), 20; Schrenk, Ardalan, El Tataway, *Yugoslavia: Self-Management Socialism and the Challenges of Development*, 23. The plan directly controlled the production of some 13,000 commodities, while a single annual plan added up to a full ton of weight in paper. See also Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 47-48.

³⁹ Berend, *An Economic History of Twentieth-Century Europe*, 154

Yugoslav Economic Council in June 1947.⁴⁰ Vučetić reveals similar tendencies even in the cultural sphere. For example, in 1948 Yugoslavia imported 97 Soviet films and only one “American reactionary and decadent film”, as the state officials commented.⁴¹

Even without taking into consideration the radical and aggressive Yugoslav foreign policy at the time, which included shooting down two U.S. transport airplanes over the Yugoslav territory in 1946, growing tensions over Trieste and other neuralgic areas (Greece and to lesser extent Albania), and other spheres in which the Soviet experience was extensively copied, it should not be surprising that in the West, and particularly in the United States, Tito was considered as “the most dogmatic, militant Stalinist in Europe”, while the Yugoslav capital of Belgrade was compared to “the capital of some Soviet republic”.⁴² Obviously seeing the country as a fortified Soviet outpost, the U.S. Ambassador in Yugoslavia, Richard Patterson, even suggested that the State Department close down the embassy in Belgrade.⁴³ The general tone of these statements was comparable to the conclusion of the Central Committee of the Communist Party of the Soviet Union in the summer of 1947, which stressed that “the KPJ had been the most effective party in terms of eliminating ‘the roots of inner and outer capitalism’ in Eastern Europe”.⁴⁴ The West was actually deeply concerned and even repulsed by the degree to which they perceived the Yugoslav replication of

⁴⁰ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 64;

⁴¹ Vučetić, *Koka-kola socijalizam*, 85. For an excellent and detailed analysis of Soviet cultural influences in Yugoslavia during the late 1940s and early 1950s, see Goran Miloradović, *Lepota pod nadzorom: Sovjetski kulturni uticaji u Jugoslaviji, 1945-1955* [The Beauty under Surveillance: Soviet Cultural Influences in Yugoslavia, 1945-1955] (Београд: Институт за савремену историју, 2012).

⁴² David Mayers, *George Kennan and the Dilemmas of US Foreign Policy* (Oxford, New York: Oxford University Press, 1998), 155, cited in: Vučetić, *Koka-kola socijalizam*, 49. Additional conflicts with the USA were the Yugoslav territorial claims on Austrian lands, support to the Communists in Greece, as well as the American critique for the establishment of the one-party political system in Yugoslavia. See also Korica, 30.

⁴³ Darko Bekić, *Jugoslavija u Hladnom ratu. Odnosi s velikim silama 1949-1955* [Yugoslavia in the Cold War. Relationship with the Superpowers, 1949-1955] (Zagreb: Globus, 1988), 24.

⁴⁴ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 32.

Soviet experience and institutions in Yugoslavia, a feeling further reinforced by the Yugoslav aggressive support of Soviet foreign policy and their conscious and public boasting of the status of a die-hard ally of the Soviet Union and dedicated enemy of global imperialism.⁴⁵ With comparable estimates about Yugoslav loyalty and similarity to the Soviet Union coming from both sides of the Cold War divide, the extent of its externally perceived Sovietization seems clear. This perception also makes it difficult to explain the Tito-Stalin split of 1948, however, and at the same time, very easy to understand the West's disbelief of the veracity of this conflict in the West.

The crucial piece of the puzzle for understanding the Yugoslav desire for independence, even from the Soviet Big Brother, comes from the fact that the Yugoslav Communists came to power through their own revolution and struggle against the occupation of the country during the Second World War.⁴⁶ Unlike in other East European countries, the Yugoslav Communists led the resistance movement and fought against the occupation and quisling forces, gradually growing to a respectable army of several hundreds of thousands of battle-hardened soldiers. Tito's inner circle of associates were also people who fought and climbed the political, social and Party ladder during the war, at the same time showcasing next to absolute loyalty to him, although at least in some cases, the fear of falling out of his grace was their main motivator.⁴⁷ These circumstances also allowed for a much faster Sovietization of the society than in other East European countries, "in which socialism was usually proclaimed by a decree," all of which only further stressed the Yugoslav "avant-

⁴⁵ Bekić, *Jugoslavija u Hladnom ratu*, 22-23.

⁴⁶ Berend, *An Economic History of Twentieth-Century Europe*, 150-151. Besides Yugoslavia, local communist forces liberated also Albania, and Greece, as the German strength declined by the end of the war.

⁴⁷ Miloradović, *Lepota pod nadzorom*, 40.

gardism” and simultaneously raised the level of jealousy and animosity among East European leaders.⁴⁸

By the end of the war, Tito found himself as second only to Stalin among European Communist leaders, although it may even be argued that he considered himself equal to Stalin, as they both fought for and won their political positions.⁴⁹ His authority, political self-consciousness, and his closest associates’ unquestionable loyalty did not go unnoticed in Moscow. Djilas recalls that already in April 1945, besides formal mutual respect, “resentment could also be detected” between Tito and Stalin, who often “teased Tito with obvious deliberateness”. In a similar tone, the Yugoslav boast that the Yugoslav political system “was essentially of the Soviet type”, Stalin openly downplayed that claim by explaining that Yugoslavia is actually a combination of De Gaulle’s France and the Soviet Union.⁵⁰

Stalin, obviously, did not allow anybody to come even close to him as a leader of the socialist world, nor would he let any country be compared to the Soviet Union as the vanguard of socialism. Yet it seems Tito may have aimed exactly for that, and perhaps even a bit more. In his ground-breaking research about Yugoslav economic history in the 1940s and 1950s, Unkovski-Korica explains this logic in the economic sphere. Even much before the Tito-Stalin split of 1948, “the Yugoslav Communist leadership wanted to build an original ‘Yugoslav Road to Socialism’” and, therefore, while the Soviet model of the state-system was extensively copied, it was also continuously adapted to Yugoslav conditions.⁵¹ The Yugoslavs intended “to use the

⁴⁸ Bekić, *Jugoslavija u Hladnom ratu*, 24.

⁴⁹ Miloradović, *Lepota pod nadzorom*, 40

⁵⁰ Milovan Djilas, *Conversations with Stalin* (Harmondsworth: Penguin Books, 1967), 89-90. Stalin continuously wanted to downplay the successes of the Yugoslav Communists during the war and simultaneously emphasize the role of the Soviet Union and Red Army in the establishment of Tito’s regime.

⁵¹ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 33, 67.

experience and support of the USSR to transform Yugoslavia from a backward and dependent state into a *modern, industrial society and an independent country*” (emphasis added).⁵² However, the Yugoslav First Five-Year Plan was overly ambitious and based on the expected mass support by the Soviet Union and other socialist countries, at the time when the Soviet economy lacked the capability to provide it on the desired level. Meanwhile the Soviet political leadership did not consider the Yugoslav position in the future socialist camp in the same light as Tito did.⁵³

Unkovski-Korica also insists that, in the political and ideological sphere, the Yugoslav authorities emphasized even more ambitiously their own “Road to Socialism”, which they viewed as not only different from the Soviet experience, but also better suited as a model for revolutions in a majority of the colonial or semi-independent countries, including China, Vietnam and the rest of the Balkan nations. Therefore, regarding relations with the Soviet Union, the Yugoslav leadership considered that they should be based on friendship and not subordination, combined with the recognition of the Yugoslav “vanguard role” in future socialist revolutions “that would tip the balance of forces internationally against imperialism”.⁵⁴

The fact remains that Yugoslavia could not achieve economic independence, as a crucial step towards political independence, without Soviet or some other outside support. Similarly, the political and ideological role Tito had planned for Yugoslavia would put the country on the world map as a leading force in fostering socialist revolutions among developing and newly independent nations. Stalin was not too thrilled about such prospects, to put it mildly, even if he considered them a distant

⁵² Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 23

⁵³ Bekić, *Jugoslavija u Hladnom ratu*, 26.

⁵⁴ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 33.

possibility. On the other hand, while these ambitions may be deemed unrealistic or even impossible, it does not mean that Tito and his closest associates did not take them seriously. This situation unavoidably caused friction between the two comrades and it was a matter of time when it would evolve into an open conflict. More importantly, it also meant that, if Yugoslavia seriously considered taking the active and even leading role in the expansion of socialism on a global level, the country's leadership had to start with a direct copying and only gradual adaptation of the Soviet state-system and only where necessary, for no other reason but the lack of alternatives. This would mean that the Sovietization of Yugoslavia was rather self-imposed than forced by the Soviet Union.

Setting aside for the moment the Yugoslav plan to copy the Soviet state-system as closely as possible (and perhaps build a fresh structure on this basis), the ideological similarity between the two countries, the Yugoslav's desired role in the socialist world, and the general effects of the Soviet propaganda, it must be emphasized that, at the time, the Soviet state-system did have a global appeal as a viable alternative to other known political, social and economic systems that were compromised during two contemporary global calamities, the Great Depression of the 1930s and the Second World War.⁵⁵ In addition, no other budding people's democracy had any experience in organizing a socialist centrally planned economy, which made the Soviet know-how and technology even more important, although the Soviet propaganda about their technical and technological prowess contributed significantly to that impression.⁵⁶ In Yugoslavia, this sentiment was further emphasized by the fact that the American representatives of the United Nations Relief and Rehabilitation

⁵⁵ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 23.

⁵⁶ Pál Germuska, "In a State of Technological Subjection: Soviet Advisers in the Hungarian Military Industry in the 1950s" in *Expert Cultures in Central Eastern Europe. The Internationalization of Knowledge and the Transformation of Nation States since World War I*, Martin Kohlrauch, Katrin Steffen and Stefan Wiederkehr (eds.) (Osnabrück: Fibre Verlag, 2010), 203-204.

Administration's (UNRRA) continuously sabotaged Yugoslav attempts to purchase from the West a number of advanced industrial technologies that were necessary for the country's modernization. This must have been particularly disappointing since Yugoslavia was the single biggest recipient of the UNRRA's support programs in Europe, a huge majority of them funded by the U.S. Government.⁵⁷

Unkovski-Korica provides several important conclusions related to the Tito-Stalin split of 1948. According to him, the main stumbling block between the Soviet Union and Yugoslavia was the disagreement on the Yugoslav developmental policies, part of which were related to the Yugoslav understanding of global affairs. Expecting at least some support from the West, partially experienced through the UNRRA programs, the Yugoslav leadership planned to industrialize much faster compared to the Soviet experience in the 1930s. To this end, they were ready to "borrow, but adapt, superpower models to their conditions". Somewhat surprisingly, he also concludes that "Yugoslavia never underwent sovietisation, but effectively embarked on a 'Yugoslav Road to Socialism' before 1948."⁵⁸ Although the previous discussion suggests a rather different scenario, an important, albeit unexpected conclusion is that the debate about when and how and to what extent Yugoslavia Sovietized, was Sovietized, self-Sovietized, or otherwise related to the USSR model remains a fundamental and open question in the historiography.

The question of adaptation is indeed an integral part of any process of political transfer, which by default makes the proverbial Yugoslav exceptionalism not that

⁵⁷ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 30, 39; Vučetić, *Koka-kola socijalizam*, 49. Both authors agree that Yugoslavia received \$415.6 million worth of goods between April 1945 and June 1947. This amounted to roughly double the value of Yugoslav imports in 1938, although it included, food, clothing, medical supplies, industrial, agricultural and transport equipment. The US Government provided roughly 73 percent of these supplies.

⁵⁸ *Ibid.*, 69.

exceptional.⁵⁹ While this theoretical framework to a certain extent confirms Unkovski-Korica's conclusion about the Yugoslav original "Road to Socialism", at the same time it deeply undermines its value; this originality was unavoidable, regardless of the Yugoslav plans. Investigating the transfer of the Soviet model in the economic sphere, Geerling and Magee go even further and compare it to human organ transplants, suggesting that like new organs in the recipient's body, "new institutions out of touch with, and unaccepted by, the community it works for are unlikely to take."⁶⁰ Viewed from the perspective suggested by Geerling and Magee, it may be argued that, if certain institutions were easily transferred from one political system to another, it was the consequence of their initial deep systematic resemblance and compatibility. Putting this argument in the Yugoslav context and taking it to its logical conclusion, it would be actually very difficult to argue that Yugoslavia "never underwent sovietization, but effectively embarked on a 'Yugoslav Road to Socialism' before 1948", as Unkovski-Korica suggests.⁶¹ The opposite seems more likely, that the Sovietization had been experienced much earlier, perhaps even before, but more likely and more aggressively during the war, as the Yugoslav Communist and the KPJ were preparing for the political takeover. Perišić indirectly confirms that by the end of the war the KPJ was "already highly Bolshevized party".⁶² Therefore, I would argue that everything that happened in the years after the war and the establishment of the

⁵⁹ Nathan Rosenberg, "Economic Development and the Transfer of Technology: Some Historical Perspectives", *Technology and Culture* 11, no. 4 (October 1970), 550-575; Henk de Velde, "Political Transfer: An Introduction", *European Review of History – Revue européenne d'Histoire* 12, no. 2 (July 2005): 205-221; Janny de Jong, "'The Principles of Steam: Political Transfer and Transformation in Japan, 1868-89'", *European Review of History – Revue européenne d'Histoire* 12, no. 2 (July 2005): 269-290.

⁶⁰ Wayne Geerling, Gary B. Magee, "Piecemeal and the Sovietization of the East German Workplace", *Central European History* 45 (2012), 718.

⁶¹ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 69.

⁶² Miroslav Perišić, *Od Staljina ka Sartru. Formiranje jugoslovenske inteligencije na evropskim univerzitetima, 1945-1958* [From Stalin to Sartre. Formation of the Yugoslav Intelligentsia on European Universities, 1945-1958]. (Beograd: Institut za noviju istoriju Srbije, 2008), 51.

necessary state institutions was a conscious implementation of an already accepted and deeply understood model of the Soviet state-system.

Consequently, the originality is the Yugoslav strong sense of and desire for independence, combined with an overestimated belief in their own capabilities and historical role as vanguards of the global socialist revolution. For example, in March 1947, Anatoly Lavrentiev, the Soviet ambassador in Belgrade, complained officially to the Yugoslav authorities about their “economically ‘parasitical’ tendencies” towards the Soviet Union, their downplaying of the Soviet military support during the war, and for their insistence on “the alleged specificity of their own experiences and the insufficiency of copying Soviet methods.”⁶³ On the one hand, ambassador Lavrentiev could have been acting from his superior position, emphasizing the Yugoslav overestimated self-confidence in their own abilities and importance, similar to Stalin’s criticism of the Yugoslav leadership a couple of years earlier. On the other hand, if Lavrentiev’s comments are to be scrutinized for their underlying meaning, the core of his statement is that the Yugoslav Communists were no different than the Soviet, perhaps even regarding their strong sense of and desire for independence.

Investigating the initial phase of the Yugoslav nuclear program necessitates analysis of two deeply related aspects or avenues of Sovietization, namely economy and education. Germuska explains that the Sovietization of the East European countries in general, and of their economies in particular, was carried out through the Soviet expert-advisors who made the most important decisions in their own area of expertise or industrial sectors they were coordinating in host countries. In most of Eastern Europe this concept was fully implemented only after the establishment of the Council for Mutual Economic Assistance (COMECON) in 1949, when the so-called

⁶³ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 31, 33.

“permanent advisory system” was created in the Soviet satellite countries. As Germuska recognizes, at least some aspects of this “system” were established already in 1944 and 1945, as the victorious Red Army was marching through Eastern and Central Europe. Though predominantly as a support to the Soviet military campaign, the support was extended to the local Communist parties, particularly regarding the establishment of the secret police. The concept was also evident in the civil sector, where the most important characteristic was the uncompromising requirement of accepting the related Soviet models.⁶⁴

One of examples of the early and willing Sovietization of Yugoslavia in the economic sphere was the process of establishment of joint enterprises with the Soviet Union. According to Unkovski-Korica, the establishment of joint enterprises was a topic initiated by the Yugoslav side and “had been the subject of loose discussion ever since 1944”. The slow implementation of these projects was due mainly to power-struggles within Yugoslavia and to the Yugoslav dissatisfaction with the Soviet strategy and performance of the few joint enterprises (joint-stock companies) that had been established.⁶⁵ Ninković confirms this, adding that besides joint enterprises, Yugoslav authorities had openly asked for Soviet experts since 1944, “in order to organize certain [industrial] production branches”, all of which indirectly confirm Germuska’s assertions, at least regarding the importance of the Soviet advisors.⁶⁶

Once in power, the main rationale for this Yugoslav strategy was the desire to speed up the country’s industrialization and general economic development through close cooperation with the Soviet Union and later with “people’s democracies”. The

⁶⁴ Germuska, “In a State of Technological Subjection: Soviet Advisers in the Hungarian Military Industry in the 1950s”, 202-203.

⁶⁵ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 30-31

⁶⁶ Momir Ninković, “Neuspešni pregovori o organizaciji jugoslovensko-sovjetskih mešovitih društava (1945-1947)”, *Tokovi istorije* no. 2 (2015), 131.

main bargaining chip was Tito's personal promise to Stalin that he would not accept loans and capital from other countries, particularly from the USA. For this gesture, Tito expected to receive necessary industrial machinery and related technologies from the Soviet Union.⁶⁷ The negotiations continued throughout 1946 and 1947. While several joint enterprises were at least formally established, by April 1947 it became clear that neither side was completely satisfied. The Soviet demands for the control over these companies' production and export were harshly condemned by the Yugoslavs as "thievery" and "imperialist policy", while the other side openly criticized the Yugoslav "parasitic disposition" toward the Soviet Union.⁶⁸

When it came to finances and economic cooperation between Yugoslavia and the Soviet Union, then, ideology and politics were relegated to the back seat. At the same time, neither side was willing to accept the opposing arguments, even making very similar accusations against each other. This confirms the Yugoslav desire for independence as the main or even the only original characteristic in comparison to the Soviet Union. However, both countries suffered serious destruction during the war, both planned for the rapid reconstruction and modernization, both had very ambitious plans about their role in future expansion of socialism, yet neither had enough means to support these ambitions. While this topic requires further analysis that goes beyond the scope of my research, it is important to note that these similar dispositions of two

⁶⁷ Ninković, "Neuspešni pregovori o organizaciji jugoslovensko-sovjetskih mešovitih društava (1945-1947)", 132, 135. The initial plan for the establishment of joint enterprises anticipated creation of eight different companies in following sectors: oil extraction and refining, bauxite extraction and aluminium production, lead extraction and production, coal exploration and exploitation, black metallurgy, civilian aviation, navigation of the Danube and joint bank.

⁶⁸ Ninković, "Neuspešni pregovori o organizaciji jugoslovensko-sovjetskih mešovitih društava (1945-1947)", 132, 135-138, 149-150. The main stumbling blocs in these negotiations were the Soviet demands for the top managing positions for their citizens in these joint enterprises, tax exemptions, favourable prices for export to the Soviet Union as well as the priority of the Soviet market. The Yugoslav side insisted on lower capital investments, overpriced value of the existing Yugoslav companies that were supposed to draw higher investments from the Soviet side, overambitious Yugoslav Five-Year Plan that necessitated huge investments. See also: Bekić, *Jugoslavija u Hladnom ratu*, 26.

‘brotherly’ nations and ideologically similar systems, all indirectly reinforce the previous conclusion that Yugoslavia was not only deeply Sovietized already by the mid-1940s, but also that this was a Yugoslav initiative.

The Yugoslav willing and, at least at moments, very active Sovietization of the country is evident. Yet it must be stressed that the Soviet side was not sitting idle. Already in April 1947, Stalin realized that further negotiations on joint enterprises were futile and untied this Gordian knot in a traditional manner: he simply abandoned the joint enterprises negotiation and offered the Yugoslav side “direct assistance through shipments of complex machinery, access to technological documentation, and loaning of specialists”, all of which neatly coincided with the initiation of the Yugoslav Five-Year Plan.⁶⁹ While it turned out that little time was left for any serious cooperation before the final split between two leaders, this obvious attempt to keep Yugoslavia firmly tied to the Soviet Union confirms that Sovietization of Yugoslavia was again actively pursued from both sides, even though for different reasons, using different mechanisms and with different expectations.

On the shop-floor level of Sovietization, an additional original characteristic of the Yugoslav state-system reveals itself, the existence of the so-called ‘political factories’. Heretical (if not Satanic) verses written by Milovan Đilas in his book *The New Class*, explain the phenomena of socialist political leaders turned into state-property owners and managers, which became the basis and purpose of their power.⁷⁰

⁶⁹ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 32; Ninković, “Neuspešni pregovori o organizaciji jugoslovensko-sovjetskih mešovitih društava (1945-1947)”, 150.

⁷⁰ Milovan Djilas, *The New Class. An Analysis of the Communist System* (London: Thames and Hudson, 1957), 65.

“They [the Communists] first administered and controlled the entire economy for so-called ideal goals; later they did it for the purpose of maintaining their absolute control and domination. This is the real reason for such far-reaching and inflexible political measures in the Communist economy.”⁷¹

While Djilas is explaining this phenomenon as common to state socialism in general, it is a fact that he wrote these comments predominantly criticizing the Yugoslav experience. The logic of Party control over the entire economy in Yugoslavia quickly led to the establishment of ‘political factories’, “irrational local investments [...] particularly widespread in weakly-developed localities, which made use of the financial and political means at their disposal”; regardless of the factory’s performance, local political elites monetized their authority and muscled the federal investments back into often underperforming factories in order to provide full salaries and keep the workers content, while deflecting any responsibility.⁷² Therefore, ‘political factories’ were located and established with the main criteria of assuring the political rise and solidification of power of local ex-Partisans and Party leaders, while rational economic reasons usually were not included in these calculations.⁷³ The problem was only further complicated with the inter-regional competitiveness among the Party leaders for very limited financial sources, who channeled federal investments into the region or republic where they came from and where their political support lied. This was eventually institutionalized in the policy of the so-called ‘ethnic key’, yet another and related characteristic of the Yugoslav state-system. This system was introduced in order to accommodate different regions, republics and their leaders

⁷¹ Djilas, *The New Class*, 105.

⁷² Pieter Troch, “Tensions between plan and market in a political factory in socialist Kosovo”, *Business History*, DOI: 10.1080/00076791.2020.1733981, accessed on April 12, 2020: 3, 12

⁷³ Sharon Zukin, *Beyond Marx and Tito: Theory and Practice in Yugoslav Socialism* (New York: Cambridge University Press, 1975), 20.

and to provide them access to emerging and potentially profitable industrial sectors, often multiplying investments and establishment of enterprises with identical production programs for the sake of keeping any potential grievances at bay.⁷⁴

The outcome was the inter-regional competition for federal investments among the leading politicians. The winner was the usually the person closest to the source of power, while simultaneously such a victory confirmed and recognized the person's position in the Yugoslav socialist hierarchy. Any multiplication of similar or identical enterprises in other regions would reflect the fact that there were several more or less equally deserving competitors for the same grace emanating from the source of the political power.

In his ground-breaking research about the Sovietization of the higher education in East European countries, namely Poland, Czechoslovakia and East Germany, Connelly identifies that, while “the institutions and programs created in these years [1940s and 1950s] were nearly identical [...] what varied were the people who operated within them.”⁷⁵ Ackermann and Urbansky build on this notion and conclude that “Sovietization also had its everymen, anonymous and yet indispensable.”⁷⁶ Connelly concludes that the Soviet Union was not making much effort in these matters. Comparable to advisors in the economic sphere, “small handfuls of Soviet professors and functionaries from VOKS [All-Union Society for Cultural Relations with Foreign Countries] helped facilitate desires of East European Communists for

⁷⁴ Marko Miljković, “Western Technology in a Socialist Factory: The Formative Phase of the Yugoslav Automobile Industry, 1955-1962”, MA Thesis (Budapest: Central European University, 2013), 82-86. Based on the analysis of the establishment of the Yugoslav automobile industry, the logic of ‘political factories’ and the ‘ethnic key’ were deeply responsible for the continuous underperformance of this industrial sector in Yugoslavia, with devastating consequences on the entire economy.

⁷⁵ John Connelly, *Captive University: The Sovietization of East German, Czech, and Polish Higher Education, 1945-1956* (Chapel Hill and London: The University of North Carolina Press, 2000), 2.

⁷⁶ Felix Ackermann, Sören Urbansky “Einteilung – Introduction: Reframing Postwar Sovietization: Power, Conflict, and Accommodation”, *Jahrbücher für Geschichte Osteuropas*, Bd. 64, H. 3, Reframing Postwar Sovietization: Power Conflict and Accommodation (2016), 353-362 (here 354)

specialized knowledge about Soviet higher education”. While local Communists were successful in replicating the Soviet structure and curricula, they failed in “uniformly reproducing the internal life of Soviet universities”. The main reason for this failure was the opposition from within their own societies, based on the different “native political culture”.⁷⁷

It is important to note, however, that the East German experience with the transfer of the Soviet model of higher education was the most complete. East German universities were “places that dependably reproduced official ideology” and consequently kept students loyal to the state and Party.⁷⁸ According to Connelly, the main reason for this success was that, as a consequence of war losses and the denazification process, in East Germany it was easy to break apart the old university structures and create new ones. This process was additionally fueled by the rapid influx of new students from working-class and peasant backgrounds, thus making the new university elite (both professors and students) loyal to the ruling Party and state in general, because they “owed” their “social advance” to them.⁷⁹

This conclusion is instructive considering the Yugoslav case, given certain similarities with the East German experience. According to official statistics, in 1948 Yugoslavia only 0.3 percent of the population had a university degree. Adding to these poor numbers the wartime destruction of universities, laboratories, loss of educated personnel and professors to war and migration, the ambitious plans for the country’s industrialization and modernization were far removed from the reality.⁸⁰ On the other hand, Yugoslav universities had a tradition of being crucial points for

⁷⁷ Connelly, *Captive University*, 282-285.

⁷⁸ *Ibid.*, 282.

⁷⁹ *Ibid.*, 287-288.

⁸⁰ Dragomir Bondžić, “Prosveta i nauka u Srbiji i Jugoslaviji 1945-1990”, *Istorija 20. veka* 2 (2008), 409-466.

dissemination of European scientific and cultural influences. During the interwar period, 59.4 percent of professors at the University of Belgrade acquired their diplomas in foreign universities, while almost three quarters (74.1 percent) got their doctoral titles abroad.⁸¹

Therefore, if a native educational culture existed in Yugoslav universities, it was well attuned to accept and transfer foreign experiences and trends in higher education, which can be understood even as a local tradition. In that respect, the dire situation of Yugoslav higher education after 1945 created very favorable circumstances for a rapid and profound Sovietization, not unlike the situation in East Germany, as explained by Connelly. Painting on a proverbial blank canvas in the process of creating a Soviet-style system of higher education, the Yugoslav authorities would not be bothered too much by the inherited university tradition simply because it was very limited and ideologically unacceptable. According to Perišić, the “already highly Bolshevized Party” considered the university reform as a continuation of the struggle against the ideological enemy that had been defeated in the political arena. As soon as the Yugoslav socialist state apparatus was established, “an absolute negation” of the previous system of values became the norm.⁸² Not unlike with the general layout of the KPJ, Perišić also concludes that the Yugoslav attitude towards the intelligentsia and universities among the Party leadership was developed during the interwar period and was “based on the experience offered by the Soviet practices”.⁸³

On the other hand, it would also mean that in that process, Yugoslavia would necessarily have to rely on the Soviet experience, at least in the first couple of years. As Perišić states, Soviet influence was dominant in the period until 1948, which is

⁸¹ Perišić, *Od Staljina ka Sartru*, 36, 46-47.

⁸² *Ibid.*, 51-52.

⁸³ *Ibid.*, 74.

consistent with experience in other fields. He characterizes the following period as “an attempt” of the political establishment to define and implement the original concept of revolution and independent ‘Road to Socialism’, even though the ‘originality’ was a common feature in other socialist countries.⁸⁴ The part of the Soviet model which survived the transformation in Yugoslavia after 1948 was the reorganization of universities into “factories” for producing of the experts necessary for the economy and industrialization. Simultaneously the university contributed to the “formation of a different type of intelligentsia”.⁸⁵ The process was particularly visible in the rapid rise of the number of students in universities in comparison to the prewar period, as well as in their social background. By the mid-1950s, the overall number of students was three times higher, while the social background of the student body also changed dramatically. The proportion of students from working-class families rose from roughly 3 to 10 percent, and to almost 50 percent from families whose parents were on various levels included the state bureaucratic system. Meanwhile the number of students coming from the families of ‘free professions’ fell from 26.4 percent in 1939, to 2.6 percent in 1955.⁸⁶

Several conclusions can be made regarding the Sovietization of Yugoslavia in the period immediately after the Second World War. The Soviet state-system was not imposed upon Yugoslavia but was instead actively pursued by the KPJ and its leadership. By the end of the war, the KPJ was already so deeply Sovietized that at the moment the Yugoslav Communists took power, the essential institutional framework and necessary blueprints for reproducing the Soviet experience were already well developed and operational. Instead of the pressure to accept a foreign model of a state-

⁸⁴ Perišić, *Od Staljina ka Sartru*, 57-58; Connelly, *Captive University*, 4-5.

⁸⁵ Perišić, *Od Staljina ka Sartru*, 57, 59.

⁸⁶ *Ibid.*, 61-62.

system, Yugoslavia's much bigger problem was to secure the necessary and all-encompassing support from the Soviet Union. The pattern elaborated here for the Yugoslav economy and higher education was not much different in other spheres of life.

This lack of the expected support from the Soviet Union gradually led to alienation between the two countries and their leadership. In Yugoslavia, the necessity to establish the new political elite, and to secure its unyielding support in the face of the growing conflict with the Soviet Union, led to the establishment of the 'political factories', as a specific kind of a reward for a continuous support to Tito and the Party, as well as a sign for a recognition within the ranks in the country's political pyramid. Combined with the interregional competition which further complicated the situation, the general political and institutional framework in which the Yugoslav nuclear program was initiated starts to become clearer.

Chapter 1: Soviet(ized) Atoms in Yugoslavia

1.1 A Complicated Case of Sovietization: The Institute for Physics in Vinča

“Many Soviet officials are interested in the establishment of our Physical Institute, and particularly Academician Kapitsa.”⁸⁷

The establishment of the Institute for Physics in Vinča in 1947/48 is a foundational moment in the creation of the Yugoslav nuclear industry. The rationale behind this project was the result of the personal ambition of its founder, physical chemists Pavle Savić, and his ability to exploit his relatively strong political position in the budding Yugoslav socialist establishment. However, while seeing this Institute as one of those ‘political factories’ captures the spirit of the time, the logic behind the decision to initiate the Yugoslav nuclear program is much more complex. Untangling the fine threads of this very richly embroidered tapestry requires deep scrutiny of Savić’s activities especially in the early period of the process.

⁸⁷ Arhiv Jugoslavije, fond 836 Kancelarija Maršala Jugoslavije [Office of the Marshal of Yugoslavia], II-6-a/2 (in further reference AJ, 836, II-6-a/2). Pavle Savić's letter to Tito, March 17, 1946.

The First Step of a Long Journey

During the war, Pavle Savić was the cryptographer in the General Staff of the People's Liberation Army of Yugoslavia [*Narodnooslobodilačka vojska Jugoslavije* – NOVJ] and performed other important political functions during and after the war, usually being in a proximity to Tito. On the surface Tito seems to have trusted Savić's loyalty sufficiently to send him as a member of the NOVJ Military Mission to Moscow, where he stayed between April and October 1944. However, this assignment can be interpreted as the final step and symbolic act of forgiveness in the long process of Savić's political rehabilitation. In July 1943 he had been removed from all of his functions due to his "big mouth," as explained by his (and subsequent Tito's) biographer; until this assignment to Moscow he was only gradually returning to his previous political prominence.⁸⁸

According to a much later account by one of Savić's closest friends and colleagues, the reason for his removal in July 1943 was that he publicly insulted Tito's lover Davorjanka. Savić was promptly demoted, relieved of all his duties, and adding insult to injury, sent on foot as a simple soldier to a remote partisan unit while being escorted by an officer on a white horse. However, the biggest punishment for Savić was that he was left completely alone to cross enemy-controlled territory. This punishment meant "practically a death sentence," but "since he survived he was eventually pardoned."⁸⁹ Whatever the true story may be, it seems rather odd for Tito to send Savić on a Military Mission to Moscow, since aside from Savić's "big mouth," he did not even speak Russian and have never before visited the Soviet Union.

⁸⁸ Pavle Savić, *Nauka i društvo* [The Science and the Society] (Beograd: Srpska književna zadruga, 1978), 256-257.

⁸⁹ Arhiv Radio Beograda, Imenski Registar, Pavle Savić (in further reference ARB, IR, Pavle Savić). Slobodan V. Ribnikar, "Molim pomilovanje za našeg nuklearnog demona!" *NIN*, June 10, 1994. Savić actually complained publically for Davorjanka feeding Tito's dog with meat while the rest of partisan fighters were starving.

However, it is more important to understand what Savić was doing in Moscow since this is the period when the idea to establish the first nuclear institute in Yugoslavia started to hatch.

The Yugoslav Military Mission to Moscow was led by Milovan Đilas, one of the Tito's closest associates at the time. The mission's main task was to secure assistance in armaments and funding from the Soviets as well as to explore chances for the international recognition of the NOVJ as an anti-fascist movement and the KPJ as the country's (at least) temporary government.⁹⁰ According to Savić's own account, he personally "did not have much enthusiasm" for activities of the Military Mission. In letters to his wife he openly complained about his boring life and work in Moscow as well as the lack of education, rampant alcoholism and overall primitive behavior of a couple of members of the Military Mission. Therefore, soon after his arrival in Moscow, Savić asked Tito for permission to work in one of the Soviet scientific institutes. The permission took almost a full month to arrive, but when it did, Molotov confirmed it within a few days and sent his personal adjutant to take Savić to the Institute of Physical Problems (IPP) of the Soviet Academy of Sciences. There he met with the director and probably one of the most internationally renowned Soviet physicists at the time, Pyotr Leonidovich Kapitsa, later winner of the Nobel Prize in physics.⁹¹

This meeting began a lasting friendship between Kapitsa and Savić, which should not be that surprising. As the Red Army gradually gained confidence and

⁹⁰ Dragomir Bondžić, "Rad Pavla Savića u Moskvi 1944. i 1945-46. i projekat za izgradnju jugoslovenskog Instituta za fiziku", *Istorija 20. veka* 2 (2015), 91-92.

⁹¹ Savić, *Nauka i društvo*, 259-272; Pavle Savić, *Kazivanja Pavla Savića o periodu 1944-1960* [Pavle Savić's Tales on the 1944-1960 Period] (Recorded and edited by Milenko Sušić and Slobodan V. Ribnikar Beograd, 1993), 7-8; Pyotr Kapitsa – Biographical, https://www.nobelprize.org/nobel_prizes/physics/laureates/1978/kapitsa-bio.html (accessed on March 2, 2017).

started to reclaim lost territories, the Soviet scientific community recovered to an equal measure and started making plans for the period after the war. Kapitsa was among the strongest supporters for reestablishing contacts with foreign scientists in order to help Soviet science to catch up for the time lost during the purges of the late 1930s and the war, as well as with more utopian aspirations for the future role of scientists as crucial agents for reconstructing the international political system and establishing a lasting peace. According to Holloway, it was exactly in this capacity that Kapitsa wrote to the famous physicist Niels Bohr in October 1943, inviting him to the Soviet Union and offering hospitality at the moment when he just escaped to Britain from Nazi-occupied Denmark.⁹² Savić was not Bohr, but he could have easily been known to his Soviet colleagues for his work in the late 1930s with Irène and Frédéric Joliot Curie that contributed to the discovery of fission. Taking into consideration the Soviet desire to reestablish contacts with the Western scientific community, he could have also been considered as a valuable mediator and a link to the French scientific community.

At the IPP Savić cooperated and even became friends with other Soviet physicists, such as the famous theoretician Lev Davidovich Landau and Abraham Isaakovich Alikhanov, who actually designed the first Soviet heavy water nuclear reactor (1949) and was otherwise involved with the Soviet atomic bomb project.⁹³ In many interviews and biographical notes Savić continuously repeated that at the IPP he was researching superconductivity and superfluidity of liquid helium, mostly in cooperation with Alexander Iosifovich Shalnikov, Kapitsa's personal assistant at the time. This was the general research program at the IPP and Savić seems to have made some decent progress with his own research, although he did not have any previous

⁹² Holloway, *Stalin and the Bomb*, 112-113.

⁹³ *Ibid.*, 447, 450.

experience in this field.⁹⁴ However, according in a much later interview that Savić gave in 1993, he claims that Alikhanov offered him to stay in Moscow and work on nuclear fission under the condition that he cut all connections with his family and friends for full five years. Savić agreed to these terms and Yugoslav authorities even granted him the necessary permission; however, the Soviet authorities soon changed their mind and explained to him that as a foreigner he could not participate in such classified work.⁹⁵

This scenario is plausible since the Soviet authorities at that time did not treat the nuclear program as an absolute priority. Even after the surrender of Germany they were slow to incorporate into the program the captured German scientists who were employed as experts in various segments of the Nazi atomic bomb project.⁹⁶ Brown reveals that even when the Soviet atomic bomb program was in full swing, Beria was still very suspicious even of German inmates used as simple labor on the secret construction sites of the future Soviet nuclear industry.⁹⁷ Therefore, it should not be surprising that, as a foreigner, Savić was directed to work with liquid helium, although Shalnikov on one occasion confirmed that he and his colleagues were excited about his arrival because of his work on fission in Paris. Savić also found some pleasure in this completely new field for him and in one of the letters to his wife he expressed the desire and hope that *Stari* [Tito] would let him finish his research in the IPP. However, these dreams and plans were disrupted when *Stari* ordered Savić to return to Yugoslavia only a few days before the liberation of Belgrade (April 20, 1944).⁹⁸

⁹⁴ Holloway, *Stalin and the Bomb*, 96-114.

⁹⁵ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 9.

⁹⁶ Holloway, *Stalin and the Bomb*, 114.

⁹⁷ Brown, *Plutopia*, 92-93.

⁹⁸ Savić, *Nauka i društvo*, 259-266, 273, 279; Miloš Jevtić, *Razgovori sa Vinčancima* [Conversations with the 'Vinčians'] (Beograd: Institut za nuklearne nauke "Vinča", 1998), 22. *Stari* ("the old man") was one of Tito's many nicknames, used only by his closest associates.

It seems evident that Savić did not have a clear task as the member of the Military Mission in Moscow in 1944. Rather, Tito's main motivation for sending him was to exploit his scientific reputation in order to present the NOVJ and the still budding socialist regime in Yugoslavia as a credible force. This intention was also directed to the Western audience since Savić gave an interview to "Les Dernières Nouvelles," the French journal published in Cairo, where he spoke about "the struggle of the Marshal Tito's Army against occupying forces as well as Yugoslav quislings."⁹⁹ Unkovski-Korica agrees; he explains that during the war Stalin was not in a position to do much for the Yugoslav Partisans, nor did he give them much prominence at least until Tito's success became recognized and backed by the USA and Great Britain by June 1944.¹⁰⁰ Savić was one of the very few highly educated associates of Tito and experienced scientists were important for Tito's propaganda, although sending abroad a bright but obviously hardheaded scientist may have been counted as an added benefit.

The Soviet nuclear program was only slowly gearing up in 1944. Even if Savić could have provided some of his expertise, there was not much need for it on the Soviet side. In fact, it may also be argued that Savić's research was interrupted by the war and after five years outside of the cutting-edge scientific research, his knowledge must have been even more outdated than for Soviet scientists who had a similar problem.¹⁰¹ Many years later Kapitsa made a passing reference in one of his letters that Savić was "a scientific attaché at the Yugoslav Embassy during the war and who worked with us in our Institute in his spare time," obviously not adding much

⁹⁹ Savić, *Nauka i društvo*, 259.

¹⁰⁰ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 26-28.

¹⁰¹ Holloway, *Stalin and the Bomb*, 112-113, 134. The Soviet nuclear program was initiated with some limited research in 1943, but became full-fledged atomic bomb project on August 20, 1945 after the creation of the Soviet Special Committee on the Atomic Bomb.

significance to his contribution.¹⁰² It seems probable that the Soviets allowed Savić to work at the IPP only as recognition of his previous work in Paris and in a wider perspective as a friendly gesture towards Tito. Although it should be noted that Savić was not allowed to join the research in the most sensitive area – research on characteristics of liquid helium seems to have been the most obvious choice for the Soviet authorities, or at least not as sensitive as working on nuclear fission.

At this point the plot thickens. According to Holloway, the Soviets started to realize that the Americans might be working on the atomic bomb already in the early 1940s, when they suddenly stopped publishing scientific articles about fission.¹⁰³ Employing the simple analogy in this case, the fact that Soviet authorities did not allow Savić to continue his work on fission and redirected him to a less sensitive field of study certainly did not raise similar interest on the Yugoslav side. Aside from Savić nobody in the Tito's wider circle of associates had any understanding of this phenomena, but it must have created at least some resentment and suspicions in the hardheaded Yugoslav scientist about the true nature of the relationship with the great Soviet ally.

Back in the USSR

The liberation of Belgrade was probably the most important milestone in the establishment of the socialist rule in Yugoslavia. Once again Tito needed Savić's authority and reputation, as proved by the number of political functions he held from

¹⁰² J.W. Boag, E. Rubinin, D. Shoenberg (eds.), *Kapitza in Cambridge and Moscow: life and letters of a Russian physicist* (Amsterdam; New York: North-Holland; New York, NY, USA: Sole distributors for the USA and Canada, Elsevier Science Pub. Co., 1990), 417; Savić, *Nauka i društvo*, 306. This was the Institute for Physical Problems of the Soviet Academy of Sciences, established in 1934.

¹⁰³ Holloway, *Stalin and the Bomb*, 56-59, 76-78.

late 1944 in Serbia and on the federal level.¹⁰⁴ Therefore, it is rather surprising that, after the invitation to attend the celebration of the 220th anniversary of the Soviet Academy of Sciences in July 1945, Savić decided to move to Moscow with his wife and a young daughter, where he stayed for more than a year, until September 1946.¹⁰⁵

Documents and other sources are a bit blurry about Savić's second stay in Moscow, and particularly about the reasons behind it. The organization of the 220th anniversary of the Soviet Academy of Sciences as a high-level international event that hosted more than one hundred foreign scientists was important for reestablishing contacts with the international scientific community. Savić's extended stay in Moscow illustrated this policy. On a personal level, Savić was able to reestablish his old contacts, since on this occasion he got met Irène and Frédéric Joliot Curie for the first time since 1939.¹⁰⁶

The Yugoslav delegation's report reveals that their strategy was to use this opportunity to try to secure Soviet support for reconstructing the University of Belgrade. Among other things, they requested from the Soviets to provide positions for up to 1,000 Yugoslav students at their universities.¹⁰⁷ Part of the problem was a serious lack of 'cadres' among the university professors and teaching assistants, due not only to the inherited small number in comparison to the ambitions of the new regime in Yugoslavia, but also to the fact that many professors died during the war, some emigrated with the Germans, while some were "removed from the university" as ideological enemies. Therefore, sending Yugoslav students to the Soviet Union was not simply a plan for "refreshing the meagre intelligentsia" in an ideologically

¹⁰⁴ Savić, *Nauka i društvo*, 274, 281-282.

¹⁰⁵ Bondžić, *Između ambicija i iluzija*, 47-48.

¹⁰⁶ Holloway, *Stalin and the Bomb*, 113-114; Savić, *Nauka i društvo*, 281.

¹⁰⁷ AJ, 836, I-3-b/615. Report of the Yugoslav Delegation at the 220th Anniversary of the Soviet Academy of Sciences, n.d.

acceptable manner, but also a necessity in order to relieve pressure on Yugoslav universities.¹⁰⁸

What can be read as Savić's direct contribution in these requests was the section of 100 spaces for students of chemistry, physics, mathematics and biology, as well as the request that the Soviet Government should send from their occupation zone in Germany "institutes complete with equipment" as a compensation for Yugoslav institutes and libraries destroyed during the war.¹⁰⁹ This document also reveals that this was just the beginning of negotiations with the Soviet side; Savić may have been ordered to stay in Moscow in this capacity. It was already mentioned that Kapitsa remembered Savić as "a scientific attaché at the Yugoslav Embassy" who worked in the IPP "in his spare time," although Kapitsa seems to have conflated in his memory two different episodes in Moscow.¹¹⁰ Nevertheless, this indirectly confirms that Savić had a primarily (or at least nominally) diplomatic mission.

Savić did continue his research at the IPP, mostly on low temperature physics. However, this was far from simple tinkering in his spare time; by early 1946, when he actually brought his family to Moscow, he was already employed as a senior scientific associate of the Soviet Academy of Sciences with a handsome monthly salary of 4,000 rubles.¹¹¹ By early 1946, Savić evidently became a recognized member of the Soviet scientific community. On the other hand, it is difficult to reconstruct what Savić was doing in Moscow besides his research at the IPP, as he seems already on the way to

¹⁰⁸ Perišić, *Od Staljina ka Sartru*, 83-84.

¹⁰⁹ AJ, 836, I-3-b/615. Report of the Yugoslav Delegation at the 220th Anniversary of the Soviet Academy of Sciences, n.d. The Yugoslav delegation also requested Soviet university professors that could teach in Yugoslavia, various literature and textbooks, instruments and pharmaceuticals for the medical use, and creation of the Soviet-Yugoslav House in Belgrade.

¹¹⁰ Boag, Rubinin, Shoenberg (eds.), *Kapitsa in Cambridge and Moscow*, 417.

¹¹¹ ARB, IR, Pavle Savić. Đorđe Martinović, "Element od 'tri i po sata'", *Svet*, December 18, 1966; Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 9-10; Павле Савић, *Наука и друштво. Изабрани радови. Прилози животопису* (Београд: Српска књижевна задруга, 1978), 283. The comment about the salary comes from Savić.

permanently move to the Soviet Union. But this could have been a clever move of the Yugoslav secret police; a scenario of a scientist turned into an “atomic spy” was only too well attested in the Soviet Union. Their atomic bomb project benefited immensely from the assorted information and blueprints of the American atomic bombs and facilities, provided by Klaus Fuchs, one of many Soviet spies in the Manhattan project.¹¹²

Savić was not Fuchs as much as he was not Bohr, and if his intelligence mission was masked by his diplomatic position and scientific work, it was directed almost exclusively for the purpose of raising the general level of scientific research in Yugoslavia, and as an attempt to secure some material support for this project and perhaps to study the structure of Soviet research institutes. Bondžić is more inclined to the latter option and even suggests that during the second stay in Moscow Savić had “a clear task” to explore possibilities for the establishment of the Physical Institute in Yugoslavia, gather support of Soviet scientists and authorities for that project and that he was eventually successful in this. His assumptions are based on the letter Savić sent to Tito from Moscow on March 17, 1946, with the “Project for the Establishment of the Physical Institute in Belgrade” attached. In reality, this letter with the project for the ‘Physical Institute’ was Savić’s follow up with explanations of ideas that Kapitsa already suggested to Tito in his own letter on March 13, 1946.¹¹³

This explanation is seductive, yet somewhat misleading since it focuses only on the immediate consequence of Savić’s second stay in Moscow; the fact that the “Project for the Establishment of the Physical Institute in Belgrade” was presented to Tito by both him and Kapitsa does not mean that this was the main purpose of his

¹¹² Holloway, *Stalin and the Bomb*, 82-83, 93.

¹¹³ Bondžić, *Između ambicija i iluzija*, 49, 54.

mission. This is actually the case of a simple logical fallacy since there could have been many other reasons that could have led to the same outcome. Most likely, this was not Savić's "clear task," but either one that he designed for himself in an effort to secure a leading position in a novel scientific discipline in Yugoslavia, or one that Kapitsa suggested in order to support the Soviet policies regarding Yugoslavia. The dates of Kapitsa's and Savić's letters to Tito, strongly suggest the latter scenario.

Kapitsa's letter basically repeated most of suggestions of the Yugoslav delegation at the celebration of the 220th anniversary of the Soviet Academy of Sciences, proving that not much has been done in the meantime, and revealing that it was indeed his response to Tito's earlier letter to Kapitsa in which he personally asked for assistance in development of science in Yugoslavia. Kapitsa suggested that Yugoslav students could work in scientific institutions in Moscow and Leningrad, "like Savić did so far," and offered assistance in designing of the project for the Physical Institute in Belgrade. He also insisted that he would personally support the development of science in Yugoslavia "in close cooperation with our [Soviet] science."¹¹⁴ Kapitsa's mentioning of the experience with Savić at the IPP and suggestion that such form of cooperation should be expanded in the future to Yugoslav students is worth taking into consideration as an indirect proof of the Soviet strategy behind such a friendly offer to Tito. If such institute would be constructed in Yugoslavia, it would require a considerable number of scientists to develop and initiate its research projects, and they could be either sent from the Soviet Union, or educated there. In either scenario, future development of one of the most promising scientific disciplines in Yugoslavia would be completely in the hands of the Soviets.

¹¹⁴ AJ, 836, II-6-a/2. Letter of Pyotr Kapitsa to Josip Broz Tito, March 13, 1946. Tito's letter to Kapitsa is only hinted here but the letter itself could not be found in Serbian (Yugoslav) archives.

Savić's letter is more concrete and reveals that Kapitsa also suggested that "it would be the best" if Tito would "write a letter to Comrade Stalin" and ask for help, and that Kapitsa has already organized everything "with Malenkov and some other CC [Central Committee] members, all of whom were more than happy to help." In addition to that, Savić suggested that the project proposal that Kapitsa sent to Tito in Russian could be used "as already prepared material for the new commercial contract" that Yugoslavia planned to negotiate with the Soviet Union. According to Savić, Kapitsa also expressed his readiness to come to Yugoslavia and offer his assistance, but only if Tito would personally invite him:

"Knowing the force by which You charm people, I am certain that after that meeting, he [Kapitsa] would invest himself completely for our cause [...] If You would invite him, he would come with great joy, since he told me that many times. There is a fear that the Soviet Government might not let him go, because he is too important for them. But if there is even the smallest chance, he will do it only on Your invitation."¹¹⁵

Finally, Savić reiterated that all of the requests related to the establishment of the Physical Institute, which included production of necessary equipment in Soviet factories and specializations for Yugoslav graduate students in Soviet institutes, should be included in the negotiations for the new commercial agreement between the Soviet Union and Yugoslavia.¹¹⁶

However, there is another piece of the puzzle that reveals some of the agenda behind this great interest of the Soviet authorities to support Yugoslav ambitions after

¹¹⁵ AJ, 836, II-6-a/2. Pavle Savić's letter to Tito, March 17, 1946.

¹¹⁶ AJ, 836, II-6-a/2. "Project for the construction of the Physical Institute in Belgrade," March 17, 1946.

months during which not much has been done. In his letter to Tito, Savić does mention that, at the time, “plans of great constructions and new institutes of the Soviet Academy of Science were being developed,” which he considered as the opportune moment for realization of Yugoslav ambitions, “since later it might be impossible neither to construct [equipment] here nor order it from Germany.”¹¹⁷

This truly was a momentous period for the Soviet science, not exclusively related to the atomic bomb project which was given the absolute priority from August 20, 1945, with the establishment of Soviet Special Committee on the Atomic Bomb. Immediately after the war the transition of aircrafts to jet engines, development of radar, missile technology, electronics and nuclear industry required giant-scale industrial capacities with a proportional swelling of numbers of scientific and technical personnel on various levels. Kapitsa was among the first to put these demands in front of Stalin and other Soviet leaders. Already in late October 1945 he started lobbying for the establishment of the Physical-Technical Institute in Moscow which would be designed as the central institute of a new type with the purpose to prepare the staff for other scientific and technical research institutes. After months of negotiations with the authorities, and especially with Stalin and Malenkov, Kapitsa’s plan was approved on March 10, 1946 and the Higher Physical-Technical School was established as the core of the future Physical-Technical Institute.¹¹⁸

In the emerging Cold War context, it is interesting to notice that this decision came to life only a couple of days after the famous Churchill’s Iron Curtain speech, delivered on March 5 at the Westminster College in Fulton, Missouri. On a symbolic level it announced the importance of education, science and technology and their

¹¹⁷ AJ, 836, II-6-a/2. Pavle Savić’s letter to Tito, March 17, 1946.

¹¹⁸ Карлов Николай Васильевич, “Глава третья. 25 ноября 1946-го года,” *Потенциал* по. 3 (2015), <http://potential.org.ru/bin/view/Home/ArtDt200503051018PH5J3> (accessed on February 26, 2017).

intersection with politics from the very start of the Cold War. In the Soviet context, this period was marked with the beginning of the campaign for the first postwar elections to the Supreme Soviet, during which, already on February 9, 1946, Stalin offered to the Soviet public end of rationing and a “wide scale construction of all kinds of scientific research institutes.”¹¹⁹ According to Kojevnikov, this was part of the trade-off between the Party and scientific community where sharing of political power, as *preached* by Kapitsa, was out of the question, but extension of some privileges comparable to those enjoyed by the Party elite, was acceptable to Stalin.¹²⁰

Coming back to Yugoslavia, the actual dates of Kapitsa’s and Savić’s letters to Tito neatly coincided with Stalin’s promise to the Soviet scientists (February 9) and the decree for the establishment of the Higher Physical-Technical School (March 10); Kapitsa wrote to Tito only three days later, on March 13. Savić’s letter on March 17 reveals even more of the background story. He continuously repeated that the Yugoslav Physical Institute would be “the most advanced institution of the kind,” that would be central institute around which the entire “Academic city” and the “state Academy of Sciences” would be established “that would coordinate preparation of cadres and raise our science and industry.”¹²¹ In the project proposal it was also mentioned:

“The Institute will have additional laboratories – cores of future independent institutes. The Physical Institute itself would become the center of a network of corresponding

¹¹⁹ Alexei Kovjenikov, “Dialogues about Knowledge and Power in Totalitarian Political Culture,” *Historical Studies in the Physical and Biological Sciences* 30, no. 1, Physicists in the Postwar Political Arena: Comparative Perspectives (1999), 242

¹²⁰ *Ibid.* In his famous letter to Stalin, Kapitsa compared the role of scientists in the Soviet Union to the role of Patriarch sitting next to the Emperor in the Imperial Russia. This topic will be revisited in the Soviet and Yugoslav context in one of the following chapters.

¹²¹ AJ, 836, II-6-a/2. Pavle Savić's letter to Tito, March 17, 1946.

institutions that will have to be established to meet our [Yugoslav] strengths and capabilities and further developed for efficient support of our science and technology.”¹²²

Even this short passage reveals that the project proposal for the Yugoslav Physical Institute was at least in its main features a copy of Kapitsa’s plan, minimally adapted for the Yugoslav needs. One much latter account written by one of Savić’s biographers also reveals that “the initial intention was to have it [the Institute] as the link between Western and Soviet scientists,” which could not have been Savić’s idea, nor his or the Yugoslav interest.¹²³ Furthermore, in the project proposal Savić insists that “for preparation of cadres of our physicists”, students should be sent for specializations to many different institutions in the Soviet Union, but “*particularly* Higher Physical-Technical School in Moscow [emphasis added]”, the institution that has been formally established only seven days earlier.¹²⁴

In other words, the Physical Institute in Yugoslavia was indeed designed to be the central Yugoslav scientific and research institute, as Savić hoped for, but with some extended role that was neither expected nor necessarily desired by Tito and Yugoslav political leadership. As one of the Soviet windows, or indeed keyholes to the West, the Yugoslav Physical Institute was supposed to be just one small knot in a much more complex network of Soviet scientific institutions. This narrows the space for and importance of Yugoslav agency since it is difficult to attribute the particular design of the project for the Physical Institute either to Savić or even less Tito, except at the most general level of their ambition to develop Yugoslav universities and

¹²² AJ, 836, II-6-a/2. “Project for the construction of the Physical Institute in Belgrade,” March 17, 1946.

¹²³ ARB, IR, Pavle Savić, Slobodan V. Ribnikar, “Molim pomilovanje za našeg nuklearnog demona!” *NIN*, June 10, 1994.

¹²⁴ AJ, 836, II-6-a/2. “Project for the construction of the Physical Institute in Belgrade,” March 17, 1946.

science with the Soviet support, or on even lower level of Savić's personal ambition to establish his own 'political factory'. The entire project for the establishment of the Physical Institute in Yugoslavia was indeed only part of Soviet policies for reestablishment of contacts with the Western scientific community, but can also be understood as an early sign of what Soviet authorities intended as the Yugoslav role in the process; or put in a larger perspective, what was supposed to be the general place of Yugoslavia in the Soviet sphere of influence.

However, these intricate Soviet plans did not work well. One of the reasons can be found in Tito's general independent position which he did not want to compromise even during the war when he was in a much more difficult position. Moreover, by that time Tito was already starting to play a risky political game in which he was trying to distance Yugoslavia from the Soviet Union while simultaneously playing on the card of the great friendship and formal acceptance of the Soviet (Stalin's) tutelage in the political, economic and cultural sphere.¹²⁵ The scenario for the establishment of the Physical Institute in Yugoslavia had all of the components of what could be called Sovietization-before-Sovietization. Besides the fact that the Physical Institute was designed on the Soviet model, it was supposed to be integrated into the Soviet system of higher education, the task for which Kapitsa was definitely ready to act as an *advisor* in Yugoslavia.

However, Tito would have none of it. During the negotiations for the new trade agreement between the Soviet Union and Yugoslavia, held in Moscow between May 27 and June 10, 1946, the Physical Institute and other activities related to its establishment were not even mentioned, which was completely against Savić's suggestions. Tito eventually did meet with Kapitsa and Savić at the IPP, although

¹²⁵ Unkovki-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 28, 31-33.

outside of the formal protocol, while the trade negotiations only accelerated Yugoslav preparation for the implementation of the First Five-Year Plan that was seen by the Soviets as yet another symbol of Yugoslav independence.¹²⁶ Existing accounts of the meeting between Tito, Savić and Kapitsa seem to suggest that nobody actually wanted it to happen – Savić claims it was Kapitsa’s personal wish, while Kapitsa insists that Tito visited him at the IPP “through the initiative of Paul Savić.”¹²⁷ Perhaps the only person looking forward to this meeting was Tito who may have done it only to annoy Stalin, or maybe Savić in his obvious naiveté about the Soviet true intentions, although his judgement may have also been clouded judgement by the potential gain.

Whatever the truth may be, out of all ambitious plans for cooperation between Soviet and Yugoslav scientists, the only exchange that was recorded among the main actors at this meeting was Tito’s symbolic gift to Kapitsa – his own photograph with an autograph. On the other hand, Savić mentions that Tito actually made the decision to establish the Physical Institute in Yugoslavia only at this meeting when he directly yet confidentially said to Savić: “Come back to the country, we’ll build our own institute.”¹²⁸

This scenario is in accordance to the Tito’s general strategy to gradually slip away from the patronage and control of Stalin and confirms Unkovski-Korica’s results he reached in the analysis of the political and economic relations between the Soviet Union and Yugoslavia in that period.¹²⁹ Perišić also reveals that during Tito’s visit to Moscow in the summer of 1946, it became clear to him and the Yugoslav political

¹²⁶ Bondžić, *Između ambicija i iluzija*, 56-57; Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 31-32. Unkovski-Korica reports a number of complaints of the Soviet ambassador in Belgrade, who found “parasitical tendencies” in Yugoslav economic relationship with Moscow and general downplaying of the Soviet contribution to the liberation and reconstruction of Yugoslavia.

¹²⁷ Boag, Rubinin, Shoenberg (eds.), *Kapitsa in Cambridge and Moscow*, 417; Savić, *Nauka i društvo*, 306. This was the Institute for Physical Problems of the Soviet Academy of Sciences, established in 1934. Kapitsa misdates this meeting with Tito to 1945 although it happened in the spring of 1946.

¹²⁸ Savić, *Nauka i društvo*, 306.

¹²⁹ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 67-70.

establishment that the Soviets were reluctant to accept Yugoslav students, but happy to send to Yugoslavia a number of their professors, teaching assistants, theatre directors and other experts.¹³⁰ Tito obviously understood well the Soviet policy and acted quickly in an obvious attempt to get overenthusiastic Savić back home and cut this potential channel through which the Soviet control over Yugoslavia could be established.

However, it seems that this was neither the moment nor the reason for Savić's return to Yugoslavia. In one of his earlier interviews, he simply said that he returned with his family to Yugoslavia in September 1946 for a vacation, and as the relations with the Soviet Union gradually started to deteriorate, he accepted the position of a prorector of the University of Belgrade and never returned to the Soviet Union.¹³¹ According to Connelly, "at universities Soviet-style 'prorectors' were implanted to coordinate 'schooling' in Marxism-Leninism" as an extended arm of the Party, and it seems that such a position suited Savić well.¹³² Not only that he was one of very few who had any real experience with the Soviet system of higher education, but he was also trusted with the task to ideologically reeducate older professors.¹³³

On the other hand, by that time Kapitsa lost his privileged position in the Soviet science and public sphere. Kapitsa was a member of the Soviet Special Committee on the Atomic Bomb since its establishment on August 20, 1945, but he immediately got into a conflict with the project director, infamous NKVD chief, Lavrentii Beria. This culminated in October 3, 1945, when Kapitsa wrote to Stalin

¹³⁰ Perišić, *Od Staljina ka Sartru*, 84-86.

¹³¹ ARB, IR, Pavle Savić. Đorđe Martinović, "Element od 'tri i po sata'", *Svet.*, December 18, 1966.

¹³² Connelly, *Captive University*, 3.

¹³³ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 10. According to Savić's memories, his predecessor on this position was accusing old professors for collaboration with the occupying forces during the war. Sent by the Party to stop the "terror" at the University of Belgrade, the only task he could have got was 'reeducation'. Indirectly, this passage also confirms how desperate the Yugoslav authorities were for university professors.

asking him for a permission to resign from the Special Committee, because of Beria's "unacceptable" attitude to scientists." Stalin granted his wish and Kapitsa enjoyed his support for a while, most likely just to flex some muscles and annoy Beria. However, Beria got what he wanted in the end and by August 1946 Kapitsa was removed from all his positions and kept in a house arrest in his *dacha*.¹³⁴

Analysis of the chronology of events is again instructive. Return of Savić to Belgrade in September 1946 seems to be directly related to the changed fortunes of Kapitsa who indeed was his great, if not only patron in the Soviet Union. If Tito ever did call Savić to come back home with a promise to help him build the Physical Institute in Yugoslavia, the period between August and September 1946 seems as more accurate, and as the earliest. Therefore, while Savić may have excused himself before the Soviet authorities for leaving the country for a vacation, it seems that this was actually a desperate departure to avoid potential arrest and further complications of relations between the Soviet Union and Yugoslavia, maybe even after Tito's intervention, although the documents are silent on this topic. Whatever the reason for Savić's departure may have been, this episode confirms how much Tito obviously did everything he could to keep himself, his closest associates and eventually Yugoslavia as independent as possible from the Soviet Union. It also gives some hints about his relationship with quarrelsome Savić; even if only to prove his independence, he did not want to sacrifice him to Stalin's or Beria's temper and shifting mood. In comparison to the Soviet experience, this could also be a sign of a fundamentally different relationship between Tito and the Yugoslav budding scientific community, however, this topic will be investigated in more details in one of the following chapters.

¹³⁴ Holloway, *Stalin and the Bomb*, 138-144.

Between the Soviet Physical Institute and Yugoslav Institute for Physics

The Institute for Physics as the first and central institute of the Yugoslav nuclear program was officially established on January 10, 1948, although the actual decision was reached by the first half of 1947, and the first construction works started already during the summer. This was actually in accordance with Savić's and Kapitsa's plans where it was suggested that the "construction of the adequate building" for the Physical Institute should start "in spring of 1947, the latest."¹³⁵ The analysis presented so far confirms that the decision to establish the Physical Institute was only to a certain degree an independent Yugoslav decision, and that it was based on the copy of the original Soviet plan. However, this is only one part of the story.

Among information (or intelligence) Savić gathered during his second stay in Moscow, probably the most interesting and controversial was the famous Smyth Report which he attached to his letter to Tito in March 17, 1946. According to Savić, "Smyth's book 'Atomic Energy' that raised so much noise" was being "copied [in the Soviet Union] for instruction of experts, since it contains the part of the work in that field that Anglo-Americans performed during the war and that was not published so far."¹³⁶ Combining this information with what was mentioned previously it is possible to reconstruct how Tito and his closest circle of associates gradually realized that the Soviet Union was working on the atomic bomb project and how similar ambitions may have been sparked in Tito's mind, making him at the very least "bomb-curious" or contemplating about it as a distant possibility. By that time, atomic bombs were only too well-known fact and Tito must have solved this puzzle and understood that

¹³⁵ AJ, 836, II-6-a/2. Pavle Savić's letter to Tito, March 17, 1946.

¹³⁶ AJ, 836, II-6-a/2. Pavle Savić's letter to Tito, March 17, 1946. This report presents an overview of a number of activities performed in various sites in the United States during the Manhattan Project, although without sensitive technical details. The report: Henry DeWolf Smyth, "Atomic Energy for Military Purposes (The Smyth Report). The Official Report on the Development of the Atomic Bomb Under the Auspices of the United States Government," July 1, 1945; <http://www.atomicarchive.com/Docs/SmythReport/> (accessed, March 1, 2015).

the Soviets were at the very least gearing up their material and intellectual capacities for the atomic bomb project. Invasive Sovietization of the Yugoslav science, attempted through the project for the Physical Institute in Yugoslavia that has been skillfully avoided by Tito during the negotiations for the new commercial agreement in early June 1946, combined with Kapitsa's house arrest two months later, regardless of the reasons behind it, must have equally reinforced suspicions about Stalin's true plans; the Yugoslav role in the Soviet nuclear program could have been at best the window to the Western scientific community and a potential source of technicians, maybe even scientists that would service the Soviet program. It can easily be seen that this or any similar scenario would not be greeted with much enthusiasm among fiercely independent Yugoslav Communists.

The claim that this was one of the breaking points in relations between Tito and Stalin would be too strong and inaccurate, yet it most certainly contributed to the growing tension between the two allies. Nevertheless, the return of Savić in September 1946 and a rather hasty decision to establish the Institute for Physics in the early 1947, which effectively initiated the *autonomous* Yugoslav nuclear program, was most likely the result of this suspicion-evolving-into-tension, but it can also be read as the moment of Tito's realization of the political importance of nuclear science and weapons in the budding Atomic Age.

This is also the important moment when seeds of suspicion between the Yugoslav political leadership and Savić as the embodiment of the future Yugoslav scientific community were planted. While Savić was evidently dedicated to the development of science and technology in Yugoslavia, Tito and his associates were more interested in the political significance of that move as yet another gesture and push towards the Yugoslav independence. It seems that at this period this gap was

shallow and easily camouflaged, as shown by Tito's relationship with Savić during his stay in Moscow. Was this Savić's Faustian bargain with Tito and the Yugoslav political establishment, his naiveté about their true intentions or his ability to channel their support towards his own designs, is impossible to fully answer.

From Tito's perspective, it is equally difficult to fully comprehend the reasons for the establishment of the Institute for Physics, and by extension, the initiation of the Yugoslav nuclear program. It can be understood as a specific case of nuclear hedging directed Stalin in order to promote the Yugoslav independence. Of course, this is not to say that Stalin would be intimidated at all by the initiation of the Yugoslav nuclear program, even if it was evident that the development of nuclear weapons was the ultimate goal, but it is quite probable he would have been annoyed with such a gesture. Even if such a limited way, this would be the first case in the world that such strategy was implemented, and it seems that this scenario is not entirely improbable. On the other hand, the establishment of the Institute for Physics could have also been a simple move to separate the future central institution in the development of the Yugoslav science from the Soviet control. This seems quite possible, given the obviously well-developed Soviet plan to do exactly that and a more general attitude of the Yugoslav political establishment regarding the relations with the Soviet Union. The logic behind this decision will be analyzed in more details in one of the following chapters, but it is highly probable that all of these options were considered before such decision was reached.

Finally, the Yugoslav Institute for Physics was established on the basis of the Soviet project for the Physical Institute in Yugoslavia and as a more or less accurate copy of Soviet scientific institutes. This was due to the simple fact that neither Savić nor anybody else in Yugoslavia had any other experience or proper knowledge how to

design such an institution. The Soviet plan to establish the Physical Institute in Yugoslavia as the meeting point between the Soviet and Western scientists were effectively abandoned and Yugoslavia ended up with its own Institute for Physics, modeled on the Soviet experience, but without any kind of Soviet support. It seems that the Yugoslav almost religious dedication to the Soviet model, expressed in so many ways and for so many different reasons, can be seen in this case as well, albeit unintentionally. After the Tito-Stalin split of 1948 closed the doors of cooperation with the Soviet controlled East, the Yugoslav Institute for Physics was destined to open the doors of cooperation with the West, not unlike the entire country and with equal reservations, at least in the initial phase. The paradox is that the Soviet ambitious plans were eventually realized, and the Yugoslav nuclear program served all the goals as originally designed, except regarding the role of a service to the Soviet Union. This complicated case of Sovietization of Yugoslav science created the basic framework in which the Yugoslav nuclear program evolved in following two decades.

1.2 The Yugoslav Manhattan Project

*“We had no idea about these things,
but we wanted the atomic bomb at any cost.”¹³⁷*

Investigating the beginning of the Soviet atomic bomb project, Holloway comments that this was “the kind of task for which the Stalinist command economy was ideally suited”, for it could easily mobilize the necessary resources of the country, including the scientists, industrial managers “as well as slave laborers of the Gulag.”¹³⁸ Soon after the Hiroshima and Nagasaki in 1945, Stalin took measures to initiate the Soviet atomic bomb program. By August 20, the State Defense Committee established a Special Committee, led by the head of the NKVD, Lavrentii Beria, to organize “all work on the utilization of the intra-atomic energy of uranium.”¹³⁹ Simultaneously, the First Chief Directorate was established to manage the atomic bomb project, headed by Boris Vannikov, the People’s Commissar of Munitions, while Igor Kurchatov was the scientific director of the entire project. Only two days later, on August 22, the Soviet military attaché in Ottawa “and the head of the GRU [Главное разведывательное управление – Main Intelligence Directorate] spy ring” was instructed by Moscow to “[t]ake measures to organize acquisition of documentary materials on the atomic bomb!”, and according to Holloway, the similar request was undoubtedly sent across the Soviet intelligence network abroad.¹⁴⁰

Another important characteristic of the Soviet atomic bomb project was that it was led by the civilian structures. This included the NKVD director Beria, several

¹³⁷ Tamara Nikčević (ed.), *Goli otoci Jova Kapičića*, (Beograd: V.B.Z, 2010), 156

¹³⁸ Holloway, *Stalin and the Bomb*, 172.

¹³⁹ “Delo Beriia,” *Izvestiia Tsk KPSS*, 1991, no. 1, 145, quoted in Holloway, *Stalin and the Bomb*, 129.

¹⁴⁰ Holloway, *Stalin and the Bomb*, 129.

industrial managers and a few scientists, while the military had no control over the project. The line of command was particularly interesting. The Special Committee would review suggestions coming from industrial managers and scientists. Beria would then prepare final decisions for Stalin's signature, informing him on a weekly basis. Beria also had his own NKVD representatives in factories and other institutions involved in the atomic bomb project, who reported directly to him on the activities and progress of the installation they were assigned to. Finally, Beria established the so-called "Department S" within the NKVD that was coordinating all the intelligence activities related to the atomic bomb project, including the dissemination of the acquired materials.¹⁴¹

In his more recent article, Holloway effectively argues that "there is of course a great difference between acquiring a theoretical understanding of the atomic bomb and building an industry that will produce the materials needed for the bomb, as well as the bomb itself," yet that the intelligence collected by the Soviets in 1943-45 was a considerable help when they initiated the atomic bomb project in 1945, deeply influencing technical choices they made and saving the time invested by a year or two.¹⁴² The intelligence gathered by the Soviet spies from the Manhattan Project had a significant impact on the atomic bomb project, particularly regarding the most important technical choices down to the design of the first Soviet atomic bomb.¹⁴³

Yugoslavia was not the Soviet Union, however, the fact remains that the Yugoslav nuclear program had to start from scratch, needed a lot of investments of time, resources and human labor to properly take-off, while at the same time, the

¹⁴¹ Holloway, *Stalin and the Bomb*, 135.

¹⁴² Holloway, "Barbarossa and the Bomb: Two Cases of Soviet Intelligence in World War II", in *Secret Intelligence in the European State System, 1918-1989*, eds. Jonathan Haslam, Karina Urbach (Stanford, California: Stanford University Press, 2014), 62.

¹⁴³ Holloway, *Stalin and the Bomb*, 137-138.

Yugoslav decision-makers had little knowledge in organizing state projects of either high or low importance, except for the limited experience they had with the Soviet model. It is instructive to notice that even almost a full decade after 1948 and constant propaganda about the independent Yugoslav Road to Socialism, the battle-hardened Yugoslav communists were still very much convinced that they could easily repeat the Soviet experience with the atomic bomb project in equally astonishing short period of time, making even poorly informed comparisons that, unlike Yugoslavia in the 1950s, the Soviets “did not have much even in 1945.”¹⁴⁴ Pleština describes the general “revolutionary zeal” of these early years with slogans that were popular at the time, like “charge on the heavens” [*juriš na nebo*], or “we can do it all” [*sve možemo*].¹⁴⁵ Ivo Šlaus confirms that this state of mind was prevalent among the Yugoslav decision-makers and even Tito himself; as a person who, “take it or leave it, won a regional war against a superpower that was Nazi Germany, practically with barehanded boys [...] he knew that certain things can be achieved with these boys charging the bunkers [...] and the next step was to think that the kids can make the atomic bomb,” a device that was technically possible and already invented in 1945.¹⁴⁶

Combining the “Bolshevik mentality of the lapsed Yugoslav Bolsheviks”¹⁴⁷ with the Soviet practice of storming the frontline of technological development, no matter how well, distorted or superficially understood it was in the minds of Yugoslav decision-makers, necessarily created the scenario in which the Yugoslav nuclear program was the mirror image of the Soviet experience, at the very least to the extent the Yugoslav establishment understood it. While adaptations to local circumstances

¹⁴⁴ AJ, fond 177 Savezna komisija za nuklearnu energiju, f. 23, a.j. 90 (in further reference AJ, 177, f. 23-90). Organi i tela. Predsedništvo, 1957-59 [Organs of the SKNE, 1957-59. Presidency]. Transcripts and materials from the meeting of the SKNE, February 8, 1957.

¹⁴⁵ Pleština, *Regional Development in Communist Yugoslavia*, 25-26.

¹⁴⁶ Interview with academician Dr. Ivo Šlaus (Croatian Academy of Sciences and Arts), Zagreb, February 9, 2018.

¹⁴⁷ Pleština, *Regional Development in Communist Yugoslavia*, 28.

are unavoidable in any case of the political or technological transfer, the Yugoslav experience with the establishment of the country's nuclear program is also important for understanding the depth of the Sovietization of the Yugoslav state-system.

In the Beginning Was the Secret Police

The organizational structure of the Yugoslav nuclear program in the late 1940s displays a deep resemblance with the Soviet institutional framework. With unavoidable adaptations, this continued to be the base-model for organization of the Yugoslav nuclear program in following years. Of course, it would be impossible to claim that Yugoslavia had any real knowledge about the Soviet atomic bomb project, besides perhaps some pieces of third-hand information or simple suspicion that it was initiated. As mentioned earlier, even if Pavle Savić had any intelligence tasks designed to this end during his stay in Moscow, he obviously performed poorly and was quickly, elegantly and maybe even unknowingly turned into a sort of a Soviet agent, at least regarding his role in the establishment of the Institute for Physics in Yugoslavia. It seems more likely that the logic of the Soviet state-system was only too well understood and copied in Yugoslavia, and that any structural similarities with the Soviet nuclear program were the result of the systematic replication, not an intention or intricate knowledge of the Soviet experiences.

Like in the Soviet Union, the Yugoslav nuclear program was from the beginning under the strict control of the Yugoslav secret police, the Directorate for State Security [*Uprava državne bezbednosti* – UDB]. It was headed by Aleksandar Ranković, at the time the Vice Prime Minister of Yugoslavia and Federal Minister of Interior Affairs, while in the KPJ he was the member of the Politburo of the Central Committee and Organizational Secretary. The extended arm of the UDB in the nuclear

program was the Directorate for Coordination of Work in Scientific Institutes [*Uprava za koordinaciju rada naučnih instituta* - UKRNI], created already on March 20, 1948, only two months after the establishment of the Institute for Physics (January 10, 1948). On the formal level, the UKRNI was the institution of the Yugoslav Federal Government, evident in the existence of the UKRNI's Expert Council which was formally headed by the Prime Minister, Josip Broz Tito himself. Through this institution and the UDB as the intermediary and operational force, Tito monitored and coordinated all activities of scientific institutes – construction of laboratories, provisioning of equipment and raw materials, supervision of technical and scientific staff, transfer of sensitive technologies, etc.¹⁴⁸

Aleksandar Ranković-Marko came from a traditional Serbian peasant family.¹⁴⁹ He became a member of the KPJ in 1927, at the age of 18, as an apprentice in a traditional tailor's shop, the only type of formal education he ever had. In following years, he gradually climbed through the Party ranks, often being imprisoned and tortured by the police for his activities. His official biographers insist that he never revealed any comrades or information about the Party, even after heavy beatings and torture, and that these experiences helped him mature into a true leader. When the Second World War broke out, he became a member of the Politburo of the Central Committee of the KPJ, and in 1941 he joined the Tito's General Staff. Throughout the war, he had proven himself as a brave military commander and capable organizer, unquestionably loyal to Tito and the cause. He was also known as a humble, reserved and almost ascetic person, all of which earned him the nickname "the Party's

¹⁴⁸ Bondžić, *Između ambicija i iluzija*, 74-76, 117-118; Bojan Dimitrijević, *Ranković: Drugi čovek* [Ranković: The Second Man] (Beograd: Vukotić Nedia d.o.o., 2020), 96.

¹⁴⁹ The following section about Ranković was based on Jože Pirjevec, *Tito i drugovi* (Zagreb: Mozaik knjiga, 2012), 478-482; Dimitrijević, *Ranković*, 11-24, 74-94, 117-123, 144-151; Milovan Dželebdžić, *Obaveštajna služba u Narodnooslobodilačkom ratu, 1941-1945* [Intelligence Service in the People's Liberation War, 1941-1945] (Beograd: Vojnoistorijski institut), 9, 37-44.

Conscience”, although his control and surveillance of the KPJ membership and a number of covert activities he performed during the war may have been the real reason for this. Either way, soon after the liberation of Belgrade (October 20, 1944), Tito gave him the task to establish the secret police, the infamous UDB, and like in many other aspects of the early Yugoslav communist regime, it was a small-scale replica of the Soviet NKVD, both in organizational structure and methodology, including the creation of a specialized military unit, the infamous KNOJ [*Korpus narodne odbrane Jugoslavije*] under its command.¹⁵⁰ His unwavering loyalty to Tito and the country was once again proven after the conflict with Stalin in 1948, when he investigated and arrested even his closest friends if they had any sympathy for the Soviet Union, not shying away from establishing the Gulag-style political prison in Yugoslavia, the infamous *Goli otok*.

These experiences and his position in the Yugoslav state-system recommended Ranković as a manager of the Yugoslav nuclear program, and his strong arm was felt throughout the entire structure. At the time of its establishment, the UKRNI was supposed to perform “coordination between our [Yugoslav] scientific and research activities and our [Yugoslav] intelligence service in the process of acquiring various scientific and technical information, patents, recipes and in general new inventions from abroad.”¹⁵¹ For this purpose, the Department of Scientific Intelligence Service was created within the UKRNI in order to “serve our [Yugoslav] scientists as a reliable source of information, *so they would not wonder and dig through the past*

¹⁵⁰ The initial name of the Yugoslav secret police was the Department of the National Security (*Odeljenje zaštite naroda – OZN*), and it was officially established on May 13, 1944. By 1946, it was renamed into the UDB, while the military intelligence sector was established as an independent Counter-Intelligence Service (*Kontraobaveštajna služba – KOS*), under the control of the Ministry of Defense. In the process of the establishment of the UDB, Ranković extensively cooperated with the NKVD resident agents in Belgrade, who obviously played the role of the *advisors*, under the command of certain “Timofeev”.

¹⁵¹ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

while science of atomic core and its technology moves relatively quickly ahead” (emphasis added).¹⁵² In practice, the Department of Scientific Intelligence Service was supposed to collect data about the Yugoslav needs for different technologies from the domestic scientific community and transfer the most important and pressing requests to the UDB with necessary technical instructions and advices.¹⁵³

It is difficult to analyze details about the Yugoslav initial activities regarding the development of the country’s nuclear program, industrial espionage abroad or any other related activities. However, the available information reveals another important aspect of the UDB activities, its position in the Yugoslav state-system, and consequently, the country’s nuclear program. The UKRNI’s annual report for 1948 is particularly interesting. On one page of the report, which was speaking about the coordination between the UKRNI and “our intelligence service”, either Ranković or Tito wrote down a question in the margin: “Whose; ‘our’ UDB, or of the entire country?”¹⁵⁴ This limited piece of information strongly suggests that within the UDB there was a special, or informal sector or unit that was under the direct control of Ranković, maybe even Tito himself. This could have been a sector within the UKRNI or maybe even a special group of UDB agents loyal directly to Ranković and other members of the Tito’s inner circle. Realistically, this would not be an entirely impossible scenario, regarding the confusion and fear which spread among the Yugoslav communists after the Tito-Stalin split of 1948.

¹⁵² AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949]. Compare with Bondžić, *Između ambicija i iluzija*, 76-81.

¹⁵³ Bondžić, *Između ambicija i iluzija*, 81.

¹⁵⁴ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949]. Throughout the report comments from both Aleksandar Ranković and Josip Broz Tito are available, and often they can be easily distinguished by their handwriting, language and the color of the pen they used, although in this case it is not entirely clear.

According to Dimitrijević, Ranković was formally the head of the federal UDB, which was colloquially called “UDB for Yugoslavia”, with subordinated departments for each of six republics. In reality, however, his control was complete only in Serbia, while particularly in Croatia and Slovenia, UDB departments were dominated by their regional Party leadership.¹⁵⁵ Pirjevec also confirms that outside of Serbia, Ranković was considered a strong symbol of “Serbian dictatorship and hegemony”, and even though he was referring to a much later period this reputation could not have been built overnight.¹⁵⁶ Therefore, the mentioned comment could only suggest the existence of an independent and most likely informal apparatus, a sort of the UDB-within-UDB, which was under direct control of Tito and Ranković, perhaps even created directly for servicing the nuclear program, or minimally, the safety of the Tito’s inner circle of associates in the midst of the conflict with Stalin. Kapičić indirectly confirms that “in the beginning [of the atomic bomb program] not even entire UDB knew [...] only members of the Atomic commission and me.”¹⁵⁷ At the same time, an informal “leading four” of the Yugoslav leadership did exist, and it included Tito, Aleksandar Ranković, Milovan Đilas and Edvard Kardelj, and at least in the late 1940s and early 1950s, the most important decisions were debated and delivered within this limited circle.¹⁵⁸

Finally, even the line of command was remarkably similar to the Soviet experience. The UKRNI’s reports would be sent directly to the head of the UDB Aleksandar Ranković, who would provide his own comments and send it directly to

¹⁵⁵ Dimitrijević, *Ranković*, 118-119.

¹⁵⁶ Pirjevec, *Tito i drugovi*, 509-511.

¹⁵⁷ Nikčević (ed.), *Goli otoci Jova Kapičića*, 151-152. Kapičić here makes a mistake in the name of the “Atomic commission”, which was established only in 1955 and in a different name, although the fact is that the UKRNI was a predecessor of the Yugoslav Federal Nuclear Energy Commission. He also accurately identifies that the inner circle of associates included Aleksandar Ranković, Edvard Kardelj, Boris Kidrič, Svetozar Vukmanović-Tempo, Pavle Savić and Dragiša Ivanović.

¹⁵⁸ Dimitrijević, *Ranković*, 117.

Tito for a final approval.¹⁵⁹ Furthermore, and in accordance to both the Soviet experience and mentioned mentality of the Yugoslav Communists, it was emphasized that the Western countries would be prime targets for such activities, since “due to normal anarchy that exists in capitalist countries, our [Yugoslav intelligence] apparatus could very quickly acquire such [secret] inventions.”¹⁶⁰ On the other hand, this policy was also in accordance with the role the Soviets intended for the Yugoslav nuclear program in their own plans, which would suggest that they had a more active role even in this sector and at the same time explain such a deep resemblance. However, without an access to the files of the UDB, this hypothesis would have to remain unverified.

The UDB Decides Everything

In the beginning, the lack of ‘cadres’ who could perform activities necessary for the establishment of the nuclear program, both in the intelligence and scientific sector, was the most important puzzle to solve. The UKRNI started its operations in May 1948 with only two officers and half a dozen of administrative and technical staff. Slobodan Nakićenović, the first director of the UKRNI (1948-1951), which was soon followed with his appointment as the director of the Institute for Physics in Vinča (1949-1952), obviously was the person chosen by Ranković as the best for the task of coordinating activities in the field and further strengthening of the links with the UDB. Like a proper Stalinist, Nakićenović was painfully aware of the acute lack

¹⁵⁹ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

¹⁶⁰ *Ibid.*

of scientists and commented in the UKRNI's report for 1948 that "[i]t is well known that cadres can solve everything."¹⁶¹

Nakićenović was actually a well experienced intelligence officer. During the Second World War he was "the Chief Liaison Officer at the [Tito's] General Staff," where he necessarily established good personal relations with Tito himself, Aleksandar Ranković, and other leading Yugoslav politicians, who obviously had a great confidence in his competence and loyalty.¹⁶² Furthermore, Nakićenović also worked in close collaboration with Pavle Savić, the main cryptographer in the Tito's General Staff.¹⁶³ It may be argued that Nakićenović's *cursus honorum* during the war almost naturally recommended him for a delicate task to organize the Yugoslav nuclear intelligence network abroad, while his simultaneous positions as the director of the UKRNI and the Institute for Physics clearly confirm that the envisioned "coordination" between the security and scientific sectors was swiftly and quite literally implemented. The initial lack of experts necessary for the activities of the UKRNI was supplemented through "enlistment of external advisors, particularly from the University [of Belgrade]", although they were mostly used for the uranium prospection in the country.¹⁶⁴

¹⁶¹ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949]; Branislava Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)* [Half a Century of the Vinča Institute] (Beograd: Instiut za nuklearne nauke "Vinča"; Zavod za udžbenike i nastavna sredstva, 2000), 16.

¹⁶² AJ, 177, f. 11. The statement of Slobodan Nakićenović, March 7, 1963; At least on one occasion Nakićenović was acting as Tito's personal advisor on radio technology. More in *Ratna sećanja. Veze u NOB-u, 1941-1945*, knj. 3 [Wartime Memories. Liaison Service in NOB, volume 3] (Beograd: Vojnoizdavački zavod, 1981), 115.

¹⁶³ Savić, *Nauka i društvo*, 224-259; *Ratna sećanja. Veze u NOB-u, 1941-1945*, 444; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 14.

¹⁶⁴ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

Nakićenović's first task was to gather necessary scientific and intelligence "cadres" in the country and abroad, since Yugoslavia could count only on a handful of scientists capable to initiate the nuclear program. It seems that the main criterion in choosing adequate people was their unquestionable support to communist ideals, beside the necessary education and experience in nuclear physics and related fields. The internal structure of the UKRNI is difficult to reconstruct from the available sources since they do not reveal any names. However, the general strategy of gathering 'cadres' and their distribution can be established. According to several entries in the Pavle Savić's diary, it is clear that certain Silvo Hrast was Nakićenović's right-hand man employed in the Institute for Physics, often controlling Savić's work, following scientists on their travels abroad, while on a practical level he worked as an electrical technician.¹⁶⁵ Officially, Hrast was appointed on February 1, 1950 as the Technical Director of the Institute for Physics, although it is important to stress that at by the end of the war he was a captain of the KNOJ, the UDB's military formation, where he performed the duty of the Chief Liaison Officer, not unlike his boss Nakićenović did in the General Staff.¹⁶⁶

It is easy to identify the UDB network of agents and officers being spread through the Institute for Physics. On top of this network that was designed and deployed with at least an ambition to remain secret, the UDB was officially charged with the security of the institute and a number of their officers and agents were constantly present there, all under command of the UDB general Jovo Kapičić.¹⁶⁷ This indirectly reveals that by the early 1950, the UDB and political establishment

¹⁶⁵ Arhiva Srpske akademije nauka i umetnosti [in further reference ASANU], Dnevnik Pavla Savića [Pavle Savić's Diary], 14-34.

¹⁶⁶ Jevnikar, Martin; Hrast, Silvo. Slovenska biografija. Slovenska akademija znanosti in umetnosti, Znanstvenoraziskovalni center SAZU, 2013 <http://www.slovenska-biografija.si/oseba/sbi1011900/> (accessed on March 31, 2020); Veseljko Huljić, Milovan Dželebdžić, *Veze u Narodnooslobodilačkoj borbi 1943-1945. Knjiga druga* (Beograd: Vojnoizdavački zavod, 1984), 294.

¹⁶⁷ Nikčević (ed.), *Goli otoci Jova Kapičića*, 32.

definitely made a decision to put the Yugoslav nuclear program under its firm control, and although this question will be analyzed in details in the final chapter, this may also be taken as a sign that by that time Tito and the rest of the ‘leading four’ were at least seriously considering the construction of the atomic bomb.

One of the first acquisitions of an ideologically sound and reliable scientist for the Yugoslav nuclear program was Robert Janet Walen, a Dutch nuclear physicist who worked in the 1930s with Pavle Savić at the *Institut Curie* in Paris. There are very few direct information about reasons behind the Walen’s decision to come to Yugoslavia and work at the Institute for Physics, yet it seems quite probable that in this case Savić used his personal contacts, both with Walen and the UDB.¹⁶⁸ Kapičić reveals that the task of the UKRNI was “to build the institute and to bring experts, engineers from abroad”, and Walen was one of them, “a scientist and an expert in this type of work.”¹⁶⁹ At the same time, Walen had multiple qualities that recommended him for the IBK: he was a member of the French Communist Party (*Parti communiste français* - PCF), nuclear physicist, Savić’s friend, and had a Serbian wife. The only thing that Walen had to sacrifice was his membership in the PCF, which ousted him upon his arrival to Yugoslavia in 1948 because of the party’s continuous diehard support to Stalin and his policies.¹⁷⁰

Immediately after his arrival at the Institute for Physics, in August 1948, Walen became the director of the Physical Laboratory and was in charge of development of research projects in physics and modern technologies. Combining this

¹⁶⁸ Savić, *Nauka i društvo*, 306-307. Savić only briefly mentions Walen and insists that he arrived at the IBK on his personal invitation, although it is almost impossible to imagine this scenario without involvement of the UDB.

¹⁶⁹ Nikčević (ed.), *Goli otoci Jova Kapičića*, 151.

¹⁷⁰ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 15; Jevtić, *Razgovori sa Vinčancima*, 97; Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 11-12. Walen’s wife was actually a childhood friend of Savić’s own wife.

information with the UKRNI's plans for nuclear espionage in the West, it is easy to understand that he was expected to be the main coordinator of these efforts between the Institute for Physics and UKRNI, and a person who would design the shopping list of instruments and other technologies that the UDB was supposed to acquire abroad. During his six years at the Institute for Physics, Walen designed and, in cooperation with Yugoslav scientists, constructed a number of experimental machines and instruments that were difficult to obtain abroad without raising suspicions about Yugoslav nuclear ambitions. He also helped in training of the first generation of young scientists and technicians, equally necessary "cadres" for research projects at the Physical Laboratory.¹⁷¹ Walen was useful in other ways as well. The Yugoslav nuclear establishment often used his bank account in Switzerland to pay for materials, smaller instruments or services, and avoid being directly involved in these transactions.¹⁷²

Dedijer, the flamboyant director of the Institute for Physics in the period between 1952 and 1954, confirms that even though Walen was not interested in nuclear weapons, "he worked on preparation of instruments we [the Yugoslavs] needed for them."¹⁷³ The question of the actual moment when the atomic bomb project was initiated in Yugoslavia will be analyzed in details in the final chapter, but at this stage it is important to understand and reveal the Yugoslav main strategy regarding development of the Institute for Physics. Evidently, not only that initially the budding nuclear establishment had to rely on services of foreign scientists, they had to be ideologically proven in order to be trusted with such a task. On a more

¹⁷¹ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 15; Savić, *Nauka i društvo*, 307. Walen and his team at the IBK developed independently constructed particle accelerators, isotope separator, mass spectrometer, Wilson chambers, beta-spectrometers, various systems for detecting radiation, etc.

¹⁷² Jevtić, *Razgovori sa Vinčancima*, 19.

¹⁷³ Stevan Dedijer, *Stevan Dedijer: Špijun kojeg smo voljeli. Autobiografija* [Stevan Dedijer: The Spy Whom We Loved. Autobiography] (Zagreb: V.B.Z. d.o.o., 2011), 180.

practical level, their expertise, as well as other resources as was the case with Walen, seem to have been utilized not only for the training of the first generation of scientist, but also development of necessary instruments which can be counted as a covert activity. Without these channels, Yugoslavia would have to purchase these instruments abroad, which would potentially be a great security risk. On the other hand, even besides previous Dedier's statement, the fact that Walen's work was secret indirectly confirms that the Yugoslav atomic bomb program was already fully operational in the early 1950s.

Personal diary of Pavle Savić reveals that Walen's contribution was far from magnificent. The record of one meeting between Savić and Walen from August 1950 reveals that "not a single apparatus [in the Physical Laboratory] is functional," that "instruments get [easily] broken," and that Walen is "working something for his own interest."¹⁷⁴ This was indirectly confirmed in the UKRNI's 1950 report, where it is stated that the "management of foreign currencies [in the Institute for Physics] is suspicious," although details were not provided. Nevertheless, the UKRNI was investing heavily in the country's nuclear program, compared to the limited financial capabilities, and with some "measures taken [...] by higher authorities", it was expected that the management of these funds would be put under control. These were not small investments either. Estimated budget for 1951 reached in total \$463,777 in special machines and instruments from abroad, not including the main investments in the country's central Institute for Physics as the leading institution in the field, nor funding for both the Institute's and UKRNI regular activities.¹⁷⁵

¹⁷⁴ ASANU, Dnevnik Pavla Savića, 18. It is clear from this statement that Walen is accused of working both for his financial and scientific interests.

¹⁷⁵ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for

The relations with Walen and the problem of the efficiency of his instruments were eventually resolved through personal communication between him and Savić.¹⁷⁶ Walen stayed in Yugoslavia until 1954, when the Institute's Physical Laboratory finalized the education of the first doctor in nuclear physics, after which he returned to Paris and continued to work at the *Institut Curie*.¹⁷⁷ However, Bondžić explains that Walen actually escaped back to France in order to avoid problems for his open support to Milovan Đilas, whose harsh public critique of the Party and political system in Yugoslavia resulted in his removal from power in January 1954, turning him into a dissident overnight. On the other hand, it may be argued that Walen's departure did not leave a lasting impact on the Yugoslav nuclear program, as it continued to be rapidly developed.¹⁷⁸ Therefore, it seems that both explanations are correct. By that time, Walen obviously managed to establish the research program at the Physical Laboratory in Vinča and educate the first generation of Yugoslav nuclear physicists, both of which made his further engagement unnecessary. At the same time, his political activities necessarily compromised him before the Yugoslav authorities, thus only further influencing his decision to leave.

Besides Walen, Savić makes a passing reference in his memories to a couple of other foreign scientists who worked in the Institute for Physics in the first couple of years after its establishment, but it seems their contribution was not considered significant.¹⁷⁹ The main source of necessary 'cadres' was the pool of Yugoslav professors and young students who were, ideally, educated abroad, which after 1948

atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950]. The website MeasuringWorth.com calculates the contemporary value of these investments between \$3,900,000.00 to \$31,800,000.00 (<https://www.measuringworth.com/calculators/uscompare/relativevalue.php>), accessed on January 24, 2020.

¹⁷⁶ ASANU, Dnevnik Pavla Savića, 18-25.

¹⁷⁷ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 81.

¹⁷⁸ Bondžić, *Između ambicija i iluzija*, 68-69.

¹⁷⁹ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 12-16.

would read as the West, while majority of others included those who were taught by Savić at the Faculty of Science and Mathematics in Belgrade.¹⁸⁰ This approach was also completely in accordance with the policy of creation of the new Yugoslav intelligentsia, a process for which nuclear physics was ideally suited as it had basically no precedent as a scientific discipline in the country. Savić also mentions that the entire process was under the control of the UDB, which also “provided the supplies, technical cadres and workers”, although in his own diary it is evident that he consciously wanted to avoid this patronage and made a number of acquisitions of scientists, technicians and even administrative staff independently and through his personal connections in the Government and Politburo.¹⁸¹

Without other possibilities and with Walen’s initial inefficiency in construction of necessary instruments, Savić did not have much choice but to remain deeply dependent on the support of the UDB, which managed to collect the equipment, scientific literature and magazines abroad, mostly in Germany and hidden behind the operations of the Yugoslav Military Mission in Berlin and officially labelled as war reparations. Germany was also a source of technicians and professors of various expertise, although the existing sources suggest they were mostly employed in various industrial sectors in Yugoslavia. Nevertheless, the system was simple. The goods were often packed in boxes and labelled as “University”, and upon their arrival in Yugoslavia, Savić would enjoy the first come, first served option and cherry-pick anything he found useful for the nuclear program.¹⁸²

¹⁸⁰ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 11-14.

¹⁸¹ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 12; ASANU, *Dnevnik Pavla Savića*, 2-7, 14-16. He also often complained about the ‘cadres’ sent to him by the UKRNI and UDB as inadequate or not interested for the work in the Institute for Physics.

¹⁸² Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 12-13; ASANU, *Dnevnik Pavla Savića*, 1-7; AJ, fond 50 Predsedništvo Vlade FNRJ [Presidency of the FPRY Government], f. 67 (in further reference AJ, 50, f. 67). International Relations. Military Missions, 1944-1947. Top secret report of the

In Yugoslavia, the Soviet system replicated itself once again, in the use of the Gulag-style prison labor force for various tasks related to the Yugoslav nuclear program, although the scales were incomparable. Holloway makes an intriguing point that the Soviet nuclear program was “a heroic undertaking”, but “a curious combination of the best and the worst of the Soviet society”; of “enthusiastic scientists” and “of prisoners who lived in the inhuman conditions of the labor camp.”¹⁸³ Tens of thousands people of the prison labor force were eventually involved in the construction of the main nuclear infrastructure and uranium mining.¹⁸⁴ Brown goes even further and stresses that the Gulag labor force was put “at the nucleus of the atomic project”, and while this comment may be too strong, she does reveal an interesting contradiction, that people arrested for treachery and crimes against the state were not the best group to be entrusted with secrets about the entire project.¹⁸⁵

The construction of the Institute for Physics had started already during the fall and winter of 1947, even before the formal establishment on January 10, 1948, and the limited accounts available reveal the process of creation of the scientific institute as “a cell of a totalitarian power”.¹⁸⁶ From the very beginning of the construction, Savić was in full control of all related activities, including the architectural projects of several laboratories he designed singlehandedly.¹⁸⁷ Although there are no direct references about the use of labor force being used at that time, Dedijer reveals that even in the 1950 when most of the main buildings of the Institute for Physics were being

Yugoslav Military Mission in Berlin to the Yugoslav Army's Chief of Staff, April 29, 1947. Dedijer even suggests that the UDB was stealing scientific magazines in libraries across Europe, although his accounts should be taken with some reserve because of an evident inclination to produce a dramatic effect. See Dedijer, *Stevan Dedijer*, 180.

¹⁸³ Holloway, *Stalin and the Bomb*, 172

¹⁸⁴ *Ibid.*, 185, 193; Brown, *Plutopia*, 83-86.

¹⁸⁵ Brown, *Plutopia*, 85.

¹⁸⁶ János Kornai, *The Socialist System: The Political Economy of Communism* (Oxford: Clarendon Press, 1992), 222. Kornai uses this term in his explanation of the employer-employee relations in a socialist factory, but the logic explains equally well the circumstances in which the Institute for Physics was established in Yugoslavia.

¹⁸⁷ Bondžić, *Između ambicija i iluzija*, 59.

finalized, the only labor force he encountered were the prisoners, who lived on the site in the prisoners' camp surrounded by the barbwire. The image is completed by his description of Savić who was in charge of everything and walked around with his personal bodyguard, a former Partisan soldier.¹⁸⁸ On the other hand, a motley crew of the prison labor force, which included POWs, former Chetnik and Ustasha soldiers, common criminals and other categories, was extensively used since the late 1940s in uranium mining and in horrible conditions.¹⁸⁹ Other sources confirm that this was a common practice whenever there was lack of labor force for the work in uranium mines, and it would be easy to imagine that the same logic applied for construction sites under the control of the UDB.¹⁹⁰

Regarding the UDB and UKRNI's activities abroad, it seems evident that they were doing what they could to camouflage the Yugoslav activities in this field, although it seems equally evident that they were not that successful in keeping it a secret. The very first student sent abroad by the UKRNI for specialization was certain Dragiša Ivanović from the University of Belgrade, who went in 1950 "to Chicago to prof. Fermi to study atomic physics", and was expected to stay there for three years.¹⁹¹ While this move was in accordance with the UKRNI's statute, it is difficult to imagine that it would fool anyone abroad about the real intentions behind it. Sending a student to study nuclear physics under the tutelage of one of the leading scientists in the Manhattan Project would necessarily raise some alarms about the real Yugoslav

¹⁸⁸ Dedijer, *Stevan Dedijer*, 179-180.

¹⁸⁹ Bondžić, *Između ambicija i iluzija*, 93.

¹⁹⁰ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950].

¹⁹¹ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950].

intentions, although it would not be the first time that a strategy of hiding in a plain sight worked.

Similarly, a weak cover story was invented for the acquirement of the first quantities of heavy water. Initial amount of 400 grams of heavy water was acquired in 1951 from the Norwegian *Norsk Hydroelektrisk* company. Everything was arranged through the Yugoslav Embassy in Norway, which purchased the heavy water, and the Council for Science and Culture of the Yugoslav Government, which had the task to transfer it to the Institute for Physics. Part of the Yugoslav strategy to hide the final destination of the heavy water was to stress in their request that this amount would be divided among many institutions in Yugoslavia, since this was a federal country, yet the problem emerged when *Norsk Hydroelektrisk* requested a list of recipients for their merchandise.¹⁹² According to existing documents, the Norwegian side was quite happy even with “fictional recipients”, and it was actually the Yugoslav bureaucracy that mistakenly broke the secrecy by sending them the exact names and personal information of people from the Institute for Physics who handled this exchange. The sheer amateurism of this transaction was duly noted by the Yugoslav Embassy in Norway, which insisted that “it is not irrelevant who and how much knows about our purchases of heavy water, and least of all to which institute this water is sent to”, and that any further commercial agreements regarding such sensitive materials should be considered as a top secret.¹⁹³

¹⁹² AJ, fond 317 Savet za nauku i kulturu vlade FNRJ. Sektor za Visoke škole, nauku i umetnost. Veze sa inostranstvom [Council for Science and Culture of the Government of the Federal People's Republic of Yugoslavia. Sector for Higher Schools, Science and Arts. Foreign relations], f. 7, a.j. 18-21 (in further reference AJ, 317, f. 7-18-21. Izveštaj poslanstva FNRJ u Norveškoj [Report of the Embassy of the Federal People's Republic of Yugoslavia in Norway], October 1, 1951.

¹⁹³ AJ, 317, f. 7-18-21. Izveštaj Poslanstva FNRJ u Norveškoj [Report of the Embassy of the Federal People's Republic of Yugoslavia in Norway], December 3, 1951.

Finally, it is important to emphasize that in the period between March and May 1948, the Yugoslav political leadership, headed by Tito himself, initiated the secret and ambitious project for development of necessary technologies, infrastructure and develop other material bases that could potentially be used for the construction of atomic bombs. It is rather difficult to claim that Tito and his closest circle of associates established the entire nuclear program at this stage with a clear plan and expectation that Yugoslavia would soon possess this powerful weapon, and the documents are equally silent on this topic. However, the sheer fact that the UKRNI was established under the control of the UDB and that its main tasks were the nuclear espionage in Western countries and exploration of potential sources of uranium in the country, as well as a strict control of the nuclear program, not only replicates the Soviet experience, but also strongly suggests that the only reason for such a secrecy and only application of uranium in vast quantities was the atomic bomb project; for any experimental development of nuclear physics uranium mine was not necessary and trace amounts of this element would have be sufficient.

1.3 My Mine is My Comrade's Mine

“Before the Second World War nobody in Yugoslavia explored deposits of uranium, thorium and other materials interesting for nuclear energy, nor any data about their appearances existed in geological documentation.”¹⁹⁴

When it came to the uranium mining and prospection in allied or friendly countries, the Soviets were quite open about their nuclear ambitions, although it would be rather difficult to hide their frantic “uranium rush” in the period immediately after the war which saw their experts exploring every known and potential source of uranium. According to Holloway, the Soviets produced the first pure kilogram of uranium metal at the end of 1944, and the proper field prospection started only in September 1945 and in a limited region in Central Asia. Their desire for uranium was further frustrated by the Lend-Lease Administration in Washington which continuously denied transferring the desired amounts of uranium to the Soviet Union, and even more by Allied bombing of the Auer Company plant near Berlin on March 15, 1945, which produced thorium and uranium for the German atomic project. The Auer plant was in the Soviet occupation zone and US General Groves wanted to stop the Soviets from acquiring any sensitive material or technology. Only a month later Groves also managed to remove 1,200 tons of uranium prepared for the German atomic project that was hidden in the Soviet zone.¹⁹⁵

¹⁹⁴ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

¹⁹⁵ Holloway, *Stalin and the Bomb*, 100-102 ,111. General Leslie Groves was the director of the Manhattan Project . Through the Lend-Lease program the Soviets acquired first amounts 100 kilograms of uranium oxide and nitrate each in 1943, but not the uranium metal. By 1945, the Soviet desire for

All of this frustrated the Soviets and slowed down their own nuclear program. However, the victorious march of the Red Army through Eastern and Central Europe opened paths for uranium prospection in several countries. Following information left by the Germans about some uranium deposits in Bulgaria, the first group of Soviet experts arrived in the country already by the end of November 1944. The joint stock “Soviet-Bulgarian mining company,” later to be known as *Gorubso*, was established already in October 17, 1945, and it took over prospection and mining of ores and minerals in the country. The company was exempted from paying export/import taxes and customs duties for commercial arrangements with the Soviet Union, employed “primarily Soviet specialists, and its core business became discovering and developing uranium deposits in Bulgaria,” which remained classified throughout the communist period. In following years, the rumor was spread that the first Soviet atomic bomb was made with Bulgarian uranium, and although this was not completely true, by the middle of 1946 the Soviets managed to produce 272 tons of pitchblende from Bulgarian mines.¹⁹⁶

Soon after the end of the war the Soviets also took the control of Czechoslovakian uranium mine in Jáchymov (Joachimsthal), which was one of the very few known uranium mines in the world at the time, and the only one that had a history of continuous exploitation in Europe in the previous period.¹⁹⁷ After some

uranium grew in amount, but General Groves simply turned down any further requests for sensitive material.

¹⁹⁶ Ivaylo Hristov, *The Communist Nuclear Era: Bulgarian Atomic Community during the Cold War, 1944-1986* (Doctoral Dissertation; Eindhoven, Technische Universiteit Eindhoven, 2014), 36-38; Zeman, Karlsch, *Uranium Matters*, 9, 27, 76. Pitchblende is a mineral of high content of uranium of up to 80%.

¹⁹⁷ Holloway, *Stalin and the Bomb*, 105, 109. Zbynek Zeman, Rainer Karlsch, *Uranium Matters: Central European Uranium in International Politics, 1900-1960* (Budapest and New York: Central European University Press, 2008), 41-45. In the 1860s, Joachimsthal was famous for production of uranium-based dyes that gave a particular luster to yellow, green and orange colors. By the beginning of the 20th century the region became famous for healing properties of radioactive water in the Radium Palace Hotel, built in 1910. With the emerging Atomic Age, radium became important and expensive material that was mined and produced in the region, with spin-off industries mushrooming during the interwar period (radium was used for medical purposes, in luminous paints industry and scientific

negotiations, on November 23, 1945 the Czechoslovak government signed the secret treaty with the Soviet Union, granting the Soviets to mine and transport home uranium ore, thus helping them “solve the uranium problem without even being aware of its existence.”¹⁹⁸ According to Zeman and Karlsch, this secret agreement transformed small Czechoslovakian uranium industry into a huge enterprise and in the process “became the gate through which they entered Stalin’s empire.”¹⁹⁹

This is actually a gentle way to describe the Soviet strategy for putting under control all of uranium deposits in their field of influence, but also for expansion of their influence in host countries. By that time, the Soviets already had a model agreement for prospection and exploitation of uranium deposits outside the Soviet Union which required the establishment of a joint stock company with the host country. The Czechoslovaks managed to avoid this particular model for their company, although it was “a Pyrrhic victory” since their uranium deposits were firmly under the Soviet control. Among other provisions, the secret agreement guaranteed technical positions for Soviet experts and it also left the prospection and entire geological service completely in the Soviet hands.²⁰⁰

The success in Czechoslovakia “led the Russians to neighboring Saxony” and already in September 1945 the Soviet team of geologists led by Semion P. Alexandrow “began with a review of the old mines,” pretending before the Germans “that they were looking for bismuth and cobalt,” although German geologists quickly realized what was the true purpose of the Soviet mission. The initial results were disappointing but the prospection of Saxony continued in the following years and by early 1948 the Soviets realized “that Saxony could provide more uranium than any

research). In 1937, Czechoslovakia ranked third in world radium production (11%; Belgian Congo produced 15% and Canada 66%).

¹⁹⁸ Zeman, Karlsch, *Uranium Matters*, 75-76.

¹⁹⁹ *Ibid.*, 76.

²⁰⁰ *Ibid.*, 76-77.

other part of their empire.”²⁰¹ In the first couple of years the operation in Saxony was run and supervised by the NKVD and Beria himself, that was somewhat screened by the formal establishment of the Wismut AG mining company on May 26, 1947. The important difference in comparison to Bulgarian or Czechoslovakian case was that this company was completely in the Soviet ownership, thus becoming “a sort of uranium province” or “a state within a state,” in the Soviet zone of occupation in East Germany, run by the NKVD general Maltsev.²⁰²

Even the superficial glance over these arrangements reveals all the main ingredients of the Sovietization scenario, and if agreements of this type were to perform the role of a window between the host country and the Soviet Union, this was the window through which Stalin could extend his firm grip. For the Soviet side, uranium prospection and exploration sped up their nuclear program and fueled their first atomic bombs, but it obviously had an added benefit of being a tool for the extension of the political control over Central and Eastern Europe. However, it has to be stressed that while the Soviets had the model agreement for uranium prospection and mining in a host country, it seems that it was only the basis for negotiations. That was the case with Bulgaria and to a certain extent Czechoslovakia, but as the Soviet atomic bomb project progressed and the need for uranium grew, it seems that they became less careful with host countries, using brute force if necessary in order to take control over the available uranium deposits. It also seems that the Soviet behavior was dependent on their actual influence or level of control in these countries, which would

²⁰¹ Zeman, Karlsch, *Uranium Matters*, 27-29, 58. In the official communication the Soviets used formulation “raw material A9” as a code name for uranium, while the first mining facility was hidden behind a simple field-post number “no. 9372,” followed by other similar names as new mines were opened. Already in the 1950s the Wismut AG, uranium mining company in East Germany (Saxony) became the largest producer of uranium in Europe.

²⁰² *Ibid.*, 159, 162-166.

theoretically leave them some space for negotiation. Either way, the focus was on finding uranium and the Soviets wasted no time.

Soviet Uranium Prospection in Yugoslavia

In Yugoslavia, the establishment of joint stock companies was loosely discussed with the Soviet Union since 1944, but by early 1946 not much was actually being done. Andrija Hebrang, the head of the Yugoslav Economic Council and Planning Commission, restarted negotiations with the Soviets in 1946 and initial plans included the establishment of joint stock companies “in excavation, energy and infrastructure,” and although there were signs that the Soviets were interested to provide support, Tito halted further negotiations and used the opportunity to demote powerful and pro-Soviet Hebrang. Officially, complaints were also raised that the mere concept of the joint stock companies revealed the Soviet capitalistic behavior towards Yugoslavia, and as the relationship between Tito and Stalin gradually deteriorated in following months, the topic was never seriously reopened.²⁰³

This course of events in Yugoslavia consequently made the Soviet standard approach and strategy for uranium prospection in host countries impotent. Without the joint stock company agreement it seems that there was little they could have done except using other means of pressure, especially at that time when they still have not found sufficient deposits of uranium neither in the Soviet Union, nor elsewhere.²⁰⁴ This is what actually happened in Yugoslavia. The Soviets did manage to organize a uranium prospection mission without formal agreements, and it effectively worked in a similar way as in other countries of Central and Eastern Europe.

²⁰³ Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 30-32.

²⁰⁴ Zeman, Karlsch, *Uranium Matters*, 29. The sources in Saxony proved to be very rich in uranium, but the first confirmation came only in 1948.

Documents on this are scarce and scattered in various archival collections, but available information is rather instructive. In 1947, “a team of Russian specialists for exploration of nuclear ores performed measurements of all of our [Yugoslav] mines with Geiger-Müller counters” but “their findings were never delivered [...], nor we know what they found” and even though “one of our [Yugoslav] geologists was accompanying them, they kept the results from him as well.”²⁰⁵ The mission of the Soviet geologists in Yugoslavia was actually a rather detailed survey of existing mines which lasted between July 21 and October 4, 1947. Their arrival was simply and suddenly announced only three days in advance by “comrade Vasiliev” of the Soviet trade mission in Belgrade, who set the date and hour of their arrival and requested they should be greeted at the Bulgarian border “without customs inspection, other formalities and delays.”²⁰⁶

The fact that this report comes from the archives of the League of Communists of Yugoslavia (Communist Party of Yugoslavia), and an extremely short notice provided by Vasiliev, reveal that no negotiations about the mission of the Soviet geologists ever took place. It seems that the Soviets deliberately avoided the Yugoslav officials and used their Party connections instead, without even revealing their true plans. The scenario is quite similar to what was happening in Germany a few years earlier, but it is also true that in Yugoslavia the Soviets obviously could not even begin proper negotiations on establishment of a joint-stock company for the purpose, as they did in Bulgaria and to a certain extent in Czechoslovakia.

²⁰⁵ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

²⁰⁶ AJ, fond 507, Centralni komitet Saveza komunista Jugoslavije [Central Committee of the League of Communists of Yugoslavia], IX, 1119/V-32 (in further reference AJ, 507, IX, 1119/V-32). Izveštaj o radu sovjetske ekipe geologa u vremenu od 21.VII-4.X 1947 [The report about the work of the Soviet team of geologists in the period between July 21 and October 1947], October 29, 1947.

During their mission, the Soviet geologists managed to visit all major mines in Serbia and Macedonia, one in Bosnia and Herzegovina, and finished their work with the tour of the biggest mining enterprises in Slovenia. They were continuously accompanied by one unknown Yugoslav geologist, who eventually wrote the report, but without sharing any information with him or answering any of his questions. Nevertheless, he did what he could to understand and document their activities. According to his report, upon their arrival to a mine, Soviet geologists would immediately ask for “all existing geological maps and plans [...] as well as all the literature related to geology of the wider area around the mine.” After that, they would visit selected locations, carrying with them “special instruments and devices”. The Yugoslav geologist admits in his report that “these devices are of a particular construction [...] and I was not acquainted with them, neither from my experience, nor from the literature.” However, he did make an important assumption that they were used to “detect presence of radioactive minerals and to register the intensity of their radiation.” Soviet geologists had several types of these field instruments, which were described in detail, alongside several others which they kept in wooden boxes and used for the analysis of the collected samples in a closed room or laboratory and only when nobody else was around. The Yugoslav geologist could not recognize these instruments either, but he suspected that “they were constructed on the principle of spectrometers or spectrographs.”²⁰⁷

With all the obstacles, the Yugoslav geologist did realize that the Soviet field instruments were measuring a number of recorded impulses per minute, and he wasted no time in counting those impulses, eyeballing what the Soviets had recorded, and reporting them back to the Party’s Central Committee. According to his limited

²⁰⁷ AJ, 507, IX, 1119/V-32. Izveštaj o radu sovjetske ekipe geologa u vremenu od 21.VII-4.X 1947

observations, Soviet geologists would take samples from every rock that emitted more than 90 impulses per minute and the most interesting results were measured in the mines in *Vareš* (950.5 impulses per minute; Bosnia and Herzegovina), *Idrija* (630; Slovenia), *Trepča* (462.5; Serbia), *Aljin Do* (149.5; Serbia), *Dudica* (126; Serbia) and *Strumica* (unknown; Macedonia). Eventually, after the Soviet team of geologists finished their mission and performed all analyses they needed, they were escorted back to the Bulgarian border, where a car waited to take them back to Sofia.²⁰⁸

While it would be difficult to make any claims, it seems probable that the Soviet team of geologists simply took the radioactive samples with them to Bulgaria, either for further analysis in their laboratories, or simply to hide them from the Yugoslavs, not unlike to what they tried to do in Germany in 1945. This is indirectly confirmed in one later report of the UKRNI for 1948 where it is emphasized that the Soviets found “small [levels of] radioactivity” in several existing mines in Yugoslavia, but that the samples of ores that were analyzed later by the Yugoslav scientists, “did not show any radioactivity.”²⁰⁹ Another probable explanation could be that Yugoslav geologists at the time simply did not have enough knowledge or adequate instruments (or both) to perform a proper analysis which would confirm the Soviet results. The Yugoslav geologist who accompanied the Soviet team in 1947 was obviously stunned with what he had seen, but like his colleagues from Saxony, he quickly connected the dots, and so did the Yugoslav authorities.

Nevertheless, the limited information available about the Soviet uranium prospection in Yugoslavia does confirm that they were frantically searching for uranium and it would not be surprising that they send similar teams of geologists

²⁰⁸ AJ, 507, IX, 1119/V-32. Izveštaj o radu sovjetske ekipe geologa u vremenu od 21.VII-4.X 1947. During the mission, members of the Soviet team often returned to Belgrade for laboratory analyses or they would simply go back to Sofia. The Yugoslav geologist who accompanied them also offers detailed description of these devices which were obviously Soviet made Geiger-Müller counters.

²⁰⁹ AJ, 836 II-6-a/4. Izveštaj o radu Uprave za naučno istraživački rad za 1948. i zadacima za 1949.

across their entire sphere of influence in Central and Eastern Europe. Analyzing the entire story from the Yugoslav perspective, the fact that the Soviets were so desperate to find uranium was duly noted and their mission in Yugoslavia revealed a rudimentary methodology and the equipment necessary for uranium prospection.

This mission of the Soviet “specialists for exploration of nuclear ores” can also be read as a part of Stalin’s last attempt to put Tito and Yugoslav political leadership under control. In April 1947, Stalin offered direct assistance in shipments of industrial machinery, technological documentation, loaning of specialists and other support that was to replace joint stock companies that the Yugoslavs were so desperate to avoid, all of which coincided with the launch of the Yugoslav ambitious and independently designed First Five-Year-Plan.²¹⁰ Part of this plan may have been the team of Soviet geologists, and although documents are silent on this topic, their potential discovery of promising sources could have been an important bargaining chip in Stalin’s hands. Either way, even if the Soviet geologists did make some interesting discoveries in Yugoslavia, by the fall of 1947 when they finished their mission, the time remaining for a close collaboration between two countries was running out.

Roughly at the same time, in the spring of 1947, Friedrich Schumacher, the director of the geological institute and the Mining Academy in Freiberg, moved after the denazification process to Yugoslavia where he worked until 1949/50 as “chief geologist for lead and zinc mining enterprise.”²¹¹ The importance of this information lies in the fact that Schumacher was one of the leading German experts who helped the Soviets in the discovery of rich uranium deposits in Saxony, activity that was hidden behind an “office for colored metals.”²¹² Ivaylov also identifies that in

²¹⁰ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 32.

²¹¹ Zeman, Karlsch, *Uranium Matters*, 28; Andreas Udo Fitzel: “Friedrich Schumacher (1884 - 1975)”, *Spaichinger Heimatbrief* 2009, 65–66.

²¹² Zeman, Karlsch, *Uranium Matters*, 28.

Bulgaria the uranium mining was camouflaged as exploration of lead and zinc ores, which appears to have been yet another standard practice used by the Soviets to camouflage their uranium mining and prospection activities.²¹³

It is difficult to say if Schumacher's arrival to Yugoslavia was part of some clever Soviet scheme to secretly explore potential uranium reserves in the country. Back in the Soviet occupation zone in Germany, Schumacher was actually banned from teaching at the Mining Academy in Freiberg and was even threatened with the labor camp for his decision not to become a member of the newly formed SED (*Sozialistische Einheitspartei Deutschlands* – Socialist Unity Party of Germany). In a scenario worthy of a spy novel, his escape to Yugoslavia was organized by “two influential Yugoslavs,” the director of the Trepča Mines, where Schumacher was eventually employed as the chief geologist, and one of Schumacher's former students, “certain Jovanović”. They provided him a false identification and drove in a car through Czechoslovakia and Hungary to Yugoslavia.²¹⁴

In the late 1940s, dozens of German experts were actually employed in Yugoslavia, often using false papers provided by the Yugoslav Military Mission in Berlin.²¹⁵ According to the Mission's reports, only in August 1947 exactly 135 German experts and workers of various professions were sent to Yugoslavia, out of which 16 had a university degree, with additional 44 experts who were illegally transported to the country, probably in the same way as Schumacher.²¹⁶ In the following month, the number grew to 21 “doctors and engineers” and 170 technicians

²¹³ Hristov, *The Communist Nuclear Era*, 38.

²¹⁴ Fitzel: “Friedrich Schumacher (1884 - 1975)”, 65–66. Schumacher escaped with his wife and another colleague. He was employed as the chief geologist at the Trepča Mines where he stayed until 1949, after which he moved to Belgrade where he taught at the Technical School of Belgrade University. However, in 1951 he moved to Bonn in West Germany. See also Dragomir Bondžić, Milutin Živković, „Miladin Radulović-Krcun. Prilozi za biografiju“, *Tokovi istorije* 2/2018, 131.

²¹⁵ AJ, 50, f. 67. International Relations. Military Missions, 1944-1947. Top secret report of the Yugoslav Military Mission in Berlin to the Yugoslav Army's Chief of Staff, April 29, 1947.

²¹⁶ AJ, 50, f. 67. International Relations. Military Missions, 1944-1947. The report on employment of experts in August, September 12, 1947.

and workers. It was also stressed that in majority of cases this operation was organized “in secrecy and without knowledge of the occupying authorities” in Berlin.²¹⁷

Zeman and Karlsch do not mention any details about Schumacher’s activities in Yugoslavia related to uranium prospection and official documents are equally silent. Schumacher was actually a member of the larger group of German geologists that were employed in the Yugoslav ministries for black and colored metallurgy. This team was led by Ivan Jurković who was the chief geologists in these ministries and one of the most qualified Yugoslav experts in the field, charged with the task of exploring all known deposits of metal ores in the country. However, he also had close connections with the budding Yugoslav nuclear establishment. In 1953 he specialized in several methods for laboratory analysis of various types of uranium ores, in close collaboration with Arnold Cissarz, yet another German scientist employed in Yugoslavia as the main expert for prospection of metal ore deposits in Yugoslavia. With the help of German colleagues, Jurković eventually managed to train the first post-war generation of Yugoslav geologists.²¹⁸

²¹⁷ AJ, 50, f. 67. Monthly Report, October 10, 1947. The Soviet Government did try to stop this flow of German experts to Yugoslavia and other illegal activities. In 1946 they stopped issuing passes to the Yugoslav representatives who travelled from Czechoslovakia to Berlin, and eventually completely stopped issuing passes to the Yugoslavs for the Soviet zone in Berlin on May 10, 1947, which may have been provoked by the Schumacher’s escape. On the other hand, simple Soviet soldiers were easily persuaded to allow Yugoslav experts and agents to cross various borders with bribes in cigarettes and alcohol. On one occasion, when the Yugoslav agent was taking a car stolen in Berlin from the U.S. General Clay over the Czechoslovakian border, the Soviet border patrol realized that the car was stolen, but one soldier commented: “Just drive, it was paid with the Yugoslav blood.” AJ, 50, f. 63. Report of the Yugoslav Ministry of Foreign Affairs to the Presidency of the FPRY, November 4, 1946; AJ, 50, f. 67. Top secret report of the Yugoslav Military Mission in Berlin to the Yugoslav Army’s Chief of Staff, April 29, 1947; AJ, 50, f. 67. Explanation of the case of purchase of Clay’s car, April 2, 1947. U.S. General Lucius D. Clay served as the commander of U.S. forces in Europe and U.S. military governor of in Germany from 1945 to 1949 and became famous for his organization of the Berlin Airlift (1948-1949). “Lucius D. Clay,” Encyclopedia Britannica, <https://www.britannica.com/biography/Lucius-D-Clay> (accessed on July 10, 2019).

²¹⁸ Akademik Ivan Jurković, http://info.hazu.hr/hr/clanovi_akademije/osobne_stranice/ijurkovic (accessed on March 12, 2017). Besides Dr. Schumacher, the Ministry for Black and Colored Metallurgy employed Dr. Arnold Cissarz, Dr. Martin Donath, Dr. Nöth, Dr. Ledebur. Most of them stayed in Yugoslavia until the early 1950s, except Cissarz who was the main expert for prospection of metal ore deposits in Yugoslavia until 1955, and later remained an external professor of the Faculty of Mining and Geology in Belgrade. Before 1945, Cissarz was the director of the Geological Bundesanstalt in Hannover, Germany.

All of these efforts were actually considered as a crucial part of the Yugoslav First Five Year Plan of industrialization, which was initiated in the spring of 1947, and most likely these covert activities were managed by the UDB. As mentioned earlier, one of the “influential Yugoslavs”, who for all practical purposes stole Schumacher in front of the Soviet eyes, was the director of the Trepča mines, Miladin Radulović. According to his biographers, he actually had ample experience in similar activities during the war. With an education in applied chemistry before the war and his wartime record, in 1945 he became the director of the Trepča Mines where he stayed until the spring of 1947, and later moved quickly through the ranks taking high-level positions in various ministries, committees and institutes related to the mining industry, eventually becoming the director of the Directorate for Nuclear Raw Materials in 1955. Considering that he was “one of the rear individuals acquainted with the pioneering works in the search for nuclear raw materials in Yugoslavia [...] as well as in the beginnings of the secret Yugoslav nuclear program”, Radulović’s biographers rightly conclude that he must have “enjoyed a great trust of the state and Party leadership to be managing such an important and covert task” of finding uranium.²¹⁹

Considering the growing Tito-Stalin conflict and its aftermath in 1948, it would be appealing to present this episode as an elaborate Yugoslav plan to steal from the Soviets one of the very few experts in uranium prospection. However, Schumacher arrived in Yugoslavia a couple of months before the mission of the Soviet geologists, at the time when the Yugoslav nuclear program was not even initiated, and it seems

²¹⁹ Bondžić, Milutin Živković, „Miladin Radulović-Krcun. Prilozi za biografiju“, 119-133. During the war, Radulović worked as an infiltrated communist agent in the ranks of the JVuO (Jugoslovenska vojska u otadžbini - The Yugoslav Army in the Fatherland). The JVuO was officially controlled by the exiled Yugoslav Royal Government in London. Commonly known as *Četnici* (Chetniks), they were in effect royalists and Serbian nationalist troops who often bitterly fought against the Communists during the Second World War.

that the Yugoslavs were simply jumping to the opportunity to use Schumacher's services in their ambitious plans for the country's industrialization. His main job position was of a chief geologist in one of the biggest mining enterprises in the country with one of the richest lead and zinc deposits in Europe. Expert geologists from Freiberg were also well known at least in Serbia where they conducted the first geological survey already in 1835, while in subsequent years a number of students were educated in Freiberg, including the one who helped with Schumacher's escape to Yugoslavia.²²⁰

Another possibility would be that the Soviets had organized their geological mission in Yugoslavia immediately after the Schumacher's escape, in order to understand if his expertise in uranium prospection could be also used by the Yugoslavs. They also visited the Trepča Mines where he was employed, possibly even as a gentle sign that they were aware of his current position or to stop him from helping the Yugoslavs in that sensitive field. Many of these hypotheses will remain unanswered, but the fact remains that, once the Yugoslav authorities realized that the Soviet geologists were searching for uranium and may have found something interesting, the expertise of Schumacher and other German geologists was employed for the same purpose, even if only indirectly through training of the first post-war generation of Yugoslav geologists.

On a more practical level, the Soviet geological mission may have sparked similar desires among the Yugoslav political establishment. Bondžić explains that the first real uranium prospection mission was organized by the UKRNI during July and August 1948, although some initial inquiries may have been made already in October

²²⁰ Kosta Petković, *Geologija Srbije I: Istorijski razvoj* [Geology of Serbia I: Historical Development] (Beograd: 1977), 8-9. Freiherr von Herder, the manager of the Royal Saxon Mining Excavations in Freiberg, conducted in 1835 the first mining survey of Serbian lands on invitation of Prince Miloš Obrenović. For this footnote and related information, I wish to express my gratitude to my colleague Dejan Lukić.

1947.²²¹ Taking into consideration how dedicated the Yugoslav Communists were in their plan to replicate the Soviet state-system in the country, the fact that the Soviets were eager to find uranium may have been the sign that this is what they should do as well. This hypothesis is indirectly supported with the fact that, if Bondžić's report that first inquiries about the possibility to find uranium in the country were performed in October 1947, this would neatly coincide with the departure of the Soviet geological mission at the beginning of the month. Once the Soviets departed, their Yugoslav counterparts started to dig for their own uranium, equally eager to mask their ambitions and hide any potential finds from the Soviet side.

²²¹ Bondžić, *Između ambicija i iluzija*, 84-85. Bondžić accounts this early prospection to the UKRNI, although it was established only on March 10, 1948. This makes it difficult to understand if the year is wrong, or if these were initial investigations of other institutions, the UDB for example, before the establishment of the UKRNI.

1.4 Yugoslavia Must Have the Nuclear Bomb

“We must have the nuclear bomb. We must make it even if it costs us half of our entire national income for years to come.”²²²

The opening statement to this chapter comes from Edvard Kardelj, the Yugoslav leading ideologist and member of the ‘leading four’ of the KPJ leadership (Tito, Ranković, Đilas, Kardelj).²²³ Dedijer explains in his memoirs that Kardelj shared with him this somewhat dramatic, yet very clear and bold plan, during the meeting between the two of them in Kardelj’s office on January 17, 1950. At the time, Kardelj was the Vice Prime Minister of Yugoslavia and Minister of Foreign Affairs, and if this account is to be trusted, this statement can easily carry the weight of a state policy.²²⁴ Indirect confirmation comes from Savić’s personal diary for the period between January 25 and February 3, 1950, where he mentions for the first time that he was criticized for the lack of results and pressured for faster development of the Institute for Physics by Svetislav Stefanović-Ćeća and Jovo Kapičić-Kapa, both acting as Ranković’s deputies.²²⁵ The dispute happened over a dinner between the three of them at Savić’s apartment in Belgrade, and even though it does not mention nuclear weapons in any form, it does reveal the sudden interest of the Yugoslav top-ranking officials and the country’s security sector for faster development of the Institute for

²²² Dedijer, *Stevan Dedijer*, 177.

²²³ *Ibid.*; Pirjevec, *Tito i drugovi*, 390-395.

²²⁴ Dedijer, *Stevan Dedijer*, 177. Dedijer’s autobiography raises suspicions due to the very nature of the source (autobiography), but even more so with the content, where he seems to be focused on the literary and dramatic aspect of his writing, than factography.; Potter, Miljanic, Slaus, “Tito’s Nuclear Legacy”, 64. The last article in this footnote was the first to offer the same story, albeit also based on some unpublished writings Dedijer made in 1969. See also Bondžić, *Između ambicija i iluzija*, 98-100.

²²⁵ ASANU, *Dnevnik Pavla Savića*, 15.

Physics. This interest was particularly visible regarding rapid construction of the necessary buildings and some tangible results, such as the construction of a nuclear reactor.²²⁶ Being an informal meeting, which was only accidentally or intuitively documented by Savić, this episode to a certain extent explains the lack of archival documents, the problem which complicates any research regarding this already well hidden topic. On the other hand, the secrecy and the rush for results strongly support the claim that Kardelj's statement already was the state policy in early 1950.

In his own memoirs, Kapičić provides some indirect evidence that the atomic bomb project was initiated and already well underway by 1952, although his chronology is often spotty and inaccurate.²²⁷ The earliest scholarship regarding the Yugoslav ambition to acquire nuclear weapons, offers only a vague confirmation that by 1954, the U.S. State Department was convinced that the Yugoslav atomic bomb program had already been initiated.²²⁸ Combining a number of different testimonies, limited scholarship and a few existing sources, Bondžić comes to a conclusion that “1950 was crucial for the development of the Yugoslav [atomic bomb] program,” although his analysis is more focused on the question if the Yugoslavs wanted the bomb, rather than explanation when this decision had been made, why or by whom.²²⁹

Therefore, it may be taken as a point of departure of this investigation that by January-February 1950, the decision to pursue the atomic bomb project had already been crystalized in the minds of the Yugoslav political leadership, and started to be transferred down the chain of command as a task to a narrowly selected group of

²²⁶ ASANU, Dnevnik Pavla Savića, 15.

²²⁷ Nikčević (ed.), *Goli otoci Jova Kapičića*, 150-154. This is an autobiographical source, based on an interview given by Kapičić many decades after the events he is explaining, and it is evident that he is often confusing or conflating both dates and names of certain institutions, although when it was possible to cross reference his statements with other sources, they prove to be trustworthy.

²²⁸ Koch, “Yugoslavia’s Nuclear Legacy”, 123-124.

²²⁹ Bondžić, *Između ambicija i iluzija*, 106.

Yugoslav scientists. In this chapter, I will focus on the question when this decision had been made, by whom exactly, and most importantly, what was the underlying logic behind it. While it may be argued that it would be difficult to imagine that anybody except Tito himself would be able to make such a decision, I will investigate who and how had provided him with enough information to make such a decision, potentially influencing his own decision.

Delivering a Decision

Even though it may seem surprising or unbelievable that Yugoslavia initiated the atomic bomb project as early as 1950, there is enough, albeit indirect evidence, to push this date back a bit further in the past. It has already been mentioned that Tito got a first glimpse on the Manhattan Project from the Russian translation of the Smyth Report, which Savić brought with him from the Soviet Union in March 1946.²³⁰ It is impossible to estimate how much or what kind of an impression it had on Tito, but it may be argued that by that time Tito definitively became aware that the atomic bomb project was being seriously considered in the Soviet Union, or maybe even already underway, even if he had no other information. At the time of a close friendship between two nations and their leaders, it seems likely that the Soviet Union was spreading their own propaganda in Yugoslavia, and probably other socialist bloc countries, about their scientific, technical and military superiority, or maybe even as a strong deterrent not to rebel against the Soviet patronage.

In Yugoslavia, it seems the latter option became more important closer to 1948. Holloway explains that at least since November 1947, the Soviet Union gradually developed a dual policy in the emerging Cold War, at least partially caused

²³⁰ AJ, 836 II-6-a/2. Pavle Savić's letter to Tito, March 17, 1946.

by the U.S. nuclear monopoly. This consisted of conducting the “war of nerves”, in which the Soviet Union was presenting itself undeterred by the U.S. nuclear weapons, and “the idea of ‘limits’”, which meant practicing restraint in order to avoid a potential war:

“The bomb had a dual effect. It probably made the Soviet Union more restrained in its use of force, for fear of precipitating war. It also made the Soviet Union less cooperative and less willing to compromise, for fear of seeming weak.”²³¹

Part of that project was a specific spinning of information about their nuclear capability, both on a global level and regarding the East European countries. Holloway reveals that during one meeting in Moscow in February 1948, the Bulgarian party leader, Georgii Dimitrov, “had told Milovan Đilas [...] that ‘the Russians already had the atom bomb, and an even better one than the Americans’, that is, the one exploded over Hiroshima.”²³² Đilas confirms this episode, and adds that Kardelj was also present at the same meeting. He also claims that he did not believe the Dimitrov’s words, but that he was convinced that “the Russians were just on the way to making an atom bomb.”²³³

In other words, by February 1948, two members of the Yugoslav ‘leading four’ were introduced to the idea that the Soviet Union already had constructed the atomic bomb, or that was rapidly approaching that capability, even if they were not completely charmed by the Soviet propaganda, as Đilas suggests. It is next to

²³¹ Holloway, *Stalin and the Bomb*, 272. For more details about the early development of the Soviet nuclear posture see the entire chapter “The War of Nerves”, 253-272.

²³² A.P. Aleksandrov, “Gody s Kurchatovym”, *Nauka i zhizn*, 1983, no. 2, 20. Quoted in Holloway, *Stalin and the Bomb*, 266. See also Holloway, *Stalin and the Bomb*, 253-272.

²³³ Djilas, *Conversations with Stalin*, 119.

impossible to expect that they did not transfer this information to the remaining two, Tito and Ranković. At the time of the rapidly growing dispute between the Soviets and Yugoslavs, even without a direct evidence it is easy to imagine that Tito and his inner circle of most loyal comrades started to consider the atomic bomb option as a viable, ideal or only solution to the brewing conflict with the Soviet Union.

However, it seems more likely that Tito understood well the Soviet nuclear bluff and its purpose and attempted to use the same strategy to fight off the growing Soviet pressure. Unkovski-Korica confirms that by the early 1948, Tito “appeared to have decided to test or even defy Stalin,” in an attempt not to appear weak, which somewhat resembles the Soviet posture towards the United States.²³⁴ Here we also must return to the fact that the Institute for Physics was formally established on January 10, 1948, which was followed by the establishment of the UKRNI on March 20, 1948, as the UDB’s extended arm in the country’s budding nuclear program. This date is also significant as the moment when Tito initiated the exchange of letters with the Soviet political leadership, which eventually led to the split with Stalin on June 28, 1948.²³⁵ This would also neatly coincide with the indirect, albeit very clear threat which came through the mouth of Georgi Dimitrov, roughly a month earlier. Without direct evidence, however, it is difficult to make any strong claims about Tito’s plans or expectations regarding the Yugoslav nuclear program. Nevertheless, the chronological proximity is uncanny and requires further elaboration.

What these facts seem to suggest is that, at some point between February and March 1948, Tito indeed made the decision that the country’s budding nuclear

²³⁴ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 59.

²³⁵ Unkovski-Korica, *The Economic Struggle for Power in Tito’s Yugoslavia*, 60. On March 20, 1948, Tito wrote a letter to Vyacheslav Molotov, People’s Commissar for Foreign Affairs in which he asked for an explanation for the Soviet withdrawal of experts, which was part of the Soviet strategy of putting pressure on the Yugoslavs and their relative independent position in relation to them.

program should be sped up. This decision, however, must be analyzed in at least three related contexts; as a part of the country's much wider independent modernization program embodied in the First Five Year Plan, which may also be accounted as an act of defiance towards the Soviet Union, as a bluff comparable to, or inspired by the Soviet strategy, only for slightly different purpose, and as a real preparation of the most urgent institutional framework if the decision to pursue the atomic bomb program is to be made in the future. Regardless of the final answer to this trilemma, and in order to avoid the trap of providing a teleological explanation, I would argue at this point that, regarding the decision to pursue the atomic bomb project in Yugoslavia, the establishment of the UKRNI was equally important as the establishment of the Institute for Physics, and even though these events do not seem to be related, eventually both were important arguments in considering and delivering such a decision.

According to its first annual report, the UKRNI was initially established with a primary task to organize prospection of uranium ores in the country, while only "in the fourth quarter of 1948" its activities were expanded to cover general industrial espionage for the industry, while still retaining the primary focus on the development of nuclear physics in the country. The coordination of activities with the Institute for Physics was added on this list only by the end of 1948.²³⁶ The report is not dated, but given the fact that it speaks at length about plans for 1949, and some other references, it can be estimated that it was created by the end of 1948. The fact that it openly speaks about uranium as "the main raw material for both the atomic energy and atomic bomb", may point to a conclusion that at some point after May 1, 1948, when

²³⁶ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

the UKRNI officially started to operate, both civilian and military application of the nuclear energy started to be seriously considered by the Yugoslav political leadership.²³⁷ Bondžić confirms that the UKRNI initiated the exploration of uranium ore reserves in Yugoslavia only during July and August of 1948, even though he does not provide any explanation why.²³⁸ This would neatly fit into the timeline of events after the official Tito-Stalin split on June 28, 1948, and it may be used as the earliest possible date for the decision to develop the atomic bomb in Yugoslavia.

Even though the Tito-Stalin split eventually became one of the most important defining events in the history of socialist Yugoslavia and its international political position during the Cold War, this was not immediately clear. According to Bekić, Tito initially tried to find a peaceful solution to the crisis, and well into 1949, the Yugoslav political leadership continued to publically promote itself as “faithful to the principles of international proletarian solidarity and unity of the anti-imperialist front”.²³⁹ However, the strategy of proving themselves as ‘more Catholic than a Pope’, failed to grant the Yugoslav Communists any concessions from Stalin, while their continued strong public defense of their loyalty to the Soviet Union only further compromised them in the West. Bekić even compares them with Bolsheviks arrested in Stalin’s purges, who considered their accusers as “anti-Soviet conspirators and even in front the firing squad cried out Stalin’s name.”²⁴⁰ While this comparison may be too strong, it is not entirely inaccurate, and this predicament left Yugoslavia completely isolated in the international sphere, both politically and economically. It was only in

²³⁷ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

²³⁸ Bondžić, *Između ambicija i iluzija*, 85.

²³⁹ Bekić, *Jugoslavija u Hladnom ratu*, 27-30.

²⁴⁰ Bekić, *Jugoslavija u Hladnom ratu*, 30.

late 1949 when the U.S. administration started to support the Yugoslav independence, financially and politically.²⁴¹

Therefore, it would be difficult to relate the establishment of the UKRNI with the Yugoslav decision to develop nuclear weapons as an answer to a growing conflict with the Soviet Union. During the spring of 1948, it seems more likely that initially it really was imagined as a body that would coordinate uranium prospection efforts in the country. The first activities in that field were initiated in July and August of 1948, and while this fits well with the date of the Tito-Stalin split, it is more probable that this was related to the fact that this is the period of summer holiday at universities, when professors were readily available to provide their expertise in prospection and ore analysis. On the other hand, the UKRNI's subsequent expansion of activities in the late 1948 into a general industrial espionage service, can be explained as indirectly related to the conflict with the Soviet Union. The most probable reason was the realization that the expected technological support from the Soviet Union is not going to arrive, at least not in terms, price, nor the amount the Yugoslavs had expected.²⁴² Lacking other partners in the developed world and not yet accepted as a pariah of the socialist bloc, this was the only, albeit illegal solution for the rapid acquirement of advanced technologies, necessary for the country's ambitious industrialization plans.

Simultaneously, other tasks originally given to the UKRNI gradually started to disappear. During 1948, the Yugoslav Planning Commission created a range of "directorates, bureaus and institutes" in different industrial sectors and with tasks similar to the general, or more conventional task of the UKRNI. This, however, by the

²⁴¹ John R. Lampe, Russell O. Prickett and Ljubiša S. Adamović, *Yugoslav-American Economic Relations since World War II* (Durham: Duke University Press, c1990), 29-31. The first credit line of \$20 million through the U.S. Export-Import Bank was approved only in September 1949, even though the Yugoslav overtures and open requests for support were openly extended to the U.S. administration from the beginning of the year.

²⁴² Unkovski-Korica, *The Economic Struggle for Power in Tito's Yugoslavia*, 59

end of 1948 left the UKRNI with a unique mandate; to focus on exploration of uranium ores in the country, and “a certain coordination” with the Institute for Physics as a task which “practice had shown to be necessary”, while even the role of the country’s industrial espionage hub seem to have been more attuned to the needs of the nuclear program.²⁴³ This would suggest that the UKRNI only gradually, and almost accidentally, became the institution which was controlling the country’s nuclear program, and not as a part of a clever strategy, which in turn, undermines any claims that the Yugoslav political leadership had serious plans for developing nuclear weapons during 1948.

Here we have to return to the fact that the UKRNI’s director Slobodan Nakićenović was acting as a transmission belt between the country’s scientific community, the UDB, and the Federal Government, and it is difficult to imagine that he was making any decisions independently. This is the context in which his statement, that the task of coordination of activities with the Institute for Physics “was not officially given [to the UKRNI], but we intended to pursue it independently since our opinion was that it was necessary”, should be analyzed.²⁴⁴ Moving up the chain of command, it is easy to identify the director of the UDB, Aleksandar Ranković and Tito himself as only persons who could give him an order to, for all practical purposes, put under the UKRNI’s control activities in the Institute for Physics. The question is, why was this necessary by the end of 1948?

Speaking about the importance of uranium for both civilian and military application of nuclear energy, in his report of the UKRNI’s activities in 1948 Nakićenović also commented that “all of these questions, and many more, somebody

²⁴³ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

²⁴⁴ *Ibid.*

has to treat, since to a certain extent, our future depends on them [and] since there is no one else to deal with them, these can be tasks for our department.”²⁴⁵ This statement is actually more revealing than its content would suggest. With a loud and clear undertone of security concerns, and at the time of the growing conflict with the Soviet Union, it would be appealing and even logical to discover Tito’s invisible hand behind this decision. However, since Nakićenović was in effect justifying the expansion of the UKRNI’s domain to coordination of the activities of the Institute for Physics, it is more probable that this order was given to him by Ranković, otherwise the explanation of that change would have been completely redundant if it came as an order from Tito. The UKRNI’s report was indeed first sent to the Ranković’s office, and only later forwarded to Tito’s cabinet, which may imply a coordinated effort by Ranković and Nakićenović.²⁴⁶

Unfortunately, without the access to the archives of the UDB it is impossible to extend this investigation any further, but it would not be surprising that, as a person whose main duty was the state security system, Ranković could have easily been interested in the development of nuclear weapons, and independently start to prepare the necessary infrastructure, even without a direct order from Tito. While this statement may sound outrageous and unjustly point to Ranković’s apparent naiveté regarding the country’s capabilities to achieve such a feat, it is also a fact that among the tasks given to the UKRNI in 1948 was the investigation about the “death rays” developed by a certain inventor Kiš. The invention, obviously, turned out to be a fraud, but the episode strongly suggest that Ranković was deeply interested or even

²⁴⁵ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

²⁴⁶ *Ibid.*

desperate to acquire some powerful and exotic weapons, enough to risk being embarrassed.²⁴⁷

In his personal diary, Savić suggests that Nakićenović's personal interest in the operation of the Institute for Physics, was actually quite mundane, "to secure his own existence".²⁴⁸ Although he does not specify when this had happened, other sources confirm that at some point in 1949, Slobodan Nakićenović became the director of the Institute for Physics, the position in which he remained until 1952, while also remaining the director of the UKRNI.²⁴⁹ This would suggest that Nakićenović was acting independently, which is difficult to accept. On the other hand, this comment may not be too far off the mark, given the fact that it was a common practice in Yugoslavia for high-ranking politicians to establish the so-called 'political factories', the sin Savić could not resist either. Therefore, an explanation that Nakićenović was desperately trying to find a way to secure the UKRNI's and by extension his own *raison d'être* may not be neither entirely wrong, nor accurate enough. A person like Nakićenović, with such strong personal connections with top-ranking Yugoslav politicians, would not be left out in the cold, and especially not amidst the conflict with the Soviet Union where Tito could rely only on a handful of people for their absolute support. At the same time, the same person would not shy from gaining control of a potentially very important position in the Yugoslav state hierarchy.

Decades later in an interview, Savić offers another explanation and recalls that he personally demanded from Ranković to be relieved from the managerial duties as

²⁴⁷ Bondžić, *Između ambicija i iluzija*, 76. Bondžić reveals that Kiš was a German scientist who was actually electrocuting mice in a sort of an electric chair, but before he was discovered as a fraud he spent almost two years in Yugoslavia in a villa and with his personal Mercedes car.

²⁴⁸ ASANU, *Dnevnik Pavla Savića*, 28. The original text refers to his economic existence, or rather, his position in the economic and political system, suggesting between the lines that taking control of the country's nuclear program would grant him lasting and strong position in the political hierarchy.

²⁴⁹ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 14; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 16.

the director of the Institute for Physics, so he could focus more on his scientific work, while still keeping a position of a president of the institute's Scientific Council. Savić's diary indirectly reveals that this change probably happened roughly in May 1949, since his entries after that date are exclusively related to different experiments conducted at the Institute for Physics, while references to his managerial duties almost disappear.²⁵⁰

This actually strongly suggests that even in May of 1949, a clear decision to pursue the atomic bomb program was still not delivered, even if Ranković had consciously already made a number of preparations for it, maybe even in an attempt to motion Tito in delivering such a decision. For example, in the UKRNI's report for 1948, Nakićenović suggested that "it would be wrong to say that, since we are not industrialized and do not have highly developed science, we should not take any actions in this [nuclear] field" and that "an intelligent man immediately understands inaccuracy of such a claim."²⁵¹ Charming as these words may have been, it seems more probable that Nakićenović was in fact acting as a spokesperson for Ranković. These questions will remain unsolved, but nevertheless, it seems they had an impact; Tito commented in the margin next to these words by saying that "in a few years we will be industrialized, and until then, we should be prepared for atomic energy, otherwise, we will always fall behind."²⁵²

The evidence is circumstantial and the report does not directly refer to nuclear weapons, but the fact remains that by the end of 1948, Nakićenović, and by extension

²⁵⁰ ASANU, Dnevnik Pavla Savića, 7.

²⁵¹ AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

²⁵² AJ, 836, II-6-a/4. Izveštaj o radu Uprave (za naučno istraživački rad) za 1948. i zadacima za 1949. [The report about the activities of the Directorate for Coordination of the Work in Scientific Institutes for 1948 and tasks for 1949].

his patron Ranković, have received the approval from Tito to continue with a more rapid development of the country's nuclear program. This is also the context in which Nakićenović's appointment to the position of a director of the Institute for Physics, most likely in May 1949, should be analyzed. Even though Savić suggests that it was his decision, this comment was made more than fifty years later, and he could have easily been discretely pushed into making it by Ranković. While it is impossible to know what actually happened, it is a fact that by mid-1949 Ranković, and by extension (if not a decision) Tito, had a firm grip over the country's nuclear program.

Analyzing the entire process from the state security perspective, it is almost surprising to notice that, no matter how much the Yugoslav political leadership was uneasy with the consequences of the Tito-Stalin split of 1948, it seems evident that the fear was not too high to start the panic and spark the desire for an atomic bomb. However, as the situation deteriorated by the end of 1948 and early 1949, when the Soviets extended the pressure on Yugoslavia, the fear of a potential Soviet military intervention must have grown exponentially. These feelings must have been only further amplified after the Soviets successfully tested their first atomic bomb on August 29, 1949, which can easily prove to be the proverbial last drop to instigate the desire for the atomic bomb among the Yugoslav political leadership.²⁵³

The Yugoslav “Bomb” in the UN

Analyzing the Yugoslav foreign policy in 1949, Bekić names it a “sobering” period, when the country's leadership abandoned a “‘heroic’ principle”, based on an unwavering support to the Soviet Union, and gradually adopted “a realpolitical

²⁵³ Holloway, *Stalin and the Bomb*, 265. The world had actually learned about the Soviet successful atomic bomb test only on September 23, 1949, after the U.S. President Truman announced it.

principle”, based on rational interests coordinated with much wider international processes.²⁵⁴ In practice, this meant establishment of regular diplomatic communication with the West, predominantly through economic negotiations, and relinquishing any connection with the Soviet foreign policy and interests, in spite of the ideological similarities. Illusions that the conflict with the Soviet Union is not final and that it might be overcome by a stubborn display of loyalty, burst by the end of August and beginning of September of 1949, when dozens of military provocations were recorded on the Yugoslav borders with the Soviet satellite countries. This became apparent after September 11, when the show trial against the Hungarian Minister of Foreign Affairs, László Rajk, was initiated, deeply incriminating Yugoslavia as a pawn of the U.S. administration who wanted to topple the regime in Hungary. According to Bekić, this was “the biggest monster-trial ever held outside the USSR”, which was designed as a perfect *casus belli* for a military intervention in Yugoslavia.²⁵⁵

In a show of defiance, Yugoslavia started serious preparations for the conflict in military, political, propaganda and diplomatic sphere. A very important component of these preparations, and a clear sign of defiance, happened during the 4th UN Session in the fall of 1949, where the Yugoslav diplomats revealed before the UN Assembly the complete volume of threats received by the Soviet Union, including military provocations on the borders and economic blockade.²⁵⁶ Dedijer reveals that the Yugoslav delegation was also frantically working on the project of becoming a

²⁵⁴ Bekić, *Jugoslavija u Hladnom ratu*, 78.

²⁵⁵ *Ibid.*, 78-80. László Rajk was accused in a show trial for conspiring with Tito to seize power in Hungary after assassinating the country's political leadership, as a part of a plan of “American imperialists” who wanted to put Hungary under their control. On the other hand, this trial also was a sing to other East European Communists who could potentially follow Tito's example. Rajk's trial lasted between September 16 and 24, and he was eventually sentenced to death, with a handful of his closest associates.

²⁵⁶ Bekić, *Jugoslavija u Hladnom ratu*, 78-80.

non-permanent member of the UN Security Council, an act which followed the same logic of defiance, a confirmation of the split with the Soviet Union, and demonstration of the Yugoslav independence. Both of these actions in the UN were successful.²⁵⁷

Back in Yugoslavia, reports of hostile activities on the borders, movements of troops and other military preparations were continually raising the “nervousness” among the military and political leadership. In an interview to the foreign press on September 20, General Peko Dapčević, the Deputy Chief of Staff of the Yugoslav People’s Army (*Jugoslovenska narodne armija* – JNA), made a statement that he “would not mind having an atomic bomb in his possession.”²⁵⁸ Đilas dismisses this as “a pathetically, jokingly [made] statement”, but he also claims that it had an effect on the Soviet delegation which was provoked enough to ask against whom Yugoslavia would use this bomb?²⁵⁹ In a more cautious tone, Bekić argues that “it can be speculated that this statement did not reflect only nervousness of worried General, but also secret plans or at least hope of the military-political leadership in Yugoslavia that one day the country could adopt the production of A-bomb.”²⁶⁰ Pathetic, strategic, naïve or made in a state of panic, this was a clear example of the Yugoslavs using the Soviet propaganda against them and their pressure, and it seemed it was to a certain extent effective. Unfortunately, the effect quickly wore off, since only three days later, on September 23, the U.S. President Truman revealed that the Soviets had already successfully tested their own atomic bomb.

The panic regarding the country’s state security and dedication towards development of nuclear weapons is evident in Kardelj’s statement about the necessity

²⁵⁷ Dedijer, *Stevan Dedijer*, 176; Bekić, *Jugoslavija u Hladnom ratu*, 85-87.

²⁵⁸ Bekić, *Jugoslavija u Hladnom ratu*, 84.

²⁵⁹ Milovan Đilas, *Vlast i pobuna. Memoari* [Power and Rebellion. Memoirs] (Zagreb: EPH Liber, 2009), 290.

²⁶⁰ Bekić, *Jugoslavija u Hladnom ratu*, 84.

for Yugoslavia to develop nuclear weapons. Similar panic and dedication, and in a similar situation, were expressed years later by the Pakistani Minister of Foreign Affairs, Zulfikar Ali Bhutto. Analyzing the Pakistani security concerns in 1965, in an interview for the British press, he stressed that if India should build the atomic bomb, the whole Pakistani nation “will eat grass or leaves, even go hungry,” until the country gets its own atomic bomb.²⁶¹ Perkovich also confirms that the Pakistani state security sector was engulfed in “the deep anxiety [...] over the possibility that 110 million Pakistanis will wake up one fine morning [...] to learn from Radio Delhi that India has become the world’s sixth nuclear Power.”²⁶²

Back in 1949, the Yugoslav political leadership was undoubtedly under much heavier pressure and stress. The conflict with the Soviet Union seemed imminent as hundreds of Yugoslav soldiers were killed in skirmishes on the borders, but more worrying was the fact that the Soviets had already tested the atomic bomb successfully, even if it was announced by the U.S. President Truman, and not Radio Moscow. In addition to that, Stalin was on a winning streak; by the fall of 1949 Mao’s forces crushed the last resistance of the Koumintang in China, established the People’s Republic of China on November 1, and declared loyalty to Stalin.²⁶³ Even without the nuclear attribute, the Soviet Union was a superpower, and a formidable enemy in the Yugoslav eyes, much more than India was for Pakistan in 1965.

Kapičić once again indirectly confirms that it was the first Soviet test that provoked the Yugoslav political leadership into considering the atomic bomb option,

²⁶¹ Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Stanford California: Stanford Security Studies. An Imprint of Stanford University Press, 2012), 7; Hymans, *Achieving Nuclear Ambitions*, 186.

²⁶² “The Brown Bomb,” *Guardian* (Manchester), March 11, 1965, 10. Quoted in Perkovich, *India’s Nuclear Bomb*, 108. According to Perkovich, these fears among the Pakistani leadership were based on some clever propaganda launched by the Indian leading nuclear scientist, Homi Bhabha, who in 1964 suggested that India will be able to build a nuclear weapon within twelve to eighteen months.

²⁶³ Bekić, *Jugoslavija u Hladnom ratu*, 20.

explaining that the logic was that “if both the Russians and Americans had the atomic bomb, Yugoslavia had to have it as well!”²⁶⁴ Emphasizing the crucial motive for such policy, he added that “the atomic bomb is an evil, but it provides the security for the state.”²⁶⁵ While this account does not offer any additional details regarding the Yugoslav decision to develop nuclear weapons, it indirectly relates it to the successful Soviet atomic bomb test; if the decision had been made earlier, the fact that both superpowers had the atomic bomb would probably not be as important as it evidently was. Even if the atomic bomb was considered as a potential deterrent against the expected Soviet attack, either as an item in the Yugoslav propaganda toolkit or the JNA’s military arsenal, it seems that by the fall of 1949, a combination of the mounting Soviet pressure, the fact that they had become a nuclear power, and a slow opening of the West towards supporting the Yugoslav independence, finally made the country’s leadership determined to accept that the break with the Soviet Union was final, and that the atomic bomb might be the solution to their security concerns.

1.5 Conclusion: The Logic of Independence

The research presented in this chapter once again confirmed the old truth, that “[h]istorians emphasize complexity and uncertainty when looking at the past”.²⁶⁶ Guilty on both charges, I would rather argue that it is human affairs, past or present, that are so complex that only too often it is very difficult for a historian to make any claims with absolute certainty. Researching about the initial phase of the Yugoslav nuclear program proved to be one of these very challenging cases, partly due to the limited number of archival documents that could clear the path for logic and

²⁶⁴ Nikčević (ed.), *Goli otoci Jova Kapičića*, 152.

²⁶⁵ *Ibid.*

²⁶⁶ Gavin, *Nuclear Statecraft*, 2.

reasoning, and partly to the lack of any clear plans or strategies that the Yugoslav 'leading four' had regarding either civilian or military nuclear program. One thing is certain - by the end of 1949 the situation had changed dramatically, and the country's political leadership had initiated the secret atomic bomb project.

Confronted by the overwhelming power of the Soviet Union, which also included their recently acquired nuclear capacity, Soviet successes in supporting the establishment of the communist regime in China, growing economic and political isolation, military provocations and even propaganda pressures on Yugoslavia, while simultaneously lacking any other friends on the entire globe, Tito and his closest associates agreed to try to develop the atomic bomb as the country's last resort, no matter how unrealistic this plan actually was. Even though many theories had been circulating about the general logic behind reaching a decision to develop nuclear weapons, it is almost disappointingly clear that in the Yugoslav case the country's security was the only, albeit extremely powerful motive for deciding to pursue the atomic bomb option. The combination of a sheer horror about what immediate future can bring, disillusionment with Stalin and the Soviet policies in general, and a great suspicion about any real support coming from the West, all made a powerful mix of emotions and motives that pushed the Yugoslav political leadership overboard and into a fighting mode. Nobody captured this frame of mind better than Milovan Đilas. On December 15, 1950, during one of the meetings with Pavle Savić and other movers and doers involved in the country's nuclear program, he explained:

“I am for Lenin’s words: among the wolves, I howl. While we are surrounded with the wolves, we should defend and have the most powerful weapons.”²⁶⁷

The decision to construct the atomic bomb was indeed very clear already by the late 1949 and early 1950, but the route to it was paved with many uncertainties. Only two or three years earlier, it was the Soviets who had a plan to establish the scientific institute in Yugoslavia as a small cog in a much larger machinery of their own scientific institutions where it was supposed to play the role of a potential point of contact with the Western science. They have managed to successfully motion Pavle Savić who wholeheartedly supported this idea, although he most likely had his own calculations; getting a space to expand his own research, and a commanding position in the country’s future development of science and simultaneous process of creation of a new generation of the Yugoslav intelligentsia. Imagining it as his own ‘political factory’, the Institute for Physics was supposed to be the central institution which would fulfill both the Soviet and Savić’s ambitious plans. In other words, if this plan was successful, he would have become a ‘small Tito’ in his own domain. This plan obviously failed, but it may also be argued that instead the Institute for Physics became a microcosm of Yugoslavia, ‘small Yugoslavia’ for all practical purpose, with all its faults and successes.

Sources suggest that Tito, and perhaps the rest of the ‘leading four’, understood the Soviet strategy, ordered Savić to return to Yugoslavia and helped him to establish the first nuclear institute in the country. At the time of the rapidly growing conflict with the Soviet Union, it may come as a surprise that this was still not the cover story for the initiation of the atomic bomb project. Without an alternative and

²⁶⁷ ASANU, Dnevnik Pavla Savića, 32.

ideologically acceptable model for the country's rapid modernization and industrialization, Tito and his henchmen simply continued to adopt Soviet experiences, adapting them along the way to the Yugoslav needs only when they had to, not because they wanted to. The story of the establishment of the Institute for Physics clearly shows that it was only the breach of the Yugoslav independence and sovereignty that was not acceptable to the Yugoslav political leadership. Therefore, the decision to push forth the independent establishment of the central scientific institution in the country was an attempt to cover both ends; to remain independent and simultaneously follow the Soviet lead. This was also visible with the first, very limited and even shy attempts of Yugoslav scientists to find uranium in the country. Intrigued by the Soviet uranium prospection mission, the Party and state officials rapidly scrambled in order to understand what the Soviets were doing, and when they did, they pursued the same project immediately and independently, while possibly unconsciously, although very accurately, they managed to replicate the institutional framework of the Soviet atomic bomb project.

This leads us to another important conclusion about the Yugoslav nuclear program in particular and the country's history in general. Yugoslavia was a deeply Sovietized country already in the period immediately after the war, and this did not happen accidentally or overnight. The KPJ started to be Sovietized or "Bolshevized", as some authors would prefer, in the late 1930s, and the process was definitely finished during the Second World War. Once Tito secured his power, what followed was a rapid and conscious Sovietization of the country. This could have been done only if the main framework had already been laid, and that was the structure of the KPJ, combined with the existence of some seeds of institutions, such as the UDB as a true younger brother of the NKVD, and an almost religious dedication of the Party

leaders to the Soviet Union, sometimes even Stalin himself. Pressured by the Soviet attempt to extend its reach further to the West, and disappointed by the lack of support to the Yugoslav unrealistic ambitions to catch and maybe even overtake the great ally, the loyalty was suppressed by the unrestrained desire for independence, all of which eventually forced the Yugoslav leadership to stray from the establishment of the state-system based on the Soviet model. What is important to emphasize is that this was forced by the circumstances, not a consciously desired scenario.

Finally, what finally came out in the light by the end of the 1940s, was the Yugoslav understanding that the strong and very intimate affair with the Soviet Union was finally over and that new partner should be searched for. Unsurprisingly, the United States of America and the West almost overnight turned into a true eye-catcher in the eyes of the Yugoslav communists, but this new affair was from the start deeply undermined by suspicions based on the previous disappointment. Breaking away from this amorous metaphor, it is important to emphasize that what emerged as a result of tensions-growing-into-conflict between Yugoslavia and the Soviet Union seem to be the early version of the Yugoslav foreign policy. However, what this chapter has shown is that what really fueled the Yugoslav ‘leading four’ was an unrestrained desire for independence which can only be defined as a logic, not a policy. Analyzing the behavior of the Yugoslav leadership in that framework, it is easy to explain the defiant attitude towards Soviet Union, and a rapid switch to cooperation with ideological enemies when no other option for the country’s survival was available. The same is true for the initiation of the atomic bomb project; it was not a policy, it was a decision forced by the circumstances. In the following chapters, I will continue with this line of inquiry, anticipating that the decisions regarding the country’s nuclear

program shifted as the Yugoslav logic of independence was stabilized or undermined, being equally dependent on foreign and internal factors.

Chapter 2: We Can Barely Do It!

In this chapter, I will follow the development of the Yugoslav nuclear program in the period between 1950 and 1955, in which the institutional network expanded rapidly across the country and eventually included three nuclear institutes, a changing number of specialized institutes and laboratories dedicated exclusively to research in nuclear raw materials, and the overarching UKRNI and its successors as the exponent of the Government in the management of the Yugoslav nuclear program. This period also saw establishment of first serious contacts with the Western science, particularly with Norway and Sweden, often through informal or covert communication, and sometimes even illegal activities, all of which contributed significantly to the rapid development of scientific research in various fields in Yugoslavia and creation of the first generation of scientists in various fields of expertise.

These were surprising achievements for a country which could initially rely only on a handful of scientists, minimal infrastructure, no experience in the field and only some in organizing such large-scale projects, although even that were related to the establishment of the heavy industry. They are even more impressive regarding the fact that no basis for a formal cooperation between nations in exchange of knowledge and technologies in this field existed, and even if the situation started to change gradually in the West during the early 1950s, it took quite some time and effort for Yugoslavia to become recognized as a credible and trustworthy partner, exemplified in the participation of the establishment of the CERN in 1954 as the only socialist member state, and in the informal joining NATO through the Balkan Pact in the same year, as its political and military equivalent.

Despite all these successes, readers will be disappointed not to find almost any traces of natural or enriched uranium, plutonium, nuclear reactors, let alone atomic bombs in this period and in this chapter. The backdrop of this success story was the misunderstanding which over the years grew to an open conflict between the political leadership and scientists involved in the nuclear program which contributed to many failures, delays and missed opportunities to even further accelerate research and provide at least some of those highly desired, yet missing results. These problems were exacerbated by Yugoslav-specific ‘ethnic key’ policies and establishment of ‘political factories’, as well as interrepublican competition for funding, which complicated any productive cooperation between different institutions across the country.

Stretched between the necessity to acquire a powerful deterrence capability and the country’s inability to develop it independently, it is somewhat expected to find Tito’s desire for the atomic unabated. The Soviet threat continued to loom over Yugoslavia even after Stalin’s death in 1953, and these circumstances effectively secured the future of the country’s nuclear program. More importantly, in this period Tito and his closest associates started to develop a premise of the country’s nuclear policy in the international arena which will be further elaborated and developed in following years and even decades, but never dramatically changed.

Analyzing all of these different aspects and combining the results, in this chapter I will argue that this truly was the formative period of the Yugoslav nuclear program, during which the most important components had been more or less clearly defined and developed, ranging from the institutional framework, scientific core, management of the program and its political control, to related state security policies. Deep understanding of these achievements, failures and practices established along

the way are crucial tools for unwrapping and successfully digesting later stages of the Yugoslav nuclear program.

2.1 Institutional Evolution during the Early 1950s

*“Our development, comrades,
goes so fast that we cannot stand on one spot.
We have to make changes, not because what happened before was wrong,
but not to fall behind because of our earlier rigid attitude.”*²⁶⁸

Analyzing the concept and practices of “planning and direct bureaucratic control”, Kornai admits that these mechanism of coordination are indeed “viable”, but only “if perfect information on the past were available, if precondition of the future were precise, and if every command were faultless and carried out with impeccable accuracy,” and since these conditions are impossible to establish, mainly due to human fallability, the entire system becomes inefficient and extremely rigid, particularly regarding adaptation to changed internal or external circumstances or any type of initiative from ‘below’.²⁶⁹ Even though Kornai’s model is itself too rigid and does not allow for successful realization of almost any planned activity within the socialist system, it does reveal some of the weak points in the system that have to be contrasted with particular experiences.

The establishment of the Institute for Physics in Vinča and the UKRNI in early 1948, clearly represent founding moments and unquestionable symbols of the initiation and evolution of the Yugoslav nuclear program, regarding both the institutional structure and its ultimate role. According to Bondžić, additional nuclear institutes were established in a short succession by the end of 1949 and early 1950, in

²⁶⁸ Miloš Nikolić (ed.), *Josip Broz Tito o umetnosti, kulturi i nauci. Izbor tekstova* [Josip Broz Tito on Art, Culture and Science. Selected Texts] (Subotica, Beograd: Minerva, 1978), 88. Tito’s speech with members of the Council of engineers and technicians, in Belgrade, April 1, 1950

²⁶⁹ Kornai, *The Socialist System*, 117-118.

Ljubljana (Slovenia) and Zagreb (Croatia), respectfully, as a response to the need “for strengthening and expansion of the institutional infrastructure” in this field, but also as a consequence of the “policy of equality of peoples and republics”, although he does not offer any elaboration on either of these claims.²⁷⁰ Hymans also identifies that the biggest problem in Yugoslavia was the existence of “neo-patrimonialism”, or “authoritarian management approach [which] led to unprofessionalism and ultimately nuclear inefficiency”, however, he does admit that this problem made an impact on the country’s nuclear program only in a combination with other challenges, particularly the international scientific cooperation, and existence of ‘political factories’ within the nuclear establishment.²⁷¹

It would be only too appealing to accept these comments at their face value, particularly since they suggest, even if indirectly, that the ‘ethnic key’ policy, combined with the inter-republican competitiveness and the practice of establishment of ‘political factories’, were important motives behind the expansion of the network of nuclear institutes in Yugoslavia, and consequently of the country’s nuclear program. This would also indicate that the specificities of the Yugoslav state system overstretched and dispersed the limited available material and human resources, thus undermining formulation of a clear strategy regarding the development of the Yugoslav nuclear program from the very beginning. Conversely, it may be argued that, already by the early 1950s, there was a very complex plan regarding the division of tasks and research topics between nuclear institutes in the country. Chronologically this coincides with the decision to develop the atomic bomb, and considering that the Yugoslav state system at this stage of development did not differ significantly from the Soviet model, it would be expected that the Yugoslav political leadership was

²⁷⁰ Bondžić, *Između ambicija i iluzija*, 69-72.

²⁷¹ Hymans, *Achieving Nuclear Ambitions*, 175-180.

capable of organizing and successfully executing such a complex project, at the very least considering the establishment of the necessary institutional framework.

This subchapter will show that truth is somewhere between these extremes. The Yugoslav political leadership was capable of a rapid execution of decisions, no matter how complex they may have been, although it is also a fact that the entire state system was overburdened with aforementioned problems. Adding to the confusion and the complexity of the situation, two nuclear institutes in Zagreb and Ljubljana were not the only additions to the budding Yugoslav nuclear institutional network. The UKRNI itself experienced several structural changes in the first half of the 1950s, while additional institutes and laboratories dedicated exclusively to research in nuclear raw materials and related technologies were also established, with almost continuously varying research scope, responsibilities within the country's nuclear program and their managerial structures. Even though this points to a somewhat chaotic and impulsive development, the positive aspect of these changes was specialization of different institutions for particular tasks, which suggest that in the period between 1950 and 1955, the Yugoslav nuclear program rapidly expanded, adapted to changed circumstances and necessarily achieved certain important milestones.

Belgrade-Zagreb-Ljubljana: The Yugoslav Nuclear Axis

The Jožef Stefan Institute [*Institut Jožef Stefan* – IJS in further reference] was the second nuclear institute in Yugoslavia, established in 1949 in Ljubljana (Slovenia). Official histories record that this decision was reached soon after the establishment of the Institute for Physics in Vinča in an effort to “engage scientific

and expert cadres from other universities and scientific centers in the country, not only from Belgrade”.²⁷² This explanation corresponds to the Yugoslav ‘ethnic key’ policy, and the timing of the establishment of the IJS fits equally well into that scenario; once the construction of the Institute of Physics in Vinča had begun, other republics which had at least some capacity for a similar feat were accommodated adequately. In addition, or in contrast to that, the fact remains that Yugoslavia initiated the nuclear program without prior experience and institutional framework in this field and it was absolutely sensible to engage all available material and human resources, especially considering the secret, yet ambitious, atomic bomb project.

Unfortunately, the reality was much more complex. The first research program of the IJS for 1950, clearly anticipates that the institute will have to deal with “huge research work in extensive areas that are very little known to us in the country”, and that “this will require a constantly growing number of employees, each of whom will have to specialize in specific [research] problems in order to be able to form special work teams that will be able to work in the second stage.”²⁷³ Besides the general description of the research program and a list of necessary instruments, the document actually reveals that there were basically no scientists and other expert ‘cadres’ in Ljubljana that could be engaged in the Yugoslav nuclear program, all of which also reveal that the IJS existed only on paper at the time. Even official histories explain

²⁷² Slobodan Nakićenović, *Nuklearna energija u Jugoslaviji* [Nuclear Energy in Yugoslavia] (Beograd: Export Press: 1960), 28.

²⁷³ AJ, 50, f. 40. Školstvo, nauka, kultura, 1945-1952 [Schooling, science, culture, 1945-1952]. Program dela Fizikalnega instituta SAZU v Ljubljani [Work Program of the Physical Institute SAZU in Ljubljana], January 2, 1950. Behind the dramatically defined “second stage” were actual research activities for which a number of scientists and technicians had to be educated in the “first stage”.

that the construction and installation of necessary equipment lasted between 1949 and 1954, when the IJS started to operate in its full capacity.²⁷⁴

It is easy to see that there must have been a different logic behind the establishment of the IJS. Immediately after the Second World War, a young Slovenian physicist, Anton Peterlin, submitted a proposal for the establishment of the Physical Institute at the Slovenian Academy of Sciences and Arts [*Slovenska akademija znanosti in umetnosti* - SAZU], where it formally started to operate by 1946. This would suggest that the nuclear research in Yugoslavia actually began in Ljubljana in 1946, even before Savić managed to implement his own plans, yet all sources agree that the real work in this institute began only in 1949, when the construction of the buildings was initiated and when it shifted the research focus on nuclear physics.²⁷⁵ It also has to be noted that the SAZU was established in 1938. With only basic organizational structure in place before the start of the Second World War, followed with the wartime destruction, loss of lives and subsequent deep political changes in Yugoslavia, such an early establishment of the institute dedicated to research in physics could have only been a part of the continued effort of scientists (or local government) to properly establish SAZU and its research programs.²⁷⁶

The almost immediate response of local authorities to a request of a young scientist, as was the case with Anton Peterlin, serves as a great tribute to the budding

²⁷⁴ Nakićenović, *Nuklearna energija u Jugoslaviji*, 29. Until 1954, the IJS scientists conducted their research in laboratories and offices of the University of Ljubljana. See also, Bondžić, *Između ambicija i iluzija*, 70.

²⁷⁵ Bondžić, *Između ambicija i iluzija*, 69-70; Nakićenović, *Nuklearna energija u Jugoslaviji*, 28-29; Peter Gosar, "Anton Peterlin, 1908-1993", *Slovenska akademija znanosti in umetnosti*, <http://www.sazu.si/clani/anton-peterlin> (accessed on May 3, 2020); "Pogled v zgodovino instituta", *Institut Jožef Stefan*, <https://ijs.si/ijsw/Zgodovina> (accessed on May 4, 2020). The Physical Institute SANU was renamed to Jožef Stefan Institute in 1952, but for practical reasons I will use this name, or the suggested acronym IJS.

²⁷⁶ Željko Oset, "Zgodovinske prelomnice SAZU" [Turning Points in SAZU History], *Slovenska akademija znanosti in umetnosti*, <http://www.sazu.si/events/5be952aee067dc1e29c4a7dc> (accessed on May 4, 2020). The establishment of the SAZU will be discussed in more details in the following section.

Yugoslav socialist regime, although it is also the truth that he was one of the very few promising physicists in Yugoslavia. On the other hand, Peterlin had a strong political support from Boris Kidrič, one of the leading Slovenian Communists, second only to Kardelj. After the war, Kidrič was the first Prime Minister of Slovenia, moving quickly to a position of the Federal Minister of Economy in 1946, where his main responsibility was the implementation of the First Five-Year Plan, all of which established him as the most important figure the Yugoslav economy. In addition to his powerful political position, different authors also recognize him as the most important person in the initial development of the Yugoslav nuclear program, and even Savič mentions him in passing references in his diary as equally important and powerful as Ranković was at the time.²⁷⁷ Adding yet another piece to this puzzle, it is important to mention that Kidrič's father, France (sometimes Franc or Fran) Kidrič (1880-1950), was an influential Slovenian scientist, a professor of Slavic Studies at the University of Ljubljana, a member of the SAZU since the establishment in 1938, and eventually its president from 1945 until his death in 1950.²⁷⁸

All of these circumstances strongly suggest that, while Peterlin initially may have had an honest ambition to support the development of the SAZU and at the same time create the environment in which he could extend his own research, at some point

²⁷⁷ ASANU, Dnevnik Pavla Saviča, 15; Tanja Rudež, Krunoslav Pisk, *Institut Ruđer Bošković: Ljudi i događaji, 1950-2000* [Ruđer Bošković Institute: People and Events, 1950-2000] (Zagreb: Školska knjiga, 2017), 18; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 20; Bondžić, *Između ambicija i iluzija*, 60, 73; Svetozar Vukmanović Tempo, *Revolucija koja teče. Memoari* [Memoirs on a Flowing Revolution] (Zagreb: Komunist, 1971), 161, 174-175; Jože Mencinger, "Boris Kidrič, 1912-1953", *Slovenska akademija znanosti in umetnosti*, <http://www.sazu.si/clani/boris-kidric> (accessed on May 1, 2020). Kidrič later moved to position of a Director of the Federal Planning Commission and the President of the Federal Economic Council where he stayed until his premature death from leukemia in 1953. In the late 1930s, Savič and Kidrič worked together in Paris on preparation of fake passports for volunteers who wanted to join international brigades in the Spanish Civil War. Kidrič also helped Savič to become an official member of the Communist Party of Yugoslavia, in 1939. More in: Савић, *Hayka u oπpyumao*, 222-223.

²⁷⁸ France Bernik, "France Kidrič, 1880-1950", *Slovenska akademija znanosti in umetnosti*, <https://www.sazu.si/clani/france-kidric> (accessed on June 12, 2020); Janko Šlebinger, "Kidrič, Franc (1880-1950)", *Slovenska biografija. Slovenska akademija znanosti in umetnosti* (Znanstvenoraziskovalni center SAZU, 2013), <http://www.slovenska-biografija.si/oseba/sbi273316/#slovenski-biografski-leksikon> (accessed on June 12, 2020).

during 1949, roughly at the time when the Yugoslav political establishment made the decision to pursue development of nuclear weapons, this project probably started to slip out of his hands, or minimally, being redirected to serve these ambitions. In a scenario very similar to the case of Pavle Savić, and roughly at the same time, the state had intervened and supported Peterlin's project far beyond his initial plans, and with a research focus changed to nuclear physics. It should not come as a surprise that the IJS was immediately put under the supervision of the UKRNI, although like his counterpart Savić in the Institute of Physics in Vinča, Peterlin was put in charge of the IJS as the director.²⁷⁹

It is also important to investigate how much the IJS could contribute to the country's nuclear program at the moment of its establishment. As shown earlier, the officially promoted strategy was to engage scientists from other republics seemed reasonable, although it has already there were so few of them in the entire country that it definitively would not justify the creation of another nuclear institute already in 1949. On the contrary, it was the necessary technical 'cadres' for the IJS that had to be educated first, and this was initially organized at the Technical School in Ljubljana, where the Department of Physical Engineering was established in 1950 for the purpose. In following years, additional research institutes were created in the vicinity of the IJS, such as Chemical, Electro-technical, Electronic, Technology and Hydro-technical.²⁸⁰ In other words, the establishment of the IJS was based on the assumption of its future contribution to the nuclear program, not its actual capacity to do much immediately.

²⁷⁹ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950]; Nakićenović, *Nuklearna energija u Jugoslaviji*, 29.

²⁸⁰ *Ibid.*

Being in a position to understand that the country's nuclear program had been put very high (if not on the top) of the list of strategic state projects for years to come, while at the same time in control over the federal budget and the Planning Commission, Kidrič was obviously able to channel the necessary funds to his own republic, and invest in the establishment of the new nuclear institute within the SAZU where his father was the director. The accusation for nepotism easily comes to one's mind, although this scenario completely corresponds to established practices of inter-republican competition for funding, the 'ethnic key' logic, as well as creation of 'political factories'. All of these factors must have played a role in reaching a decision to establish the IJS as the center for education of necessary scientists and particularly technical personnel that could service the country's nuclear program. This position would secure the existence of the IJS for years and perhaps even decades to come, which would unavoidably include huge investments from the federal budget. Additional perspective is that, even if the IJS would not have an important role in the nuclear program, Slovenia would get an important research institute, which could perform more conventional tasks in education or support to the industry, while it would not burden the budget of the republic, a sort of a 'win-win' scenario.

Even if Boris and France Kidrič were not involved in any kind of mismanagement or unjustified allocation of state funds, they necessarily had to be in a communication and coordination of related activities. However, the fact remains that the necessary infrastructure, scientific tradition and scientific 'cadres' in this field were basically non-existent in entire Yugoslavia, and it would have probably been more economic to develop such a center closer to Vinča with the Institute of Physics as the prime (or even the only) employer of these 'cadres.' Even though the situation regarding the research capacities and scientific tradition was much better, or more

precisely, less bad in Slovenia than in the rest of the country, it is evident that the ‘ethnic key’ and the ‘political factories’ policies and practices, instead of a clear and rational planning, constituted the basis of the logic behind the establishment of the IJS.

The establishment of the Ruđer Boković Institute [*Institut Ruđer Boković* - IRB] in Zagreb in 1950, to a great degree shatters much of the accusations on account of Boris Kidrič, and instead reveals some traces of a strategy in the development of the nuclear program in Yugoslavia. Following the established pattern in Slovenia in previous year, on May 22, 1950, the Federal Economic Council and the Federal Government reached the decision to establish the Institute of Atomic Physics in Zagreb, within the Yugoslav Academy of Sciences and Arts [*Jugoslavenska akademija znanosti i umjetnosti* – JAZU]. Like in Belgrade and Ljubljana, this idea was based on the preexisting effort of a Croatian theoretical physicist, Ivan Supek, who defended his doctoral dissertation in Leipzig in 1940, under supervision of famous Werner Heisenberg. Since 1946, Supek was teaching at the Faculty of Science and Mathematics [*Prirodno-matematički fakultet*] in Zagreb, where he also established the Institute of Theoretical Physics [*Zavod za teorijsku fiziku*].²⁸¹

The strategic component in the decision to establish the IRB can be found in the fact that from the very beginning it was intended to focus on theoretical physics, and not directly on the development of nuclear energy or technology. Supek recorded that he was summoned by Boris Kidrič to an urgent meeting in his office and informed that the Federal Government had decided to establish another scientific institute in Zagreb, because it had the best theoreticians, “which was exactly the

²⁸¹ Rudež, Pisk, *Institut Ruđer Bošković*, 13-14, 18, 25-26; Bondžić, *Između ambicija i iluzija*, 37-38, 71.

weakness of both earlier established centers” in Belgrade and Ljubljana.²⁸² Once the decision had been made, the Yugoslav command economy system rapidly executed it. Immediately, the IRB had been put under the supervision of the UKRNI, under which control by the fall of the same year the project for the construction of the necessary buildings was already finished, necessary funding secured, entire project was given the maximum priority by the government of the People’s Republic of Croatia, while the best students from the University of Zagreb started to be selected and funneled to the IRB. According to the initial research plan, several departments at the IRB were also established, for theoretical physics, nuclear physics, molecular physics and electronics.²⁸³

Taking into consideration that the IJS in Ljubljana was founded with the predominant task to educate the first generation of nuclear scientists and technicians in various related disciplines, while the IRB in Zagreb was supposed to focus on theoretical research, it seems evident that the Yugoslav nuclear program was rapidly getting the shape and structure needed for any program of such importance and at least desired magnitude. Within this network, it seems that the Institute of Physics in Vinča was given the role of the central institution, if for no other reason than the fact that by 1950 it was at least somewhat operational, with the basic infrastructure in place and the necessary equipment and personnel constantly pouring in. By 1951, the Institute of Physics already had somewhat operational laboratories for physics, physical

²⁸² Rudež, Pisk, *Institut Ruđer Bošković*, 18

²⁸³ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950]

chemistry, biology, electronics and the so-called Radium Pavilion, where radium and other radioactive sources were kept and prepared for experiments.²⁸⁴

The central role of the Institute of Physics in Vinča is also visible on the formal level since it was established and funded directly by the Yugoslav Federal Government, while institutes in Zagreb and Ljubljana were operating within the network of scientific institutes of academies of sciences in Slovenia (SAZU) and Croatia (JAZU), and on the budget of respective republics. This was also the case of the Physical Institute of the Serbian Academy of Sciences and Arts [*Srpska akademija nauka i umetnosti* – SANU], which was established already on April 6, 1948. Judging by its program, it was basically acting as an extended arm of the institute in Vinča, only to be absorbed by it in the early 1950s.²⁸⁵ Regardless of the reasons behind the establishment of the Physical Institute within the SANU, it is clear that the Institute for Physics in Vinča was on the top of the hierarchy of scientific institutes in the country's nuclear program, and particularly in comparison to the IJS and IRB. Even though all three institutes were supervised and at least partially funded by the UKRNI, which itself was a body of the Federal Government, it is evident that the Institute for Physics in Vinča was on the top of this hierarchy, both institutionally and financially.²⁸⁶

²⁸⁴ Nakićenović, *Nuklearna energija u Jugoslaviji*, 20; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 21; ASANU, Dnevnik Pavla Savića, 14-23. Savić mentions in his diary many technical and organizational problems within laboratories, ranging from lack of adequate equipment to lack of clear research program, although it has to be taken into consideration that these were truly pioneering moments of research in nuclear physics in Yugoslavia, and that these problems were to be expected.

²⁸⁵ ASANU, AB-III-1957 (A-Đ). Document in this folder cover the period until October of 1951, after which no references to this institute can be found. AJ, 318 Savezni sekretarijat za obrazovanje i kulturu [Federal Secretariat for Education and Culture], f. 209-297-298. Nauka, 1949-1966 [Science, 1946-1967]. Diskusija o organizaciji naučno-istraživačkog rada [Discussion about Organization of Scientific Research], 1953. By 1953, the Physical Institute of the SANU existed only on paper, with no researchers, but with lots of instruments, budget and a director Sreten Šljivić, professor of physics at the University of Belgrade and a honorary member of the SANU.

²⁸⁶ The UKRNI funded those projects of the IJS and IRB that were flagged as importat for the nuclear program, while the existing documents reveal that the UKRNI intervened directly with the republican

On the other hand, the Institute for Physics in Vinča definitively lost its absolute monopoly, and it necessarily had to delegate some of its programs in the country's nuclear program and responsibilities within the budding nuclear establishment, to the IJS and IRB. By June 1950, this was formally confirmed when the Federal Government even changed the institute's name to Institute for the Research on the Structure of Matter [*Institut za isptivanje strukture materije*].²⁸⁷ Except for the passing reference that "the need arose to change the name of the Institute for Physics", the existing sources do not clarify reasons behind this decision.²⁸⁸ The most probable was the need to define more precisely the research program of this scientific institute and its position in the growing network of similar institutes in the country. The fact that the name of the institute was formally changed only a couple of days after the establishment of the IRB in Zagreb (May 22, 1950), strongly supports this thesis. The symbolic value of this change was equally important. The original name, no matter how inconspicuous it may have sounded in an attempt to camouflage its real intentions and operations, covered the entire field of physics, while the new revealed that the research will undoubtedly focus on nuclear physics. Finally, this change seem to have narrowed the institute's research field to a specific niche, or minimally, defined its research program more accurately. Either way, the change had definitively put an end to Savić's ambitious plan to gradually

governments regarding speeding up the work on construction of necessary buildings and acquiring equipment. AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950]

²⁸⁷ Bondžić, *Između ambicija i iluzija*, 60. See also Nakićenović, *Nuklearna energija u Jugoslaviji*, 20 and Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 20.

²⁸⁸ AJ, 50, f. 40. Školstvo, nauka, kultura, 1945-1952 [AJ, 50 Presidency of the FNRJ, f. 40. Education, science, culture, 1945-1952]. Note of the Federal Government of the FNRJ to the Council for Legislation and Development of the People's Rule of the FNRJ Government, June 3, 1950.

expand his brainchild into the entire “Academic city”, which would coordinate the overall development of science in the country.

The Missing Piece of the Puzzle

The previous discussion reveals that, already by 1950, the Yugoslav Federal Government had taken the country’s nuclear program under the firm control, and it can easily be argued that this was an obvious attempt to dramatically speed-up the research necessary for the development of nuclear weapons. On the other hand, it is also evident that this was just the proper beginning and that a clear strategy was still very much in the process of formulation and additionally burdened by specificities of the Yugoslav political system, except perhaps regarding the ultimate goal of constructing nuclear weapons. The evolution of the network of scientific institutions reveals main directions and obstacles on that route, but the changes in the supervising apparatus add more details about the hurdles, adaptations, achieved successes and mistakes made in that process.

In a very short time-span, and a manner comparable to what was happening with the institutes, the UKRNI experienced dramatic changes regarding its operating field which became narrower and focused on the search for uranium and other nuclear materials in the country. Already in 1952, it temporarily changed the name into Directorate for Mining Research and Mining Studies [*Uprava za rudarska istraživanja i rudarske studije*], clearly following the changes in its scope of duties and responsibilities. This is also evident in the fact that the new director became Miladin Radulović, who had already been very active in this field in the late 1940s as a proven and experienced ‘cadre’ in uranium prospection, as well as in related covert activities.

In the following year, this new directorate absorbed the Federal Institute for Metallurgy and the Scientific and Scientific Research Institute of the People's Republic of Serbia, both established in 1948 to service more conventional and less ambitious needs of industry in Serbia. With once again expanded scope of research field, which now included uranium prospecting, mining and development of necessary technologies for its refining, the name was changed again, this time into the Institute for Geological, Mining and Technological Research [*Zavod za geološko-rudarska i tehnološka istraživanja* - ZGRTI].²⁸⁹ One of the main tasks of the ZGRTI was to reorganize and expand the uranium prospection using the previous experiences, as well as to centralize the entire process, from the uranium prospection and mining to the production of uranium metal.²⁹⁰ In reality, however, it took more than a year for the staff (technologists, chemists and laboratory technicians) acquired by this merger to reorient themselves to the research on uranium and other radioactive materials, while the new equipment and instruments purchased for the ZGRTI during 1953 and 1954, started to be utilized in their full capacity only in 1955. Even though these circumstances strongly suggest that no significant results had been achieved before the ZGRTI had reached its full operational capacity, in the period between 1953 and 1955 the focus was on mapping all radioactive “anomalies”, in order to perform initial mining more effectively, and not on developing particular technologies. In that respect, two promising locations were identified, in the mercury mine in Idrija (Slovenia) and in the granite layers of the Stara planina (Serbia).²⁹¹

Careful profiling of duties of the country's only institution for coordination of the nuclear research clearly reveals that the Yugoslav political leadership was

²⁸⁹ Bondžić, *Između ambicija i iluzija*, 81-83; Aleksandar M. Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*(ITNMS: Beograd, 2013), 14.

²⁹⁰ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

²⁹¹ *Ibid.*

desperate to find domestic sources of uranium and other nuclear raw materials. This was completely in line with their decision to pursue the development of the atomic bomb, even though it does not exclude more peaceful uses of these materials and nuclear energy in general. At the time, it was impossible to purchase uranium on open market, while all information regarding the uranium prospection, mining and extraction were classified in countries which already mastered these technologies.²⁹² However, no matter how much this rapid evolution signaled or revealed the ambition of the Yugoslav political establishment, it also left a temporary vacuum regarding the actual coordination of the research in existing nuclear institutes. In a textbook example of a socialist bureaucratization, on August 9, 1952, the Yugoslav Federal Government established the Commission for Support in Scientific Research [*Komisija za pomoć u naučnim istraživanjima* - KPNI], which basically shared the same responsibilities the UKRNI originally had regarding the supervision and coordination of the research in nuclear institutes.²⁹³

Membership of the newly established KPNI clearly reflects the changed reality regarding the expansion of the Yugoslav nuclear program, but it also provides an additional glimpse on the evolution of the country's nuclear establishment. The director of the KPNI became Boris Kidrič, and it seems that his new appointment finally and formally recognized his position as the leading and most efficient organizer of the country's nuclear program.²⁹⁴ More importantly, for the first time a representative of the Yugoslav People's Army was involved in the management of the country's nuclear program and on a very high level. Bondžić rightly concludes that

²⁹² AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

²⁹³ Bondžić, *Između ambicija i iluzija*, 82; The KPNI's main task was "to support development of scientific-research work, and particularly in new scientific disciplines".

²⁹⁴ AJ 50, f. 40. Decision of appointment of members of the Commission for Support in Scientific Research, September 19, 1952.

inclusion of General Ivan Gošnjak, a Deputy Minister of People's Defense, was a sign of "an additional aspect and direction" of the nuclear energy research in the country. Other members included Svetozar Vumanović-Tempo (President of the Council for Industry and Construction of the FНРY Government), Jovo Kapičić (Assistant to the Minister of Interior Affairs), Anton Peterlin (Director of the IJS in Ljubljana), Robert Walen (Chief of the Physical Laboratory of the Institute for the Research on the Structure of Matter in Vinča), Pavle Savić and Slobodan Nakićenović.²⁹⁵

The establishment of the KPNI and constitution of its membership suggest that scientific expertise was recognized as unavoidable, if not highly desirable in the process of decision-making regarding the development of the nuclear program. Savić, Peterlin and Walen were evidently given enough space to voice their concerns, explain plans and make demands, although it is easy to imagine that they did not have the final word. The central role the Institute for the Research on the Structure of Matter in Vinča within the nuclear establishment was also reconfirmed, since three out of seven members were its leading officials. Besides Walen, Savić was the President of the Scientific Council at the institute and the person of the greatest scientific authority in the country, while Nakićenović was both in the position of the director of the institute in Vinča (see chapter 1.5), and a member of the KPNI. It is also obvious that he was the most trusted and effective field operator, and was constantly being transferred to duties where his managerial skills were needed the most.²⁹⁶ In relation to that, it is also easy to see that the UDB remained firmly embedded in the Yugoslav nuclear program, formally through Kapičić and Nakićenović, but also through Stevan

²⁹⁵ Bondžić, *Između ambicija i iluzija*, 82-83; AJ 50, f. 40. Decision of appointment of members of the Commission for Support in Scientific Research, September 19, 1952. The order of names in this paragraph follows the original document.

²⁹⁶ ASANU, Dnevnik Pavla Savića, 7; Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 14; AJ 50, f. 40. Copy of the Decision of appointment of members of the Commission for Support in Scientific Research, September 19, 1952, delivered to Nakićenović on September 21, 1952. Nakićenović left the position of the Director of the UKRNI in the early 1951. Bondžić, *Između ambicija i iluzija*, 81.

Dedijer, a Yugoslav scientist and politician who replaced Nakićenović later in 1952 as a new director of the Institute for the Research on the Structure of Matter in Vinča.²⁹⁷ Informally, the UDB and Ranković also had control over the institute and the entire nuclear program through Nakićenović's new position, as well as through his well-established network of agents and confidants.

On the top of the pyramid of the Yugoslav nuclear establishment was Josip Broz Tito. A few surviving sources do not record his direct intervention on almost any decision related to the development of the country's nuclear program, although he was unavoidably deeply involved in the entire process. Decisions and regulations for the establishment of the KPNI and other bodies and scientific institutes were approved and signed by Tito as the Prime Minister of the FNRJ Government and the Minister of People's Defense, and it is unquestionable that his word was the final, if not also the first. In addition to that, all surviving reports of the UKRNI and KPNI, as well as other important documents, are found in his personal archive. On the other hand, it is equally possible that, once these decisions were reached and necessary paperwork signed, Tito would delegate responsibilities to his closest and trusted 'cadres'. This was definitively the case with the initiation of the Yugoslav nuclear program, where Ranković held everything under the firm control using the UDB, and at the same time acting as the connecting rod between the nuclear program and Tito, not unlike his Soviet counterpart Beria.

However, by the beginning of the 1950s, Boris Kidrič replaced Ranković as the manager of the Yugoslav nuclear program in what seems a rational decision. His personal interventions with Peterlin in Ljubljana and Supek in Zagreb in establishment

²⁹⁷ Bondžić, *Između ambicija i iluzija*, 60; Dedijer, *Stevan Dedijer*, 183. Dedijer's role will be treated in more details in the following chapter.

of the IJS and IRB, respectively, were crucial for the rapid expansion of the network of scientific institutes and the nuclear program in general, all of which was formalized in his appointment as the director of the KPNI in 1952. With the simultaneous inclusion of the JNA representative, it is easy to see that Ranković was losing the absolute control over the country's nuclear program, even though he and his UDB still held a strong position and played a very important role within the nuclear establishment. Nevertheless, it may be argued that by the early 1950s, Tito became aware that in order to develop the atomic bomb, he could not rely exclusively on the support of Ranković and the country's security sector, but that that scientists, industry and the army had to be involved if these ambitious plans were to be realized. This integration of different sectors was evident in the membership of the KPNI, and what was initiated from the top of the country's nuclear establishment, now had to be transferred down the chain of command and properly implemented.

With the experience of organizing and implementing the First Five-Year Plan, Kidrič was obviously the right person for the integration of different sectors into a functional system, even though his involvement in the establishment of the IJS in Ljubljana makes him an easy target for accusation of mismanagement of federal funds, creation of a 'political factory' in his homeland (even home town) or even subtle nationalism. On the other hand, his equally strong involvement in the establishment of the IRB in Zagreb point to a different conclusion, more precisely, that there was some kind of a plan or even strategy in the process of the development of the country's nuclear program. Most likely scenario would be based on a combination of these motives; while Kidrič was in general acting in the best interest of the country, he was also trying to secure an economically and politically highly lucrative position of the republic and town of his origin.

Regarding the country's strategy for the development of the nuclear program, it is evident that this included establishment of additional centers for development of technicians and theoreticians that would support the activities in the central institute in Vinča. Additionally bolstered by the ZGRTI, as yet another institute dedicated exclusively to prospection and mining of uranium, all under the control of the newly established KPNI, it is clear that already by 1952, a rough blueprint of the Yugoslav nuclear program had been put in place. The entire nuclear establishment was supposed to be managed by Kidrič as the director of the KPNI, responsible only to Tito and the person in which he obviously had the most confidence. Unfortunately for Tito's nuclear ambitions, Boris Kidrič fell ill from leukemia in the fall of 1952, and lost the battle with the disease on April 11, 1953.²⁹⁸

Kidrič simply did not have the time to actually and effectively implement his plans, but the structure he had created eventually became the core of the Yugoslav nuclear establishment and the entire nuclear program in years to come. On a symbolic level, his legacy in expansion of the nuclear program and his name were immortalized in days after his death when the Institute for the Research on the Structure of Matter was, once again, renamed to the Boris Kidrič Institute of Nuclear Sciences [*Institut za nuklearne nauke Boris Kidrič – IBK*], which it kept in following decades.²⁹⁹ On a more practical level, the question of his successor remained open for a while. Svetozar Vukmanović-Tempo was designated as his immediate successor in the economic sphere.³⁰⁰ Ranković also reacted immediately and managed to raise Nakićenović to the position of the secretary of the KPNI, the second in command and the main operative

²⁹⁸ Svetozar Vukmanović Tempo, *Revolucija koja teče. Memoari* [Memoirs on a Flowing Revolution] (Zagreb: Komunist, 1971), 161, 174-175; Bondžić, *Između ambicija i iluzija*, 60.

²⁹⁹ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 20. Boris Kidrič died on April 11, 1953, and already on April 20 the Federal Government reached decision to name the central institute in Vinča after him as a recognition of his contribution to the development of the institute and the country's nuclear program. Most of the time after the fall of 1952 he spent in hospital.

³⁰⁰ Vukmanović Tempo, *Revolucija koja teče*, 161.

in the field, while Ranković himself continued to be equally powerful, if not even more after Kidrič's death.³⁰¹

This question will be resolved in following years, and indeed, the following chapter, but the important thing is that by 1953, the Yugoslav nuclear program could boast with three nuclear institutes with a clear division of programs and responsibilities, even if only on paper at that time, supported by an additional institute dedicated exclusively to uranium prospection, mining and ore refinement, and the managing structure which included representatives of science, military and civilian security sectors and industry, all under the direct control of the Yugoslav Government and Tito himself. Considering the structural framework for the successful nuclear program, it seems that all the pieces of the puzzle were in place, although the person who contributed most was gone.

On a more practical level, these rapid changes and reshuffling of people on important positions within the country's nuclear establishment may also point to a lack of stability of the entire system. With a benefit of hindsight, Savić indirectly suggested this many years after his engagement with the nuclear program had ended, emphasizing that "for scientific work it is essential to have a calm atmosphere, continuity [and] job security", but that "this environment did not exist: we did not inherit it, nor we were able to create it in those circumstances".³⁰² The following section will focus on analyzing to what extent these changes hampered the development of the country's nuclear program.

³⁰¹ Bondžić, *Između ambicija i iluzija*, 114

³⁰² Savić, *Nauka i društvo*, 151.

2.2 Patriarch(s) Standing Next to the Emperor

*“There was a time [...] when the Patriarch
stood alongside the Emperor [...].
Sooner or later we will have to raise
scientists and scholars to the rank of patriarch.”*³⁰³

Holloway quotes Kapitsa’s letter to Stalin, sent on October 3, 1945, in which he openly suggests the future role of scientists in the Soviet Union, and particularly regarding their relations with the politicians and their overall position in the political system. Unsurprisingly, Kapitsa never received neither the reply, nor any kind of satisfaction, and soon after, he quit all of his positions within the structures of the Soviet atomic bomb project. One of the greatest obstacle for Kapitsa was Beria’s “‘unacceptable’ attitude to scientists”, or put in a wider perspective, the problem was the systematic lack of communication and understanding between the politicians and scientists, at the very least regarding the management of the Soviet atomic bomb project.³⁰⁴

Eventually, Stalin did find a solution to this puzzle, offering better living standard to several thousands of scientists involved in the atomic bomb project, “with their own *dachas*, so they can relax, and with their own cars”, although this Faustian bargain was expected to produce practical results and political loyalty from scientists.³⁰⁵ This logic was eventually expanded to a wide range of workers in nuclear industry, gradually involving into what Brown calls ‘plutopia’, working-class

³⁰³ Holloway, *Stalin and the Bomb*, 138-139.

³⁰⁴ *Ibid.*, 138-144.

³⁰⁵ *Ibid.*, 148.

communities employed in nuclear industry, artificially raised to the middle class living standard as a sort of a compensation for the hazardous health conditions they had to endure, and the loss of their civil and political rights. Brown also rightfully notices that this “promise of a good life for a few sounds counterrevolutionary” in a socialist system, which strongly suggests that the successful atomic bomb project was far more important than the main ideological premises; this claim is only further emphasized by the fact that similar process was simultaneously evolving in the USA.³⁰⁶ The order of the day was to “catch up with and overtake” the West, and ideological inconsistencies were easily brushed off.³⁰⁷

According to Ivanov, the deep symbiosis of the state apparatus and science in the Soviet Union produced the so-called “Stalinist science”, or the Soviet version of Big Science, best explained with its four main characteristics; as “a science of the people and for the people (*narodnaya nauka*)”, “Party science (*partiynaja nauka*)”, with “its definite materialistic basis and practical orientation”, and as a “planned science”. However, these strict features of Soviet science gradually dissolved in years following Stalin’s death, eventually bringing it closer to the Western model.³⁰⁸ Besides the political and ideological component, most visible in the expected political support of scientists to the regime, the Soviet understanding and practice of Big Science did not significantly differ from the general international trend for the development of science in the 20th century. Behind the big name were “large

³⁰⁶ Brown, *Plutopia*, 4-5, 134. Stalin is also known for his statement that “the passenger car is a bourgeois notion”, and the fact that he was happy to offer them to scientists, as long as they produce him the atomic bomb, is intriguing. Quoted from: Nordica Netleton, “Driving Towards Communist Consumerism. AvtoVAZ”, *Cahiers du Monde russe*, 47, No. 1/2, Repenser le Dégel: Versions du influences internationales et société soviétique (Jan. – Jun., 2006), 132.

³⁰⁷ Nikolai Kremmentsov, “Russian Science in the Twentieth Century”, in *Companion to Science in the Twentieth Century*, John Krige and Dominique Pestre (eds.) (London and New York: Routledge, 2006), 787.

³⁰⁸ Konstantin Ivanov, “Science after Stalin: Forging a New Image of Soviet Science”, *Science in Context* 15/2 (2002): 317-318, 328, 334-335.

interdisciplinary projects that required collective work of engineers and scientists from different disciplines and that combined cutting-edge fundamental research with the “simultaneous development” of new technologies or other practical goals, all funded and directed by the state through very large scientific institutes.³⁰⁹

This fusion of fundamental and applied science, or theory and practice, was easily explained and justified with the concept of dialectical materialism, the Soviet philosophy of science. Without diving too deep into philosophical contemplations, for the purpose of this analysis it is important to stress that in practice this meant that Soviet scientists were expected to “give their research a clear social purpose by tying it to the needs of Soviet society.”³¹⁰ This everlasting balance was maintained until the mid-1950s and Soviet successes in nuclear and space programs, which further raised the authority of the scientific community and consequently allowed it to limit the state interference and simultaneously extend control over scientific development, eventually and gradually tipping the scale to the ‘fundamental’ research.³¹¹

Science in the Soviet Union obviously had to wait for Stalin’s death in order to experience gradual deconstruction of state apparatus mechanisms for control of both research, results and scientists themselves. In Yugoslavia, Stalin was as good as dead from 1948, and in many aspects the country’s leadership was trying to find its own path to communism, although without any other blueprint to follow. The ‘ethnic key’ policies, practice of establishment of ‘political factories’, as well as deeply related

³⁰⁹ Alexei B. Kojevnikov, *Stalin’s Great Science: The Times and Adventures of Soviet Physicists* (London: Imperial College Press, 2004), 24.

³¹⁰ Loren R. Graham, *Science, Philosophy, and Human Behavior in the Soviet Union* (New York: Columbia University Press, 1987), 57. Dialectical materialism is based on famous Marx’s postulate Based on Marx’s postulate: “Philosophers have interpreted the world, the point however is to change it”. It is published in 1888 in Marx’s *Theses on Feuerbach* as his eleventh thesis. About dialectic materialism see also, Ted Honderich (ed.), “Dialectical materialism,” *The Oxford Companion to Philosophy* (Oxford, New York: Oxford University Press 1995), 198.

³¹¹ Kojevnikov, *Stalin’s Great Science*, 128; Krementsov, “Russian Science in the Twentieth Century”, 792.

interrepublican competition for funding were Yugoslav specificities already attested in many aspects of life, and in this subchapter I will show that Savić, Supek and Peterlin were the true representatives of these policies within the country's nuclear program, both on the symbolic and practical level.

Competition Instead of Cooperation

Tito is not known for his political or philosophical writings, although in his public speeches he often commented on a wide range of topics, including the development of science in Yugoslavia. In order to fully understand the official Yugoslav position regarding the philosophy of science, Tito's own thoughts on this issue might be an interesting point of departure.

“Science in new socialist Yugoslavia, in the victorious building of socialism in our country, has a huge role. Therefore, scientific institutions have to be closely connected with the contemporary reality in our country. There are people, and people of science, who think that science is something on its own, that it has to be neutral, that they cannot be interested in anything else except ‘pure’ science. These people usually hate every social change, because they think that it interferes with their scientific work. Such viewpoints are unscientific, they are in contradiction with notions of progress, they contradict science as such [...] But it is science as one of those forces which help the most advanced social class, in this case the workers’ class, to perform in a revolutionary way the role of a gravedigger of the old, still living social order.”³¹²

³¹² “Značaj društvenih promjena u našoj zemlji i uloga nauke u izgradnji” [The Importance of Scientific Changes in Our Country and the Role of Science in Development]. Tito's acceptance speech for his membership in the Serbian Academy of Sciences and Arts, November 19, 1948. Nikolić (ed.), *Josip Broz Tito o umetnosti, kulturi i nauci*, 75. First published in Josip Broz Tito, *Govori i članci, knjiga IV* [Speeches and Articles, book IV] (Zagreb: Naprijed, 1959), 29-38.

The conflict with the *ancient régime* is obvious and not surprising given the date of the speech, although the fact that the speech has been republished several times between 1948 and 1978, confirms that the basic ideas expressed in relation to development of science in Yugoslavia were relevant throughout this period, at least on the formal level. This attitude and overall hostility towards the “old intelligentsia” is comparable to the Soviet experience immediately after the revolution, even if Tito was much gentler in his comments about them than Lenin.³¹³ Besides the fight against the “reactionary capitalist elements”, his speech also stresses the precedence of ‘applied’ science. Indirectly, this speech also confirms that Yugoslav scientific policies were based on the Soviet model, which was extensively copied, although it is emphasized that “[w]ithout deviating from that scientific basis [of Marx, Engels and Lenin], socialism in Yugoslavia is being and will be developed in accordance with specific conditions and capabilities in our country.”³¹⁴ Somewhat unsurprisingly, Tito avoided speaking about dialectic materialism in front of the academicians of the SANU, although the actual surprise came from his obvious understanding, even if only intuitively or as a consequence of his drive for political independence from Stalin, that any transfer requires adaptation to local circumstances.

The other side of the proverbial coin was the effort to create a new, socialist man. Back in the days, Bukharin explained that one of the main tasks of planning was “the systematic preparation of new man, the builders of socialism.”³¹⁵ Not to be

³¹³ Yinghong Cheng, *Creating the “New Man”: From Enlightenment Ideals to Socialist Realities* (Honolulu: University of Hawai’i Press, 2009), 24. Responding to Gorky’s protest for mass arrests of scientists and scholars in 1919, Lenin called them the “shit” of the people, not the “mind”, as Gorky put it. It is worthy to say that mass arrests of scientists were not experienced in Yugoslavia on any comparable level.

³¹⁴ “Značaj društvenih promjena u našoj zemlji i uloga nauke u izgradnji” [The Importance of Scientific Changes in Our Country and the Role of Science in Development]. Tito’s acceptance speech for his membership in the Serbian Academy of Sciences and Arts, November 19, 1948. Nikolić (ed.), *Josip Broz Tito o umetnosti, kulturi i nauci*, 29-38.

³¹⁵ Cheng, *Creating the “New Man*, 23. In this work, Cheng provides a detailed ideological background as well as practical implications of such policies in socialist societies worldwide.

undone, during the promotion of the First Five-Year Plan in 1947, his Yugoslav counterpart Andrija Hebrang compared “the fight for the execution of the plan” to “a great forge of a new life, which will forge new magnificent things and new men.”³¹⁶ Duda also explains that after the split with the Soviet Union in 1948, this logic was left without a “universal mold for shaping of consciousness” after which the creation of the “Yugoslav socialist man” had begun.³¹⁷ Starting with the premise that the Soviet philosophy of science was extensively copied and adapted with equal verve to the Yugoslav needs and capabilities, this chapter will reveal how much these policies had an impact on the development of the country’s nuclear program.

As the leading figure of the Yugoslav nuclear program in the late 1940s and early 1950s, Pavle Savić shared this basic mindset throughout his career. In a series of his interviews, taken in the 1960s and 1970s, Savić was openly and at moments even aggressively advocating for the “materialist understanding” of science, and the use of the “dialectical method”.³¹⁸ Regarding the relation between the fundamental and applied science, his position also did not differ significantly from the general position and experience of his Soviet colleagues, especially considering their rekindled emphasis on fundamental science in the post-Stalin period. It seems he was also well aware of problems in developing any Big Science project, and it would be easy to imagine that this awareness was based on his own experience with the Yugoslav nuclear program. In one of the aforementioned interviews, he stresses that, due to „huge investments” in development of science and related research projects, “application is being forced and overemphasized in order to repay huge investments,”

³¹⁶ Igor Duda, “Uvod: od nazadnosti do svemira, od projekta do zbornika” [Introduction: From Backwardness to Space, From Project to the Edited Volume], *Stvaranje socijalističkog čovjeka: hrvatsko društvo i ideologija jugoslavenskoga socijalizma*, Igor Duda (ed.) (Zagreb-Pula: Srednja Evropa, 2017), 13

³¹⁷ Duda, “Uvod: od nazadnosti do svemira, od projekta do zbornika”, 14.

³¹⁸ Savić, *Nauka i društvo*, 101.

which he considered “a massive obstacle for development of fundamental science.”³¹⁹ While these statements can be taken as universally true, he adds some comments which represent a harsh critique of Yugoslav practices:

“We are a backward, small country, and we are making great efforts to get out of that backwardness, but the fact is that this is who we are. Because of that, a much greater emphasis is put on the direct return of investments, that is to say, on application of scientific achievements, which unnaturally complicates and even stops work in fundamental science.”³²⁰

In the Yugoslav post-Stalin period, country’s officials and scientists were also trying to find a way to formulate an original concept of scientific development, yet without much or any experience other than with the Soviet model. With a considerable benefit of hindsight, Savić was able to pinpoint main problems of Yugoslav science, and by extension, of the country’s nuclear program. Considering his powerful position in the late 1940s and early 1950s, which could be compared to Kapitsa’s metaphor of a “patriarch standing next to the emperor”, it is important to understand and analyze what were the obstacles he encountered, how he navigated them and what was the response of the political establishment.

The first thing Savić had to fight for was his own position of a “patriarch,” although unlike his role-model Kapitsa who ended up in a house arrest in his *dacha* for several years until Stalin’s death, Savić was forced to accept other “patriarchs.”³²¹ The establishment of additional scientific institutes in Ljubljana and Zagreb may seem as an obvious problem in that respect, but for Savić these problems started earlier. An

³¹⁹ Savić, *Nauka i društvo*, 107-108.

³²⁰ *Ibid.*, 108.

³²¹ Holloway, *Stalin and the Bomb*, 144; Kojevnikov, *Stalin’s Great Science*, 146.

entry in his diary for the period between January 25 and February 3, 1950, reveals that by that time, the state officials were dissatisfied with the speed of construction of the institute in Vinča and situation with the “cadres”. Part of the dissatisfaction came from the fact that by the beginning of 1950, Savić had already refused a number of scientists sent to him as his assistants by the UKRNI, including both Peterlin and Supek.³²²

A deeper analysis of his diary suggests that Savić refused Supek on the basis of personal dislike, probably on account of his experience in Nazi Germany and closeness to Werner Heisenberg in the late 1930s, unlike Savić who roughly at the same time cooperated with proven communists in Paris and Joliot-Curies. This conflict between the two obviously had a deep political and ideological context, although more likely reason for Savić’s refusal to work with Supek was their different understanding of the philosophy of science and scientific research; whereas Savić was a true profet (if not a patriarch) of dialectic materialism, Supek was a strong supporter of the Copenhagen school of quantum mechanics since the late 1930s, which was directly undermining foundations of dialectic materialism and Marxist interpretation of science in general.³²³ Nakićenović, the director of the IBK at the time, admitted during one conversation with Savić that “Supek, truthfully, is not a dialectician, but Einstein is not a dialectician either, and the entire world celebrates him,” in an obvious and desperate attempt to expand the team of leading scientists working on the nuclear program, even if it meant inclusion of ideologically problematic Supek, yet to no avail.³²⁴

³²² ASANU, Dnevnik Pavla Savića, 14-15.

³²³ Ana Rajković, “Odnos Ivana Supeka prema jugoslavenskoj ljevici (1939.-1972.)” [Ivan Supek’s Attitude towards the Yugoslav Left, 1939-1972], *Historijski zbornik* LXVII (2014), 382-384.

³²⁴ ASANU, Dnevnik Pavla Savića, 15. The ideological conflict between Savić and Supek was further expanded to a personal dislike after Savić wrote a negative review of one of Supek’s books.

Nevertheless, against Savić's wishes, and even turning a blind eye on the ideological aspect of the problem, Supek was, not only included in the Yugoslav nuclear program, but was also supported to establish his own institute and in the field of his studies. The situation is actually comparable to what was happening in the Soviet Union in the late 1940s, where the Lysenkoism and general campaign against foreign influences on the Soviet science destroyed modern genetics and threatened physics. This was part of the Stalin's wider attempt to put entire intellectual life under his control, although physicists were left with a certain degree of autonomy, largely because their work on the atomic bomb was too important for the state security, in what Landau commented as "the first example of successful nuclear deterrence."³²⁵

Savić also admits that he personally invited Peterlin "so many times", but that he never came to the institute in Vinča, and was only interested to receive some symbolic funding and scientific publications from its library. In addition to Supek and Peterlin, Savić either directly refused or could not get at least three additional scientists, finding them either personally disinterested to work at the institute, or experiencing direct refusals from companies where they were already employed.³²⁶ Considering the obvious scramble for educated 'cadres' in the country, the scenario in which Savić did not want to accept who could compromise his 'patriarchate' becomes even more probable, while his explanations that other scientists one way or another refused working with him should be taken with a grain of salt.

On the other hand, Savić was a true believer and dedicated follower of the main premises of the socialist (or Soviet) philosophy of science. At least on one occasion, he refused one physicist, his own student at the University of Belgrade,

³²⁵ Holloway, *Stalin and the Bomb*, 212-213.

³²⁶ ASANU, *Dnevnik Pavla Savića*, 15.

harshly commenting that she was “a prewar student, married and negligent”, which was a stark contrast to his comments about a 17 years old typist, “a peasant girl” who taught herself how to use a typing machine while working on one youth labor actions, and whom he accepted to be tested by the administration of the IBK.³²⁷ This did not go unnoticed, and in one of harsher exchanges with Nakićenović, Savić was directly accused that he “wants only to gather kids [around himself] so he could pretend to be something” in front of them.³²⁸

These episodes reveal that Savić was seriously committed to creating proper socialist men and women as a proverbial ‘engineer of the human soul’, using the country’s nuclear program and ‘his’ institute as one of the most important hubs, at least regarding the scientific sector.³²⁹ More importantly and more worrisomely, they also confirm that already by the early 1950 the nuclear establishment started to be deeply annoyed by Savić for his attitudes regarding the expansion of the nuclear program and the obvious lack of results, at least judging from their perspective.

Whatever was in the background of Savić’s failure or reluctance to establish a wider support from the scientific community or to expand it, if he ever wanted to do that, it is evident that the Yugoslav nuclear establishment was desperate to provide him every possible support, only to be left additionally annoyed and frustrated with Savić’s stubbornness. Episodes with Supek and Peterlin are particularly interesting since they reveal their desperation to speed up work on the atomic bomb, as well as Savić’s equal desperation to keep his own position and plans for the IBK intact. Once the channeling of already extremely limited number of scientists into the institute in

³²⁷ ASANU, Dnevnik Pavla Savića, 14-15.

³²⁸ *Ibid.*, 15

³²⁹ Cheng, *Creating the “New Man*, 23. Cheng explains that Stalin was often using this metaphor “for educators, propaganda workers, and writers” in explaining their task in the process of creation of a new socialist man.

Vinča had failed, the creation of additional two institutes in Zagreb and Ljubljana must have seemed as the next best option. This seemingly throws a different light on the practices of inter-republican competition, suggesting that at least in this case, the creation of additional nuclear institutes in Zagreb and Ljubljana was to a certain extent forced upon the UKRNI in order to bypass a real or imagined backlog created by Savić. Simultaneously, it also reveals the sheer determination and capabilities of the centrally organized Yugoslav state system in rapid execution of important decisions and projects.

On the other hand, if Peterlin was genuinely not interested to work with Savić on one of the top scientific projects and in the only somewhat operational nuclear institute in the country, it would be difficult to explain such a decision in any other way except for his anticipation of the establishment of a similar institute in Ljubljana where he would be a ‘small patriarch’ in his own right. The timing of the establishment of the IJS would also fit this scenario nicely, and it is a fact that Kidrič definitively was aware of these circumstances, and in a position to give Peterlin a proper hint to stay put. Introduction of Peterlin, but not Supek, in the membership of the newly established KPNI in 1952 and presided by Kidrič, can be taken as another indirect proof for this claim. The truth will probably never be known, but either way, by late 1950, Savić got at least two other “patriarchs” to worry about and compete with, and neither seemed too friendly.

Even if no foul play was intended on either side, a direct consequence of such an evolution of the nuclear program was the competition for the federal funding between three scientists and their respective institutes, and the duplication of research, all of which necessarily compromised the program’s cost and efficiency. The construction of the first cyclotron in Yugoslavia offers a telling example of these

problems in everyday planning and evolution of the nuclear program. Already during the negotiations with Kidrič about the future research program at the IRB in 1950, Supek “managed to convince him” that his team in Zagreb would be able to construct the cyclotron independently, thus saving one million of USD Kidrič already set aside for a purchase of this machine abroad for the Institute of Physics in Vinča.³³⁰ The report of the UKRNI for 1950 confirms that the IRB was supposed to send one engineer abroad “to get acquainted with the construction of cyclotrons”, so it could be built in Yugoslavia, and instead of one million, Supek received 100.000 USD.³³¹ It is only too easy to imagine the reaction of Savić when he learned about this change; not only he lost an important research machine, he lost a lot of funding, while for Supek, even though he got one tenth of the sum intended for Savić, it was still much more than nothing.

Already in January 1950, Savić started to be aware that things are slipping out of his hands, as he learned that Kidrič had already decided to construct one “generator” in Yugoslavia and to purchase another one abroad.³³² By July 1950, the air started to clear, and after several meetings between “patriarchs” and Kidrič, the decision was reached that funding should be provided for the purchase of “a generator and a cyclotron” abroad, and that additional “big cyclotron” should be constructed much later and independently in the country. However, it was only after “the Dutch”

³³⁰ Rudež, Pisk, *Institut Ruđer Bošković*, 18.

³³¹ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta za atomsku fiziku i istraživanja na pronalaženju urana i drugih ruda, sa beleškom Marka (A. Rankovića) za Starog (J.B.T.), Beograd, 15. IX 1950. [Report of the Directorate for Coordination of Work in Scientific Institutes for atomic physics and prospection and finding of uranium and other ores, with the note of Marko (A. Ranković) for Stari (Josip Broz Tito), Belgrade, September 15, 1950]

³³² ASANU, Dnevnik Pavla Savića, 15. Savić uses the word “generator” for an instrument commonly known as accelerator. Savić also writes: “I was hit hard by deceitfulness of the closest people from which I expected support. Does this mean lack of trust from Marko [Ranković] and Kidrič, or a conspiracy from Slobodan [Nakićenović] and someone else of which they are not aware? Another thing: why Kidrič does not tell me the decision about the generator, when at least ten times I tried to get in touch with him and why Marko does not ask me for an explanation if his opinion is similar to Slobodan’s? We shall see what is it?”

refused to sell a smaller cyclotron was it decided that it should also be constructed independently.³³³

This course of events undermines Supek's agency regarding the redirection of funding from Vinča to Zagreb, at least to a measure he suggested, but more importantly, it confirms that Kidrič and Ranković were bypassing Savić on important issues regarding the development of the nuclear program, and reaching decisions without even notifying him. It also seems that neither Supek nor Peterlin could do much to steer the events, although it is highly probable that they had been consulted, probably to a same or lesser degree than Savić was. What is clear is that in a short period between the end of 1949 and the mid-1950, Savić as the original "patriarch" was first delegated to a role of an advisor, while almost simultaneously competing "patriarchs" were created, all of them playing a role in what strikingly resembles an old *divide et impera* scenario.

This was visible in the somewhat chaotic purchase and construction of various machines in Yugoslav nuclear institutes. By 1952, the 1.5 MeV Cockcroft Walton accelerator was purchased from the Swiss company Haefely and installed at the IBK in Vinča, as the first big research instrument of the nuclear program in Yugoslavia.³³⁴ Savić could not hide his excitement when the foundations for the building that will house the accelerator were poured, commenting that he would be even happier if it had been constructed in the country and that in this respect, he is a "chauvinist."³³⁵ Perhaps these feelings were somewhat reinforced as the events regarding construction of accelerators evolved. Just as the IBK finished installation of their accelerator, a 30 MeV betatron accelerator was purchased for the IJS in Ljubljana, once again in

³³³ ASANU, Dnevnik Pavla Savića, 16

³³⁴ Nakićenović, *Nuklearna energija u Jugoslaviji*, 20-21.

³³⁵ ASANU, Dnevnik Pavla Savića, 23.

Switzerland, while the IJS engineers independently constructed a 2.5 MeV Van de Graaff accelerator. Almost simultaneously, a big 16 MeV cyclotron had started to be constructed in the IRB in Zagreb, although its construction and installation lasted much longer, between 1952 and 1959.³³⁶

Several important conclusions about the strategy behind the development of the Yugoslav nuclear program can be drawn from the history of purchase, construction and installation of a number of different particle accelerators. The fact that Yugoslav nuclear institutes were installing and using basically all known types of accelerators, strongly suggest that the nuclear establishment was keen to rapidly develop the country's capacity to independently develop and construct them. This is indirectly confirmed in the monograph published for the 50th anniversary of the IBK, where it is clearly stressed that "[i]n the beginning, it was thought that we should master independently nuclear technology and that it is necessary to develop all the basic technologies, from uranium refining and fabrication of fuel cells, to reprocessing of used fuel."³³⁷ This scenario also completely corresponds with the decision to pursue the development of the atomic bomb, where it is absolutely necessary to independently master the required technologies. On the other hand, the scenario is very close to duplication or multiplication of research, which was unavoidable in the situation where three institutes competed for the state funding.

The previous conclusion leaves almost no room for doubt that the nuclear establishment was completely focused on visible results, and that all other steps were most likely considered a necessary nuisance. This attitude also explains the relation between the decision-makers and the country's top scientists, which was very far from

³³⁶ Nakićenović, *Nuklearna energija u Jugoslaviji*, 29, 37; ASANU, *Dnevnik Pavla Savića*, 16.

³³⁷ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 61.

the desired patriarch-emperor partnership. This question will be treated separately in the following section, but what can be said here is that it seems that the most important decisions were delivered by the least qualified individuals, and even if they were well-informed, the country's leading scientists never were downgraded to the role of consultants with limited options to intervene.

Finally, it is also clear that in the given setting, the competition between “patriarchs” and their respective nuclear institutes was inevitable. Following the simple chronology of events, it can easily be argued after one of them received the confirmation that a certain type of accelerator was going to be built, the other was suggesting a bigger project that would be more in line with the desires of the nuclear establishment. Savić did not hide his dissatisfaction, at least in his diary, where he recorded that he was “personally against construction of cyclotron [in the IRB], because I do not see what are we going to do with it.”³³⁸ This would necessarily create dispersion of resources and decentralization of research, where the latter nominally may seem as a decent idea, but it is easy to imagine that at least some duplication of research was inevitable, as well as that it would be very difficult to coordinate these activities in an environment of a competition instead of cooperation.

Applied is Fundamental

Besides being accused for employing predominantly young students at the IBK in Vinča, which should be taken with a healthy amount of reservations given his ‘master plan,’ Savić also annoyed the nuclear establishment for his focus on a range of experiments instead of development of actual machines, including the atomic bomb. During one of the meetings in the early 1950, Nakićenović stressed that Savić

³³⁸ ASANU, Dnevnik Pavla Savića, 16.

“suggests to construct a generator, because he wants to avoid uranium oven [nuclear reactor] at any cost,” and that he is “afraid of physicists.”³³⁹ Realizing that his performance, achievements, and to a certain extent his scientific credibility were being questioned, that the immediate response of the nuclear establishment was to redirect funding in establishment of new nuclear institutes, and to include in the nuclear program scientists he had rejected, Savić did not have much choice except to make a compromise regarding the research as well. Already by July 1950, he wrote for the first time in his diary that “the ultimate goal, *practical* [emphasis added], of the entire training in Vinča is the construction of uranium oven for the purpose of propulsion.”³⁴⁰ It is almost comical to see Savić so deeply annoyed and to an equal measure pressured to redirect his efforts towards more practical goals that he had to stress in his own diary that the nuclear reactor was the ultimate “practical” goal of all the programs he had planned and designed for the IBK.

In order to secure Savić’s cooperation, Dilas eventually sent Stevan Dedijer to work with him in Vinča. In his autobiography, he continuously refers to his intelligence activities throughout his life, greater part of which was dedicated to the Yugoslav nuclear program and industrial espionage in general.³⁴¹ Dedijer studied mathematics and physics at Princeton, between 1930 and 1934. While he admits that his studies were not completely successful, it seems that he eventually managed to obtain the diploma, although the details are a bit fuzzy.³⁴² Working in New York as a journalist for *Newsweek* and several left-wing newspapers and magazines, in 1936 he

³³⁹ ASANU, Dnevnik Pavla Savića, 15. At the time, the phrase “uranium oven” was commonly used in Yugoslavia in a reference to a nuclear reactor.

³⁴⁰ *Ibid.*, 16.

³⁴¹ Dedijer, *Stevan Dedijer, passim*.

³⁴² The Princeton University Graduate Alumni Index does not record his name, which seems to confirm that he never graduated. “The Princeton University Graduate Alumni Index, 1839-1998”, <https://library.princeton.edu/special-collections/databases/princeton-university-graduate-alumni-index>, accessed on December 15, 2020.

joined the Communist Party of the United States of America and quickly got in touch with the Soviet intelligence network in the US. According to his own account, in 1937 he even got in touch with Mustafa (“Mujaga”) Golubić, a high-ranking NKVD agent and (in)famous Tito’s competitor for the leading position in the Communist Party of Yugoslavia.³⁴³

In the summer of 1942, Dedijer was recruited by the newly established Office of Strategic Services (OSS), the predecessor of the Central Intelligence Agency (CIA), only to be expelled from the OSS, allegedly for being a radical communist.³⁴⁴ Undeterred by his “failure” with the OSS, Dedijer volunteered for the US Army and quickly rose through the ranks to become a paratrooper of the elite 101st Airborne Division and a personal bodyguard of the division’s commander, General Maxwell Taylor. After surviving all of the major battles (Normandy, Operation Market Garden, Bastogne), he was summoned in February 1945 by the newly established Yugoslav Embassy in London to return to the country and continue fighting against Germany. Again, the details are hazy, but it is quite probable that this move was organized by his brother Vladimir, a member of the Central Committee of the Communist Party of Yugoslavia.³⁴⁵

After the war, Dedijer quickly rose through the ranks of the Yugoslav political establishment. Through his brother, he was introduced to Aleksandar Ranković, Milovan Đilas, Edvard Kardelj and the rest of the top-ranking Yugoslav officials and members of the Tito’s inner circle of associates. Dedijer first worked in Belgrade as a

³⁴³ Dedijer helped Golubić to flee from the US to Europe, after being located by the FBI. Allegedly, Golubić was the leading officer and organizer of the NKVD network in Canada and the US, and according to Dedijer, the mastermind behind the organization of Trotsky’s assassination in Mexico in 1940.

³⁴⁴ Dedijer, *Stevan Dedijer*, 127-130. The scenario of being kicked out of the OSS sounds rather silly; he could have been easily sent on a task that necessitated that kind of a cover story, or his NKVD connections were suspected. However, the story is difficult to check and Dedijer’s own confession is hazy at best and occasionally superficial.

³⁴⁵ Dedijer, *Stevan Dedijer*, 136, 152-155.

journalist for major Yugoslav dailies, *Borba* and *Politika*, eventually becoming the associate director of TANJUG [*Telegrafska agencija nove Jugoslavije* – Telegraphic Agency of New Yugoslavia], the central propaganda and news agency that was modelled on the Soviet TASS. He was also involved in several diplomatic missions as Tito's personal translator.³⁴⁶

Savić and Dedijer knew each other since their early childhood and considered each other friends. However, after his arrival to the IBK, Savić commented in his diary that Dedijer was making many suggestions regarding the research at the institute, many of which he found constructive, but also added that he was “not completely sure where the initiative ends, and where the ‘assignment’ begins.”³⁴⁷ This comment does sound a bit paranoid, but in his memoirs Dedijer admits that he was sent to Vinča by Kardelj himself with a task to monitor Savić and “clarify” the situation there, since the Yugoslav decision-makers were not completely satisfied with the work on the atomic bomb Savić had promised to develop, and were puzzled by his behavior.³⁴⁸

It would not be surprising that Savić himself was puzzled with the task ahead, even if he ever seriously considered the construction of the atomic bomb, let alone leading Yugoslav politicians. More importantly, this course of events reveals how misunderstanding between scientists and politicians in Yugoslavia gradually evolved into mistrust and led to some rash decisions, including rapid expansion of the nuclear program at the time when there were not enough scientists to support the existing research in this field. For the time being, Savić was content with undermining Dedijer's activities by directing him to research an isotope of arsenic, a phenomenon

³⁴⁶ Dedijer, *Stevan Dedijer*, 156-165.

³⁴⁷ ASANU, *Dnevnik Pavla Savića*, 17.

³⁴⁸ Dedijer, *Stevan Dedijer*, 177.

completely irrelevant to the institute's main goal. In his memoirs, Dedijer admits that he had spent full two months before he realized he had been tricked, while Savić probably gained some breathing space and time to reinforce his own position, although he justifies this episode in his diary as testing of sensitivity of the instruments Walen developed for the Physical Laboratory of the IBK.³⁴⁹ It is almost laughable to see how effectively the bureaucratic control of scientific research, against which Savić openly fought, replicated in his own behavior within the IBK, as his own fief.

Whether Savić was actually successful or not with the development of the country's nuclear program, seem to have been irrelevant from the perspective of the political establishment, as he did not materialize his achievements on any level. The pressure on him to redirect his efforts to construction of a nuclear reactor and the atomic bomb continued to rise, and by November of 1950 it resulted in open conflict between Savić on one, and Nakićenović and Dedijer on the other side. While it is easy to argue that his attackers were merely loudspeakers of the political establishment and Tito himself, it is somewhat surprising that Savić stood his ground with much more courage and dedication than earlier. Questioned for the lack of progress on the development of the "uranium oven", Savić explained that it is "an instrument", that "institutes are not built for construction of instruments," but the other way round, and that the institute in Vinča exists not for the "construction of the uranium oven, but for the development of nuclear physics and preparation of cadres in that field."³⁵⁰

The response of the establishment was swift and harsh. On December 15, 1950, Savić was summoned to a meeting with Ranković, Đilas, Nakićenović and

³⁴⁹ Dedijer, *Stevan Dedijer*, 181.

³⁵⁰ ASANU, *Dnevnik Pavla Savića*, 28.

Dedijer. Commenting in his diary only hours after, he said that this was “the most exciting” meeting he ever had, “and surely foreshadowing, for me personally, and for the future development of the Institute [in Vinča].”³⁵¹ Being attacked by Dedijer and Nakićenović for his lack of vision, interest to work on nuclear reactors, as well as for his repeated complaints for the lack of trust of the political establishment in him, Savić replied energetically:

“Regarding the trust, a justifiable doubt has grown in me. Why, on such a huge thing like a uranium oven, which presents a very serious work, Slobodan [Nakićenović] and Kapičić give me tasks and are providing a meritorious appraisal [of my work]? Based on what?”³⁵²

He continued in the same vein, emphasizing that he is “not interested in uranium oven as a scientific problem” because “others already made it,” responding with equal passion to other, less important accusations.³⁵³

Savić’s comments reveal that his personal dissatisfaction with the management of the Yugoslav nuclear program and resistance to the pressure of the political establishment to construct the atomic bomb has grown considerably during the 1950, but particularly since the previous meeting in November. More importantly, his responses are strikingly similar to opinions expressed by his Soviet colleague and short-lived mentor Kapitsa, who in late 1945 openly complained to Stalin about the attitudes of Beria and other officials (Malenkov and Voznesensky) towards the scientists, emphasizing that they were making ill-informed decisions regarding the Soviet atomic bomb project. Kapitsa even suggested that Beria should learn physics

³⁵¹ ASANU, Dnevnik Pavla Savića, 29.

³⁵² *Ibid.*, 30.

³⁵³ *Ibid.*, 31.

and that scientists should take over the management.³⁵⁴ At the time when Yugoslavia was desperately attempting to cut every tie with the Soviet Union and reinvent itself as a vanguard of socialism, it is striking to notice that a burst of Sovietization experienced immediately after the war was so profound that a replication of the experiences in relationship and communication between the state apparatus and leading scientists was very close to identical. The only difference was that, as it seems, Savić could not even reach Tito, while those he could reach, like Ranković, usually never replied to his suggestions and requests.³⁵⁵

During the meeting, the most important retort to Savić's complaints came from Đilas, who was not hiding his frustration and who openly said that he personally does not trust him. Interestingly, his greatest objection was Savić's lifestyle, which he judged to be overly fashionable and jet-set in nature, thus somewhat anticipating his future harsh critique of the Yugoslav political elite in his pivotal book *New Class*. Nevertheless, a couple of years before he became a world-renowned dissident, Đilas was expressing his expectations regarding the country's nuclear program bluntly and in a proper Stalinist fashion:

"I think [...] that the goal of the Institute [in Vinča] is the uranium oven and atomic bomb, and that the development of cadres for that is – secondary [...] My opinion is that we should let you [Savić] work on pure science, and that someone else should take over the work on the atomic bomb. I disagree with you when you say that Slobodan [Nakićenović] has no

³⁵⁴ Holloway, *Stalin and the Bomb*, 140-141; Kojevnikov, *Stalin's Great Science*, 142-143.

³⁵⁵ ASANU, *Dnevnik Pavla Savića*, 17.

rights to give you directives. Every citizen of this country has the right and duty to request an atomic bomb from you.”³⁵⁶

These comments alone are enough to reveal next to a complete lack of understanding among the Yugoslav decision-makers about scientific research in general and the necessary preconditions for a successful nuclear program in particular, although this statement requires some qualification. It is easy to accuse the Yugoslav leading politicians for their unquestionable belief in their own capabilities. During the meeting, Ranković even directly accused Savić for his „inner resistance, skepticism,” and the fact that he was constantly providing “some figures to reveal our impotence.”³⁵⁷ On the other hand, their self-confidence was based on a successful resistance to both Hitler and Stalin, as well as certain tangible successes in the reconstruction of the country. Combined with their deep fear of an almost imminent Soviet attack, it is almost understandable that they thought that the bomb is the absolute priority, while they were equally ready to sacrifice Savić’s efforts to first educate a generation of scientists and his preference for development of fundamental science as a precondition for its application. This deep-seated fear of a potential war with the entire Soviet bloc, must have made them additionally cautious and nervous about scientists like Savić, who was given a lot of space and funding to establish the nuclear program, but who seemed very reluctant to provide the atomic bomb as a powerful deterrent at the moment when it was considered essential for the country’s defense and existence. Without any insight into either American or Soviet experience with their respective atomic bomb projects, it is equally unsurprising how little they knew about it.

³⁵⁶ ASANU, Dnevnik Pavla Savića, 32.

³⁵⁷ *Ibid.*, 33.

Combining all of these components, it is easy to see that by the end of 1950, the Yugoslav political establishment could not come to any other decision except to perform a rapid and complete takeover of the country's nuclear program, including any related scientific or industrial sector if they wanted to have the atomic bomb in a reasonably short amount of time. It is equally easy to imagine that with this decision they had bitten more than they could chew and that this course of events would necessarily lead to minor or even huge mistakes along the way. The question remains, however, to what extent the scientists were ready to participate.

2.3 Tito Went Courting the West: Evolution of the Yugoslav Security Strategy and Nuclear Policy

*“The Yugoslav resistance is not just a Yugoslav thing...
Therefore, it is not important only for the United States,
but for all European countries.
I think that this important factor sometimes is forgotten.”³⁵⁸*

Viewed from the perspective of the Yugoslav political leadership, urgent economic, political and military support was desperately needed in order to successfully deter the Soviet Union from attacking, or at least to be able to defend the country in case of such an attack long enough to receive necessary support from the West, as the only existing counterweight to the Soviet pressure. Neither scenario seemed overly realistic in the beginning of the 1950s, although these were only, even if only theoretically possible options that would guarantee the Yugoslav independence and the survival of Tito’s regime in any form.

Overcoming political and ideological obstacles between the West and Yugoslavia was already a formidable task for both sides. Much bigger problem was the inclusion of Yugoslavia into the U.S. and NATO military planning without provoking the Soviet intervention. Stretched between the hammer and sickle of the Soviet response to any strategic changes in the Balkans, and the anvil of the Western support, protection and cooperation, Tito had to carefully navigate between these equally dangerous options. Therefore, in this chapter I aim to explore how difficult it was finding a solution to this security puzzle, as undoubtedly the most important topic

³⁵⁸ Josip Broz Tito, *Govori i članci*, knj. 6, 10.III 1951-21.XII 1951 [Speeches and Articles, Vol. 6, March 10-December 31, 1951] (Zagreb: Naprijed, 1959), 248-249. Quoted in Bojan B. Dimitrijević, *Jugoslavija i NATO* [Yugoslavia and NATO] (Belgrade: Tricontinental, Novinsko-izdavački centar “Vojska”, 2003), 28.

in the Yugoslav security considerations in the early 1950s, and how any consequent formulation of a security policy, which in this case obviously included nuclear weapons as a highly desired even if equally improbable component, required a mastery of strategic thinking and planning.

The West is (not) the best

As mentioned earlier, the first meaningful financial and consequent political support from the United States came only in the fall of 1949 (see chapter 1.5). Even though the economic support to the Yugoslav regime had its unavoidable and very strong political connotation, provisioning of any significant military support or extension of any security guarantees was a much more sensitive issue regarding geopolitically much wider security aspect, and these decisions had to be reached carefully and in baby steps. According to Dimitrijević, throughout 1949 and 1950, the American, British and French politicians and military strategists were only gradually recognizing Yugoslavia as a potential Western partner in their military planning against the Soviet bloc, all of which made the Yugoslavs “very nervous.”³⁵⁹

Leo Mates, one of the Yugoslav leading diplomats at the time, insists that the main reason for such a reluctance among Western leaders was their belief that Yugoslavia simply would not be able to resist the Soviet attack, thus making any support a waste of resources and unnecessary provocation of the Soviets. While these estimates may have been realistic, Mates insists that the only reason why Yugoslavia survived the turbulent period between 1948 and 1950, was Stalin’s miscalculation that a combined political, economic and slight military pressure would be enough to topple

³⁵⁹ Dimitrijević, *Jugoslavija i NATO*, 9-10.

Tito's regime, without provoking larger conflict in region or Europe.³⁶⁰ Holloway agrees that Stalin "mistakenly believed" that pro-Soviet forces in Yugoslavia would easily "replace Tito with someone more pliable."³⁶¹ Focusing on the internal political situation, Lees confirms that the main reason why Tito managed to withstand the Soviet pressure in those years was the stability of his rule in Yugoslavia, visible in his complete control over the Party and government apparatus, combined with the strong public support.³⁶²

By 1950, however, Tito managed not only to strengthen and solidify his own rule within the country, but also to win at least some sympathies in the West. Gaddis stresses that an important milestone was reached on December 22, 1949, when the U.S. President Truman announced that a Soviet attack on Yugoslavia would be regarded as an act of aggression, "implying something more than a passive response."³⁶³ This was confirmed and reinforced on January 5, 1950, when George V. Allen, the newly appointed U.S. Ambassador in Belgrade, announced to the press that the United States will resist any potential Soviet aggression on Yugoslavia. Bekić rightfully comments that this was more of a clever propaganda than a clear policy at the time, although he also admits that this undoubtedly meant that Yugoslavia became included into the U.S. Cold War strategic calculations, even if only as being recognized as a stable and significant partner or maybe even a potential ally.³⁶⁴

³⁶⁰ Leo Mates, *Politika supersila i oružje. O granicama moći* [Superpowers' Policies and Weapons. On Limitations of Power] (Zagreb: Globus, 1988), 235. After the Second World War, Leo Mates (1911-1991) performed duties of the Counselor for the Yugoslav Embassy in London and Washington, and was a long standing Permanent Representative of Yugoslavia to the U.N. More in "Leo Mates, 1962-1972", <https://www.diplomacy.bg.ac.rs/misija/leo-mates-1962-1972/>, accessed on November 15, 2020)

³⁶¹ Holloway, *Stalin and the Bomb*, 257.

³⁶² Lorraine M. Lees, *Keeping Tito Afloat: The United States, Yugoslavia, and the Cold War* (University Park, Pa. : Pennsylvania State University Press, 1997), 73.

³⁶³ John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of American National Security Policy during the Cold War* (Oxford, New York: Oxford University Press, 2005), 66.

³⁶⁴ Bekić, *Jugoslavija u Hladnom ratu*, 135. The announcement was given to the British press in London, before his arrival to Belgrade.

The U.S. administration also started to recognize Tito's schism, often defined as 'Titoism', as an "erosive and disintegrating force" in the Soviet sphere, which could be used as a specific signpost for other Soviet satellites to follow.³⁶⁵ This policy was approved by President Truman in December 1949, through the NSC 58/2, which stipulated that the U.S. administration should support "schismatic Communist regimes" in order to displace puppet governments and perhaps even "foster a heretical drifting-away process on the part of the satellite states."³⁶⁶ This policy can be understood within the context of the so-called "strategies of containment", officially presented in March 1947 in a speech which announced the Truman Doctrine, but also as a specific predecessor of a switch to more active policies of NSC 68/2 (April 1950). Among other provisions, such as massive rearmament and general militarization of the Cold War, the NSC 68/2 revealed the "emergence of satellite countries as entities independent of the USSR", as one of most important U.S. foreign policy goals.³⁶⁷

In reality, however, these policies were easier to envision than to implement, and it was only in 1951, that it was truly recognized in the West that Yugoslavia will not fight on the Soviet side in the potential Third World War, while the proverbial signpost strategy proved to be somewhat elusive and perhaps even too ambitious, at

³⁶⁵ Gaddis, *Strategies of Containment*, 67-68.

³⁶⁶ *Foreign Relations of the United States (in further reference FRUS), 1949, Volume V, Eastern Europe; Soviet Union*, eds. William Z. Slany and Rogers P. Churchill (Washington: United States Government Printing Office, 1975), Document 17. For comment on the role of Yugoslavia in strategy and policies defined in the NSC 58/2, see Lees, *Keeping Tito Afloat*, 73.

³⁶⁷ Gaddis, *Strategies of Containment*, 22-23, 67-68; David C. Engerman, "Ideology and the origins of the Cold War, 1917-1962", in: *The Cambridge History of the Cold War. Volume I. Origins*, Melvyn P. Leffler, Odd Arne Westad (eds.) (Cambridge: Cambridge University Press, 2010), 35-39; Melvyn P. Leffler, "The emergence of an American grand strategy, 1945-1952", in: *The Cambridge History of the Cold War. Volume I. Origins*, Melvyn P. Leffler, Odd Arne Westad (eds.) (Cambridge: Cambridge University Press, 2010), 83-85. The Truman Doctrine, and the entire logic of "containment" were based on the Kennan's document "The Sources of Soviet Conduct", a revised version of his famous Long Telegram (1947), and initially aimed at resisting further Soviet expansion, and particularly in the Eastern Mediterranean where the Turkey and Greece have been identified as next Soviet targets. The NSC 68/2, however stressed more active approach, suggesting a massive rearmament, particularly regarding the expansion of the U.S. nuclear arsenal, in order to deter any potential Soviet aggression.

least for the time being.³⁶⁸ Nevertheless, after months of meticulous negotiations, on November 14, 1951, the Military Assistance Act (MAP) was signed in Belgrade between governments of Yugoslavia and the United States. The pact also meant Yugoslav participation in Mutual Defense Aid Program (MDAP), according to which the military equipment requested by Yugoslavia would be provided by the United States, Great Britain and France, while training of Yugoslav pilots and officers was to be organized in the United States.³⁶⁹ This was quickly followed with the signing of the “Economic Cooperation Agreement between the United States of America and the Federal People’s Republic of Yugoslavia” on January 8, 1952, as the first commercial bilateral agreement signed between the U.S. administration and a socialist country after the Second World War.³⁷⁰

This truly was an important milestone in the process of recognition of Yugoslavia as a credible partner of the West. Even though Yugoslavia started to receive significant financial and military aid already during 1950, most of these arrangements, and particularly those regarding transfer of armaments, were executed through covert agreements and operations. According to Lees, part of the problem was Tito’s reluctance to accept official support from the West, trying not to provoke the Soviets, while also maintaining the country’s at least formal independence through strengthening and enhancing its military potential. It was only in the summer of 1951, that the Yugoslav side made an official request for military assistance, expecting an

³⁶⁸ Lees, *Keeping Tito Afloat*, 112. For example, ambitious estimates suggested that ‘Titoist Poland’ scenari might evolve already in 1951, yet it proved to be too ambitious, even though enough dissatisfaction existed in the country. It was expected that the Soviets would intervene militarily as any dissent in the region might jeopardize both East Germany and Czechoslovakia.

³⁶⁹ Bojan Dimitrijević, “The mutual defense aid program in Tito’s Yugoslavia, 1951–1958, and its technical impact,” *The Journal of Slavic Military Studies*, 10:2 (1997), 20; Dimitrijević, *Jugoslavija i NATO*, 10, 36; Vučetić, *Koka-kola socijalizam*, 53.

³⁷⁰ Dragan Bogetić, *Jugoslavija i Zapad, 1952-1955. Jugoslovensko približavanje NATO-u* [Yugoslavia and the West, 1952-1955. Yugoslav approaching to NATO] (Belgrade: Javno preduzeće Službeni list SRJ, 2000), 15-16.

imminent attack by the Soviet satellites, which eventually resulted in the aforementioned signing of the MAP.³⁷¹

After that point, Yugoslavia gradually started to be “incorporated into NATO, through defence co-ordination, arms deliveries, and other military assistance”, thus becoming a crucial partner in NATO’s strategic planning against a possible Soviet attack in Southeastern Europe, the so-called “southern flank” of the European front.³⁷² The high point of cooperation and the “first phase” of incorporation of Yugoslavia into NATO was the signing of a Treaty of Friendship and Assistance in Ankara between Yugoslavia, Greece and Turkey (Ankara Treaty), on February 28, 1953.³⁷³ The treaty obviously had a huge strategic and political importance, and symbolically or even somewhat paradoxically, this may be confirmed by the events in the immediate aftermath of its signing. In a curious twist of fate, roughly 24 hours after the treaty had been signed, Stalin suffered a sudden stroke, and after four days in coma – he died.³⁷⁴

The proverbial icing of the cake of the Yugoslav cooperation with the West, at the time, was Tito’s official visit to London, between March 16 and 21, 1953, during which he had received a direct security guarantees that, in case of the Soviet attack, Yugoslavia would receive full military support. In addition to that, Tito could bask in his great political triumph, since he was shown a great honor and respect during public events, thus emphasizing the importance of his diplomatic mission as the first official

³⁷¹ The “Tripartite Committee on Military Assistance to Yugoslavia”, comprised of the American, British and French staff officers, was established in October 1950, and even though it operated in extreme secrecy, it did provide significant military support to Yugoslavia. More in Bekić, *Jugoslavija u Hladnom ratu*, 231; Bogetić, *Jugoslavija i Zapad, 1952-1955*, 29-30; Lees, *Keeping Tito Afloat*, 92-107.

³⁷² Svetozar Rajak, “The Cold War in the Balkans, 1945-1956”, in: *The Cambridge History of the Cold War. Volume I. Origins*, Melvyn P. Leffler, Odd Arne Westad (eds.) (Cambridge: Cambridge University Press, 2010), 214; Bekić, *Jugoslavija u Hladnom ratu*, 488.

³⁷³ Lees, *Keeping Tito Afloat*, 128; Bogetić, *Jugoslavija i Zapad, 1952-1955*, 13-14.

³⁷⁴ Bekić, *Jugoslavija u Hladnom ratu*, 499.

visit of a communist country representative to the Great Britain, while roughly at the same time, the YPA Chief of Staff, General Peko Dapčević, was visiting Washington.³⁷⁵

These events represented a huge blow to the Soviet Union and an important victory for Yugoslavia after years of fierce resistance to the Soviet threat. Bekić effectively argues that the significant change in the Soviet policies towards Yugoslavia which followed Stalin's death, initially relieved Tito from much of the pressure to further strengthen and enhance cooperation with the West and NATO, but it also sparked doubt in the West that Yugoslavia might return to the Soviet orbit, thus only further raising tensions in these already complicated relations. Nevertheless, the Ankara Treaty eventually evolved into a Treaty of Military Alliance (Balkan Pact) between Yugoslavia, Greece and Turkey, which was officially signed on August 9, 1954, in Bled (Yugoslavia). Considering the strengthening of the NATO's southern flank, the Balkan Pact added an estimated combined force of 70 infantry divisions or roughly 875.000 soldiers to the defense of the NATO's "southern flank".³⁷⁶ Comparable to the formal establishment of the economic cooperation between Yugoslavia and the United States in 1952, and Tito's visit to London in 1953, the Balkan Pact was unique in a similar way, as "the only formal Cold War military alliance with ideologically antagonistic members."³⁷⁷

The logical next step was the Yugoslavia's full membership in the NATO, which would effectively provide deeply desired and still very much needed security for the country, including the NATO nuclear umbrella. However, by the time when

³⁷⁵ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 251.

³⁷⁶ Bekić, *Jugoslavija u Hladnom ratu*, 493, 499. See also Lees, *Keeping Tito Afloat*, 13; Bogetić, *Jugoslavija i Zapad, 1952-1955*, 57. In his later work, Bogetić estimates the strength of the Balkan Pact armies to 1.5 million troops. Dragan Bogetić, "Sjedinjene Američke Države i formiranje Balkanskog pakta 1952-1955", *Arhiv, Časopis Arhiva Jugoslavije*, 2 (2001), 197.

³⁷⁷ Gaddis, *Strategies of Containment*, 208.

the Balkan Pact was formally ratified by all three governments in the following year, it had already become a dead letter.³⁷⁸ Besides Tito's reluctance to formally commit to cooperation with NATO and raise the status of Yugoslavia to a level of a full member, a significant resistance was present among some NATO members during more than a year of negotiations, and particularly in Italy whose leadership was concerned about the impact of this alliance on the resolution of the Trieste Crisis.³⁷⁹ The details about these resistances and strategic calculations will be discussed in the following section, but here it must be stressed that the proverbial final nail in the coffin of the Balkan Pact, eventually was the combined effect of the Yugoslav-Soviet rapprochement in 1955, and the evolving conflict between Greece and Turkey over Cyprus.³⁸⁰

“The pudding is too small”

Bogetić emphasizes that during the entire period between 1948 and 1955, relationship between the West and Yugoslavia was directed by three factors: hypothetical possibility that Yugoslavia might normalize relations with the Soviet Union and effectively return to its orbit; disagreements regarding the Trieste Crisis; and the political importance of the Balkan Pact and the consequent incorporation of Yugoslavia into NATO and its general defense strategy. In addition to that, “ideological animosity” was continuously present on both sides and only further complicated any real negotiations and continuously raised suspicions and fears about the other side's true intentions.³⁸¹

³⁷⁸ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 10.

³⁷⁹ Lees, *Keeping Tito Afloat*, 128-139.

³⁸⁰ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 232-237; Svetozar Rajak, “The Cold War in the Balkans, 1945-1956”, 214-215.

³⁸¹ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 8-10.

Establishment of any form of cooperation within such confines necessarily required very complex diplomatic negotiations in order to even attempt to accommodate all interested parties, which is particularly emphasized in the field of the West European security. Bekić reveals that the U.S. planners were worried that any significant military support or even strong security guarantees to Yugoslavia might actually provoke the Soviet intervention in the Balkans. According to this scenario, their attack on Yugoslavia would then compromise the security of the entire Eastern Mediterranean and potentially even escalate into a global war.³⁸² The opposite impulse came from the U.S. “peripheral defense” strategy in Europe, which meant halting any potential breakthrough of the Soviet Navy’s into the Atlantic Ocean. The focus of this strategy was on European “peripheries,” which required a close cooperation between Norway and Denmark in the European north, and Yugoslavia, Greece and Turkey in the south, as the points from which the pincer movement could be performed against the Soviet forces, should they attempt a direct attack through Central Europe.³⁸³ This only further emphasizes the importance of inclusion of Yugoslavia into NATO strategic planning and membership, but also suggests that the Western partners would be more than willing to make many concessions regarding Yugoslav demands and the country’s specific international position, as was effectively demonstrated both in economic and political-military spheres.

In reality, this was easier said than done. Among the American European partners, both France and Britain were initially very reluctant to dispense with even a very small share of modern armaments which had to be taken from the shared NATO gunstock, judging that it would compromise their own defense, while the Soviets would gain an easy victory in Yugoslavia anyway. Their additional fear was that

³⁸² Bekić, *Jugoslavija u Hladnom ratu*, 135-136.

³⁸³ *Ibid.*, 139-140; Bogetić, *Jugoslavija i Zapad*, 29.

strong military support to Yugoslavia could force the Soviets to redirect any future attack from the Balkans to the “German corridor”, granting the Red Army potentially easy breakthrough to the French border and the English Channel. This must have sounded only too familiar and similar to their experiences in two previous world wars and was taken as a serious threat to their security. Similar feelings were present among the West German leadership who, for obvious reasons, also wanted to avoid such a scenario, while Italy was against any support to Yugoslavia due to ongoing problems with Trieste.³⁸⁴

The Trieste Crisis had been burdening the Yugoslav relations with the West since 1945, when the Yugoslav forces occupied the town and its hinterland during battles in final days of the war.³⁸⁵ The symbolic significance of this problem may be even found in the Churchill’s famous speech in Fulton, Missouri, in March 1946, in which he stretched the “iron curtain” “[f]rom Stettin in the Baltic to Trieste in the Adriatic,” where Trieste indeed was a highly contested and neuralgic zone in the emerging Cold War divisions.³⁸⁶

The negotiations about Trieste did not begin in earnest until 1952/53, when Yugoslavia became recognized as a trustworthy partner of the West, and when other preconditions for the resolution of this crisis had been reached. Given the fact that the U.S. strategy for the European security relied on NATO, in which Italy obviously played a very important role, favorable resolution of the Trieste Crisis would have necessarily further strengthen the Italian position within the alliance and enhance cooperation between NATO members. In addition to that, much of the armaments and other military equipment designated for Yugoslavia had to come from the NATO

³⁸⁴ Bekić, *Jugoslavija u Hladnom ratu*, 135, 138-141. The Yugoslav army captured Trieste on May 1, 1945.

³⁸⁵ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 44.

³⁸⁶ Melvyn P. Leffler, “The emergence of an American grand strategy, 1945-1952”, 72.

stockpiles in Italy or through this country. In their conversations with Tito, the U.S. Ambassador in Belgrade, George V. Allen, and on one occasion even the President Eisenhower, did not shy away from conditioning military and economic support to Yugoslavia with the resolution of the Trieste Crisis, although the U.S. administration constantly had to carefully tiptoe between their own strategic needs, expectations of the Italian side, and Tito's demands.³⁸⁷

Nevertheless, after series of official and secret negotiations between the United States, Great Britain and Italy with Yugoslavia, and after many ups and downs in the process, which in October 1953, brought Yugoslavia and Italy to the brink of the military conflict, the Trieste Crisis was eventually and peacefully resolved on October 5, 1954, when all interested parties signed the London Memorandum.³⁸⁸ Correlation between this event and the creation of the Balkan Pact (August 9, 1954) is only too easy to identify.³⁸⁹ More importantly, the resolution of the Trieste Crisis also shows to what extent did the political environment of the Cold War made all sides very suspicious and careful in accepting even important political/diplomatic victories. The outcome of the long process of incorporating Yugoslavia into NATO strategic planning, which effectively began in 1948, reached its highpoint in 1954, and collapsed in 1955, does confirm that the suspicions were not irrational.

The Yugoslav Communist ideology and political system made the country's recognition as a credible Western partner very challenging and time-consuming. Developments in Vietnam, and particularly the question of the Yugoslav recognition

³⁸⁷ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 45-46; Lees, *Keeping Tito Afloat*, 140.

³⁸⁸ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 124-127, 140-141; Svetozar Rajak, "The Cold War in the Balkans, 1945-1956", 202.

³⁸⁹ Dragan Bogetić, "Sjedinjene Američke Države i formiranje Balkanskog pakta 1952-1955, 197. Bogetić finds the resolution of the Trieste crisis as a key point when the "favorable context" for the establishment of the Balkan Pact, and he also emphasizes that the military aspect of this alliance was less important than its political implications.

of the Ho Chi Minh's government, reveal the complexity of the Yugoslav diplomatic position. Acting upon a Ho Chi Minh's request for such a recognition in February 1950, the Yugoslav political leadership had to balance their keen interest to further undermine the Soviet efforts in this region, anticipating that Ho Chi Minh's request was probably an indirect invitation from Beijing for some sort of a joint effort against the Soviet political pressure, with risks involved in working against the U.S. and French interests in the region and Tito's continuous desire for independence.³⁹⁰

Tito's initiative in Vietnam was very difficult to explain to the American public and Congress, and particularly regarding the fact that Ho Chi Minh was fighting against the regular French forces and their rule in Vietnam. The situation caused quite a stir in diplomatic relations between Yugoslavia and the United States, in which Tito demonstrated his fierce desire for independence and that he would not be bullied by either superpower, while the American side was satisfied to turn the blind eye, focusing on the fact that, having Yugoslavia "as a Communist state independent of both East and West," was of huge importance to the West.³⁹¹ Put in other words, Tito's moves in Vietnam did not undermine the American immediate strategy and goal, to encourage "Titoism" where it seemed promising as a mean "to roll back Soviet influence in the communist world."³⁹²

The estimates about Mao's schism eventually turned out to be wrong, yet careful consideration of the situation lasted for a couple of months during 1950, and it did not grant Yugoslavia much sympathies in the West, even if some understanding of Tito's political moves in that direction had been acknowledged.³⁹³ On the other hand, this episode did reveal that both the U.S. and Yugoslav administrations were capable

³⁹⁰ Bekić, *Jugoslavija u Hladnom ratu*, 143-144

³⁹¹ Allen to Acheson, April 20, 1950, *FRUS*, 1950, 4:1404-7, quoted in Lees, *Keeping Tito Afloat*, 83.

³⁹² Gaddis, *Strategies of Containment*, 68.

³⁹³ Bekić, *Jugoslavija u Hladnom ratu*, 143-145.

of bending the ideological boundaries to a breaking point if it would serve some more immediate real political goals. The American side realized that they will have to accept cooperation with both nationalists and communists within the Soviet sphere in order to undermine it, while Tito obviously understood that he had to accept and even occasionally pursue American strategies where they did not dramatically undermine his own ideological and political position.³⁹⁴ Regarding the Yugoslav recognition of the Ho Chi Minh's government, eventually even the French had to accept that Tito's regime will have to be supported as long as it demonstrates a clear defiance to the Soviet Union.³⁹⁵

The Korean War definitely, even if only temporary, redirected the Soviet focus from Europe to Asia, in what Bekić explains as a "Korean, instead of the Balkan war" scenario.³⁹⁶ Referring to the changed fortunes of Yugoslavia, other authors also confirm that this war, combined with the strong response of the United States and United Nations, "nipped Stalin's pet project in the bud."³⁹⁷ Even so, Dimitrijević reveals that Stalin was continuously shelving and restoring military plans for the attack on Yugoslavia, depending on changing tides of the Korean War.³⁹⁸ At the time, the U.S. military planners also considered that, if the Soviets had decided to expand the war, they would attack Yugoslavia using their East European satellites, and while this explanation was abandoned by the fall of 1950 as unrealistic, it was still expected

³⁹⁴ Gaddis, *Strategies of Containment*, 69; Bekić, *Jugoslavija u Hladnom ratu*, 240.

³⁹⁵ Lees, *Keeping Tito Afloat*, 84.

³⁹⁶ Bekić, *Jugoslavija u Hladnom ratu*, 160.

³⁹⁷ Bela K. Kiraly, "The Aborted Soviet Military Plans Against Tito's Yugoslavia," in Wayne S. Vucinich, ed., *At the Brink of War and Peace: The Tito-Stalin Split in Historic Perspective*, vol. 10 of *War and Society in East Central Europe* (New York: Columbia University Press, 1982), 273-88. Quoted in Lees, *Keeping Tito Afloat*, 100.

³⁹⁸ Dimitrijević, *Jugoslavija i NATO*, 13.

that the Soviet Union could use the war scare in order to “separate the United States from their allies.”³⁹⁹

Detailed plans for the conventional attack on Yugoslavia were indeed prepared and rehearsed on military planning boards and map war-games during 1950 and 1951 in a number of East European countries.⁴⁰⁰ The U.S. Central Intelligence Agency (CIA) even estimated that “an attack in 1951 must be considered a real possibility”, given the fact that Yugoslavia still did not receive any significant military support from the West and that the Soviets might not want to wait for that to happen. The fact that the Soviets were rapidly arming their East European satellites with modern weaponry in this period and supporting the expansion of their armies only fueled existing fears in Yugoslavia, even though this was at least to a certain extent part of the Soviet response to the establishment of the NATO in April 1949.⁴⁰¹

By 1951, the Yugoslav comprehensive military preparations for the Soviet attack were at their height, and even though Lees suggests that these were executed “without panic or publicity”, it is difficult to accept this description as anything more than a political propaganda, carefully crafted by the country’s leadership.⁴⁰² Equally strong reason for panic, at least for some die-hard Yugoslav Communists, was the concern that the United States might topple the country’s socialist regime when convenient, or as a consequence of a direct military intervention in Yugoslavia in case

³⁹⁹ Lees, *Keeping Tito Afloat*, 87.

⁴⁰⁰ Dimitrijević, *Jugoslavija i NATO*, 13-14. Namely, these plans included engagement of the Hungarian, Romanian, Bulgarian, Albanian and even Czechoslovakian and Polish troops, organized to independently perform specific tasks in a major offensive, all under Moscow’s watchful eye. By mid-1950, the satellite forces reached more than 360.000 troops, supported by six Soviet tank divisions with over 1.000 tanks, outnumbering Yugoslav army of 250.000 poorly equipped soldiers. See more in Bekić, *Jugoslavija u Hladnom ratu*, 238-239, and Lees, *Keeping Tito Afloat*, 86-87.

⁴⁰¹ NIE-29, Probability of an Invasion of Yugoslavia in 1951, March 20, 1951, <https://www.cia.gov/library/readingroom/docs/CIA-RDP79R01012A000700040018-0.pdf> (accessed on July 18, 2020). See also Bekić, *Jugoslavija u Hladnom ratu*, 275; Holloway, *Stalin and the Bomb*, 240.

⁴⁰² Lees, *Keeping Tito Afloat*, 99. Lees’s estimation is based on the interview with Leo Mates, a high-ranking, veteran Yugoslav diplomat, conducted in 1988.

of a Soviet attack, which they estimated an even bigger defeat than being forced back under the Stalin's wing.⁴⁰³

Bekić offers an additional perspective and explains that the Yugoslavs understood that future Soviet policies in Europe might be highly dependent on the outcome of the Korean War, judging that no matter who might win, Stalin would be equally encouraged to be more aggressive in Europe. According to this scenario, Stalin obviously had many favorable strategic options to choose from, ranging from limited to full-scale attack on Yugoslavia or West Germany, while Tito's only option was to "deter" the Soviets from attacking by any means, and perhaps redirect their potential aggression to Germany. On the other hand, if Stalin was successful in occupation of Western Europe through the "German corridor", Yugoslavia would be left completely isolated and sooner, rather than later, occupied by the Red Army. Tito's calculation was that in such a scenario, Yugoslavia would probably have to make some kind of an incident, in order to provoke a conflict with the Soviet Union and consequently, a direct military intervention on its soil by the NATO.⁴⁰⁴

Tito and his closest associates estimated that this strategy of diffusing the potential Soviet attack on West Germany would probably save Yugoslavia from eventual Soviet occupation, or at least buy enough time for diplomacy to intervene. This strategy was obviously closely connected to a more complex problem which was on the top of the list of potential Cold War crises, the German Question, but for the Yugoslav political leadership this problem obviously had an additional dimension, and any related disturbances and changes in that part of Europe were deeply contemplated and hotly debated, both within the country and with foreign partners. Put in other

⁴⁰³ Bekić, *Jugoslavija u Hladnom ratu*, 145.

⁴⁰⁴ *Ibid.*, 240-242.

words, it seems that this specific balance of power between West Germany and Yugoslavia, and particularly regarding the Soviet perception of their strength, was one of the most important security challenges for the Yugoslavs; estimating either country as a too weak or too strong link in the NATO's European defense system, the Soviet military planners could choose one of them as a potential point of attack on NATO in Europe, except that for Tito, neither option was acceptable. Analyzed within this context, it is easy to see that maintaining this delicate balance and overall peace in Europe and elsewhere was the only policy that could guarantee the survival of Yugoslavia.

One of the early episodes provides a telling example of this strategy. The beginning of the Korean War in 1950, galvanized the idea of the rearmament of West Germany in Washington, which "relentlessly employed [...] considerable political and economic leverage to bring the other Western allies around to its way of thinking", although this question already had been opened and seriously discussed a few years earlier.⁴⁰⁵ According to Gaddis, in the following five years, before West Germany became the NATO member (May 1955), the biggest challenge to the U.S. diplomacy was "how to subordinate the West Europeans' atavistic fears of the Germans to their all-too-contemporary fears of the Soviet Union".⁴⁰⁶ Tito was equally suspicious about German rearmament and he did not hesitate to transfer these feelings to, then Senator John F. Kennedy, during his visit to Yugoslavia in January 1951. According to the report of the U.S. Ambassador Allen, Tito's concerns were based on his "general left-

⁴⁰⁵ David Clay Large, *Germans to the Front: West German Rearmament in the Adenauer Era* (Chapel Hill: University of North Carolina Press, c1996), 62. The problem was an imbalance in strength of conventional forces in Europe, where in 1948, the Western allies could muster roughly 16 divisions against an estimated force of 84 divisions of the Red Army and satellite countries, in Europe alone. The problem became acute after the Soviets successfully tested the atomic bomb, which broke the U.S. nuclear monopoly, and after Mao's success in China, both in 1949. For detailed evolution of the idea of German rearmament in the late 1940s, see chapter "The Question is Raised", 31-61. See also Gaddis, *Strategies of Containment*, 112.

⁴⁰⁶ Gaddis, *Strategies of Containment*, 112.

wing suspicion of revival of Fascism in western Germany”, although he also reveals that Tito himself, albeit cautiously in favor of the West German rearmament, also suggested that it should only follow the political settlement of the “German problem”, because the opposite order of actions would appear “as dangerously provocative”.⁴⁰⁷

Viewed from the perspective of such a complex political environment and foreign policy challenges, it is easy to see that the only survival option for Yugoslavia was to enhance its military capability to resist the Soviet attack, at least long enough to receive political and military support from the West, or in an ideal case scenario, to completely deter the Soviet Union from attacking. On the other hand, the latter option too had to be very carefully managed since overly powerful deterrence capabilities would be equally dangerous for the Yugoslav security in the longer run, or in case of a wider European conflict, even if only as an indirect consequence. This conclusion adds more life to the often mentioned and almost universally accepted idea, both in scholarship and popular culture, about the Yugoslav strong desire for independence, exemplified in Tito’s crafty balancing of superpowers’ conflicting interests in Yugoslavia during his entire rule, the so-called “policy of equidistance”. Bogetić explains that no such policy was possible, even in its main elements, until Stalin’s death in 1953, because Yugoslavia was more than willing to become incorporated into the NATO defense system, even if only informally, estimating the Soviet Union as its greatest enemy.⁴⁰⁸

In reality, maintenance of the Yugoslav independence was actually the only policy which would guarantee both the country’s security and survival of Tito’s regime. The biggest challenge was that it had to be defined within a very narrow

⁴⁰⁷ Foreign Relations of the United States (in further reference FRUS), 1951, Vol. 4, Part 2, Europe: Political and Economic Developments, Document 373. Also cited in Bekić, *Jugoslavija u Hladnom ratu*, 245.

⁴⁰⁸ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 34.

framework and continuously redefined in response to even the slightest changes in the Cold War balance of powers. This can be understood as an active component of the Yugoslav security policy. Within the given framework, the passive component necessarily had to be the maintenance of the delicate peace and balance of powers between two Cold Warriors, and it could be expected that Yugoslavia would support any and every peaceful initiative which would add to the stability of that balance. Alternatively, Yugoslavia could play the role of the weight that would add to or take from either side in order to establish that balance. Therefore, any related policies in other spheres of life, including any ideological inconsistencies, necessarily had to be regarded as a mere adaptation to this grand strategy. Tito himself was quite capable in explaining these (ideo)logical fallacies:

“Therefore, we constantly have to consider our specific position, and if we find ourselves on the same line with the Western countries, for example regarding aggression, this does not change a thing. We did not lose any of our principledness, since this is in accordance with the struggle to maintain peace.”⁴⁰⁹

The final piece of the Yugoslav security puzzle in the early 1950s is the answer to the question of the importance of developing the nuclear weapons. The problem is that in this period not even superpowers did necessarily have a fully operational strategy for military or political use of these weapons, and it would be highly unlikely that Yugoslavia had anything to offer. Gaddis claims that the Truman administration “had never worked out a clear strategy for deriving political benefits from its possession of nuclear weapons”, although these “devices” were seriously

⁴⁰⁹ *Borba*, February 18, 1951. Quoted in Bekić, *Jugoslavija u Hladnom ratu*, 240.

considered in war planning. Even when he authorized the development of the thermonuclear (hydrogen) bomb, his administration did not want their diplomacy to rely on the public threat to use these weapons.⁴¹⁰ It was only the Eisenhower's "New Look" policy, as defined in late 1953 (NSC-162/2), which relied on the "deterrent of massive retaliatory power" as a tool of diplomacy. Among other things, this policy necessitated the publically expressed willingness to consider the use nuclear weapons in defense of the U.S. interest, considering them "as available for use as other munitions."⁴¹¹

The state of the art in the Soviet strategic thinking was even less developed. Back in 1946, Stalin commented that atomic bombs are "meant to frighten those with weak nerves", in an attempt to show that the Soviet Union would not be intimidated by the U.S. nuclear weapons monopoly.⁴¹² Even after the successful atomic bomb test in 1949, the Soviets were trailing way behind the United States in sheer number of usable weapons and the delivery systems. According to Zaloga, Stalin had started to prepare the Red Army to employ atomic bombs in event of the war in 1953, while the Soviet Air Force started to receive significant number of weapons only in 1954.⁴¹³ Other reasons come from the fact that, until Stalin's death in 1953, the strategic thought was considered to be his own prerogative, while it is also truth that deterrence was considered a political, rather than military concept. Therefore, it should not be

⁴¹⁰ Gaddis, *Strategies of Containment*, 145-146.

⁴¹¹ *Ibid.*, 145-147. Besides the reliance on nuclear weapons as tools of diplomacy, the "New Look" strategy also included other elements, such as alliances, psychological warfare, covert actions and negotiations, as much wider options to counter the perceived Communist threat (for details, see chapter "Eisenhower, Dulles, and the New Look", 125-161)

⁴¹² Holloway, *Stalin and the Bomb*, 253. Stalin expressed his famous opinion in an interview given to Alexander Werth in September 1946.

⁴¹³ Zaloga, *The Kremlin's Nuclear Sword*, 16, 21. In 1953, the Soviet Union had only a dozen usable nuclear weapons, while the U.S. nuclear arsenal could boast with roughly 1,350 weapons with adequate delivery systems.

surprising that was “no Soviet equivalent to the theory of deterrence developed in the United States in the late 1950s and early 1960s.”⁴¹⁴

Dimitrijević explains that the use of atomic bombs against the Soviet Union in case of an attack on Yugoslavia was seriously contemplated by the American military planners, although a nuclear attack on the Soviet satellites in Eastern Europe seemed more realistic, as an effort to avoid the Soviet retaliatory attack on the U.S. soil. Of course, these plans were changing rapidly during the early 1950s, partly due to the changing tides in international politics, including the Korean war, and partly due to estimates about Yugoslav response in case of a major conflict with the Soviet Union in Europe.⁴¹⁵ Tito never was consulted or informed about similar strategic calculations by the U.S. military, yet that he would most likely be very reluctant to accept such a version of the nuclear umbrella strategy in which both Yugoslavia and Soviet satellites would become testing grounds for Soviet and American respective nuclear arsenals.⁴¹⁶

In that period, Yugoslavia was obviously nowhere near to even a theoretical possibility of achieving such a capability, and formulation of any corresponding strategies and policies was equally distant, although it does not mean that they were not at least superficially contemplated. Unfortunately, the lack of access to the archive of the UDB, limits any analysis of these issues. Nevertheless, limited available evidence does reveal that diplomatic value and strategic importance of nuclear weapons was understood, at least on the basic level. According to Bekić, during the aforementioned meeting between Tito and Senator John F. Kennedy in Belgrade, January 1951, Leo Mates contemplated about the potential war between the United

⁴¹⁴ Holloway, *The Soviet Union and the Arms Race*, 28, 32-33. Holloway also argues here that the Soviet concept of deterrence is considered differently and more broadly than in the United States, and can mean both “containment” and “deterrence”, instead of almost exclusively in terms of the balance of armaments between the two sides.

⁴¹⁵ Dimitrijević, *Jugoslavija i NATO*, 23-24.

⁴¹⁶ *Ibid.*

States and Soviet Union and speculated that a highly centralized state is particularly vulnerable to an attack to its center, suggesting that a global war would easily have a favorable outcome in case of the U.S. nuclear attack on Moscow.⁴¹⁷ While this episode falls into a category of general diplomatic parlaying, it does show that at the time of desperation and anticipation of the imminent Soviet attack in 1951, the Yugoslav political leadership was contemplating a potential solution to their woes, at least as a support for a potential American nuclear attack on Moscow, although probably more on a level of wishful thinking.

Similarly, in the beginning of 1953, at the time of heated debates about the resolution of the Trieste Crisis, creation of the Balkan Pact, and the U.S. financial and military support to Yugoslavia, an indication of an additional Yugoslav strategy revealed itself. During a meeting with Allen, the U.S. Ambassador in Belgrade, Tito emphasized that in case of the inadequate support, Yugoslavia would have to “mobilize our [Yugoslav] internal strengths and capacities”, which seems to have included a very gentle and indirect signal that Yugoslavia might be forced to develop nuclear weapons, as it is difficult to understand which other internal capacities would be even remotely sufficient to counter the Soviet threat.⁴¹⁸ The U.S. Army attaché in Greece had no such doubts. In one of his reports from January 23, 1954, he was convinced that “the Yugoslavs have commenced a program to produce atomic weapons.”⁴¹⁹ This question will be analyzed in more details in the following section and chapters, but here it is important to emphasize that this policy, which for the lack of better phrases could be defined as nuclear bluffing/hedging. It seem to have been designed by Tito and his closest associates, and had been implemented first in the

⁴¹⁷ Bekić, *Jugoslavija u Hladnom ratu*, 245.

⁴¹⁸ AJ, 837, I-2/108, January 7, 1953. Quoted in, Bekić, *Jugoslavija u Hladnom ratu*, 491.

⁴¹⁹ Koch, “Yugoslavia’s Nuclear Legacy: Should We Worry?”, 124.

international arena back in 1949, by General Peko Dapčević, the Deputy Chief of Staff of the JNA.

Commenting on the amount of the financial and military support Yugoslavia had received by 1953, on one occasion Tito half-jokingly said to the U.S. Ambassador, Allen, that “the pudding is too small”.⁴²⁰ Without an actual capacity to produce the necessary arms independently, he could rely only on the cooperation with the United States and West European countries, with all related clauses, conditions and demands, exemplified in the resolution of the Trieste Crisis and the establishment of the Balkan Pact. If there was anything that Tito had learned was that strong and well balanced deterrence capability was necessary for the stability of his regime and the country’s independence, and with inadequate U.S. support in development of the powerful conventional army as a deterrence, it seems that he also played with the idea that the atomic bomb could actually work as the Yugoslav version of the “more bang for the buck” scenario. Proverbial opposite side of that coin was the Yugoslav strong insistence on supporting any international peace initiative, part of which included support to the UN system of collective security.

⁴²⁰ Bekić, *Jugoslavija u Hladnom ratu*, 489.

2.4 By Hook or by Crook or by Industrial Espionage: International Cooperation and Technology Transfer

*“We were forced to turn to the Western people,
where progressive people also live;
we turned to them and said:
we are alone, we are suffering, we need help.”⁴²¹*

With education in mathematics and physics, even if without a formal degree, a significant background as a proven communist before and after the war, and obviously an extended experience in intelligence sector, in 1952 Dedijer succeeded Nakićenović as the director of the IBK, where his main task was to supervise the atomic bomb project and especially to monitor and report about Savić’s activities, who was still considered suspicious because of the apparent slowness of his work on the bomb.⁴²² While this basic scenario is confirmed by various sources, particularly regarding Savić’s open opposition regarding the atomic bomb project, it seems more likely that, at the time, Dedijer was considered the most trustworthy politician among physicists and *vice versa*, capable to perform his duty of a link between the nuclear establishment and scientific sector, in a way comparable to roles played by Robert Oppenheimer in the Manhattan Project, and Igor Kurchatov in the Soviet atomic bomb project.

⁴²¹ Josip Broz Tito, *Govori i članci*, knj. 6, 10.III 1951-21.XII 1951 [Speeches and Articles, Vol. 6, March 10-December 31, 1951] (Zagreb: Naprijed, 1959), 164-165. Quoted in Dimitrijević, *Jugoslavija i NATO*, 27.

⁴²² Dedijer, *Stevan Dedijer*, 177; Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 16.

This was particularly important since the clash between Savić and the decision-makers had shown that they desperately needed a scientist who could be entrusted with development of the central institute in Vinča, capable manager, and a politician who would be keen, or minimally obedient enough, to work on the atomic bomb project. In addition to that, it seems that after Savić's links with the Soviet science were cut-off even before 1948, while his French connection was effectively exhausted with the arrival of Walen, predominantly due to the Joliot-Curie's unreserved support to Stalin, a different person was needed to establish contacts with the West as the only available source of desperately needed technologies and equipment.⁴²³ Dedijer was probably the best, if not the only person in Yugoslavia who could cover all ends.

While Yugoslavia could potentially rely on cooperation with the West European socialists as a specific backdoor to the West, as was the case with Walen, considering much greater ambitions of the Yugoslav nuclear establishment, this partnership had to be established on a much more solid basis. The security concerns were the glowing hot topic among the Yugoslav politicians, although much bigger problem was relatively slow and very gradual recognition of Yugoslavia as a credible partner of the West, further complicated by Tito's strong reluctance to fully commit to such cooperation, even in the direst times. This was clearly visible in the process of integration of Yugoslavia into NATO's military plans, and it would be expected that in the field of nuclear technology hesitance in the West would be even greater. Pressed for concrete results, industrial espionage would be the only option to quickly and effectively overcome these obstacles, and in this setting, Dedijer's experience in intelligence sector was an important additional asset.

⁴²³ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 80.

One accelerator, one mass spectrometer and one spy

At one occasion in early 1951, Anton Peterlin, one of the leading physicists in Yugoslavia and the director of the IJS in Ljubljana, officially approached the British Metropolitan-Vickers company with the request to purchase “one accelerator, linear or circular, one mass spectrometer (not specified), one electron microscope and one electron diffraction outfit.”⁴²⁴ In the communication with the British Foreign Office regarding these requests from Yugoslavia, the Ministry of Supply (Division of Atomic Energy) raised the question “to which side of the iron curtain Yugoslavia was now considered to be” and if they should approve this transaction and similar arrangements in the future. The Foreign Office denied the export license, commenting that, although the ban on sale of weapons to Yugoslavia had been lifted “because we [Foreign Office] wanted to do nothing to impede the Yugoslavs building up their defences against a Cominform attack”, the equipment in question “is for research purposes and could only enable Yugoslavia to produce atomic weapons in the very long term,” which “would not assist her to meet the present threat.” Interestingly enough, it was also added that “[t]his is quite apart from the question of the desirability of Yugoslavia being allowed to make atomic weapons at all.”⁴²⁵

The British Foreign Office was obviously not completely convinced about the Yugoslav plans in the nuclear sphere, nor in their honesty regarding the split with the Soviet Union. Therefore, it is not surprising that their biggest fear was that this equipment could “fall into the hands of the Russians”, and that for the same reason they would even “hesitate to supply it to other countries in the ‘front line’, such as Finland, Norway, Austria, Greece or Turkey, some of whom may have grater claims

⁴²⁴ The National Archives (NA), Foreign Office (FO), 371/93220. Consideration of proposed supply of certain atomic energy equipment to Yugoslavia. Code GE file 20

⁴²⁵ *Ibid.*

on our indulgence than Yugoslavia”. It is also important to notice that the U.S. Atomic Energy Commission was immediately informed about this Yugoslav request and that they shared the opinion of their British colleagues.⁴²⁶ This seem to have been a general practice of the British Government at the time, at least regarding their relationship with Yugoslavia. In January 1951, Đilas went on a secret mission to London, where he met with the Prime Minister Attlee. However, his request for secret deliveries of modern armaments for the YPA was not met with equal enthusiasm and the decision was postponed until agreement was reached with the U.S. Government.⁴²⁷ Nevertheless, few months after, even the Foreign Office had changed their decision regarding the Peterlin’s shopping list and suggested that the necessary export licenses should be granted, realizing that their initial refusal made them appear “in an unfavourable light to Yugoslavian scientists.”⁴²⁸

One of the U.S. NSC reports form early 1954, reveals the true nature of this strenuous cooperation between Yugoslavia and the West regarding the cooperation in the nuclear field. The document recognizes the “Tito heresy” as “an important asset” of the West, since it was “the first defection of a Communist Government from the Soviet orbit”, which was the main reason why Yugoslavia received economic and military support from the United States, United Kingdom and France. Even though some hurdles in this relationship have been recognized, the main conclusion about future courses of action was that the West should, among other suggestions, “[c]ontinue to provide military aid to Yugoslavia, where possible and appropriate in concert with the U.K. and France”, but that it should also “[c]ontinue to deny to

⁴²⁶ The National Archives (NA), Foreign Office (FO), 371/93220. Consideration of proposed supply of certain atomic energy equipment to Yugoslavia. Code GE file 20. The only country in which Great Britain exported similar equipment at the time was Belgium.

⁴²⁷ Dimitrijević, *Jugoslavija i NATO*, 14.

⁴²⁸ The National Archives (NA), Foreign Office (FO), 371/93220. Consideration of proposed supply of certain atomic energy equipment to Yugoslavia. Code GE file 20.

Yugoslavia, materials and equipment judged to be for use in an advanced atomic energy program”. The document also suggests that the U.S. Atomic Energy Commission should be given “discretionary authority as regards the licensing for export to Yugoslavia of reasonable quantities of materials and equipment” which could be used for basic research and “source material (e.g. *uranium*) exploration”, as well as for medical or “normal industrial use”.⁴²⁹

Unsurprisingly, the situation changed dramatically only a few days after the Balkan Pact had been officially signed (August 9, 1954). According to the Memorandum prepared by the Chairman of the Operations Coordinating Board Working Group on Yugoslavia, from August 18, 1954, one of the suggestions for the U.S. Department of State was to “[e]xplore with AEC [Atomic Energy Commission] and such other Governmental authorities [...], the possibility of including Yugoslavia amongst those nations to cooperate in the President’s proposed organization to exploit the peaceful uses of atomic energy.”⁴³⁰ The initiative referred to in this document is President Eisenhower’s Atoms for Peace program, and while the Yugoslav participation in it will be discussed in details in the next chapter, here it should be emphasized that Yugoslavia obviously could not count on any meaningful support from the West in the field of nuclear science and technology until late 1954, when the country effectively, even if indirectly, became the member of the NATO. This actually left very small amount of time for such a cooperation to be established, as the rapprochement with the Soviet Union was only months away.

⁴²⁹ *FRUS, 1952-1954, Volume VIII, Eastern Europe; Soviet Union; Eastern Mediterranean*, eds. William Z. Slany et al., (Washington: United States Government Printing Office, 1988), Document 688.

⁴³⁰ *FRUS, 1952-1954, Volume VIII, Eastern Europe; Soviet Union; Eastern Mediterranean*, eds. William Z. Slany et al., (Washington: United States Government Printing Office, 1988), Document 700. The aforementioned sections were actually drafted on August 13, 1954.

Pavle Savić and other leading scientists were obviously under great pressure to rapidly produce some tangible results, and it may be argued that, in the given circumstances, the only option left for the Yugoslav nuclear establishment was to turn to industrial espionage and other related covert activities in the West. The situation was further complicated by the fact that any such cooperation was under the control of the U.S. administration and the AEC, with its extended reach even in the Great Britain, as a country with the most advanced nuclear program outside the United States, disregarding the Soviet Union which was, at the time, sealed off to any form of cooperation with Yugoslavia in any field. Organization of any covert activities in the West, therefore, had to be planned very carefully as there were only a few options to choose from. On the other hand, it may also be argued that Tito had a particular interest to advertise his nuclear ambitions, as was demonstrated in a couple of occasions earlier, in order to use them as a silent, but lingering argument of the Yugoslav diplomacy for achieving some more immediate and conventional goals.

Considering what had been said about the establishment of the IJS in Ljubljana, its designed position and role in the Yugoslav nuclear program, and the general political structure of Yugoslavia at the time, it would be impossible that Peterlin operated independently on any level in his 1951 failed request for sensitive equipment from the British companies. At the time when even support in conventional armaments was negotiated covertly, Peterlin's request can only be understood as a part of the carefully crafted plan, to try to acquire necessary equipment for the IJS through a simple commercial agreement, and even if it fails, to simultaneously signal the Western partners that Yugoslavia is on the path of the rapid development of its nuclear capacity. The Foreign Office definitively was contemplating this option, even if only as a relatively distant possibility.

Alternative option would be that the entire Yugoslav nuclear program was so poorly managed that the entire state apparatus, including the UDB, could not maintain the even the basic security standards necessary for such a high-priority and secret program. Hymans supports this option, explaining that, “whereas China’s nuclear program was brilliantly managed, Yugoslavia’s was not”, which led the entire program “to unprofessionalism and ultimately to nuclear inefficiency.”⁴³¹ The episode with the Peterlin’s purchase list also reveals that, even if the sale of the requested equipment was to be approved, and if the risk of it being misused in any way became too high, the British side had an option to intervene immediately. As it was suggested, “in certain eventualities”, the sensitive equipment “can readily be destroyed”, although it was not mentioned how, nor by whom.⁴³² The UDB was controlling every aspect of the nuclear program, therefore, it may be argued that the “unprofessionalism” and “inefficiency”, are the accusations that should be directed to the Yugoslav security sector, in which the British had planted at least one agent who had, or would have the access to this equipment if necessary. This obviously had to be a medium to high-ranking scientist or someone more or less equal in the managing or security sector, working in Yugoslav nuclear facilities, or particularly the IJS in Ljubljana, but the available sources do not reveal any details.

The Great Embassy of Dedijer

While the United States tried to maintain the strict control, if not a complete monopoly over the dissemination of nuclear materials, technology and related knowledge, at the time when no international control mechanisms in this field existed,

⁴³¹ Hymans, *Achieving Nuclear Ambitions*, 176.

⁴³² The National Archives (TNA), Foreign Office (FO), 371/93220. Consideration of proposed supply of certain atomic energy equipment to Yugoslavia. Code GE file 20.

independent and often informal networks of scientists and institutions among aspiring nations were being created to fill this gap. One of surprising leaders in that respect during the late 1940s and early 1950s was Norway.⁴³³ According to Forland, the Norwegian early prominence in this field was based on “its indigenous production of heavy water and its early acquisition of basic nuclear technology and know-how”. The country’s nuclear program was led by a young astrophysicist Gunnar Randers, who was the first director of the Physics Division of the Norwegian Defense Research Establishment (*Forsvarets forsknings institutt* - FFI), established in January 1946 in Kjeller, near Oslo, and from 1948 the director of the newly established Institute for Atomic Research (IFA) in the vicinity of the FFI. Randers was also the initiator of the project for the construction of the first Norwegian nuclear reactor, which went critical in 1951, thus putting Norway on the map as the sixth country in the world to construct a nuclear reactor.⁴³⁴

Both Yugoslavia and Norway shared many interests for the establishment of cooperation in political and other fields. In the early 1950s, the Yugoslav political leadership found it difficult to publically justify and defend their direct and firm cooperation with the ‘capitalist’ West. The best available alternative was to promote the cooperation with the West European socialist parties, and particularly the British Labour Party, French Socialists (SFIO), German Social-Democratic Party (SDP), as well as the Swedish and Norwegian socialists. Serious activities in that direction began already in 1950, and their importance may be observed in the fact that they were led by Milovan Đilas, the President of the Commission for International

⁴³³ Astrid Forland, “Norway’s Nuclear Odyssey: From Optimistic Proponent to Nonproliferator”, *The Nonproliferation Review*, (Winter 1997): 1-16.

⁴³⁴ Forland, “Norway’s Nuclear Odyssey”, 1, 6.

Relations of the Central Committee of the Communist Party of Yugoslavia.⁴³⁵ This effort was actually part of the much wider Yugoslav strategy of taking the initiative in organizing cooperation with West European socialists, exploiting its obvious advantage at that time and taking the advisory role in that network.⁴³⁶ One of the early successes in implementation of this strategy was the reconstitution of the Socialist International in July 1951, when the Communist Party of Yugoslavia was accepted as a member, thus paving the way for further cooperation with the West European socialists.⁴³⁷

The Norwegian Labor Party (*Det norske Arbeiderparti* - DNA) was in stable power in the country since 1935 (except for the period 1940-1945), and according to the Yugoslav sources, they had already experienced their own '1948' back in 1923, when they had split with Comintern, all of which made them open for cooperation with the Yugoslav comrades and equally sympathetic to their efforts for independence. Haakon Lie, one of the leading DNA officials, strongly supported the Yugoslav admittance to the Socialist International (with Swedish and Swiss representatives following the suit), while the DNA representatives were the first among the West European socialists to officially visit Yugoslavia in October 1951.⁴³⁸ These were the early examples of close cooperation between Yugoslavia and Norway, but it is important to emphasize that this backdoor communication with the West was

⁴³⁵ Aleksandar V. Miletić, "Unrealised Nordic Dream. Milovan Đilas and the Scandinavian Socialists", *Tokovi istorije* 3 (2015), 89-91.

⁴³⁶ Bekić, *Jugoslavija u Hladnom ratu*, 164-165.

⁴³⁷ Nikola Mijatov, *Milovan Đilas i evropski socijalisti* [Milovan Đilas and the European Socialists], University of Belgrade, Faculty of Philosophy, Department of History (MA Thesis, June 2015), 33-40. For a detailed analysis of the process of reconstitution of the International, see Talbot C. Imlay, *The Practice of Socialist Internationalism: European Socialists and International Politics, 1914-1960* (Oxford: Oxford University Press, 2018), 263-308.

⁴³⁸ Mijatov, *Milovan Đilas i evropski socijalisti*, 38, 71-72; "Information in English. Information about The Norwegian Labor Party", <https://www.arbeiderpartiet.no/om/information-in-english/>, accessed on November 25, 2020. The high point of the cooperation between the Yugoslav and Norwegian ruling parties was supposed to be the Đilas's official visit to Norway, Sweden and Denmark in February 1954, yet it was never realized due to his political demise earlier that year. More in Miletić, "Unrealised Nordic Dream", 94-96.

obviously much easier to establish and maintain, compared to the official diplomatic channels, and it provided almost immediate results.⁴³⁹

In his memoirs, Dedijer explains that he became interested in Norwegian nuclear program and Randers's own research after he read a scientific article about their successful construction of the first nuclear reactor in Norway in 1951. Understanding that the potential cooperation with the IFA in Kjeller, as well as with other West European institutes would be highly beneficial for the Yugoslav nuclear program, he suggested to Savić that a field trip to "European nuclear centers in France, Italy, Britain, Germany and Norway" should be organized for directors of Yugoslav nuclear institutes. Soon enough, Savić, Peterlin, Supek and Dedijer visited nuclear research facilities in Harwell (Great Britain), Saclay Nuclear Research Center (France), "Heisenberg's institute in Göttingen" (West Germany), Institute for Atomic Energy (IFA) in Kjeller (Norway) and the KTH Royal Institute of Technology in Stockholm (Sweden).⁴⁴⁰

It is not clear when this field trip was organized, although Dedijer insists that his official role was still of a "researcher in Vinča", which would suggest the period between mid-1950 and the first half of 1952, although some later date seem more probable, particularly considering the relation with the Norwegian nuclear reactor, as well as the Yugoslav membership in Socialist International.⁴⁴¹ Throughout his autobiography, Dedijer downplays his role within the nuclear program and even avoids to mention that he ever was the director of the IBK in Vinča, although the

⁴³⁹ In 1953, the Norwegian Government joined the World Bank and U.S. Government initiative to financially support Yugoslavia and independently provided an additional loan. Bekić, *Jugoslavija u Hladnom ratu*, 502; Bogetić, *Jugoslavija i Zapad, 1952-1955*, 55-56.

⁴⁴⁰ Dedijer, *Stevan Dedijer*, 183-184.

⁴⁴¹ *Ibid.*, 184. Some sources put the date of this trip to the end of 1950, Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 81. CIA, Information Report, Atomic Research Institute at Vinca, May 28, 1953 <https://www.cia.gov/readingroom/document/cia-rdp80-00810a001400230006-5> (accessed on January 5, 2021). The document suggests that Dedijer "toured nuclear institutes" with Savić in February 1952, but the details about which nuclear institutes they visited are classified.

simple fact that he successfully organized the tour of West European nuclear facilities, strongly suggest that, even without an official position within the Yugoslav nuclear establishment, he could still enjoy all the related powers and privileges. Sent to the IBK by Đilas with a specific task to control Savić's activities and speed up work on the bomb, it seems that Dedijer was achieving some decent results and very quickly. His initial low-ranking position indirectly confirms that the UDB wanted to mask his true role, and his eventual appointment to a position of the director of the IBK in mid-1952, may have become a necessary move after formal contacts with West European institutes had been established.⁴⁴²

Early contacts with the Norwegian nuclear program and their scientists, combined with their government's general friendly attitude towards Yugoslavia, seem to have provided Dedijer a solution to many puzzles he was supposed to solve. Similar to the experience of the Yugoslav scientists, their Norwegian colleagues were also very disappointed with Great Britain, and their Ministry of Supply, which denied them all requests for assistance in developing the reactor in Kjeller, during the late 1940s. This may be one of the reasons why Gunnar Randers openly "advocated a total openness regarding nuclear research and development", expecting that this would eventually force the United States to abandon its monopolistic and secretive policies regarding the international cooperation in the peaceful uses of nuclear energy. In addition to that, without adequate domestic sources of uranium, or a possibility to purchase it in the international market, Norway was forced to rely on support from other countries. By 1950, formal cooperation with both France and the Netherlands had already been established, and even though the sources do not reveal if similar

⁴⁴² The problem may also be quite trivial. If Dedijer never graduated from Princeton, it would have been very offensive to Savić and other scientists if he became the director of the country's leading nuclear institute. At the time when he eventually rose to this position, the results of his activities may have been too important to ignore. Even so, the episode confirms that the UDB and Ranković had a firm grip over the nuclear program.

communication had been established with Yugoslavia, it must have been at least seriously contemplated.⁴⁴³

Norwegian main bargaining chip in cooperation with other countries in the nuclear field was their capacity to produce heavy water in quantities, and Yugoslav authorities were quick to sample this option as the first attempt to establish meaningful cooperation. In late 1951, Yugoslavia acquired the initial amount of 400 grams of heavy water from the Norwegian *Norsk Hydroelektrisk* company. The entire deal had been arranged through the Yugoslav Embassy in Norway, which purchased the heavy water, and the Council for Science and Culture of the Yugoslav Government, which had the task to transfer it to the Institute for Physics (IBK) in Vinča. Part of the Yugoslav strategy to hide the final destination of the heavy water was to stress in their request that this amount would be divided among many institutions in Yugoslavia, since this was a federal country, yet the problem emerged when *Norsk Hydroelektrisk* requested a list of recipients for their merchandise.⁴⁴⁴

According to existing documents, the Norwegian side was quite happy to accept even “fictional recipients”, and it was actually the Yugoslav bureaucracy that mistakenly broke the secrecy by sending them the exact names and personal information of people from the Institute for Physics in Vinča who handled this exchange. The sheer amateurism of this transaction was duly noted by the Yugoslav Embassy in Norway, which insisted that “it is not irrelevant who and how much knows about our purchases of heavy water, and least of all, to which institute this water is sent to”, and that any further commercial agreements regarding such sensitive

⁴⁴³ Forland, “Norway’s Nuclear Odyssey”. 6-8.

⁴⁴⁴ AJ, 317, f. 7-18-21. Izveštaj poslanstva FNRJ u Norveškoj Savetu za nauku i kulturu Vlade FNRJ, October 1, 1951.

materials should be considered as a top secret.⁴⁴⁵ Unfortunately for the Yugoslav side, it seems that the UDB and Ranković's strong desire to maintain high security standards, not only compromised apparent secrecy of the entire nuclear program, but also undermined future efforts. According to Dedijer, in 1953 he coauthored a report with Savić and Walen, which openly criticized "Yugoslav bureaucracy and the secrecy policy" as main reasons for the failure to purchase larger quantities of heavy water in Norway.⁴⁴⁶

The main achievement of the Dedijer's field trip to nuclear facilities in Western Europe was that he managed to agree with Gunnar Randers in Kjeller and Manne Sieghban in Stockholm to accept one student each from the IBK in Vinča for specializations.⁴⁴⁷ According to memories of Milorad Mladenović, he was the first Yugoslav scientist sent for specialization to the Nobel Institute in Stockholm (Sweden) in 1952, where he worked on development of a number of instruments necessary for the Yugoslav nuclear program, and where in 1954 he eventually defended his doctoral dissertation, thus becoming the first in the new generation of scientist employed by the IBK in Vinča with the doctoral title in nuclear physics.⁴⁴⁸ In reality, however, Mladenović was a trusted "cadre" with ample wartime experience in cover activities and with deep personal relations with Nakićenović and Savić,

⁴⁴⁵ AJ, 317, f. 7- 18-21. Izveštaj Poslanstva FNRJ u Norveškoj, December 3, 1951.

⁴⁴⁶ Dedijer, *Stevan Dedijer*, 187; Bondžić, *Između ambicija i iluzija*, 109.

⁴⁴⁷ Dedijer, *Stevan Dedijer*, 184.

⁴⁴⁸ Jevtić, *Razgovori sa Vinčancima*, 80, 99; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 84, 330. Dušan Mitrović was the first representative of the new generation of the IBK scientists. He defended his dissertation in mathematics in 1953. Together with physicist Rajko Tomović, in 1959/60, he developed the first electronic computer in Yugoslavia. More in: Marko Miljković, "CER Computers as Weapons of Mass Disruption: The Yugoslav Computer Industry in the 1960s", *Godišnjak za društvenu istoriju* 2 (2017): 99-123.

probably also with Dedijer, and it should not come as a surprise that he performed a number of secret operations in Sweden.⁴⁴⁹

According to his own testimony, at the Nobel Institute he worked on development and construction of beta-spectrometers with Manne Siegbahn, a Nobel Prize winner in physics in 1924, and the director of the institute's Department of Physics. In addition to his research, Mladenović also managed to exploit his close relations with Siegbahn to secretly purchase sensitive materials and equipment that were blacklisted, although it is impossible to say if Siegbahn participated in this willingly or to what extent.⁴⁵⁰ The scheme worked perfectly. Yugoslav government would transfer the funds to Walen's bank account in Switzerland that Mladenović was authorized to use to purchase "chemicals" ordered for the Nobel Institute by Siegbahn. These "chemicals" would then be transferred from the Nobel Institute to the Yugoslav Embassy in Stockholm and sent to Yugoslavia in a diplomatic pouch.⁴⁵¹ There are no records about the type or amount of "chemicals" purchased and covertly sent to Yugoslavia this way, but the fact remains that these materials Yugoslavia could not legally purchase on the global market.

The biography and activities of Dragoslav Popović, the second Yugoslav scientist sent for specialization abroad, are even more interesting and revealing. Popović graduated from the School of Electrical Engineering in Belgrade in July 1951, and already in October 1952, he was sent to the IFA in Kjeller (Norway), where he specialized in reactor physics for almost two years, returning to the IBK in Vinča in

⁴⁴⁹ Mladenović was trained during the war by the OSS as a paratrooper. He returned to Yugoslavia in 1944 to work as a radio-telegrapher and maintain communication between Yugoslav partisans and the Allied troops in Italy. After the war, he started studying physics and by 1948 he was employed in the newly established Physical Laboratory of the Institute for Physics (IBK) in Vinča, where Walen was his immediate supervisor. Jevtić, *Razgovori sa Vinčancima*, 79, 90-91, 96.

⁴⁵⁰ Jevtić, *Razgovori sa Vinčancima*, 99; Nobelprize.org, "Manne Siegbahn-Biographical," https://www.nobelprize.org/nobel_prizes/physics/laureates/1924/siegbahn-bio.html, accessed on March 2, 2018.

⁴⁵¹ Jevtić, *Razgovori sa Vinčancima*, 99.

August 1954.⁴⁵² Besides his regular activities, some sources suspect that in 1953 he managed to smuggle back to Yugoslavia “a quantity of highly enriched uranium.”⁴⁵³ Existing records reveal that, at some point in 1953, Popović did receive “separated uranium 235” from “the Dutch”, who wanted to support his research, apparently being impressed with his results. Unsurprisingly, records do not reveal how and if Popović managed to transport weapons-grade uranium to Yugoslavia.⁴⁵⁴ If he did, it seems probable that the diplomatic pouch was once again utilized for the purpose. This story also strongly suggests that “chemicals” sent by Mladenović may have been equally sensitive and restricted, but the real truth will probably never be known.

Popović’s activities in Kjeller included research in “area which is classified by atomic commissions of the USA, England and Canada”, mostly related to some characteristics of uranium 235, important for construction of nuclear weapons.⁴⁵⁵ Working in close collaboration with Randers, Popović may have been influenced by his “openness” strategy, which aimed in breaking the U.S. monopoly. During 1953 and 1954, he published several scientific articles which revealed many of otherwise highly classified information, causing quite a stir in the international scientific community.⁴⁵⁶ It would be difficult to measure the impact of his research on Eisenhower administration’s changed attitude regarding cooperation with developing nations’ in peaceful uses of nuclear energy, exemplified in the Atoms for Peace program, which was Randers’s general plan, but the fact remains that previously

⁴⁵² AJ, 318, f. 213-302. Promotion of Dragoslav Popović to the rank of Expert Associate of the Institute for the Research on the Structure of Matter, November 2, 1954; AJ, 318, f. 214-303-304. Official Records of Dr Dragoslav Popović, August 12, 1955.

⁴⁵³ Potter, Miljanić, Šlaus, “Tito’s Nuclear Legacy”, 65; Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 256.

⁴⁵⁴ AJ, 318, f. 213-302. Promotion of Dragoslav Popović to the rank of Expert Associate of the Institute for the Research on the Structure of Matter, November 2, 1954.

⁴⁵⁵ *Ibid.*

⁴⁵⁶ *Ibid.*

classified knowledge was acquired independently and shared globally by an unlikely candidate.

Another component of Dedijer's clever scheme was that Popović published almost all of his problematic articles in Western scientific journals, and as a representative of the institute in Kjeller, not the Yugoslav IBK. Of course, it would be only too easy to identify his Yugoslav background, but it is also a fact that his specialization at the IFA was initially supposed to last only three months, and was only gradually extended to almost full two years, all funded by the IFA. In other words, nothing suggested that he would ever return to Yugoslavia.⁴⁵⁷ This setting also allowed Popović to participate in a number of international conferences, but more importantly, during 1953 and 1954, as a representative of the IFA he organized his own 'Great Embassy' and visited nuclear institutes and research facilities in Denmark, Sweden, West Germany, Belgium, France, Switzerland, Italy and the United States, where he toured the U.S. national laboratories in Brookhaven, Oak Ridge and Argonne. From these trips he "brought to this institute [IBK in Vinča] useful information and invaluable contacts", while he also took some time to intervene against "certain discrimination against Yugoslavia regarding procurement of publications and purchasing materials in the USA."⁴⁵⁸

Mladenović and Popović were followed by dozens of scientists sent to Western universities and institutes for specializations and training in their respective fields of expertise. According to the official records, by 1954 exactly 47 Yugoslav scientists were sent for specializations abroad, with additional 92 who participated in international conferences, conducted short research trips and visited various scientific

⁴⁵⁷ AJ, 318, f. 213-302. Promotion of Dragoslav Popović to the rank of Expert Associate of the Institute for the Research on the Structure of Matter, November 2, 1954.

⁴⁵⁸ *Ibid.*

conventions.⁴⁵⁹ The numbers do seem relatively negligent, but it has to be considered that until the First International Conference on Atomic Energy, held in Geneva in 1955, Yugoslavia had very few options for international cooperation, “limited to specialization of small number of experts on strictly defined topic in a handful of centers abroad.”⁴⁶⁰ Nor did Yugoslavia have much scientists to send abroad, regardless of the purpose, availability or openness of various foreign research centers. According to official records, in 1953 the IBK in Vinča employed only 79 scientists of various field and level of expertise, while the combined scientific force of under the supervision of the KPNI was 276.⁴⁶¹

The number of scientists engaged in the Yugoslav nuclear program rose dramatically in following years (to 1,059 in 1959), but here it is important to emphasize that from the very beginning a significant number of them were sent abroad to specialize in different fields, which seems to have been the main strategy for acquiring knowledge.⁴⁶² Some of them were obviously engaged in industrial espionage or certain informal diplomatic tasks, but it is clear that this strategy continued to be pursued, that it produced very good results, at least initially. It is also evident that the Yugoslav nuclear espionage network was cast much wider and employed more aggressively than it would be expected from a relatively small and underdeveloped nation. The first two Yugoslav scientists sent abroad, eventually returned home to take important positions at the IBK in Vinča. Mladenović became the Director of the Physical Laboratory after Walen returned to France in 1954, and in the following years became the leading scientist for development of nuclear

⁴⁵⁹ Nakićenović, *Nuklearna energija u Jugoslaviji*, 97-99. Beside Sweden and Denmark, Yugoslav scientists were also sent to France, Great Britain, Belgium, Switzerland, Denmark, Federal Republic of Germany and the United States.

⁴⁶⁰ Nakićenović, *Nuklearna energija u Jugoslaviji*, 98.

⁴⁶¹ AJ, 318, f. 213-302. The Number of Scientific Cadres, May 19, 1953; Nakićenović, *Nuklearna energija u Jugoslaviji*, 95.

⁴⁶² Nakićenović, *Nuklearna energija u Jugoslaviji*, 95.

instrumentation in the country. Roughly at the same time, Popović became the Director of the Laboratory for Reactor and Neutron Physics at the IBK, where he could best utilize his expertise.⁴⁶³

Yugoslavia was also one of original twelve member states that officially founded CERN (*Conseil européen pour la recherche nucléaire*) in 1954.⁴⁶⁴ Krige comments that “CERN was not simply an instrument to promote the aims of the Marshall plan in Europe”, but also “a platform on which to build a Western alliance under American leadership,” and following their policies regarding the importance of ‘Titoism’, the U.S. administration supported the inclusion of Yugoslavia among founding members of CERN in an attempt to “drive a wedge into the Soviet bloc and lure other satellites to follow.”⁴⁶⁵ Therefore, it seems evident that the Yugoslav participation in establishment of CERN was a scientific counterpart and a clear reflection of the process of the country’s gradual recognition and acceptance as a credible political and military partner of the West, what Krige defines as a support ranging “from food to physics”, and this parallel can obviously be drawn even in terms of simple chronology.⁴⁶⁶

⁴⁶³ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 83, 256.

⁴⁶⁴ First two intergovernmental conferences were held in UNESCO in Paris in December 1951 and February 1952, which defined the technical and political structure of the future CERN, although still on the level of a provisional agreement. Yugoslavia joined this group later, and was one of signatory states of the convention which established CERN in June 1953. The convention entered into force after ratification by the majority of national parliaments in September 1954, as it seems. Yugoslavia ratified the convention on February 9, 1955, when it formally became the member of the CERN. AJ, 177, f. 22-89. Minutes, Conclusions and Materials from the Meetings of the Federal Nuclear Energy Commission, 1956. Our Financial Contribution to the European Organization for Nuclear Research, Confidential Report of the State Secretariat for Foreign Affairs, November 22, 1956. John Krige, Dominique Pestre (eds.), *Companion to Science in the Twentieth Century* (London, New York: Routledge, 1997), 901-918; John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (London, Cambridge: The MIT Press, 2006), 73; “Origins”, CERN, <https://timeline.web.cern.ch/origins>, accessed on December 25, 2020. Bondžić mistakenly pushes the establishment of the CERN and the Yugoslav participation to 1951. Bondžić, *Između ambicija i iluzija*, 194.

⁴⁶⁵ John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, 67.

⁴⁶⁶ *Ibid.*, 159.

In Belgrade, nobody had any illusions regarding CERN's main function and the Yugoslav role in it. In a somewhat arrogant tone it was commented that "the presence of Yugoslavia in CERN is important for CERN itself, and for some of its member states, and it is known that neither would want Yugoslavia to step out from this organization."⁴⁶⁷ The overwhelming importance of the political aspect of CERN is evident, not only in case of Yugoslavia, but also in the wider process of European integration. Krige compares the establishment of CERN with the development of the Schuman Plan for European unification, roughly simultaneously and "similarly structured".⁴⁶⁸ Documents also reveal that, "in the beginning, we [Yugoslavia] supported CERN, not so much for the interest in the scientific area it treats [...], but much more because of the desire to contribute to the international cooperation in nuclear field."⁴⁶⁹ By 1956, Yugoslavia already had five scientists working directly on the construction of the synchrocyclotron, which had a powerful symbolic significance for such a small and underdeveloped country, but on a more practical level, additional three Yugoslav scientists were sent from CERN on specializations in institutes and universities in England and Denmark, which was compatible with the Yugoslav strategy for acquiring sensitive and otherwise restricted knowledge and technologies.⁴⁷⁰

⁴⁶⁷ AJ, 177, f. 15-50. Minutes and Materials from the Meeting of the Federal Nuclear Energy Commission, July 1, 1959. Overview of International Cooperation of Our Country in the Field of Nuclear Energy, 9.

⁴⁶⁸ John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, 71.

⁴⁶⁹ AJ, 177, f. 15-50. Minutes and Materials from the Meeting of the Federal Nuclear Energy Commission, July 1, 1959. Overview of International Cooperation, 11

⁴⁷⁰ AJ, 177, f. 22-89. Minutes, Conclusions and Materials from the Meetings of the Federal Nuclear Energy Commission, 1956. Opinion of the Sector for Scientific Research of the Federal Nuclear Energy Commission on Yugoslav Membership in CERN, November 20, 1956.

Dedijer as a Pariah

In his personal file at the UDB archives, Stevan Dedijer is described as an “irredeemable optimist”, a characteristic obviously not appreciated by an authoritarian regime.⁴⁷¹ It is evident that he had many other personal qualities which qualified him for such an important position within the Yugoslav nuclear establishment, and which eventually helped him develop and implement his very ambitious strategy for the expansion of the nuclear program, with astonishing results. Official history of the IBK openly claims that it was he who played “the key role” in opening of the institute to cooperation with foreign partners.⁴⁷² It also seems that the qualities he lacked were supplemented with the direct support from Milovan Đilas, in the political sphere, and Aleksandar Ranković in the intelligence sector. However, his closeness to Đilas eventually proved to be fatal for his own career in Yugoslavia, while it unavoidably also had a significant impact on the development of the country’s nuclear program.

The beginning of Dedijer’s political dissent and decline was a top secret report about the state of the art of the Yugoslav nuclear science and necessary conditions for its further development, which he coauthored with Savić and Walen, in which they showed a lot of courage and independence and openly criticized overly ambitious plans of the Yugoslav political leadership.⁴⁷³ The report was delivered directly to Tito, Kardelj, Ranković, Đilas and Vukmanović-Tempo on May 25, 1953, which perhaps was an intended symbolic gesture since Tito’s birthday was celebrated on this date as

⁴⁷¹ Hrvatski državni arhiv [Croatian State Archive] (HR-HDA) 1561 SDS RSUP SRH, file 77968. Case: Stevan Dedijer. Summary of Data. Although the UDB central archive in Belgrade is unavailable for researchers, the republican UDB archives in Croatia are open. Unfortunately, personal file of Stevan Dedijer is the only file of any top-ranking official within the Yugoslav nuclear establishment.

⁴⁷² Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 81.

⁴⁷³ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Unfortunately, during my initial research period, this and many other documents from this collection were in the process of digitalization, and unavailable for the researchers. In December 2020, the entire collection is still unavailable. On the other hand, Bondžić extensively quotes this documents, often in full paragraphs, and with these limitations this document will be used in my analysis. Bondžić, *Između ambicija i iluzija*, 107-110.

a mass event, the so-called Relay of Youth, with young people from all corners of the country ritualistically carrying a baton to Tito as a birthday gift and a pledge to be hardworking, obedient and to continue following his footsteps.⁴⁷⁴

Even if this connection is accidental, the report itself was designed with best intentions, but as a sobering critique and with suggestions for eventual improvement. One of the main problems identified by Dedijer, Savić and Walen was the lack of a coherent strategy for the development of the nuclear program. The authors suggested that the only solution for this was to educate at least one or even a few of the leading politicians in the field of nuclear energy, in order for them to be capable to develop the necessary strategy. The IBK's management even expressed their readiness to provide them support in this process, "so they can gain such elementary knowledge with the least effort", thus clearly, albeit indirectly, asking for more voice in the decision-making process.⁴⁷⁵ Back in 1945, Kapitsa came to the same conclusion, suggesting in a direct letter to Stalin that "Comrade Beria's basic weakness is that the conductor ought not only to wave the baton, but also to understand the score", and that he should actually learn some physics in order to be able to make informed decisions regarding the Soviet atomic bomb project.⁴⁷⁶

This astonishing similarity with the Soviet experience may suggest that by 1953 the Yugoslav nuclear program had reached the point the Soviets did in 1945, although this would be an overly optimistic estimate, especially regarding the

⁴⁷⁴ Jovana Karaulić, "Slet kao kulturalna izvedba jugoslovenstva: javne politike i upravljanje" [Youth Rally as a Cultural Performance of Yugoslavism: Public Policies and Management (PhD dissertation, University of Art in Belgrade, 2020), 137-147. From 1957, the entire event's official name was changed to the Day of Youth, in an attempt to formally disconnect it with Tito's name, and even though it never became an official national holiday, it had all the characteristics of the most important state celebration.

⁴⁷⁵ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 107-108.

⁴⁷⁶ Holloway, *Stalin and the Bomb*, 140. Besides Beria, Kapitsa also criticized behavior of other leading figures in the management of the Soviet atomic bomb project, namely Malenkov and Voznesenskii.

scientific and industrial capacities of Yugoslavia. The report reveals that, in reality, Yugoslavia “did not have three institutes for atomic energy, but only one”, while the IRB in Zagreb and IJS in Ljubljana were merely institutes attached to universities and dedicated only to a general research in physics and chemistry. In the same vein it was suggested that Yugoslav industry is far behind the French, and it was estimated that even they will be able to develop nuclear weapons in no less than ten years.⁴⁷⁷

Another important point of criticism in the report was the continued insistence on secrecy (*konspiracija*) of all activities within the country’s nuclear program. Adding an insult to injury, the authors of the report did not miss the opportunity to emphasize that in Yugoslavia this principle was employed “infinitely harsher [...] than in any other country, except within the Soviet bloc.”⁴⁷⁸ The outcome of such policy was that often many people or institutions worked on the same problem, isolated from each other and without the ability to compare their results and reach adequate conclusions, all of which made research on any topic and in any field more expensive and less effective.⁴⁷⁹ Once again, the same approach is identified in the early years of the Soviet atomic bomb project, where all the sensitive information were “strictly compartmentalized”, code words were used in reports to mask scientific terms, and where scientists could not even talk to unauthorized people about their work.⁴⁸⁰ These tight security measures implemented by Beria in the Soviet atomic

⁴⁷⁷ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 107-108.

⁴⁷⁸ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 109. The term *konspiracija* used and attacked by Dedijer, Savić and Walen, is best defined as secrecy employed in underground organizations and their activities to protect them from enemies and their potential infiltration. Bratoljub Klaić, *Rječnik stranih riječi, A-Ž* [Dictionary of Foreign Words, A-Z] (Zagreb: Nakladni zavod MH, 1989), s.v. “konspiracija”.

⁴⁷⁹ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 109-110.

⁴⁸⁰ Holloway, *Stalin and the Bomb*, 202.

bomb project, including compartmentalization of research, were his own interpretation of the American experience during the Manhattan Project.⁴⁸¹ In a somewhat paradoxical twist of faith, at the time when the Yugoslav political leadership was trying to run away from the Stalinist model and present itself as more liberal than any other socialist state system, they were, probably unintentionally, implementing policies which would impress even Beria or Stalin.

The records do not reveal if suggestions made in this secret report, which may be even considered as an open conflict between the leading Yugoslav scientists and the political establishment, resulted in any positive changes regarding the management of the country's nuclear program. Dedijer was quick to expand his criticism both in scope and reach. Ever since the establishment of the *Nova misao* magazine in the beginning of 1953, he had been a member of the editorial board, and already in the first edition he published a highly critical article about the organization of scientific research in the country, only to continue to publish on this topic in following months. Dedijer was actually part of the group of scholars who participated in this public discussion in a number of magazines and dailies, in which the main clash was the relationship between the Serbian Academy of Sciences and Arts (SANU), universities and scientific institutes. Like elsewhere in the entire country, the discussants were divided in more or less two confronted camps; those who supported the highly centralized Soviet system with the SANU on the top of this pyramid, and those who favored the more liberal model in which independent universities and institutes supposed to be the main agents, and to which Dedijer belonged.⁴⁸²

⁴⁸¹ Brown, *Plutopia*, 100-104.

⁴⁸² HR-HDA-1561 SDS RSUP SRH, file 77968. Case: Stevan Dedijer. Summary of Data; AJ, 318 Savezni sekretarijat za obrazovanje i kulturu. Nauka. 1949-1966 [Federal Secretariat for Education and Culture. Science. 1949-1966], f. 209- 297-298. Diskusija o organizaciji naučno-istraživačkog rada [Discussion about the Organization of the Scientific Research], 1954; Dedijer, *Stevan Dedijer*, 186.

One of his suggestions for solving the problem in the triangular relationship between the SANU, universities and institutes was forming a commission which he imagined as “a complete opposite to bureaucratized, closed commissions”, and which should perform its task through “public sessions”.⁴⁸³ It seems that it was during this discussion in the early 1953 that Dedijer gradually developed his opinion and identified main problems which he later polished and used with more focus in the secret report about the Yugoslav nuclear program. It may be also be argued that these arguments had, as well as the entire previous discussion, a certain impact on Milovan Đilas, who started publishing his own critical analyses of the Yugoslav state system in the Party daily *Borba* and *Nova misao*, by the end of 1953. The fact that Stevan Dedijer and his brother Vladimir were the only who publicly supported Đilas during the political process against him in January 1954 and after his expulsion from the Party, seem to confirm this claim.⁴⁸⁴

In following months, Dedijer gradually started to withdraw himself from public life, and by the end of 1954, he managed to secure a one year research stipend in Edinburgh, supported by the Commission for the Cultural Relationship with Foreign Countries of the Yugoslav Federal Executive Council (*Savezno izvršno veće* – SIV; the Yugoslav Federal Government). In reality, this research stipend was his silent exit from the nuclear program, and eventually from Yugoslavia. Dedijer did return to Yugoslavia in 1956 and got employed at the IRB in Zagreb, working exclusively on

⁴⁸³ AJ, 318, f. 209-297-298. Diskusija o organizaciji naučno-istraživačkog rada [Discussion about the Organization of the Scientific Research], 1954, 22-23. This lengthy document contains excerpts from a number of articles published in the early 1953 by various authors. One of those who supported Dedijer was Pavle Savić.

⁴⁸⁴ HR-HDA-1561 SDS RSUP SRH, file 77968. Case: Stevan Dedijer. Summary of Data. Dedijer was in Switzerland at the moment when Đilas was officially attacked at the Party plenum, but he wrote a protest letter and sent him directly to Kardelj. See also: Dedijer, *Stevan Dedijer*, 187; Bondžić, *Između ambicija i iluzija*, 186-187; Borislav Lalić, *Milovan Đilas. Vernik, buntovnik, mučenik* [Milovan Đilas. Believer, Rebel, Martyr] (Belgrade: Novosti, 2011), 110-114; Bondžić, *Između ambicija i iluzija*, 111-112.

some problems in theoretical physics, although because of his continued support to Đilas, as well as contacts in Great Britain he had with their intelligence community, he was continuously monitored by the UDB. By 1957, Dedijer got fired from the IRB, and in 1961 he finally left for Sweden, where he got employed at the Lund University and the Institute for Theoretical Physics.⁴⁸⁵ Not dissimilar from the reaction to Đilas's heresy, the political establishment reacted harshly and filled the position of the director of the IBK by Vojko Pavičić, an UDB cadre with no scientific qualifications.⁴⁸⁶

⁴⁸⁵ HR-HDA-1561 SDS RSUP SRH, file 77968. Case: Stevan Dedijer. Summary of Data. Dedijer actually reported to the Yugoslav Embassy in London that he had been directly contacted by the British intelligence officer Marriot while in Edinburgh in 1955, and that he refused the cooperation. Dedijer returned to Yugoslavia in 1956, when he was formally fired from the IBK in Vinča. He was employed by the IRB in Zagreb, where he worked exclusively in the field of theoretical physics, yet for his continuous support to Đilas, by 1957 he lost his position at the IRB as well. He left the country for a position at the Lund University (Sweden) in 1961, using contacts he established as the director of the IBK. His later career will be analyzed in the following chapter.

⁴⁸⁶ Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 16; Marko Lopušina, *Ubij bližnjeg svog. Jugoslovenska tajna policija, 1945-2002* [Kill Thy Neighbor. The Yugoslav Secret Police, 1945-2002] (Belgrade: Tea Books, 2019), 135; Bondžić, *Između ambicija i iluzija*, 111.

2.5 Uranium Frenzy

“As far as it is known, the main raw material for the atomic bomb and atomic energy remains to be uranium.”⁴⁸⁷

The secret report prepared by Dedijer, Savić and Walen in 1953, reveals that in the period between 1948 and 1952, only 0.8 to 1 ton of uranium ore reserves have been identified in the entire country, with only half of that available for extraction and reprocessing. The authors estimated that the construction of nuclear weapons would require the production of roughly 1,000 tons of uranium per year, with additional 6 tons of uranium metal for the experimental nuclear reactor. The gloomy conclusion was that, because of the acute lack of uranium, “we are standing in an absolute uncertainty regarding our current atomic energy policy.”⁴⁸⁸ Even though the authors, by chance or purpose, miscalculated the amount of uranium needed for a small nuclear weapons project, which some experts estimate at minimally 100 tons of uranium-oxide (U_3O_8 , the ‘yellow cake’), it is easy to see that the results after four years of extensive work and significant funding of uranium prospection in Yugoslavia produced quite disappointing results.⁴⁸⁹

⁴⁸⁷ AJ, 836, II-6-a/4. Izveštaj o radu Uprave za naučno istraživački rad za 1948. i zadacima za 1949.

⁴⁸⁸ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 108-109.

⁴⁸⁹ Hymans, *Achieving Nuclear Ambitions*, 177.

Who is this Geiger-Müller?

Field prospection of uranium and other radioactive materials requires mobile, hand-held Geiger-Müller counters and other instruments which Yugoslavia did not have, and at least in the late 1940s and early 1950s, found it very difficult to purchase abroad.⁴⁹⁰ This was actually a harsh reality for the Yugoslavs at the time, particularly regarding the instruments and equipment they needed for the nuclear program, as was the case with Peterlin's shopping list. In the report for 1950, the UKRNI was urgently requesting foreign currency in order to purchase necessary equipment for prospection, mining and laboratories. The situation was actually so bad that, during their search for uranium, prospection teams were also digging other industrial minerals, such as feldspar and mica, that were sold abroad in order to get the foreign currency.⁴⁹¹ By that time, the UDB had already established a number of commercial companies and in a variety of fields, including hotels, transport, construction, or trading companies which functioned as any other civilian enterprises, with the only difference that the gained profit could be used to finance their covert operations.⁴⁹²

At least regarding the acquisition of the basic uranium prospection equipment, the problem was hastily solved during 1948 with several improvised devices constructed by Yugoslav technicians. These were soon supplemented with the first Yugoslav *Durmitor* model GM counters, which were produced only in small numbers during 1949 and 1950.⁴⁹³ They were based on a reverse-engineered French model, while the necessary components were purchased abroad "individually", probably with the idea to mask the entire operation. However, while these devices were a huge

⁴⁹⁰ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

⁴⁹¹ AJ, 836, III-2-a/22. Izveštaj Uprave za koordinaciju rada naučnih instituta, September 15, 1950.

⁴⁹² AJ, 25 Ministarstvo rada FNRJ [Ministry of Labor of the FPRY], f. 149. Odeljenje za plan radne snage, 1949-1951 [Labor Planning Department, 1949-1951]. Uprava državne bezbednosti. Glavna direkcija privrednih preduzeća. Dinamični plan radne snage za 1950. godinu, August 8, 1950

⁴⁹³ Nakićenović, *Nuklearna energija u Jugoslaviji*, 69.

improvement in comparison to previous GM counters in use, they were still of a rudimentary design and could only provide results for “comparison and orientation,” not any “absolute values.”⁴⁹⁴

According to memories of Jovo Kapičić, the UDB general and person who was included in the search for the uranium at the time, the first batch of professional mobile GM counters was purchased in 1952 in the United States by an UDB courier sent by him on a covert mission with a suitcase full of cash, although it soon became obvious that the secrecy and money involved were redundant since these instruments were relatively cheap and could be bought without restrictions. Nevertheless, the mission was successful and the model acquired was also used by the American Army and Navy.⁴⁹⁵ This story is indirectly confirmed in one of the SKNE official reports where it is stressed that in that period, necessary instruments were acquired first “through smuggling and later through official trading channels.”⁴⁹⁶

The first GM counter produced in larger series of roughly 5,000 units and of acceptable quality was the model *Lovac* [The Hunter], which was based on the original design of the IBK and manufactured in the *RR Zavodi* (later known as Ei –

⁴⁹⁴ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959. *Durmitor* GM counters were based on French models which “started to arrive” to Yugoslavia by the end of 1948. AJ, 836, II-6-a/4. Izveštaj o radu Uprave za naučno istraživački rad za 1948. i zadacima za 1949. Yugoslav prospection teams in 1950 could rely on only 50 *Durmitor* GM counters. More in: AJ, 836, III-2-a/22. Izveštaj uprave za koordinaciju rada naučnih instituta, September 15, 1950

⁴⁹⁵ Tamara Nikčević, 155. At the time, UDB officials thought that GM counters were considered as sensitive equipment, so they sent their agent-courier Luka Vučinić secretly to the United States, through West Berlin, with a 300,000 USD in cash in his suitcase. With the help of the Yugoslav Ambassador in Washington, who was shocked to see the unnecessary amount of cash for the instruments that worth roughly 100 USD, the courier easily purchased a number of instruments and took them back to Yugoslavia. According to the website MeasuringWorth.com, the relative value of this money in 2018 would be 2,840,000 USD (<https://www.measuringworth.com/calculators/uscompare/>, accessed on July 10, 2019). The model acquired by the Yugoslavs was El-Tronics's SM-3 GM counter, which was sold in 1951 for 195 USD. U.S. Department of the Navy - Bureau of Ships, http://national-radiation-instrument-catalog.com/new_page_124.htm, accessed on July 11, 2019; El-Tronics, http://national-radiation-instrument-catalog.com/new_page_10.htm, accessed on July 11, 2019. The model

⁴⁹⁶ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959

electronic industry) in Niš (Serbia) between 1952 and 1955. These models were eventually used for the purpose well into the 1960s.⁴⁹⁷ However, it would not be surprising that these instruments were not coming off the assembly line in large numbers immediately, and in fact, they were delivered to geological institutes and laboratories throughout the country only by the end of 1955.⁴⁹⁸

It seems that the only obstacle in this operation was the UDB's strong motivation to keep Yugoslav nuclear ambitions, plans and eventual achievements, well-hidden and protected from prying eyes of their foreign counterparts, while the profit from illegal operations was also appreciated. Many decades later, Kapičić referred to the episode with GM counters as an "embarrassment" which revealed that "we [the Yugoslav political leaders] knew nothing about these things, but [...] wanted the atomic bomb at any cost."⁴⁹⁹ On the other hand, it has to be stressed that, regarding the experience with the UK and similar reaction of the U.S. AEC, some obstacles were real and did require smuggling and covert missions, as well as occasional embarrassments. By the mid-1950s, Yugoslavia at the very least solved the problem of the lack of adequate instruments for basic uranium prospection through production of instruments of domestic design and secret purchases abroad.

The second big obstacle was an almost complete lack of experts in the field, combined with a very limited general knowledge of existing geologic formations in the country.⁵⁰⁰ In the late 1940s, it was even commented that geological maps of Yugoslavia and other related documents and data inherited from "former Yugoslavia [and] the period of occupation, are completely unarranged, scattered, often suspicious

⁴⁹⁷ Nakićenović, 69; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

⁴⁹⁸ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959

⁴⁹⁹ Nikčević, *Goli otoci Jova Kapičića*, 155-156

⁵⁰⁰ Nakićenović, *Nuklearna energija u Jugoslaviji*, 64.

and incomplete, while for entire areas there are no information or they are unexplored.”⁵⁰¹ Considering this situation, it becomes clearer how important was the help provided by the German geologists in the late 1940s and early 1950s. In spite of all the obstacles, the uranium prospection had started already in the summer of 1948, with only two geologists who had some experience in the field, Dr Stojan Pavlović and Milan Ristić, with roughly 9-11 miners. They managed to find some examples of a uranium mineral autanite in the vicinity of Prokuplje (Serbia). Supported by the UKRNI, which provided them with everything available in the country at the time, these two Yugoslav pioneers in nuclear prospection effectively initiated the uranium rush in Yugoslavia, organizing 19 uranium prospection teams during 1948 alone. Due to a severe lack of “cadres”, these hastily organized teams were often composed of geologists, engineers, physicists, chemists, and even promising students, all of them borrowed from universities, Serbian Academy of Sciences and Arts, scientific institutes and industry. Fully engaged on other conventional projects for the industry, their involvement in uranium prospection had to be limited, making missions somewhat chaotic and turning them into a piece-work activity in which selected locations were stormed one by one.⁵⁰²

They were soon joined by “a small number of hastily trained prospectors”, followed by another group of “radio-amateurs who, considering their previous knowledge in electronics, had to be trained in prospection, geology and mineralogy.”⁵⁰³ In 1950, the situation had only slightly improved. The number of prospectors was raised to 55, and they were still supported by 40 students, five university assistants, five radio technicians and one university professor. The only

⁵⁰¹ AJ, 836, II-6-a/4. Izveštaj o radu Uprave za naučno istraživački rad za 1948. i zadacima za 1949. (p. 16)

⁵⁰² *Ibid.*; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959

⁵⁰³ Nakićenović, *Nuklearna energija u Jugoslaviji*, 69.

aspect of uranium prospection that “did not show as a problem” was the simple labor force for mining and other related activities, whose ranks were easily filled “thanks to the inmates.”⁵⁰⁴ Forced labor was obviously used for this task, and presumably any other task under the control of the secret police. The logic of it is comparable to the Soviet experience where in the beginning of the “Soviet Manhattan project” the NKVD used roughly 9,000 prisoners from the Gulag system to assist in construction of the necessary infrastructure.⁵⁰⁵ It is easy to imagine that number of prisoners used for uranium mining was much lower in the Yugoslav case, although the actual numbers are impossible to identify.

American uranium prospection in Yugoslavia

The desire to find the domestic reserves of uranium was obviously as great as the country’s inability to independently provide enough expert geologists and prospectors, or properly equip teams that could be assembled. Against expectations of the Yugoslav nuclear establishment, this problem could not be easily solved through purchases of necessary equipment abroad, even after Yugoslavia became recognized as the credible partner by the U.S. administration. In the early 1950s, Yugoslavia was showered with Western financial and material support, including modern armaments, but this good will was invisible when it came to sensitive technologies and equipment for nuclear institutes, except for very basic and conventional uses of instruments and materials, as shown earlier.⁵⁰⁶

⁵⁰⁴ AJ, 836, III-2-a/22. Izveštaj uprave za koordinaciju rada naučnih instituta, September 15, 1950

⁵⁰⁵ Brown, *Plutopia*, 85, 89.

⁵⁰⁶ *FRUS, 1952-1954, Volume VIII, Eastern Europe; Soviet Union; Eastern Mediterranean*, eds. William Z. Slany et al., (Washington: United States Government Printing Office, 1988), Document 688.

Early contacts between Yugoslav and Norwegian scientists in 1952 may have been one of the reasons why prospects for receiving at least some support from the United States started gradually to improve for Yugoslavia. Back in 1946, Norwegian scientists Gunnar Randers and Odd Dahl toured the U.S. nuclear facilities, although not the most sensitive ones, and had been advised by their American colleagues that the Norwegian uranium ore reserves were sufficient for the construction of a small nuclear reactor, but not for construction of atomic bombs. According to Forland, this support proved to be “a decisive factor” for the Norwegian government to provide necessary funding for the construction of their first nuclear reactor, which effectively initiated the country’s nuclear program.⁵⁰⁷

It would be impossible to make any claims, but it is probable that the Yugoslav nuclear scientists had learned about this and other aspects of cooperation in communication with their Norwegian colleagues, and perhaps suggested that this option should be probed. Whatever the truth may be, the fact is that in 1952 a certain number of uranium ore samples from Yugoslavia was sent to the United States for the analysis. The results of the radiometric and chemical analyses were received later in the year, and they were used for comparisons with analyses made in Yugoslav laboratories, which was crucial in confirming the quality of their independently developed methods. Soon after these first successful, albeit limited contacts had been established, the Yugoslav Embassy in Washington officially requested to expand this cooperation, and soon after, “a prospection expert” geologist Donald Wyant came to Yugoslavia and “visited all interesting radioactive phenomena.”⁵⁰⁸ This was actually the first official project between two countries in development of nuclear technology

⁵⁰⁷ Forland, “Norway’s Nuclear Odyssey”, 3

⁵⁰⁸ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959; AJ, 177, f. 23-90. Cooperation with the United States, September 5, 1957.

and science in Yugoslavia and it seems that the American side was taking it seriously, although not necessarily in a way their hosts would appreciate it.

Donald G. Wyant was one of the pioneers in uranium prospection in America. Since 1944, he was conducting field analyses for the U.S. Geological Survey and later for the U.S. AEC for potential sources of uranium and thorium in the USA.⁵⁰⁹ Learning their lessons from the experience with the Soviet geologists in 1947, the Yugoslavs sent an entire team of their own experts to accompany Wyant, yet to no avail. During his mission, Wyant “did not give any data or advice, transfer any experience, nor did he want to get into any kind of conversation.” The Yugoslavs were appalled to discover that he even “hid his own field-type Geiger-Müller counter [...] so it would not fall into hands of our experts,” and when the first unit broke down, he exchanged it for a new one in the U.S. Embassy in Belgrade. His report was received only in 1954, but it turned out to be “useless” since it contained only data received from the Yugoslav side, combined with some laboratory analyses of the raw materials acquired during this mission. The only symbolic victory for the Yugoslavs was that the GM counter Wyant was so desperately trying to hide from them was of the same model the UDB secretly smuggled from the United States only a year before. In the situation where mistrust was still strong on both sides, it should not come as a surprise that this information was not disclosed to Wyant, and when his instrument malfunctioned, he was offered only the rudimentary *Durmitor* GM counter.⁵¹⁰

⁵⁰⁹ AJ, 177, f. 23-90. Cooperation with the United States, September 5, 1957; J.O. Harder, D.G. Wyant, *Preliminary report on a trace elements reconnaissance in western states*, Washington D.C.: United States Department of the Interior, Geological Survey, 1944. His full list of similar publications prepared for the U.S. Geological Survey and the AEC is rather impressive and covers reconnaissance reports for uranium and thorium for the states of Utah, North Dakota, Montana, New Mexico, Wyoming, California and others, performed primarily between 1950 and 1954.

⁵¹⁰ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959; AJ, 177, f. 23-90. Cooperation with the United States, September 5, 1957. The report from 1957 pushes this mission back to 1951, although the story about the American GM counters that Yugoslavia already had at the time of Wyant's mission suggests that it had to be

In reality, the Donald Wyant's mission followed to the letter the U.S. policy towards Yugoslavia at the time, which in the nuclear sphere must have proved to the Yugoslavs that the "capitalistic behavior" from either the Soviet or the American side will not get them far in their plan to establish uranium mining industry and that they will have to continue working on that project independently and secretly. The lack of experienced prospectors obviously could not be successfully circumvented through a foreign assistance and this problem continued to plague the ambitions of the Yugoslav nuclear establishment which had to implement some desperate measures.

In the beginning of 1956, as soon as newly manufactured *Lovac* GM counters became available in numbers, they were immediately distributed to the "mountaineers, foresters, hunters, schoolteachers and others" whose job was in any way related to the field work.⁵¹¹ In previous years, even more ambitious plans were proposed. Already in 1948 the UKRNI anticipated that the entire school system will have to be involved. The idea was to organize "mass youth labor actions" composed of "pioneers and youth" who would collect mineral samples during their field trips "or excursions specially prepared for this purpose," while the existing schools would serve as centers for collection and selection of promising samples.⁵¹² Fortunately, this frantic search for uranium in Yugoslavia during the early 1950s stopped with schoolteachers and this ambitious and somewhat scary idea never was realized.

organized after that, so I accepted 1953 that was mentioned in the 1959 report. It is also a fact that Yugoslavia started to purchase legally some instruments for nuclear institutes in the United States 1952, in cooperation with the American partner Sanford De Brun. AJ, 177 SKNE, 438 Cooperation with the USA, 1955-1968. Translation of the de Brun's letter to the FNEC, September 7, 1959. Either way, the actual year is less important in comparison to Wyant's performance.

⁵¹¹ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959

⁵¹² AJ, 836, II-6-a/4. Izveštaj o radu Uprave za naučno istraživački rad za 1948. i zadacima za 1949. It is interesting that in 1949 Tito personally flagged this suggestion as important or interesting, marking it with a red pencil in the margin.

These stories sound almost laughable or as a desperate attempt of the Yugoslav authorities to find even remotely promising uranium deposits in the country, although it has to be emphasized that the uranium rush was a global phenomenon. This was particularly visible in the United States where the so-called “yellowcake towns”, such as Uravan (Colorado), Moab (Utah), Grants (New Mexico), Jeffrey City (Wyoming) and others, mushroomed through the American West in the early 1950s.⁵¹³ In the United States the uranium industry “followed the traditional consolidation evolution from lone prospector to giant corporation.” From the beginning of the Manhattan Project in the 1940s until the 1970s, the U.S. Federal Government “subsidized prospecting, mining, milling” in these towns, “and was the only legal uranium buyer.” At the same time, yellowcake towns developed an entire culture around uranium, building “uranium cafés” and even organizing a “‘Miss Uranium’ pageant where the lucky winner received a truckload of uranium ore.”⁵¹⁴ It was also not uncommon to see “[r]eal estate salesmen, schoolteachers, hash-slingers and lawyers” to compete with mining engineers and expert prospectors.⁵¹⁵ This uranium frenzy eventually became a part of the popular culture, at least in the American West, and was immortalized in the song “Uranium Fever”:

*“Uranium fever has done and got me down,
Uranium fever is spreadin' all around,
With a Geiger counter in my hand,
I'm a-goin' out to stake me some government land,
Uranium fever has done and got me down.”⁵¹⁶*

⁵¹³ Michael A. Amundson, *Yellowcake Towns: Uranium Mining Communities in the American West*, Boulder, Co.: University Press of Colorado, 2002, xv. See also Raye C. Righolz, *Uranium Frenzy: Saga of the Nuclear West*, Logan, Ut.: Utah State University Press, 2002.

⁵¹⁴ Amundson, *Yellowcake Towns*, xvii.

⁵¹⁵ Righolz, *Uranium Frenzy*, ix

⁵¹⁶ Elton Britt, “Uranium Fever”, RCA Victor (47-6325), 1955.

Similar development was visible in the UK, or more precisely, in their colonies in Africa. In one short newsreel it was suggested that in Rhodesia “it is quite the fashion to spend weekends prospecting for uranium” and that “it’s advisable to take your Geiger counter with you to test for radioactivity, and you might as well chuck in a drill or two when you’re packing the sandwiches,” ending with an optimistic comment that “with luck, you there’ll be no need to go back to work on Monday.”⁵¹⁷

Similarities between the American (or British) and Yugoslav experiences with the uranium prospection are striking, although the differences are also noticeable. Yugoslav authorities could not afford to reward prospectors in truckloads of uranium ore, nor they had any of it to waste, yet they also managed to provide stimulating rewards for successful prospectors, making it at least comparable to a lucrative business. By the end of the 1950s, these rewards ranged between 1 and 1.5 million dinars for promising findings. As a comparison, in 1959 the monthly salary of Slobodan Nakićenović, a top-ranking official in the nuclear establishment, was roughly 60,000 dinars.⁵¹⁸ It would be easy to imagine that Yugoslav mountaineers, foresters, hunters and teachers were only too eager to get their hands on a GM counter, as well as on the potential prize, and at the same time how difficult it must have been to keep this secret.

Potential prospectors were carefully selected for their political suitability and closely followed during their work by the UDB agents or regular police, who were particularly careful not to allow them to exchange any information with the locals or

⁵¹⁷ Associated Press (AP) Archive, “Holiday for Profit”, British Movietone (Story No. BM71032), June 27, 1957 (<http://www.aparchive.com/metadata/youtube/123e4ec6a06e4378a5e84d0493564226#DetailsAnchor>, accessed on July 14, 2019)

⁵¹⁸ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959; AJ, 177, f. 452. Personal Files. Personal file of Slobodan Nakićenović

even with their own families.⁵¹⁹ It is also easy to imagine that in Yugoslavia every potential finding of uranium deposits would stay in the hands of the state, as well as that the Yugoslav uranium prospection, under the firm supervision of the UDB, could not leave much impact on the popular culture as it did in the United States. Nevertheless, it is astonishing how many similarities were there in uranium prospection experiences in two countries that could not have been more different.⁵²⁰

The establishment of uranium mining industry also required enough engineers, chemists, technologists and technicians in a number of fields who would be able to develop complex technological processes for processing of uranium ore, first in laboratories and eventually on an industrial scale. As mentioned earlier, by 1953 Jurković managed develop a number of methods for laboratory analysis of uranium ores in close collaboration with the team of German geologists. Official records also show that between 1948 and 1955 the number experts who worked on the development of technologies for the refining of the uranium ore grew to minimally 120, employed by the ZGRTI only.⁵²¹ By 1959, this number swelled to 850 scientists and technicians from various disciplines. Majority of them were employed by the ZGRTI and successor institutions.⁵²²

On the other hand, *konspiracija* and other harsh security measures severely hampered activities related to prospection and production of uranium in Yugoslavia. Experiences with both the Soviet and American uranium prospection missions alone

⁵¹⁹ Bondžić, *Između ambicija i iluzija*, 92-93.

⁵²⁰ A brilliant comparative analysis was done by Professor Kate Brown on similarities and differences between the American and Soviet plutonium producing towns, where she suggests that the importance of these projects was so great that it easily crossed any ideological or political boundaries. See more in, Brown, *Plutopia*.

⁵²¹ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 196-210. The editor stresses that “due to transformation of the Institute and incomplete documentations” these information are incomplete.

⁵²² Nakićenović, *Nuklearna energija u Jugoslaviji*, 79. Hymans presents a number of 1,100 people employed by the Directorate for Nuclear Raw Materials, quoting the same source, but with wrong data and page number. Hymans, *Achieving Nuclear Ambitions*, 172-173.

were enough for the Yugoslav decision-makers to put a strong emphasis on secrecy and security regarding the uranium prospection in the country, even if the entire project had been purely civilian. These circumstances somewhat justify the desire for *konspiracija*, but even if it had secured these activities from foreign observers of all kinds, the heavy hand of the UDB proved to be devastating regarding the efficiency of the entire effort to acquire uranium.

The compartmentalization of the activities was actually so strict that the field prospection, including the results, information about the types of ores or even location of promising deposits, were hidden even from the management of the IBK in Vinča, as well as from other institutes in the country. These policies eventually led to paradoxical situation, where “scientists who knew the most about radioactive ores, organization of uranium prospecting, methods, instruments, education of cadres, do not participate and have no clue about these activities in our country”.⁵²³ In his memoirs, Dedijer reveals that he learned from his foreign contacts that the UDB was ‘secretly’ sending uranium ore samples for the analysis to laboratories in West Germany, but then when he wanted to openly exchange uranium ore samples with colleagues in Sweden and perform joint comparative analysis, he was attacked by Svetozar Vukmanović-Tempo (the successor of Boris Kidrič and one of the leading figures in the KPNI) for compromising the security of the entire nuclear program.⁵²⁴

These contacts with Sweden may have proved to be valuable, since the IBK eventually developed a method for uranium extraction from the ore of the mercury mine in Idrija (Slovenia), with very poor uranium content. At that time, uranium extraction from similar poor quality ore had been attempted only by Sweden and the

⁵²³ AJ, 837, II-6-a. O dva bitna uslova za razvitak atomske energije kod nas [On Two Important Conditions for the Development of Atomic Energy in Our Country], May 25, 1953. Quoted in Bondžić, *Između ambicija i iluzija*, 109-110.

⁵²⁴ Dedijer, *Stevan Dedijer*, 184.

aforementioned joint comparative analysis of Yugoslav and Swedish ores must have helped scientists on both sides to develop the necessary methods and technologies. However, in Yugoslavia the security measures unnecessarily complicated this process. In order to extract uranium from this ore, the IBK had to order a semi-industrial plant in West Germany, the same type the French CEA had already purchased. The only difference was that, unlike their French colleagues, the IBK management had to hide the real reason for this purchase behind the invented order for the manganese ore extraction plant, which left them with a differently tuned machines and wrong technological process.

These problems were eventually solved by the IBK experts, but the fact is that these security measures only produced losses in time, funding, as well as production capacity and quality. For example, two groups of scientists worked independently on solving the problems of the technology for the extraction of uranium, one at the plant in Idrija, and one at the IBK, and they learned about each other's results only in 1955, and by that time, all operations at the uranium extraction plant in Idrija had been stopped due to poor utilization of only 20 percent of the plant's capacity. The chief engineer and the manager of the plant in Idrija, Vladimir Logomerac, also revealed that group of engineers who worked at the site were "exposed to heavy physical labor and unfavorable and harmful to health working conditions", for which they received a symbolic financial reward.⁵²⁵

Nevertheless, in spite of the obstacles, mistakes and missed opportunities, and after full three years of development of necessary technologies, by 1955 Yugoslavia

⁵²⁵ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu [Minutes, Conclusions and Materials from the Meetings of the Presidency in 1956]. The question of the Idrija plant, July 20, 1956; Suggestion for Rewards, June 10, 1955. The plant was designed for processing of 6 tons of ore per day. The reward ranged from less than one to a double monthly salary, depending on the time they spent in Idrija.

managed to produce its first quantities of uranium-oxide from domestic ores in the semi-industrial plant in Idrija. According to the official report, this facility proved to be capable for processing of “any domestic ore, at least for the purpose of determining indicators necessary for later industrial production of uranium.”⁵²⁶ The sources do not reveal the actual quantities of uranium produced at the plant in Idrija, nor details about the technological process, but what they do suggest is that by 1955, Yugoslav scientists felt confident in their capabilities to produce uranium, even from poor quality ores, which means that the only remaining step was to find enough uranium deposits in the country, or to secure the necessary (or wanted) quantities in any other way. In relation to that, the plant in Idrija was left in place to serve for future research purposes, or even production on industrial scale.⁵²⁷ Regardless of the problems in terms of its efficiency, and without any consideration about the health of the plant operators, the Yugoslav nuclear establishment was obviously very pleased to have developed this capability.

⁵²⁶ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu [Minutes, Conclusions and Materials from the Meetings of the Presidency in 1956]. Suggestion for Rewards, November 24, 1956.

⁵²⁷ *Ibid.*

2.6 Conclusion

The discussion in this chapter seems to be rather extensive for a period in the Yugoslav nuclear program during which little had been achieved. The network of institutions had expanded significantly, but it only became operational by the end of the analyzed period; the production of illusive uranium showed first promising results, although the frantic prospection did not result in finding significant deposits; the first generation of scientists had been trained, yet they only gradually started taking important positions in the institutes across the country; the country's political leadership continued to express strong desire for nuclear weapons, although they still did not develop a clear strategy how to get it, establish proper relationship with the scientific sector, nor did they have a real idea how to approach this topic in the international arena. On the other hand, this was the formative period of the Yugoslav nuclear program, during which all the main positive and negative characteristics, policies and practices had been established and implemented. Even though it can be argued that most, if not all of these components had only reached their initial or rudimentary stage, they eventually had a huge impact on the development of the Yugoslav nuclear program in following years, and as they will on following chapters of this dissertation.

The strong hand of Ranković and his UDB had an equally strong and all-encompassing, although ambiguous impact on the development of the Yugoslav nuclear program. The secrecy and security measures, exemplified in the term *konspiracija*, meant a very clear compartmentalization of different aspects of the nuclear program, between the research conducted in institutes, as well as separating the scientists from information about the prospection, mining and production of uranium. This approach was necessary for the obvious intention to hide the ambitions

of the Yugoslav political leadership regarding construction of atomic bombs, but it was additionally inspired by similar practices and measures employed by countries with more developed nuclear programs, particularly the United States and Great Britain.

The implementation of strong *konspiracija* in Yugoslavia eventually resulted in serious delays, and in some cases, even a complete halt in development of certain technologies, or acquirement of sensitive materials or equipment, as was the case with purchase of heavy water from Norway, and development of uranium extraction technologies in the country. As a consequence, this also alienated scientists who, unlike the politicians, understood quite well that this situation had to be changed in favor of less strict *konspiracija* and their stronger voice in the decision-making process. In 1953, Dedijer, Savić and Walen did in fact use their voice openly in order to resolve these problems, but this only resulted in expulsion of Dedijer and Walen from the nuclear program, and appointment of the UDB ‘cadre’ as the director of the IBK in Vinča, the central and only properly operating nuclear institute at the time. Savić did survive this ordeal, although with seriously diminished power and authority within the establishment. Therefore, even though in 1950 Dedijer had started to play the all important role of the connecting rod between the political establishment and scientists, not unlike Oppenheimer did in the Manhattan Project, or Kurchatov during the Soviet work on the atomic bomb, by 1953/4 his honest suggestions and critique became too similar to Đilas’s heresy, and he had been ousted from the nuclear program.

Part of the reason for this must have been overly ambitious expectations of the country’s political leadership that Yugoslavia would be able to construct the atomic bomb as quickly as the Soviet Union did, and when the scientists could not come

anywhere near that milestone after four or five years of dedicated work, they decided to take full control over the management of the nuclear program and focus on materialization of these efforts. This actually was one of the main stumbling blocks in relationship between scientists and politicians within the Yugoslav nuclear establishment, and by 1955 it resulted in redirecting all efforts on uranium production and construction of the country's first nuclear reactor. These would undoubtedly be important milestones, but in the given circumstances it seemed more as one of the administrative ticks in the table of an ambitiously designed plan.

The UKRNI/KPNI, as extended arm of the UDB, was surprisingly successful in organizing industrial espionage activities, using its network of agents and other resources in countries like Sweden and particularly Norway, which were more open to formal or informal cooperation with Yugoslavia. Dedijer was again the mastermind behind this operation, which provided Yugoslavia with the first generation of experts in various fields which otherwise could not be trained in the country, knowledge and technologies which would take much more time and funding than Yugoslavia would appreciate or be able to provide, access to sensitive materials otherwise unavailable in open market, and contacts with leading West European and American scientists and research institutions, everything before any such cooperation was possible to establish on a formal basis, and in only two or three years, between 1952 and 1954/5.

The strong involment of the intelligence sector in the Yugoslav nuclear program obviously contributed to achieving some astounding results, as well as making some crippling mistakes, and both were further emphasized by the specificities of the Yugoslav political system. The ambitious Savić's plan to establish the IBK in Vinča as his own 'political factory', central institution for development of science in the country, his own fief and eventually monument, by 1949/50 failed completely,

partly due to the importance of the project which government could not leave in his hands, but predominantly as a victim of the ‘ethnic key’ policy and interrepublican competition for federal funding. This is the only viable explanation for the rapid construction of scientific institutes in Ljubljana and Zagreb, at the time when not even the central institute in Vinča could gather enough scientists and technicians to support its own projects. These circumstances produced the environment of competition instead of cooperation between Savić in Vinča, Peterlin in Ljubljana and Supek in Zagreb, which additionally fueled *konspiracija* and particularly compartmentalization. As a result, three institutes often duplicated research, and it would be equally sad and bitter explanation if this happened unknowingly or in competition with each other. The only logical outcome of this approach were further delays and waste of time and resources.

In order to be able to provide some results and secure further investments for their research, scientists in three nuclear institutes necessarily had to establish at least minimal cooperation. It is difficult to attest this thesis in this period, for the simple fact that the IJS in Ljubljana and IRB in Zagreb only started to operate as research institutes by 1954/5, although Dedijer’s ‘Great Embassy’ to Western Europe, as well as cooperation between him, Savić and Walen within the IBK in Vinča, initially very suspicious to each other, proved to be both valuable and effective for further development of the nuclear program, or at least in providing a cold-blooded estimate of the country’s capabilities.

Finally, it is far from surprising that Tito and his associates did not develop a strategy for potential use of nuclear weapons or their particular role in the Yugoslav or wider European security, other than its utility as a potential deterrent against the Soviet Union. Until Stalin’s death in 1953, and for some time after, the threat of the

Soviet attack was both real and severe which necessarily required an adequate response. This was found in a combination of semi-official security guarantees by the United States and indirect inclusion of Yugoslavia to NATO through the Balkan Pact with Turkey and Greece in 1954. What Tito and his inner circle did realize was that too strong deterrence capability would be as dangerous for survival of Yugoslavia as having no or very weak such capability. In relation to that, they also realized that Yugoslavia was as important as a potential point of the Soviet attack as Germany was, and that this balance of power between two countries would have to be established and maintained as an important condition for the Yugoslav security. The same can be said regarding a potential inclusion of Yugoslavia into NATO, or return under the wing of the Soviet Union, since both options would compromise the survival of Tito's regime. Therefore, this period also saw the early evolution of the so-called policy of 'equidistance' from two blocs.

The Yugoslav nuclear program and potential decision to construct nuclear weapons had to be embedded within these security policies and the same is true for this analysis. Naturally, Yugoslavia was very far from achieving such a capability at this stage, but what a few shy overtures in press and other public forums made by Tito, army generals or diplomats, about potential construction of atomic bombs in Yugoslavia, seem to have been examples of the, once again, early evolution of the nuclear hedging policy. The only thing missing in this puzzle was mastering of necessary technologies, acquiring sufficient amount of uranium and construction of nuclear reactors in Yugoslavia.

Chapter 3: Between the Soviet and American Nuclearity

On March 17, 1955, Khrushchev initiated an exchange of letters with Tito, which eventually led to his “historic trip” to Belgrade two months later (May 27-June 2, 1955).⁵²⁸ Two days after this correspondence had started, on March 19, 1955, the Federal Executive Council (Yugoslav Government) established the Federal Nuclear Energy Commission [*Savezna komisija za nuklearnu energiju* – SKNE], with the official task to “support, coordinate and direct the development of nuclear sciences and manage all activities in practical application of science in this field”.⁵²⁹ A day after that, *The New York Times* published an article with the dramatic title – “Tito Stands Off Soviet Advance.” The article included a small comic depicting Tito digging for uranium next to the sign which reads, “on this site will be built a small atomic industry (for peace, of course)”, while a frowning Khrushchev watches him over the hilltops with a huge pile of atomic bombs stacked behind him.⁵³⁰

The establishment of the SKNE was indeed a significant event, although not necessarily as a deterrent against the Soviet Union, as the author of the comic would imply, or as a simple bargaining chip for the upcoming meeting with Khrushchev. The most important change was the SKNE’s field of jurisdiction. Approved and signed by Tito, a very simple two-page statute revealed that the SKNE had its own budget and its own ‘plan’, which would be included in the general, state-wide plan. More importantly, the SKNE had the right to give orders and make executive decisions “for

⁵²⁸ Svetozar Rajak, *Yugoslav-Soviet Relations, 1953-1957: Normalization, Comradeship, Confrontation* (PhD Thesis, University of London: London School of Economics and Political Science, February 2004), pp. 156-157.

⁵²⁹ AJ, 177, f. 14. Uredba o osnivanju Savezne komisije za nuklearnu energiju [Statute on the Establishment of the Federal Nuclear Energy Commission], March 19, 1955. Quoted in Bondžić, *Između ambicija i iluzija*, 117

⁵³⁰ Jack Raymond, “Tito Stands Off Soviet Advance”, *The New York Times*, March 20, 1955, 6E

coordination of activities in certain parts of the state administration, economy and scientific research”, to “establish and maintain relations with relevant organizations and institutions abroad”, and to independently establish its own internal organization.⁵³¹ In other words, the SKNE had the full authority and political power of a ministry in the Yugoslav Government, lacking only the formal title.

Behind the strength of its formal position, the SKNE actually enjoyed much more power than an average ministry, which in fact made it a state within a state. Its establishment led to abolishing the KPNI, and all its facilities and the budget were transferred to the SKNE. More importantly, so were the management, which included basically the same people, with Aleksandar Ranković once against the Director.⁵³² Through the position of the Deputy Prime-Minister of Yugoslavia, Ranković was technically in a position to funnel as much as he wanted of the federal funds to the SKNE, or in other words, to approve requests he signed in the first place, a proper judge and a jury scenario. Under its supervision, the SKNE had three nuclear institutes, IBK in Vinča, IJS in Ljubljana and IRB in Zagreb. More importantly, part of the SKNE was the newly established Directorate for Nuclear Raw Materials [*Direkcija za nuklearne sirovine* – DNS], which in turn coordinated all activities in the field, starting with uranium prospection, mining, ore refinement and production of uranium metal, thus functioning as an almost independent institution within the

⁵³¹ AJ, 177, f. 14. Uredba o osnivanju Savezne komisije za nuklearnu energiju [Statute on the Establishment of the Federal Nuclear Energy Commission], March 19, 1955

⁵³² Deputy Directors were Svetozar Vukmanović-Tempo (Deputy Vice-Prime Minister), and Pavle Savić (President of the IBK Scientific Council). The Secretary was Slobodan Nakićenović (former Secretary of the KPNI), while members of the SKNE Presidencz were Ivan Gošnjak (Minister of Defense), Milentije Popović (President of the Board for the People's Economy in the Yugoslav Government) and Veljko Zeković (Government Secretary). Members included representatives of scientific institutes under the SKNE supervision (Drago Grdenić and Ivan Supek from the IRB, Vojko Pavičić, the director of the IBK and his associate Milorad Ristić, Anton Peterlin from the IJS and Mirjan Gruden from the University of Ljubljana, Miladin Radulović as the Director of the ZGRTI), and Čedo Milićević, the director of the hydro plant Jablanica, on the Neretva River, as the only member outside of the nuclear program. AJ, 177, f. 14. Rešenje o imenovanju Savezne komisije za nuklearnu energiju [Decision on Appointment of the Federal Nuclear Energy Commission], March 23, 1955

SKNE. Unsurprisingly, the Director of the DNS was Miladin Radulović, a person who had managed these activities under various labels since the late 1940s as one of Ranković's closest and most loyal associates, thus effectively becoming a small Ranković in his own right.

This was also the first time that the world 'nuclear' found its way into the name of the institution that managed the entire nuclear program and the public discourse in Yugoslavia. By the end of 1954, Pavle Savić paraphrased famous Lenin's words in an article in the official Party daily newspaper *Borba*: "socialism + nuclear energy = communism". On a separate occasion Kardelj expanded this formula into a law, commenting that the use of nuclear energy will have the same impact on the development of socialism, as the industrial revolution had on the development of capitalism.⁵³³ Tito added his own touch, speaking for the first time in the National Assembly about the "use of nuclear energy for peaceful purposes". A month later, he visited the IBK in Vinča for the first time, reiterating the 'peaceful atom' formula and stressing the importance of nuclear energy in raising the living standard in Yugoslavia.⁵³⁴

Changes happening in the structure of the nuclear program in Yugoslavia and the related the public narrative were perfectly capturing the global *Zeitgeist*. "On December 8, 1953", is a favorite opening phrase scholars use to explain changes initiated in the field of nuclear energy and science by the U.S. President Eisenhower's historic "Atoms for Peace" speech in the United Nations.⁵³⁵ Krige probably rightly

⁵³³ *Borba*, December 28, 1954, 4. Quoted in Bekić, *Jugoslavija u hladnom ratu*, 686.

⁵³⁴ Bekić, *Jugoslavija u hladnom ratu*, 684; Bondžić, *Između ambicija i iluzija*, 138.

⁵³⁵ Joseph F. Pilat (ed.), *Atoms for Peace: A Future after Fifty Years?* (Washington, D.C.: Woodrow Wilson Center Press, 2007), 1. See also, John Krige, "Techno-Utopian Dreams, Techno-Political Realities: The Education of Desire for the Peaceful Atom", in *Utopia/Dystopia: Conditions of Historical Possibility*, eds. Michael D. Gordin, Helen Tilley and Gyan Prakash (Princeton, N.J.: Princeton University Press, 2010), 154; John Krige, "Atoms for Peace, Scientific Internationalism, and

comments that “[n]o single narrative can capture its many dimensions”. The speech has been analyzed from perspectives of cold war propaganda, “as a Marshal Plan for atomic energy, as an instrument of informal intelligence gathering, as an imperialist strategy to create export markets for American utility companies in the postcolonial world, as a major contribution to the controlled spread of nuclear science and technology, as a naive and misguided attempt to demilitarize a dual-use technology, and as a major factor in proliferation of nuclear weapons.”⁵³⁶

The ‘Atoms for Peace’ initiative was all of this and probably some more, although authors in general agree that its legacy in the contemporary world “bears little relation to the original proposal”, directly or indirectly suggesting that its success or failure was highly dependent on the Cold War dynamics. The most lasting result was the establishment of the International Atomic Energy Agency (IAEA) in 1957, as the solid basis on which the global nuclear nonproliferation regime evolved over the years, culminating with the Treaty on the Nonproliferation of Nuclear Weapons (NPT) of 1968. The IAEA eventually became the verification agency for the NPT, after the treaty entered into force in 1970, but it never fulfilled the original role of a bank of uranium and other nuclear materials provided by the superpowers in order to support projects for the peaceful uses of nuclear energy in developing nations.⁵³⁷

Despite this success story, the ‘Atoms for Peace’ initiative originally “was not premised on breaking the disarmament deadlock”; rather it aimed more at propaganda gains from discrediting Soviet peaceful initiatives with an American “realistic

Scientific Intelligence,” *Osiris*, 21, No. 1 Global Power Knowledge. Science and Technology in International Affairs (2006), 161.

⁵³⁶ Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 152.

⁵³⁷ David Holloway, “The Soviet Union and the Creation of the International Atomic Energy Agency,” *Cold War History* 16, No. 2 (2016), 177-178; Pilat (ed.), *Atoms for Peace*, 1-3; Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 152.

proposal”, expecting that the Soviets would most likely refuse.⁵³⁸ This was visible in the establishment of the IAEA, which the Soviets did reluctantly support only because “[n]ot to take part would be to leave the field to the Americans.” The three main Soviet criticisms of Eisenhower’s ‘realistic proposal’ – that it would not stop the arms race, it would not decrease the danger of nuclear war, and that it could be exploited to increase production of nuclear weapons – proved to be rational and eventually true.⁵³⁹

The last notion takes the analysis back to the Cold War relations of ‘competition instead of cooperation’, providing the backdrop against which this seemingly peaceful initiative evolved. This was also the overall environment in which Yugoslavia was trying to formulate the nuclear policy and direct the development of their nuclear program. This chapter will show that Tito and his inner circle of associates continued to desire the atomic bomb with equal passion, but also that their reasoning evolved to meet the “peaceful” standard. Instead of a deterrent against a potential Soviet attack, the bomb came to be considered as the ultimate measure, in case nuclear weapons dramatically proliferated among allies of either bloc. Combined with a better understanding of what such project entailed and the environment of overall instability, the Yugoslavs developed a dual-track nuclear policy in which they supported any initiative, which would maintain the *status quo*, in which they had found their niche, while simultaneously working frantically on developing the atomic bomb, expecting that the balance of superpowers might soon change.

These circumstances necessarily affected the development of the nuclear program, where any option that promised potential acceleration was exploited behind the façade of the nuclear energy program. In practice, this meant playing one

⁵³⁸ Kenneth Osgood, *Total Cold War: Eisenhower’s Secret Propaganda Battle at Home and Abroad* (Lawrence: University of Kansas, 2006), 154-155

⁵³⁹ Holloway, “The Soviet Union and the Creation of the International Atomic Energy Agency,” 186.

superpower against the other in order to get more. While this formally was achieved, measured in nuclear reactors and tons of uranium fuel, in practice it only put the Yugoslav nuclear program wide open to different, yet equally effective nonproliferation strategies of both the United States and the Soviet Union, which, despite important achievements, produced only delays and waste.

3.1 Tito's Blunders and Blunderbusses: Formulation of the Yugoslav Nuclear Policy

*“Once again we have the arms race, and we lose valuable time
in discussion on banning nuclear weapons.
Those who are sincerely interested in peace
will overlook these trivial details
and pledge all of their strengths for peace.”*⁵⁴⁰

In early October 1956, the Yugoslav delegation led by Tito visited Khrushchev in the Crimea for a hunting trip and discussion on “issues of mutual interest and importance”, in what Khrushchev describes as a “warm and friendly atmosphere”.⁵⁴¹ During a break from the hunt in the Crimean forests, the Yugoslav delegation was shown “films of the tests of atomic and hydrogen bombs” and it was immediately clear to Khrushchev that it “made an exceptionally strong impression on the Yugoslavs”.⁵⁴² At one point, Aleksandar Ranković commented to one of the members of the Yugoslav team that if the hydrogen bomb “were dropped on Belgrade, Zagreb would not survive either.”⁵⁴³

⁵⁴⁰ Josip Broz Tito, *Govori i članci: 1941-1957, knj. 5, 18. II 1950-9. III 1951* [Speeches and Articles: 1941-1957, Vol. 5, February 18, 1950-March 9, 1951] (Zagreb: Naprijed, 1959), 177-178. Quoted in Bekić, *Jugoslavija u Hladnom ratu*, 686.

⁵⁴¹ Strobe Talbott (ed.), *Khrushchev Remembers* (Toronto, New York, London: Bantam Books, 1971), 421.

⁵⁴² Wilson Center, Digital Archive. Note from N. Khrushchev to the CPSU CC Presidium regarding conversations with Yugoslav leaders in the Crimea,” October 08, 1956, History and Public Policy Program Digital Archive, APRF, Fond 52, Opis 1, Delo 349, List 64-113. Published in “Istochnik” no earlier than 24 September 1956. Translated by Gary Goldberg, <https://digitalarchive.wilsoncenter.org/document/112230>, accessed on February 12, 2021. Besides Tito and Ranković, the Yugoslav delegation included Veljko Mićunović (the Yugoslav Ambassador in Moscow) and Đuro Pucar, a high-ranking member of the Central Committee of the SKJ and the People's Defense Council, which was the most probable reason for his participation in this delegation.

⁵⁴³ Wilson Center, Digital Archive. Note from N. Khrushchev to the CPSU CC Presidium regarding conversations with Yugoslav leaders in the Crimea,” October 08, 1956, History and Public Policy Program Digital Archive, APRF, Fond 52, Opis 1, Delo 349, List 64-113. Published in “Istochnik” no

Khrushchev backed his thoughts and suggestions about “issues of mutual interest and importance” with vivid images of Soviet might. In the period between 1956 and 1962, Khrushchev did employ his missile diplomacy hoping for political gains, although it was based “in significant measure, on bluff.”⁵⁴⁴ Garthoff also argues, “the only period in which the Soviets claimed superiority and brandished their nuclear weaponry for political pressure was at the time of greatest relative weakness, in the late 1950s and early 1960s.”⁵⁴⁵

For this discussion, it is important to stress that the same strategy was implemented toward Yugoslavia as well. While it would be a mistake to overemphasize its impact on Tito and his inner circle, the fact remains that this was the period of the closest cooperation between Yugoslavia and the Soviet Union since 1948. In this section, I will investigate the effects of the Soviet nuclear bluffs on the early attempts of formulation of the Yugoslav nuclear policy in the field. My main argument is that, while the Soviet pressure did in fact raise fears about the effects of the potential nuclear war between two superpowers, the more important factor was an estimate that such a Soviet posture against nuclear sharing within NATO member states would serve the Yugoslav security equally well.

earlier than 24 September 1956. Translated by Gary Goldberg, <https://digitalarchive.wilsoncenter.org/document/112230>, accessed on February 12, 2021.

⁵⁴⁴ Holloway, *The Soviet Union and the Arms Race*, 84-85.

⁵⁴⁵ Raymond L. Garthoff, *Deterrence and the Revolution in Soviet Military Doctrine* (Washington, D. C.: The Brookings Institution, 1990), 19. The Soviets achieved a rough parity with the United States in nuclear weapons capability only in early to mid-1970s.

The German rearmament: "God (*sic*) knows what form the cold war might then take"⁵⁴⁶

As Bogetić explains, "Yugoslavia never had a final position" about the German Question; it "continuously 'wandered' in that context", approaching policies of the United States or the Soviet Union, often without a clear logic.⁵⁴⁷ Yugoslav policies regarding the German Question often overlapped with positions of two superpowers, although these similarities came from different and sometimes even original motives. One of important specificities was the understanding of the relation between changes in one or the other Germany with Yugoslav security, and particularly within larger problem of the European security, as shown earlier. Bekić also explains that, as a victim of Nazism, Yugoslavia was honestly fearful of the potential German rearmament, while as a country which was divided by the superpowers during the war according the infamous 'fifty-fifty' formula, Yugoslavia was also somewhat sympathetic and supportive regarding the German reunification, independence and their right to defend themselves.⁵⁴⁸ These two conflicting motives remained prominent in formulation of the Yugoslav policy towards Germany, which obviously had to be adapted to the continuously changing international circumstances, as well as to the emergence of the new Yugoslav foreign policy after 1955.

In the early 1950s, when the fear from Soviet attack was at its height, Yugoslavia did not have many options but to strongly support German rearmament, on occasion surpassing even Great Britain or France in that respect, and arguing that it was "necessary for legitimate defense" of Germany. It is also possible to read this

⁵⁴⁶ FRUS, 1958-1960, Vol. X, Part 2, Eastern Europe, Finland, Greece, Turkey, ed. Glenn W. LaFantasie (Washington: United States Government Printing Office, 1993), Document 121

⁵⁴⁷ Bogetić, *Jugoslavija i Zapad*, 198.

⁵⁴⁸ Bekić, *Jugoslavija u Hladnom ratu*, 740. Bekić refers to the Fourth Moscow Conference (October 1944) and the infamous 'Percentages Agreement', where Churchill and Stalin divided their respective spheres of influence in Eastern and Southeastern Europe in a sort of a 'gentleman's agreement', writing down details on a napkin during the official dinner.

‘necessity’ as Yugoslavia’s own desperate appeal to the West for military assistance, supporting the legitimacy of such a request using the German example, although carefully phrasing their position in order not to disturb the existing delicate balance between superpowers. This was one of the reasons why the Yugoslavs accepted Western military assistance only as a last resort even when the Soviet attack seemed imminent. The same logic applied regarding German rearmament. Tito was careful to approach this problem loudly, yet cautiously, conditioning his support with the political solution of the German Question. In other words, he was happy to support German rearmament in the early 1950s, as long as realization of this plan seemed unlikely, and as long as the Soviet pressure on Yugoslavia remained strong.

In early months of 1955, Tito started promoting the idea of German unification and neutralization. Western politicians officially understood that Tito simply followed his own principles of independence, as attested in the case of Korea, and his newly found interest in non-alignment. On the other hand, the similarity with the Soviet policy of creating the belt of neutral states ranging from Finland on the north to Yugoslavia in Southern Europe, made them very uneasy, which resulted in their unofficial, yet extended pressure on Tito to tone down his public speeches on the topic. Bogetić reveals that Tito abandoned this policy only days before his meeting with Khrushchev in Belgrade. Although the official explanation underlined the Yugoslav fears of the destabilization of NATO and the potential withdrawal of the United States from Europe, he admits the reasons for this sudden change are “insufficiently understood”.⁵⁴⁹

⁵⁴⁹ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 198, 205; Dragan Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961* [New Strategy in the Yugoslav Foreign Policy, 1956-1961] (Belgrade: Institut za savremenu istoriju, 2006), 50-51. In December 1954 and January 1955, Tito went on his first diplomatic trip to Asia, visiting Burma, India and Egypt, during his return trip.

During negotiations in Belgrade, Yugoslav politicians learned that the main Soviet reason for this change was the combined effect of the FRG joining NATO in May 1955, quickly followed by the establishment of the Warsaw Pact in response. The initiation of the German rearmament under NATO made the Soviet concept of German unification and neutralization obsolete, since it would only result in strengthening of the FRG with additional 18 million GDR inhabitants.⁵⁵⁰ As Bekić confirms, the inclusion of the FRG in NATO was a turning point in Yugoslav policies towards the German Question, bringing them closer to the Soviet position.⁵⁵¹

Yugoslavia and the Soviet Union reached an agreement on this complex issue in the context of their reinvigorated friendship, which was an important foreign policy goal for both sides, but this does not exclude the possibility of at least slightly different motivations. Potential German reunification as a NATO member would produce a whole range of problems for Tito and Yugoslav security in general. An economically strong, reunited and rearmed Germany would turn Yugoslavia once again into a weak link against potential Soviet attack in Europe, or minimally, it would shift the focus of the Soviet political pressure back to Yugoslavia, as an option to counterbalance the loss of Germany. This would eventually force Yugoslavia to join either NATO or Warsaw Pact, a decision Tito had to avoid making if he wanted to maintain his own rule and regime in the country. The formation of a belt of neutral countries in Europe would have been equally unacceptable for Yugoslavia since it would disrupt the NATO defense system and perhaps even lead to withdrawal of the United States from Europe. Between the lines, Bekić also suggests that by the mid-1950s, the Yugoslav leadership also realized that even if the belt of neutral countries

⁵⁵⁰ Bogetić, *Jugoslavija i Zapad, 1952-1955*, 205; Dragan Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 35.

⁵⁵¹ Bekić, *Jugoslavija u Hladnom ratu*, 740-741.

would not undermine NATO, at least not significantly, it would necessarily downgrade Yugoslavia to the status of a regional, Balkan power.⁵⁵²

Adding nuclear weapons to this equation only further complicated the Yugoslav position. Already during negotiations about the EDC, the French Marshal Juin, Commander-in-Chief of the NATO Central Region (CINCENT), had proposed the creation of a European defense organization within NATO if the EDC project should fail. This proposal included development of nuclear weapons in order to be relatively independent from the United States. Once the French parliament rejected the EDC, the plan was put in motion. The idea was to unite financial, material, and scientific resources of European nations in order to help France to produce a nuclear arsenal, which would be under the joint European command. While the British were reluctant to participate in this project and share their nuclear weapons, France, Germany, and later Italy were engaged in a serious discussion until 1958, when de Gaulle put an end to this project, proudly explaining it as his first diplomatic act upon returning to power.⁵⁵³

In 1954, right after the EDC project failed and before the FRG became a member of the WEU and later NATO, Chancellor Adenauer “explicitly renounced the production on the FRG’s territory of nuclear (or chemical or biological) weapons”. Heuser explains, however, that this renouncement was only nominal. It was consciously and carefully crafted to leave space for the FRG to own or control such

⁵⁵² Bekić, *Jugoslavija u Hladnom ratu*, 601-602.

⁵⁵³ Beatrice Heuser, *NATO, Britain, France and the FRG: Nuclear Strategies and Forces for Europe, 1949-2000* (Houndmills Basingstoke, Hampshire [England]: Macmillan Press, 1997), 148-149, 151. CINCENT was established in August 1953. More in Gregory W. Pedlow, “The Evolution of NATO’s Command Structure, 1951-2009”, SHAPE (<https://shape.nato.int/resources/21/Evolution%20of%20NATO%20Cmd%20Structure%201951-2009.pdf>), accessed on January 22, 2021.

weapons on its territory, or to produce them abroad.⁵⁵⁴ The Eisenhower administration had plans for sharing *tactical* nuclear weapons with its European allies since 1954, and although “[n]o real program to produce an IRBM existed until 1955”, the “technological imperative” of such weapons necessitated their deployment in “friendly countries relatively near the USSR”, since otherwise they would be completely useless as a deterrent against the Soviet Union.⁵⁵⁵

On the other hand, various types of U.S. nuclear weapons had been deployed in a number of European countries since 1954: Great Britain in September 1954, FRG in March 1955, Italy in April 1957, France in August 1958, Turkey in February 1959, Netherlands in April 1960, Greece in October 1960, and Belgium in November 1963. Even though the U.S. forces were supposed to keep these bombs and warheads under tight control in secure locations, “initial arrangements” during Eisenhower’s administration “were amazingly lax” and actually allowed “West German Luftwaffe fighter-bomber pilots [...] virtual control of the bombs when on alert.”⁵⁵⁶

Eventually, and somewhat paradoxically, it was the periodical ‘beep’ produced by the Sputnik satellite on October 4, 1957, which gave wind to the project of nuclear sharing within NATO. On December 16-19, 1957, the North Atlantic Council (NAC), as the governing body of NATO, assembled in Paris to discuss the U.S. proposal to deploy tactical IRBMs in European countries, thus allowing NATO for the first time the capability to deliver nuclear bombs deep inside the Soviet Union.⁵⁵⁷ The

⁵⁵⁴ Heuser, *NATO, Britain, France and the FRG*, 124-126. Heuser explains that Adenauer in his memoirs that the renouncement would be respected “as long as circumstances did not change”.

⁵⁵⁵ Heuser, *NATO, Britain, France and the FRG*, 150; Phillip Nash, *The Other Missiles of October: Eisenhower, Kennedy, and the Jupiters, 1957-1963* (University of Carolina Press, 1997), 7, 20. The acronym IRBM stands for Intermediate Range Ballistic Missile, which is a tactical weapon, unlike the ICBM (Intercontinental Ballistic Missile), which is in category of strategic weapons.

⁵⁵⁶ Robert S. Norris, William M. Arkin, William Burr, “Where they were”, *The Bulletin of the Atomic Scientists*, November/December 1999, 29-30.

⁵⁵⁷ Nash, *The Other Missiles of October*, 6-7; Paul R. Josephson, *Red Atom: Russia’s Nuclear Power Program from Stalin to Today* (Pittsburg: University of Pittsburg Press, 2000), 121.

negotiations about the deployment of the U.S. IRBMs (*Thor* and *Jupiter*) with France, Italy, Federal Republic of Germany, Greece, and Turkey continued in following two years. Among potential hosts, the agreement was signed only with Italy and Turkey, in March 26 and September 19, 1959, respectively, while the actual deployment of missiles was finalized during 1960 and 1961. The final agreement included thirty *Jupiter* missiles in Italy and fifteen in Turkey, with an additional sixty *Thor* missiles in Great Britain, which had been agreed earlier (February 22, 1958).⁵⁵⁸

Sputnik obviously raised the alarm in the West about the rapidly expanding Soviet nuclear capability, but the shockwaves were felt in Yugoslavia as well. On October 15, 1957, barely eleven days after the launch of Sputnik, Yugoslavia established diplomatic relations with the German Democratic Republic (GDR), thus becoming the first country outside the Soviet bloc to provide formal recognition.⁵⁵⁹ The close chronological proximity between these events is rather eerie, although it would be probably wrong to put these events in a direct causal relation. Yugoslavia had been supporting Soviet policy regarding the German Question since the summer of 1955. Even though Yugoslav diplomats bent back and forth to explain their Western counterparts this decision within the concept of “active peaceful coexistence” and maintenance of equidistance between the blocs, in reality it deeply resembled the Soviet concept of two independent German states.⁵⁶⁰ In fact, some authors claim that this decision was in many ways the result of the Kremlin’s continuous pressure on Tito, aiming to trigger a wave of recognitions among neutral countries. This

⁵⁵⁸ Nash, *The Other Missiles of October*, 34-77. For the Italian nuclear policy in this period, please see Leopoldo Nuti, “Extended Deterrence and National Ambitions: Italy’s Nuclear Policy, 1955-1962”, *Journal of Strategic Studies*, Vol. 39, No. 4 (2016): 559-579 (565)

⁵⁵⁹ Lees, *Keeping Tito Afloat*, 222-223; Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 114.

⁵⁶⁰ Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 115-121.

interpretation seems probable considering Tito's active diplomacy and growing popularity among newly liberated nations in Asia and Africa.⁵⁶¹

Enter Rapacki

Even though the recognition of the GDR did not happen *because* of the Sputnik scare, the timing of such a decision was obviously related and part of the larger Soviet diplomatic offensive. Bogetić comments that this was a big price to pay for practicing and advertising policies of 'active coexistence': "[Yugoslavia] made a concession to a country with which did not have good political relations in order to fight for the affection of suspicious autocrats in Kremlin, while jeopardizing cooperation with its biggest economic partner, the Federal Republic of Germany."⁵⁶² However, his reasoning might be a bit one-dimensional. On October 2, 1957, Polish Foreign Minister Adam Rapacki introduced before the United Nations' General Assembly his plan for creation of a nuclear-free zone, which would encompass territories of Poland, FRG and GDR. In a coordinated move, on the same day Czechoslovak Foreign Minister supported the proposal, suggesting that his country would gladly join the suggested zone.⁵⁶³

The Rapacki Plan, as it became known, was intended to enhance Polish security since it would stop future deployment of the IRBMs in the FRG and remove the existing NATO stock of nuclear weapons in this country, while it would also grant the formal recognition of the contentious Oder-Nisse border with the GDR. In addition, the acceptance of the Rapacki Plan would raise Polish prestige in the

⁵⁶¹ Amit Das Gupta, "The non-aligned and the German Question", in Nataša Mišković, Harald Fischer-Tiné, Nada Boškowska (eds.), *The Non-Alignment Movement and the Cold War: Delhi-Bandung-Belgrade* (London and New York: Routledge, 2014), 146.

⁵⁶² Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 114

⁵⁶³ Piotr Długolecki, "An Unknown Context of the Rapacki Plan," *The Polish Quarterly of International Affairs*, Vol. 20, No. 1 (2011), 59.

international community, while simultaneously allowing them more independence from Soviet domination. In the West, however, denuclearization of the GDR was considered very dangerous as it would undermine the NATO's defense strategy in Europe and simultaneously emphasize the Soviet overall superiority in conventional military capability, both of which might have initiated the U.S. military withdrawal from the continent. Unsurprisingly, Western countries rejected the Rapacki Plan by mid-1958, while the idea had also been undermined by the Soviet "peace offensive" in that period, with a number of similar proposals raised in a quick succession. Khrushchev finally torpedoed the Rapacki Plan with his proposal for universal disarmament at the U.N. General Assembly, on September 19, 1959.⁵⁶⁴

Yugoslavia showed a significant interest in this initiative and provided equally strong support to the Rapacki Plan. An important meeting between the Polish and Yugoslav leadership was held in Belgrade on September 11, 1957, led by Gomułka on the Polish and Tito on the Yugoslav side.⁵⁶⁵ Although signing several bilateral agreements in the fields of economic, cultural and scientific cooperation, the two sides made only general statements regarding the topic of nuclear disarmament. The two governments did agree to support "every constructive initiative" towards reaching

⁵⁶⁴ Długolecki, "An Unknown Context of the Rapacki Plan", 59-66; Ryan Alexander Musto, "Polish Perspectives on the Rapacki Plan for the Denuclearization of Central Europe", Wilson Center, History and Public Policy Program <https://www.wilsoncenter.org/blog-post/polish-perspectives-the-rapacki-plan-for-the-denuclearization-central-europe> (accessed on January 28, 2021).

⁵⁶⁵ AJ, 837, I-3-a-94-5. Poseta delegacije CK Poljske URP i Vlade NR Poljske na čelu sa Vladislavom Gomułkom [The Visit of the Delegation of the Central Committee of the Polish United Workers' Party (PZPR) and the Government of the PR Poland, led by Władysław Gomułka], September 10-16, 1957. Beleška o razgovorima između delegacija Centralnog komiteta SKJ i vlade FNRJ i Centralnog komiteta PURP-a i vlade NR Poljske, vođenim 11. septembra 1957. godine u Beogradu [Note on conversations between delegations of the Central Committee of the SKJ and the FNRJ Government and the Central Committee of the PZPR and the Government of the PR Poland, held on September 11, 1957 in Belgrade]. The Polish delegation included also Prime Minister Józef Cyrankiewicz, Minister of Foreign Affairs Adam Rapacki, Minister of Agriculture Edward Ochab, and Polish Ambassador in Yugoslavia Henryk Grochulski. The Yugoslav delegation included the President of the Federal Executive Council (*Savezno izvršno veće* - SIV, Yugoslav Government) Edvard Kardelj, Vice-President of the SIV Aleksandar Ranković, State Secretary for Foreign Affairs Koča Popović, and a number of members of the Central Committee of the SKJ (Mijalko Todorović, Veljko Vlahović, Rato Dugonjić, Dobrivoje Vidić) and the Yugoslav Ambassador in Poland Milorad Milatović.

“even initial or partial agreements, which would open the path to a comprehensive solution of this fateful question.”⁵⁶⁶ Even though Rapacki himself was present during these meetings in Belgrade, beside this general formulation, no other details about his plan were revealed to Tito.

However, already on September 21, the Polish Ambassador in Belgrade, Henryk Grochulski, informed the Yugoslav Ministry of Foreign Affairs about the details of what was to become the Rapacki Plan. According to this report, the Polish Government was ready to declare “in the nearest future” its readiness to abandon nuclear weapons if the FRG would do the same. While they still contemplated whether the United Nations would be the best audience to promote this initiative, Grochulski insisted that they had already secured the support of the Soviet Union, as well as identical statements renouncing nuclear weapons by Czechoslovakia and the GDR that which would immediately follow the Polish announcement.⁵⁶⁷

Starting in January 1958, Polish diplomats initiated several meetings with officials of the Yugoslav Ministry of Foreign Affairs, pressuring for their support of the Rapacki Plan.⁵⁶⁸ As explained to representatives of the Polish Embassy in Belgrade, Yugoslavia was very much interested in the success of the Rapacki Plan, even if with some reservations. The Yugoslavs understood the problem in a wider

⁵⁶⁶ AJ, 837, I-3-a-94-5. Poseta delegacije CK Poljske URP i Vlade NR Poljske na čelu sa Vladislavom Gomulkom [The Visit of the Delegation of the Central Committee of the Polish United Workers' Party (PZPR) and the Government of the PR Poland, led by Władysław Gomułka], September 10-16, 1957. Zajednička deklaracija Saveza komunista Jugoslavije i Poljske ujedinjene radničke partije i vlada Federativne Narodne Republike Jugoslavije i Narodne Republike Poljske [Joint Declaration of the SKY and PZPR, and Governments of FPRY and PRP], September 16, 1957.

⁵⁶⁷ AJ, 837, I-5-b/95-1. Poland, June 30, 1953–December 14, 1957. Poverljiva zabeleška o razgovoru Dr. Aleša Beblera sa poljskim ambasadorom g. Grohulskim, dana 21. septembra 1957. godine [Confidential note on conversation between Dr Aleš Bebler and the Polish Ambassador Mr. Grochulski, September 21, 1957].

⁵⁶⁸ AJ, 837, I-5-b/95-2. Poland, January 21, 1958–November 7, 1961. Series of meetings were organized between January 21 and April 2, 1958, roughly in interval of two to three weeks, usually between Polish Ambassador Grochulski and the Yugoslav Minister of Foreign Affairs, Koča Popović, and always on Polish initiative.

context, explaining that the “central problem” is “denuclearization” of the existing nuclear powers, compared to which all other problems are merely “consequences”. This included the Polish initiative. Consequently, the Yugoslavs considered the Rapacki Plan only “as one measure towards prohibiting the use of nuclear energy for military purposes”, although the Yugoslav officials expressed their hope that this would eventually lead to global nuclear disarmament: “Otherwise, what would be the significance of the Rapacki Plan if the threat of atomic war between nuclear powers would continue to hang above us all?”⁵⁶⁹

The last comment suggests that, while the Yugoslavs were interested in the success of this initiative, they did not want to lose their prominent position in the international political scene as a sort of a socialist maverick. The *New York Times* journalist Sulzberger rightly noticed that, “[f]or years the virtuosity of Marshal Tito’s diplomatic tightrope act dazzled an international audience”, but that “[n]ew stars, like that versatile Polish acrobat Gomulka, have showed up on the stage”⁵⁷⁰. It seems Tito would have none of it, and while he provided full support to the Rapacki Plan, he used the opportunity to express his concerns about the establishment of NATO rocket bases in Italy, arguing that “such IRBM ramps across the Adriatic would indirectly menace Yugoslavia”, and that he will be forced to “undertake concrete measures – not military but diplomatic.”⁵⁷¹

The Polish Embassy in Belgrade was quick to notice this and questioned the Yugoslav officials if this meant an extension of the Rapacki Plan, expressing their

⁵⁶⁹ AJ, 837, I-5-b/95-2. Poland, January 21, 1958-November 7, 1961. Poverljiva zabeleška o razgovoru Državnog potsekretara za inostrane poslove druga Dobrivoja Vidića sa poljskim otpravnikom poslova Jakub Gelbart-om, dana 8. marta 1958. g. [Confidential note on conversation between the Under-Secretary for Foreign Affairs Dobrivoj Vidić and Charge d’Affairs in the Polish Embassy, Jakub Gelbart, March 8, 1958.]

⁵⁷⁰ C.L. Sulzberger, “Foreign Affairs. Tito: I – Is the Tightrope Still There?”, *The New York Times*, March 3, 1958, 26

⁵⁷¹ *Ibid.*

fears that the Yugoslavs might lose interest in their plan and pursue their own “competitive” initiative for a much wider zone, which would include additional countries. The Yugoslav Minister of Foreign Affairs reassured the ambassador that no such plans existed. The general Yugoslav position toward the installation of IRBMs in Italy was that of “a neighbor towards these ramps are also turned to”, because of which “we [the Yugoslavs] cannot avoid expressing our concern and warning.”⁵⁷² Interestingly, less than two months earlier the Polish diplomats responded much more harshly to a Bulgarian idea to propose “an accord between Bulgaria, Albania, Yugoslavia, Greece and Italy re a ban on stationing thermonuclear weapons and the constructions of missile launchers on the territory of those states”, which somewhat reveals the importance they gave to Tito and Yugoslavia in general.⁵⁷³

The U.S. Embassy in Belgrade was rather dismissive regarding Tito’s comments about the rocket bases in Italy, suggesting that he was only using this topic “to recreate an international role for himself”, and desperately hoping for an invitation to the “Summit Conference” where he could present himself as the leader of neutral countries. The US also emphasized that “[t]he present Yugoslav regime is adept at tossing out ‘sleepers’ to which at some later date it can point with the hackneyed comment, ‘We told you so.’”⁵⁷⁴ On the other hand, foreign observers also noticed that

⁵⁷² AJ, 837, I-5-b/95-2. Poland, January 21, 1958-November 7, 1961. Zabeleška o razgovoru državnog sekretara Koče Popovića sa poljskim ambasadorom H. Grohulskim, održanim 24. marta 1958. godine u 12 č. [Note on the conversation between the State Secretary Koča Popović and Polish Ambassador H. Grochulski, March 24, 1958]; AJ, 837, I-5-b/95-2. Poland, January 21, 1958-November 7, 1961. Poverljiva zabeleška o razgovoru Državnog potsekretara za inostrane poslove druga Dobrivoja Vidića sa poljskim otpravnikom poslova Jakubom Gelbart-om, dana 8. marta 1958. g. [Confidential note on conversation between the Under-Secretary for Foreign Affairs Dobrivoj Vidić and Charge d’Affairs in the Polish Embassy, Jakub Gelbart, March 8, 1958.]

⁵⁷³ "Deputy Minister Winiewicz, 'Record of Conversation with the Ambassador of Bulgaria on the 30th of this Month' ," January 30, 1958, History and Public Policy Program Digital Archive, Polskie dokumenty dyplomatyczne 1958 (Warszawa: Polski Instytut Spraw Międzynarodowych, 2011), Document #47, 98-99. Translated by Jerzy Giebułtowski. <https://digitalarchive.wilsoncenter.org/document/208959>, accessed on January 30, 2021.

⁵⁷⁴ FRUS, 1958-1960, Vol. X, Part 2, Eastern Europe, Finland, Greece, Turkey, ed. Glenn W. LaFantasie (Washington: United States Government Printing Office, 1993), Document 121

Tito was “profoundly depressed” about the potential failure of the Summit Conference, quoting him saying, “God (*sic*) knows what form the cold war might then take”, which the U.S. Embassy in Belgrade was “inclined to accept as a faithful reflection of his probable views.”⁵⁷⁵ The Indian Embassy in Belgrade also noticed that the Yugoslavs were “anxiously looking around or support for their inclusion in the Summit talks, where they can hope to influence the fateful decisions” regarding the future relations in Eastern and Central Europe.⁵⁷⁶

The last comment indirectly confirms both Tito’s desire to reaffirm himself in the international political scene, individually and as a leader of the neutrals, and his fears about what the future might bring. More importantly, the report reveals that Yugoslavia was “pressing hard in support of the Rapacki Plan”, working simultaneously on “its extension to cover Hungary as well as the Balkan countries and Italy.”⁵⁷⁷ The cacophony of ideas and comments in various reports about Tito’s position regarding the potential proliferation of nuclear weapons in Europe somewhat disguises his real interests, plans, and concerns, however. Tito embarked on the diplomatic initiative in the early 1958, obviously attempting to take a more active role in the potential solution of this problem, either through the Summit Conference, as a representative of the ‘neutrals’, or in the U.N., as a promoter of an arrangement for denuclearization of Balkans and Italy. The Yugoslav documents do not reveal much about this plan, even if it really existed in any complete form, but the idea seems to be based on the logic of the Rapacki Plan, with Yugoslavia and Italy playing roles of Poland and the FRG in the Polish concept. Another explanation is that it was simply

⁵⁷⁵ FRUS, 1958-1960, Vol. X, Part 2, Eastern Europe, Finland, Greece, Turkey, ed. Glenn W. LaFantasie (Washington: United States Government Printing Office, 1993), Document 121

⁵⁷⁶ The National Archive of India (NAI), 224, Ministry of External Affairs (MEI), Historical Division (R&I Section), 1950-1972 [Research and Intelligence Section]. 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report of the Indian Embassy in Belgrade, for the Month of March 1958, April 8, 1958, 1-2.

⁵⁷⁷ *Ibid.*

part of the wider Soviet initiative, minimally considering the general concept to move the discussion to the United Nations General Assembly.⁵⁷⁸

The Soviets were continuously rekindling Yugoslav fears of the nuclear war between superpowers in order to push Tito back under the Moscow's control in any capacity, or minimally to compromise him in the West. The report of the Indian Embassy in Belgrade about Tito's interview in the *New York Times* explains, "Marshal Tito objected to the installation of rocket bases in Italy as rockets flying over Yugoslavia would infringe upon her air space and would therefore involve Yugoslavia's neutrality".⁵⁷⁹ This corresponds to the general idea expressed in the interview, although it is considerably richer than Tito's original comment in both information and the word count. The difference is probably the result of additional information provided by the Yugoslav diplomats to their always well-informed Indian counterparts, but the question remains how Tito came to this understanding of potential consequences in establishment of rocket bases in Italy and how independent his reasoning was.

In April 1958, the Yugoslav Embassy in London reported that the Ambassador Ivo Vejvoda used this explanation during his meeting with Duncan Sandys, the British Minister of Defence. Responding to Sandys's comment that Yugoslavia should not feel threatened by the missiles in Italy, or by the West in general, Vejvoda explained that a potential use of these missiles would be considered "a violation of our [Yugoslav] security and sovereignty", as they would have to fly over Yugoslavia. In

⁵⁷⁸ Holloway, "The Soviet Union and the Creation of the International Atomic Energy Agency", 184-193. Holloway explains that this was the overall Soviet approach in the establishment of the IAEA.

⁵⁷⁹ The National Archive of India, Transfer List 224, Ministry of External Affairs, Historical Division (R&I Section), 1950-1972 [Research and Intelligence Section] (NAI, TL 224, MEA, Historical Division (R&I Section), 1950-1972). 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report from the Indian Embassy in Belgrade for the Month of February 1958, March 10, 1958, 1.

addition to that, he reminded Sandys that missile bases intended for Scotland were eventually installed in Eastern England after Sweden protested, obviously using this precedent in support of legitimacy of the Yugoslav protest about construction of similar bases in Italy. Sandys denied that this ever happened, half-jokingly explaining to Vejvoda that “there is much greater danger in one of these rockets falling back on Italians’ heads”. He also noticed that the Yugoslavs were not complaining about Sputnik flying over their territory, asking rhetorically “how will the world know which Sputnik is peaceful and which carries the atomic charge”, thus effectively dismantling Vejvoda’s argument that Sputnik was a peaceful research project.⁵⁸⁰

Back in January 1958, at the time when Poland was desperately trying to pressure Yugoslavia in supporting the Rapacki Plan, they obviously played the card of the destructive power of the Soviet thermonuclear weapons, perhaps knowing that the Yugoslavs might be easily impressed. During an informal dinner at the residence of the Polish Ambassador Grochulski, the Yugoslav Minister of Foreign Affairs learned that the Soviet Union already had bombs so powerful that “for the entire GB, that is, for its annihilation”, only two of these weapons would be enough, adding that both the Soviets and Americans have some secret weapons as well.⁵⁸¹ In a similar tone, the Yugoslav Embassy in Warsaw also learned from their Polish colleagues that if the *Bundeswehr* eventually received nuclear weapons, the armies of Poland,

⁵⁸⁰ Diplomatski arhiv Ministarstva spoljnih poslova Republike Srbije [Diplomatic Archive of the Ministry of Foreign Affairs of Republic of Serbia], Politička arhiva [Political archive], 1958, f. 115, SSSR [USSR], file 18 (DA MSPRS, PA, 1958, f. 115, SSSR, file 18). Pošta za maj 1958, Ambasada SFRJ u Moskvi. Informacija iz Londona od 5. aprila 1958. godine o razgovoru Vejvode sa Duncan Sandys-om u vezi izgradnje raketnih baza u Italiji [Post for May 1958, Embassy of SFRY in Moscow. Information from London, about the conversation between Vejvoda and Duncan Sandys about the construction of rocket bases in Italy, April 5, 1958]

⁵⁸¹ AJ, 837, I-5-b/95-2. Poland, January 21, 1958-November 7, 1961. Poverljiva zabeleška o razgovorima Koče Popovića na večeri kod Gruholskog, 21. I 1958. [Confidential note on Koča Popović’s conversations during the dinner at Grucholski’s, January 21, 1958]

Czechoslovakia and the GDR would have to be armed with similar weapons, including even establishment of missile bases as “the ultimate measure.”⁵⁸²

Such a rhetoric and vocabulary could have only come from Moscow. It was completely in accordance with the Soviet policies in the early 1958 and early 1959, in which similarly rough and direct threats of a potential nuclear annihilation in defense of the Soviet Union were cast to potential hosts of NATO nuclear missiles. Eventually, this approach was effective at least in slowing down and complicating negotiations between the United States and potential host countries.⁵⁸³ Yugoslavia was not among potential hosts for NATO IRBMs, but Tito’s political authority and his support to Soviet policies would be more than welcomed by Moscow. This scenario fits with the Khrushchev’s missile diplomacy of the period, but also with the approach he successfully tested on the Yugoslavs during Tito’s Crimean hunting trip of 1956, particularly if Yugoslavia would be presented as a potentially innocent victim of a conflict triggered by the West.

One rough exchange of thoughts between Khrushchev and newly appointed Italian Ambassador in Moscow, Pietromarchi, in late 1958, reveals the Soviet tactics. During a farewell dinner in honor of the Polish delegation, headed by Gomulka, the Indian Ambassador noticed that Khrushchev protested to Pietromarchi about the expected decision of the Italian Government to permit the construction of rocket-launching bases in Italy. Khrushchev explained that the Soviet Union “could easily destroy Italy with rockets in Soviet territory, but the Soviet Government did not want to let them off over Yugoslavia”. Instead, they would set up bases in Albania and

⁵⁸² DA MSPRS, PA, 1958, f. 115, SSSR, file 18. Information, May 8, 1958.

⁵⁸³ Nash, *The Other Missiles of October*, 36-38.

reduce Italy to ashes “in two hours”, if necessary.⁵⁸⁴ It is not known if this or similar information ever was transferred to Yugoslavia, which would not be surprising considering the close communication between Yugoslavia and India at the time, but it is equally irrelevant. The important thing is that the approach had been implemented in Yugoslavia as well, directly by the Soviet officials, or indirectly through Poland, as was the case in securing Yugoslav support for the Rapacki Plan.

Rajeshwar Dayal, the Indian Ambassador in Belgrade and a careful observer of situation in Yugoslavia with extended contacts among the country’s top-ranking politicians, provides a comprehensive analysis of the Yugoslav foreign policy situation in 1958. Dayal shows that Yugoslavia was becoming increasingly isolated, “no longer sought after” by superpowers, and “shrinking into the modest dimensions of a Balkan power”, a course of events which the Yugoslavs found very irritating. He explains that the Hungarian Revolution of 1956 allowed the Soviets to take “the full measure of Yugoslavia’s strength and capacity to unsettle things in its orbit countries”, making them confident that they could “control whatever situation may arise as a result of Yugoslavia’s continued heresy.” As a result, the Soviets started to “take the Yugoslavs somewhat for granted” and were no longer concerned about ‘Titoism’, while the West had been “cold-shouldering them as Yugoslav views on the current international questions” were only too similar to those of the Soviets.⁵⁸⁵

An additional problem for Tito was that “the choice between political settlements or nuclear catastrophe”, as the biggest problem confronting the world at the time, created the situation where only the Soviet Union and United States could

⁵⁸⁴ NAI, TL 258, MEA, Europe and Pakistan Division. 8(195) Eur.E/58 – USSR – Rocket-launching bases in Italy – Soviet protest. Secret Letter of K.P.S. Menon, the Indian Ambassador in Moscow, to Shri S. Dutt, the Indian Foreign Secretary in the MEA, November 14, 1958

⁵⁸⁵ NAI, TL 224 MEI, Historical Division (R&I Section), 1950-1972. 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report of the Indian Embassy in Belgrade, for the Month of March 1958, April 8, 1958, 1-2.

find a solution: “while the others may have their say, they cannot decide”, thus relegating Yugoslavia to a minor role in the process.⁵⁸⁶ This situation became particularly apparent during the first Conference of Experts on nuclear test verification, held at the U.N. in Geneva between July 1 and August 21, 1958, which was attended by representatives from eight countries (USA, USSR, UK, Canada, France, Czechoslovakia, Poland and Romania).⁵⁸⁷ Simultaneously, “the flow of nuclear missiles to Germany, to Italy and therefore to the East European countries”, would necessarily “place Yugoslavia in a position of a permanent military inferiority”, although at the time it could boast of having “one of the strongest standing armies in Europe, outside Russia.”⁵⁸⁸

Even though some of these estimates are not completely accurate in every detail, they do reveal Tito’s general line of reasoning, which necessarily led him to provide support to the Soviet Union and their policies regarding the German Question and other related problems, rather than to the United States or the West. Realistic calculations that the existing Yugoslav conventional deterrence capability might effectively disappear should the proliferation of nuclear weapons within NATO and Warsaw Pact continue or accelerate, point to a conclusion that Tito’s only option was to try to stop such development, even it meant providing the support to the proverbial

⁵⁸⁶ NAI, TL 224 MEI, Historical Division (R&I Section), 1950-1972. 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report of the Indian Embassy in Belgrade, for the Month of March 1958, April 8, 1958, 1-2

⁵⁸⁷ Kendrick Oliver, *Kennedy, Macmillan and the Nuclear Test-Ban Debate, 1961-63* (New York: St. Martin's Press, Scholarly and Reference Division, 1998), 8-9; Ola Dahlman, Svein Mykkeltveit, Hein Haak, *Nuclear Test Ban: Converting Political Visions to Reality* (Dordrecht: Springer, 2009), 60; *Geneva Conference on the Discontinuance of Nuclear Weapon Tests: History and Analysis of Negotiations* (Washington: United States Disarmament Administration, Department of State, 1961), 15-19

⁵⁸⁸ NAI, TL 224 MEI, Historical Division (R&I Section), 1950-1972. 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report of the Indian Embassy in Belgrade, for the Month of March 1958, April 8, 1958, 1-2; Dimitrijević, *Jugoslavija i NATO*, 88. The JNA was among the strongest standing armies in Europe already by 1953, second only to the Soviet Union and France. See also, Beatrice Heuser, “Yugoslavia in Western Military Planning, 1948-53”, in *Yugoslavia’s Security Dilemmas: armed forces, national defence, and foreign policy*, Marko Milojević, John B. Allcock, Pierre Maurer (eds.) (Oxford [Oxfordshire]: Berg, c1988), 142.

‘lesser evil’, in this case the Soviet Union. It may be argued that he shared the logic of the Canadian Undersecretary of State, Jules Léger, who at the time of the debate about the Rapacki Plan, commented that “neither the U.S. nor the U.S.S.R. will ever be able to agree to the denuclearization of any region in which nuclear weapons have already been placed”.⁵⁸⁹

This scenario would be horrific from the perspective of the Yugoslav security. The Soviets did not waste much time to exploit this fact and continuously fueled these fears in an attempt to pull Tito closer to their orbit. Dayal finds that the only alternative for Yugoslavia in this scenario would be “to attempt to rectify the balance by asking for similar weapons – and these can only come from the Soviet Union”, although he admits that “that would mean the end of her [Yugoslav] distinctive position in Europe.”⁵⁹⁰ The comment that nuclear weapons could or would come to Yugoslavia only from the Soviet Union is somewhat misleading, since it would equally be possible to get them from the United States, although the probability of either scenario being implemented was very slim. On the other hand, it seems to reflect the political reality of a very close alignment between Yugoslav and Soviet policies at the time. Either way, this was not a realistic choice for Tito, as it would mean the end of the Yugoslav neutralism, as Dayal points out, consequently the end of his regime as well.

Comparable to the gradually narrowing space for Tito’s political maneuvers between the two blocs, his policy choices regarding the Yugoslav security were reduced to only two: hope for, either a superpowers’ agreement on nuclear

⁵⁸⁹ Ryan Alexander Musto, “The Storied Past of ‘Denuclearization’”, Wilson Center, History and Public Policy Program (<https://www.wilsoncenter.org/blog-post/the-storied-past-denuclearization>), accessed on February 1, 2021.

⁵⁹⁰ NAI, TL 224 MEI, Historical Division (R&I Section), 1950-1972. 6(59)- R&I/58 – Reports (other than Annual) from Yugoslavia. Monthly Report of the Indian Embassy in Belgrade, for the Month of March 1958, April 8, 1958, 1-2

disarmament or halt to nuclear weapons proliferation, and to independently develop nuclear weapons in Yugoslavia. A potential agreement between two superpowers to stop further proliferation of nuclear weapons at least among their respective allies, if not on a global level, would be an ideal solution for the Yugoslav security, as it would solidify the credibility of the Yugoslav conventional military deterrence. The JNA's status as one of the largest standing armies in Europe was difficult to sustain, but if neighboring countries did not acquire nuclear weapons from their respective Cold War patrons, it would be relatively easy to maintain it. An additional component of this option was gathering support from among a growing number of independent, post-colonial nations, who faced similar problems. With a limited "demographic, political, economic and military potential" to respond adequately to international crises as well as any other security challenge, their only option for political survival was to struggle together "against the conditions that bred war", namely, bloc politics, spheres of influence and conventional and nuclear arms race.⁵⁹¹

The failure of the Rapacki Plan had shown that an agreement on these matters between two superpowers did not seem as a realistic possibility in the late 1950s⁵⁹², while the creation of the third bloc of neutral countries was in its infancy and still relatively far away. Equally or even more distant was the only alternative available to Tito, the indigenous development of nuclear weapons. Nuclear weapons could serve to "rectify the balance" if proliferation of nuclear weapons in Europe should continue, but also as an effective deterrent, a tool to maintain the country's neutrality and a precondition for the survival of his regime. While officially Tito continued to support

⁵⁹¹ Jovan Čavoški, "Between Great Powers and Third World neutralists: Yugoslavia and the Belgrade Conference of the Non-Aligned Movement, 1961", in: Nataša Mišković, Harald Fischer-Tiné, Nada Boškowska (eds.), *The Non-Alignment Movement and the Cold War: Delhi-Bandung-Belgrade* (London and New York: Routledge, 2014), 187

⁵⁹² Joseph Goldblat, *Arms Control: The New Guide to Negotiations and Agreements* (London; Thousand Oaks, Calif.: Sage Publications, 2002), 196.

peaceful initiatives that offered regional or global nuclear disarmament, hoping to gather enough momentum among the neutrals, secretly he was investing all available resources in development of the atomic bomb, or minimally, into the capacity to construct them in a very short period of time.

Tito's conference and logic

The West's lack of interest in the Rapacki Plan, let alone its possible extension to the Balkans, combined with continuous advances made by the Soviet Union in the U.N. and other forums regarding the nuclear disarmament and ban on nuclear testing throughout 1958, necessarily drew Tito closer to support the Soviet policies, even without Kremlin pressure. Bourantonis explains that these discussions in the U.N. throughout the 1950s "took the form of an endless propaganda contest" during which both superpowers were "deliberately looking for something which the other side would strain at accepting", thus transferring the blame for the anticipated failure of negotiations to the other side.⁵⁹³ Submitting often impracticable yet simple proposals, such as a complete nuclear disarmament, the Soviets proved to be very capable and successful in these propaganda wars, effectively grabbing the attention of a global public and creating a rather positive global image.⁵⁹⁴ Khrushchev's effective, yet aggressive nuclear diplomacy, as attested during the Suez Crisis, continuously undermined these propaganda successes. But the fact remains that the Soviet Union had announced a unilateral moratorium on nuclear testing, which was eventually

⁵⁹³ Dimitris Bourantonis, *The United Nations and the Quest for Nuclear Disarmament* (Aldershot [England]: Dartmouth Publishing Company Limited, 1993), 30-32.

⁵⁹⁴ *Ibid.*, 37.

accepted by the United States and United Kingdom and which was respected by three nuclear powers in the period between November 3, 1958 and September 1, 1961.⁵⁹⁵

Without the possibility to participate and directly influence these negotiations, and at the time when neutral countries still were not fully organized to act in concert on such important international issues, it is easy to see why Tito must have favored Soviet proposals. They were simply better suited to the Yugoslav security needs which seemed to be undermined by the West, even if only indirectly. This was visible in case of the important trilateral nuclear test ban negotiations between the United States, Soviet Union and United Kingdom. After the agreement on moratorium had been reached, the negotiations continued in October 1958, and while did show some progress in following months, the shooting down of the U-2 spy airplane over the Soviet Union on May 1, 1960, effectively stopped the negotiation process. The discussion continued again in March 1961, only to be disrupted after the failed U.S.-sponsored Bay of Pigs invasion on Cuba in April 1961. It is easy to see how the United States seemed intent to undermine or even abandon these negotiations, and in fact, one of very reasons why they did not was that “[t]he Soviets had us [United States] right on the propaganda hook”, which even the U.S. President Kennedy had to admit.⁵⁹⁶

All of these problems were deeply interwoven with the German Question and the Berlin Crisis in the late 1950s and early 1960s, as “the pivot on which the Cold War turned” in this period and the most likely trigger for turning it hot,⁵⁹⁷ and another

⁵⁹⁵ *Geneva Conference on the Discontinuance of Nuclear Weapon Tests: History and Analysis of Negotiations* (Washington: United States Disarmament Administration, Department of State, 1961), 13-21; Dahlman, Mykkeltveit, Haak, *Nuclear Test Ban*, 61-62.

⁵⁹⁶ Oliver, *Kennedy, Macmillan and the Nuclear Test-Ban Debate, 1961-63*, 10-21; Dahlman, Mykkeltveit, Haak, *Nuclear Test Ban*, 61.

⁵⁹⁷ Lawrence Freedman, “Berlin and the Cold War”, in: John Gearson, Kori Schake (eds.) *The Berlin Wall Crisis: Perspectives on Cold War Alliances* (New York: Palgrave Macmillan, 2002), 2.

problem in which Tito found the Soviet policies better suited to his own needs. Trachtenberg argues that it was actually the potential “nuclearization” of the NATO, and particularly of West Germany, that laid “at the heart of the great Berlin crisis of 1958-62, the central episode of the Cold War.”⁵⁹⁸ “Khrushchev’s Berlin crisis”, as Bundy calls it, compared to a more dangerous gamble during the Cuban Missile Crisis of 1962, was “his less intense but longer attempt to rearrange the politics of Berlin and Germany”, which involved more than four years of “interacting force of Soviet nuclear strength and what he hoped to be debilitating nuclear fear in the West.”⁵⁹⁹ The successful launch of the first intercontinental ballistic missile (ICBM) and the Sputnik satellite in 1957, were the sources of Khrushchev’s courage to implement such policies, and an additional “public relation boost” in which the Western analysts expected that missiles were “coming off the Soviet production lines like sausages”, which adds another component to the aforementioned Soviet propaganda successes.⁶⁰⁰

The Yugoslav position in the nuclear arms race was significantly enhanced by the Non-Aligned Conference in Belgrade in September 1961, the founding event of the Non-Aligned Movement (NAM). Bogetić claims that Tito was trying to position himself as an “uncompromising champion against all sorts of violent behavior of great powers, without ruining Yugoslavia’s relations with these powers”, but that the heated political events in the international political scene left minimal space for compromise between two sides, as well as any initiative in that direction, which seems a reasonable estimate.⁶⁰¹ The failure of the Vienna summit on June 4, 1961, followed with the Khrushchev’s new deadline for the resolution of the Berlin Crisis, and eventual

⁵⁹⁸ Marc Trachtenberg, *The Cold War and After: History, Theory and the Logic of International Politics* (Princeton, N.J.: Princeton University Press, 2012), 152

⁵⁹⁹ McGeorge Bundy, *Danger and Survival: Choices about the Bomb in the First Fifty Years* (New York: Vintage Books, 1990), 358-359.

⁶⁰⁰ Freedman, “Berlin and the Cold War”, 6.

⁶⁰¹ Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 366.

erection of what was to become the Berlin Wall on August 13, all happened during the final preparations for the Non-Aligned Conference in Belgrade.⁶⁰²

This left Tito with very little space to strike a balance between the needs of the superpowers on the one hand, and his own designs on the other. While it is true that the leading nations of the NAM were focused on nuclear disarmament ever since the Conference in Bandung in 1955, among other principles with global importance and reach, these were put to the hard test on September 1, 1961, on the opening day of the Non-Aligned Conference in Belgrade, when the Soviets resumed nuclear testing.⁶⁰³ Even though George Kennan, the U.S. Ambassador in Belgrade, was informed that Tito would take a strong negative position on this Soviet decision, by September 3, when his speech on the conference was scheduled, Tito surprised the global audience and his own Government by expressing a radical approach to a number of international problems, aligning himself more closely to Soviet policies. However, the biggest surprise was his full understanding regarding the Soviet resumption of nuclear testing, indicating that this was a response to the French nuclear tests in the Sahara in 1960⁶⁰⁴:

“What is even worse, a Western power which is a member of the Atlantic Pact – France – has failed to comply with the resolutions of the United Nations on the discontinuance of atomic tests and continues to carry out such tests, and the other Western powers possessing atomic armaments have not taken any resolute measures against this. Matters have now

⁶⁰² Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 366-367.

⁶⁰³ William Potter, Gaukhar Mukhatzhanova, *Nuclear Politics and the Non-Aligned Movement: Principles vs Pragmatism* (Abingdon; New York: Routledge, for the International Institute for Strategic Studies, 2012), 37-40; Čavoški, “Between Great Powers and Third World neutralists”, 185, 197-198; Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 370-371. These principles included world peace, international dialogue, non-bloc policies, and economic development, among others.

⁶⁰⁴ Čavoški, “Between Great Powers and Third World neutralists”, 198-199; Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 371.

reached a point where the Soviet government has published a statement on the resumption of nuclear weapon tests. We are not so much surprised by the announcement on the presumption of atomic and hydrogen bomb tests, for we understand the reasons given by the Soviet Government. We are surprised by the fact that this was done on the day this peace conference began.”⁶⁰⁵

This statement shocked even the Yugoslav Minister of Foreign Affairs, Koča Popović, who was not informed of such a decision. Even worse, in days prior to this statement, Popović was reassuring Western partners that Tito would condemn the Soviet decision to resume testing nuclear weapons. In his own words, “we [the Yugoslavs] behaved as we were aligned, with the Eastern side”, because “you cannot condemn nuclear tests in the West, while asking for ‘understanding’ when the same happens in the East.”⁶⁰⁶ On the other hand, during these conversations with Popović, Kennan did notice that the “Soviets had played this hand to very good effect in their discussions with Yugoslavs, and that latter had found no very convincing counterargument to Soviet representations on this point.”⁶⁰⁷ The incident eventually enraged the U.S. Ambassador Kennan, who did not accept the oversimplified and somewhat insulting explanation that Tito was trying to provide support to Khrushchev at the time when he was under “extreme pressure in the Kremlin for not taking a hard line over Berlin and the arms race”.⁶⁰⁸ Kennan actually expressed his “deep disappointment” with Tito’s speech, emphasizing that it was “weaker and more pro-

⁶⁰⁵ John F. Kennedy Presidential Library and Museum. Papers of John F. Kennedy. Presidential Papers. President’s Office Files. Subjects. Non-Aligned Nations summit meeting, Belgrade, 1 September 1961. Material on Nonaligned Conference, September 3, Ninth Session, <https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/104/JFKPOF-104-004>, accessed on February 22, 2021.

⁶⁰⁶ Aleksandar Nenadović, *Razgovori s Kočom* [Conversations with Koča] (Zagreb: Globus, 1989), 29. Quoted in Dragan Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 371.

⁶⁰⁷ FRUS, 1961-1963, Vol. XVI, Eastern Europe; Cyprus; Greece; Turkey, ed. James E. Miller (Washington: United States Government Printing Office, 1994), Document 95.

⁶⁰⁸ Čavoški, “Between Great Powers and Third World neutralists”, 199.

Soviet than even those of Nasser and Nkrumah”, and that the part about Berlin “contains no word that could not have been written by Khrushchev.”⁶⁰⁹

It is obvious that Tito was aligning himself and Yugoslavia closer to the Soviet Union during the Non-Aligned Conference in Belgrade and in that period, which can be explained with the great pressure extended on him by the Soviets in order to gain momentum for solving the Berlin Crisis in their favour. Bogetić confirms this claim, but he also emphasizes that the central topic of the Tito’s speech on September 3 was the general and nuclear disarmament. According to his analysis, this was “the most concrete and most exhaustive elaboration of paths which would lead to gradual termination of arms race and lessening of the danger of proliferation of nuclear and thermonuclear weapons.”⁶¹⁰ Kennan’s report to the Department of State completely overlooks this topic, but it has to be taken in consideration in an attempt to reconstruct Tito’s nuclear policy at the time.

If the Soviet propaganda and bluffing performed surprisingly well in the West, it must have been equally efficient in Yugoslavia. It is difficult to estimate how much Tito feared growing Soviet nuclear might, but he must have been more than anxious about the rapidly accelerating nuclear arms race between two superpowers, as well as of potential sharing of nuclear weapons among their respective allies, particularly in Western Germany. While “Khrushchev was happy with the *status quo* as far as a divided Germany was concerned, he was extremely unhappy with the *status quo* in Berlin”⁶¹¹, it seems that Tito was happy with either option on either topic, as long as it halted nuclear weapon sharing and proliferation, thus keeping Yugoslav conventional military deterrence credible.

⁶⁰⁹ FRUS, 1961-1963, Vol. XVI, Eastern Europe; Cyprus; Greece; Turkey, ed. James E. Miller (Washington: United States Government Printing Office, 1994), Document 96

⁶¹⁰ Bogetić, *Nova strategija spoljne politike Jugoslavije, 1956-1961*, 372.

⁶¹¹ Freedman, “Berlin and the Cold War”, 5.

On the other hand, Khrushchev's open threat just a few days before the erection of the Berlin Wall, that he would be willing to use nuclear weapons against the West should the war start over Berlin, particularly targeting Italy and Greece as innocent countries on the wrong side,⁶¹² must have had a strong impact on Tito. Not only that it played the old card of nuclear-tipped missiles flying over Yugoslavia, which obviously worked well in supporting existing Yugoslav fears, but it also suggested that Khrushchev might actually be willing to do that if West did not accept his proposals. Bundy clearly shows that Khrushchev's strong political stance during the Berlin Crisis was a bluff which was never intended to escalate into a real conflict, but he also admits that in 1961 and 1962, the U.S. administration "thought it wise to take him seriously, as our predecessors had".⁶¹³ There is no reason to believe that Tito was not taking him seriously as well. Aside the fear of potential escalation, in this period Soviet policies were simply better aligned with Yugoslav security designs, which was the primary motivation for Tito to provide the Soviets his support.

⁶¹² Bundy, *Danger and Survival*, 360-366. The statement was given on August 11, 1961, during a Soviet-Romanian meeting in Moscow, in what Bundy explains as Khrushchev's "most belligerent single appearance".

⁶¹³ *Ibid.*, 363-364.

3.2 My Nuclear Reactor is Bigger

*“[O]ur people should know that nuclear energy
is not just a monopoly of certain powers,
that in their own country there are precious
nuclear raw materials and realistic perspective [...]
to put this great invention of human mind
in service of securing well-being for nations of our country.”⁶¹⁴*

If Khrushchev was able to successfully bluff the United States and entire world into believing that the Soviet Union was taking the lead in the nuclear arms race during the late 1950s and early 1960s, Tito’s ability to make a successful bluff when necessary must have been comparable, if not greater. The only difference, albeit a very significant one, was that without an actual weapon in his possession or control, and with limited material and human resources to pursue this ambition, Tito had to implement his bluffing strategy carefully and in a reasonable measure. In other words, in this specific game of brinkmanship, Tito was aiming at those areas and topics that would raise enough attention from superpowers, but not enough to cause an alarm, thus keeping the country in the “Goldilocks zone”.⁶¹⁵

⁶¹⁴ Josip Broz Tito, *Govori i članci: 1941-1957, knj. 10, 30. XI 1954 - 31. I 1956* [Speeches and Articles: 1941-1957, Vol. 10, November 30, 1954-January 31, 1956] (Zagreb: Naprijed, 1959), 111-112. Quoted in Darko Bekić, *Jugoslavija u Hladnom ratu. Odnosi s velikim silama 1949-1955* [Yugoslavia in the Cold War. Relationship with the Superpowers, 1949-1955] (Zagreb: Globus, 1988), 685

⁶¹⁵ Tristan A. Volpe, “Atomic Leverage: Compellence with Nuclear Latency”, in *Nuclear Latency and Hedging: Concepts, History, and Issues*, ed. Joseph F. Pilat (Washington: Woodrow Wilson International Center for Scholars, Nuclear Proliferation International History Project, September 2019), 324-328. The author defines the “Goldilocks zone”, or “sweet spot”, as a balanced position between credible assurances of countries nuclear technological and related capabilities, and the clear determination not to proliferate.

This nuclear strategy can be understood as a textbook case of the “shot across the bow”, aimed at both superpowers in order to use it as a bargaining chip for gaining some tangible security guarantees or economic benefits and concessions. According to Levite, in order for this strategy to work, the state has to credibly present itself as “both determined to pursue and capable of pursuing nuclear weapons if left to its own devices”, while leaving the option to actually pursue development of nuclear weapons open, “if the shot across the bow goes unnoticed.”⁶¹⁶

This strategy is deeply related to the issue of prestige, aimed both at international and domestic audience. In his groundbreaking study, Sagan tackled this issue in relation to acquisition of nuclear weapons, and concluded that, depending on dominant norms in different periods, countries might consider it beneficial to acquire nuclear weapons or abandon these ambitions if such a decision had a positive impact on their international prestige.⁶¹⁷ Fuhrmann also argues that even acquisition of certain sensitive technologies, such as enrichment and reprocessing (ENR) technologies, can serve to enhance a country’s prestige on the international or domestic front.⁶¹⁸

Tito had plenty of reasons to pursue both of these strategies. It has already been shown that he understood well that a rapid proliferation of nuclear weapons in Europe would be a horror scenario for Yugoslavia, and as the decade drew to a close, it seemingly became more and more realistic. This meant that Yugoslavia had to speed

⁶¹⁶ Ariel E. Levite, “Nuclear Hedging and Latency: History, Concepts and Issues”, in *Nuclear Latency and Hedging: Concepts, History, and Issues*, ed. Joseph F. Pilat (Washington: Woodrow Wilson International Center for Scholars, Nuclear Proliferation International History Project, September 2019), 26-27. Levite offers more elaborate explanation, suggesting that “the ultimate goal in such actions may be to obtain security guarantees and alliance arrangements; acquire conventional or nuclear capabilities; secure economic, technological, and diplomatic benefits; exert pressure on others; or deter or coerce an adversary into some other action.”

⁶¹⁷ Sagan, “Why Do States Build Nuclear Weapons?”, 75-76.

⁶¹⁸ Matthew Fuhrmann, “Explaining the Proliferation of Latent Nuclear Capabilities”, in *Nuclear Latency and Hedging: Concepts, History, and Issues*, ed. Joseph F. Pilat (Washington: Woodrow Wilson International Center for Scholars, Nuclear Proliferation International History Project, September 2019), 303-304.

up its own work in mastering of necessary technologies, while in the meantime, carefully crafted “shot across the bow” strategy had to be implemented particularly to hide the fact that the country’s nuclear capacities were far from developed.

On the other hand, breaking out of the relative political isolation during the late 1950s and creating his leadership role among the growing number of neutral nations, became another of Tito’s political imperatives. The pinnacle of these efforts was the Non-Aligned Conference in Belgrade in 1961, where he emerged in this role on the international political scene, after years of delicate work in this direction. The Yugoslav nuclear program evidently played an important role in the process. According to estimates of the U.S. Department of State Bureau of Intelligence and Research (INR), by 1960 this had already become an important component of the Yugoslav nuclear policies in general, and particularly considering the emerging Non-Aligned Movement. In one of their reports, it was stressed that “the prestige effect on underdeveloped and uncommitted countries of having a well-developed nuclear program” was of huge importance to the Yugoslav leaders, since “they will be able to show their advanced position by giving nuclear assistance to the underdeveloped countries of Africa and Asia.”⁶¹⁹

⁶¹⁹ Wilson Center. Digital Archive. Nuclear Proliferation International History Project (NPIHP). United States. National Archives and Records Administration. Department of State Bureau of Intelligence and Research, Intelligence Information Brief No. 236, 'Yugoslavia Nuclear Reactor Goes into Operation', January 04, 1960, History and Public Policy Program Digital Archive, RG 59, Entry UD-UP 139, INR/DDR, Bureau of Intelligence and Research, Reports Coordination and Review Staff, Intelligence Documents and Reports, 1958-1966, box 146, Intelligence Information Briefs 210-246 <https://digitalarchive.wilsoncenter.org/document/134045> (accessed on January 15, 2021).

American reactor good, Soviet reactor better

The First International Conference on the Peaceful Uses of Atomic energy, held between August 8 and 20, 1955, in the U.N. building in Geneva, saw roughly 1,400 delegates and equal number of observers from 73 countries⁶²⁰, and was a perfect opportunity for the Yugoslav scientists to ‘come out of the closet’ of secrecy and present their achievements. Already during preparation for the conference, the Yugoslav authorities got wind in their sails, realizing that the abstract of papers they had received were not “on the level we imagined them to be”, making them confident they can prepare roughly twenty-two papers, instead of only five, as originally planned.⁶²¹ Savić recalls this period and somewhat dramatically suggests that in Geneva, Yugoslavia proved to be “the fifth nuclear power in the world (America, Soviet Union, England, France then Yugoslavia)”.⁶²² This statement was made roughly forty years after the event and it obviously lacks balanced critical appraisal of the performance of the Yugoslav delegation, although it probably accurately depicts its propaganda aims.

Following the already established practice of publishing sensitive or classified information in order to force superpowers to declassify sensitive technologies, the Yugoslav delegation did not fail to dazzle the audience in Geneva. Expectedly, one of its stars was Dragoslav Popović, who played a role of a nuclear Robin Hood for neutral and underdeveloped nations. He gave a paper titled “The Time Involved in the Fission Process”, but he was first and foremost recognized as “the first scientist to publish the width of a fission resonance”, only a year earlier, the time to which he

⁶²⁰ John Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 151.

⁶²¹ AJ, 177, f. 22-88. Zaključci sednice Predsedništva Savezne komisije za nuklearnu energiju [Conclusions of the of the SKNE Presidency meeting], May 18, 1955.

⁶²² Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 17.

referred to as the “unfortunate period (of secrecy) which we hope is disappearing.”⁶²³ His performance was followed with Slobodan Ribnikar’s presentation of the method for production of heavy water using the catalytic exchange, based on the same principle used in the United States at the time. According to official histories, this forced his American colleagues to declassify the method “simultaneously with our [Yugoslav] presentation”, while it also served as “one of the first affirmations of the Institute on an international level”.⁶²⁴

These statements may seem exaggerated, but it is a fact that during the conference “[a] large amount of recently declassified material on nuclear science and technology was made available for the first time by major nuclear powers”⁶²⁵, and it evident that Yugoslavia wanted the piece of that prestige cake. Other papers presented by Yugoslav delegates predominantly dealt with methods for extraction of uranium from different ores and its refinement, which is significant to note considering that Yugoslavia was nowhere near actual production of uranium at the time.⁶²⁶ Savić indirectly reveals the logic behind the Yugoslav propaganda: “We did not have intentions to construct the bomb, so we did not have the reason to hide such results.”⁶²⁷

It seems that Tito’s instincts served him well once again, as he quickly understood the name of the game. While the United States wanted to establish its global dominance in peaceful uses of atomic energy, with obvious political and

⁶²³ U.S. Department of Energy Office of Scientific and Technical Information (OSTI). The International Conference on the Peaceful Uses of Atomic Energy. Geneva, Switzerland, August 8-20, 1955, Vol. 1 (Report of the United States Delegation to the International Conference on the Peaceful uses of Atomic Energy held by the United Nations; with Appendices and Selected Documents, 36. <https://www.osti.gov/opennet/servlets/purl/16295117/16295117.pdf> (accessed on March 2, 2021).

⁶²⁴ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 146.

⁶²⁵ Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 151.

⁶²⁶ AJ, 177, f. 22-88. Pregled referata za ženevsku konferenciju [The Overview of Papers for the Geneva Conference], May 18, 1955.

⁶²⁷ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 17.

propaganda aims and gains, Yugoslavia was playing copycat, trying to take the same role in the developing world. Even before the conference in Geneva, and at the time of the establishment of the Egyptian Atomic Energy Authority (EAEA), the Egyptian Government asked the information about the complete structure of the Yugoslav Federal Nuclear Energy Commission, including the statutes of research institutes, and the FNEC was happy to provide all the necessary assistance.⁶²⁸ This, however, is only a part of the story.

Yugoslavia may have emerged as a vocal, if not an interesting player in the field of nuclear science and related technologies, but the conference in Geneva was a true masterpiece of the U.S. propaganda. The entire event is was a “carefully orchestrated psychological warfare campaign” within a much larger ‘Atoms for Peace’ project, which some authors consider “the largest single propaganda campaign ever conducted by the American government.”⁶²⁹ The centerpiece of the American propaganda was the technical fair exhibition, displaying a fully functional swimming pool-type nuclear research reactor, designed by the Oak Ridge National Laboratory (ORNL) and installed in the United Nations building in Geneva. The presentation was supposed to encourage interested nations to purchase such a machine through Bilateral Agreement of Cooperation with the United States. On the last day of the Geneva Conference, the Swiss government formally bought the -exhibited reactor, thus making it “the first nuclear reactor ever sold by one nation to another”, although in the

⁶²⁸ AJ, 177, f. 22-88. Zaključci sednice Predsedništva Savezne komisije za nuklearnu energiju [Conclusions of the of the SKNE Presidency meeting], May 18, 1955; Robert J. Einhorn, "Egypt: Frustrated but Still on a Non-Nuclear Course," in *The Nuclear Tipping Point*, ed. Kurt M. Campbell, Robert J. Einhorn, and Mitchell B. Reiss (Washington, DC: Brookings Institution Press, 2004), 45.

⁶²⁹ Osgood, *Total Cold War*, 155-156, 161. Quoted in Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 160.

period between June 10 and August 11, 1955, the USAEC had already negotiated signing of more than a dozen bilateral agreements.⁶³⁰

The strategy worked flawlessly for the United States, but Yugoslavia was too important to be offered a small research reactor the AEC was promoting in Geneva. On August 9, 1955, the second day of the Geneva Conference, the president of the Westinghouse Electric International Company, W. E. Knox, sent a letter directly to Tito, with an offer for a much more elaborate nuclear reactor and the “scientific and engineering know-how which will enable you today to make atomic energy a practical realization” in Yugoslavia.⁶³¹ The offer actually included the pressurized water reactor (PWR) capable to produce 10 MW electric power, using highly enriched uranium (93%) and light water as moderator. The reactor was of the same type Westinghouse developed for the world’s first operational nuclear submarine, *USS Nautilus*, and the demonstrated first full-scale nuclear power plant in Shippingport, Pennsylvania, which was still under construction at the time.⁶³² This offer provided exceedingly more than any other developing nation could ever hope to receive, although the most important provisions were the same as in any other bilateral agreement for cooperation with the United States, particularly considering the ownership of the nuclear fuel.⁶³³

⁶³⁰ Krige, “Techno-Utopian Dreams, Techno-Political Realities”, 156, 164. These agreements were made with Turkey, Pakistan, Greece, Israel, Lebanon, Argentina, Brazil, Chile, Venezuela and Taiwan, among others.

⁶³¹ AJ, 177, f. 22-88. The letter of W. E. Knox of the Westinghouse Electric International Company to Josip Broz Tito, August 9, 1955.

⁶³² AJ, 177, f. 22-88. Izveštaj o ponudi Westinghouse-a za isporuku jedne nuklearne električne centrale od 10.000 kW [Report on the Westinghouse’s offer to deliver one nuclear electric plant of 10,000 kW], September 21, 1955; Wendy Allen, “Nuclear Reactors for Generating Electricity: U.S. Development from 1946 to 1963” (Santa Monica: Rand Corporation, R-2116-NSF, June 1977), 81. The construction of the Shippingport nuclear power plant started in March 1955, and the reactor became critical only on December 2, 1957. More in: P. A. Fleger, I. H., Mandil, Phillip N. Ross, *Shippingport Atomic Power Station: Operating Experience, Developments and Future Plans* (Report prepared for the U.S. – Japan Atomic Industrial Forum, Tokyo, December 5-8, 1961), 34

⁶³³ AJ, 177, f. 22-88. Izveštaj o ponudi Westinghouse-a za isporuku jedne nuklearne električne centrale od 10.000 kW [Report on the Westinghouse’s offer to deliver one nuclear electric plant of 10,000 kW], September 21, 1955.

Krige explains that that “[k]ey provisions in the standard agreement were waived for historical allies”, such as the United Kingdom and Canada. Similar attention was given only to Belgium, “as a major supplier of uranium to the United States from its mines in Katanga” in Belgian Congo, and the agreement they signed allowed them to “move beyond research reactors and to proceed immediately with the construction of power reactors in Belgium and its colonies.” As a result, Belgian scientists and engineers participated in construction and operation of the nuclear power plant in Shippingport, while in 1958, the United States helped the Belgians to construct an 11.5 MW nuclear power reactor for the world fair (Expo 58) in Brussels.⁶³⁴

Details of Westinghouse’s original offer to Tito are lost, but it is easy to see that in this case Yugoslavia was recognized as much more important partner than other developing nations, although one step less important than the American “historical allies”. The opportunities for the advancement of the Yugoslav nuclear program were also immense. According to estimates of the Yugoslav experts, the price offered was very attractive, equivalent to the most expensive conventional thermal and hydro power plants made in Yugoslavia, while the basic level of technology transfer was also included in the offer.⁶³⁵ Notwithstanding the gains for the U.S. administration, Tito was obviously offered an excellent opportunity to promote

⁶³⁴ John Krige, “Techno-Utopian Dreams, Techno-Political Realities: The Education of Desire for the Peaceful Atom”, in *Utopia/Dystopia: Conditions of Historical Possibility*, eds. Michael D. Gordin, Helen Tilley and Gyan Prakash (Princeton, N.J.: Princeton University Press, 2010), 165.

⁶³⁵ AJ, 177, f. 22-88. Izveštaj o ponudi Westinghouse-a za isporuku jedne nuklearne električne centrale od 10.000 kW [Report on the Westinghouse’s offer to deliver one nuclear electric plant of 10,000 kW], September 21, 1955. The price was calculated per 1 kW of installed power and compared to the price of conventional power plants, and it was calculated to 400 USD per kW in the Westinghouse’s offer, compared to 200-400 USD per kW in Yugoslav conventional power plants. Considering technology transfer, the offer included “a complete project for location and assembly of the plant, qualified personnel for supervision of the assembly, training of the key personnel for operating the plant, nuclear reactor with all associated instruments for control and fuel elements for the first charge (except for the price of uranium 235 which is purchased directly from the AEC), complete devices for heat transfer and production of electric energy, including all auxiliary devices, pipelines, cables, cranes, etc. Construction project is also delivered.”

his strong political relations with the United States, accelerate and expand the country's modernization effort, as well as the image of modernity to a level other developing nations could only dream of at the time, effectively 'shooting across the bow' with large caliber projectiles.

Therefore, it is even more surprising that this offer was flatly rejected by the SKNE. Following the presentation of the offer during one of the meetings of the SKNE Presidency, Aleksandar Ranković simply said, "these conditions are hostile, at the moment", after which the debate was finished, never to be reopened.⁶³⁶ The fact that the decision on the Westinghouse offer was made without any official discussion points to a conclusion that the decision had already been made by Tito and that Ranković only had to formally implement it. Even if there were different opinions, those who were present did not dare to express them, or they simply decided to keep them for themselves, which indirectly proves the hypothesis.⁶³⁷

Part of the explanation why this offer was so rejected lies in the fact that the 'Belgrade Declaration' of June 2, 1955, besides promoting more conventional commercial agreements between the Soviet Union and Yugoslavia, included the announcement that the two countries will establish cooperation in peaceful uses of nuclear energy. Negotiations on these topics were accelerated in following months and eventually formalized on January 28, 1956, when the official agreement for cooperation between two countries in the field of nuclear science and peaceful use of nuclear energy was signed. Among other provisions, the agreement included the

⁶³⁶ AJ, 177, f. 22-88. Stenografske beleške sa sednice Predsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955. The actual adjective used was *neprijateljiv*, which does not exist in the BCMS language, and seems as either Ranković's slip of the tongue, or stenographer's typo. Being a combination of *neprihvatljiv* [unacceptable] and *neprijateljski* [hostile], I opted for the latter option, as its meaning is closer to the invented word.

⁶³⁷ Besides Ranković, there were Slobodan Nakićenović, Svetozar Vukmanović-Tempo, Ivan Gošnjak, Milentije Popović, Pavle Savić, Ivan Supek, Dragoslav Popović, Kosta Lado, Miodrag Ristić, and Milorad Mladenović

purchase of the Soviet nuclear reactor of an unspecified type.⁶³⁸ It is also important to emphasize that this was part of the Soviet version of the ‘Atoms for Peace’ initiative. Similar agreements had already been signed in 1955 with China, Czechoslovakia, GDR, Poland, and Romania, and in the summer of 1956, with Bulgaria and Hungary.⁶³⁹

While it is appealing to view this agreement within the framework of the much wider and deeper process of rapprochement between Yugoslavia and the Soviet Union, the reality is more complex. During one very heated debate held in the offices of the SKNE, held on September 30, 1955, Pavle Savić explained the Yugoslav plan and motives in details, indirectly also revealing his transition from the strongest opponent to the most vocal supporter of the nuclear reactor development. Savić’s main preoccupation was for the Yugoslav scientists to “pass the exam”, as he repeated many times during the discussion, and construct the first nuclear reactor independently, thus proving that they did not waste the time and money invested in their education. Therefore, the first step was to purchase the uranium fuel and heavy water from the Soviet Union, since Yugoslav industry could not yet produce either in any significant quantities, and to use them for the independent construction of the zero-power reactor, which would play the role of an “exam” Savić was so keen to organize. Simultaneously, Yugoslavia would order a much larger reactor in the Soviet Union based “on our design”. In an attempt to save the money, the fuel and heavy

⁶³⁸ Bondžić, *Između ambicija i iluzija*, 140-141; *Jugoslovensko-sovjetski odnosi 1945-1956: zbornik dokumenata* [Yugoslav-Soviet Relations 1945-1956: Collection of Documents] (Beograd: Ministarstvo spoljnih poslova, 2010), 836-838. Agreement on Cooperation between the Federal People's Republic of Yugoslavia and the USSR in Expanding Research in the Field of Nuclear Physics and the Peaceful Use of Nuclear Energy [*Sporazum o saradnji između FNRJ i SSSR u unapređenju straživanja u oblasti nuklearne fizike i korišćenja atomske energije u mirnodopske svrhe*]

⁶³⁹ Gloria Duffy, “Soviet Nuclear Exports”, *International Security*, Vol. 3, No. 1 (Summer 1978), 85.

water used in the zero-power reactor would be transferred and used in the bigger reactor after its construction had been finalized.⁶⁴⁰

This was the basis of the so-called “Vinča Project”, which will be discussed in more details in the following chapter. Here it is important to stress that the question of national prestige was the focus of the discussion. The Soviet initial offer included a 2 MW nuclear reactor, the same type that had already been under construction in other East European countries. This was not received well in Yugoslavia. Vukmanović-Tempo, who led the negotiations with the Soviets, called it simply “the schoolboy’s reactor” [*đački reaktor*], finding it insulting that the Bulgarians, who “have no idea about anything” would receive the same type of nuclear reactor, while insisting that the vast experience of Yugoslav scientists and existing infrastructure qualified them to purchase and operate a more elaborate machine. Savić followed his lead and explained that “we [the Yugoslavs] cannot accept it and put ourselves on the level of Albania, Bulgaria or Madagascar, and simply buy what they offer”. His suggestion was that the Yugoslavs have to appear as “clients and partners”, who would order a nuclear reactor of their own design, not as simple buyers. Ranković explained the logic behind the Yugoslav request in plain words, saying that “we would go for something bigger, with 10.000 kW [10 MW], in order not to fall behind countries such as Bulgaria, Czechoslovakia, Hungary, etc., to which they [the Soviets] have already given such reactors”.⁶⁴¹

During one of the meetings with the Soviets in Moscow, where details about the cooperation between two countries were hotly debated, Dr. Franc Kos from the

⁶⁴⁰ AJ, 177, f. 22-88. Stenografske beleške sa sednice Pretsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955.

⁶⁴¹ AJ, 177, f. 22-88. Stenografske beleške sa sednice Pretsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955.

Yugoslav delegation provided an explanation about the difference between Yugoslavia and other socialist countries, leaving no space for misunderstanding:

“The Yugoslav delegation did not arrive to the USSR to purchase an existing type of reactor, and it was only by a chance that our wish for the reactor matched with the Chinese reactor. We have agreed that the Soviet Government should allow us to purchase material for construction of this reactor, and that during the process joint cooperation on designing necessary changes and prefabrication would be established. This is the difference between the Soviet and our proposal for the agreement, the Soviet side sells an existing type of reactor, and the Yugoslav side speaks about purchase of materials for the reactor. This is the difference between Yugoslavia and countries of people’s democracy, like there is a difference between Yugoslavia and countries of people’s democracy in the level of development of nuclear science.”⁶⁴²

The agreement with the Soviet Union was eventually signed on January 28, 1956, and while it will be discussed in more details in the following chapter, here it must be stressed that, in comparison to the standard U.S. bilateral agreement, it was more liberal regarding the most sensitive components. The agreement stipulated that the uranium fuel and heavy water would remain in Yugoslav ownership, allowed Yugoslav companies to contribute up to, what eventually amounted to roughly 40 percent of the project value, and that the reactor design would be modified in accordance to Yugoslav requests.⁶⁴³

⁶⁴² AJ, 177, f. 437. Strogo poverljivo. Zapisnik br. 3 [Top Secret. Minutes No. 3], December 13, 1955.

⁶⁴³ Bondžić, *Između ambicija i iluzija*, 140-144. The Yugoslav companies involved in the project mostly contributed to basic construction work and production of more conventional components. *Jugoslovensko-sovjetski odnosi 1945-1956: zbornik dokumenata* [Yugoslav-Soviet Relations 1945-1956: Collection of Documents] (Beograd: Ministarstvo spoljnih poslova, 2010), 836.

The Soviet offer was obviously more appealing, but its significance to national prestige can be better understood from the fact that the nuclear reactor in question was of the same model, size and capacity as the Soviets were developing for China. This heavy water moderated reactor, using low enriched uranium fuel (2 percent), was capable of producing between 6.5 and 10 MW of power (in forced mode of operation), the so-called RA reactor, installed at the IBK in Vinča.⁶⁴⁴ The timing was also of immense importance for Yugoslavia. While the Chinese reactor became critical in June 1958 and the Yugoslav on December 28, 1959, the cooperation with the Soviet Union helped Yugoslavia to put in operation their independently constructed zero-power reactor already on May 17, 1958. This was named the RB reactor, and it was also installed at the IBK. Nominally, the Soviet assistance was considered crucial in accelerating these projects.⁶⁴⁵

Yugoslavia thus became the first Balkan nation to create a nuclear chain reaction, which had an important symbolic significance in the regional competition with both the Soviet and American allies. Among the neutrals, India took the lead in August 1956, after they constructed and successfully put in operation a 1 MW swimming pool-type research reactor relying on the British assistance, although

⁶⁴⁴ AJ, 177, f. 1-1. Strogo poverljivi Zapisnik br. 1 [Top secret, Minutes No. 1], December 13, 1955; Bondžić, *Između ambicija i iluzija*, 146-147; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 256; Zhihua Shen, Yafeng Xia, "Between Aid and Restriction: The Soviet Union's Changing Policies on China's Nuclear Weapons Program, 1954-1960", *Asian Perspective* Vol 36, No. 1 (Jan.-Mar. 2012), 97; Liu Yanqiong, Liu Jifeng, "Analysis of Soviet Technology Transfer in the Development of China's Nuclear Weapons", *Comparative Technology Transfer and Society*, Vol. 7, No. 1 (April 2009), 73

⁶⁴⁵ AJ, 177, f. 22-88. Stenografske beleške sa sednice Pretsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955; Bondžić, *Između ambicija i iluzija*, 145-146; Yanqiong, Jifeng, "Analysis of Soviet Technology Transfer in the Development of China's Nuclear Weapons", 73, 78. Yanqiong and Jifeng estimate that China would be capable to independently construct a nuclear reactor by the end of 1959, while the Yugoslav estimate was that they would not be capable to do it before 1962, although predominantly due to the lack of uranium, rather than the necessary know-how. The zero-power (RB) reactor was a non-reflected, natural uranium, heavy water critical assembly. It used roughly seven tons of heavy water and 208 fuel rods. Specific details may be found in Milan Pešić, "Estimation of Doses Received by Operators in the 1958 RB Reactor Accident Using the MCNP5 Computer Code Simulation," *Nuclear Technology & Radiation Protection* 27, no. 3 (2012): 199-221.

Yugoslavia could still claim that their RB ‘zero-power’ reactor was of indigenous design, even if it was much smaller and the fuel came from the Soviet Union.⁶⁴⁶ Egypt on the other hand, signed in 1956 an agreement with the Soviet Union to purchase of a 2 MW light-water research reactor, the same type the Soviets sold to East European countries, and the Soviets completed its installation only in 1961.⁶⁴⁷

Tito declined Westinghouse’s offer, which would confirm the Yugoslav special position among the U.S. allies, as the only communist country to receive such a favorable treatment. This position and related propaganda would have also worked well even with the gradually developing policy of non-alignment. On the other hand, the Soviets did indirectly support Yugoslav independence through very favorable provisions they offered, particularly regarding the ownership of uranium fuel and heavy water. Moreover, all activities in the main contract and subsequent agreements were formulated under the umbrella term of “scientific-technical assistance” that the Soviet Union was supposed to provide to Yugoslavia. This was crucial from the aspect of the Yugoslav prestige of an independent and developed nation, and far from simple commercial agreement, even if the “assistance” was, again, only formulaic.⁶⁴⁸ The fact that Yugoslavia was treated, at least nominally, on the same level as China, suggests that it was symbolically recognized as one of the most important Soviet allies, or one of the leading communist nations, which must have had influence on Tito’s decision.

Tito had relatively equal offers in his hands and roughly at the same time, and at least regarding the immediate political consequences, he *chose* to cooperate with

⁶⁴⁶ Perkovich, *India’s Nuclear Bomb*, 27; Yanqiong, Jifeng, “Analysis of Soviet Technology Transfer in the Development of China’s Nuclear Weapons”, 74.

⁶⁴⁷ Robert J. Einhorn, "Egypt: Frustrated but Still on a Non-Nuclear Course," in *The Nuclear Tipping Point*, ed. Kurt M. Campbell, Robert J. Einhorn, and Mitchell B. Reiss (Washington, DC: Brookings Institution Press, 2004), 45; Gawdat Bahgat, “Nuclear Proliferation: Egypt”, *Middle Eastern Studies*, Vol. 42, No. 3 (May 2007), 412

⁶⁴⁸ Bondžić, *Između ambicija i iluzija*, 140-144.

the Soviet Union, not the United States. The period of rapprochement with the Soviet Union obviously played an important role in making this choice, but it seems that the desire for the symbolic status of one of the leading countries in the communist world was more important and more desired than the similarly exclusive status in the West. However, it must be stressed that the Soviet agreement seemingly offered more freedom in use and transfer of nuclear technologies, uranium fuel and heavy water, which was obviously extremely important to Tito who was desperate to rapidly develop the country's nuclear capacities. The Yugoslav official estimates at the time showed that without the Soviet support, and particularly regarding the uranium fuel and heavy water, Yugoslavia would not be able to construct the first nuclear reactor independently before 1962.⁶⁴⁹

The cooperation with the Soviet Union allowed Tito to successfully place a 'shot across the bow' roughly four years earlier than initially planned and in the desired direction, which was particularly important considering that it happened during one of the hottest periods of the Cold War. Paradoxically, the speed seems to have been too great for the Yugoslav nuclear establishment to handle, as the desired shot turned out to be a dud. On October 15, 1958, the accident happened with the RB 'zero-power' reactor during regular experiments, irradiating six reactor operators with lethal doses of radiation. Although the innovative treatment the irradiated workers received in Paris led to only one casualty among the operators, the so-called "Vinča accident" of 1958 effectively erased the prestige points gained only a few months earlier when this reactor became critical. In addition, it produced one of the first

⁶⁴⁹ AJ, 177, f. 22-88. Stenografske beleške sa sednice Pretsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955

victims among the nuclear reactor operators in the world, and slowed down work on the assembly of the larger “Chinese” reactor.⁶⁵⁰

Exhibiting the American, Soviet and Yugoslav atom

This Yugoslav policy necessarily and clearly reflected in the propaganda field. The U.S. Government had been organizing ‘Atoms for Peace’ exhibitions all over the world since 1954, through the United States Information Agency/Service’s (USIA/USIS) dense network of posts and offices across the world.⁶⁵¹ In 1954, the exhibition was first sent to Italy, Germany, Spain, the Netherlands and Great Britain, eventually reaching India and Pakistan in 1955, among other countries, drawing hundreds of thousands visitors.⁶⁵² The American exhibition during the Geneva Conference in 1955 was part of that effort, and it “certainly upstaged the Soviets”, who were actually ahead of the United States in development of nuclear power reactors, but who exhibited only a model of their reactor, eventually being forced to respond to this American propaganda offensive.⁶⁵³

Yugoslavia was on the list of these countries, and by the end of 1955, the USIA/USIS mission in Belgrade stressed with some pride that “it has become virtually trite to report that the ‘Atoms for Peace’ exhibit achieved a greater impact... than any

⁶⁵⁰ It is not clear how much did the Vinča accident slow down the installation of the 6.5/10 MW nuclear reactor, but sources do reveal that until the end of 1958, all activities were slowed down due to safety concerns. More about the accident in Marko Miljković, “Nuclear Yutopia: The Outcome of the First Nuclear Accident in Yugoslavia, 1958” in: *Labor in State-Socialist Europe, 1945-1989: Contributions to a History of Work*, ed. Marsha Siefert (Budapest; New York: Central European University Press, 2020), 274-305. See also Spencer R. Weart, *The Rise of Nuclear Fear* (Cambridge and London: Harvard University Press, 2012), 166.

⁶⁵¹ Osgood, *Total Cold War*, 174.

⁶⁵² *Ibid.*, 176; Nicholas J. Cull, *The Cold War and the United States Information Agency: American Propaganda and Public Diplomacy, 1945-1989* (Cambridge; New York: Cambridge University Press, 2008), 106. In Sao Paulo (Brazil), roughly 400,000 people visited the exhibition, with significant numbers elsewhere: in Frankfurt (188,000), Buenos Aires (195,860), Ghana (135,853), Kyoto (155,000).

⁶⁵³ Krige, “Techno-Utopian Dreams, Tehcno-Political Realities”, 158.

other project undertaken... by the U.S. Information Service”⁶⁵⁴. On the other hand, the background of this success story is not that straightforward. In March 1955, the Yugoslav Government was officially contacted about organization of the ‘Atoms for Peace’ exhibition at the Zagreb Trade Fair in September that year.⁶⁵⁵ Responding on the Ministry of Foreign Affairs request for an advice, the SKNE’s Secretary, Slobodan Nakićenović, replied that “the opinion of this Commission is that it is out of the question [to organize the exhibition in Zagreb], because the purpose of the exhibition does not fit the nature of the fair.”⁶⁵⁶

Once again, the unyielding response of the SKNE may easily be attributed to the overall spirit of rapprochement between Yugoslavia and Soviet Union, where Tito obviously did not want to make waves before his meeting with Khrushchev, but it is also comparable to initial conservative plans and preparations for the Yugoslav participation in the Geneva Conference in 1955. Therefore, it is somewhat surprising that ‘Atoms for Peace’ exhibition was eventually accepted and organized in Belgrade and Zagreb in September and October 1955, and that “large audiences, including key government officials” visited it.⁶⁵⁷ This change of heart seems more as a concession to the American side after the refusal to accept Westinghouse’s offer, or a balancing act although official records reveal precious little on this issue.

Regardless of the actual logic behind eventual acceptance of the exhibition, the entire event proved to be great success for the USIA and the American propaganda in

⁶⁵⁴ Atoms for Peace Exhibit in Zagreb and Belgrade, USIS Belgrade, December 15, 1955, RG 306, World Project Files of the Office of Research, box 2, NA. Quoted in: Osgood, *Total Cold War*, 176.

⁶⁵⁵ FRUS, 1955-1957, Vol. XXVI, Central and Southeastern Europe, ed. Roberta L. DiGangi et al. (Washington: United States Government Printing Office, 1992), Document 241; AJ, 177, f. 2. Confidential files. Dopis Državnog sekretarijata za inostrane poslove Saveznoj komisiji za nuklearnu energiju [Note of the State Secretariat for Foreign Affairs to the SKNE], March 31, 1955.

⁶⁵⁶ AJ, 177, f. 2. Confidential files. Odgovor Državnom sekretarijatu inostranih poslova (Ekonomsko odeljenje) [Response to the State Secretariat for Foreign Affairs, Department for the Economy], May 4, 1955.

⁶⁵⁷ FRUS, 1955-1957, Vol. XXVI, Central and Southeastern Europe, ed. Roberta L. DiGangi et al. (Washington: United States Government Printing Office, 1992), Document 241.

general, which did not go unnoticed in the Soviet Union. Soon after Yugoslavia and the Soviet Union formalized their cooperation in peaceful use of nuclear energy, the Soviet Embassy in Belgrade offered to organize an exhibition in Belgrade and Zagreb about “peaceful uses of nuclear energy”, which was “supposed to serve as a reciprocity to the American exhibition ‘Atoms for Peace’”.⁶⁵⁸ Unlike with the American offer, the SKNE and the Ministry of Foreign Affairs immediately accepted the Soviet proposal, but the negotiations on details dragged on for months.

By August 1956, it was agreed that the Soviet nuclear exhibition held earlier in Bratislava should be transported and presented to the audience in Yugoslavia during the following month. However, clearly lacking real experience in organizing this kind of propaganda outside of their orbit, the Soviets failed to mention that the SKNE was expected to share the cost of the exhibition with the Soviet Embassy, which clearly annoyed the Yugoslav side and led almost to abandonment of the idea.⁶⁵⁹ Notwithstanding these obstacles, the Yugoslav Government eventually agreed to finance the entire exhibition (except for the transport expenses), and rescheduled it for the period between September 25 and October 25, 1956.⁶⁶⁰ In the aftermath, the exhibition was once again postponed, after which the discussion was never reopened, and while official records do not provide an explanation, it is easy to assume that for the Soviets, the ‘exhibition’ of their more conventional power in Hungary during late

⁶⁵⁸ AJ, 177, f. 2. Confidential files. Zabeleška o razgovoru sa Tupicinom, prvim sekretarom Sovjetske ambasade [Note on Conversation with Tupicin, the First Secretary of the Soviet Embassy], April 16, 1956.

⁶⁵⁹ DA MSPRS, PA, 1956, f. 92. Zabeleška o razgovoru Radomira Aleksića, načelnika u Saveznoj komisiji za nuklearnu energiju i prvog sekretara Sovjetske ambasade Tupicina [Note on conversation between Radomir Aleksić, representative of the SKNE and Tupicin, the First Secretary of the Soviet Embassy], August 10, 1956

⁶⁶⁰ AJ, 177, f. 437. Beleška o razgovorima povodom sovjetske izložbe o mirnodopskoj primeni nuklearne energije [Note on Conversations Regarding the Soviet Exhibition on Peaceful Use of Nuclear Energy], August 22, 1956; AJ, 177, f. 437. Beleška o razgovorima povodom sovjetske izložbe o mirnodopskoj upotrebi nuklearne energije sa sekretarom Sovjetske ambasade Tupicinom [Note on Conversations Regarding the Soviet Exhibition on Peaceful Use of Nuclear Energy with the Secretary of the Soviet Embassy, Tupicin], August 25, 1956.

October and early November of 1956, became their imperative.⁶⁶¹ It would be also logistically almost impossible to transfer such an exhibition to Yugoslavia, while the political impact of such an event would be equally embarrassing for Tito.

The “Vinča Accident” of 1958 was a huge embarrassment for the entire country and for the Yugoslav political establishment in particular, and while the aftershocks of this negative propaganda were difficult to control on a global level, the situation on the home turf was easier to manage. Života Vranić, the only victim among irradiated scientists and technicians, was raised to the level of a national hero, while the rest of his colleagues earned a status of “pioneers of nuclear exploration”, comparable to the Soviet and American space explorers.⁶⁶² This probably was not enough to manage the public image of the Yugoslav peaceful atom, and in 1960, the SKNE organized its own nuclear exhibition in Belgrade.

Immediately after irradiated scientists returned to Yugoslavia, the SKNE started preparing for a “nuclear energy exhibition” in Belgrade. The event was supposed to have a clear “propaganda character” and with the primary goal to “present to our audience what we have achieved so far in the field of nuclear energy”, focusing on “our efforts, results and successes”, as well as “real and realistic benefits and possibilities for further development of nuclear energy in our country” [original emphasis].⁶⁶³ With an aim to fulfill expected propaganda goals, the same exhibition, only in smaller scale, was supposed to be organized as a travelling event in capital

⁶⁶¹ DA MSPRS, PA, 1956, f. 92. Zabeleška o razgovorima vođenim sa Sekretarom Ambasade SSSR Tupicinom [Notes on Conversations with the Secretary of the USSR Embassy, Tupicin], September 6, 1956.

⁶⁶² Miljković, “Nuclear Yutopia”, 280-281.

⁶⁶³ AJ, 177, f. 8-20. Izložba nuklearne energije u Jugoslaviji [Nuclear Energy Exhibition in Yugoslavia], July 17, 1959.

cities of other Yugoslav republics.⁶⁶⁴ More importantly, already during the initial preparation, it was requested that the exhibition must not be “limited with restrictions in publishing or conspiracy regarding achieved results”, except information about reserves of uranium ore, which “will not be published, since they are neither confirmed nor final”.⁶⁶⁵

While it may be argued that the Yugoslav version of the ‘we can neither confirm nor deny’ formulation resembles the idea about confidential activities even in contemporary popular culture⁶⁶⁶, it is evident that the exhibition was supposed to divert the public attention from the embarrassing accident and appease the public about what kind of research is performed on the outskirts of Belgrade. Part of the entire effort was creation of “information boards” in May 1959, in each institute under the control of the SKNE, with the main task to take control over “sensationalistic interpretations of statements” of their employees and representatives in media. It was identified that it was “a common and almost regular practice” of journalist to “give themselves the right to comment” such statements, which often created embarrassing situations in which “foreign scientists and functionaries asked us questions with ridicule” about news their news agencies published based on articles in the Yugoslav press.⁶⁶⁷

Although this resembles a crawling censorship, it is particularly interesting how much the initial circumstances, which sparked this Yugoslav nuclear propaganda effort, are similar to the circumstances surrounding the development of the ‘Atoms for

⁶⁶⁴ AJ, 177, f. 8-20. Pro Memoria o razgovoru vođenim sa predsednikom SKNE, drugom Aleksandrom Rankovićem [Pro Memoria on a Conversation With the President of the SKNE, Aleksandar Ranković], November 13, 1959.

⁶⁶⁵ AJ, 177, f. 8-20. Izložba nuklearne energije u Jugoslaviji [Nuclear Energy Exhibition in Yugoslavia], July 17, 1959

⁶⁶⁶ CIA Twitter Account, “We can neither confirm nor deny that this is our first tweet”, <https://twitter.com/CIA/status/474971393852182528>, June 6, 2014 (accessed on March 10, 2021).

⁶⁶⁷ AJ, 177, f. 28, a.j. 115. Izveštaj o radiju i štampi [Report about the Radio and Press], July 12, 1961.

Peace' project. Nuclear accidents with the Yugoslav research reactor and the unfortunate Japanese fishing boat are very different on many levels and scales, but the similarities and consequences regarding the bad publicity they produced as well as governments' responses are uncanny. Considering the success of the 'Atoms for Peace' exhibition, as well as the fact that the Yugoslavs did not get the chance to gain any similar experience from the Soviets, it is hardly a surprise that the Yugoslav nuclear exhibition in 1960 was a decent copy of the American concept.⁶⁶⁸ This is particularly true regarding the attempt to redirect the public attention to civilian uses of nuclear energy. While the United States were eager to defuse the public outrage and fear about the dangers of nuclear weapons, Yugoslav authorities were trying to hide the military aspect of their nuclear program in plain sight, reassuring both the domestic and global audience about its peaceful nature.⁶⁶⁹

⁶⁶⁸ AJ, 177, f. 11-31. Materijal sa izložbe nuklearne energije. Komisiski izveštaj [Material from the Nuclear Energy Exhibition. Commission's Report], 1962. Osgood, *Total Cold War*, 170-174. Osgood explains that the 'Atoms for Peace' exhibition "explained and dramatized the peaceful applications of atomic energy using working models, colorful displays, short films and mini lectures" with exhibits like "model reactors, Geiger counters, and devices for handling radioactive materials." The Yugoslav version used the same type of exhibits, with adaptations to local achievements and circumstances, where it was necessary, down to the publication of the special set of post stamps, like in the United States.

⁶⁶⁹ Osgood, *Total Cold War*, 156-157.

3.3 The Accidental “Vinča Project”

“There have been today, even in developing countries, many research reactors established and most of them went already critical but unfortunately only few of them are being utilized to some extent, because they were bought, according to ‘Atoms for Peace’ program without really having made a reasonable program for their utilization.”⁶⁷⁰

The complaint of Professor Dr. Fahri Domaniç may be used as a very accurate general explanation why a developing nation would purchase its first nuclear reactor during the late 1950s and early 1960, and what problems it would encounter during the initial phase of its civilian nuclear program. Read between the lines, the decision to participate in either the ‘Atoms for Peace’ project or the Soviet version of it, was inherently political, as most of the recipient countries did not have enough trained scientist who could design a research program and adequately utilize their high-end research machines. Extending this argument to its logical conclusion, it would not be too harsh to say that most of developing nations did not even have any ambition, let alone well-developed plans to invest in research in this field, at least not in that period, which in itself is hardly a surprise.

Yugoslavia was among very few developing nations in that period which did not fit this general framework. Unlike most of developing countries, Yugoslavia could rely on a small, but well-trained team of scientists, at least regarding the core disciplines necessary for the initiation of the nuclear energy program. The 1955 Geneva Conference was the perfect stage for the Yugoslav nuclear scientists to show-

⁶⁷⁰ International Atomic Energy Agency Archives, SC/110-36-2 Study Group Meeting on the Utilization of Research Reactors, Athens, September 9-13, 1963 (Invitation Letters Replies and Correspondence re: Abstracts) [in further reference IAEA Archives SC/110-36-2]. Letter from Dr. Fahri Domaniç of the Çekmece Nuclear Research and Training Centre (Turkey), to Munir Khan of the IAEA Division of Reactors, April 30, 1963.

off their achievements, and even though propaganda goals were high on their agenda, the fact remains that most of these scientists were involved in the process of design, construction and operation of the RB ‘zero-power’ research nuclear reactor in Yugoslavia as the country’s first. They were also among the leading members of the team which negotiated the purchase of the larger RA, or “Chinese” nuclear reactor from the Soviet Union.

Another related distinction was that Yugoslavia was in a unique position to establish cooperation with both Cold War superpowers, or minimally to play one against the other in order to get more. Thus, once the international circumstances changed in favor of international cooperation, the Yugoslav nuclear establishment was able to react immediately, exploit the country’s political position as well as the competition of two superpowers, efficiently employ existing scientific and technical expertise and significantly speed-up its nuclear program. This ‘Great Game’ is in the focus of the analysis in this section, investigating expectations, ambitions, plans, and eventual achievements of all three players. This is particularly important discussion since it presents a case of a developing nation as an active player, rather than a simple recipient or a mere target of policies designed in Washington or Moscow. This image was obviously an important propaganda goal for the Yugoslav political establishment, but as this section shows, it was also a fact.

The Soviets give and decide everything

The construction of RA and RB nuclear reactors were important milestones of the Yugoslav nuclear program and central components of the so-called “Vinča Project”. Traditional historiography shows that the “Vinča Project” was developed

and implemented between February 1956 and the summer of 1959, when the assembly of the RA nuclear reactor was finalized. Besides nuclear reactors, it also included the construction of the “laboratory for high activity (HL) [hot-lab] and laboratory for isotopes (LI)”, as well as purchases of “materials for work on nuclear sciences and nuclear technology”.⁶⁷¹ These were supplemented with the Laboratory for Reactor Materials (RM) and Laboratory for Radiological and Medical Protection (LRMP), with most of them constructed and operational by the early 1960s, thus completing this “substantial and complex investment intended for development of the most important branches of nuclear technology.”⁶⁷² Bondžić adds significant details about the “Vinča Project” project, but does not adequately address its true significance, also missing the opportunity to analyze it within the framework of the superpowers competition in Yugoslavia.⁶⁷³

Some contemporaries remembered this period as time of “heroic ambition”, when the Yugoslav nuclear establishment wanted to “master independently [...] all basic technologies [...], from production of uranium and fabrication of fuel elements, to reprocessing of spent fuel.”⁶⁷⁴ From the very beginning of the Yugoslav nuclear program, this “independent” development actually translated into heavy reliance on support from foreign partners, even if without their knowledge, using the UDB espionage network. This did not change dramatically in the second half of the 1950s, when most of restrictions for such a cooperation had been lifted. In fact, these relaxations in restrictions were the only significant change, as far as the Yugoslavs

⁶⁷¹ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 255, 264.

⁶⁷² *Ibid.*, 28-29.

⁶⁷³ Bondžić, *Između ambicija i iluzija*, 138-163. Bondžić dedicates an entire chapter to the Vinča Project, but his narrative often gets overburdened with statistical information, details about operational characteristics of reactors and similar details, thus remaining loyal to his prevailing historicist approach.

⁶⁷⁴ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 29, 61.

were concerned, and one which had to be exploited immediately, regardless of the political or ideological background.

During one of the very first SKNE meetings in April 1955, the participants reached the conclusion that “it would be particularly possible to exploit rivalry between the USSR and USA, even Great Britain”, and acquire uranium and heavy water necessary for the construction of the first nuclear reactor in Yugoslavia. More importantly, “favorable international situation for bilateral agreements with the USA, Great Britain, France, USSR, etc.”, actually sparked the Yugoslav desire to initiate development of the nuclear reactor. Only then it was decided that a team led by Pavle Savić should prepare a report about “one variant of the first reactor”, depending on availability of nuclear raw materials abroad, as it was not expected that domestic uranium and heavy water would be available before “the end of 1957 [...] or maybe even in 1959.”⁶⁷⁵

The construction of a nuclear reactor in Yugoslavia was desired since 1950, but it is evident that the actual planning, including the decision about its type and size, started only after it became possible to purchase uranium and heavy water abroad. These circumstances evidently accelerated the Yugoslav nuclear program, but it is also important to stress that, while at that point there were still no real preferences regarding the potential source of nuclear raw materials, the initial decision was to start negotiations “*in the first place with the USA, then with Great Britain, and possibly with the USSR* [emphases added].”⁶⁷⁶ The SKNE’s main concern was “a potential gain

⁶⁷⁵ AJ, 177, f. 22-88. Zaključci sednice Predsedništva Savezne komisije za nuklearnu energiju [Conclusions of the SKNE Presidency meeting], April 18, 1955. The team was hastily assembled and included IBK scientists (Pavle Savić, Miodrag Ristić), the UDB ‘cadres’ at the IBK (Director Vojko Pavičić and Secretary Slobodan Nakićenović), Milentije Popović, a member of the SIV (Federal Government), as well as representatives of the Ministry for Foreign Affairs.

⁶⁷⁶ AJ, 177, f. 22-88. Zaključci sednice Predsedništva Savezne komisije za nuklearnu energiju [Conclusions of the of the SKNE Presidency meeting], May 18, 1955.

in time”, and it was happy to get the necessary support through any arrangement, “payment, trade, gifts or a loan”.⁶⁷⁷ Additional and very important point was the understanding that research programs in Yugoslav nuclear institutes “cover all necessary fields”, and that they can rely on “a considerable number of scientific and expert associates whose expertise is more or less on the West European level.” It was also added that “our institutes are capable for calculation, design and construction of nuclear reactors” and that Yugoslav scientists “worked on construction and operation of Scandinavian nuclear reactors” in Norway and Sweden.⁶⁷⁸

While it is easy to identify a somewhat excessive pride and belief in capabilities of Yugoslav nuclear institutes and scientists, this was the starting point for negotiations with foreign partners. The biggest obstacle in establishing a bilateral cooperation, “in the first place” with the United States, was the overall design of the ‘Atoms for Peace’ project, which first and foremost insisted on keeping the U.S. control over the reactor fuel. The SKNE became painfully aware of this problem already by the end of May 1955, since “in negotiations with the USA this question was raised 2-3 times, but without an answer”, after which it was decided to approach Great Britain and the Soviet Union with a similar proposal, obviously following the initial plan to the letter.⁶⁷⁹ Only a couple of days later, the Soviet delegation led by Khrushchev arrived in Belgrade, and among other topics, offered cooperation in peaceful use of nuclear energy, as stipulated by the Belgrade Declaration on June 2, 1955.

⁶⁷⁷ AJ, 177, f. 22-88. Zaključci sednice Predsedništva Savezne komisije za nuklearnu energiju [Conclusions of the session of], April 18, 1955

⁶⁷⁸ AJ, 177, f. 2. Strogo poverljivi izveštaj SKNE. Stanje u oblasti nuklearnih nauka i nuklearne energije u Jugoslaviji i konkretne mogućnosti saradnje [SKNE Top Secret Report. Situation in the Field of Nuclear Science and Nuclear Energy and Concrete Possibilities for Cooperation], May 23, 1955.

⁶⁷⁹ *Ibid.*

With the intent to continue playing one side against the other, in early September 1955, the SKNE sent a memorandum with their requests and topic for cooperation simultaneously to the United States, Great Britain and Soviet Union.⁶⁸⁰ Sensitive to Yugoslav demands, and with a clear political agenda, the Soviet side proved to be “very generous”, and already by the end of the month, they summarized their offer in few words: “we can give you everything you need”.⁶⁸¹ The most important series of meetings between two countries was organized in Moscow between November 1955 and January 1956. The Soviet negotiating team included some of their most respected scientists, such as academicians Abram Alikhanov and Vladimir Veksler, Vasily Fursov, Dean of the Physics Department at the Lomonosov State University in Moscow, Professor Vasily Emelyanov (sometimes Emel’ianov), the director of the Main Administration for the Utilization of Atomic Energy - *Glavatom*, and Sergei Sobolev, with equally important names among political members of the Soviet team.⁶⁸²

The Soviets obviously wanted to leave no doubts regarding the importance they attached to these negotiations, but the composition of their team can also be understood as an attempt to indulge the Yugoslav desire to participate in negotiations

⁶⁸⁰ AJ, 177, f. 438. Saradnja sa SAD [Cooperation with the USA], September 3, 1957

⁶⁸¹ AJ, 177, f. 22-88. Stenografske beleške sa sednice Pretsedništva Savezne komisije za nuklearnu energiju [Stenographic Notes of the Federal Nuclear Energy Commission Presidency Meeting], September 30-October 1, 1955

⁶⁸² In total, nine meetings were organized between November 24, 1955 and January 2, 1956. AJ, 177, f. 437. Zapisnik br. 1 [Minutes No. 1], November 24, 1955; AJ, 177, f. 14. Strogo poverljivo. Izveštaj o pregovorima o saradnji na polju mirnodopske upotrebe nuklearne energije sa SSSR-om u Moskvi, od 22. novembra 1955. do 5. januara 1956. [Top Secret Report on Negotiations about Cooperation on Peaceful Use of Nuclear Energy with the USSR in Moscow, between November 22, 1955 and January 5, 1956], January 4, 1956; Vesselin Dimitrov, “Revolution Released: Stalin, the Bulgarian Communist Party and the Establishment of the Cominform” in *The Soviet Union and Europe in the Cold War, 1943-53*, eds. Francesca Gori, Silvio Pons (New York: St. Martin's Press, 1996), 283. Among political or executive members in the Soviet team there were, Nikolai Vasilevich Novikov, A. A. Lavrishev, former head of the Balkan Department of the Soviet Foreign Ministry and the head of the delegation. Other, unidentified persons included Kalinin, Sobolyev, Panyin, Melnikov [transcriptions may be wrong]. More about Lavrishev in: Vesselin Dimitrov, “Revolution Released: Stalin, the Bulgarian Communist Party and the Establishment of the Cominform” in *The Soviet Union and Europe in the Cold War, 1943-53*, eds. Francesca Gori, Silvio Pons (New York: St. Martin's Press, 1996), 283.

as an equal partner, regardless of how far from the reality it was. Whatever the Soviet logic was, the Yugoslav delegation remained unimpressed and focused on the task, understanding their presence as a “mere decoration with an aim to impress our delegation, and based on the argument of such famous names, make us accept their ideas” about the type of reactor and agreement in general. This may be a rather accurate estimate since after the first meeting, “only clerks with some legal experts participated in actual negotiations.”⁶⁸³ On the other hand, the fact that some of the Soviet representatives were deeply involved in their own atomic bomb project in the 1940s, may indicate that their additional task was to estimate with precision the Yugoslav capabilities in the field, thus leaving space to, either undermine the Yugoslav ambitions, or provide an equally effective support.⁶⁸⁴

The Yugoslav counterpart to Alikhanov was Dragoslav Popović, by this time obviously an internationally recognized scientist and one of the leading figures within the Yugoslav nuclear establishment. During direct negotiations with Alikhanov, Popović was able to speak with him on equal footing, indirectly providing solid arguments to the Yugoslav general claim about the country’s scientific prowess, although he was not able to hide the true purpose of the Yugoslav nuclear program. Alikhanov’s main interest was why the Yugoslavs insisted on construction of the smaller ‘zero-power’ reactor, and why they wanted to adapt the ‘Chinese’ reactor to be able to work with natural uranium fuel, “when in the scientific view this represents a step back.” The only explanation Popović was able to provide was that the ‘zero-power’ reactor was expected to be used “to train cadres while the bigger reactor is

⁶⁸³ AJ, 177, f. 14. Strogo poverljivo. Izveštaj o pregovorima o saradnji na polju mirnodopske upotrebe nuklearne energije sa SSSR-om u Moskvi, od 22. novembra 1955. do 5. januara 1956. [Top Secret Report on Negotiations about Cooperation on Peaceful Use of Nuclear Energy with the USSR in Moscow, between November 22, 1955 and January 5, 1956], January 4, 1956.

⁶⁸⁴ More about these scientists and their work on the Soviet atomic bomb project in: Holloway, *Stalin and the Bomb*.

being constructed”, while regarding the fuel, he explained that Yugoslavia was expecting to be able to produce natural uranium fuel independently in a few years’ time, unless the Soviets would be willing to sell uranium enrichment technology too.⁶⁸⁵

The rest of the Soviet delegation was interested only in availability of the most sensitive nuclear raw materials in Yugoslavia, particularly uranium, zirconium and beryllium, which the Yugoslav delegation confirmed to have in significant quantities, even though they admitted that the production had not yet started, particularly regarding uranium. The final topic of interest for the Soviets were the characteristics and stage of construction of the 16 MeV cyclotron under construction at the IRB in Zagreb, which Yugoslavia wanted to design and construct independently.⁶⁸⁶

Yugoslavia was developing and requesting Soviet assistance in development of highly sensitive technologies in a way that would allow the independent nuclear fuel cycle capability⁶⁸⁷. Yet the Soviets were more than open for cooperation, obviously being fully aware of the Yugoslav plans. In one of the final reports from Moscow, sent on the New Year’s Eve 1955, Kos emphasized that the Soviets “do not set a condition for returning used uranium, but that it depends on us”, and that “in general, they had found a favorable solution to all of our questions in order to accommodate us as much as possible.”⁶⁸⁸ With some sincere disbelief, he also

⁶⁸⁵ AJ, 177, f. 437. Zapisnik br. 1 [Minutes No. 1], November 24, 1955.

⁶⁸⁶ *Ibid.*; Nakićenović, *Nuklearna energija u Jugoslaviji*, 37; Rudež, Pisk, *Institut Ruđer Bošković*, 100. The cyclotron at the IRB was designed by the Yugoslav scientists and produced independently in Yugoslavia, although its development and construction lasted between 1952 and 1959, although it was officially put in operation only by the end of 1962.

⁶⁸⁷ The nuclear fuel cycle steps include in order, uranium mining, uranium ore refinement or enrichment, fuel fabrication, burning of fuel in nuclear reactor, spent fuel reprocessing, with plutonium as one of byproducts that can be used for nuclear weapons, and ending with nuclear waste storage. More in: “Nuclear Explained: The Nuclear Fuel Cycle”, U.S. Energy Information Administration (EIA), <https://www.eia.gov/energyexplained/nuclear/the-nuclear-fuel-cycle.php> (accessed on March 12, 2021).

⁶⁸⁸ AJ, 177, f. 437. Telegram from Franc Kos to the SKNE, December 31, 1955.

commented that “all conversations passed surprisingly simple”, and “they did not even refuse to talk about purchasing pure uranium and necessary technological processes for processing of U 235 [enriched uranium]”. On the other hand, he also commented that it was “completely clear that they [the Soviets] are going for purely political effect, which is why they accept all of our requests, and why the price-tag does not play any role”, being lower and with less restrictions than in the offer made earlier by the United States. The main point was that, although “their goal is transparent”, for the Yugoslav delegation it was “difficult to find arguments to reject [the Soviet proposal]”.⁶⁸⁹

The ‘too-good-to-be-true’ agreement between Yugoslavia and the Soviet Union was signed on January 28, 1956. Bondžić details every aspect of the agreement, as well as all subsequent protocols and additional contracts agreed and signed during meetings between two sides during 1956 and 1957,⁶⁹⁰ although he fails to compare it to the support the Soviet Union provided to China roughly at the same time. Between 1955 and 1958, China and the Soviet Union “signed five principal and one supplementary agreements in the field of nuclear technology”, covering all aspects, from the development of nuclear science and supporting industry, to the “development of nuclear weapons.”⁶⁹¹ Regarding the material aspect, this agreement included the sale of the already mentioned 6.5/10 MW heavy-water nuclear reactor, a 12.5/25 MeV cyclotron, as well as the fuel and radioactive isotopes necessary for operation of these machines. In terms of technology transfer, the Soviets provided training to the Chinese scientists and technicians, as well as the know-how for the construction of necessary uranium mines, laboratories, institutes and factories in China, thus eventually

⁶⁸⁹ AJ, 177, f. 437. Telegram from Franc Kos to the SKNE, December 31, 1955

⁶⁹⁰ Bondžić, *Između ambicija i iluzija*, 140-144

⁶⁹¹ Yanqiong, Jifeng, “Analysis of Soviet Technology Transfer in the Development of China’s Nuclear Weapons”, 71.

establishing the Chinese nuclear industry. In short, the cooperation with the Soviet Union, allowed China to finalize the entire nuclear fuel cycle, which proved to be an important, although not vital contribution towards the Chinese atomic bomb project.⁶⁹²

The initial Yugoslav agreement with the Soviet Union stipulated “exchange of information and experiences regarding methods of geological research, uranium production technology, design and construction of nuclear reactors and research on these reactors, as well as questions regarding health protection during work with radioactive materials and use of radioactive isotopes in science, technology, medicine and other branches of economy”.⁶⁹³ The entire cooperation was supposed to be executed through exchange of scientific literature and technical documentation, training of Yugoslav scientists and technicians in the Soviet Union, and the Soviet supervision over joint projects in Yugoslav institutes.⁶⁹⁴

In short, the agreement contained the same components regarding the development of the nuclear science and industry in Yugoslavia as was the case with China, although lacking even nominal support regarding nuclear weapon design. It also did not contain the cyclotron which was being independently developed at the IRB in Zagreb, with characteristics comparable to the one offered by the Soviet Union. Either way, the Yugoslav delegation was certain that the Soviets offered them the same basic agreement as they did to the Chinese, which they considered “dishonest”, as they expected much more. The only extenuating circumstance for the Yugoslav side was the price of this fuel which was much cheaper than it was for the

⁶⁹² Yanqiong, Jifeng, “Analysis of Soviet Technology Transfer in the Development of China’s Nuclear Weapons”: 66-110; Shen, Xia, “Between Aid and Restriction: The Soviet Union’s Changing Policies on China’s Nuclear Weapons Program, 1954-1960”, 96-98.

⁶⁹³ *Jugoslovensko-sovjetski odnosi 1945-1956: zbornik dokumenata* [Yugoslav-Soviet Relations 1945-1956: Collection of Documents] (Beograd: Ministarstvo spoljnih poslova, 2010), 836.

⁶⁹⁴ *Ibid.*

Eastern bloc countries, which were “skinned to the bone in the old way”, as was commented during one of the SKNE meetings.⁶⁹⁵

However, as with other things in life and politics, when something sounds too good to be true, it probably is not, and this was the case with the Soviet support to the Yugoslav nuclear program. Right from the start the Soviets implemented what, for the lack of better terms, can be termed as a ‘delay and blackmail’ strategy. Negotiations about particular details regarding the cooperation between Yugoslavia and the Soviet Union were conducted in Belgrade in May 1956. Already during initial meetings, the Soviet side explained that redesigning of the ‘Chinese’ reactor to be able to use natural uranium fuel, as requested by the SKNE team earlier in Moscow, would “extend the construction of reactor for 12 to 18 months, and would introduce a general uncertainty regarding deadlines.”⁶⁹⁶ It was also clarified that the Soviet side was not interested in making any changes in the original nuclear reactor design, and as a proverbial carrot on a stick, they expressed their readiness to provide additional supply of low-enriched uranium fuel.⁶⁹⁷ Notes from these negotiations are very condensed and ‘dry’, and do not allow for any strong claims regarding the Yugoslav decision to accept the Soviet request only two days later ⁶⁹⁸. It does seem, however that the potential one and a half year delay was a good enough argument for the Yugoslavs to abandon one of their most important demands regarding the purchase of the ‘Chinese’ reactor – to make it capable of operating with natural uranium fuel.

⁶⁹⁵ AJ, 177, f. 14. Strogo poverljivo. Izveštaj o pregovorima o saradnji na polju mirnodopske upotrebe nuklearne energije sa SSSR-om u Moskvi, od 22. novembra 1955. do 5. januara 1956. [Top Secret Report on Negotiations about Cooperation on Peaceful Use of Nuclear Energy with the USSR in Moscow, between November 22, 1955 and January 5, 1956], January 4, 1956

⁶⁹⁶ AJ, 177, f. 437. Beleška sa III (trećeg) sastanka jugoslovenske i sovjetske delegacije [Notes from the Third Meeting between the Yugoslav and Soviet Delegation], May 9, 1956.

⁶⁹⁷ *Ibid.*

⁶⁹⁸ AJ, 177, f. 437. Beleška sa IV (četvrtog) sastanka jugoslovenske i sovjetske delegacije [Notes from the Fourth Meeting between the Yugoslav and Soviet Delegation], May 11, 1956.

When it came to other aspects of cooperation, and particularly regarding the support in the field of geology and processing of uranium ore, which included specializations for Yugoslav scientists, the SKNE delegation was equally unsuccessful in making their Soviet counterparts agree on details; the Soviets argued that “such elaboration is unnecessary” and suggested additional negotiations.⁶⁹⁹ Once again, this translated as a threat of potential delays and it included actual blackmail, since the Yugoslav delegation eventually had to accept that their “requests in fields of geology and uranium technology are studied [...] in Moscow”, and that the response will be sent a month after the Soviet delegation returns home.⁷⁰⁰ With equal authority and stressing safety concerns, the Soviet team discarded the Yugoslav project for the construction of the hot-lab and semi-industrial uranium fuel reprocessing plant at the IBK with the projected capacity of one kilogram per 24 hours.⁷⁰¹ Even regarding the price of the heavy water, the Soviets insisted on what they claimed to be equal as in the U.S. agreements (\$ 62 per kg), and after some discussion the Yugoslavs accepted even that.⁷⁰²

The final report about this set of negotiations with the Soviet Union was delivered to the SKNE Presidency by Pavle Savić himself, and it reveals why the Yugoslav side so easily buckled under the Soviet pressure. His main argument was that “the aforementioned reactor would come into operation in the beginning of 1958, which represents a record time reduction for construction of the first reactor in our

⁶⁹⁹ AJ, 177, f. 437. Beleška sa V (petog) sastanka jugoslovenske i sovjetske delegacije [Notes from the Fifth Meeting between the Yugoslav and Soviet Delegation], May 21, 1956.

⁷⁰⁰ *Ibid.*

⁷⁰¹ AJ, 177, f. 437. Beleška sa II (drugog) sastanka jugoslovenske i sovjetske delegacije [Notes from the Second Meeting between the Yugoslav and Soviet Delegation], May 5, 1956. The Soviet delegates remarked that the safety zone around these facilities had to be considerably enlarged than anticipated in the Yugoslav project.

⁷⁰² AJ, 177, f. 437. Beleška sa V (petog) sastanka jugoslovenske i sovjetske delegacije [Notes from the Fifth Meeting between the Yugoslav and Soviet Delegation], May 21, 1956.

country and with that power.”⁷⁰³ The speed was obviously essential, which was clearly visible in the field of national prestige, but considering that Yugoslavia wanted to establish a fully independent nuclear industry and close the entire nuclear fuel cycle through cooperation with the Soviet Union, it is equally clear that prestige points were only the tip of the iceberg of the Yugoslav nuclear ambition.

The eventual agreement included the construction of the 6.5/10 MW ‘Chinese’ nuclear reactor, without its redesign to use natural uranium fuel as well, delivery of one ton of low-enriched (2 percent) uranium fuel, including two reserve charges, delivery of technical documentation and drawings of the reactor, 4 tons of natural uranium fuel and 7 tons of heavy water for the ‘zero-power’ reactor, and one kilogram of uranium irradiated “to 400 curie per kilogram”. Although this source does not provide much details, it seems evident that the irradiated uranium was supposed to be used for experimenting with irradiated fuel and training of scientists and technicians, thus implementing the same logic as with the ‘zero-power’ reactor. In addition, transfer of a range of laboratory instruments and devices necessary for prospection and processing of nuclear raw materials was also agreed, while exchanges of experts and specializations for the Yugoslav scientists were left open for future negotiations, once again, exactly as the Soviets suggested.⁷⁰⁴ This final component of cooperation was eventually agreed and the necessary contract between two countries was signed in Belgrade on March 14, 1957.⁷⁰⁵

What is evident from the existing documents is that, after the necessary agreements for cooperation between two countries were signed, the Soviets

⁷⁰³ AJ, 177, f. 437. Izveštaj o postignutim rezultatima u toku pregovora između jugoslovenske i sovjetske delegacije stručnjaka [The Report about the Results Achieved during Negotiations between the Yugoslav and the Soviet Delegations of Experts], May 28, 1956.

⁷⁰⁴ *Ibid.*

⁷⁰⁵ AJ, 177, f. 437. Informacija o saradnji sa SSSR-om [Information about the Cooperation with the USSR], April 25, 1959.

implemented their ‘delay and blackmail’ strategy comprehensively; from sending the nuclear reactor components, fuel, heavy water, to exchange of technicians and specializations of Yugoslav scientists. Eager not to grind the country’s nuclear program to a halt, or at least not to miss what seemed to be an excellent opportunity and lose invaluable time, the SKNE usually succumbed. Even when the enchantment period ended, the only viable strategy was to take what they could and suffer what they must.

For example, the Soviets were accepting a much lower number of scientists than the Yugoslav side expected and demanded. In 1958, out of 85 specializations suggested by the SKNE, only 22 were approved, while only 11 specializations eventually accepted by the Yugoslav side. The problem was that the Soviets would accept only Yugoslav geologists, medical professionals and biologists, fields of study that were not the main interest of the SKNE, particularly not when they were in the middle of construction of nuclear reactors and other facilities. Yugoslav requests for specializations for nuclear physicists and technicians, as well as in any other sector of nuclear industry, “and exactly those branches which are vital to us”, were usually denied. Even in the case of Yugoslav geologists and miners, they were not allowed to visit actual uranium mines.⁷⁰⁶ By the end of 1959, after many interventions and additional negotiations and protocols, the SKNE managed to send only 6 additional scientists to specialize in various disciplines. Nevertheless, the problem remained as these were approved on “less important topics, while those on topics most important

⁷⁰⁶ AJ, 177, f. 437. Godišnji izveštaj o saradnji sa SSSR-om u 1958. [The Annual Report about the Cooperation with the USSR in 1958], n.d., 1958.

for us, and for which it is difficult or impossible to get specializations in the West, were rejected.”⁷⁰⁷

When they did allow access and training programs in Soviet nuclear institutes, the majority of the Yugoslav scientists would be transferred to “second class institutes”; very few of them were able to expand their practical knowledge on working with nuclear reactors.⁷⁰⁸ However, the control of what they could learn or take home was immense. The harshest treatment was implemented against Yugoslav geologists, whose notes which they took, were taken away from them after their training program ended, “stitched with a thread [...] sealed with red wax” and returned to Yugoslavia only much later through the Yugoslav Embassy in Moscow.⁷⁰⁹ Furthermore, during their specialization in the USSR, the Yugoslavs received very cold welcome and were on several occasions even directly told that they were “unwelcome or that they did not master their topics completely”. The Soviets were not discriminating in that sense either, since Polish and Czechoslovakian scientists in the Soviet institutes complained to their Yugoslav colleagues that they received the same treatment continuously.⁷¹⁰

Another way to compromise any serious cooperation, which the Soviets used extensively, was to answer urgent letters and telegrams of the SKNE sometimes with five or more months of delay, thus pushing the start of the already agreed specializations for months and even years. Delay was a simple strategy that worked. Final approvals for specializations of Yugoslav scientists would come too late for the

⁷⁰⁷ AJ, 177, f. 437. Saradnja sa Sovjetskim Savezom [Cooperation with the Soviet Union], December 16, 1959.

⁷⁰⁸ *Ibid.*

⁷⁰⁹ AJ, 177, f. 437. Izveštaj Direkcije za nuklearne sirovine IV sektoru SKNE [Report of the Directorate for Nuclear Raw Materials to the Fourth Sector of the SKNE], October 22, 1958.

⁷¹⁰ AJ, 177, f. 437. Informacija o saradnji sa SSSR-om [Information about the Cooperation with the USSR], April 25, 1959

previously agreed schedules, and unsurprisingly, new dates had to be renegotiated, while the scientists themselves were “kept in reserve” often for more than a year, not being able to fully engage themselves even with projects in Yugoslavia.⁷¹¹ Furthermore, all the costs of these specializations had to be paid by the SKNE, which was quite opposite to the strategy used by the United States or West European countries, and was “very disadvantageous” for the Yugoslav side.⁷¹²

The famous Soviet Joint Institute for Nuclear Research (JINR) in Dubna was, for all practical purposes, completely closed for Yugoslav scientists. The Soviets demanded that Yugoslavia should first join this institute on the same basis as other “Eastern lager” countries, which was completely unacceptable for the Yugoslav side, “due to political reasons”. On the other hand, it was easy for the SKNE to abandon this option, even if they wanted to invest in development of theoretical physics, since similar specializations were available in CERN on much more relaxed political, if not financial terms, although even for this cooperation the SKNE found it difficult to “select the necessary cadres”.⁷¹³ The full loop was made by the end of 1958, when acting upon the request of the Soviet side the SKNE managed to find one scientist who wanted to specialize in the JINR on “ion sources for the cyclotron”, but their answer was that they could train only “experts from the countries which are members of the Institute [JINR].”⁷¹⁴

⁷¹¹ AJ, 177, f. 437. Informacija o saradnji sa SSSR-om [Information about the Cooperation with the USSR], April 25, 1959; AJ, 177, f. 437. Godišnji izveštaj o saradnji sa SSSR-om u 1958. [The Annual Report about the Cooperation with the USSR in 1958], n.d., 1958.

⁷¹² AJ, 177, f. 437. Informacija o saradnji sa SSSR-om [Information about the Cooperation with the USSR], June 1, 1959.

⁷¹³ AJ, 177, f. 437. Ujedinjeni institut nuklearnih istraživanja – Dubna [Joint Institute for Nuclear Research – Dubna], n.d., 1959; AJ 177, f. 15. Prikaz međunarodne saradnje [Overview of International Cooperation], May 1959.

⁷¹⁴ AJ, 177, f. 15. Ujedinjeni institut nuklearnih istraživanja – Dubna [Joint Institute for Nuclear Research – Dubna], December 24, 1959

Some obstacles happened due to different approaches to scientific research. It was already discussed that Yugoslav nuclear establishment was ready to sacrifice the development of ‘fundamental’ science, aiming to accelerate the construction of the nuclear reactor, related laboratories and research machines, and hoping to skip a step or two towards the atomic bomb as the ultimate goal. While leading Yugoslav scientists were against such an approach to the development of the country’s nuclear program, they could do very little to change this attitude among leading politicians.

On the other hand, the fact that between 1948 and 1956, Yugoslav scientists could receive training only in the West necessarily shaped their approach to scientific research. This created a conflict between Yugoslav scientists who went to the Soviet Union for specialist courses and Glavatom representatives, who “often found it funny” to read Yugoslav requests to work on particular scientific problems, being “accustomed to the luxury in the West”.⁷¹⁵ Contrary to the Western practice, the Soviet understanding of the term ‘specialization’ meant “mastering of required method through practical work and support in acquiring necessary knowledge, while the entire training is calculated to enable the trainee to independently educate others in mastering the required method.”⁷¹⁶ According to this report, this was one of the reasons for “failure of many our [Yugoslav] specializations in the USSR”⁷¹⁷, although this comment also confirms that the Soviets completely controlled the process of knowledge transfer, allowing it only when, and on topics they wanted, not those requested by the Yugoslav side.

⁷¹⁵ AJ, 177, f. 437. Milorad Ristić. Informacija o nekim mojim razgovorima i utiscima povodom boravka u SSSR od 20.4. do 5.5.1960 god. [Milorad Ristić. Information on My Conversations and Impressions during the Stay in the USSR, from April 20 to May 5, 1960], May 6, 1960. Milorad Ristić was the technical manager of the “Vinča Project”; AJ, 177, f. 437. Dr. Ivan Draganić. Izveštaj o boravku u SSSR-u od 20.IV. do 10.V. 1960 god. [Dr. Ivan Draganić. Report on the Stay in the USSR, from April 20 to May 5, 1960], n.d., 1960

⁷¹⁶ *Ibid.*

⁷¹⁷ *Ibid.*

The technological aspect of cooperation with the Soviet Union was not working much better either. During the final stages of the assembly of the RA or 'Chinese' 6.5/10 MW nuclear reactor, enough problems were identified and eventual changes made to the original project that the final version of the nuclear reactor could have been named 'Yugoslav', instead of 'Chinese', although the reasons for it would not be a point of pride. The overall estimate was that "almost no component of the equipment was functionally sound". This included such important systems like heavy water pumps, which required "reconstruction or replacement", distillation system which had to be replaced, technical (fuel) channels on the reactor which were "forcibly mounted" and required "reconstruction for the second uranium charge", electronic equipment and dosimeters which were "very bad" and tended to "burn out due to poor construction", and when they worked, they were continuously making measurement errors of up to 10 percent.⁷¹⁸ Some of the comments are rather instructive:

"We do not know what to expect from the Russians, due to their attitude which one can never know in advance, nor would they reveal [to us] even those things they know are faulty. Shortening of draining tubes, change of technical channels, change of the position of the heavy water pumps, change of heavy water pipelines, redesign of heavy water pumps, etc. Significant changes [were made] in the [technical] documentation, so if compared, the current situation with the documentation would not even resemble the one which was ordered. Not a single change in the documentation was formally approved and signed by the Russians, even

⁷¹⁸ AJ, 177, f. 15. Beleška o stanju radova na velikom reaktoru [Note on the construction work on the big reactor], April 24, 1959.

if it was made on their request. We urged them and made requests many times, yet with no response.”⁷¹⁹

This behavior can be understood as an example or leftover of the Soviet ‘safety culture’ in nuclear facilities, as practiced during the time when Beria was in charge of their atomic bomb project. At that time “employees were required to memorize the complicated network of plumbing, electrical schemas, and machinery in their sector”, which necessarily led to accidents and almost continuous stress among the people involved.⁷²⁰ It would be difficult to claim that the Soviets had learned from their mistakes and created the same circumstances in the IBK in Vinča, although the result was the same. The official estimate of the IBK director, Vojislav Babić, was that this situation created “constant insecurity during work”, which “psychologically can make operating personal to waver, since there is no confidence in the instruments.”⁷²¹ This problem must have been particularly emphasized at the IBK after the accident with the RB ‘zero-power’ reactor, on October 15, 1958. Either way, the estimate of Vojislav Babić was that “any slowing down of the assembly would demoralize the personnel.”⁷²²

It is difficult to discern which parts of Soviet behavior during the design and installation of the RA (‘Chinese’) nuclear reactor at the IBK were intentional, and which were part of their own ‘safety culture’, but the fact remains that problems it produced had a significant impact on the Yugoslav nuclear program. Among the reasons which contributed significantly to the accident with the ‘zero-power’ reactor

⁷¹⁹ AJ, 177, f. 15. Beležka o stanju radova na velikom reaktoru [Note on the construction work on the big reactor], April 24, 1959.

⁷²⁰ Brown, *Plutopia*, 115.

⁷²¹ AJ, 177, f. 15. Beležka o stanju radova na velikom reaktoru [Note on the construction work on the big reactor], April 24, 1959.

⁷²² *Ibid.*

in 1958, the lack of any written instructions for the reactor operation or safety procedures and faulty instruments proved to be very important.⁷²³ While this situation necessarily had to be quickly mended, other problems created directly or indirectly by the Soviets remained. Only one day after the RA nuclear reactor was put in operation (December 28, 1959) in an official ceremony attended by Tito himself and other top-ranking Yugoslav politicians, the SKNE concluded that most of the problems with the RA reactor remained unresolved, and particularly regarding technical channels and entire heavy water system. In addition, lack of adequate training in nuclear reactor operation led to the situation in which “it was difficult to draw people from the Institute to work with the reactor”, and even those who did, left the position soon after their arrival, which was true for even those who did pass specialist training. The outcome was that “the reactor personnel never was in full number, and now it fell under the half of the personnel necessary for a 24-hour operation.”⁷²⁴

The final results of the Soviet ‘delay and blackmail’ strategy were astonishing. Nowhere is it more visible than in the evolution of the “Vinča Project”. In contrast to the official history, the “Vinča Project” was not some sort of a master-plan on which Yugoslavia negotiated the cooperation with the Soviet Union, but the result of the agreement between two countries, signed on January 28, 1956. The “Vinča Project” was formally approved only on June 12, 1956 and it included only the construction of the “‘RB’ object in Vinča”.⁷²⁵ One of the reasons for such a late approval was that initial version “was not designed in accordance to existing regulations”, it did not contain technical documentation or “the analysis about chosen capacities and other

⁷²³ Miljković, “Nuclear Yutopia”, 299.

⁷²⁴ AJ, 177, f. 15. Izveštaj o reaktorima A i B u Institutu „Boris Kidrič“ – Vinča [The Reports on Reactors A and B in the IBK-Vinča], December 29, 1959

⁷²⁵ AJ, 177, f. 2. Odobrenje za revidirani “Projekat Vinča” [Approval for the Revised “Vinča Project”], June 12, 1956

technical matters, but only approximate measures” for the construction and interior work.⁷²⁶

This comment alone confirms that the “Vinča Project” was developed hastily and without much necessary information which the Soviets were reluctant to share, while any additions, such as the hot-lab or semi-industrial fuel reprocessing plant were results achieved during negotiations with the Soviets in 1956 and 1957. In fact, it may be argued that once the initial agreement for cooperation had been signed, the Soviets could exploit their position of a dominant partner and steer the “Vinča Project” in the direction they wanted. As soon as the RA reactor was assembled in the fall of 1959, “the organization Vinča-project [...] was disbanded”, and so were the Yugoslav illusions about successful cooperation with the Soviet Union.

The potential acceleration of the Yugoslav nuclear program, combined with the sheer volume of technologies, machines and materials, all of which cooperation with the Soviet Union formally offered, proved to be too tempting for the SKNE to refuse. However, instead of producing the shiny jewel in the crown of the Yugoslav nuclear program, the “Vinča Project” produced the “Vinča Accident”. Continuous negotiations and renegotiations with the Soviets also led to waste of time which Yugoslavia wanted to save, funds which they struggled to gather, and distrust in the management of the SKNE among scientists and technicians, which rose sharply. The construction of the RA nuclear reactor, which needed serious overhaul even before it became operational, clearly represent a monument to all of these failures. In fact,

⁷²⁶ AJ, 177, f. 22-89. Pregled investicionog elaborata Projekta Vinča [Overview of the Investment Study of the Vinča Project], n.d. 1956.

official history somewhat euphemistically records that the “trial period [...] ended with a general overhaul of reactor’s equipment in 1963.”⁷²⁷

Finally, Liu argues that the Chinese scientists would have built their first atomic bomb in 1964 or 1965, even without the Soviet support, since their scientists and technicians were able to solve key problems independently.⁷²⁸ Considering the results of the cooperation with the Soviet Union, particularly regarding the loss of time during the period of intense cooperation (1955-1959), a similar claim based on the same arguments can be made for Yugoslavia and their desire to construct their first nuclear reactor and their first atomic bomb.

Trained in the USA to operate the Soviet nuclear reactor

Already during the initial negotiations with the Soviet Union, the SKNE representatives estimated that the main negative side of this cooperation was that Yugoslavia would be “for extended period of time tied almost exclusively to the Soviets” and that this “would probably weaken our [Yugoslav] connections with Western countries”.⁷²⁹ On the other hand, the Yugoslav honeymoon period with the Soviet Union had all but passed after the installation of the RA reactor at the IBK in Vinča, which exhausted the original agreement made on January 28, 1956, “while cooperation in other fields we are interested in, it did not fully secure.”⁷³⁰

⁷²⁷ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 265.

⁷²⁸ Yanqiong, Jifeng, “Analysis of Soviet Technology Transfer in the Development of China’s Nuclear Weapons”, 104.

⁷²⁹ AJ, 177, f. 14. Strogo poverljivo. Izveštaj o pregovorima o saradnji na polju mirnodopske upotrebe nuklearne energije sa SSSR-om u Moskvi, od 22. novembra 1955. do 5. januara 1956. [Top Secret Report on Negotiations about Cooperation on Peaceful Use of Nuclear Energy with the USSR in Moscow, between November 22, 1955 and January 5, 1956], January 4, 1956

⁷³⁰ AJ, 177, f. 1. Top Secret Archive. Predlozi za buduću saradnju sa SSSR [Suggestions for Future Cooperation with the USSR], March 14, 1961.

Soon after it also became evident that the Soviets did not want to change their approach to cooperation. During meetings with the Glavatom in 1960, the SKNE representatives had to continuously fight for every specialization Yugoslav institutes desired, usually not receiving the most vital ones, as well as to fight-off continuous demands to become a member of the JINR in Dubna. Those specializations that Glavatom did accept were postponed to 1961, for a number of often bureaucratic reasons.⁷³¹ The main Soviet precondition for any serious cooperation was for Yugoslavia to join the JINR and cut all similar arrangements with other countries. This policy was best summarized by Alikhanov, who suggested during one of the meetings in Moscow in 1960, that the Yugoslavs “must anchor themselves next to one shore”, something they fought tooth and nail not to do since 1948.⁷³² A much bigger obstacle was the fact that in the spring of 1960, the SKNE restarted negotiations with the United States.

Although Westinghouse’s offer in August 1955 could have been a basis for negotiations, it seems that the Yugoslav flat refusal, combined with their communication with the Soviets less than a month later, compromised the Yugoslav ‘special’ position and made Washington hesitant and suspicious. In an obvious response to ongoing negotiations in Moscow, as well as to the SKNE’s proposal made a couple of months earlier, in January 1956 the U.S. Government offered an agreement for cooperation with Yugoslavia. This time, however, it was “identical with

⁷³¹ AJ, 177, f. 437. Milorad Ristić. Informacija o nekim mojim razgovorima i utiscima povodom boravka u SSSR od 20.4. do 5.5.1960 god. [Milorad Ristić. Information on My Conversations and Impressions during the Stay in the USSR, from April 20 to May 5, 1960], May 6, 1960. This collection includes several similar reports, but in all of them these were the most important identified problems.

⁷³² DA MSPRS, PA, 1960, f. 128 (USSR). Telegram No. 147, from the Yugoslav Embassy in Moscow to the State Secretariat for Foreign Affairs, March 2, 1960.

other standard agreements the USA made with a number of other states”, something the SKNE simply would not accept.⁷³³

The question of ownership of the uranium fuel was an obstacle on which neither side wanted to compromise, although it is also the fact that the Soviet relaxed attitude to this issue made it much easier for the SKNE to stand its ground. This position was summarized in one of the SKNE reports as the “principled attitude that, in closing such or similar contracts in any field, we do not truncate our sovereignty and cooperation on equal basis.”⁷³⁴ Another problem was that, according to estimates of the SKNE management, the United States was overburdened with agreements with dozens of other countries. Therefore, they concluded that “there are no chances that the Americans would put the reactor in operation before the Soviets”, confirming how much the speed was important for Yugoslavia.⁷³⁵

On the other hand, the SKNE did not close the cooperation with the United States on other topics, particularly regarding training Yugoslav scientists in their scientific centers and institutes, purchase of scientific literature, as well as in other areas considered less sensitive and which did not require signing agreements between two governments.⁷³⁶ One of the ways the SKNE kept this channel of communication open was their formal request for the transfer of the U.S. Atomic Energy Commission (USAEC) library, which included all of the USAEC publications and thousands of abstracts of articles from all over the world. The USAEC commonly transferred it to interested countries, but the fact that the SKNE sent their formal request by the end of

⁷³³ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu [Transcripts, Conclusions and Materials of the Meetings at the FNEC, 1956]. Zapisnik sa sednice Predsedništva Savezne komisije za nuklearnu energiju [Minutes from the SKNE Presidency Meeting], January 7, 1956; AJ, 177, f. 438. Saradnja sa SAD [Cooperation with the USA], September 3, 1957.

⁷³⁴ AJ, 177, f. 438. Saradnja sa SAD [Cooperation with the USA], September 3, 1957.

⁷³⁵ AJ, 177, f. 22-89. Američki predlog za sporazum za civilnu upotrebu atomske energije [American Proposal an Agreement on Civilian Use of Atomic Energy], n.d., 1956.

⁷³⁶ AJ, 177, f. 438. Saradnja sa SAD [Cooperation with the USA], September 3, 1957

1955, at the time of the intense negotiations with the Soviet Union, indicate that this was a move to somewhat counterbalance negotiations in Moscow, at least until the final decision was not made.⁷³⁷ The details are fuzzy, but the cooperation was established and USAEC publications kept pouring in, so much that by 1958, the SKNE library could not handle the sheer volume of publications, and parts were transferred to the library in the IBK in Vinča, which eventually became the depository library of the USAEC.⁷³⁸

The SKNE also continued to send Yugoslav students for training and specialist courses to the United States, even before it became evident that, formally more open and more flexible cooperation with the Soviets, provided much less than expected and agreed. Following the old industrial espionage strategy, the SKNE concluded that “all of our experts who are leaving for such specializations [in the USA] should receive before the departure absolutely precise tasks and should deliver a detailed report about their accomplishments on these tasks upon their return.”⁷³⁹ Already in March 1956, soon after the agreement with the Soviet Union was signed, the SKNE negotiated sending two students for specialist courses in nuclear reactor engineering organized by the Argonne National Laboratory (ANL), obviously aiming to reinforce the knowledge of the IBK experts in preparation for the construction of the RB, ‘zero-power’ reactor.⁷⁴⁰ Considering the experience of the ANL personnel in development

⁷³⁷ AJ, 177, f. 2. Biblioteka USAEC [U.S. AEC Library], February 14, 1956; AJ, 177, f. 2. Traženje biblioteke o nuklearnoj energiji [Request for the Nuclear Energy Library], February 9, 1956

⁷³⁸ AJ, 177, f. 28, a.j. 116. Zapisnici i zaključci sa sastanaka Kolegijuma SKNE, 1956-1965. Zapisnik sa sednice Kolegijuma SKNE [Minutes and Conclusions from Meetings of the SKNE Collegium, 1956-1965. Minutes from the SKNE Collegium Meeting], May 14, 1958; Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 306-307.

⁷³⁹ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu [Transcripts, Conclusions and Materials of the Meetings at the FNEC, 1956]. Zapisnik sa sednice Predsedništva Savezne komisije za nuklearnu energiju [Minutes from the SKNE Presidency Meeting], January 7, 1956.

⁷⁴⁰ AJ, 177, f. 2. Zabeleška o razgovoru druga Nakićenovića sa Auslandom, sekretarom i Lorencom iz Američke abasade [Note on Conversation between Comrade Nakićenović and Ausland, Secretary of the U.S. Embassy and Lawrence from the Embassy], March 13, 1956; ⁷⁴⁰ AJ, 177 FNEC, f. 8, a.j. 22.

of various types of nuclear reactors as well in the wider field of physical chemistry, stretching back to the Manhattan project, it is easy to see the interest of the SKNE.⁷⁴¹

On the other hand, it seems that the U.S. representatives were happy to play this game, as long as they could learn more about details of cooperation between Yugoslavia and the Soviet Union, using this channel as probably one of very few to better understand what the Soviets were willing to offer in similar agreements. The Secretary of the U.S. Embassy in Belgrade, Ausland, was particularly interested in prices of the Soviet nuclear reactor, payment methods and other technical details about the agreement Yugoslavia signed with the Soviet Union only two months earlier, and the SKNE representatives were happy to provide all necessary explanations.⁷⁴² Actually, between January and June 1956, Ausland and representatives of the USAEC and the U.S. nuclear industry had several meetings with SKNE representatives, hoping to learn more details about the agreement with the Soviet Union, and perhaps manage to make yet another offer the Yugoslavs could not refuse.⁷⁴³

Only a few reports submitted to the SKNE by Yugoslav scientists who received their specializations in the United States survived, but those that did offer an important glimpse into their activities in the United States, as well as the reception

Odeljenje za veze sa inostranstvom, 1957-1964 [The Department for International Relations], Cooperation with the USA, December 16, 1957.

⁷⁴¹ “Argonne National Laboratory. Our History: Inspiring the Nation’s Future”, <https://www.anl.gov/our-history> (accessed on March 30, 2021).

⁷⁴² AJ, 177, f. 2. Zabeleška o razgovoru druga Nakićenovića sa Auslandom, sekretarom i Lorencom iz Američke ambasade [Note on Conversation between Comrade Nakićenović and Ausland, Secretary of the U.S. Embassy and Lorentz from the Embassy], March 13, 1956.

⁷⁴³ AJ, 177, f. 438. The collection records seven different meetings in the given period. Besides the Second Secretary Ausland, the First Secretary Marcy participated in one of these meetings, as well as Ulysses Staebler “chief of civil reactor branch” of the USAEC. AJ, 177, f. 438. Zabeleška sa g. Ulysses Staebler-om, koji je boravio u Jugoslaviji u danima od 24. aprila do 1. jula 1956 [Note about Ulysses Staebler, who stayed in Yugoslavia between April 24 and July 1, 1956], July 3, 1956; Staebler was the director of the USAEC Reactor Development Division. Jeffrey W. Taliaferro, *Defending Frenemies: Alliances, Politics, and Nuclear Nonproliferation in US Foreign Policy* (New York: Oxford University Press, 2019), 69.

they received there. One the two Yugoslav scientists who received specializations in the ANL was Vojno Dizdar, a young physical chemist who was specializing in chemistry of transuranic elements. In his first report, Dizdar could not hide his disappointment with the organized visit to the Oak Ridge National Laboratory (ORNL), commenting that “unfortunately, it was more tourism than an opportunity to see anything in details”. Although he admitted to having seen three nuclear reactors and other departments, laboratories and institutes of the ORNL, he was somewhat embittered, since “that was not even 1% of what could have been seen”. The gaseous diffusion plant as the prime target of his interest proved to be completely illusive since he was driven around it “at speed of 80 kilometers per hour and in front of the fence.” Dizdar also explained that he and other Yugoslav scientists were swarmed by the journalists who photographed him at the ORNL and posed provocative questions, making him uncertain to “who needs this course more, them or us.”⁷⁴⁴

However, his disappointment quickly turned into excitement when he signed up for courses organized at the ANL. In accordance with his expertise, he enrolled for the Reactor Metallurgy, Chemistry and Separation Processes. According to his estimate, the last course on the list was the most important an the best on offer, since it provided him with “detailed analysis of chemical schemes and physical conditions in separation process,” as well as the introduction to “adequate chemical processes for derivation of reactor-grade metallic fuel” that he was even able to test experimenting in laboratory. His change of hearts seems impressive, and he did not shy away from

⁷⁴⁴ AJ, 177, f. 22-89. Kopija pisma Vojna Dizdar, saradnika Instituta „Boris Kidrič“ [Copy of the Vojno Dizdar's Letter, Associate of teh IBK], September 14, 1956. Gaseous diffusion is one of technologies for uranium enrichment. Regarding the team of Yugoslav scientists, Dizdar does not reveal any names, although speaks in plural in his report, while the original agreement was speaking only about Milan Čopić from the IJS in Ljubljana and himself as trainees at the ANL. The general tone of Dizdar's mail suggests a larger group.

expressing it in the report: “I hope with all of my heart for everything else to be as good as this program”.⁷⁴⁵

While it is difficult to discern between his honest excitement, his strategy to extend his stay at the ANL, or perhaps even fear that his hosts might be reading his mail, the fact remains that Dizdar visited all of the most important U.S. nuclear research and industrial facilities. Even if he experienced it at the speed of 80 km/h, this was something his colleagues found impossible to do in the Soviet Union. Beside the ANL and ORNL, Dizdar visited Tennessee Valley Authority, Brookhaven National Laboratory, Grand Junction in Colorado (pilot plant for uranium ore processing), Moab uranium mine in Utah, Bureau of Mines in Salt Lake City (Utah), Bingham Copper Mines, National Reactor Test Station in St. George (Idaho), and University of California Radiation Laboratory (Berkeley Lab). Dizdar was particularly impressed with the Berkeley Lab, and as a proper intelligence agent, he reported that “it would be good to see if they would accept any of our chemists”, since they had declassified their research.⁷⁴⁶

This type of cooperation between the United States and Yugoslavia continued in following years, although neither side was completely satisfied. While various U.S. representatives continued to pressure for signing the bilateral agreement, the Yugoslav side continued to hope to use this potential cooperation to counterbalance the overwhelming Soviet influence. On a more practical level, the SKNE was also aware that they simply did not have “enough expert cadres” to operate even the smallest nuclear reactor the USAEC was willing to supply.⁷⁴⁷ On the other hand, training

⁷⁴⁵ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu. Izvod iz pisma ing. Vojna Dizdara od 10. septembra 1956. godine, October 10, 1956.

⁷⁴⁶ AJ, 177, f. 22-89. Zapisnici, zaključci i materijali sa sednica Predsedništva za 1956. godinu. Izvod iz pisma ing. Vojna Dizdara od 10. septembra 1956. godine, October 10, 1956.

⁷⁴⁷ AJ, 177, f. 438. Saradnja sa SAD [Cooperation with the USA], September 3, 1957

Yugoslav scientists in the United States did not produce expected results either, since they would be usually accepted in doctoral programs “which was too long for us [SKNE]”. The SKNE preferred to have more scientists on shorter specialist courses, stressing that “they can obtain their doctorates here [in Yugoslavia].”⁷⁴⁸ What the SKNE actually wanted, was comparable to what entire Yugoslavia wanted – the Soviet approach to direct application of scientific research, and the American openness and even generosity in sharing such knowledge.

The stalemate was broken on January 16, 1960, when the Secretary of the U.S. Embassy in Belgrade, Wilson, delivered the USAEC official invitation to the SKNE to visit the United States in the first week of March. The proposal for cooperation was aiming openly and directly at the field the SKNE could not reach an understanding with the Glavatom representatives – the construction of the hot-lab at the IBK in Vinča. The USAEC “had decided to send their expert for consultations about the HOT laboratory, and that this expert should arrive in Belgrade even before the departure of the Yugoslav delegation.”⁷⁴⁹ More importantly, “the Americans expressed their readiness to reassess possibilities for more elastic forms of cooperation with Yugoslavia”. This agreement does not reveal much, but it does suggest that the USAEC was willing to sacrifice at least some of provisions in the standard bilateral agreement.⁷⁵⁰ The SKNE was also happy that their strategy of playing one superpower against the other seemed to be working well, noting that “it is characteristic that the

⁷⁴⁸ AJ, 177, f. 438. Zabeleška o razgovorima sa gosp. Hoyt Whipple, savetnikom Američke Atomske komisije i savetnikom Tehničke pomoći, Vinča 3. oktobar 1958 [Note on Conversation with Mr. Hoyt Whipple, Advisor of the USAEC and Advisor of the U.N. Technical Aid, October 3, 1958].

⁷⁴⁹ AJ, 177, f. 438. Poziv Komisije za atomsku energiju SAD delegaciji SKNE za odlazak u SAD [Invitation of the U.S. AEC to the SKNE Delegation to Visit the USA], January 18, 1960.

⁷⁵⁰ *Ibid.*

invitation to send a Yugoslav delegation to the USA came twenty-ish days after the official commissioning of the [Soviet] reactor in Vinča.”⁷⁵¹

However, in reality the USAEC was trying to play a much more complex game using the old strategy of a carrot on a stick. In June 1959, the representatives of the U.S. Embassy in Belgrade openly suggested that Yugoslavia could get this and much more if the SKNE would establish cooperation with them through the newly established International Atomic Energy Agency (IAEA).⁷⁵² The communication between the SKNE and USAEC representatives accelerated during the IAEA Third General Conference, held in September and October 1959 in Vienna, which eventually resulted in the USAEC invitation to the SKNE representatives to visit the United States.⁷⁵³ During the March 1960 visit, the SKNE management became aware that the United States had exhausted the ‘Atoms for Peace’ program, regarding the cooperation through bilateral agreements, and were hoping to extend its reach through the IAEA “as a mediator”. For the Yugoslavs this became particularly important considering sensitive issues of inspection of nuclear facilities and related sovereignty breach, although they also understood that the United States “continuously aimed to

⁷⁵¹ AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960

⁷⁵² AJ, 177, f. 8-22. Odeljenje za veze sa inostranstvom, 1957-1964 [The Department for International Relations], Zabeleške o razgovoru savetnika Dr. Mirka Brunera sa Robert Hill-om, I sekretarom Američke ambasade u Beogradu [Notes on Conversation between the advisor Dr. Mirko Bruner with Robert Hill, the First Secretary of the U.S. Embassy in Belgrade], June 24, 1959.

⁷⁵³ AJ, 177, f. 438. Poziv Komisije za atomsku energiju SAD delegaciji SKNE za odlazak u SAD [Invitation of the U.S. AEC to the SKNE Delegation to Visit the USA], January 18, 1960; *Twenty-fifth Semiannual Report of the Atomic Energy Commission* (Washington D.C.: United States Government Printing Office, January 1959), 213. The SKNE established contacts with John A. Hall, the USAEC Assistant General Manager for International Activities, and Brady, the USAEC Senior Scientific Advisor.

promote the Agency [IAEA] and help in realization of its statutory functions, among which is mediation in acquiring reactors and nuclear fuel.”⁷⁵⁴

Ever since its official establishment in 1957, the IAEA was the central international hub for international nuclear diplomacy. It should not come as a surprise that it was also a breeding-ground for a variety of diplomatic activities, although for Yugoslavia it had an added benefit of an international institution, formally under the control of United Nations. The SKNE understood well that this institution offered a completely new set of opportunities for cooperation with a number of countries and started to work hard in planting trusted cadres on high-ranking positions at the IAEA. Already in 1958, Yugoslavia proposed “three engineers and one lawyer” for different positions in the IAEA’s Secretariat. However, the SKNE quickly realized that “the USSR and USA have their people in top-ranking positions in every department,” and that they were pushing their candidates even for lower positions.⁷⁵⁵ Surprisingly, and against all the odds, in September 1958, the SKNE managed to push through these obstacles their own candidate, Dr. Milan Osredkar a young scientist from the IJS in Ljubljana, and to secure him a position of the Director of the IAEA Division of Reactors, where he stayed until 1962.⁷⁵⁶ It is difficult to estimate if Osredkar’s appointment on such an important position in the IAEA was a result of the American support, but it is a fact that a year later, the USAEC representatives “expressed their

⁷⁵⁴ AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960.

⁷⁵⁵ AJ, 177 FNEC, f. 23-91. Zapisnici i materijali sa sednica Pretsedništva za 1958 [Minutes and Materials of the Meetings of the Presidency in 1958], Međunarodna agencija za atomsku energiju, 1958.

⁷⁵⁶ AJ, 177 FNEC, f. 23-91. Zapisnici i materijali sa sednica Pretsedništva za 1958 [Minutes and Materials of the Meetings of the Presidency in 1958], Međunarodna agencija za atomsku energiju, 1958; „Življenjepis: Profesor Doktor Milan Osredkar,” *Novice IJS*, no. 104 (June 2003), 8, 22. In 1954, he graduated as a technical physics engineer, received a master's degree in nuclear engineering from the New York University in the USA and a doctorate in 1958 from the University of Ljubljana. Immediately after his doctorate, took over the duties of Director of the Nuclear Reactor Department at the International Atomic Energy Agency in Vienna.

readiness to support Yugoslav candidates for appropriate places within the IAEA apparatus".⁷⁵⁷

During the negotiations in the United States in March 1960, instead of the standard bilateral agreement between two countries, and with a clear aim to completely charm their guests, the U.S. representatives offered that the "written formulation of the agreement on cooperation should be executed in the form of exchange of letters". The Yugoslavs understood well that this was "a precedent based on which the USA for the first time goes into realization of a wide program of cooperation [...] without a typical bilateral agreement, renouncing their right to inspection in favor of the International Atomic Energy Agency."⁷⁵⁸ Suggested and approved by the U.S. State Department and the USAEC, this format of cooperation was more flexible in terms of the actual content, but also since it allowed the USAEC "to avoid restrictive legislation and complicated procedure in the Congress", which did not even needed to be notified about it. In fact, the letters in question were not exchanged between two governments, but between the U.S. State Department and the SKNE. In an obvious attempt to draw Yugoslavia completely into its own orbit, the USAEC even accepted the SKNE proposal that "what cannot go through the agency [IAEA], would go directly between two countries", which probably represented the least formal level of cooperation, except perhaps industrial espionage.⁷⁵⁹

In an open Cold War battle for Yugoslav hearts and minds, the United States was obviously willing to venture deep into a grey area of diplomacy, their own

⁷⁵⁷ AJ, 177, f. 438. Poziv Komisije za atomsku energiju SAD delegaciji SKNE za odlazak u SAD [Invitation of the U.S. AEC to the SKNE Delegation to Visit the USA], January 18, 1960.

⁷⁵⁸ AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960.

⁷⁵⁹ AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960; DA MSPRS, PA, 1960, f. 122 (USA). Telegram of the Yugoslav Embassy in Washington D.C, No. 231, March 1, 1960.

nuclear non-proliferation policies, and even the country's political system. Not unlike with the Yugoslav experience in Moscow in 1956, this was visible in the composition of the U.S. delegation, which included John A. McCone, the Chairman of the USAEC, Phillip J. Farley, special Assistant to the Secretary of State, and John A. Hall, the USAEC Assistant General Manager for International Activities, among others. According to the SKNE report, "the Americans were [...] very elastic and willing to accommodate our requests", and it was particularly emphasized that "they did not resist including certain sensitive areas of cooperation", such as the uranium fuel elements technology, radiation protection, and "technological and economic studies of nuclear power plants". It was also emphasized that these were the topics on which "the USSR refused to provide cooperation, justifying it with the fact that they fall into military use of nuclear energy."⁷⁶⁰

The final agreement, no matter how informal it may have been, included one TRIGA II research reactor of 100 kW thermal power, destined for the IJS in Ljubljana, and two small reactors for universities in Belgrade and Zagreb of 10 W each. This part of the agreement, including the fuel for nuclear reactors, was supposed to be carried out through the IAEA. The purchase of equipment for the hot-lab, adjacent laboratories and the entire pilot-plant for uranium metal production, all to be installed in the IBK in Vinča, were part of the direct cooperation between two countries. It seems that the USAEC planned to redirect this aspect of cooperation to American private companies and provide them with necessary export permits. This also included any potential joint construction of a nuclear power plant in Yugoslavia, as additional field of interest expressed by the SKNE. Specialist courses for Yugoslav

⁷⁶⁰ AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960; DA MSPRS, PA, 1960, f. 122 (USA). Telegram of the Yugoslav Embassy in Washington D.C, No. 231, March 1, 1960.

scientists were put somewhere in the middle between these two options, since the USAEC suggested that the IAEA training programs should be exploited “to possible limits”, while for any other request, the Yugoslavs would be trained at universities, national laboratories and private companies in the United States. In fact, the only aspect in which this agreement resembled the original bilateral agreements was that the entire financial package would not surpass value of \$ 350.000.⁷⁶¹

In addition, during the negotiations in the United States, the SKNE delegation managed to visit a range of USAEC facilities and research institutions, and enjoyed a lunch in the Blair House, which had a particular significance considering that Khrushchev was accommodated there during his visit to Washington D.C. in September 1959. They also spent an evening with scientists from the University of Chicago in the apartment of Enrico Fermi’s widow. The list of world famous scientists whom they spoke with included Isidor Isaac Rabi, Edward Teller, Owen Chamberlain, Emilio Segrè, Edwin McMillan, and many others, being clearly impressed that some of them “participated [...] in construction of the first atomic bomb.”⁷⁶² The USAEC was obviously doing its best to surpass the Glavatom in pampering the Yugoslavs,

⁷⁶¹ DA MSPRS, PA, 1960, f. 122 (USA). Prevod pisma Phillip J. Farley-a, specijalnog pomoćnika sekretara spoljnih poslova, upućenog Slobodanu Nakićenoviću, sekretaru SKNE [Translation of the Letter of Phillip J. Farley special Assistant to the Secretary of State, to Slobodan Nakićenović, Secretary of the SKNE], March 31, 1960.

⁷⁶² AJ, 177, f. 438. Rezime izveštaja o boravku jugoslovenske delegacije za nuklearnu energiju u SAD [Resume of the Report about the Stay of the Yugoslav Delegation for Nuclear Energy in the USA], April 25, 1960; DA MSPRS, PA, 1960, f. 122 (USA). Telegram of the Yugoslav Embassy in Washington D.C, No. 237, March 2, 1960; FRUS 1958–1960, Volume X, Part 1, Eastern Europe Region; Soviet Union; Cyprus, ed. Ronald D. Landa et al. (Washington: United States Government Printing Office, 1993), Document 108. The SKNE delegation visited the ORNL, ANL, Berkeley Lab, Brookhaven National Laboratory, Idaho Falls National Reactor Testing Station, Dresden Nuclear Power Plant, “military nuclear power plant” in Fort Belvoir, Kingston Fossil Plant and Universities of Chicago and California. Among other scientists were Steven *Weinberg*, Karl Z. *Morgan*, Jack M. Hollander, Isadore Perlman, Vernon W. Hughes, and Norman Hilberry.

who at least admitted that “they have given us more possibilities [...] than Emelyanov.”⁷⁶³

The cooperation between the USAEC and SKNE continued with the return visit of the American scientists and experts in various disciplines, led by John A. Hall from the USAEC, who came to Yugoslavia in May 1960, in order to estimate the Yugoslav nuclear program and identify more precisely fields for future cooperation.⁷⁶⁴ Following the agreement, on September 27, 1960, during the Fourth General Conference of the IAEA, the Yugoslav representative Slobodan Nakićenović received the signed letter of intention from John A. McCone, the Chairman of the USAEC, which guaranteed the support of up to \$ 200.000 for construction of the research nuclear reactor at the IJS in Ljubljana. The letter obviously aimed also at those terms that the Soviet made many problems in their own agreement with Yugoslavia, stressing that “major components of the reactor shall be manufactured by United States or Yugoslav firms”, and the same approach was implemented for the actual assembly of the reactor. At the same time, the entire arrangement was supposed to be implemented through the IAEA, which was an important goal of the USAEC.⁷⁶⁵

On October 4, 1960, the U.S. Embassy in Belgrade sent a formal approval to the Yugoslav Ministry of Foreign Affairs for \$ 150.000 towards the purchase of the equipment for the hot-lab at the IBK in Vinča.⁷⁶⁶ The arrangement was within already agreed provisions, but the SKNE made an additional request, not to be obligated to send to the USAEC copies of “all technical publications which are the result of

⁷⁶³ DA MSPRS, PA, 1960, f. 122 (USA). Telegram of the Yugoslav Embassy in Washington D.C, No. 312, March 16, 1960

⁷⁶⁴ AJ, 177, f. 438. Stenografske beleške sa razgovora vođenih između predstavnika SKNE i delegacije Atomske komisije SAD [Stenographic Notes of the Conversation between Representatives of the SKNE and Delegation of the U.S. AEC], May 16, 1960.

⁷⁶⁵ DA MSPRS, PA, 1960, f. 122 (USA). Pismo McCone-a, direktora USAEC upućeno Aleksandru Rankoviću, direktoru SKNE [The Letter of McCone, the Chairman of the USAEC, to Aleksandar Ranković, the Director of the SKNE], September 27, 1960.

⁷⁶⁶ AJ, 177, f. 438. Američka pomoć [American Aid], October 11, 1960

research conducted with the equipment from the American aid”, which was eventually accepted by the USAEC. The SKNE understood this a direct control of the research conducted in the hot-lab, which was probably what it aimed at, but it is more important that the USAEC accepted this change, provided that “this document would not be published” and details of it not revealed “to third-party representatives”.⁷⁶⁷

The communication regarding the hot-lab equipment continued in following months and the final agreement was made on April 19, 1961, through exchange of notes between the U.S. Embassy in Belgrade and the Yugoslav Ministry of Foreign Affairs. Additional \$ 130.000 were approved soon after by the International Cooperation Administration (ICA) for training programs in the United States, which included specializations for 22 Yugoslav scientists and arrival of two experts from the United States to provide support in realization of the nuclear reactor and hot-lab projects. Moreover, obviously dizzy with success, in June 1961 the SKNE also requested support through the ICA for the construction of the “HOT metallurgy” laboratory at the IBK in Vinča, for the research in reactor materials.⁷⁶⁸

The realization of these projects started to evolve according to the initial plan, particularly concerning the role intended for the IAEA. During 1960, the IAEA organized the Vinča Dosimetry Experiment at the IBK, in order to estimate the exact radiation doses received by the operators of the RB (‘zero-power’) reactor in the “Vinča Accident” of 1958. Considering the promotion of the IAEA and its mission, the importance of this experiment is invaluable since this was “the first multinational

⁷⁶⁷ AJ, 177, f. 438. Američka pomoć [American Aid], October 11, 1960; AJ, 177, f. 438. Zabeleška o razgovoru druga Bauma sa sekretarom američke ambasade Wilsonom i g. Coop-om, predstavnikom ICA misije u Jugoslaviji [Note on Conversation between Secretary of the U.S. Embassy, Wilson, and Mr. Coop, representative of the ICA mission in Yugoslavia], November 4, 1960.

⁷⁶⁸ AJ, 177, f. 438. Saradnja sa SAD u nuklearnoj oblasti [Cooperation with the USA in the Nuclear Field], September 17, 1961.

‘big science’ project in this field”.⁷⁶⁹ Immediately after, in June 1960, the SKNE officially filed the request with the IAEA to act as mediator in the purchase of the TRIGA II nuclear reactor for the IJS in Ljubljana. The negotiations with the IAEA representatives, most of which were conducted directly between IAEA Director, Sterling Cole and Slobodan Nakićenović, lasted until April 7, 1961, when the final approval of the IAEA Board of Directors was received on April 7, 1961.⁷⁷⁰

The IAEA experts in various disciplines were also included in the team which estimated the safety of the proposed reactor location, providing all necessary support, from pure technical, to analyses of seismic activities. Among them was aforementioned Milan Osredkar, the Director of the IAEA Division of Reactors, who actively participated in the entire communication and played a significant role in approving the project for the IJS where he was previously employed.⁷⁷¹ The SKNE policy to install as much of its own personnel in the IAEA as possible, obviously started to produce first significant results, although in this case Osredkar’s role of the judge and executioner, worked equally well in support of the American strategy for the IAEA.

The potential realization of support offered by the United States would definitively allow Yugoslavia to finalize the nuclear fuel cycle. The expected ability to

⁷⁶⁹ Toshihiro Higuchi, Jacques E.C. Hymans, “Materialized internationalism: How the IAEA made the Vinča Dosimetry Experiment, and how the experiment made the IAEA”, *Centaurus*, 2021: 1-18. The experiment onsite included seven American and 13 French scientists, including three IAEA officials and roughly 650 Yugoslav scientists and technicians of the IBK in Vinča, while the British Atomic Energy Research Establishment (AERE) in Harwell, who supplied the heavy water for the experiment. The IAEA support also included refurbishment of the RB nuclear reactor.

⁷⁷⁰ IAEA Archives, SC/441-YUG-1. Telegram of Sterling Cole to Slobodan Nakićenović, April 7, 1961.

⁷⁷¹ IAEA Archives, SC/441-YUG-1, and SC/441-2. Requests for Agency services as intermediary for the supply of nuclear facilities and materials (including fissionable materials), 1960-1961. These conclusions were made after analysis of dozens of documents in these folders. While it is obvious that Osredkar did not deliver his decision independently, he was in charge of evaluation and communication with Yugoslav officials and the director of the IAEA Sterling Cole, and was in a position to influence a positive outcome of these negotiations.

operate in the near future three different nuclear reactors, one of them Soviet, one American, and one Yugoslav, does sound like a beginning of a Cold War joke, but it was a reality for Yugoslavia, and not very bad one either. Combined with the enhanced know-how in mining and refining uranium ore, expected installation of facilities for production of uranium fuel and for spent fuel reprocessing, supported with personnel trained at the most prestigious scientific institutions in the United States, and to a certain extent in the Soviet Union, all spelled a bright future for Tito's nuclear ambitions. Unfortunately for him, by the end of 1961, the United States halted any cooperation with Yugoslavia in this field.

One of the reasons for the change of hearts was the actual change of the state administration in the United States in 1961. Even though Kennedy was actually much less interested in halting nuclear proliferation than Eisenhower was⁷⁷², Kennedy replaced many people in the administration, which necessarily produced delays during the late 1960 and the first half of 1961. For example, the Chairman of the USAEC, McCone, was scheduled to arrive to Yugoslavia on an official visit on October 1, 1960, with an official approval for the transfer of nuclear reactor and the equipment for the hot-lab, which he wanted to deliver personally to Aleksandar Ranković, the director of the SKNE. However, this visit was postponed for the period "after the presidential elections in the USA."⁷⁷³ This never was realized as McCone was deposed and Ranković had to establish close communication with the newly appointed Chairman of the USAEC, Glenn Seaborg, which did not happen officially until July

⁷⁷² Francis Gavin, *Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca and London: Cornell University Press, 2012), 79, 99.

⁷⁷³ AJ, 177, f. 438. Američka pomoć [American Aid], October 11, 1960

1961, when he sent an invitation to Seaborg to visit Yugoslavia, hoping to “promote collaboration between our two countries.”⁷⁷⁴

This problem (un)necessarily delayed realization of agreements between the SKNE and USAEC. However, the true obstacle was Tito’s speech on September 3, 1961, during the Non-Aligned Conference in Belgrade. The speech enraged the Cold War superstar diplomat George F. Kennan, then the U.S. Ambassador in Belgrade, and initiated a period of cold relations between United States and Yugoslavia, which unavoidably had an impact on the realization of approved projects of cooperation in peaceful use of nuclear energy. In following months, various diplomats from the U.S. Embassy in Belgrade tried to convince the SKNE representatives that all agreed arrangements will be respected, but could not offer actual explanations why their realization was effectively stopped. Either way, the change was obvious enough for Aleksandar Ranković to request an update from the Ministry of Foreign Affairs, about the current state of relations between two countries.⁷⁷⁵ The failed attempt of the IRB in Zagreb to purchase multichannel analyzer from the Nuclear Data, Inc. provides a vivid image of the drastically changed attitude towards Yugoslavia immediately after the Non-Aligned Conference in Belgrade. In response to the official request, the General Manager of the Nuclear Data, Inc., W. J. Buffo, did not even try to obscure his true feelings:

⁷⁷⁴ AJ, 177, f. 438. Pismo Rankovića Seaborg-u [Letter from Ranković to Seaborg], July 1, 1961.

⁷⁷⁵ AJ, 177, f. 438. Zabeleška o razgovoru D. Bauma, načelnika Odeljenja za veze sa inostranstvom SKNE sa g. Johnpollom, šefom Političke sekcije i g. Schackleton-om, drugim sekretarom Ambasade SAD u Beogradu [Note on Conversation between D. Baum, Chief of the SKNE Department for International Relations, with Johnpoll, Chief of the Political Section and Mr. Schackleton, the Second Secretary of the U.S. Embassy in Belgrade], October 21, 1961. AJ, 177, f. 438. Zabeleška o razgovoru D. Bauma, načelnika odeljenja za veze sa inostranstvom sa drugim sekretarom Ambasade SAD, g. Schackleton-om [Note on the Conversation between D. Baum, Chief of the Department for International Relations with the Second Secretary of the U.S. Embassy, Mr. Schackleton], October 28, 1961; AJ, 177, f. 438. Zabeleška za druga Aleksandra Rankovića. Sadašnje stanje odnosa Jugoslavija-SAD [Note for Comrade Aleksandar Ranković. Current State of Relations Yugoslavia-USA], November 7, 1961.

“We sincerely regret that we are unable to export this equipment to your fine country because of the fact that it is still under communist control. We trust that in time, communism and Western Democracy will learn to be at peace. At that time we hope to have even finer instrumentation, and that you will still be interested in us.”⁷⁷⁶

This statement did not necessarily reflect the official position of the U.S. Government, but it can be attributed to the overall attitude of the American public and press towards Yugoslavia, after Tito’s speech at the Non-Aligned Conference in Belgrade in 1961. Without going deeper into this problematic, the fact remains that the cooperation between the USAEC and SKNE all but stopped soon after and it took some time to be reestablished. Considering Tito’s nuclear ambitions, it can be argued that his decision to provide understanding and support to the Soviet breaking of moratorium on nuclear testing produced additional delays in realization of the Yugoslav nuclear program, and deeply annoyed the United States.

⁷⁷⁶ AJ, 177, f. 438. Transcript of the Response of W. J. Buffo, General Manager of the Nuclear Data, Inc., to the request of Dr. Tomo Bosanac, Director of the IRB in Zagreb, September 20, 1961.

Chapter 4: The SKNE Archipelago

4.1 The Bomb in a State within a State

“All phases of work on production of nuclear explosive simultaneously represent phases of work on peaceful use of nuclear energy. [...] Therefore, in principle, military and civilian program do not differ.”⁷⁷⁷

The first formal document that contained a premise of a sensible plan to produce nuclear weapons in Yugoslavia was developed by the end of 1957.⁷⁷⁸ Before the actual analysis of this document, it would be important to stress that the this plan was designed as an annex to the so-called Perspective Plan for Development of Nuclear Energy in Yugoslavia (Perspective Plan). The name alone is reminiscent of the standard practice in a well-developed planned economy, which starts with the general, state-wide plan, “prepared by the most powerful bureaucratic agency”, usually the national planning body, supported by the “Central Committee on the party’s behalf and the government on the states, and then enacted by parliament.” The general plan usually spans period of five years, divided in annual plans, and while “the annual plan is the real operational tool”, the main five-year plan “tends more to be a

⁷⁷⁷ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961

⁷⁷⁸ AJ, 177, f. 1. Strogo poverljivo. Prilog perspektivnom programu naučno-istraživačkih i drugih radova u oblasti nuklearne energije za potrebe narodne odbrane /odjeljak: atomsko oružje/ [Top Secret. Annex to the Perspective Program of Scientific Research and Other Work in the Field of Nuclear Energy for Purposes of People’s Defense /Section: Atomic Weapons/], n.d., 1957. There are reasons to date this document either in the late 1957, or the beginning of 1958, depending on the reading of certain information it provides.

statement of economic-policy intent, although the investment program it includes has a practical influence on how the investment process develops.”⁷⁷⁹

The SKNE was working intensively on the development of the Perspective Plan since 1956, which was composed of individual plans for different sectors and in one of its first draft versions covered the ten-year period, between 1957 and 1966, only to be rescaled to the ‘classical’ format of a five-year plan (1957-1961).⁷⁸⁰ Among different components, the plan for the nuclear reactor sector development was finalized in 1958, as the central component of the Perspective Plan, thus influencing development of plans in all other sectors.⁷⁸¹ Bondžić details all administrative and structural changes that had an impact on the development of the Perspective Plan, which was “repeatedly edited” during the late 1950s, through “numerous discussions in the SKNE organs and in institutes.” Eventually, the final version of the Perspective Plan was formally adopted only in 1960, for the five-year period (1960-1965), and following the ‘classical’ practice, it was sent for approval to the Federal Executive Council (Federal Government), and then to Federal Office for Economic Planning for coordination with the Social Plan for the Country’s Development, in order to secure the necessary funds.⁷⁸²

The chronology and the backdrop of the evolution of the Perspective Plan is relatively easy to follow, but it is also instructive. At the time when initial drafts started to appear, the cooperation with the Soviet Union was just being established. Considering the (d)evolution of this cooperation and the parallel establishment of

⁷⁷⁹ Kornai, *The Socialist System*, 111.

⁷⁸⁰ Bondžić, *Između ambicija i iluzija*, 123, 153; AJ, 177, f. 24-93. Perspektivni plan razvoja nuklearnih nauka i primene nuklearne energije u mirnodopske svrhe [Perspective Plan for Development of Nuclear Sciences and Peaceful Uses of Nuclear Energy], n.d., 1957

⁷⁸¹ These included, but not restricted to, SKNE sectors for raw materials, international cooperation, ‘cadres’, etc., each of them branching in a similar way into more specialized plans.

⁷⁸² Bondžić, *Između ambicija i iluzija*, 123-155.

equally, if not more promising relations with the United States, it is easy to see why the final version of the Perspective Plan was formulated only in 1960. This process was obviously chaotic, dependent on the Cold War political relations between two superpowers, Yugoslav successes and failures in cooperation with both, as well as the country's policies and material capabilities, including financial, industrial and human capital. As if this was not complicated enough, editing the Perspective Plan was equally dependent on different opinions, ideas, plans, expectations and power plays between the JNA, SKNE management, and nuclear institutes under its supervision; more precisely, between the army, state bureaucracy and scientists. This chapter will demonstrate that the SKNE eventually managed to cover all ends, and developed the plan which included the construction of nuclear weapons as a mid to long-term goal, resisted the attempted takeover by the JNA, and kept a strict control over nuclear institutes and the nuclear program in general. The question remains, what were the costs of this victory?

The Bomb in the basement of the five-year plan

The original plan for development of nuclear weapons was designed in 1957/8 by the State Secretariat for People's Defense Affairs [*Državni sekretarijat za poslove narodne odbrane* – Ministry of Defense] and the SKNE, and like the initial draft of the Perspective Plan, it covered the period of full ten to twelve years. It was expected that by the end of this period (1969), Yugoslavia would develop technology for the “industrial production of nuclear explosive”, which would naturally provide “first quantities of nuclear explosive”, to be used to “perform nuclear test explosions”. These achievements would, in additional three to four years, “provide conditions” for

production of maximum ten nuclear weapons per year, “suitable to our economic and cadre capabilities”.⁷⁸³

Following the well-established practice in a planned economy, this general plan included several tasks as preconditions for its further elaboration. These included studies about necessary quantities of nuclear explosive and about the actual weapon design, since it was admitted, “our current knowledge on nuclear weapons is extraordinarily small”. Studies about different types of “dual-purpose reactors”, particularly considering those considered optimal for production of weapons-grade plutonium and about technology for plutonium extraction, were also included. The plan contains two potential “variants” for development of the atomic bomb project, one designed as a dual-purpose, or a wider civilian project with a military component based on power producing nuclear reactors (Variant I), and a purely military project designed exclusively for plutonium production (Variant II). Without reaching a decision on a preferable variant, it is admitted that civilian option would “engage better all interested capacities of our country and the costs of its realization would not fall exclusively on the budget of people’s defense”, although it is also emphasized that the military option could be potentially quicker.⁷⁸⁴

More importantly, both ‘variants’ aimed exclusively at production of plutonium as a nuclear explosive, completely disregarding the enriched uranium option. This is particularly important considering that the SKNE continuously insisted on development of nuclear reactors based on the natural uranium as fuel and heavy

⁷⁸³ AJ, 177, f. 1. Strogo poverljivo. Prilog perspektivnom programu naučno-istraživačkih i drugih radova u oblasti nuklearne energije za potrebe narodne odbrane /odeljak: atomsko oružje/ [Top Secret. Annex to the Perspective Program of Scientific Research and Other Work in the Field of Nuclear Energy for Purposes of People’s Defense /Section: Atomic Weapons/], n.d., 1957.

⁷⁸⁴ AJ, 177, f. 1. Strogo poverljivo. Prilog perspektivnom programu naučno-istraživačkih i drugih radova u oblasti nuklearne energije za potrebe narodne odbrane /odeljak: atomsko oružje/ [Top Secret. Annex to the Perspective Program of Scientific Research and Other Work in the Field of Nuclear Energy for Purposes of People’s Defense /Section: Atomic Weapons/], n.d., 1957.

water as moderator, which is the most suitable technology for production of weapons-grade plutonium, and which was the general design of the indigenously developed RB ‘zero-power’ reactor. It is worthy to remember that during the negotiations with the Soviet Union, the SKNE representatives insisted that the RA (‘Chinese’) reactor must be redesigned to operate with natural uranium fuel, and only reluctantly abandoned this request after the Soviets warned that it would postpone the entire arrangement for more than a year. Often invoked argument that the natural uranium fuel was expected to be available relatively soon from the domestic production, while being reasonable and perhaps even realistic, does not deny the fact that the plutonium production was more important factor in the choice of the preferred nuclear reactor design.

Indirect confirmation of the logic may be found in the fact that the Indian nuclear program was based on production of plutonium in nuclear reactors using natural uranium fuel. The CIRUS research reactor, purchased in 1955 in Canada was based on that technology, and “large amounts of weapon-grade plutonium” it produced “was used ultimately in India’s 1974 peaceful nuclear explosion.”⁷⁸⁵ At least considering the aforementioned Perspective Plan for Development of Nuclear Reactors, during the final discussion it was decided that “first nuclear-energetic facilities must be designed on the natural uranium base”, but without plutonium extraction or “regeneration of irradiated uranium”. The second phase included the “construction of the dual-purpose [nuclear] power plant and the facility for plutonium extraction”, while in the third phase it was somewhat optimistically expected to

⁷⁸⁵ Perkovich, *India's Nuclear Bomb*, 26-28.

initiate nuclear reactors with enriched fuel project, “as well as solving problems of breeding uranium 238”.⁷⁸⁶

The RB ‘zero-power’ reactor was promoted to the Soviets and other foreign partners, as a necessary training facility for future operators of the larger RA reactor. While this explanation is true, it is far from complete. The plan for nuclear weapons production anticipated installation of a 65 MW thermal power (18 MW electric) nuclear reactor by 1965, and additional 250 MW thermal power (70 MW electric) reactor by 1970, capable to produce the necessary quantity of plutonium for the nuclear test explosion, and for production of ten weapons per year, respectively.⁷⁸⁷ Within this plan, the RB ‘zero-power’ reactor is not mentioned, which is not surprising considering the practice that general plans provide only overarching goals to be detailed in annual and other operational plans. The construction of the RB reactor was originally expected to secure “the possibility for research work on energy [producing] reactors”, which would provide the experts with “all the necessary knowledge and experience, while it would be [also] useful for getting necessary parameters with an aim to design and construct energy reactors for heat and electric energy and ship propulsion.”⁷⁸⁸ In that respect, the RB reactor was a working prototype for testing and verification of the design and development of the technical

⁷⁸⁶ AJ, 177, f. 24-93. Materijal za diskusiju o Perspektivnom planu razvitka nuklearnih reaktora [Material for the Discussion on the Perspective Plan for Development of Nuclear Reactor], October 9, 1957.

⁷⁸⁷ AJ, 177, f. 1. Strogo poverljivo. Prilog perspektivnom programu naučno-istraživačkih i drugih radova u oblasti nuklearne energije za potrebe narodne odbrane /odjeljak: atomsko oružje/ [Top Secret. Annex to the Perspective Program of Scientific Research and Other Work in the Field of Nuclear Energy for Purposes of People’s Defense /Section: Atomic Weapons/], n.d., 1958. The plan aimed at total production of 100 kilograms of plutonium per year in these two nuclear reactors by 1971 (20 in smaller and 80 kilograms per year) and it quite accurately estimated that 10 kilograms of plutonium would be a critical mass for securing the 20 kilotons explosion.

⁷⁸⁸ AJ, 177, f. 24-93. Perspektivni plan razvoja nuklearnih nauka i primene nuklearne energije u mirnodopske svrhe [Perspective Plan for Development of Nuclear Sciences and Peaceful Uses of Nuclear Energy], n.d., 1957

documentation, a crucial step in the product development process, and one which also includes labor standardization and training.⁷⁸⁹

This also adds a new perspective to the outcome of the “Vinča Accident” of 1958. Besides causing the first civilian casualty among nuclear reactor operators in the world, as well as undermining the carefully crafted image of a modern and scientifically advanced country, on a more practical level this accident all but completely stopped the process of independent development of nuclear reactor technology during its most important phase. It seems that Arnold’s claim that “technologies learn from mistakes and accidents,” but that nuclear technology “could not afford accidents” and had to learn without them, receives confirmation in the Yugoslav experience, although in its negative context; once the accident had happened, the learning process was interrupted, at least for a couple of years.⁷⁹⁰

The military plan also sparked a discussion, if not a direct conflict, between the SKNE and JNA regarding the eventual division of jurisdiction in the nuclear program. It seems that General Ivan Gošnjak, the Minister of Defense and a member of the SKNE Presidency, “even though he was not very intelligent”, would have completely agreed with the thoughts of General Jack D. Ripper, a character from the *Dr. Strangelove* movie, who said “war is too important to be left to politicians.”⁷⁹¹ Documents do suggest that the JNA was hoping to exploit the achievements of the civilian program and “take over those investments directly related to weapons production [...] in the first place facilities for plutonium extraction, production of

⁷⁸⁹ I would like to extend my gratitude to my friend and neighbor, Saša Mladenović, a mechanical engineer with years of experience in military industry, for explaining me details about the product development process.

⁷⁹⁰ Lorna Arnold, *Windscale 1957: Anatomy of a Nuclear Accident* (London: Palgrave Macmillan, 2007), xxii. See also Marko Miljković, “Nuclear Yutopia: The Outcome of the First Nuclear Accident in Yugoslavia, 1958” in: *Labor in State-Socialist Europe, 1945-1989: Contributions to a History of Work*, ed. Marsha Siefert (Budapest; New York: Central European University Press, 2020), 274-305

⁷⁹¹ Pirjevec, *Tito i drugovi*, 476; “*Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb*”, Stanley Kubrick (dir.), 1964.

plutonium metal and weapon construction.” The proposed or anticipated ‘takeover’ was actually more of a hijack or a blackmail, since the JNA openly announced that “in case that energy and other needs do not require intensive work on development of nuclear issues in this period, the Army needs might tip the scale regarding decision making.”⁷⁹²

The conflict between the SKNE and JNA started to smolder already in 1956, when dozens of problems were identified in relations between the JNA, SKNE, and nuclear institutes, ranging between the jurisdiction over the nuclear program and concrete research plans and tasks, down to the status of JNA personnel trained in nuclear institutes. This was particularly visible in intelligence work abroad, and the SKNE managed to secure the exclusive right to “give instructions to experts from institutes regarding acquiring certain technical information”, as well as to decide if it wanted to share it with the JNA.⁷⁹³ Much bigger problem was that the JNA was pressuring nuclear institutes with a number of tasks over which the SKNE initially had no control. In fact, already in May 1956, the SKNE agreed that the JNA could give research tasks to nuclear institutes independently and freely use their results for their research in military institutes. The JNA personnel was also supposed to be included in the construction and operation of nuclear reactors at the IBK, as well as in other institutes depending on the training they required, which translated into permission to form “military research groups” within institutes under the SKNE supervision.⁷⁹⁴ Combined with the fact that General Ivan Gošnjak also was a member of the SKNE

⁷⁹² AJ, 177, f. 1. Strogo poverljivo. Prilog perspektivnom programu naučno-istraživačkih i drugih radova u oblasti nuklearne energije za potrebe narodne odbrane /odeljak: atomsko oružje/ [Top Secret. Annex to the Perspective Program of Scientific Research and Other Work in the Field of Nuclear Energy for Purposes of People's Defense /Section: Atomic Weapons/], n.d., 1958.

⁷⁹³ AJ, 177, f. 28-116. Zaključci sa sastanka Kolegijuma SKNE [Conclusions from the SKNE Collegium Meeting], October 1, 1956.

⁷⁹⁴ AJ, 177, f. 22-89. Pro Memoria za sednicu Pretsedništva [Pro Memoria for the Presidency Meeting], May 26, 1956.

Presidency, these “military research groups” had a potential to become the JNA’s own archipelago, integrated into the entire nuclear program both horizontally, spreading to all three nuclear institutes, and vertically, through the entire chain of command.

The relationship, or perhaps even the competition between the SKNE and JNA in the management of the nuclear program was somewhat resolved through the Instructions on Research Works in the Field of Nuclear Energy for the Needs of People’s Defense (Instructions), formally adopted on June 3, 1957. The document did stipulate strict division regarding rights and responsibilities within any potential joint project, but it also secured the central managerial role for the SKNE.⁷⁹⁵ In practice, however, the Instructions changed very little since the first plan for nuclear weapons was developed by the beginning of 1958, and the JNA did not waste much time in designing a full collection of tasks to be performed by nuclear institutes. The Plan of Scientific Research in the Field of Nuclear Energy for the Purpose of People’s Defense in 1958, included dozens of tasks for development of equipment, devices, and scientific studies, ranging from personal dosimeters to the already mentioned station for detection of atmospheric nuclear tests, or studies for development of naval and plutonium producing nuclear reactors. Although most of these tasks were overly ambitious, particularly regarding the one-year deadline, some of them included strange and even ludicrous requests, like the “imitation of the radioactive dust”, for training in decontamination, or the “recipe for a dummy atomic bomb”, which was supposed to “imitate atomic explosions during tactical training of the JNA units.”⁷⁹⁶

⁷⁹⁵ AJ, 177, f. 23-90. Pravilnik o istraživačkim radovima u oblasti nuklearne energije za potrebe narodne odbrane š Instructions on Research Works in the Field of Nuclear Energy for the Needs of People’s Defense], June 3, 1957.

⁷⁹⁶ AJ, 177, f. 1. Top Secret files. Plan naučno-istraživačkih radova u oblasti nuklearne energije za potrebe narodne odbrane [Plan of Scientific Research in the Field of Nuclear Energy for the Purpose of People’s Defense], January 21, 1958. The list included 12 types of radiation detectors, ranging from personal dosimeters, hand-held devices (Geiger-Müller counters) and those that could be installed on

It would be complicated to analyze how much of this plan was actually realized, although the station for detection of atmospheric nuclear tests was obviously a good example of a successful cooperation. On the other hand, the sheer volume of different tasks, even if divided among all nuclear institutes in an efficient manner,⁷⁹⁷ would necessarily mean engaging of most of their scientific and technical personnel. Therefore, it is not surprising that only two days after the JNA plan for 1958 had been submitted, the SKNE decided that the “perspective plan should be limited to the peaceful variant [...], the military component should be detached”, and the new version of the Perspective Plan designed without it. Somewhat euphemistically it was also added that “creation of ‘efficient groups’ [...] is impossible to achieve in this phase of development and social relations”, thus clearly referring to ‘military research groups’ within nuclear institutes. On the other hand, the cooperation with the JNA remained nominally possible and was even encouraged in the Perspective Plan. The fact that the army had its representatives in the management of the SKNE was the obvious reason for such a lenient approach, but it is equally clear that this was more of a formality and that the SKNE managed to regain full control over the nuclear program and repel the JNA attack.⁷⁹⁸

It seems that such a strict decision was implemented with equal passion and that military component was effectively ‘detached’ from the Yugoslav nuclear program. In October 1960, during intense discussions about the Perspective Plan, General Ivan Gošnjak sent his complaints to the SKNE, where he stressed that

tanks, ships and airplanes, up to the station for detection of atmospheric nuclear tests; 13 different types of equipment and devices for passive protection against radiation and decontamination of personnel and equipment, to name a few. The recipe for the dummy atomic bomb was to be based on a combination of “napalm, magnesium and trinitrotoluene [TNT]”.

⁷⁹⁷ Out of 43 different tasks, 32 were given to the IBK, while for the rest the IRB and IJS were tasked to develop independently or in coordination with the IBK.

⁷⁹⁸ AJ, 177, f. 28-116. Zapisnik sa sednice Kolegijuma SKNE [Minutes from the SKNE Collegium Meeting], January 23, 1958.

“people’s defense [...] is not even mentioned anywhere, and that, conclusively, the Plan is not directed to key problems of people’s defense.” He also complained that even those components which were of the interest to the JNA, such as radiological protection and decontamination, were “undeveloped and unclear”, while many of related topics were “completely left out”. This was also the destiny of naval reactors and mobile nuclear electric plants, “two problems of particular interest to the JNA”.⁷⁹⁹ Following the earlier established logic, the Perspective Plan did anticipate possible space for the military application of nuclear energy, particularly regarding dual-purpose technologies, equipment and devices. In fact, the only thing completely ‘detached’ from the nuclear program was the atomic bomb project, or more precisely, the JNA was restricted from having any say in it.

The most elaborate study about the potential atomic bomb project was written in 1961. The authors of the Information on Possibilities for Production of Nuclear Weapons in Small Quantities (Information) are unknown, but it is clear that this document was prepared independently by the SKNE and that it was presented to an equally unknown group of people in the personal office of Aleksandar Ranković, most likely without a single representative of the JNA.⁸⁰⁰ The only identifiable person involved is Ranković himself, so it would be safe to assume that he was the person who ordered the study, controlled its dissemination and who would be in charge of implementation of its conclusions and decisions, although no firm claims can be made.

⁷⁹⁹ AJ, 177, f. 10. Primedbe na “Predlog plana razvoja nuklearne energije” [Remarks on the “Proposal of the Plan for Development of Nuclear Energy], October 18, 1960.

⁸⁰⁰ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961.

The starting point of the analysis was the calculation that the “‘economical’ production of nuclear weapons, and in a quite small capacity [of] 1-2 nominal bombs per year” could be accomplished “with investments of only a few tens of millions of dollars”, instead of “billions” spent by “great powers.” The calculation itself was made on “private information” gathered during the IAEA’s Fourth General Conference in 1960 .It is particularly emphasized that John McCone, the Chairman of the USAEC, was one of the sources and that he referred to India as a country that will gain such a capacity soon. He made similar claims for Sweden, Israel, Italy, Japan and the FRG, while “in private conversations with nuclear experts from various countries” it was specifically emphasized that in Italy, Spain and the FRG, civilian nuclear programs are “at the very least attuned to raise their potentials for nuclear weapons production.”⁸⁰¹

It would be difficult to make any strong claims considering the sources of these ‘private information’, but in the case of John McCone, it is safe to assume that his comments were taken out of context and were actually made in concern about potential nuclear weapons proliferation, not as an encouragement to pursue this option. On the other hand, among countries mentioned as proliferators there were both the FRG and Italy, as countries whose acquisition of nuclear weapons was considered the ultimate security risk for Yugoslavia, even if only indirectly. While it may be argued that raising this kind of fears among the Yugoslavs was an already proven Soviet tactic to draw them back into their orbit, there is no proof that they used it in this case. Either way, “the political side and military aspect of this complex problem were not considered” in the Information, and unsurprisingly, additional plans for

⁸⁰¹ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961.

weapons construction, “launching devices and performing test explosions” would have to be devised, but only if the atomic bomb project is approved.⁸⁰²

On the technical side, the Information was by far more developed than its predecessor from 1957, which indirectly signals a considerable development of the nuclear program, but also that the development of nuclear weapons continuously was a topic of interest. The Information discusses in detail both the enriched uranium and plutonium option as potential explosives, with rather accurate calculations for the critical mass and other details, although it is clear that the “plutonium path” was preferred. The main reason was that “technology of individual phases is much better known, since it is strongly connected with peaceful development [original emphasis]”. Moreover, the fact that it is suggested that the weapon design is “identical for U-235 [enriched uranium] as well as for plutonium” may indicate that the implosion option was the only one seriously considered, even if only theoretically. It is actually admitted that “technical obstacles that will be met in this phase are not enough known”, and that “the construction would probably be primitive in comparison to modern nuclear weapons.”⁸⁰³

Production of uranium was expected to reach 75 to 100 tons per year by 1967, a tad less ambitious than in the previous plan (100 tons), although probably more realistic, as will be shown in the following section. Other important technical components of the Information include the choice of the type of plutonium producing nuclear reactor, uranium fuel production and plutonium extraction from spent fuel.

⁸⁰² AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961.

⁸⁰³ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961. Critical mass for enriched uranium is calculated at 45 kg, or 16-30 kg in an implosion device, and for plutonium at 10 kg, 4-6 kg in an implosion device.

Particularly regarding the type of the nuclear reactor, the Information suggests natural uranium fuel as the only acceptable option, which is consistent with the choice of plutonium as explosive. Among eight different nuclear reactors (four different power ranges, for graphite and for heavy water moderated reactors each), it can be inferred that the natural uranium and graphite moderated 200 MW thermal power reactor was the preferred type, as it was estimated that it is “undoubtedly best suited to peaceful development”, therefore making it easy to camouflage plutonium production as electric power production. This option would also consume a complete planned uranium production of 100 tons per year, and would produce enough plutonium for roughly five atomic bombs per year, which again may be considered optimal, since other options ranged between one and ten weapons per year. The time needed for constructing a reactor of this size, along with all other necessary facilities, was optimistically estimated at 6.5 to 8 years and with costs of \$85.2 million in investments and production cost (\$68.3 and \$16.9, respectively). Presenting this calculation from the perspective of weapons-grade plutonium production, the Information suggests that “production costs per bomb” would be mere \$3.4 million.⁸⁰⁴

The Information is not a scientific document, although it is based on scientific data and related technical knowledge. It is also a collaborative product, evident from its earlier versions kept in the same folder, which gradually included different components, presumably as different experts or sectors sent their contributions. In fact, the Information is evidently a programmatic document, a close relative of a well-

⁸⁰⁴ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961. Heavy water moderated nuclear reactors were analyzed for thermal power output of 40, 120 and two pf 400 MW, and for graphite moderated for 40, 60, 200 and 400 MW, although the most powerful options were immediately scrapped as they would represent “adventure even for developed countries”. Estimates for facilities for plutonium extraction (hot-lab) and uranium fuel production are equally well coordinated to meet designed capacities for each of eight suggested nuclear reactors.

developed general plan in a ‘classical’ socialist system, and as such, it needed further elaboration regarding annual and sectorial plans. More importantly, in order to become operational, it needed a formal approval and it needed it immediately. The conclusion of the Information stresses that, “since delivering a decision about the type of reactor and the power of the [nuclear power] plant is urgent and conditioned with the decision about potential creation of atomic military potential, it would be necessary to make a definite decision as soon as possible.”⁸⁰⁵

Scholars agree that in the early 1960s, Aleksandar Ranković was at the peak of his political power, although his control over the Yugoslav nuclear program is almost completely overlooked. He had a full control over the party, the UDB and entire civilian security sector, and through the infiltrated UDB agents, he also had a control over the Ministry of Foreign Affairs. Even without his formal position of the Vice-Prime Minister, it is easy to see that Ranković was second only to Tito. Pirjevec stresses that, at that time, he also closely collaborated with General Gošnjak, although by the mid-1960s they entered into a direct political conflict.⁸⁰⁶ More will be said about internal political conflicts in Yugoslavia between leading politicians and their impact on the nuclear program, but here it is worth noting that competition between Ranković and General Gošnjak for the control over the nuclear program started already in the second part of the 1950s; Ranković seemed to be winning this fight.

It was at this period when presumably Ranković ordered the Information to be prepared, as only he could present such a document to the only person who could deliver the final and executive decision – Tito. The only alternative was that Tito

⁸⁰⁵ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961.

⁸⁰⁶ Dimitrijević, *Ranković*, 160-161; 168-174; 262-263; Pirjevec, *Tito i drugovi*, 457-467; 476, 484-485. Dimitrijević dedicates three pages in total about Ranković’s role in the nuclear program, out of roughly 450 pages of his biography, and only reiterates some of Bondžić’s conclusions.

personally requested it. There are no records about the discussion during the meeting in Ranković's office, nor about any decisions made there or thereafter. Bondžić reaches the same obstacle in his analysis: "due to lack of direct sources and archive documents", he concludes that "it seems that it was just another list of wishes and plans, for the realization of which there were no cadre, organizational, financial or scientific possibilities, nor real needs, even on the basic informative level".⁸⁰⁷ Making such an overarching conclusion based on the "lack of direct sources" and oversimplified reading of the document that he dismisses as a "list of wishes and plans" to begin with, is a logical fallacy in its own right, and a missed opportunity to contextualize the moment when the document was created or its actual purpose.

It is unknown if Tito ever saw the Information, although it is highly unlikely that he did not, regardless of who requested it to be made. What is certain is that he was more than interested in the topic, at least on the level of basic information. During his speech in the National Assembly on January 26, 1960, Tito presented the new Five-Year Plan, and with evident self-confidence spoke about the need for construction of the nuclear power plant and even ships with nuclear propulsion, emphasizing the Yugoslav economic and technological progress, effectively and perhaps accidentally sharing details from the Information, which is the only systematic document that mentions nuclear propulsion, although this represents only circumstantial evidence.⁸⁰⁸ Dobrica Ćosić, a famous writer and less accomplished politician, remembers in his heavily edited political diary that during an informal conversation in February 1961, Tito commented that it would be possible for a dozen of countries to acquire nuclear weapons in next six years, adding: "Soon we will have

⁸⁰⁷ Bondžić, *Između ambicija i iluzija*, 290-291, 293.

⁸⁰⁸ Pirjevec, *Tito i drugovi*, 444-445.

it too. We are making preparations in that direction. We are not making the bomb. But we are preparing ourselves to be able to make even the atomic bomb.”⁸⁰⁹

This is completely consistent with the ‘shot across the bow’ strategy, which was already identified as the basis of the Yugoslav policy in the nuclear field. It can also be understood as the specific type of “war communism” Tito did not shy away from expressing publicly as one of his speeches captures: “Let us work as if peace is going to last one hundred years, but let us prepare as if the war is going to start tomorrow.”⁸¹⁰ General Gošnjak made a similar comment in his remarks about the Perspective Plan. In the section about nuclear reactors, he makes a passing comment which can be understood as the underlying logic of the Yugoslav nuclear policy: “the global development [of science] is rapid and requires from us to be updated and ready [to make] right decisions when demands are made before us to construct them as well.”⁸¹¹

The date of the secret meeting at Ranković’s office seem to suggest that the main ‘target’ was Tito, as it was organized on May 27, 1961, at 8:30 a.m., a day after Tito’s official birthday (May 25).⁸¹² This may be a pure coincidence, but it may also be a carefully planned event, aiming to deliver probably the best possible present an

⁸⁰⁹ Dobrica Ćosić, *Piščevi zapisi (1951-1968)* [Writer’s Notes (1951-1968)] (Beograd: Filip Višnjić, 2000), pp. 173-174. This conversation allegedly happened on Tito’s official yacht, the so-called “Peace Ship” *Galeb*, during the trip to diplomatic mission to Ghana. Ćosić was a member of the Yugoslav delegation, and even though it is difficult to estimate the credibility of his ‘notes’ due to his dissident and subsequent political career in the 1990s, this ‘note’ seems minimally as an accurate description of Tito’s thoughts on the topic at the time, particularly when cross-referenced with other sources.

⁸¹⁰ Rahmija Kadenić et al., eds., *Za pobjedu i slobodu: Završne operacije za oslobođenje Jugoslavije* [For Victor and Freedom: The Final Operations for the Liberation of Yugoslavia] (Belgrade: Centar oružanih snaga za stratejska istraživanja i studije “Maršal Tito”, 1986), 27. Quoted in Miljković, *Nuclear Utopia*, 305

⁸¹¹ AJ, 177, f. 10. Primedbe na “Predlog plana razvoja nuklearne energije” [Remarks on the “Proposal of the Plan for Development of Nuclear Energy”, October 18, 1960.

⁸¹² Pirjevec, *Tito i drugovi*, 408; “Relay of Youth, 1957”, Muzej Jugoslavije, <https://www.muzej-jugoslavije.org/en/art/stafeta-mladosti-1957/> (accessed on March 25, 2021). Tito’s birthday was celebrated as a national holiday since 1945, and since 1957, it was renamed to Day of Youth. Celebration included Relay of Youth, a symbolic race across the country starting from Kumrovec, Tito’s hometown, and ending in a final mass ceremony traditionally organized on the JNA Stadium in Belgrade where he received a baton.

authoritarian communist leader could desire; a general plan for the construction of the atomic bomb, waiting only for his approval. Regarding Tito's own thoughts and feelings it would be difficult to make any firm claims, but considering the development of the Yugoslav nuclear program, he was informed that by 1961, it had reached the stage where it was necessary to make serious decisions and commitment. Moreover, stressing almost trivial "production costs per bomb", the authors of the Information obviously wanted to motion Tito to unwrap his present and make the 'right' decision.

"That's it, I'm gettin' outta here!"

The Yugoslav nuclear establishment preferred uranium ore, nuclear reactors, laboratories and other machines and devices to some unreadable charts and equations, and since the very beginning of the nuclear program they openly pressured Pavle Savić and other scientists to materialize their knowledge and expertise in such a way and justify all the funding invested. Consequently, this rift between applied and fundamental scientific research had a significant impact on the development and content of the country's nuclear program and the behavior of scientists, who were stretched to cover both ends.

The establishment of the SKNE in 1955 only increased the pressure for practical results, partially due to the gradually expanding role of JNA representatives in the nuclear program through their membership in the SKNE, and their continuously expanding wish-list of materials, equipment, devices and procedures that scientific institutes were tasked to develop. Bilateral agreements for cooperation, first with the Soviet Union, and soon after with the United States, formally promised a significant

acceleration in that direction, but they also further increased the pressure for results. In fact, even the training programs for Yugoslav scientists had to be focused even more on gaining practical knowledge in nuclear reactor operation and construction, as well in other related technologies. While it is true that these agreements actually had a delaying effect on the Yugoslav nuclear program, it is equally true that it took some time, measured in years, before this problem became apparent. In the meantime, these circumstances underscored the already strong preference for applied science, the success of which was measured in nuclear reactors, tons of uranium and heavy water, and megawatts of thermal or electric power, leaving very narrow space and even fewer options for Yugoslav scientists to perform actual research in their own country, as a precondition for eventual practical application.

Nowhere is this more visible than in the SKNE communication with CERN. Yugoslavia was one of the founding members of CERN, although without very serious expectations regarding this cooperation, except immediate political and propaganda gains, important both for the West and Yugoslavia. Already in 1956, it became clear to the SKNE management that, considering the research conducted there is focused on “problems of high-energy particles [...] for which our country has no perspective to get involved in”, mostly due to the high level of necessary investments. Consequently, it was decided that Yugoslav scientists would be sent to CERN only for particular tasks, and only if such tasks exist in annual plans of nuclear institutes. On the other hand, it was also concluded that, during periods of “intense political relations”, CERN would be a perfect alternative to sending scientists to the United States, or to the Soviet Union. Considering the overall lack of interest for research in theoretical physics performed in CERN, this alternative was considered exclusively in the political context. Related problem was the amount of annual contribution, which

for 1957 was expected to rise to roughly \$300,000. The simple calculation, based on previous experience, showed that up to one hundred scientists could be sent for one-year specializations in Western institutes with that amount.⁸¹³

The financial contribution was too much for Yugoslavia to bear, but the lack of interest was equally strong. Therefore, it is not surprising that already by the end of 1956, the SKNE was searching for an exit strategy. The main obstacle was that the CERN Convention stipulated that a member state could leave the organization only after a period of seven years from the date when the Convention entered into force, September 29, 1954. The only alternative was to be expelled from membership due to the unpaid contribution, but the estimate of the Yugoslav Ministry of Foreign Affairs was that this “would not be opportune”, and that the best course of action was to try to negotiate a lower contribution.⁸¹⁴ Joining forces with Greek representatives in CERN, the SKNE unsuccessfully tried to lower annual contributions in following years, although their dissatisfaction with the research program was continuously raised.⁸¹⁵

Simple mathematics show that the earliest date Yugoslavia could leave the CERN, without any financial or political penalties, was September 29, 1961, and the SKNE did not want to waste a single day to initiate the procedure. The SKNE sent such a request to the Ministry of Foreign Affairs, on September 12, 1961, right on time “to deliver [it] to the General Manager on 29th or 30th September 1961 [original emphasis]. The explanation emphasized high contributions as the main reason,

⁸¹³ AJ, 177, f. 22-89. Mišljenje Sektora za naučna istraživanja SKNE o stavu učlanjenja Jugoslavije u CERN [Opinion of the SKNE Sector for Scientific Research on the Yugoslav Membership in the CERN], November 20, 1956.

⁸¹⁴ AJ, 177, f. 22-89. Kontribucije CERN-u [CERN Contributions], December 5, 1956.

⁸¹⁵ Bondžić, *Između ambicija i iluzija*, 194; AJ, 177, f. 8-22. CERN – Evropska organizacija za nuklearna istraživanja [CERN – European Organization for Nuclear Research], December 1957. The CERN General Assembly tried to lure the SKNE by promising lucrative jobs for Yugoslav companies that would be invited to produce certain components for machines under construction in Geneva, although it soon became obvious that Yugoslav industry simply could not guarantee the expected high quality of components.

although only in context of the “rapid economic development” of Yugoslavia, which “dictates ever increasing investments in those branches of science which are directly related to development of economic activities”, or more precisely, in those “which promise direct practical application”.⁸¹⁶ An additional argument for withdrawal from CERN was found in the establishment of the IAEA, “as an organization more universal than CERN, both considering the variety of its activities, and the number of members”, and to which Yugoslavia “reoriented itself”.⁸¹⁷ It is evident that, besides next to completely universal membership, the cooperation with the IAEA promised and delivered a tangible practical support, as Yugoslavia attested during the Dosimetry Experiment in Vinča in 1960, the IAEA’s first project outside of Vienna. Eventually, CERN was notified about this decision precisely on September 29, 1961, based on which the Yugoslav membership formally ended on December 31, 1961.⁸¹⁸

The political context of such a decision was also important. The Director-General of CERN, the famous physicist Victor Weisskopf, visited Yugoslavia in December 1961, offering the illusive lowered contribution, orders for components from Yugoslav industry, while he also emphasized that “the international posture of Yugoslavia represents a great hope for the future of today’s world”, but to no avail.⁸¹⁹ Analyzing this decision from the Yugoslav perspective, it is particularly interesting to considering the overlap with the Non-Aligned Conference, held in Belgrade (September 1-8, 1961). This can be read as a strong political statement of Yugoslav independence, although chances are it was coincidental, as the end of September simply was the earliest date Yugoslavia could withdraw its membership in CERN, and

⁸¹⁶ AJ, 177, f. 2. Istupanje FNRJ iz CERN-a [Withdrawal of the FPRY from CERN], September 12, 1961.

⁸¹⁷ AJ, 177, f. 8-22. Međunarodna saradnja [International Cooperation], June 2, 1959.

⁸¹⁸ AJ, 177, f. 11. Izveštaj o radu Savezne komisije za nuklearnu energiju u 1961. god. [The Report on the SKNE Activities in 1961], n.d., 1962.

⁸¹⁹ AJ, 177, f. 2. Izveštaj Državnog sekretarijata za inostrane poslove o poseti Viktora Vajskofa [Report of the State Secretariat for Foreign Affairs about the Victor Weisskopf visit], December 2, 1961.

missing this deadline would extend the process and annual contribution for a year. On the other hand, Yugoslavia never wanted to join the JINR in Dubna, which was the Soviet version and answer to the establishment of CERN, quoting exclusively political reasons. Therefore, the decision to withdraw from CERN can be read as another example of yielding to the Soviet pressure, or of Tito's own posture as leader of the non-aligned world. The logic Tito used will probably never be known, but both arguments are consistent with his position at the time.

Focusing on the impact this decision had on the Yugoslav nuclear program, Hymans suggests that it "was [...] indicative of the regime's declining interest in nuclear physics". He explains it the wider context of the alleged Yugoslav decision to abandon the atomic bomb project, which is missing the target completely, although it does hold some truth in it.⁸²⁰ The only interest Yugoslavia lost was in the research in theoretical physics, but the impact of this on the nuclear program was insignificant, as there never was any real interest to expand research in that field. In every other aspect the Yugoslav nuclear program was evidently blossoming, notwithstanding any mistakes or harbored illusions about the country's actual capabilities. The Yugoslav exit from CERN was a combination of lack of interest in its research program and high contributions that could have been redirected to some more practical projects, while the political aspect of this decision proved to be useful, but most likely last on the list of motives.

However, this does not mean that the price for the SKNE's almost exclusive focus on the applied science was not very dear. This cost is best visible in the destiny of yet another Yugoslav super-star scientist, Bogdan Maglič, a Dragoslav Popović's counterpart in the field of particle physics. Maglič worked at the IBK in Vinča until

⁸²⁰ Hymans, *Achieving Nuclear Ambitions*, 194.

1955, after which he was sent to specialization in the United States through the UNESCO scholarship. In 1959, he became the first Yugoslav to receive a PhD degree at the Massachusetts Institute for Technology (MIT) in “experimental nuclear physics”, after which he continued with his post-doctoral research at the University of California - Berkeley Lab, in the team of famous scientist Luis W. Alvarez. Working on one of the projects that “everybody gave up on”, in 1961 he discovered the Omega meson particle that was thought to be last of the theoretically possible particles, hence the name. This was a huge discovery at the time, and among other things, Maglić urged the SKNE to provide him the necessary support and nominate him for the Nobel Prize in physics for 1962, which Aleksandar Ranković personally promised to do, after his discovery is “evaluated for its wider scientific significance.”⁸²¹

Ranković did keep his word and the SKNE officially nominated Maglić for the Nobel Prize in physics in 1962.⁸²² The entire idea may have been a bit too ambitious, although it is a fact that Luis W. Alvarez was eventually awarded a Nobel Prize in physics in 1968 for the discovery of the Omega meson particle, and in his Nobel Lecture he gave due credit to Maglić:

Although Bogdan Maglić originated the plan for this search, and pushed through the measurements by himself, he graciously insisted that the paper announcing his discovery

⁸²¹ AJ, 177, f. 11. Bogdan Maglić’s letter to the UNESCO office in Yugoslavia, August 27, 1960; AJ, 177, f. 438. Bogdan Maglić’s letter to the SKNE Secretary Slobodan Nakićenović, September 22, 1961; AJ, 177, f. 438. Aleksandar Ranković’s letter to Bogdan Maglić, October 12, 1960.

⁸²² “Bogdan Maglich [Maglić]”, *Nomination Archive*. *Nobelprize.org*. <https://www.nobelprize.org/nomination/archive/show.php?id=17541> (accessed on April 2, 2021).

should be co-authored by three of us who had developed the chamber, the beam, and the analysis program that made it possible.⁸²³

Having a Nobel Prize winner in its ranks would have been a great achievement and propaganda success for the SKNE and Yugoslavia. But even if Maglić's nomination had been successful, the fact remains that this bright scientist would not have made such a discovery in Yugoslav institutes. Lack of funding, advanced equipment and personnel immediately come to mind as acute problems, but the underlying reason was that the Yugoslav nuclear program had been continuously directed almost exclusively towards development and construction of nuclear reactors and other machines and equipment which had a "direct practical application". Maglić never returned to Yugoslavia, which nominally confirms Hymans's 'brain-drain' thesis, although the SKNE management never actually wanted him back, simply because they did not know what to do with his expertise, and it is easy to imagine that he was not the only Yugoslav theoretical physicist with such a problem.

The "Vinča Accident" of 1958 made a lasting impact on the Yugoslav nuclear program for a variety of reasons, some of which have already been analyzed. Instead of conducting a thorough investigation into the reasons for the accident, the SKNE management decided to camouflage all omissions and mistakes, and failed to notice that the pressure for results only created an environment in which mistakes were unavoidable, similar to the Soviet experience during the period when Beria was the leading figure of the atomic bomb project.⁸²⁴ According to Hymans, Ranković only

⁸²³ Luis W. Alvarez, *Recent Developments in Particle Physics* (Nobel Lecture), December 11, 1968, 283. *Nobelprize.org*. <https://www.nobelprize.org/uploads/2018/06/alvarez-lecture.pdf> (accessed on April 2, 2021).

⁸²⁴ Miljković, "Nuclear Yutopia", 274-305.

increased the pressure for results and “caused further organizational disarray by replacing the directors of all three main nuclear institutes.”⁸²⁵

Ranković’s preferred approach to solving managerial problems seems to have been to enforce strict military-type discipline. Back in 1949, Slobodan Nakićenović, an electrical engineer and proven UDB cadre, replaced Pavle Savić on the position of the director of the IBK after his apparent slow progress in development of the institute. When it became obvious that director needed at least basic knowledge in nuclear physics, in 1952 Stevan Dedijer was introduced, a reliable and resourceful party cadre with a strong background in intelligence work. After his political heresy, more discipline was obviously needed and his replacement in 1954 was, once again, a trusted UDB cadre, Vojko Pavičić. Eventually, the “Vinča Accident” of 1958 obviously revealed much bigger problems than Ranković was willing to admit in official reports, and while Vojko Pavičić had to be replaced, it is easy to imagine that his successor would not be a renowned scientist.

Vojislav Babić, the new director of the IBK, previously was the director of the Cable Factory [*Fabrika kablova*] in Svetozarevo (today Jagodina) in Serbia, one of the largest industrial companies in Yugoslavia.⁸²⁶ It is impossible to establish his direct relation to Ranković; however, chances are that they were very close, not only because he came from Serbia as Ranković’s stronghold, but also because the standard practice in Yugoslavia was to position proven party ‘cadres’ as directors of industrial companies.⁸²⁷

⁸²⁵ Hymans, *Achieving Nuclear Ambitions*, 194.

⁸²⁶ *Ko je ko u Jugoslaviji: biografski podaci o jugoslovenskim savremenikima* [Who is Who in Yugoslavia: Biographic Information on Yugoslav Contemporaries] (Beograd: Sedma sila, 1957), s.v. Babić, inž. Vojislav, 33

⁸²⁷ AJ, 177, f. 28. Zapisnik sa sednice kolegijuma u Saveznoj komisiji za nuklearnu energiju [Minutes from the meeting of the SKNE Collegium], January 5, 1959. Babić was a personal friend of Svetozar

During his first report before the SKNE Collegium, he proved to be a stereotypical socialist manager with a task to put all activities of the IBK under strict control. The first thing he noticed is that the entire organization of research in the IBK was “understood too liberally” and that “somebody has to be responsible for something, whether it is a scientific or non-scientific worker.” He also insisted that all correspondence between the IBK and the SKNE must be signed by him personally. Work of all union and party commissions was also forbidden, because Babić estimated that they “waste time”, but he was particularly annoyed with scientists and engineers:

“I have the feeling that these are clever people, enlightened, but they are not the ones to measure the Commission’s intelligence. The Commission is the authority and they have to behave with the Commission as with the authority. They, for example, say that ‘those in the Commission do not know anything’. This is a grotesque relationship. [...] He [the scientist] has to execute orders. [...] I think they [the engineers] were pampered from the beginning and brought up poorly. I had 58 engineers and never had any difficulties with them. We cannot allow that these people behave like that, as if this is only their interest. After all, these people were educated by the state, and they have to repay it. [...] Commission is the body above me, and I have nothing to discuss, because this is how it has to be.”⁸²⁸

Babić was evidently keen on enforcing the military-type discipline with a clear system of subordination, combined with a centralized management and security standards of a secret military facility. While this may be used as yet another indirect

Vukmanović-Tempo, one of the top-rankih politicians and influential figure in the nuclear program in the early 1950s.

⁸²⁸ AJ, 177, f. 28. Zapisnik sa sednice kolegijuma u Saveznoj komisiji za nuklearnu energiju [Minutes from the meeting of the SKNE Collegium], January 5, 1959.

proof that the Yugoslav decision makers did have the atomic bomb as the ultimate goal of the country's nuclear program, it is absolutely clear that the work environment Babić was brought to create was not the most stimulating, if not outright toxic, for any kind of work.

The situation at the IJS in Ljubljana was not much different. Already in 1952, when the IJS was still being established, Anton Peterlin moved to the position of the President of the Scientific Council, while the new director became Karol Kajfež, who previously worked as the Assistant Director-General for the electric industry in the Republic of Slovenia, which was part of the reorganization in the management of the IJS.⁸²⁹ Reorganization at the time when the IJS barely started to operate may not be that unusual, but the fact that Peterlin moved to the exactly same position as Pavle Savić did earlier in the IBK (1949), points to a strategy for the development of the nuclear program and perhaps a takeover of the IJS by the federal authorities (UKRNI/KPNI at the time), not a simple internal reorganization. However, by the end of 1958, in a scenario similar to what was happening in the IBK, Lucijan Šinkovec, an engineer and “a non-scientist” was appointed director of the IJS, although some sources suggest that Peterlin's replacement had been prepared months earlier, due to some political reasons although the entire affair is unclear. Whatever the true story, by the beginning of 1959 Peterlin left Yugoslavia for several research fellowships in Germany and the United States, never to return.⁸³⁰

⁸²⁹ “In memoriam, Karol Kajfež, 1917-2007”, *Novice IJS*, No. 133 (September 2007), 7-8

⁸³⁰ *Ibid.*; Hymans, *Achieving Nuclear Ambitions*, 170, 191; Knapp, “Jugobomba-što je istina? Prilog raspravi”, 135; Mitja Rosina, “Nekaj zanimivih epizod iz zgodovine Oddelka za fiziko [Several Interesting Episodes from the History of the Department of Physics], Lecture at the meeting of former physics graduates of the Faculty of Mathematics and Physics, University of Ljubljana, May 19, 2007, <http://diplomanti-fiz.fmf.uni-lj.si/prds/PREDAV03.pdf> (accessed on April 3, 2021); AJ, 177, f. 23. Minutes from the meeting of the Chair of the SKNE, November 21, 1958; Peterlin was accused by several of his colleagues from the IJS, who themselves threatened to leave due to poor relations with Peterlin. While these complaints could be understood as a characteristic show-trial designed for Peterlin, it is surprising that for other two directors of nuclear institutes similar accusations never were

On December 30, 1958, Ivan Supek was also officially replaced in the position of the Director of the IRB by Tomo Bosanac, professor at the Faculty of Electrical Engineering, University of Zagreb. As an engineer, Bosanac had worked in the IRB since 1953 on the design of magnets and electric supply for the cyclotron, and unlike Supek, who continuously insisted on fundamental research, he was personally very interested in developing the nuclear energy program, particularly in the construction of nuclear reactors. Supek ‘survived’ the ordeal and stayed at the IRB as the President of the Scientific Committee, and also kept his position of the President of the SKNE’s Expert Council, however, without much actual power to steer research in the institute he helped to establish, except in an advisory role.⁸³¹

Since the very beginning of the nuclear program, Savić fought tooth and nail not to allow politicians to completely take over the control over his brainchild. During the early 1950s, he wanted to avoid the construction of the nuclear reactor before creating a solid scientific base. When RB and RA nuclear reactors were constructed at the IBK in 1958 and 1959, respectively, he insisted that they should be used “to train cadres, so we could be equal to the rest of the world, but in fundamental nuclear science”.⁸³² In that respect, Savić and Supek understood well each other, although in minutes from the SKNE meetings and their own recollections, some sort of a competition or tension between the two scientists did exist.⁸³³

produced, and they were removed from their posts roughly at the same time and without any noise. Furthermore, some of the complaints against Peterlin were founded on simple facts, like his abandonment of the Yugoslav delegation on the Second Conference on *Peaceful Uses of Atomic Energy, held in Geneva* in September 1958, in order to finish some of his private businesses in Vienna, or his purchasing of some expensive equipment for the IJS without any authorization by the SKNE. Limited as they may be, existing evidence suggest that the “Vinča Accident” was not the cause for his replacement, but a mere ‘accidental’ chronologic overlap. In that case, Peterlin’s exit from the nuclear program and Yugoslavia was probably the only move he could make, not a statement of any kind, as Hymans prefers.

⁸³¹ Rudež, Pisk, *Institut Ruđer Bošković*, 56-59.

⁸³² Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 20.

⁸³³ Rudež, *Institut Ruđer Bošković*, 56.

In his memoirs, Savić explains that he was gradually being isolated from the “Vinča Project” since he was against its use in applied research, but that the final drop in the already overfilled cup of his dissatisfaction were discussions about the Perspective Plan, during 1959 and 1960. His suggestion was that the IBK should be “a school for cadres for research in nuclear science”, but “the rest wanted immediate application, perhaps [even] the atomic bomb in the future”, and his proposal was outvoted.⁸³⁴ One of his contemporaries noted somewhat euphemistically, that “as a personification of the Yugoslav nuclear project, he reacted impatiently, which led him to misunderstandings” with the political leadership.⁸³⁵ On March 3, 1960, Pavle Savić officially resigned his functions at the IBK and SKNE, officially due to his “current health condition”, keeping only his professorship at the University of Belgrade.⁸³⁶ In one of his final comments about his reasons for walking out of the Yugoslav nuclear program, Savić also paints a powerful image of the tense relationship between the political establishment and scientists in Yugoslavia, which also confirms an almost absolute preference for applied research among the country’s decision-makers:

“I told them that I am sick and tired from apologizing for my scientific research before the working class f [...] Nobody [actually] had the courage to ask me [for an apology], but I always had to invent, I – ‘progressive intelligentsia’, ‘peaceloving’, ‘patriotic’, and someone says ‘He – tinsmith’, and it passes [as truth].”⁸³⁷

⁸³⁴ Savić, *Kazivanja Pavla Savića o periodu 1944-1960*, 23-24.

⁸³⁵ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 30.

⁸³⁶ AJ, 177, f. 10. Pavle Savić’s letter of resignation to the Director of the IBK, Vojislav Babić, March 3, 1960; Milenko Šušić, Slobodan Ribnikar (eds.), *Kazivanja Pavla Savića o periodu 1944-1960* (Beograd: Institut za nuklearne nauke „Vinča“, 1993), 23-24. In his memories, Savić claims that his resignation was not accepted immediately, and that

⁸³⁷ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 24. Savić explains that he held 17 different functions (presumably in the IBK, Party and University of Belgrade), and that after the political leadership, namely Kardelj, were not successful in convincing him to withdraw his resignation, Ranković allegedly ordered him to write individual resignation for each of his functions, which adds a

Sources reveal how much the scientists were enraged or at least disappointed when, to use Supek's words, "overnight, some directors and engineers who barely understood the [nature of the] work", came and took managing positions at the IRB.⁸³⁸ Ranković obviously wanted to force scientists to focus on rapid materialization of their knowledge and built him nuclear reactors and eventually the atomic bomb. In that respect, his equally obvious preference to put electrical engineers in the managing positions of nuclear institutes under his supervision may actually be considered as completely rational. Ranković treated nuclear institutes as industrial facilities which had their production plan and program, and in that respect he installed directors who had at least some experience in working and managing big industrial companies. Considering that the Perspective Plan stipulated construction of electric power producing nuclear reactors, the choice of electric engineers as managers was the logic he evidently used.

Hidden or not, the ultimate plan was to prepare all the ingredients for production of atomic bombs, and there can be no doubt that the IBK in Vinča was gradually designed to perform this duty. Supek indirectly confirms this in his comment that "Vinča was organized on principles of high confidentiality", not unlike other two institutes, and that this was the reason why confidential projects went to the IBK. In order to have all operations in such an important institution under his direct control, he needed an engineer and a loyal 'cadre', not stubborn Pavle Savić.

drop of color into the image of the powerplay between the politicians and scientists. Savić eventually resigned on 16 functions, keeping the one at the University of Belgrade.

⁸³⁸ Rudež, Pisk, *Institut Ruđer Bošković*, 56.

4.2 The Yellow Cake for President Tito

“I would be surprised if Yugoslavia did not find enough uranium that would be in balance with the invested funds. But this is only my opinion.”⁸³⁹

Tito’s ‘shot across the bow’ would make its full effect and more sense only if Yugoslavia was relatively close to production of uranium in the country. At the time when production of the uranium-oxide on a semi-industrial level had only started to be tested and with very limited reserves of uranium confirmed in the country, Yugoslavia did not shy away from boasting with the level of expertise reached in this field during the First International Conference on the Peaceful uses of Atomic Energy (Geneva, 1955).⁸⁴⁰ On the other hand, by 1955 the research in the field of uranium prospection and mining, as well as in development of technologies for extraction of uranium from ore, production of uranium-oxide and uranium metal, became advanced enough for one institution to handle. In March 1955, the ZGRTI, along with its tasks and responsibilities, was split between two newly established institutions: the Federal Geological Institute [*Savezni geološki zavod* – SGZ] and Institute for Technology of Mineral Raw Materials [*Institut za tehnologiju mineralnih sirovina* - ITMS], both in Belgrade. According to the official explanation, achieved results and the necessity for better coordination of their future research and related projects in this field, combined

⁸³⁹ AJ, 177, f. 438. Stenografske beleške sa razgovora vođenih između predstavnika SKNE i delegacije Atomske komisije SAD [Stenographic Notes of the Conversation between Representatives of the SKNE and Delegation of the U.S. AEC], May 16, 1960. The comment was made by Robert D. Nininger, Assistant Director of the USAEC Division of Raw Materials during the meeting with SKNE representatives in Belgrade.

⁸⁴⁰ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 17.

with similar expansion of activities in nuclear institutes, was one of the main reasons for the establishment of the SKNE, soon after.⁸⁴¹

By the end of the 1950s, it seemed that Yugoslavia was only a step away from acquiring highly desirable, but equally elusive uranium, and in significant quantities. In 1955, the ITMS managed to develop the technology for extraction of uranium-oxide (yellowcake) from the coal ash on a laboratory scale, and by 1957 from various other uranium ores available in the country.⁸⁴² In the following year, they were able to start processing of uranium ore on a semi-industrial scale and the production of the yellowcake at the aluminum factory in Kidričevo (Slovenia) and in Kalna (Serbia). Finally, in 1958 they also developed technology to produce uranium metal on a laboratory level.⁸⁴³

The future seemed ‘yellow’ bright, but the actual situation reveals a myriad of different shades and shadows. This chapter will show that the combined effect of the bilateral cooperation with the Soviet Union and the United States considerably undermined all the investments and efforts made into prospection and production of uranium in Yugoslavia. Combined with the interrepublican competition, the successes made in development of different of necessary technologies was left almost completely unexploited, which translated in only symbolic quantities of produced uranium in any form.

⁸⁴¹ AJ, 177, f. 22-89. Izveštaj o radu Savezne komisije za nuklearnu energiju u 1955. godini [The SKNE Report on Activities in 1955], February 6, 1956

⁸⁴² AJ, 177, f. 22-88. Obrazloženje predloga dnevnog reda. Radovi na uranu, May 12, 1955; AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957. See also Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 17.

⁸⁴³ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959; Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 16-18.

Kalna uranium mines & Co(mrades)

Training a necessary number of prospectors and providing them with adequate equipment and access to related infrastructure was obviously a complex problem the Yugoslav authorities had to solve. However, by the mid-1950s the situation in Yugoslavia was dramatically improved as the first generation of properly trained prospectors and geologists “gained the necessary experience” and started to fill these gaps.⁸⁴⁴ The ‘Atoms for Peace’ program, and especially the First International Conference on the Peaceful uses of Atomic Energy in 1955, effectively initiated “systematic work on raising the cadres, acquiring of the necessary equipment and more systematic exploration of nuclear ore materials” in Yugoslavia. The main reason was that it became possible to officially and legally purchase the necessary equipment abroad, to train scientists and technicians in foreign institutions and to use foreign scientific publications that suddenly became available.⁸⁴⁵

Exploiting the fact that the Soviets were quick to join these initiatives and as a part of the agreement between two countries, in 1956 Yugoslavia received as a gift from the Soviet Union instruments for aerial uranium prospection, which considerably accelerated and modernized the process. By 1958, uranium prospection became a routine activity and the SKNE even considered acquiring additional two helicopters from the United States, while the JNA also contributed by borrowing one helicopter for the purpose. Furthermore, by the end of the 1950s, Yugoslav scientists developed several additional methods for uranium prospection, such as “geochemical,

⁸⁴⁴ AJ, 177, f. 1. Top secret documents. Prethodna informacija o rudniku urana Kalna [Previous Information about the Kalna Uranium Mine], November 10, 1965. The “necessary” experience can be actually translated into “basic”, since it was also mentioned that the problem of “partially trained cadres” still existed at the time.

⁸⁴⁵ AJ, 177, f. 3, a.j. 3. Direkcija za nuklearne sirovine [The Directorate for Nuclear Raw Materials]. Nuklearne sirovine, 1959.

hydrochemical, emanational, and other geophysical methods,” which supplemented standard field and aerial uranium prospection.⁸⁴⁶

The system established in previous years, including all efforts made toward establishing the production of uranium, seemed to have been effective enough to start producing some tangible results. But the situation on the shop-floor was less impressive. Even after 1955 and changes that happened on a global level after the ‘Atoms for Peace’ program was initiated, the old-fashioned *konspiracija* continued to plague the work in this field in Yugoslavia. This seriously limited the number of experts involved in the project, but also “excluded wider discussion on certain problems in research methods and organization of this service” between those who were involved.⁸⁴⁷ The futility of such a strict control was later described as “*konspiracija* for the sake of *konspiracija*,” the *l’art pour l’art* in its ultimate stage.⁸⁴⁸ In 1959, it was once again repeated that “the rigidity regarding *konspiracija* still obstructs the work with nuclear raw materials and that *konspiracija*, which lessens the work efficiency, should be liquidated, especially since it is impossible to keep some things in secrecy, for example, locations.” It was also concluded that the results of the research on nuclear raw materials in the country “should be printed in our [Yugoslav] publications and press.”⁸⁴⁹

⁸⁴⁶ AJ, 177, f. 23-92. Problemi u istraživanju nuklearnih ruda u Federativnoj Narodnoj Republici Jugoslaviji [Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia], January 20, 1959. Bondžić, *Između ambicija i iluzija*, 171.

⁸⁴⁷ AJ, 177, f. 23-92. Problemi u istraživanju nuklearnih ruda u Federativnoj Narodnoj Republici Jugoslaviji [Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia], January 20, 1959.

⁸⁴⁸ AJ, 177, f. 23-90. Zapisnik sa sednice Predsedništva Savezne komisije za nuklearnu energiju, održane 12. aprila 1957. Godine [Minutes from the session of the Presidency of the Federal Commission for Nuclear Energy, held on April 12, 1957]

⁸⁴⁹ AJ, 177, f. 23-92. Zapisnik sa sednice Predsedništva Savezne komisije za nuklearnu energiju, održane 20. januara 1959. Godine [Minutes from the session of the Presidency of the Federal Commission for Nuclear Energy, held on January 20, 1959].

None of this effort was in vain. By 1960, various methods of uranium prospection were performed on roughly 33,000 km², or almost 13% of the entire territory of Yugoslavia, and by 1970/71, mostly using aerial prospection, full 54,000 km² were covered or 21% of the country, out of which around 70% of entire territory of Serbia was explored through digging, drilling and mining works.⁸⁵⁰ Documents record dozens of locations that were explored systematically and where the first sampling, deep drilling and mining activities had started.⁸⁵¹ Bondžić also carefully collects and presents every location that was explored, initial findings, problems in the process and eventual results, although does not expand his view further.⁸⁵² However, even a superficial analysis of locations covered by uranium prospector teams between 1948 and 1960 reveals that the vast majority were in Serbia and Macedonia, and this focused effort eventually led to the opening of the first Yugoslav uranium mine in Kalna (Serbia) in the late 1950s.⁸⁵³

“Radioactive anomalies” near the village of Kalna (South-East Serbia) were detected already in 1949, after which a number of prospection missions, geological and mining surveys and technological experiments were performed in the following years on that location.⁸⁵⁴ The initial reason for choosing this location was indeed rational. The 1947 Soviet uranium prospecting mission did find some traces of radioactivity in the wider area surrounding Kalna, but they did not disclose any related

⁸⁵⁰ Nakićenović, *Nuklearna energija u Jugoslaviji*, 70; Bondžić, *Između ambicija i iluzija*, 171. Radule Tošović, Rade Jelenković, “Uranium mineral resources of Serbia and their potential economic importance”, *Acta Monastica Slovaca*, Vol. 21 (2016), no. 1: 9. The territory of Yugoslavia covered 255,804 km². „Jugoslavija“, <http://www.leksikon-yu-mitologije.net/jugoslavija/>, (accessed on July 14, 2019).

⁸⁵¹ These information are scattered across the entire collection of the SKNE, with dozens of various reports, information, plans and statistics, that add up to hundreds of pages. For the purpose of this analysis, I will focus only on the most detailed of them.

⁸⁵² Bondžić, *Između ambicija i iluzija*, 84-96, 164-187.

⁸⁵³ AJ, 177, f. 25-95. Predlog plana razvoja nuklearne energije u Jugoslaviji, za period 1960-1964 [Draft Plan for Development of Nuclear Energy in Yugoslavia, for the Period 1960-1964], January 1960.

⁸⁵⁴ Nakićenović, *Nuklearna energija u Jugoslaviji*, 71-72; Bondžić, *Između ambicija i iluzija*, 88-89, 173.

information.⁸⁵⁵ After the Yugoslav authorities realized that the uranium ores had already started to be mined in neighboring Bulgaria and exported to the Soviet Union, it made perfect sense to immediately analyze territories closest to the Bulgarian border which are a part of the same geomorphologic formation, the mountain range Balkan.

Systematic exploration of this region officially started in 1951, when the *Preduzeće za istraživačke radove br. 3* [The Enterprise for Exploratory Works No. 3; Kalna in further reference] was established by the Yugoslav Federal Government, approved and signed by Tito himself. This was actually one out of five similar enterprises, all of which had the task to focus on what was vaguely defined as “exploratory works”. The other interesting thing is that other four ‘enterprises’ were established in Serbia and one in Macedonia, possibly following the same initial hint from the Soviet success in Bulgaria, and perhaps also the same logic for disguising the actual task they were supposed to perform.⁸⁵⁶

Right from the start, the emphasis was put on Kalna, which only a couple of months later absorbed the Enterprise No. 2 and its investment fund. Even without that, a simple calculation suggests that Kalna seemed the most promising potential source of uranium at the time.⁸⁵⁷ Taking into consideration that it took some time to train necessary experts capable to develop techniques and methods for the analysis of uranium ores, it should not be surprising that laboratory analyses of the ore from Kalna began only in 1954, and the samples showed a rather poor content of uranium

⁸⁵⁵ AJ, 507, IX, 1119/V-32. Izveštaj o radu sovjetske ekipe geologa u vremenu od 21.VII-4.X 1947.

⁸⁵⁶ AJ, 50, f. 76. Privreda. Rudarstvo. Rešenje o osnivanju preduzeća za istraživačke radove [Decision for establishment of enterprises for exploratory works], April 27, 1951. The same document actually established five enterprises with a similar name (Enterprise for Exploratory Works No. 1, 2, 3, 4, and 5). The locations in Serbia were Prokuplje, Donji Milanovac, Janja (Kalna), and Suvo Rudište (Kopaonik Mountain), and in Macedonia it was Strumica. See also, Nakićenović, *Nuklearna energija u Jugoslaviji*, 68-72; Bondžić, *Između ambicija i iluzija*, 91.

⁸⁵⁷ AJ, 50, f. 76. Decision of the Presidency of the FPRY, October 15, 1951. Out of 101.5 million dinars invested in all five enterprises, full 50 million (56.3 million after the merger with the Enterprise No. 2) were invested in Kalna, or 56%.

in ore of roughly 300-350 grams per ton (g/t), but obviously promising considering that no other source of similar quality had been discovered.⁸⁵⁸ However, all works at that location were suddenly halted in 1954.⁸⁵⁹

One man's ash is another man's uranium

Following the detection of low levels of radiation in various coal mines in the country, roughly at the same time, it was realized that the ash of the burnt coal (fly ash) in various factories and power plants contained a relatively rich content of uranium, that stretched between 350 to 1,350 g/t in some samples. That amount of uranium was significant. In one of the SKNE reports it was commented that “it is a shame” to lose uranium through regular burning of coal in country's industrial enterprises and standard ways of ash disposal.⁸⁶⁰ It seems that this was enough for the authorities to temporarily stop other uranium prospection activities and turn their attention to the radioactive coal, repeating the same logic of storming different locations upon the discovery of radioactivity.

The ITMS “performed a substantial and detailed research” on the development of technology for extraction of uranium from coal ash.⁸⁶¹ Preselection of radioactive coal and its ash had started already in 1954, a full year before the process for extraction of uranium was developed, which also reveals how desperate the Yugoslav nuclear establishment was to acquire uranium and how confident they were in their abilities. Radioactive coal was first separated from the regular in the mines, at least in

⁸⁵⁸ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 17-18. The research of this location also included the entire cycle of uranium ore processing and making the yellowcake, which included a number of different methods.

⁸⁵⁹ Bondžić, *Između ambicija i iluzija*, 88-89.

⁸⁶⁰ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

⁸⁶¹ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 18.

those which had the technical capacity and space for that. The only exception was the coal mine *Potravlje* (Croatia), which was mined exclusively for radioactive coal, since it had a very high level of uranium of roughly 300-500 g/t in ore, and over 1,000 g/t in its ash, with only roughly estimated reserves of 600.000-800.000 tons of coal. Radioactive coal was then sold to various companies which used it instead of a regular coal.⁸⁶²

Burning radioactive coal was the first actual phase of the concentration of uranium and initially it was performed in factories, steamships, locomotives and power plants all over the country. The next phase was the collection and storage of radioactive ash, which was eventually sent to the Directorate for Nuclear Raw Materials for further processing. By 1956, the process for separation of uranium from the ash was developed and tested in the aluminum factory in Kidričevo (Slovenia) using the existing equipment, while experimental semi-industrial plant capable for processing of 30.000 tons of ash per year was installed and successfully operated in test runs during 1957 and 1958. It was expected that even this experimental plant would provide roughly 11-13 tons of uranium-oxide (yellowcake) per year.⁸⁶³

As a consequence of these developments, burning the radioactive coal was further sophisticated and made more efficient in 1957, when the SKNE decided that the number of enterprises and companies involved in the process should be narrowed down to those which could burn it in the form of a coal dust and on a lower temperature, could keep a separate stock of radioactive ash, and which had filters in their chimneys. As can be imagined, this last demand was raised not for any health or environmental concerns, but in order to capture even the last particle of uranium that

⁸⁶² AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

⁸⁶³ *Ibid.*

would otherwise be lost in the atmosphere. All of this dramatically narrowed the number of enterprises involved in the process, raised the costs since the capacities of a few qualified enterprises were stretched to the maximum, but also accidentally redirected all efforts for uranium production to Slovenia and Croatia; two most promising mines were *Potravlje* and *Raša*, both in Croatia, while the majority of qualified enterprises were in Slovenia.⁸⁶⁴

This was an almost brilliant project in many respects. The technology for extraction of uranium from ash was considered simpler than from other sources, including Kalna. It could be performed in the existing facilities, such as aluminum factory in Kidričevo, without much investment in the new equipment. In addition, burning of radioactive coal was dispersed to several conventional factories and power plants, which was very important considering the high level of *konspiracija* desired by the SKNE. The estimates were that this project could deliver 11-13 tons of uranium-oxide per year, and although this amount may be considered small, it was a lot for a country that did not have any. With some additional investments this amount could probably be raised significantly and combined with exploitation of other promising sources of uranium in the country. Most importantly, everything could be done in secrecy, camouflaged with regular production in completely conventional enterprises. However, this almost perfect project was completely abandoned by the SKNE in 1958, never to be even mentioned again.

⁸⁶⁴ AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959. These factories were: Vintgar, Izolirka Ljubljana, power plant Brestanica, Izolirka Pragersko, Batuje Lokavec (all in Slovenia), Raša Power Plant and Jugovinil (in Croatia). Besides *Potravlje* and *Raša*, two other significant mines were *Kanižarica* and *Kočevje*, both in Slovenia.

Having a yellowcake and eating it too

Although radioactive coal did grab the attention of the Yugoslav nuclear establishment between 1954 and 1958, uranium deposits at Kalna were far from abandoned. In fact, this was a rather ambitious project. Already in the mid-1960s, the entire mining field covered some 30 km², while the systematic prospection was organized on a surrounding 60 km². Eventually, two mines (mining locations) were opened, *Mezdreja* and *Gabrovnica*, which by the mid-1960s employed 840 people, or 81% of workers in the region.⁸⁶⁵ All things considered, Kalna uranium mines rose to become an industrial facility of a decent size, a motor of regional economy that was firmly under the control of the SKNE and Ranković.

The construction of a semi-industrial facility for production of yellowcake with a capacity for processing 15 tons of ore per day started already in 1956 in the *Mezdreja* mine. This was primarily an experimental facility designed to test various technologies of ore processing, and at the same time, as a training facility for Yugoslav scientist, engineers, technicians and miners for a proper industrial production of uranium-oxide and metal in the future. The capacity of this facility gradually grew to 50 tons per day as people working on the project gained more experience and as the facility was adapted and modernized in following years.⁸⁶⁶

⁸⁶⁵ AJ, 177, 13-34. Informacija o istraživanju i proizvodnji uran koncentrata u Preduzeću za istražne radove broj 3 u Kalni. Dopunske informacije uz varijantu III [Information on exploration and production of uranium concentrate in the Enterprise for Exploratory Works No. 3 in Kalna. Additional Information for the Option III], 1965; Zoran Nikić *et al.* “Stanje elemenata životne sredine u široj zoni bivših rudnika urana u slivu Trgoviškog Timoka” [State of elements of the environment in the broader area of former uranium mines in the catchment of the Trgoviski Timok], *Glasnik Šumarskog fakulteta* [Bulletin of the Faculty of Forestry 107], No. 107 (2013): 163-174.

⁸⁶⁶ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 17-18; Nakićenović, *Nuklearna energija u Jugoslaviji*, 74-75; Bondžić, *Između ambicija i iluzija*, 173-175; AJ, 177, f. 1. Top secret documents. Prethodna informacija o rudniku urana Kalna [Previous Information about the Kalna Uranium Mine], November 10, 1965. The fact that on January 19, 1956 the name of the mine was changed to Enterprise for Exploratory Works Janja-Kalna in Construction, confirms that the experimental ore processing facility only started to be built during 1956.

Encouraged with the results of facility in *Mezdreja*, in 1958 the SKNE Directorate for Nuclear Raw Materials started to design a semi-industrial scale facility for production of uranium-oxide with a projected capacity of 200 tons of ore per day, and expected production of 20-30 tons of uranium-metal per year. Following the approval of the Federal Executive Council, the directive to start the construction of the bigger “hydrometallurgical facility” in *Gabrovnica* was finally reached by the SKNE by the end of October 1960. The construction of facility was finalized in 1962 and first test trials were performed during 1963.⁸⁶⁷

The initial results of uranium prospection and trial exploitation in the Kalna mines suggest a rather small, yet significant source of uranium, especially considering this was the most burning issue in plans and expectations of the SKNE. Within these circumstances, the decision to abandon any potential source of uranium seems rather odd, and even if the coal ash as source seems equally odd, it was not unheard of elsewhere in the world. Uranium-bearing lignite beds were investigated in the United States between 1950 and 1954, and this source was abandoned only after “the discovery of large amounts of relatively low-cost uranium in western U.S. sandstone deposits.”⁸⁶⁸ Compared to the American experience, it would be expected that Kalna uranium mines represented more promising and more economic source of uranium than from investigated uranium in coal deposits.

⁸⁶⁷ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959; AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965; AJ, 177, f. 13-34. Informacija o rudniku urana u Kalni i razlozima za obustavljanje njegovog rada [Information about the uranium mine in Kalna and the reasons for stopping its production], undated, after June 27, 1966.

⁸⁶⁸ Fred J. Hurst, “Recovery of Uranium from Lignites”, Paper presented at the Western Regional Conferenc on Gold, Silver, Uranium and Coal, Rapid City, South Dakota, September 18-20, 1980, 1-2, https://inis.iaea.org/collection/NCLCollectionStore/_Public/12/573/12573125.pdf, accessed on April 6, 2021. One of scientists who discovered these deposits in the United States was Donald G. Wyant, and although it is appealing to assume that he may have suggested to his Yugoslav counterparts to investigate that potential source during his mission in Yugoslavia in 1953, the existing documents do not allow making such conclusions.

The only explanation available for abandoning production of uranium-oxide from coal ash was that it was more expensive than the estimated costs of production in Kalna. The SKNE Directorate for Nuclear Raw Materials provided pages of detailed comparisons between the costs related to the production of uranium-oxide from coal ash and in Kalna which, presented as they were, seem reasonable: uranium-oxide from coal ash of *Potravlje* would cost 64.604 dinars per one kilogram (din/kg), from *Raša* 82.069 din/kg, from other coal mines 229.729 din/kg, and the estimated cost of uranium-oxide from Kalna was 45.000 din/kg.⁸⁶⁹

The emphasis here has to be on the word ‘estimated’ since production in Kalna had not yet started properly at that time, but this question will be treated in-depth later in the section. On the other hand, it is important to notice that in the report from 1957, which provides basically the same estimates and numbers as the report from 1959, there is an almost passing note that in the case of Kalna “costs of investments are not included” in the calculation, but also that the price of 45,000 din/kg was “for orientation only” and based on the maximum capacity of facilities that were only expected to be installed there in the future. On the other hand, in the case of the production of uranium-oxide from coal ash, basically every cost was included: investments, costs of selective mining, prospection, ore sampling, laboratory analyses, transport, storage and waste. Adding insult to injury, the report also made it clear that “interests on bank loans, current assets, [...] etc.” were not included in that part of the calculation.⁸⁷⁰

⁸⁶⁹ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959. In full compliance with the ‘classical’ socialist system, the decision to stop further separation of radioactive coal and its burning in power plants was reached by the end of the fiscal year, on December 26, 1957.

⁸⁷⁰ AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957.

Regarding the investments, the 1957 report does state that 400 million dinars were already spent in the opening of the mine *Potravlje*, and 35 million in the construction of the storage facilities in the Jugovinil factory, while expected investments for the industrial production of uranium-oxide were estimated to additional 800 million dinars. On the other hand, in 1957 the necessary investments in Kalna were estimated at 1.2 billion dinars, and in 1959 this number swelled to 2.5 billion dinars, obviously without taking into account previous investments in the site. It was also stressed that these investments would have to be spread over the period of two and a half years.⁸⁷¹ This meant that the production of uranium would also be delayed at least for the same period. In addition, considerably less investment was necessary for the easy-to-hide production of uranium from coal ash, with relatively unknown deposits, but with existing facilities in which it had already been attested, than for the production in Kalna, which had only modest known reserves and facilities that were yet to be built. While it may be argued, and probably rightly so, that the country could not finance both options, exactly because of this problem it is difficult to understand why Kalna came on top.

The reserves of radioactive coal were never properly analyzed, although it was commented in the SKNE reports that uranium was not spread evenly in the deposits. The richest source in *Potravlje* was expected to be closed down by 1958/59, since it was going to be sunk under the artificial lake of the Peruća hydro-plant which was under construction at the time. The SKNE did intervene on that account and the production of coal in *Potravlje* was raised to the maximum between 1956 and 1958. In comparison, the production of coal in *Raša*, with a similar quantity of uranium in ore,

⁸⁷¹ AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

also reached its post-war peak in 1959, and continued mining operations until 1999. The reserves of uranium in Kalna were not completely explored at the time, but known reserves carried only 50 tons of uranium in 1957 and the estimates grew to roughly 200 tons in 1959 after some new discoveries.⁸⁷²

A careful reader will observe that reserves and potential for production of uranium both from the coal ash and from the deposits at Kalna were rather small, and a country so desperate to produce its own uranium would be unlikely to abandon either.⁸⁷³ It should also be mentioned that when the Soviets started mining uranium in Jáchymov (Czechoslovakia) in 1945, estimated reserves amounted to only 300 tons, while in neighboring Saxony was not discouraged even with initial estimates of only 32 tons of uranium in deposits.⁸⁷⁴ The Yugoslav authorities were equally eager and frustrated, and findings in Kalna were probably considered equally precious.

One explanation could be that, even though the production of uranium from coal ash seemed easy to hide, the very concept of a dispersed production of uranium would be considered liable to a security breach, especially in comparison with an option of a single location where everything could be done – mining, milling, refining and production. The entire nuclear program was already spread across a number of institutes and industrial facilities across the country and involved thousands of people which made the management of high security standards very difficult. In the given

⁸⁷² AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959; "Istarski ugljenokopi Raša [Istrian Coal Mines Raša]", *Istrapedia*, <http://istrapedia.hr/hrv/1188/istarski-ugljenokopi-rasa/istra-a-z/> (accessed on July 14, 2019). The SKNE's optimism was not in vain, since current reserves of uranium in Serbia are estimated at 4,150 tons of uranium, based on geological explorations performed in the period 1948-2000. However, they could not know that at the time. More in: Radule Tošović, Rade Jelenković, "Uranium mineral resources of Serbia and their potential economic importance", *Acta Monastica Slovaca*, Vol. 21 (2016), no. 1: 9-18

⁸⁷³ Hymans reports that 100 tons of uranium-oxide would be the threshold for a small nuclear weapons project. Hymans, *Achieving Nuclear Ambitions*, 177.

⁸⁷⁴ Zeman, Karlsch, *Uranium Matters*, 27-28.

circumstances, where all activities related to uranium prospection in Yugoslavia were under the strict control of the SKNE and UDB, this logic would seem reasonable. The manpower required for that would be huge, while the chances of keeping the project secret would be minimal. The alternative would be to lessen the *konspiracija* regarding the uranium business in Yugoslavia, although that option was probably not even considered.

Either way, it is evident that the explanation for abandoning the radioactive coal ash project based on economic calculations was a sham. This is indirectly confirmed in the reports from 1957 and 1959 that also stress that uranium could not be freely purchased abroad, and therefore, nobody could estimate its actual market value.⁸⁷⁵ Read between the lines, the price-tag for uranium production was arbitrary for every country and more dependent on how much it was desired than on the actual production costs.

Evidence presented also strongly point to a conclusion that Ranković wanted to exploit the experience and knowledge acquired with the coal ash and move the entire operation from Slovenia and Croatia back to the only potential location in Serbia where leading institutions of the Yugoslav nuclear program already existed and which were also developing the necessary technology. This would also allow Ranković to have all crucial components necessary for the production of either atomic bombs or nuclear power plants in Serbia and under his control. Evidence suggest that Ranković made this decision solely for nationalistic reasons, although such an explanation would be oversimplified and simply not true. Shifting the main thrust of uranium mining back to Serbia was to a great degree a political decision based on the

⁸⁷⁵ AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples' Republic of Yugoslavia, January 20, 1959.

simple fact that his influence, political support, and control were strongest in Serbia. In that respect, this move was not dissimilar from what Boris Kidrič did in 1949 and 1950, when he supported establishment of nuclear institutes in Ljubljana and Zagreb, respectively, closer to his own power base.

This was actually the case with other important political figures in Yugoslavia who also enjoyed strong support from their respective republics, and in accordance with that, they were also redirecting federal funds for various projects to their own political powerbase.⁸⁷⁶ Pirjevec skillfully describes this competition as an open hostility between “old revolutionaries and partisans” from different republics who previously could have never even imagined a possibility of a conflict between them.⁸⁷⁷ Ranković was quite familiar with that practice and he definitively used it in the case of the development of the computer industry in Yugoslavia, which was a spin-off project of the country’s nuclear program, with a huge economic potential. After two similar models of electronic computing machines were simultaneously developed by the end of the 1950s by the IBK in Belgrade and IRB in Zagreb, Ranković simply channeled all funding dedicated for further development to the IBK and other Serbian companies, without any consideration of the other option.⁸⁷⁸

The most important piece of the puzzle comes from some earlier plans made even before the establishment of the SKNE. In February 1955, “negotiations were held” in Frankfurt with companies Degussa and Leybold, for purchasing “a facility for

⁸⁷⁶ Miljković, *Western Technology in a Socialist Factory*, 70-80. Here I analyze how politicians from Slovenia and Serbia were competing and using their influence to channel federal funding to the republic of their origin in order to establish the Yugoslav automobile industry. It would not be surprising that for more important, more expensive and more sensitive projects the competition was even more brutal. The crucial advantage Ranković had in this race was that he was in charge of the Yugoslav nuclear program and his overall powerful political position, second only to Tito’s.

⁸⁷⁷ Pirjevec, *Tito i drugovi*, 494.

⁸⁷⁸ Marko Miljković, “CER Computers as Weapons of Mass Disruption: The Yugoslav Computer Industry in the 1960s”, *Godišnjak za društvenu istoriju* [Annual of Social History], no. 2 (2017): 99-123.

producing 20 tons of pure uranium (in the form of reactor rods)” per year, and another for “separation of U-235” (uranium enrichment), with equal annual processing capacity of 20 tons of natural uranium. These negotiations continued during the First International Conference on the Peaceful uses of Atomic Energy in August 1955, and it was expected that both facilities would be ready in six to eight months. The deal was in its final stage by the beginning of 1956, but “after negotiations in Moscow, where we secured uranium for our first reactor, and after delaying the construction of facility for processing of ash from uranium coals”, these negotiations with Degussa and Leybold were postponed for an “indefinite period of time – actually until we resolve all technological questions and secure raw materials for operation of this facility.”⁸⁷⁹

The first plan for development of atomic bombs from 1957 spoke exclusively about the use of plutonium as the explosive. Earlier contemplations on the topic, if they were ever put on the paper, remain elusive. On the other hand, communication with Degussa and Leybold seem to suggest that the Yugoslav nuclear establishment initially wanted to produce both plutonium (using natural uranium fuel in nuclear reactors) and enriched uranium (U-235) as explosives. In addition to that, the sheer capacity of facilities offered by Degussa and Leybold also suggest that 20 tons of processed natural uranium would provide roughly 120-140 kilograms of enriched uranium, which would theoretically be enough to construct two atomic bombs per year of the type used on the attack on Hiroshima.⁸⁸⁰ Expected production of 11-13

⁸⁷⁹ AJ, 177, f. 22-89. Informacija o razgovorima sa nemačkim firmama Degussa i Leybold [Information about Negotiations with German Companies Degussa and Leybold], April 28, 1956. In April 1956, representatives of both companies even visited Belgrade in an attempt to restart negotiations, promising even to provide the SKNE a tour of such facilities, already constructed “for one country in Europe” and in test runs at the time in Göttingen, but to no avail. These negotiations were completely abandoned after April 1956.

⁸⁸⁰ Natural uranium (U-238) contains roughly 0.7% of more fissile isotope U-235, which adds up to maximum 140 kilograms of U-235 in 20 tons of natural uranium metal. With enrichment percentage of

tons of uranium-oxide in the Kidričevo factory would be far below the maximum capacity of the negotiated enrichment facility, but the quantity of enriched uranium would be still significant, even if other Yugoslav sources would not be found or exploited. In other words, if the SKNE did not abandon the deal with Degussa and Leybold and installed facilities for production of uranium fuel rods and uranium enrichment by the end of 1956, it would probably acquire first significant quantities of weapons-grade enriched uranium by 1960, while the production of plutonium would necessarily have to wait for construction of larger nuclear reactors.

Either way, it is clear that the SKNE and Yugoslav decision makers were completely mesmerized by the Soviet “we can give you everything” approach, which is the main reason why the almost completed deal with Degussa and Leybold companies were “postponed”. The Soviets did promise the same facilities as Degussa and Leybold, and it is easy to imagine that they suggested lower prices initially, however, it is obvious that these promises they never intended to keep.⁸⁸¹ In a dramatic and paradoxical twist of fate, the agreement for purchasing very important facilities that could significantly enhance the Yugoslav capability to construct nuclear weapons in the near future was successfully negotiated with two companies from the FRG, the country Yugoslavia feared most, while similar cooperation with the officially friendly and ideologically close Soviet Union only undermined these Yugoslav ambitions.

roughly 90-95 percent and some losses along the way, annual production of roughly 120 kilograms of weapons-grade enriched uranium would be realistic amount. The “Little Boy” bomb reportedly used 60 kilograms of U-235

⁸⁸¹ ⁸⁸¹ AJ, 177, f. 22-89. Informacija o razgovorima sa nemačkim firmama Degussa i Leybold [Information about Negotiations with German Companies Degussa and Leybold], April 28, 1956. The price for facilities offered by Degussa and Leybold was estimated at DM 13-15 million, or \$ 3-3.5 million, using an average 4.2 conversion rate. For example, four tons of uranium fuel and seven tons of heavy water for the RB reactor cost \$ 594.000. Harold Marcuse, “Historical Dollar-to-Marks Currency Conversion Page”, <http://marcuse.faculty.history.ucsb.edu/projects/currency.htm> (accessed on April 10, 2021).

While the technological process for extraction of uranium from coal ash had been solved by 1957 and 1958, and successfully tested at the Kidričevo factory, the fuel for nuclear reactors had already arrived from the Soviet Union, and at the time it probably still seemed possible to purchase more uranium from the Soviet Union, with no restrictions. This would make continuation of uranium production in the country a complete waste of time and money, and it would partially explain why the coal ash option was so quickly abandoned. What it does not explain is why it was continued and expanded in Kalna.

The actual explanation may be found using the combination of all of these factors. Instead of investments into the coal ash project in Croatia and Slovenia that seemed difficult to keep secret, without knowledge on the actual reserves of uranium in the deposits, and which could not be distributed to his closest collaborators, the decision was made that money should be invested in Serbia where some reserves of uranium were confirmed, where he had a strong political powerbase, and where this covert operation could be firmly in his hands and easily managed. In that respect, the economic feasibility analysis of the coal ash project performed in 1957 and 1959 reports was obviously open to adjustments and did not need to be accurate. It just had to serve the purpose and Ranković had the right person for that. Both of these reports were carefully prepared and signed by Miladin Radulović, one of his closest collaborators and the director of the SKNE Directorate for Nuclear Raw Materials. The only other person who could outvote Ranković was Tito and the fact is that the only knowledge he had about the entire nuclear program came directly from Ranković in whom he had a complete confidence at the time. In the meantime, arrival of uranium from the Soviet Union did cover all needs.

The final piece that may complete the puzzle is the answer to the question: what happened with already preselected, prepared and collected radioactive coal ash which contained some 13 tons of uranium? Based on the report from 1957, by the end of the same year the decision was made to stop burning of radioactive coal and to “conserve” all existing radioactive ash with content of over 1 kilogram of uranium per ton in a “convenient,” yet undisclosed location.⁸⁸² It should be mentioned again that the technology for processing of coal ash and production of uranium-oxide had already been developed and tested and that the decision to “conserve” the existing stock of ash with high content of uranium did not mean complete abandonment of that option, but simply its “conservation” for the future.

Combining all the evidence, it may well be argued that the SKNE simply could not afford to invest in several potential sources of uranium simultaneously, and therefore, after the production of uranium from one source was stormed and conquered, it was “conserved” until other promising sources would pass through the same process. The same logic seem to have been implemented during negotiations with Degussa and Leybold, which were officially only “postponed”. The radioactive coal ash kept in reserve had a potential for quick a production of some 13 tons of uranium in existing facilities and it seems that for the SKNE and Ranković that was good enough in the given circumstances. Once other sources would be stormed and conquered in a similar fashion, Yugoslavia would be prepared to start producing uranium in quantities that would satisfy both the civilian and military aspirations, with an added benefit that, in the meantime, it would be very difficult to suspect that Yugoslavia had that capability. On the other hand, once serious investments would be

⁸⁸² AJ, 177, f. 23-90. Neki problemi nuklearnih sirovina [Certain Problems with Nuclear Raw Materials], October 23, 1957; AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959. The latter report confirms that the decision was formally reached at the SKNE plenary meeting on December 26, 1957.

made in development of uranium mines, institutes, technology, related infrastructure and entire industry around the mine in Kalna, it would make no sense to move it elsewhere, even if new and very rich sources would be found other republics, thus securing the Serbian leadership in this potentially lucrative business in the future. Ranković obviously had the ambition and enough political power to cover both ends.

Smirking Buddha

Official documents show that the SKNE was interested to support the budding Egyptian nuclear program, which was initiated in 1955 through the establishment of the Egyptian Atomic Energy Authority (EAEA).⁸⁸³ Already in 1957 the first meeting between the representatives of the EAEA and the SKNE took place in Yugoslavia. Led by the general secretary of the EAEA, Abdel Rahman, the Egyptian side openly complained that their program was developing slowly and that “not all of the [planned] departments [of the EAEA] were actually formed,” mostly because of the “lack of cadres.”⁸⁸⁴ Another problem expressed by Abdel Rahman was the insufficient knowledge of Egyptian scientists on geological prospection of uranium ore deposits and uranium extraction and refinement. During the negotiations it was agreed that the EAEA should send to the SKNE roughly 1 ton of uranium ore, alongside with a couple of Egyptian experts in this field, in order to “investigate possibilities of cheap extraction” of uranium in Egypt.⁸⁸⁵ The negotiations went smoothly, at least considering the stenographic notes, and two sides agreed to focus their cooperation on fields of “prospection, geology, nuclear physics and operation of nuclear reactors.”

⁸⁸³ Kurt M. Campbell, Robert J. Einhorn, Mitchell B. Reiss (eds.), *The Nuclear Tipping Point: Why States Reconsider Their Nuclear Choices* (Washington, D.C.: Brookings Institution Press, 2004), 45.

⁸⁸⁴ AJ, 177, f. 438. International Cooperation, UAR Files. Conversation with Abdel Rahman, Secretary of the Egyptian Atomic Energy Commission, held in the SKNE on June 17, 1957.

⁸⁸⁵ AJ, 177, 438. International Cooperation, UAR Files. Conversation with Abdel Rahman, Secretary of the Egyptian Atomic Energy Commission, held in the SKNE on June 17, 1957.

Furthermore, in the true spirit of non-alignment, both sides agreed that the newly founded IAEA was used as a tool of superpowers “for their own purposes” and that they should both “keep open possibilities for further cooperation with any state on a bilateral level,” thus avoiding the strict control of the proliferation of nuclear technology by the United States or the Soviet Union, or expected safeguards mechanisms of the newly formed IAEA.⁸⁸⁶ However, on the official level the NAM countries publically supported the establishment of this institution since the Bandung Conference in 1955.⁸⁸⁷

What seems evident is that the main field of cooperation was the “geological prospection” and exchange of technology for uranium ore refinement. In that respect, Yugoslavia could offer its limited expertise to Egypt, possibly expecting to be able to purchase uranium or even the yellowcake more or less covertly and outside of the still budding non-proliferation regime. All of this seemed reasonable enough and both sides agreed that Yugoslav experts should visit Egypt in the fall of 1957, thus starting the technology transfer and exchange of experts in fields of mutual interest and outside of international control.⁸⁸⁸

The first spark of mistrust was initiated already in 1959 by Egyptian experts visiting Yugoslavia where they were supposed to develop the technology of uranium ore processing. Yugoslav scientists actually developed the technology and provided all of the necessary information to their Egyptian colleagues, translated both in English and German. But the main problem was that Egyptian geologists were suspicious that the ore they brought with themselves, and the technology developed in

⁸⁸⁶ AJ, 177, 438. International Cooperation, UAR Files. Conversation with Abdel Rahman, Secretary of the Egyptian Atomic Energy Commission, held in the SKNE on June 17, 1957.

⁸⁸⁷ Potter and Mukhatzhanova, *Nuclear Politics and the Non-Aligned Movement*, 82-83.

⁸⁸⁸ AJ, 177, 438. International Cooperation, UAR Files. Conversation with Abdel Rahman, Secretary of the Egyptian Atomic Energy Commission, held in the SKNE on June 17, 1957.

Yugoslavia, might be used “for incomprehensible purposes” by the SKNE and demanded that the remaining ore must be returned to Egypt.⁸⁸⁹ The Yugoslav side agreed to their demands, adding a comment that the SKNE “has no interest in their [Egyptian] ore or the developed technology for its refinement since it was specific to the ore of their country,” and therefore could not be used in Yugoslavia.⁸⁹⁰

The mistrust was actually mutual. The Yugoslav side was clearly interested in Egyptian uranium ore, having only low quality ore in the country, and with the appropriate technology could have started the production of yellowcake or potentially even nuclear reactor fuel based on natural uranium much before Egypt, hoping that the general good relations with Egypt would be sufficient guarantee for the purchase of enough amounts of uranium ore outside of the gradually evolving system of safeguards. On the other hand, the Egyptian side was quite aware of the problem and wanted only the actual technology explained to and understood by their experts without much sharing. The problem was that they could develop the necessary technology only in cooperation with their Yugoslav colleagues, while at the same time they could not get simply use the existing Yugoslav experience since it was specific to the type of uranium ore found in Yugoslavia.

The final nail in the coffin of the Yugoslav-Egyptian nuclear technology sharing came already in 1961, when the SKNE sent its team of experts to Egypt to perform the geological prospection of the country. The team was funded and equipped by the SKNE, and beside experts included two helicopters for the aerial prospection and the additional personnel for the maintenance of the equipment.⁸⁹¹ This was

⁸⁸⁹ AJ, 177, 438. International Cooperation, UAR Files. Minutes from the meeting in the Institute for Research of Nuclear Raw Materials about complains of Egyptian experts, February 13, 1959.

⁸⁹⁰ *Ibid.*

⁸⁹¹ AJ, 177, 438. International Cooperation, UAR Files. The SKNE Mission to the UAR, February 9, 1961.

possibly the last attempt by the SKNE to try to investigate the uranium ore deposits in Egypt, and potentially strike a deal for the future purchase of uranium ore. This can be read between the lines of the mentioned document where it was said that the whole project “would pay off even if the UAR [Egypt] pays only the field expenses.”⁸⁹² And in order to lube up the cooperation, the SKNE agreed to sell to the EAEA “300-500 kg of various samples of uranium ores [...] and 500 kg of yellowcake.”⁸⁹³

Whatever the motives behind the cooperation may have been, the Yugoslav team eventually managed to “discover for the first time in Egypt considerable amounts of uranium mineralization with prospects for additional discoveries in the future.”⁸⁹⁴ This was an important discovery both for the Yugoslav and Egyptian side, and further protocols of cooperation were immediately negotiated. However, the negotiations were clearly dropped by the end of 1963 with several complaints about the lack of enthusiasm or response on either side. It was also evident that it was the Yugoslav side that pushed for the extension of the cooperation while the EAEA usually avoided to respond to the SKNE demands or delayed the exchange of experts, especially in cases of Yugoslav scientists who were supposed to work in Egypt.⁸⁹⁵

The existing evidence is inconclusive but it seems that the Egyptian initial fear of being exploited by the SKNE was only augmented as the cooperation between two countries progressed and the first solid results appeared. The discovery of the uranium ore deposits in Egypt by the Yugoslav team may have also sparked the desire of the EAEA officials to abandon the cooperation with the SKNE and continue further work

⁸⁹² AJ, 177, 438. International Cooperation, UAR Files. The SKNE Mission to the UAR, February 9, 1961.

⁸⁹³ AJ, 177, 438. International Cooperation, UAR Files. Protocol of Cooperation in Research and Testing of Nuclear Raw Materials between the SKNE and the AEA, April 4, 1961

⁸⁹⁴ AJ, 177, 438. International Cooperation, UAR Files. Information about the Cooperation with the UAR, April 19, 1962

⁸⁹⁵ AJ, 177, 438. International Cooperation, UAR Files. Information about the current problems in cooperation with the UAR, September 13, 1963

on their own. It can also be argued that the Egyptian officials were particularly sensitive in this respect, considering the country's colonial experience. The possibility of Yugoslavia enforcing itself in any way as a new colonial power in Egypt was highly remote, to say the least, but it is also true that the SKNE officials could have managed the cooperation with the EAEA in a more delicate manner. Finally, the fact that the NAM became a reality already in 1961 with prospects of rapid enlargement of the movement's size and political strength in a short period of time, necessarily sped up the race for the leading position in the NAM, in which Yugoslavia and Egypt were front runners.

The official cooperation between Yugoslavia and India started also in 1957 by the visit of famous professor Homi Bhabha, the president of the Atomic Energy Commission of India (AEC). The only difference compared to the Yugoslav experience with Egypt was that Bhabha visited Yugoslavia as a sort of a superstar and it was he who was investigating Yugoslav prospects of uranium production. After a meeting with several Yugoslav scientists, he showed little interest in the Yugoslav central "Boris Kidrič" Institute and was repeatedly inquiring only about the kind of ores Yugoslavia is processing, the methods that are used and "when the production of uranium will start."⁸⁹⁶ Bhabha also suggested that "since we [Yugoslavia] still have enough potential for the exploitation of hydro energy it is not necessary to work on nuclear power plants," in what seems to be an encouragement for the Yugoslavs to abandon their nuclear ambitions.⁸⁹⁷ Finally, he was interested to send a couple of Indian experts to work in Yugoslavia on problems of electronic equipment and geologic prospection, but shunned the possibility of signing the bilateral agreement of

⁸⁹⁶ AJ, 177, 435. International Cooperation, India Files. Note about the Homi Bhabha's Visit, June 19, 1957.

⁸⁹⁷ AJ, 177, 435. International Cooperation, India Files. Minutes from the meeting with Homi Bhabha, June 11, 1957.

cooperation between two countries, insisting that personal contacts with leading scientists would be enough.⁸⁹⁸

In cooperation with India, Yugoslavia and the SKNE obviously played the role of an inferior partner, not unlike the role Yugoslav officials casted for Egypt. Being interested only in possibilities of acquiring the Yugoslav uranium, which can be read between the lines, Bhabha avoided committing to any formal cooperation with the SKNE. Nevertheless, some sort of cooperation, focused mostly on exchange of experts, eventually did evolve. Official documents of the SKNE do not mention the true number of visiting scientist or the value of these exchanges (at least from the Yugoslav perspective) but the actual numbers seem to be relatively low and symbolic.

The only return visit of a high ranking Yugoslav official to India happened in 1961, when aforementioned Dragoslav Popović was sent by the SKNE to visit the opening of the first Indian nuclear reactor in Trombay. In his report, Popović particularly stressed that India already had a well developed military nuclear program since capacities of their facilities were “adjusted according to needs related to the weapons construction.”⁸⁹⁹ It also seems that this was not surprising to Popović, but rather a confirmation of Yugoslav suspicions and prior knowledge about the true nature of the Indian nuclear program. Nevertheless, he voiced his concerns that India will be capable of producing atomic bombs in two or three years, obviously acknowledging the fact Yugoslavia will not be able to compete with India in that time span.⁹⁰⁰ At the same time, this concern also revealed the rivalry between Yugoslavia

⁸⁹⁸ I AJ, 177, 435. International Cooperation, India Files. Minutes from the meeting with Homi Bhabha, June 11, 1957.

⁸⁹⁹ AJ, 177, 435. International Cooperation, India Files. Dragoslav Popović's Report from the Visit to India, February 1961.

⁹⁰⁰ *Ibid.*

and India within the NAM movement where the possession of nuclear weapons obviously had a huge political importance.

On the other hand, Popović's main task in India was to convince Bhabha to sign an agreement for cooperation between India and Yugoslavia. However, in this task he failed completely since Bhabha "started avoiding me [Popović] as soon as I mentioned to him that I wanted to speak about the cooperation between our two countries," while the only interest Bhabha did express when they finally met was, not surprisingly, about the developments related to the production of uranium in Yugoslavia.⁹⁰¹ The meeting with Nehru went even worse for Popović who after several attempts to squeeze into conversation the possibility of cooperation between two countries received only a smirk from Nehru and an ambiguous answer: "Ah, Yugoslavia."⁹⁰²

Other attempts by the SKNE to establish a proper cooperation with India in following years also failed, since the negotiations were dragging for a long time and the Indian side right from the beginning clearly stated that it had no interest in sharing classified technology.⁹⁰³ By 1963 there were even several drafts of the treaty of bilateral cooperation on the development of nuclear technology, but none of documents were eventually signed, which basically ended any other exchange between two countries in this field.

⁹⁰¹ AJ, 177, 435. International Cooperation, India Files. Dragoslav Popović's Report from the Visit to India, February 1961

⁹⁰² *Ibid.*

⁹⁰³ AJ, 177, 435. International Cooperation, India Files. Minutes from the meeting with the Indian ambassador in Yugoslavia, December 14, 1961.

Chapter 5: To Kill a Ticking Bomb

The final act of the Yugoslav nuclear program begins with one rumor, one fact, and one rough estimate. The rumor is that, during one of the meetings in the central office of the SKNE in Belgrade, at some unidentified point between the end of 1960 and the beginning of 1961, the Secretary of the SKNE, Slobodan Nakićenović, received an urgent phone call. Those who were present in the room stopped their ongoing discussions and could hear him saying: “Yes, comrade Marko, yes, comrade Marko”. When he finished the call, he turned to those present in the office and said: “We received the order from comrade Marko to stop the military nuclear program.”⁹⁰⁴ The fact in the story is that by October 1, 1962, Aleksandar Ranković, better known to his closest associates as “comrade Marko”, was no longer the President of the SKNE. Without any fuss or noise, the meeting of the SKNE on the aforementioned date was chaired by the new President, Avdo Humo, a national hero and a high-ranking party and state official.⁹⁰⁵

The Gilpatric Committee, established by the U.S. President Johnson’s administration in 1964 in order to reconfigure the country nonproliferation policy in the wake of the Chinese successful atomic bomb test (October 16, 1964), estimated that eleven nations “have or will soon have the capability of making nuclear weapons, given the requisite national decision”. Yugoslavia was among these eleven nations,

⁹⁰⁴ Rudež, Pisk, *Institut Ruđer Bošković*, 122-123. The story is based on recollections of Đuro Miljanić, a nuclear physicist who worked at the IRB in Zagreb, hence the inaccuracy regarding the date.

⁹⁰⁵ Bondžić, *Između ambicija i iluzija*, 129, 217; *Samo oni mogu biti naš ponos i naša dika*, 172-173. Humo was the Minister of Finance (1956-1958) and the Vice-President of the Government Board for the Federal Perspective Plan, among his other duties.

although it is evident that the Gilpatric Committee eventually reevaluated their initial list and did not include Yugoslavia in the final report.⁹⁰⁶

This chapter dismantles the Yugoslav nuclear program. The focus of the analysis will show that the rumor, the fact and the rough estimate are not particularly accurate or true, but not completely wrong either. Despite all the problems, obstacles and mistakes made along the way, the Yugoslav nuclear program continued to evolve and expand during the 1960s, and it was successful enough for the country to be an important and very active participant in the global nuclear game. On the other hand, the decision to dismantle the entire nuclear program in the second half of the 1960s was based on the almost evenly balanced influence of internal and international factors. Domestically, the country was entering an economic slowdown and rise of nationalism, both of which made it extremely difficult to manage and finance a state-wide program of such an importance and magnitude. Internationally, the gradual establishment of the global nonproliferation regime and Tito's carefully crafted image of a peace-loving 'third' world leader undermined the utility of such ambitions, particularly regarding nuclear weapons.

⁹⁰⁶ Gavin, *Nuclear Statecraft*, 76-79. This estimate was made by one of the members of the Gilpatric Committee, Russell Murray. His estimate included India, Japan, Israel, Sweden, West Germany, Italy, Canada, Czechoslovakia, East Germany, Romania and Yugoslavia. Original report can be found in FRUS, 1964-1968, Volume XI, Arms Control and Disarmament, eds. Evans Gerakas, David S. Patterson, Carolyn B. Yee (Washington: United States Government Printing Office, 1997), Document 64.

5.1 Ranković's 'to be or not to be' Dilemma

“Bitter national antagonisms [...] plus strong regional rivalries and resentments [...] are again expressing themselves.”⁹⁰⁷

The story about the Ranković's alleged executive order to stop the atomic bomb project is based on the memory of Đuro Miljanić, a physicist from the IRB in Zagreb. The person who told him that story many years later was Dragoslav Popović, who apparently was one of the persons present in the SKNE office.⁹⁰⁸ In an article he co-authored in 2000, Miljanić does not recall this episode, and the only reference made on the topic is that “it appears that [...] sometime in the early 1960s”, but definitely by 1966, “Tito had put his nuclear weapon aspirations on hold”.⁹⁰⁹ Popović told a similar story to Hymans, suggesting that in 1961, “a ‘highest-level order’, apparently from Tito himself, abruptly halted then ongoing intensive discussions for a bomb-grade plutonium-producing reactor.”⁹¹⁰ Bondžić's research does not help either, since his overall conclusion is that “there is not enough evidence from available sources to confirm that Yugoslavia ever had serious ‘program for nuclear weapons’”.⁹¹¹

Popović was obviously an important figure in the Yugoslav nuclear program, and it is a fact that on July 21, 1960, he became the President of the SKNE Expert

⁹⁰⁷ Richard Nixon Presidential Library and Museum, National Security Council Institutional Files, Meeting Files, box H-019 (RNPLM, H-019). NSSM 129. U.S. Policy and Post Tito Yugoslavia. Analytical Summary.

⁹⁰⁸ Rudež, Pisk, *Institut Ruđer Bošković*, 122-123.

⁹⁰⁹ Potter, Miljanic, Slaus, “Tito's Nuclear Legacy”, 65.

⁹¹⁰ Hymans, *Achieving Nuclear Ambitions*, 194.

⁹¹¹ Bondžić, *Između ambicija i iluzija*, 429-430.

Council, thus necessarily being in a position to spend lots of time in the SKNE central office. In March 1961, Popović moved to the IAEA on an important duty as the Director of Safeguards.⁹¹² More will be said about his work in the IAEA, but here it is enough to note that the overall story about Ranković's order to abandon the atomic bomb project seems plausible, at least considering chronology, since this was the only period during which Popović performed an official function within the SKNE during the Ranković's directorship.

If such a decision had been made, and in that period, the problem arises with the secret meeting held in Ranković's personal office on May 27, 1961. During this meeting, the Information on Possibilities for Production of Nuclear Weapons in Small Quantities (Information), as the most elaborate plan for construction of nuclear weapons ever made by the SKNE, was discussed among the select group of people. Popović most likely was present; he anticipated in one of his letters from Vienna that he would most likely be present in Belgrade for the discussion about the Perspective Plan by the end of May, but the details are fuzzy.⁹¹³ If the basic storyline were accurate, then it would suggest that Ranković officially stopped the work on the atomic bomb, but continuing to work on it in secret, exploiting to the maximum the dual-purpose quality of nuclear energy programs in general, before the domestic and international and internal audience.

On the other hand, the entire story is very similar to the scenario of the meeting of the SKNE Collegium on January 23, 1958, when the only decision made was that the military part of the Perspective Plan should be 'detached'. The only

⁹¹² Bondžić, *Između ambicija i iluzija*, 128; Hymans, *Achieving Nuclear Ambitions*, 188.

⁹¹³ AJ, 177, f. 9. Personal letter of Dragoslav Popović to Slobodan Nakićenović, May 19, 1961.

problem is that Popović was not present there, although Nakićenović was.⁹¹⁴ If this can be accepted as the root of the story, then it becomes even more complicated to find the truth, since it seems a case of a rumor based on hearsay and reported to researchers half a century later. Either way, the origin of the story about the alleged abandonment of the atomic bomb project will probably never be known, but it is equally unimportant. The explanation of its origin is used here to question the argument that Tito had ordered a halt to discussions about the development of the atomic bomb, or the necessary “bomb-grade plutonium producing reactor”.⁹¹⁵

(Lack of) Perspective Plan, 1961-1965

Additional clues to what was happening may be found in the analysis of the Perspective Plan for the period 1960-1964. Even though it was the first such plan, not all of its provisions were put into action immediately, and they continued to be renegotiated in following years. The type of the future nuclear power reactor was one of those issues. The original version (1960-1964) contained only a general description of the type and even that was not very accurate. The plan suggested that the reactor be based on “uranium, of natural isotopic composition, or slightly enriched”, while the moderator could be “heavy water or graphite”, without any additional explanations.⁹¹⁶ The problem persevered, but during the meeting of the SKNE on June 30, 1961, it was concluded that, among other things, that the final decision about the type and size of the nuclear power plan must be delivered by the end of the year.⁹¹⁷ In following

⁹¹⁴ AJ, 177, f. 28-116. Zapisnik sa sednice Kolegijuma SKNE [Minutes from the SKNE Collegium Meeting], January 23, 1958.

⁹¹⁵ Hymans, *Achieving Nuclear Ambitions*, 194

⁹¹⁶ AJ, 177, f. 24-94. Perspektivni plan razvoja nuklearne energije u FNRJ, 1960-1964 [Perspective Plan for Development of Nuclear Energy in FPRY, 1960-1964], n.d. 1959. The power was equally roughly estimated to 50-100 MW thermal.

⁹¹⁷ Bondžić, *Između ambicija i iluzija*, 156.

months a new iteration of the Perspective Plan was prepared, covering the period 1961-1965. It clearly stipulated that the type of the future nuclear power reactor should be based on natural uranium fuel and graphite as moderator.⁹¹⁸

This general order of events that led to the decision about the type of the future nuclear power reactor overlap with meetings and decisions related to the atomic bomb project. One of the main requests in the Information from May 27, 1961, was that the decision about the type of nuclear reactor must be made as soon as possible and it depended on the decision about the atomic bomb project. The authors of the Information also preferred the natural uranium and graphite moderated type of 200 MW thermal power as the best option to both fully engage civilian industry and simultaneously hide the fact that the country was developing its capacities with the military use in mind.⁹¹⁹

All of these different plans, agendas and related issues funneled to one meeting of the SKNE, on May 10, 1962, which turned out to be the last meeting over which Aleksandar Ranković presided. Bondžić provides no explanation on this issue and, “according to available data”, suggests almost euphemistically that “after many years of managing the SKNE, Aleksandar Ranković left the position of the president”, or elsewhere that “Ranković left the SKNE already in 1962, and ceased to engage [himself] in nuclear politics”.⁹²⁰ During this meeting, Supek apparently got into a conflict with the SKNE management, because he stood against the latest version of the Perspective Plan, which he understood as a hidden atomic bomb project. Bondžić does

⁹¹⁸ AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962. The report was written by Ivan Supek, and presents part of materials prepared for the SKNE meeting on May 10, 1962.

⁹¹⁹ AJ, 177, f. 1. Strogo poverljivo. Nuklearno oružje. Informacija o mogućnosti proizvodnje nuklearnog oružja u malim količinama [Top Secret. Nuclear Weapons. Information on Possibilities for Production of Nuclear Weapons in Small Quantities], May 22, 1961.

⁹²⁰ Bondžić, *Između ambicija i iluzija*, 129, 187, 221.

address this issue, but concludes in broad strokes that the records from the meeting do not reveal any conflict and that such comments made by Supek several years later were part of the organized campaign against Ranković, during and after his political downfall in 1966. He finishes his analysis in a deeply sarcastic tone, suggesting that “it could be concluded that in the field of dark nuclear plans [Ranković] withdrew before Supek’s assumptions and suspicions, four years before his fall from power”.⁹²¹ Paradoxically, this is very close to what Bondžić himself suggests in his explanation that, after leading the nuclear program from day one, Ranković simply left it with no apparent reasons.

While it is true that there was an organized campaign against Ranković after 1966, and that many persons, even among his closest associates, joined his political trial, for the purposes of this analysis, it is important to focus on facts: in 1962, Supek did make many complaints against the Perspective Plan, and Ranković was replaced at some point after this meeting. Regarding his complaints, Supek was obviously intelligent enough not to express his critique directly. Instead, he targeted all the points that could be related to the atomic bomb project. He started with the fact that the Perspective Plan was “based on a complete autarchy” regarding financial means and raw material sources. In relation to that, he then focused on the fact that a nuclear power plant based on natural uranium and graphite would not be economical to run, questioning if “our economy would bear such a parasite”, and suggesting that in that case “domestic plutonium extracted from graphite reactor would hardly be useful and that entire investment would be rejected as uneconomical.” Supek also emphasized that “in following years we should do nothing that would tie our hands” regarding the choice of the type of the nuclear reactor. We should instead focus on “raising of the

⁹²¹ Bondžić, *Između ambicija i iluzija*, 296-305.

entire scientific-technological potential.” More importantly, he was strictly against publishing the Perspective Plan naming a given type of nuclear reactor, since “it would reinforce suspicions abroad that Yugoslavia is also preparing for a military use of nuclear energy”, which would “weaken our position, as a government and as individuals, in peacekeeping activities”. “Why should it be painted so specifically?” he asked. Finally, he underscored all of his points with his firm position that “the decision about the road we should take cannot be delivered in expert bodies”, but in “the Nuclear commission [SKNE], government and [National] assembly.”⁹²²

Supek was obviously raising the flag that, behind the civilian Perspective Plan, “the apparatus of Sakne [SKNE] with its energy commission” was actually directing the entire nuclear program towards the construction of nuclear weapons.⁹²³ Insisting that such a decision is necessarily political, he only further strengthened his indirect accusation that the SKNE was operating outside of its jurisdiction. Furthermore, his comment about the economic aspect of constructing the nuclear power plant of the desired type was in a similar tone, speaking against the atomic bomb project and simultaneously against the SKNE’s control over the vast financial resources. Read between the lines, Supek accused the SKNE of promoting the construction of a nuclear power plant without the economic justification, while it would be in a position to control channeling of funds to civilian industrial companies through lucrative contracts for production of different components for the reactor, ending up with “domestic plutonium” which did not have any civilian purpose. Considering the fact that the SKNE and the entire nuclear program had been under a heavy hand of

⁹²² AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962.

⁹²³ AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962. Instead of the acronym SKNE, Supek uses the word Sakne, which means the same; it is an acronym with an added letter “a” for easier pronunciation [SaKNE], a common practice in BCMS languages.

Ranković since 1948, one does not have to be a nuclear physicist to understand where or at whom Supek was aiming.

The story can be reconstructed in the following way. Starting with the original Information presented during the secret meeting in Ranković's office on May 27, 1961, in the following months it was decided to implement the plan, starting with the suggested choice of the reactor type and size, all set behind the screen of a civilian program. However, the program first had to be 'sold' to members of the SKNE and its different bodies and sub-committees as a 'classical' Perspective Plan, which was anyway in a process of continuous adaptation since 1957. Once formally accepted by the SKNE, the plan would be sent to the Federal Executive Council (Yugoslav Government) for final deliberation. While it cannot be claimed that the Perspective Plan would be eventually accepted, considering the preference among communist leaders for strategic development formulated through mid to long-term plans, all wrapped with a hint of a scientific method and reasoning, chances are that it would, and easily so. The introduction itself was aiming exactly at that, promising that nuclear energy would be necessary to resolve the country's "energy deficit in a conventional base", expected to become acute after 1980.⁹²⁴ Ranković was also the Vice-Prime Minister and backed by such an authority. After passing the regular procedure without much or any resistance, the Perspective Plan would probably have Tito's support as well. The only thing left to solve would be to carve out a generous part of the federal budget for its realization. Several years earlier, Tito described their relationship in a very direct way:

⁹²⁴ AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962

“Understandably, I must say that we worked together [on the country’s security], and that he [Ranković] never took any important task without counseling with me first and with other comrades in the inner circle of leadership, but I must also say that I cannot recall that I ever rejected any of his suggestions or ideas.”⁹²⁵

The relationship between Tito and Ranković was not the same as it was in 1954, but the fact remains that Ranković was unquestionably the second strongest politician in Yugoslavia and one of the closest to Tito. Considering the secret, or disguised atomic bomb project, everything was prepared for the Government, and perhaps even Tito, to accept the atomic bomb project without being aware of it.

The plan’s creators seemed confident enough to push it through formal meetings within different SKNE bodies. The only problem was that it evidently did not pass the scrutiny of the SKNE members, the most critical step. Paradoxically, it was begrudged to Ivan Supek, the last of three ‘fathers’ (Savić, Peterlin, Supek) of the Yugoslav nuclear program still left standing, who effectively torpedoed Ranković’s plan. As a scientist, Supek was focusing on research in theoretical physics, which was probably one of the reasons he was not involved deeply in direct discussions about the potential development of atomic bombs; it is also probably what ‘saved’ him after the *čistka* [purge] in 1958 and 1959. On the other hand, losing all three leading names was not the message the Yugoslav nuclear establishment wanted to send to the rest of scientists, who kept Supek within the SKNE, probably expecting that he would not make waves in the future, as he did not do so in the past.

⁹²⁵ Part of Tito’s speech during a decennial anniversary of the establishment of the UDB, May 13, 1954. Quoted in: Dimitrijević, *Ranković, drugi čovek*, 273-274.

Whatever the calculation, it underestimated Supek. While it would be appealing to say that scientists of Supek's status could enjoy such authority in Yugoslavia to be able to undermine plans of Ranković, it seems more likely that Supek himself was aiming to spark imagination among some politically powerful persons present at the meeting of the SKNE on May 10, 1962. And there is no one who would be a better target for that than 'not very intelligent' General Ivan Gošnjak, the Yugoslav Minister of Defense who was present at the meeting when Supek expressed his well-formulated concerns.⁹²⁶ Đuro Miljanić, a person who disseminated the rumor that Tito stopped the atomic bomb project with a phone call, also claims that General Gošnjak doubted that it would be possible to make the atomic bomb, but also that any available money should be invested in conventional armaments.⁹²⁷ Even though it has been shown that General Gošnjak was actually very interested in nuclear weapons in the late 1950s, he could have become suspicious after all of these claims made by Supek, and could possibly be a person who alerted Tito.

The evidence presented in support of this story is circumstantial and the exact truth will probably never be known. But the fact remains that Ranković was deposed from the position of SKNE President at some point after the fateful meeting, and after full fourteen and some years of managing the Yugoslav nuclear program. Considering all the effort and plans for developing the nuclear program, which evidently included construction of nuclear weapons, the explanation that "Aleksandar Ranković left the position" is simply unacceptable. Supek's own words are instructive:

⁹²⁶ AJ, 177, f. 17-58. Zaključci sa sednice Savezne komisije za nuklearnu energiju [Conclusions of the SKNE Meeting], May 10, 1962. Besides the President Aleksandar Ranković and Ivan Supek, participants were Milentije Popović, Ivan Gošnjak, Avdo Humo, Slobodan Nakićenović, Milorad Ristić, Miladin Radulović, Salom Šuica, Anton Moljk, Drago Grdenić, Toma Bosanac, Lucijan Šinkovec, Muhek Andrija, Ljubomir Barbarić, Ivan Draganić and Predrag Anastasijević. The composition of participants included all the members of the SKNE, heads of its different sectors and directors of institutes under its supervision, which confirms the importance of the meeting, particularly considering any eventual (or expected) decisions which would have a significant weight.

⁹²⁷ Rudež, Pisk, *Institut Ruđer Bošković*, 122.

“Over ominous thirteen years, from 1949 to 1962, I have collected a lot of signs, but a *corpus delicti* never fell into my arms. I do not know in what way an unbiased court would accept this testimony of mine. I came to believe that the group in Vinča harbored ambiguous desires for atomic bombs, but that about some serious preparations we can speak only after 1957, when the Chinese reactor was procured and Kalna opened. Since the establishment of the SKNE in the summer of 1955, I presumed that there was a conspiratorial plan, but – this was my second assumption – bombs themselves were not the main goal of the UDB chief, but more an instrument to grab a full power over science, key industries and in the end, the army. You can judge yourself how much this assumption explains all that secretive and contradictory [evidence] that was collected over the course of years.”⁹²⁸

Supek’s own role remains somewhat obscured by the strength of accusations he directly or indirectly launched against Ranković. While Supek could be accused of Croatian nationalism, like Bondžić does, particularly considering the fact that he published his thoughts about the country’s nuclear program in the period after Ranković’s downfall and the rise of the reformist but also nationalist “Croatian Spring” movement of the late 1960s and early 1970s, in which he did play a prominent role, it is also true that he expressed the same accusations already in 1962, during the SKNE meeting and in Ranković’s presence, even if only implicitly.⁹²⁹ This would suggest that Ranković’s political downfall started a couple of years earlier than presented in traditional historiography, with his removal from the SKNE and the nuclear program, which is an important discovery in its own right.

⁹²⁸ Ivan Supek, „Svjedočanstvo o jugoslavenskoj A bombi, 3, Šutnja“ [The Testimony on the Yugoslav A Bomb, 3, Silence], *Hrvatsko sveučilište*, No. 6, April 22, 1971, 16. Quoted in Bondžić, *Između ambicija i iluzija*, 304.

⁹²⁹ Ante Batović, *The Croatian Spring: Nationalism, Repression and Foreign Policy Under Tito* (London; New York: I.B. Tauris & Co. Ltd, 2017); Bilandžić, *Hrvatska moderna*, 534-609.

According to Bilandžić, “the greatest paradox” of the political environment in Yugoslavia in the early 1960s was that the country could boast rapid economic development in the previous period and a strengthened international position, while “in the center of the absolute power, in the state-party top, the situation of blockade and paralysis was being created, threatening disintegration, not only of the League of Communists, but also of the social structure, and the state itself.”⁹³⁰ A significant part of the problem, which revived old nationalist divisions, was related to the everlasting competition for the investments from the federal budget, sparking the conflict between developed and underdeveloped republics. This created two interest groups, one led by Ranković and the Serbian political leadership, which included also the political elite from Bosnia and Herzegovina and parts of Dalmatia, while in the opposing group were representatives of Slovenia, Croatia, and Macedonia, led by Kardelj. In the backdrop of the conflict was the ongoing debate about the new constitution, which was being prepared by Kardelj, and which favored the model of confederation, while Ranković was more inclined to the existing centralized model.⁹³¹

The conflict reached its peak during the meeting of the Executive Committee of the Central Committee of the League of Communist of Yugoslavia, on March 12-14, 1962, when the discussion regarding the future state organization reached a deadlock between two opposing camps. The meeting revealed that the federal government was dysfunctional, with each republic trying to secure for itself as the largest chunk of the federal budget. The debate was so heated that Tito became distressed and for the first time anticipated the collapse of Yugoslavia; he even offered his resignation two times, which of course was not accepted. While Tito did not choose sides in the conflict, he eventually called for unity in the Party, supported by

⁹³⁰ Bilandžić, *Hrvatska moderna povijest*, 397.

⁹³¹ Pirjevec, *Tito i drugovi*, 462-466.

two powerful political figures and die-hard conservative communists, Ranković and General Gošnjak. This spelled an immediate disaster for Kardelj's plans but, as it turned out, this was also the last time Tito supported Ranković. On April 7, 1963, the new constitution came into force, promoting self-management and decentralization, two concepts Ranković fought against, recognizing them as forces that would undermine the Party and strengthen nationalism.⁹³²

This was the backdrop of Ranković's activities in the SKNE and his eventual removal from the position of its president. This is also the context in which Supek's attack should be understood, since all the basic points he raised correspond hand in glove with arguments used against the centralized state model in the ongoing discussion among the Yugoslav political leadership. According to some later accusations against Ranković, there was at least one year when "more money went to the Commission [SKNE], than for the entire remaining scientific research" in the country.⁹³³ While these estimates may be overblown, the official funds dedicated to the SKNE were necessarily huge and would be a thorn in the eye to those who advocated decentralization, or simply channeling of federal funds to their own republic.

Returning to Ranković's attempt to push the Perspective Plan through the official system and secure necessary funding for the atomic bomb project, the fact that he was replaced by Avdo Humo seems like a deeply symbolic sign that Ranković's strategy was uncovered. As the President of the Board for Social Planning [Planning Commission], Humo would be a crucial link in this process; had the discussion in the SKNE been successful, he would have probably approve the Perspective Plan without

⁹³² Bilandžić, *Hrvatska moderna povijest*, 397-410; Pirjevec, *Tito i drugovi*, 462-466, 473-475; Dimitrijević, *Ranković, drugi čovek*, 263-266; Batović, *The Croatian Spring*, 62.

⁹³³ Dimitrijević, *Ranković, drugi čovek*, 270.

much or any additional discussions. Unfortunately for Ranković, as a staunch supporter of self-management and decentralization, Humo was in the opposite camp, which makes him the other potential person who forwarded Supek's accusations to Tito. Four years later, Humo was in charge of the enquiry about the UDB activities in the aftermath of Ranković's political downfall, and a person who accused him in the National Assembly for the conspiracy and attempted coup.⁹³⁴ Therefore, his appointment to the position of the President of the SKNE in 1962 may have been a sort of a reward, adequate to his performed loyalty to Tito, which was reconfirmed four years later.

Supek eventually 'survived' Ranković's removal from the SKNE, only to abandon the nuclear program and the SKNE by the end of 1963. He continued to fight against the nuclear program in different federal bodies and through the Yugoslav group of the Pugwash Conference he helped to establish in 1963.⁹³⁵ Supek was a leading nuclear physicist in Yugoslavia, as well as a leading figure in the country's nuclear program, who eventually became a recognized activists against it, a Yugoslav version of Andrei Sakharov. On the other hand, he did have a lot to fight against since the Yugoslav nuclear program continued basically undisturbed and more or less according to Perspective Plan. Ranković remained a powerful figure and was capable to get a conciliatory prize when the new Constitution came into force. In order to support the new Constitution, he instead on establishment of the office of the Vice-

⁹³⁴ Pirjevec, *Tito i drugovi*, 446; Dimitrijević, *Ranković, drugi čovek*, 384-385; Batović, *The Croatian Spring*, 60.

⁹³⁵ Hymans, *Achieving Nuclear Ambitions*, 193-194; Bondžić, *Između ambicija i iluzija*, 216-217. Bondžić uses the fact that Supek stayed in the SKNE after the removal of Ranković, as an evidence that he did not protest against nuclear weapons as such, but particularly against Ranković as a part of the internal conflict. This has a grain of truth in it, as presented here, but the fact is that the records show that Supek did not participate in not a single SKNE meeting after October 1, 1962, which was the first meeting presided by Avdo Humo. AJ, 177, f. 17. Zapisnik sa sednice Savezne komisije za nuklearnu energiju [Minutes from the Meeting of the SKNE], October 1, 1962. Other meetings were held on January 11, May 17 and November 8, 1963.

President, which he filled between 1963 and 1966. This formally confirmed his position of the second most powerful political figure in the country, and informally designated him an heir to Tito's throne.⁹³⁶

These circumstances were evident in the Federal Executive Council's (Yugoslav Government) tightly balanced decision to eventually accept the Perspective Plan for Development of Nuclear Energy in Yugoslavia for the period 1961-1965, but with important reservations. The plan was "accepted as a general orientation about activities of the Commission for nuclear energy", which will be "scrutinized in its entirety during the discussion and deliberation of the next long-term plan for the economic development of Yugoslavia." Considering financing of the SKNE activities envisioned in the Perspective Plan, it was decided that funds will be provided on an annual basis. More importantly, it was concluded that the SKNE "should orient itself on gradual decentralization in the field of nuclear energy [...], that is, on gradual transfer of tasks and financing on republics or the republican councils for scientific work, scientific institutes, economic enterprises, etc."⁹³⁷

Unsurprisingly, the decision was forwarded also to the office of Avdo Humo, who obviously was a link between the Supek's critique of the Perspective Plan in the SKNE, and the final decision of the Federal Executive Council. All the financing was conditioned by annual analysis of the SKNE's performance, but also completely in accordance to the policy of Ranković's political adversaries, who favored decentralization in management and financing. Therefore, even without any formal document about his removal from the SKNE, which seems to be lost if it ever existed, sufficient evidence supports the claim that Ranković was, one way or another,

⁹³⁶ Pirjevec, *Tito i drugovi*, 476

⁹³⁷ AJ, 130 Savezno izvršno veće [Federal Executive Council], f. 601 (in further reference: AJ, 130, f. 601). Decision of the Federal Executive Council sent to the SKNE, August 10, 1962.

removed from the SKNE under the pressure of his political opponents in Yugoslavia and certainly with an approval of Tito.

Did Ranković want to construct nuclear weapons? Supek's assumption that the atomic bomb was Ranković's "instrument to grab a full power" over science, industry and the army, does fit this scenario. On the other hand, it is also a fact that the atomic bomb was a top priority, not only to Ranković, but also to the entire top echelon of the Yugoslav political leadership at least since 1950, which was something Supek was not interested in, was not directly included in, and according to his own words, was not completely aware of until 1962. Without making any definitive claims at this point, it is important to emphasize that Ranković remained very powerful figure and the Yugoslav nuclear program was not terminated, even if the desire for the construction of nuclear weapons started to be questioned. This also became evident to Supek, who left the SKNE after the meeting on October 1, 1962, the first one presided by Humo, when it became clear that Ranković's Perspective Plan was going to be implemented, even if without his official supervision.⁹³⁸

Go to the IAEA

Lack of formal control over the country's nuclear program was not a serious setback to Ranković's plans. Even though he was known as the head of the Yugoslav secret police UDB, the fact is that he left the position back in 1953, installing his henchman Svetislav Stefanović-Ćeća as a formal successor, while in reality Stefanović was nothing more than an important knot in Ranković's network of clients. This relation and his tight grip over the UDB activities was formalized through his

⁹³⁸ . AJ, 177, f. 17. Zapisnik sa sednice Savezne komisije za nuklearnu energiju [Minutes from the Meeting of the SKNE], October 1, 1962.

position of the President of the Security Board of the Federal Executive Council which he held between 1953 and 1963, as the Vice-Prime Minister. Although he left this office in 1963, as the Vice-President of Yugoslavia he still had a strong political authority. In addition, Ranković kept the position of the Party Secretary, as well as other important positions he held.⁹³⁹ Although he could not count on Avdo Humo, and most likely also General Gošnjak in the SKNE for loyalty, a network of his clients throughout the entire nuclear establishment and Serbia as his power base had to suffice.

The IAEA became a tempting solution to many problems experienced within Yugoslavi. Immediately after its formal establishment in 1957, Ranković started exploiting this option. An additional benefit was that cooperation with the IAEA would necessarily grant him, and Yugoslavia in general, sympathies in the United States, whose administration had their own interests in promoting the IAEA. This benefit was already visible in the appointment of Milan Osredkar from the IJS in Ljubljana as the new IAEA Director of the Division of Reactors, where he stayed until 1962.

Dragoslav Popović was the next important name among Yugoslav scientists to be appointed to a position within the IAEA. Between 1961 and 1964, he was the IAEA Director of Safeguards, an important post in the budding nonproliferation regime, although at the time it was yet to be established properly. The existing historiography mentions that this was his “ambitious departure” from the Yugoslav nuclear program as a scientist “socialized into the international nuclear community” to

⁹³⁹ Dimitrijević, *Ranković, drugi čovek*, 270, 273; Batović, *The Croatian Spring*, 59. Ranković was the president of the Union of Veterans of the National Liberation War [*Savez udruženja boraca Narodnooslobodilačkog rata*] SUBNOR, formally a civilian organization but with extensive political power, mostly through the social standing and authority veterans had in Yugoslavia, many of whom also performed a variety of other political duties.

an extent that working on realization of “Tito’s grand nuclear ambitions” became incompatible with this international career. Within the IAEA, he “shepherded Yugoslavia to sign an IAEA safeguards agreement” as one of the very first countries to do so.⁹⁴⁰

In fact, Popović remained a member of the SKNE, being noted as officially “absent” for most of meetings between 1961 and 1964. He eventually returned to Yugoslavia by December 1964, continuing to work as a full member of the SKNE in following years. It is important to stress that he participated in two meetings in 1963, despite his formal obligations at the IAEA, and during a period of Supek’s silent protest expressed by his boycott of the SKNE meetings, lasting between October 1962 and the end of 1963.⁹⁴¹ Much like Supek, Popović was a physicist with international status, but unlike Supek, he also continuously proved his dedication and loyalty to the country’s nuclear program, performing not only covert operations abroad, but also conducting a number of sensitive diplomatic missions and negotiations. All of these evidence paint a rather different picture of Popović than suggested by Hymans, which was strange to begin with as it would have happened at the time of the most heated debates about the Perspective Plan and construction of atomic bombs, and with Ranković at the zenith of his power.

Unsurprisingly, not only did Popović not abandon the Yugoslav nuclear program, but he actually continued to operate as a sort of a SKNE agent infiltrated within the IAEA. Immediately upon his arrival to the IAEA, he sent his first

⁹⁴⁰ Hymans, *Achieving Nuclear Ambitions*, 185-189. Bondžić uncritically accepts Hymans’s results.

⁹⁴¹ AJ, 177, f. 19. Organi i tela SKNE, 1964-65. Zapisnik i materijali sa VII sednice Savezne komisije za nuklearnu energiju [Organs and Bodies of the SKNE, 1964-65. Minutes and Materials from the Seventh Meeting of the SKNE], December 25, 1964. Popović was present on the SKNE meeting on November 8, 1963 AJ, 177, f. 17. Zapisnik sa III (treće) sednice Savezne komisije za nuklearnu energiju [Minutes from the Third Meeting of the SKNE], November 8, 1963), and on January 11, 1963 (AJ, 177, f. 17. Zaključci sa I sednice Savezne komisije za nuklearnu energiju [Conclusions of the First Meeting of the SKNE], January 11, 1963

impressions in a letter to Slobodan Nakićenović, which may be read as a specific ‘ready-to-go’ signal:

“I slowly get acquainted with the work. Even though instead of congratulations, everybody is expressing their condolences, I am not at all discouraged. It [the job] will be done under the existing conditions – period. [...] Cole appointed me (that is, the Director of Safeguards) as the permanent representative of the Agency with the Bureau of Control in the European agency for nuclear energy (OEEC) [European Nuclear Energy Agency], so I will participate in their meetings (in Paris), and I will get another worry on my back. [...] Nothing more for now. I expect to see you in Belgrade soon. Send my regards to everybody in the Commission [SKNE] and at [your] home.”⁹⁴²

The type of military discipline in executing given orders visible in Popović’s language would be quite surprising for a scientist of his status, although not something previously unseen or unattested within the Yugoslav nuclear apparatus, and particularly in the IBK in Vinča. The letter also confirms that he did not leave the SKNE or the Yugoslav nuclear program. On the contrary, regarding the ongoing discussion about the Perspective Plan, he openly expressed his hope that “at least energy will wait for me in Belgrade, although it would be better to have something sooner”, underlining that his position in the IAEA was more of a current task he had, like many others he successfully performed, not a career choice.⁹⁴³

This letter was followed with Nakićenović’s response in which he sent a number of questions regarding Popović’s opinion about ongoing joint projects and

⁹⁴² AJ, 177, f. 9. Personal letter of Dragoslav Popović to Slobodan Nakićenović, May 19, 1961.

⁹⁴³ *Ibid.*

negotiations between the SKNE and IAEA, “so we [SKNE] would have a clear orientation in the upcoming negotiations with the Agency’s representatives.”⁹⁴⁴ The aforementioned case of cooperation will be discussed in details in the following sub-chapter, but this exchange clearly reveals the nature of relations between the SKNE and its employees sent for either specialization abroad or as country’s representatives in international organizations. It also shows that the old espionage activities, as established in the early 1950s, had adapted to new circumstances; even the names of the main characters remained the same.

Documents do not add much about Popović’s other intelligence activities within the IAEA, but it is safe to assume that he was minimally informing the SKNE about different activities within his department, as suggested in the exchange with Nakićenović. In a position where he would be the first to know any changes, and perhaps being the one to design them, as Fischer suggests⁹⁴⁵, Popović could have minimally notified the SKNE in advance about the IAEA’s plans in that field, which would have been more than significant information for the nuclear establishment of a nation aspiring to secretly construct nuclear weapons within the context of the simultaneous, albeit gradual evolution of the system of safeguards.

For example, the IAEA’s first safeguards were established on January 31, 1961. Among other provisions, it stipulated inspections of nuclear reactors provided in arrangements through the IAEA, but only of those under 100 MW thermal power.⁹⁴⁶ While there is no clear evidence to support the following claim, this may have been one of the reasons why the authors of the SKNE’s infamous “Information” preferred

⁹⁴⁴ AJ, 177, f. 9. Personal letter of Slobodan Nakićenović to Dragoslav Popović, May 22, 1961.

⁹⁴⁵ David Fischer, *History of the International Atomic Energy Agency: The First forty Years* (Vienna: IAEA, 1997), 132. Fischer mentions Popović, under his nickname ‘Dragan’, as a person “who helped establish the IAEA’s role in safeguards.”

⁹⁴⁶ Fischer, *History of the International Atomic Energy Agency*, 247-249.

nuclear reactor of 200 MW thermal power, which would not fall under the IAEA safeguards, even if it would be purchased or constructed with the Agency's assistance. On the other hand, knowing how much importance was attached to the establishment of the system of safeguards, he could have signaled the SKNE to accept them early on, as it did in 1962, for the U.S. supplied TRIGA II nuclear reactor for the IJS in Slovenia, and for a potential transfer of two AGN 211 P-type training reactors.⁹⁴⁷ These were training and research reactors and would not contribute to a military program, except regarding basic training of 'cadres'. So accepting the IAEA safeguards on them, and so early on in the game, would produce propaganda points for Yugoslavia and Tito, without jeopardizing any sensitive activities in the country, and particularly those at the IBK in Vinča. On the other hand, it is also a fact that the USAEC would not sell them without accepting the IAEA safeguards.

By 1962 the SKNE had formalized the cooperation with foreign partners through an internal guidebook, a set of orders and suggestions for the personnel of the SKNE and nuclear institutes to follow. Reminiscent of almost identical plans for its predecessor UKRNI in 1948, this guidebook covered all aspects of cooperation, starting with conferences and specializations in foreign institutes, to purchases of equipment and nuclear material. Naturally, these activities had to be anticipated in annual plans and approved in advance by the SKNE, written records had to be prepared for the SKNE "by experts who spent time abroad on specific tasks, as well as of foreigners who spent their time in or visited any of our institutions". It was particularly emphasized that Yugoslav scientists can be sent abroad only if it is

⁹⁴⁷ AJ, 177, f. 1. Strogo poverljive zabeleške za izbor reaktora za univerzitete u Zagrebu i Beogradu [Top Secret Notes of the Commission for Selection of the Reactor Type for Universities in Zagreb and Belgrade], June 3, 1960; *Annual Report of the Board of Governors to the General Conference 1 July 1960–30 June 1961*, GC(V)/154, IAEA, 16; *Annual Report of the Board of Governors to the General Conference 1 July 1961–30 June 1962*, GC(VI)/195, IAEA, Vienna (1962), 9; *Annual Report of the Board of Governors to the General Conference 1 July 1962–30 June 1963*, GC(VII)/228, IAEA, Vienna (1963), 18. The arrangement for two smaller research reactors eventually never was realized.

impossible to train them in the country, “or if this accelerates execution of tasks and cuts costs.” In that respect, it was also suggested to institutes to “use as much as possible foreign stipends”, targeting the IAEA and U.N. Technical Aid programs as the most favorable option.⁹⁴⁸ There are no doubts that this was just a formalization of existing practices, and that Popović followed these suggestions to the letter, having a vast experience with similar tasks.

If the documents do not support directly the claim that Popović was the Yugoslav cuckoo’s egg at the IAEA, there is plenty of undeniable evidence that Slobodan Nakićenović, his successor on the position of the IAEA Director of Safeguards, truly was a spy. Hymans uses his biography as one of the main examples for “desperate departures” among top-ranking Yugoslav scientists from the nuclear program.⁹⁴⁹ According to him, “understanding that the end [of the Yugoslav nuclear program] was near,” Nakićenović took a position of the IAEA Director of Safeguards in 1964, and moved permanently to Vienna.⁹⁵⁰

While the basic facts are true, particularly regarding Nakićenović’s permanent stay in Vienna, in my view this account of his biography is superficial and ultimately wrong, as are the conclusions based on it. As mentioned earlier, since the very beginning of the Yugoslav nuclear program in the late 1940s, Nakićenović was one of the main organizers of the Yugoslav nuclear espionage network abroad. His departure from Yugoslavia to the IAEA in 1964, after more than two decades of working on the most confidential tasks and positions in the country during and after the Second World War, strongly suggests that this move was yet another intelligence task where his loyalty and expertise could be exploited. Much like Popović, he was in an excellent

⁹⁴⁸ AJ, 177, f. 17. Zaključci o saradnji sa inostranstvo u oblasti nuklearne energije [Conclusions Regarding Cooperation With Foreign Countries in the Field of Nuclear Energy], March 1962.

⁹⁴⁹ Hymans, *Achieving Nuclear Ambitions*, 194.

⁹⁵⁰ Hymans, “Proliferation Implications of Civil Nuclear Cooperation”, 98.

position to gather sensitive information about the IAEA activities and channel them covertly back to Yugoslavia, effectively embodying an almost classic Cold War image of a diplomat, soldier and a spy.

Beside several confidential reports about the internal dynamics of the IAEA and possibilities for the SKNE to install even more of their representatives to different Agency's departments, in 1965 Nakićenović sent back to Belgrade a highly confidential IAEA report about the American newly built spent fuel reprocessing plant, capable also for "production of plutonium." Nakićenović's task at the IAEA reveals itself through the report and his suggestion that the information it contained could be interesting to the one Yugoslav scientist who worked on the same problem on a laboratory scale at the IBK:

"The second material is a top secret [original emphasis], because it provides information on the facility for reprocessing of irradiated fuel and production of plutonium, which is mostly classified."⁹⁵¹

The American plant in case was the Nuclear Fuel Services Inc.'s (NFS) West Valley (New York) facility, which became operational in 1966 as the first private plant in the United States to reprocess spent nuclear fuel.⁹⁵² According to Fischer, this was the facility in which the IAEA performed its first inspection of a fuel reprocessing

⁹⁵¹ AJ, 177, 1. Top secret report from Slobodan Nakićenović, November 6, 1965; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 171. The scientist mentioned here is Zdenko Dizdar, a brother of Vojno Dizdar who complained back in 1956 how he was driven at high speed around some of facilities he wanted to visit in the United States. On a symbolic level, Nakićenović righted this 'wrong' in 1965.

⁹⁵² *Plutonium & Uranium Recovery from Spent Fuel Reprocessing by Nuclear Fuel Services at West Valley, New York, from 1966 to 1972* (US Department of Energy, Office of Defense Programs, November 1999), 1, 4-5. In total, by 1972 the NFS's West Valley facility recovered 1,926 kg of plutonium.

plant in August and September 1967, and it was necessarily prepared based on the earlier report used by Nakićenović which represented “first steps of the Agency towards preparation of the system of guarantees for such facilities in the future”.⁹⁵³ The inspection itself was “designed to test the procedures for accounting for all declared nuclear material.”⁹⁵⁴ In other words, this inspection was designed by Nakićenović, or minimally under his supervision as the IAEA Director of Safeguards, following the general agenda for strengthening and expansion of the safeguards procedures, and at the time of heated negotiations about the Treaty on the Nonproliferation of Nuclear Weapons (NPT).

The fact that Nakićenović used his position of the IAEA Director of Safeguards to send the entire highly confidential report about the most modern U.S. nuclear fuel reprocessing facility, with detailed explanations about processes used, and at the time when Yugoslavia was preparing its own similar facility on a laboratory scale, confirm his real task at the IAEA.⁹⁵⁵ His leaving was far from a disgruntled departure, and much closer to an enthusiastic performance of covert activities behind enemy lines. The episode also adds weight to previous suggestions about activities of his predecessor, Dragoslav Popović, who received tasks directly from Nakićenović. Naturally, it would be difficult to see at the top of the chain of command anybody else except Ranković, although no claims can be made.

It would also be difficult to accurately estimate how much this report helped Yugoslav scientists to master the technology for nuclear fuel reprocessing, although

⁹⁵³ AJ, 177, 1. Top secret report from Slobodan Nakićenović, November 6, 1965

⁹⁵⁴ Fischer, *History of the International Atomic Energy Agency*, 252.

⁹⁵⁵ AJ, 177, 1. Top secret report from Slobodan Nakićenović, November 6, 1965; AJ, 177, 1. Top secret report from Slobodan Nakićenović, June 8, 1966. The report is descriptive, but it contains detailed description of the entire technology for extraction of plutonium, including order of activities, procedures, equipment and chemicals used in the process, batch size, estimated costs and profits, personell structure and eventually the layout of the facility, all of which was not enough for this author to understand the technology, but it must have been plenty for a scientist engaged in developing the same technology back at the IBK.

the fact remains that in 1966 the IBK recovered first quantities of plutonium from spent fuel, using the same process (PUREX) as the NFS's West Valley facility.⁹⁵⁶ If nothing else, this report helped Yugoslav scientists to confirm their technical choices in the design of the fuel reprocessing laboratory and potentially save time. Its impact may be compared to the impact of the information provided by Klaus Fuchs to the Soviets and their atomic bomb effort, which did help the Soviet scientists not to waste time exploring different bomb designs or other potentially blind alleys.⁹⁵⁷ More importantly, Nakićenović and Popović can be compared to Fuchs, at least considering their intelligence gathering activities.

Combining all available pieces, this sub-chapter shows that the initial enthusiasm about the Yugoslav nuclear program visible during the 1950s, including the desire for development of nuclear weapons, started to rapidly dissipate in the early 1960s. Part of the problem was the internal conflict between two most visible groups: those who supported decentralization of the state-system, led by Kardelj, and the conservative group who preferred the strong centralized states, led by Ranković. The initial conflict did not result in a clear solution, and it seems Tito was happy to try to find a middle way; while the new constitution which supported decentralization and self-management was adopted in 1963, Ranković as the strongest opponent to such policies and the head of the SKNE, as one of the symbols of huge burdens on the federal budget and highly centralized decision-making systems, was removed from the position of its president in 1962. On the other hand, the SKNE and the nuclear program continued to operate in a 'business-as-usual' mode, which suggests that Ranković continued to supervise it informally, through the network of his clients

⁹⁵⁶ AJ, 177, 1. Top secret report from Slobodan Nakićenović, November 6, 1965; Perović-Nešković, (ed.), *Pola veka instituta "Vinča" (1948-1998)*, 170-171; Potter, Miljanić, Šlaus, "Tito's Nuclear Legacy", 65.

⁹⁵⁷ About Fuchs contribution to the Soviet atomic bomb project, see Holloway, *Stalin and the Bomb*, 106-108; 138, 196-201; 222-223.

which spanned most of the country and state administration, but also that Tito still did not want to divorce himself from the possibility to have access to his own nuclear arsenal.

The final puzzle to solve was to find a solution to finance these ambitions without tapping federal funds, at least not more than usual. The solution was found in the cooperation with the IAEA, which could potentially help fill many gaps in the process of raising the country's overall nuclear capacities, while having an added benefit in the propaganda sector. For both of these agendas, Ranković evidently was the best person to organize a dual conspiracy, directed both towards the international and domestic audience; while it could not fool people like Supek, it was successful in almost every other aspect. The first step was to plant operatives in the IAEA, and it seems this task was executed flawlessly. The following sub-chapter will investigate how successful this plan was regarding further development of the Yugoslav nuclear program.

5.2 “Internal” Atomic Energy Agency

“The biggest atomic programs in the world are predominantly developed in the shadow of military programs of major bloc powers. This circumstance is strongly reflected on those parts Of civilian programs which are also[...] of special interest for military programs.”⁹⁵⁸

Among its many purposes and functions, the International Atomic Agency in Vienna (IAEA) served as an international intelligence hub, something Krige elegantly explains as “the fusion between the invocation of internationalism and the pursuit of national interest”, a functional combination of sharing with surveillance.⁹⁵⁹ Krige analyzes these topics from the perspective of the United States, as a country which invested itself in the establishment and recognition of the IAEA and its international mandate. It was already shown that Yugoslavia, and probably other developing nations, understood very well the overall environment, and consequently, the usefulness of having their own people installed in the IAEA management.

The cooperation through the IAEA was very significant for Yugoslavia, considering impressive but equally problematic bilateral cooperation in ‘peaceful uses of nuclear energy’ as the SKNE representatives never missed an opportunity to emphasize. In fact, Yugoslavia was “a major recipient of Atoms for Peace largesse,” which included research reactors, sensitive technology, financial and technical assistance, and specializations in the leading nuclear institutes for the country’s

⁹⁵⁸ AJ, 177, f. 17. Plan razvoja nuklearne energije u Jugoslaviji u periodu 1961-1965 [Plan of the Development of Nuclear Energy in Yugoslavia in the Period 1961-1965], March 1962.

⁹⁵⁹ Krige, “Techno-Utopian Dreams, Techno-Political Realities, 152; Krige, “Atoms for Peace, Scientific Internationalism, and Scientific Intelligence”, 180-181.

scientists.⁹⁶⁰ By the beginning of 1980s, Yugoslavia was ranked seventh among states with the most cumulative historical IAEA technical assistance.⁹⁶¹

The opening thought of this sub-chapter comes from the section of the Perspective Plan (1961-1965) which covers the field of international cooperation. Identifying that the dual-purpose technologies, such as “nuclear raw materials technology, nuclear fuel and reactor materials technology, reprocessing of nuclear fuel and some problems in [radiation] protection” are classified, the Perspective Plan identified the IAEA as the best solution to overcome “bloc divisions” and support construction of “nuclear energy facilities” in developing countries.⁹⁶² These comments confirm that Yugoslavia was aiming to exploit the IAEA and its programs in order to master technologies necessary for the atomic bomb project, all under the pretense of a civilian program. The cooperation with the IAEA could also mitigate the political backlash after stepping out from CERN, indirectly proving that Yugoslavia continued to support and practice cooperation in the field which cuts across Cold War divides. An added benefit was that the IAEA could solve the ongoing conflict, if not a confusion, between fundamental and applied research, as its programs focused predominantly in practical application of science and in a myriad of fields, therefore indirectly confirming that such a policy of development of science was not characteristic for Yugoslavia only.

⁹⁶⁰ Hymans, *Achieving Nuclear Ambitions*, 173.

⁹⁶¹ Jonathan Schiff, *International Nuclear Technology Transfer: Dilemmas of Dissemination and Control* (Totowa: Rowman and Allanheld, 1984), 194. Quoted in Hymans, *Achieving Nuclear Ambitions*, 173.

⁹⁶² AJ, 177, f. 17. Plan razvoja nuklearne energije u Jugoslaviji u periodu 1961-1965 [Plan of Development of Nuclear Energy in Yugoslavia in the Period 1961-1965], March 1962.

Demonstrate the power plant

Realizing that only limited assistance could be gained through the cooperation either with the USA or the USSR, and that specializations of Yugoslav scientists in either of these countries for various reasons did not produce expected results, in the early 1960s SKNE started lobbying extensively for the construction of the “international demonstration nuclear power plant” in Yugoslavia designed specifically for the “training of cadres.” This research facility was supposed to become a gathering point for young nuclear scientists from other developing countries where they would receive and eventually exchange their knowledge with their Yugoslav colleagues about the “design, construction and functioning of the nuclear power plants.”⁹⁶³ The project was supposed to be partially financed by the USAEC through the International Atomic Energy Agency (IAEA), Yugoslavia and eventually participating countries, all cleverly wrapped in a narrative of nuclear technical assistance for the developing countries “for peaceful purposes”.⁹⁶⁴

Records reveal that the idea about the construction of the international demonstrational nuclear power plant in Yugoslavia was developed in March 1960, during the official visit of the SKNE representatives to the United States, although the idea was formally promoted during the Fourth General Conference of the IAEA in September 1960, during which Yugoslavia offered to host such a project.⁹⁶⁵ The idea

⁹⁶³ AJ, 177, f. 217. Suggestions for the macro location of the international demonstrational nuclear power plant in Yugoslavia, July 1962, 1.

⁹⁶⁴ AJ, 177, f. 2. Response of the P. Farley, Special Assistant to the Secretary of State, and Y. Hall, Assistant General Manager of the United States Atomic Energy Commission to the SKNE project proposal, June 19, 1961.

⁹⁶⁵ AJ, 177, f. 17. Izveštaj o radu i analiza problema u 1961 [Report on Activities and Analysis of Problems in 1961], March 1962; AJ, 177, f. 9. Informacija o predlogu za izgradnju međunarodne demonstracione nulearne elektrane u Jugoslaviji i Izveštaju Misije Međunarodne agencije za atomsku energiju [Information on the Proposal for the Construction of International Demonstrational Nuclear Power Plant in Yugoslavia and the Report of the IAEA Mission], September 1961; “Official Record of the Thirty-Ninth Plenary Meeting”, International Atomic Energy Agency, General Conference. Fourth Regular Session, September 22, 1960. GC (IV)/OR. 39, December 6, 1960, 16-18, https://www.iaea.org/sites/default/files/gc/gc04or-39_en.pdf (accessed on April 12, 2021).

evolved in following months, and gained its full momentum during the meeting between the IAEA Director, Sterling Cole, and the SKNE Director, Aleksandar Ranković, on May 13, 1961, on the sidelines of the IAEA conference on nuclear electronics, held in Belgrade (May 15-20, 1961). Cole apparently “wholeheartedly accepted this initiative,” and provided his official support to the project in the joint statement for the press, where he emphasized that “the project, construction and operation of such power plant would be of particular interest for less developed countries.”⁹⁶⁶

In his letter to Nakićenović, Popović confirms that at the IAEA headquarters in Vienna “everybody is astonished” that the proposal was accepted and that not even he expected such a favorable response by Cole.⁹⁶⁷ Being in a position to activate the SKNE personnel in the IAEA, Nakićenović’s answered Popović already on May 22, 1961, giving him the task to inquire about the “attitude in the Agency’s apparatus” and among “representatives of other countries” about this project. He particularly asked him to investigate “if behind the idea for the construction of the power plant there is a certain great company”. The fear was that the entire project would end up being a simple purchase of a turnkey facility, something Nakićenović particularly wanted to avoid:

⁹⁶⁶ AJ, 177, f. 9. Zajedničko saopštenje za štampu (MAAE – Jugoslavija). Razgovor potpredsednika Aleksandra Rankovića i generalnog direktora Sterlinga Kola [Joint Press Release (IAEA – Yugoslavia). Conversation of the Vice-President [Vice-Prime Minister of the Federal Executive Council] Aleksandar Ranković and General Director Sterling Cole], May 15, 1961; AJ, 177, f. 9. Internacionalni poduhvat izgradnje demonstracione nuklearne centrale u Jugoslaviji [International Venture to Construct the Demonstrational Nuclear Power Plant in Yugoslavia], n.d., 1961

⁹⁶⁷ AJ, 177, f. 9. Personal letter of Dragoslav Popović to Slobodan Nakićenović, May 19, 1961

“I should not underline that we are not going to go for a purchase of a finished power plant, because we believe that the Agency should work on the development of some improved type of reactor, which would have the perspective to be economical for less developed countries.”⁹⁶⁸

Cole did not waste much time. Already on May 30, 1961, he wrote directly to Glenn Seaborg, the Chairman of the USAEC, suggesting that “[e]xtremely valuable lessons could be learned from such an enterprise”, particularly about “the problems of reactor construction and operation in underdeveloped countries”. He also stressed that the Yugoslavs were ready to participate with roughly 40-60 percent of total costs, which would include the production of certain components in the country, while the entire project costs could be covered “through some joint undertaking between the United States, Yugoslavia and the Agency.”⁹⁶⁹ With a similar idea, only a full month later, Cole sent a letter to Vyacheslav Molotov, who was the Resident Representative of the Soviet Union at the IAEA at the time.⁹⁷⁰ A full month of delay can only be understood as a part of the Cold War conflict and competition, with Cole hoping to provide at least some advantage for the United States. In the following weeks, many letters were exchanged between the SKNE and IAEA representatives, mostly focusing on the preparation of the Preliminary Power Reactor Mission to Yugoslavia, which was supposed to get a better sense of the entire idea and Yugoslav capacities.

As the Director of the IAEA Division of Reactors, Milan Osredkar was also included in the communication. Although the true nature of his activities are impossible to fathom, chances are that they did not differ from Popović’s agenda.

⁹⁶⁸ AJ, 177, f. 9. Personal letter of Slobodan Nakićenović to Dragoslav Popović, May 22, 1961

⁹⁶⁹ IAEA Archives, SC/512-YUG-1. Science. Agency Participation in Small Power Reactor Projects in Member States – Yugoslavia, 1961-1966 (no Box no.) [IAEAA, SC/512-YUG-1]. Letter of Sterling Cole to Glenn Seaborg, May 30, 1961

⁹⁷⁰ IAEAA, SC/512-YUG-1. Letter of Sterling Cole to Vyacheslav Molotov, June 30, 1961.

Minimally, he could have sent to the SKNE all the questions the IAEA experts prepared for their Preliminary Power Reactor Mission to Yugoslavia and all the analysis they wanted to perform, thus helping the SKNE to be well prepared to provide all the right answers. Chances are he did exactly that, although it is impossible to make any claims.⁹⁷¹

The first stumbling block appeared almost immediately, and it concerned the funding of the entire project. Despite the promise, the Yugoslav side was actually very interested “in what way the Agency intends to approach the realization of this project and from which sources it intends to secure necessary financial resources.”⁹⁷² Within the IAEA management, it also became clear that “obviously, the Yugoslav Authorities are still of the opinion that the proposed Power Demonstration Project should merely be an Agency project with a significant contribution by Yugoslavia.” It was also added that the project should be considered as “a joint undertaking [...] for the time being”, but that eventually “this should be a Yugoslav project.”⁹⁷³ Both parties in this project proposal had an obvious problem to secure the necessary funds, and while Yugoslavia could not count on availability of funds, nor the industrial capacity, the IAEA preferred the role of “a link between Yugoslavia and other Member States which might be interested in the project, or as the executing agency for an international source of finance.”⁹⁷⁴

The second problem was that such a project would be impossible to keep secret within the organization that, beside its statutory obligations, served as a global diplomatic and intelligence hub. During the Fourth General Conference of the IAEA in September 1960, the President of the Pakistan Atomic Energy Commission

⁹⁷¹ IAEAA, SC/512-YUG-1. Preliminary Power Reactor Mission to Yugoslavia, June 23, 1961.

⁹⁷² AJ, 177, f. 9. Personal letter of Slobodan Nakićenović to Dragoslav Popović, May 22, 1961.

⁹⁷³ IAEAA, SC/512-YUG-1. Preliminary Power Reactor Mission to Yugoslavia, June 23, 1961.

⁹⁷⁴ IAEAA, SC/512-YUG-1. Letter of Sterling Cole to Vyacheslav Molotov, June 30, 1961.

(PAEC), Dr. Ishrat Husain Usmani, announced that Pakistan was also interested in constructing a similar nuclear power reactor “which would be of interest for less developed countries.” Soon after the official press release about conversations between Cole and Ranković in Belgrade in May 1961, Usmani flew to Vienna to continue his own campaign with the IAEA. As Cole eventually suggested, the IAEA wanted to consider both options, supporting the construction of one nuclear reactor of roughly 20 MW in Yugoslavia, and of 50 MW for Pakistan.⁹⁷⁵

These proposals took a life of their own within the IAEA and the Cold War context, rapidly growing outside of their originally designed framework and with much more active role of the developing nations than expected. As soon as Usmani arrived in Vienna, he arranged a meeting with Cole without Yugoslav representatives and “energetically attacked the idea of construction of demonstrational facility in Europe, and specifically in Yugoslavia, denying any value of this project to less developed countries” in Asia. The Yugoslav side did not sit idle either, working frantically to “stop connecting Yugoslav and Pakistani project.” In all these activities, Yugoslavia had the full support of the “Deputy Director-General, the Frenchman Balligand”, who kept the Yugoslavs posted about Usmani’s activities and also promoted the Yugoslav proposal with Cole. While it may be argued that he had some sympathies for the Yugoslav cause on a political level, or as an interested professional, it can also be read between the lines that he was also trying to promote to the Yugoslavs several French experts as advisors, and potentially even secure lucrative business arrangements for French companies. Yugoslavia also enjoyed full support from the Indian representative in the IAEA, Ambassador Arthur Lall, who was acting not only against the Pakistani proposal, but also in order to secure the

⁹⁷⁵ AJ, 177, f. 9. Izveštaj o razgovorima vođenim u MAAE 1. i 2. juna 1961. u Beču [The Report about Conversations Conducted in the IAEA on the June 1 and 2, in Vienna], n.d., 1961.

Yugoslav support for the election of Sigvard Eklund as the next Director-General of the IAEA, commenting that Cole's performance was "a very distinguished failure."⁹⁷⁶

The cooperation among two leading non-aligned countries once again proved to be based on their individual interests, not on any shared system of values or policies. The episode also reveals inner dynamics of the IAEA activities in the years of its establishment as a functional international organization. Although this may be qualified as merely one example, considering the potential importance of the project and the period, it would be difficult find a better one. More importantly, the two most active countries attempting to rapidly secure the IAEA technical support and accelerate their own nuclear programs were Yugoslavia and Pakistan, countries that also worked intensively on their respective atomic bomb projects. This situation was visible even through people involved in the initiative: Usmani (President of the PAEC, 1960-1972) as the person who helped establish the Pakistan nuclear program, and Nakićenović (Secretary of the SKNE), who was, for all practical purposes, Ranković's right hand man and his executive officer, who coordinated all practical activities within the Yugoslav nuclear program since the late 1940s.⁹⁷⁷

The negotiations eventually resulted in the IAEA Preliminary Power Reactor Mission to Yugoslavia, organized between July 1 and 7, 1961. The mission included visits to Yugoslav scientific institutes and industrial companies targeted potential suppliers of the workforce and more conventional components for the future power plant, respectively.⁹⁷⁸ The result was the Information about the International Project to

⁹⁷⁶ AJ, 177, f. 9. Izveštaj o razgovorima vođenim u MAAE 1. i 2. juna 1961. u Beču [The Report about Conversations Conducted in the IAEA on the June 1 and 2, in Vienna], n.d., 1961; AJ, 177, f. 9. Razgovori sa guvernerom Indije, ambasadorom Lall-om [Conversations with the Governor of India, Ambassador Lall], June 2, 1961

⁹⁷⁷ About Pakistani quest for nuclear weapons see Khan, *Eating Grass*.

⁹⁷⁸ AJ, 177, f. 9. Informacija o internacionalnom poduhvatu izgradnje demonstracione nuklearne centrale u Jugoslaviji [Information about the International Project to Construct the Demonstrational Nuclear

Construct the Demonstrational Nuclear Power Plant in Yugoslavia, a feasibility study of the entire project. The study concluded: to advance the project to the next level by preparing the “fore-project which should contain the final decision of the type and size of the reactor, the study of the site selection, the definite optimized choice of the main characteristics, the investment cost estimate, the general lay-out of the plant and the details of the organizational set-up of the project”, all under the supervision of the IAEA.⁹⁷⁹

In following months, Yugoslavia invested a lot of energy in promoting the project, and undermining the Pakistani idea, engaging all its embassies and other diplomatic representatives abroad.⁹⁸⁰ It would be difficult to imagine that realizing such a project would be impossible without the support of at least one of the superpowers; therefore it is not a surprise that the Yugoslav Embassy in Washington D.C. received more detailed instructions than other missions.⁹⁸¹ Seaborg was nominally enthusiastic about the project, although he did advise caution in his reply to Cole, suggesting that more experience must be gained by “countries more advanced in nuclear technology”, before similar projects are supported in developing nations:

“The U.S. has been reluctant to encourage countries less advanced in nuclear technology to undertake such projects until the economics of these small-scale plants have been adequately demonstrated to warrant installation of such plants in these countries. This, in my view, does not

Power Plant in Yugoslavia], n.d., 1961; IAEAA, SC/512-YUG-1. Travel Report on the Preliminary Power Reactor Mission to Yugoslavia, July 14, 1961. The international IAEA team included Pierre Balligand (France; Deputy Director-General), Sanches del Rio (Spain; Director of the Division of Reactors), George Petretic (USA), Boris Semenov (USSR) and F. Pikler (Hungary).

⁹⁷⁹ IAEAA, SC/512-YUG-1. IAEA Report of the Preliminary Mission to Study the Feasibility of Building an International Demonstration Power Reactor in Yugoslavia, September 1961.

⁹⁸⁰ AJ, 177, f. 9. Ambasade i poslanstva FNRJ [Embassies and Diplomatic Missions of the FPRY], n.d., 1961. The main argument against the Pakistani project was that the Yugoslav had “an international character” and that Yugoslavia offered a significant contribution of up to 50 percent of investments.

⁹⁸¹ AJ, 177, f. 9. Ambasada Washington [The Embassy in Washington], n.d., 1961.

necessarily rule out the possibility of a cooperative program along the lines you have suggested depending on the soundness of the specific proposals that are developed and the technical benefits that would secure.”⁹⁸²

The U.S. representatives in the IAEA, Brady and Trevithick, revealed more about the USAEC position regarding the Yugoslav project proposal. Officially they showed their keen interest, but also revealed that “they are not sure what position the State Department and the Atomic commission of the USA will take, considering that the new administration’s policy towards the IAEA had not been formulated yet.”⁹⁸³ Their answer confirms that the ongoing establishment of the new administration in the United States played an important role in delaying any important international cooperation in peaceful uses of nuclear energy, as already attested in the bilateral arrangements between the USAEC and SKNE.

An additional problem for the SKNE was that Cole’s mandate at the IAEA was also nearing its end, which would make him reluctant to invest himself into any long-term project. The timing of the Yugoslav project proposal could hardly be worse, being stretched over the period between mid-1961 and mid-1962, as one of the most problematic period of the Cold War, which culminated in the Cuban Missile Crisis during fateful ‘thirteen days in October’ of 1962. Within this framework, it is hardly a surprise that during negotiations about the project, Emelyanov made a public statement against any joint projects through the IAEA. It is also understandable that in

⁹⁸² IAEA, SC/512-YUG-1. Glenn Seaborg’s letter to Sterling Cole, July 10, 1961.

⁹⁸³ AJ, 177, f. 9. Razgovori sa predstavnicima misije SAD pri MAAE [Conversations with the USA Representatives in the IAEA], June 2, 1961.

such a toxic environment Cole “became scared of its own statements given in Belgrade” after his meeting with Ranković.⁹⁸⁴

The importance of the project for constructing a demonstrational nuclear power plant in Yugoslavia can be analyzed from many different perspectives. Considering the general narrative of an “international character” of the project, its focus on “less developed countries”, clearly aimed to reinforce the image Yugoslavia as a leader among non-aligned countries, which was particularly important in the context of the first Non-Aligned Conference, held in Belgrade in September 1961. Tito did emerge as the most important figure of the budding Non-Aligned Movement (NAM) and the creation of such a center for education and training of scientists and technicians from the member states fits perfectly with this policy. This project would also represent a new and important activity of the IAEA, which could not brag about any multinational projects of this or even similar size or significance in the previous period. The cooperation with the IAEA fit perfectly with the overall Yugoslav foreign policy, which preferred the United Nations and other international organizations to any specialized or bloc formations, regardless of their agenda or character.

The comparative analysis of the Yugoslav Perspective Plan for Development of Nuclear Energy (1961-1965) and the IAEA’s Information about the International Project to Construct the Demonstrational Nuclear Power Plant in Yugoslavia (September 1961), reveals that the SKNE had successfully planted the central component of its Perspective Plan to the IAEA’s as a joint project for constructing the demonstrational nuclear power plant. In fact, even the complete argumentation used in support of the SKNE’s Perspective Plan was also used in the IAEA’s feasibility study,

⁹⁸⁴ AJ, 177, f. 9. Izveštaj o razgovorima vođenim u MAAE 1. i 2. juna 1961. u Beču [The Report about Conversations Conducted in the IAEA on the June 1 and 2, in Vienna], n.d., 1961.

effectively making it yet another iteration or version, which by this time obviously became a common practice in Yugoslavia.⁹⁸⁵ In other words, the SKNE's Perspective Plan (1961-1965), or at least its central section dealing with the construction of nuclear power plants, was destined to become the IAEA's project, which was supposed to finance it through the participation of its member states, while its technical staff was expected to provide necessary technical support. If successful, this plan would not only distribute costs of the Yugoslav nuclear program worldwide, but it would also secure those 'cadres' Yugoslavia was not able to train in sufficient numbers or at all. More importantly, considering the Yugoslav lingering desire to eventually exploit those capacities and know-how for the construction of nuclear weapons, it would not be too far-fetched to say that, if successful, this would have produced the first international atomic bomb, although under Yugoslav control. The final benefit the SKNE could hope for was to silence internal complaints and pressure for decentralization and control of cash flow from the federal budget, as this arrangement would make the project cheaper, while the SKNE would keep a complete control over the foreign investments.

The fact that basically the same project was simultaneously put into the process of evaluation in Yugoslavia and the IAEA speaks volumes about Ranković's deep understanding of how the centrally planned economy works, as well as his mastery to exploit its advantages, supported with unscrupulousness and audacity of a veteran commanding Cold War intelligence officer. The creation and implementation of such a complex plan which would almost certainly receive support from at least one source, indirectly confirms how important this project and the entire Yugoslav nuclear

⁹⁸⁵ AJ, 177, f. 17. Plan razvoja nuklearne energije u Jugoslaviji u periodu 1961-1965 [Plan of the Development of Nuclear Energy in Yugoslavia in the Period 1961-1965], March 1962; IAEA, SC/512-YUG-1. IAEA Report of the Preliminary Mission to Study the Feasibility of Building an International Demonstration Power Reactor in Yugoslavia, September 1961.

program was to him. On the other hand, it also undermines the credibility of Supek's accusations that Ranković wanted only to use the nuclear program "to grab a full power over science, key industries and in the end, the army". Ranković probably wanted that, but it was the atomic bomb that was his deepest desire.

This is also one of rare occasions that it can be confirmed that Tito received a detailed draft of the project by August 1961. Considering the fact that the project continued to evolve, it is safe to say that he also approved it.⁹⁸⁶ The project was sent to his favorite summer residence at the Brioni islands, making it appealing to imagine Tito sitting in the shade, enjoying his cigars, and perhaps some refreshing drinks, reading and eventually approving a project which would eventually provide him nuclear weapons. On the other hand, this dreamy image dissipates under the weight of the fact that he was officially notified about the entire project only after Ranković finalized most of the details with the IAEA, which can suggest only two things: either Ranković enjoyed Tito's complete trust, or his almost completely autonomous activities raised many red flags. His removal from the SKNE in 1962, and eventual political downfall in 1966, suggest the latter option, but no firm claims can be made. Either way, the SKNE had enough formal authority to perform such activities independently in this and similar matters, even if no hidden agenda existed.

A much bigger problem for Ranković was that the project eventually failed by the summer of 1962. If there is one reason that can tie together all different factors which contributed to such an outcome, it would be poor timing. International relations particularly between the two superpowers was only weeks away from the Cuban

⁹⁸⁶ AJ, 177, f. 9. Strogo poverljivo. Materijali nacrtu II o mogućnostima izgradnje međunarodnog demonstracionog energetskeg reaktora u Jugoslaviji [Top Secret. Materials of the Second Draft on Possibilities of Construction of the International Demonstrational Energy Reactor in Yugoslavia], August 18, 1961. The document was also sent to offices of Edvard Kardelj, Aleksandar Ranković, Mijalko Todorović, Koča Popović and Milentije Popović.

Missile Crisis, while Tito's infamous speech at the Belgrade Conference in September 1961, had already damaged relations between Yugoslavia and the United States, as reflected By delayed cooperation in already agreed arrangements in the field of nuclear energy. The most visible symbol was the decision of the U.S. Congress to suspend the Most-Favored-Nation (MFN) status on October 12, 1962, a privilege Yugoslavia (Serbia) had enjoyed since 1881.

The related problem was that the SKNE obviously wanted to exploit the potential cooperation with the IAEA to fill all the gaps in the country's nuclear program, ranging between lack of finances, 'cadres', and related sensitive technologies, while keeping the entire project as a component of the Perspective Plan. In one of the later reports of the SKNE it was clearly stressed that "the type of the international nuclear power plant [...] should be as close as possible to our national orientation, so the knowledge and experience gained from one, could be used as much as possible in development of our nuclear technologies and energy."⁹⁸⁷ This approach necessarily compromised the credibility of the SKNE and the entire project, which was particularly visible in the insistence on the use of natural uranium, graphite moderated type, as the desired model for the "first generation of Yugoslav nuclear power plants, "which should be based on the use of domestic natural uranium."⁹⁸⁸

Ranković and the SKNE obviously wanted to accelerate the country's nuclear program, using the same logic as in previous years through cooperation with the Soviet Union and United States. The masterplan was not divorced from the general logic of the process of technology development. The beginning was the construction of the RB 'zero-power' nuclear reactor in 1958, based on natural uranium and heavy

⁹⁸⁷ AJ, 177, f. 9. Izveštaj o stanju i radu na predprojektu međunarodne nuklearne centrale [Report on the Status and Activities on the Pre-Project of the International Nuclear Power Plant], June 6, 1962.

⁹⁸⁸ *Ibid.*

water model, which served as a working prototype. Disregarding for the moment the accident that happened with it, it was refurbished with the assistance of the IAEA and continued to be used for its designed purpose. This was followed with the installation of the 6.5/10 MW, ‘Chinese’ or RA reactor in 1959 (slightly enriched uranium and heavy water type), with the aim to be used for training of personnel and a vast spectrum of experiments. The next step was the so-called demonstrational nuclear power plant, designed to produce roughly 25 MW of electric power, based on natural or slightly enriched uranium fuel and graphite type. The underlying idea was to engage Yugoslav industry as much as possible in its design and construction, much like it was unsuccessfully attempted with the RB reactor. This would be comparable to a zero-series production, the last step before the fully independent production of the full-size nuclear power plant. According to the Perspective Plan, this “experimental nuclear facility for production of the nuclear energy”, also known as the demonstrational nuclear power plant, was expected to be constructed “immediately after 1970.”⁹⁸⁹

Returning to the ‘poor timing’ argument, and much like in previous cases, the entire project went far ahead of the actual capabilities. During the intense communication between Belgrade and Vienna about the SKNE’s project in 1961, and before Tito’s infamous speech at the NAM conference in Belgrade, one of the U.S. experts employed in the IAEA commented on the feasibility study of the entire project, targeting all of its deficiencies and flaws:

“Further I believe, care should be exercised to refrain from inferring that the natural uranium reactor would be more suitable than the enriched reactor. It would appear to me that the Yugoslavians

⁹⁸⁹ AJ, 177, f. 17. Plan razvoja nuklearne energije u Jugoslaviji u periodu 1961-1965 [Plan of the Development of Nuclear Energy in Yugoslavia in the Period 1961-1965], March 1962.

would have the same type of problems and the same effort would be required in their solution whether they decide to construct a natural or enriched uranium reactor. Personally, considering the time before large units might be installed in their electric system (which would tend to favor the natural uranium), the smaller enriched reactor would be a more logical choice in this decade.”⁹⁹⁰

The SKNE did try to adapt to these suggestions, which it ‘miraculously’ became aware of, even though it was part of the IAEA’s internal communication. Even if there were no foul play, by the beginning of 1962, the SKNE brought back Milan Osredkar from the IAEA, and gave him a task to form a group of experts of the IJS in Ljubljana which would prepare the concept of the reactor for the demonstrational power plant.⁹⁹¹ By June 1962, the detailed study was ready and sent to the IAEA “for further work and consultations”⁹⁹² This study was evaluated soon after by experts provided on the IAEA requests by the French (P. Bacher, B. Saitcevisky) and British Government (G. Brown), while the requested visit of the Soviet expert was officially postponed on Yugoslav request.⁹⁹³

The report of the IAEA team revealed “that the reactor proposed is a smaller version of the Windscale AGR, but slightly modified with a view to a reduction in size and greater simplicity and safety in operation.”⁹⁹⁴ Although both teams of experts provided by the IAEA to estimate Osredkar’s proposal suggested that “technological

⁹⁹⁰ IAEA, SC/512-YUG-1. G.J. Petretic’s Report on the Yugoslavian Power Reactor Mission, August 31, 1961.

⁹⁹¹ AJ, 177, f. 9. Izveštaj o stanju i radu na predprojektu međunarodne nuklearne centrale [Report on the Status and Activities on the Pre-Project of the International Nuclear Power Plant], June 6, 1962.

⁹⁹² IAEA, SC/512-YUG-1. Yugoslav Slightly-enriched-uranium, Graphite-moderated CO₂ gas-cooled Reactor Power Plant (YEGGR), June 15, 1962.

⁹⁹³ IAEA, SC/512-YUG-1. Summary of the Reports Presented to the Agency by the French and British Experts in Connection with the “Yugoslav Demonstration Power Reactor Project”, December 5, 1962; IAEA, SC/512-YUG-1. Letter of Pierre Balligand, to Slobodan Nakićenović, December 5, 1962.

⁹⁹⁴ *Ibid.*

and mechanical problems [...] will be more difficult to solve than the physics problems,”⁹⁹⁵ the British expert, G. Brown, was much harsher in his own report:

“There was insufficient appreciation within Yugoslavia of the project and engineering aspects including general technology, fuel manufacture, safety considerations, etc. associated with the A.G.R. design. Yugoslavia has not at present the technological experience to be in a position to advise other countries or to act as leader in making an international power demonstration reactor a useful exercise.”⁹⁹⁶

The Yugoslav project was as good as dead by the end of 1962. Although there are no clear references that the United States administration had anything to do with it, at the time when the IAEA experts came to the IJS to estimate Osredkar’s proposal, the U.S. Embassy in Belgrade finally delivered the opinion of the USAEC. They made it clear that, even if there were initial interest for the project in 1961, changed political circumstances a year later were the obvious reason why the USAEC estimated that it was “out of the question” to support such a project. The explanation suggested that the USAEC did not have enough funds for such a project, nor would it be able to justify it before the Congress, although the Embassy’s unnamed official stressed that “this attitude towards our project does not represent any sign of political discrimination towards our country.”⁹⁹⁷

⁹⁹⁵ IAEA, SC/512-YUG-1. Summary of the Reports Presented to the Agency by the French and British Experts in Connection with the “Yugoslav Demonstration Power Reactor Project”, December 5, 1962.

⁹⁹⁶ IAEA, SC/512-YUG-1. Report on Visit of Dr. G. Brown to Yugoslavia, July 2nd and 3rd, 1962.

⁹⁹⁷ AJ, 177, f. 9. Izveštaj o stanju i radu na predprojektu međunarodne nuklearne centrale [Report on the Status and Activities on the Pre-Project of the International Nuclear Power Plant], June 6, 1962.

The failure of such an important project must have been a huge blow to the Yugoslav nuclear ambitions, although it cannot be related to the removal of Ranković from the SKNE, as this happened at least two months earlier. On the other hand, the IAEA final report did reveal main deficiencies of the Yugoslav nuclear program in general – the lack of industrial capacity to support the establishment’s ambitious designs. The fact that the Yugoslav expertise in reactor physics was not criticized in any way was a cold comfort, but perhaps also an encouragement not to give up.

IAEA, Norway, Poland and Yugoslavia

“Two guys walk into a bar” is the most common beginning of a usually poor joke, and although the following story is not funny, it is almost laughable to imagine how many similar situations did take place on the sidelines of the IAEA General Conferences. For Yugoslavia, it seems that the Fourth General Conference of the IAEA in September 1960 was the most productive, and the two guys in this story are unavoidable Slobodan Nakićenović and Gunnar Randers, the director of the Institute for Atomic Research (IFA) in Kjeller. What they spoke about was the construction of the semi-industrial facility for spent nuclear fuel reprocessing at the IBK in Vinča, which would be designed by the Norwegian *Noratom* company.⁹⁹⁸

Norway was the first and probably the only country in the early 1950s to accept Yugoslav scientists who wanted to specialize in nuclear reactor physics and technology. While this cooperation proved to be indispensable for the rapid development of the Yugoslav nuclear program, by the end of the 1950s, Yugoslavia embarked on seemingly more promising cooperation with the Soviet Union and the

⁹⁹⁸ AJ, 177, f. 25, a.j. 95. Informacija o razgovoru sa dr Gunar Randersom [Information on the Conversation with Dr. Gunnar Randers], November 9, 1960.

United States, both of which provided much less than the SKNE expected. This was particularly true with the construction of the hot-lab and spent fuel reprocessing facility, neither superpower wanted to provide. Even before the project for the international demonstrational nuclear power plant had failed, the Yugoslavs obviously attempted to reinvigorate the cooperation with their old partners from Norway.

More importantly, Randers was ready to cooperate with his Yugoslav colleagues “without much formalities and practically with no reservations”, which was something the SKNE, deeply engulfed in *konspiracija*, could only dream of. During negotiations after the initial exchange in Vienna, the SKNE concluded that “considering the sensitivity of the problem of reprocessing of irradiated fuel, it seems to us that it would be better if the cooperation on this matter continues without much publicity,” and that a simple commercial agreement between the IBK and *Noratom* would suffice. It was also identified that Norway researched some of problems in nuclear technology included in the SKNE’s Perspective Plan, which in combination with the previous statement must have sounded as a dream come true.⁹⁹⁹

The contract for development of the blueprint for the spent fuel reprocessing facility was signed on December 11, 1961, between the IBK and *Noratom*.¹⁰⁰⁰ The importance of this agreement lies in the fact that neither the United States nor Soviet Union were willing to sell this technology to Yugoslavia. While the Soviets continuously undermined the Yugoslav nuclear program using their ‘delay and blackmail’ strategy, the United States insisted on an official agreement of cooperation, which would include the clause about inspection of facilities, something the Yugoslavs never wanted to accept. On the other hand, the *Noratom* was established as

⁹⁹⁹ AJ, 177, f. 436. Zabeleška o Gunnar-u Randers-u [Note on Gunnar Randers], March 8, 1962

¹⁰⁰⁰ *Ibid.*; AJ, 177, f. 166. Ugovor 2.16, Prerada isluženog nuklearnog goriva, između SKNE i Instituta „Boris Kidrič“ [Contract 2.16, Used Nuclear Fuel Repocessign, between the SKNE and IBK], March 15, 1962

an export industry company, and already in 1959, it sold 20 tons of heavy water to Israel, which was one of crucial components necessary for the Israeli atomic bomb project; it was Randers who managed these negotiations and who closed the deal.¹⁰⁰¹ The contract between the IBK and *Noratom* was a similar trade agreement which would have provided the SKNE the necessary technology, without any restrictions, even if the IAEA safeguards system would rapidly evolved. Much like in the early 1950s, Norway was once again the first country to extend the necessary support to Yugoslavia in this field, which was classified and extremely important considering Yugoslav ambitions.¹⁰⁰²

On a practical level, the SKNE requested that the annual capacity of the Norwegian facility of 2.5 tons of reprocessed fuel should be raised to 10 tons for the IBK facility, which was based on the expected maximal annual exploitation of the RA reactor and leaving enough space for future fuel from future nuclear reactors. This would provide roughly 700 kilograms of uranium enriched to 1.7 percent, 700 grams of plutonium of 94 percent purity, and 2.5 kilograms of other fission products. The only problem with this project was that, according to Nakićenović's own words, the plutonium extracted in this process from the Yugoslav reactor "is not of the best quality (not good as a nuclear explosive)," but that it could still be used for future experiments in "production of plutonium metal," or uranium-plutonium alloys; he was anticipating that the purity issues of the first batches of Yugoslav plutonium would be solved in the future. Finally, Nakićenović emphasized that this agreement would help the Yugoslavs to "exploit six years of research conducted by the Norwegians" and "to

¹⁰⁰¹ Forland, "Norway's Nuclear Odyssey", 10-12; Avner Cohen, *Worst-kept secret: Israel's bargain with the bomb* (New York: Columbia University Press, c2010), 48, 167-168; Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, c1998), 61-62.

¹⁰⁰² AJ, 177, f. 17. Izveštaj o radu i analiza problema u 1961. [Report on Activities and Analysis of Problems in 1961], March 1962.

quickly acquire necessary experience in construction and exploitation of the facility for nuclear fuel reprocessing and extraction of plutonium.”¹⁰⁰³

The general concept behind its construction was already seen in the attempted construction of nuclear reactors, starting with the prototype and gradually progressing to an industrial facility. The *Noratom* was expected to provide a “testing facility [...] not a factory” which would be used for “technological experiments on the ‘pilot-plant’ level” and for “perfecting of the technological process.” In that respect, the first “‘intermediate-phase’ or the ‘step’ between theory and its application on the industrial level” was the development of the laboratory facility (‘hot-cell’) which would effectively be used as a prototype for all the necessary testing, and training of personnel.¹⁰⁰⁴

The blueprint for the semi-industrial spent nuclear fuel reprocessing facility was delivered to the IBK in 1963, eventually designed to an annual capacity of 5 tons, but the facility itself never was constructed.¹⁰⁰⁵ One problem was the lack both of finances and of Ranković. Documents confirm a significant difficulty in securing the necessary foreign currency to finalize the payment to *Noratom*, which became a problem in the second part of 1962 and early 1963, immediately after Ranković’s departure.¹⁰⁰⁶ Since its establishment in 1955, the SKNE had a free hand in financing nuclear institutes under its supervision from the federal budget. The 1961 Law on Model of Financing Scientific and Research Institutes changed all of that, forcing institutes to apply to the SKNE with detailed projects, which had to be approved by

¹⁰⁰³ AJ, 177, f. 25-95. Informacija o razgovoru sa dr Gunar Randersom [Information on the Conversation with Dr. Gunnar Randers], November 9, 1960; William C. Potter, Đuro Miljanić, Ivo Šlaus, “Tito’s Nuclear Legacy”, in: *The Bulletin of the Atomic Scientists*, March-April 2000, 65.

¹⁰⁰⁴ AJ, 177, f. 166. Ugovor 2.16, Prerada isluženog nuklearnog goriva, između SKNE i Instituta „Boris Kidrič“ [Contract 2.16, Used Nuclear Fuel Repocessign, between the SKNE and IBK], March 15, 1962

¹⁰⁰⁵ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 171; Potter, Miljanić, Šlaus, “Tito’s Nuclear Legacy”, 65.

¹⁰⁰⁶ AJ, 177, f. 1. Strogo poverljivo. Devizna sredstva za 1963. godinu po ugovoru sa „Noratom“-om [Top Secret. Foreign Currency for 1963 for the Contract with Noratom], January 13, 1963

the Federal Executive Council (Yugoslav Government).¹⁰⁰⁷ This was the result of the process of decentralization of Yugoslavia, but can be read as an attempt to deny Ranković his effectively discretionary right to use federal funds as he found suitable, and it seems he continued to do it even after the changes in legislation in 1961. Combined with his removal from the nuclear program in 1962, and the Federal Executive Council in the following year, one very important control lever over the nuclear program was taken from Ranković's hands. The only one left was 'his' UDB and network of clients, and it seems he used them extensively.

On the other hand, this conclusion adds additional perspective to his plans to plant the most important section of the Yugoslav nuclear program to the IAEA as a sort of a nuclear cuckoo's egg. Ranković was attempting to transfer financing of the future Yugoslav nuclear power plant to the IAEA simply because he could no longer secure the necessary funding in Yugoslavia on his authority alone. This clearly suggests that Ranković's main priority was to keep the nuclear program alive and prosperous, which also undermines accusations about his nationalism or the desire to take control over the country's most important sectors. The most probable explanation is that he simply wanted Yugoslavia to have the atomic bomb, being convinced that it would reinforce the country's security, the sector to which he dedicated his career. Once he lost control over the financing of the nuclear program, he tried to keep it alive through delegating costs to the IAEA and foreign partners. This strategy had already been attested in case of the budding Yugoslav computer industry, the roots of which were established at the IBK's Laboratory for Automatics and Laboratory for Digital

¹⁰⁰⁷ Bondžić, *Između ambicija i iluzija*, 131-132; Đuro Kutlača, Dušica Semenčenko, *Nacionalni inovacioni sistem u Srbiji: prošlost, sadašnjost, budućnost*, Institut „Mihajlo Pupin” (Beograd: Akademska misao, 2015), 55-56.

Technology in the early 1950s, only to be transferred by the end of 1961 to Institute for Electronics and Telecommunications “Mihajlo Pupin” (IMP) in Belgrade.¹⁰⁰⁸

The construction of the semi-industrial spent nuclear fuel reprocessing facility was yet another failed project, but the technology transfer was successful. By 1962, the IBK finalized the long awaited Laboratory for Chemistry of High Activity (‘hot-lab’, HL), which also housed the Department for Spent Nuclear Fuel Reprocessing (‘hot-cell’).¹⁰⁰⁹ The nature of the cooperation with Norway leaves few traces in the documents, but according to Hymans’s research, between 1962 and 1966 Norwegian scientists provided extensive training to their colleagues at the IBK, who eventually succeeded in extracting the first quantities of plutonium from spent fuel.¹⁰¹⁰ The laboratory had the capacity to reprocess only one fuel element at a time, producing 0.7 grams of plutonium, among other isotopes, using the PUREX process. The technology was further improved at the IBK (“pump-mix” mixer and extractor) and at the IFA in Kjeller (pulse columns extraction), leading to the installation of the experimental facility using vibrating plate column extraction technology, by the end of the 1960s. The highlight of this project was cooperation with Czechoslovakian Nuclear Research Institute (NRI) in Řež. In 1968, the spent fuel from the VVR reactor was dissolved in the NRI and sent for extraction of uranium and plutonium at the IBK.¹⁰¹¹

Behind all complicated names of different technologies lies a fact that by 1966, the IBK in Vinča mastered the technology for plutonium extraction on a

¹⁰⁰⁸ Miljković, “CER Computers as Weapons of Mass Disruption”, 99-123.

¹⁰⁰⁹ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 164, 170.

¹⁰¹⁰ Hymans, *Achieving Nuclear Ambitions*, 183.

¹⁰¹¹ Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 170-171; AJ, 177, f. 27-111. Zapisnici i zaključci sa sastanaka Kolegijuma projekta 1968-1971. Zapisnik III sednice Kolegijuma projekta 1.5 – Prerada nuklearnog goriva [Minutes and Conclusions from Meetings of the Collegium for Projects, 1968-1971. Minutes from the Third Meeting of the Collegium of the Project 1.5], July 15, 1968; AJ, 177, f. 27-111. Simpozijum o preradi nuklearnog goriva, Karlove Vari ČSSR [Symposium on Nuclear Fuel Reprocessing, Karlovy Vary, Czechoslovak Socialist Republic], February 27-March 3, 1968.

laboratory level, which was considered classified and still is today. While milligram quantities of plutonium do not seem impressive, the only thing left was to secure the funding and construct the spent fuel reprocessing facility of semi-industrial or full industrial size. Gunnar Randers had a similar impression back in March 1962, when he visited the IBK and was pleasantly surprised with the level of expertise of Yugoslav scientists. He noticed that the only thing holding back their plans was lack of money, much like he commented during his first visit to the IBK in 1952.¹⁰¹² Reinforced with detailed explanation of the technology used in the industrial-sized NFS's West Valley facility, which based on the same process (PUREX) used in the IBK, secretly provided by Nakićenović in 1965, it really was a matter of decision and money to expand the Yugoslav plutonium extraction capacities. Finally, the fact that the plutonium extracted in the IBK laboratories was 'not good as a nuclear explosive' was also solved on laboratory level in the HL, which by 1963 managed to develop the technology for plutonium purification and production of plutonium metal.¹⁰¹³

Exploiting the established, or perhaps reestablished cooperation with Norway, in 1963 Yugoslavia managed to establish the trilateral cooperation with unlikely partners - Poland and Norway – in the so-called NPY Project (Norway-Poland-Yugoslavia), all under the auspices of IAEA. This was the joint project for development of experimental methods and their application in the field of nuclear reactor physics.¹⁰¹⁴ The joint project was negotiated during Randers's visit to Poland and Yugoslavia in March 1962, and V.O. Erikson's repeated visit two months later. The proposed cooperation was based on the NORA project of the IAEA and Norway,

¹⁰¹² AJ, 177, f. 436. Zabeleška o Gunnar-u Randers-u [Note on Gunnar Randers], March 8, 1962; Hymans, *Achieving Nuclear Ambitions*, 182.

¹⁰¹³ AJ, 177, f. 167. Istraživanja na dobijanju plutonijuma, II faza [Research on Plutonium Production], February, 1963.

¹⁰¹⁴ AJ, 130, f. 650. Agreement of cooperation between IAEA and the governments of Poland, Norway and Yugoslavia, January 21, 1963.

and it anticipated the use of the personnel, nuclear reactors, laboratories and related equipment in the IBK in Vinča, IFA in Kjeller and Institute for Nuclear Research [*Instytut Badań Jądrowych* – IBJ] in Świerk.¹⁰¹⁵ The Yugoslav Federal Executive Council approved this project on May 21, 1963.¹⁰¹⁶

The original NORA project was designed by the IAEA and the Norwegian Government to provide research on “fundamental reactor physics”, using the Norwegian ‘zero power’ reactor NORA, a natural uranium and low-enriched uranium fuel reactor (1.7 and 3 percent), light or heavy water moderators with variable and mixed lattices.¹⁰¹⁷ By 1963, it became obvious to the members of the Nora Committee that “the operational staff of NORA has turned out to be too small to permit a proper maintenance of the reactor equipment”, which made it impossible to allow for full utilization of the nuclear reactor; solutions were investigated about potential prolongation of the NORA project.¹⁰¹⁸

The solution was found in initiation of the NPY project as the extension or “an outgrowth of the NORA project”, that was supposed to facilitate international cooperation in research of nuclear reactor physics, all under the auspices of the

¹⁰¹⁵ IAEAA, RN/620-22 (AC P-620/70, Box 06374). NPY Project – Correspondence 1962-1965. Letter of J.W. Webster, Acting Director Division of Reactors to M. Ristić, Director of the IBK in Vinča, July 25, 1962; AJ, 177, f. 436. Beleška razgovora vođenih za vreme posete G. Eriksena u inntitutu u Vinči od 4. do 6. maja 1962. [Note on Conversations Held during the Visit of Mr. Eriksen to the Institute in Vinča, May 4-6, 1962], May 25, 1962; AJ, 177, f. 436. Note from Visits to Poland and Yugoslavia in May 1962, July 6, 1962.

¹⁰¹⁶ AJ, 130 SIV, f. 650. Rešenje o davanju saglasnosti za zaključenje Sporazuma o saradnji u reaktorskoj fizici između MAAE, Jugoslavije, Norveške i Poljske [Decision on Giving an Approval for Conclusion of an Agreement of Cooperation between the IAEA, Yugoslavia, Norway and Poland], May 21, 1963.

¹⁰¹⁷ IAEAA, L/704-NOR-1 (2) Legal Matters. Research Contracts (Country Projects). Norway – NORA Project, Scientific Personnel, Box 03896, 1961-1965. The Circular Letter of the IAEA Director-General, Sterling Cole, February 17, 1961.

¹⁰¹⁸ IAEAA, L/704-NOR-1 (1) Part II. Research Contracts (Country Projects); Norway – NORA Project; Joint Scientific Program Committee, 1963-1965, Box 03895. Minutes of the Fifth Meeting of the Nora Committee, October 2, 1963.

IAEA.¹⁰¹⁹ The NPY agreement stipulated that the personnel from the IBK, IBJ and IFE would circulate and conduct research on reactors installed in these institutes, financed by the IAEA which would also provide support in nuclear material, services, equipment and expertise if requested by one or more countries.¹⁰²⁰ In other words, the NPY project would secure the necessary personnel for full exploitation of nuclear reactors, providing important knowledge in nuclear reactor physics, while it would also allow engagement of researchers from other countries to receive their training in nuclear reactor physics.

This was basically the same strategy as Yugoslavia employed with the project for the demonstrational nuclear power plant. Besides the obvious difference in scale and costs of two projects, the difference in the underlying logic is also important. While the SKNE wanted to use the demonstrational nuclear power plant project to gain practical experience in construction and operation of such a facility and train ‘cadres’, the NORA/NPY project was designed to provide deeper understanding of the reactor physics, which is a precondition for independent construction of nuclear reactors, or any other industrial product for that matter. The preference of the Yugoslav nuclear establishment for practical application of science had been already attested and confirmed. It was one of the reasons why the demonstrational plant project failed; without the actual understanding of the reactor physics, the entire project was based on providing fuel, development of different components and their installation on the prepared site, much like with a more conventional power plants or other facilities.

¹⁰¹⁹ IAEAA, RN/620-22 (AC P-620/70, Box 06374). NPY Project – Correspondence 1962-1965. Letter of Alfred H. Spano of the IAEA Division of Nuclear Power and Reactors to Dr. Toshio Nakai, Director of the Japan Atomic Energy Research Institute, August 19, 1965.

¹⁰²⁰ AJ, 130 SIV, f. 650. Sporazum između Međunarodne agencije za atomsku energiju i vlada Norveške, Poljske i Jugoslavije o kooperativnom istraživanju u reaktorskoj fizici [Agreement between the IAEA and Governments of Norway, Poland and Yugoslavia on Cooperative Research in Reactor Physics], January 21, 1963.

The inclusion of Yugoslavia in the expanded NORA project is not surprising, particularly considering the fact that Dragoslav Popović was the IAEA's representative in the NORA Committee, while V.O. Eriksen was the manager of the project, the same person who was sent to investigate practical possibilities for inclusion of Poland and Yugoslavia.¹⁰²¹ Once again, Ranković's policy of securing important positions for Yugoslav scientists at the IAEA paid off. While it is highly unlikely that the entire arrangement was designed by Popović, he was well acquainted with the NORA project, both through the position in the project Committee, and through the organization of the first safeguards inspection of the NORA reactor in 1962.¹⁰²² Understanding that there was lack of 'cadres' to support the NORA reactor, he could have easily suggested Yugoslavia as a potential partner, while his already strong contacts in Norway and the IFA in Kjeller, or the fact that the RB 'zero-power' reactor he helped to design was quite similar to the NORA reactor, could have equally be used as arguments in support of Yugoslavia's candidacy.

The details will probably never be known. The NORA/NPY project continued to evolve throughout the 1960s, exactly as anticipated. When the first three-year phase of the NORA project ended in 1964, a new three-year contract was signed for the NORA and the NPY projects on April 1964.¹⁰²³ Without deeper analysis of the NORA/NPY project, the explanation that "the NORA and NPY people are doing some highly sophisticated work" was probably accurate.¹⁰²⁴ The project necessarily

¹⁰²¹ IAEAA, L/704-NOR-1 (1) Part II. Research Contracts (Country Projects); Norway – NORA Project; Joint Scientific Program Committee, 1963-1965, Box 03895. Minutes of the Fifth Meeting of the Nora Committee, October 2, 1963.

¹⁰²² Fischer, *History of the International Atomic Energy Agency*, 248.

¹⁰²³ IAEAA, RN/620-22 (AC P-620/70, Box 06374). NPY Project – Correspondence 1962-1965. Letter of Alfred H. Spano of the IAEA Division of Nuclear Power and Reactors to Dr. Toshio Nakai, Director of the Japan Atomic Energy Research Institute, August 19, 1965.

¹⁰²⁴ IAEAA, RN/620-22 (AC P-620/70, Box 06374). NPY Project – Correspondence 1962-1965. Letter of Alfred H. Spano of the IAEA Division of Nuclear Power and Reactors to Dr. Toshio Nakai, Director of the Japan Atomic Energy Research Institute, August 19, 1965.

provided substantial training of ‘cadres’ and sharing of tacit knowledge about nuclear reactor physics which is the precondition for development of necessary technologies, including the construction of nuclear reactors. Unfortunately for the Yugoslav scientists and the country’s nuclear program, by the late 1960s, when these projects were finalized, the time to implement the acquired knowledge for practical purposes was running out.

5.3 A Fistful of Uranium: The Yugoslav Nuclear Industry in the 1960s

*“It is important to notice that,
once the technological process is mastered,
during its repeated application
it does not represent such a problem
as it did during the initial mastering.”¹⁰²⁵*

Ambitious ‘perspective’ plans for the Yugoslav nuclear future were entirely dependent on the availability of domestic uranium and in significant quantities. After more than a decade of a painstaking geological survey of the entire country, by the beginning of the 1960s, the SKNE was ready to initiate the excavation and refinement of uranium ore on a semi-industrial level in the *Gabrovnica* and *Mezdreja* uranium mines, near Kalna. The initial plans suggested that by the end of 1964, the *Gabrovnica* mine alone would produce 60-80 tons of uranium, or 130 tons by the end of 1967, which was considered enough for the initial fuel charge of the future Yugoslav nuclear power plant. In parallel, the Perspective Plan (1961-1965) also anticipated construction of facilities for production of uranium metal in the *Prva iskra* explosive factory in Barič (Serbia), reactor-grade graphite in *Tvornica elektroda i ferolegura* (Electrode and Ferroalloy Factory – TEF) in Šibenik (Croatia) and *Tvornica ugljenografitnih proizvoda* (Carbon Graphite Products Factory – TUP) in Dubrovnik

¹⁰²⁵ AJ, 177, f. 27-109. Zapisnici i zaljučci sa sastanaka Stručne komisije za reaktorske materijale, 1961-1967. Izveštaj o radu Stručne komisije za reaktorske materijale SKNE [Minutes and Conclusions from the Meetings of the Reactor Materials Expert Commission, 1961-1967], January 8, 1962.

(Croatia), as well as for production of reactor-grade magnesium and CO₂ in unidentified locations.¹⁰²⁶

Even though these plans were a bit too optimistic, based on simple mathematical calculations and expectations that this facility would run for several years at full projected capacity, these plans would suggest that the Yugoslav nuclear establishment had more or less solved the uranium puzzle and that the illusive metal had finally become available to fuel their nuclear ambitions. However, after months of heated debate about the economic performance of the entire operation, on June 27, 1966, the SKNE reached the decision to close the uranium mines in Kalna. Much like with the radioactive coal ash in the late 1950s, the official explanation was based almost exclusively on economic reasons, packed in the extensive report of over one hundred pages which analyzed in detail every aspect of uranium production in Kalna (Report).¹⁰²⁷

The Perspective Plan obviously anticipated a significant contribution of the Yugoslav industry. This suggested that the nuclear program had reached a mature stage, which was probably true already in the early 1960s. But equally important was the problem of financing and the growing pressure for decentralization of the country, which forced Ranković to transfer financing of significant sections of the nuclear program to industry or foreign partners and organizations, as was the case with the IAEA. The problem was the actual capacity and interest of Yugoslav conventional

¹⁰²⁶ AJ, 177, f. 3-3. Direkcija za nuklearne sirovine [The Directorate for Nuclear Raw Materials]. Nuklearne sirovine, 1959; AJ, 177, f. 17. Plan razvoja nuklearne energije u Jugoslaviji u periodu 1961-1965 [Perspective Plan for Development of Nuclear Energy in Yugoslavia for the Period 1961-1965], March 1962.

¹⁰²⁷ AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965; AJ, 177, f. 20-78. Zapisnik sa druge sednice Savezne komisije za nuklearnu energiju održane 27. juna 1966. u Beogradu sa početkom u 10 časova [Minutes of the Second Meeting of the SKNE, held on June 27, 1966].

industry to support these elaborate plans. The British expert Brown signaled in his 1962 report about the SKNE's project for the demonstrational nuclear power plant in Yugoslavia, that the biggest problem was the lack of "technological experience" and "insufficient appreciation" of the entire engineering process, including the production of reactor fuel.

This subchapter will follow the gradual establishment of the Yugoslav nuclear industry as the indispensable logistical and material component to the scientific part of the country's nuclear program. Although the fact that Yugoslavia never produced either atomic bombs or nuclear power plants would suggest that this entire project of developing a nuclear industry was a failure, the reality was more complex. Failures, miscalculations and often irrational self-confidence were present, but so were the interrepublican competitiveness among companies with similar production programs, as well as political pressures to stop draining of funds from the federal budget on projects deemed as 'political factories'. This political show-down between the conservative group embodied in Ranković, and the nominally 'democratic' group which supported further decentralization of the country, had a significant impact on the country's nuclear program. The end of Ranković's political career in 1966 resulted in stopping all activities in the Kalna mines, as the only operational uranium mining company in the country, and while this suggests abandonment of the search for domestic sources of this vital material, once again, the reality was painted in many shades of yellow.

Uranium business as usual

The early 1960s in Yugoslavia was the period of growing internal pressure for decentralization of the state system in general, and the system for funding of strategic

projects in particular. The uranium prospection and mining activities actually followed a completely opposite path and started to centralize once again, growing gradually into a big business. The beginning of this process may be pushed back to 1960, when the Federal Geological Institute [*Savezni geološki zavod* – SGZ] was renamed to Institute for Exploration of Nuclear Raw Materials [*Institut za istraživanja nuklearnih sirovina* - IINS], which was the first time the often criticized *konspiracija* started to be lifted from uranium mining and related activities, regarding both domestic and foreign public, being even published in promotional materials.¹⁰²⁸

This was the necessary precondition for transformation of secret experimental and research facilities, scattered across the country, into at least a formally civilian industry, but also a move to reassure the foreign public that Yugoslavia was dedicated exclusively to peaceful uses of nuclear energy, as was the mantra of the period. The next step was the concentration of all facilities and institutions working in this field into a socialist-type company. The Federal Executive Council achieved this in 1961, merging the SKNE's Directorate for Nuclear Raw Materials (DNS), Institute for Technology of Mineral Raw Materials [*Institut za tehnologiju mineralnih sirovina* – ITMS] and aforementioned IINS into a single company - Nuclear Raw Materials Plant [*Zavod za nuklearne sirovine* – ZNS].¹⁰²⁹

The director of the ZNS was a well-known figure in this field, Miladin Radulović-Krcun, and he was directly responsible to the Director of the SKNE.¹⁰³⁰ This chain of command meant that nothing had changed significantly in the

¹⁰²⁸ Nakićenović, *Nuklearna energija u Jugoslaviji*, 79. Nakićenović's book was actually prepared for the exhibition of nuclear energy prepared by the SKNE in 1960. The book was also translated at the very least to English as Slobodan Nakićenović, *Nuclear Energy in Yugoslavia* (Belgrade: Export Press, 1961).

¹⁰²⁹ Aleksandar M. Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013* (ITNMS: Beograd, 2013), 14-15; Bondžić, *Između ambicija i iluzija*, 167-168.

¹⁰³⁰ AJ, 130 SIV, f. 601. Letter of Miladin Radulović to the Federal Executive Council, August 7, 1961.

management of this sector, since Ranković was controlling it through Radulović since the very beginning of the nuclear program. What did change was that it was only further centralized and put directly linked Ranković and Radulović. Even on a symbolic level, the ZNS was located in Belgrade, as all of the institutions that constituted it also were. But it had a unique mandate as a single company operating in this field and it covered the entire country. The ZNS started its life with several uranium mines having semi-industrial facilities for pre-concentration and refining of uranium ore, a specialized geological survey institute (previous IINS), and a R&D institute (previous ITMS), all funded through the SKNE and the federal budget, with a potential to become an actual monopolist in the trade once expected nuclear power plants, all ‘made in Yugoslavia’ start to mushroom across the country.

These plans looked excellent on paper, but they had yet to be realized. The experimental facility in *Mezdreja* mine was supposed to be exploited in its full capacity of 50 tons of ore per day during the entire 1958; however, that never happened. The production was stopped at some point before October 1, 1958, for maintenance and was expected to be reestablished only in February 1959, mostly due to continuous deliveries of faulty equipment by Yugoslav companies.¹⁰³¹ One later document also reveals that the facility achieved the full capacity of 30-50 tons of ore per day only in the period between 1960 and 1962, but without any reference to how long this level of production was maintained. The bigger facility in *Gabrovnica* became operational only by the end of 1963 “more or less with technological success, but very rarely in full capacity of 200 tons of ore per day”. This capacity was

¹⁰³¹ AJ, 177, f. 23-92. Problems in exploration of nuclear ores in Federative Peoples’ Republic of Yugoslavia, January 20, 1959. The report does not mention the date when the production was stopped, but it does mention that some of the equipment (autoclaves and pachuka tanks) had to be reordered and the date for this delivery was October 1, 1958. However, even this new equipment was not functioning properly, and had to be adjusted on the site which caused further delays.

eventually reached, but only in 1965 and only in two “campaigns of 15-20 days” each.¹⁰³²

While this situation may easily be attributed to the novelty of the technology, or even to the “classical” inefficiency of a socialist enterprise, the fact remains that the ambitious goals for uranium production were never reached. In the period between August 1963 and the end of 1965, when the mine became fully operational, it was calculated that the facility in *Gabrovnica* worked in total of 447 days and managed to process only 44,222 tons of ore with 13.81 tons of uranium metal. Based on these numbers it was also estimated that during 1964 the *Gabrovnica* mine worked on average with 30% of its capacity, which fell to 25% in 1965. Total production of uranium-metal in both mines for the period between 1957 and 1965 was 15,929.60 kilograms (15.93 tons), far below the 60-80 tons targeted for the end of 1964. In addition, known reserves of uranium in deposits were recalculated at a lower level of only 168.84 tons in *Gabrovnica* and *Mezdreja* combined.¹⁰³³

The entire enterprise in Kalna was obviously not as productive as projected and may be considered as a failed project. The analysis of the financial aspect provides additional support to this claim. According to the original projections made in 1960, when the entire project for the facility in *Gabrovnica* was approved, it was estimated that one kilogram of uranium would cost 46,000 dinars per kilogram, which was one of the main reasons why the extraction of uranium from the coal ash was abandoned two years earlier. However, in 1964 the actual price of one kilogram of uranium produced in *Gabrovnica* reached 137,500 din/kg, and in 1965 it rose to

¹⁰³² AJ, 177, f. 13-34. Letter of Miladin Radulović, the member of the Plenum of the SKNE to the director of the SKNE, June 11, 1965.

¹⁰³³ AJ, 177, f. 13-34. Izveštaj o radu Preduzeća za istraživačke radove u izgradnji – Kalna [The Report about the Performance of the Enterprise for Exploratory Works in Construction – Kalna], April 1966. Simple mathematics gives us that the facility reached an average capacity of roughly 99 tons of ore per day, far less than projected 200 tons per day.

158,772 din/kg, more than three times higher than projected, and also much higher than prices in Great Britain, France, USA, Sweden and Canada.¹⁰³⁴

Using the economic explanation to hide the actual reasons for making a certain decision had already been tried and tested in shutting down uranium extraction from the coal ash in 1958; it seems the same logic was used for Kalna. The Report does mention that the prices of uranium in aforementioned countries were based on “calculations for making economic reports for the construction of nuclear power plants”, rather than on “the actual price and even less so on the market price” of uranium. In addition, it was also stressed that it would be difficult to speak about real prices of uranium from *Gabrovnica* because the price presented in the report “cannot be accepted as the price that will figure in normal production conditions with utilization of the full capacity.”¹⁰³⁵ The author of the Report does mention that the facility in *Gabrovnica* was experimental, but it somehow did not use it as an important component in presented calculations.

However, the letter of Miladin Radulović, the Director of the ZNS and the person who was in a direct control all of the activities regarding uranium prospection and production since the late 1940s, throws a different light on the situation. According to him, at the time when the facility in *Gabrovnica* was being developed, “not a single country with which we [Yugoslavia] had bilateral agreements for cooperation in the field of nuclear energy [...] wanted to accept our experts for

¹⁰³⁴These prices ranged widely, between 12 USD in Canada to 40 USD in Sweden. With the exchange rate offered in the report of 1,250 dinars for 1 USD, this price range should be 15-50,000 dinars. AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965.

¹⁰³⁵ AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965.

training in industrial or semi-industrial facilities for uranium ore processing”, neither through the IAEA, nor through other international organizations. Therefore, Yugoslavia had to develop this technology independently and the facility in *Gabrovnica* was designed for gaining the necessary experience in this field and training of cadres. In support of this claim, he also stresses that “in the period around 1960”, uranium-oxide or metal became available in the international market, but “only with safeguards which our country did not accept at the time.”¹⁰³⁶

This last comment is yet another indirect proof that “around 1960” Yugoslavia was still very much interested in manufacturing the atomic bomb since these safeguards were exclusively designed with the idea to make any misuse of uranium for that purpose impossible. During the heated debate in the SKNE in 1965 about the destiny of the Kalna operations, Salom Šuica, yet another top-ranking official of the Yugoslav nuclear establishment who supported the closure of Kalna, commented in a similar fashion that “uranium problem” does not have to be seen “the way we have seen it six years ago, when we had other motives and reasons.”¹⁰³⁷

It seems reasonable to argue that at the time when the mining of uranium had started in Kalna, during late 1950s and early 1960s, Yugoslav authorities simply wanted to have uranium at any cost, but also that the situation had changed a couple of years later. Radulović confirms this in his letter where he insists on the fact that the entire project in *Gabrovnica* was experimental, developed as a “noneconomic” facility, and that from the very start it was not expected to be profitable; it simply had

¹⁰³⁶ AJ, 177, f. 13-34. Letter of Miladin Radulović, the member of the Plenum of the SKNE to the director of the SKNE, June 11, 1965.

¹⁰³⁷ AJ, 177, f. 18-74. Zaključci i materijali sa III sednice SKNE [Conclusions and Materials from the Third Meeting of the SKNE]. Stenografske beleške [Minutes from the meeting], June 14, 1965.

to produce uranium.¹⁰³⁸ The Report also confirms that *Gabrovnica* was being financed as a scientific institution rather than on market principles, although this fact was taken as one of the reasons for its closure, not as an extenuating circumstance.¹⁰³⁹

However, if this was so problematic for the country's authorities, there is no reason why nuclear institutes, as prime users of uranium, as well as a lot of money from the federal budget, were not also shut down. That actually never happened: the three leading nuclear institutes in Yugoslavia were never closed and still operate in respective former Yugoslav republics. The only explanation was that the reaction of hundreds of scientists to losing their jobs would have been much more problematic than of the miners, who were treated as an expendable workforce.¹⁰⁴⁰ Either way, with all the evidence presented here, it is evident that the poor economic performance of Kalna was irrelevant as the actual reason for its shutdown. The final confirmation for this statement comes from a personal letter posted in 1967 by Miodrag Ristić to Vojin Guzina, then director of the SKNE. He explains that, regarding the entire Yugoslav nuclear program, money never was a problem “which every January 1 proves it time and time again.”¹⁰⁴¹

On the other hand, money was a problem at the time, perhaps not in terms of its availability as Ristić was suggesting, but as an argument in public debates about

¹⁰³⁸ AJ, 177, f. 13-34. Letter of Miladin Radulović, the member of the Plenum of the SKNE to the director of the SKNE, June 11, 1965.

¹⁰³⁹ AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965.

¹⁰⁴⁰ Marko Miljković, “Nuclear Yutopia: The Outcome of the First Nuclear Accident in Yugoslavia, 1958” in: *Labor in State-Socialist Europe, 1945-1989: Contributions to a History of Work*, ed. Marsha Siefert (Budapest; New York: Central European University Press, 2020), 290-292.

¹⁰⁴¹ AJ, 177, f. 13-38. Korespondencija predsednika SKNE, 1965-1971 [Correspondence of the President of the SKNE, 1965-1971]. Personal letter of Miodrag Ristić to the director Vojin Guzina, February 14, 1967. Miodrag Ristić was working at the IBK since 1952 as a machine engineer on the development of nuclear reactor technology. Between 1961 and 1965 he was the director of the IBK. At the time he posted this letter, Miodrag Ristić was working at the IAEA as an expert in the department for nuclear power plants. Perović-Nešković, (ed.), *Pola veka instituta “Vinča” (1948-1998)*, 30.

the country's economy. In the summer of 1965, the Yugoslav Federal Government started the ambitious economic reform based on market principles that was supposed to raise productivity and profitability of companies, support their technical modernization and lower production costs. However, the ambitious reform backfired within months and resulted in high inflation and deficits in many industrial enterprises. To avoid admitting that they had made a the mistake, the Yugoslav political leadership blamed it on many failed investments in the past, the so-called "political factories", that were established without any economic logic by a number of top-ranking politicians who channeled federal funding to their own republics. According to Pirjevec, the dissatisfaction with the reforms was the strongest in Serbia and Montenegro, republics which received the lion's share of these investments and where the reform was also understood as the beginning of the end of their control over the entire Yugoslav political apparatus.¹⁰⁴²

Kalna perfectly fits the concept of a "political factory." It was not profitable, although it never was supposed to be. Even without taking that into consideration, it was not even producing enough uranium. The investments in Kalna in the period between 1950 and 1965 were indeed very high and calculated in the Report at 8.5 billion dinars. For the period until 1960 the Report emphasized that fully 2.6 billion dinars were spent for unknown, "various objects", which can also be read as a textbook example of a failed investment.¹⁰⁴³ Analyzing the problem with uranium mine in Kalna, Hymans suggests that Ranković was funding "industrial prestige projects, typically in Serb-dominated areas, that often had little economic value or even purpose", in order to extend his Serb-dominated network of apparatchiks, while

¹⁰⁴² Jože Pirjevec, *Tito i drugovi* [Tito and Comrades], (Ljubljana: Mozaik knjiga, 2012), 493-494.

¹⁰⁴³ AJ, 177, f. 13-34. Materijali u vezi Kalne [Materials regarding Kalna], 1965-68, 1971. Pregled rada Preduzeća br. 3 u Kalni sa ekonomsko tehničkim analizama proizvodnje urana [Overview of the Performance of the Enterprise No. 3 in Kalna with economic and technical analyses regarding the production of uranium], May 25, 1965

neglecting much more promising uranium deposits discovered in Žirovski Vrh, in Slovenia.¹⁰⁴⁴ Bondžić effectively shuns these statements and explains that uranium deposits in Žirovski Vrh were discovered only in 1961, more than ten years after Kalna, suggesting that it was rational to start mining in a well explored location first. He does accept that the mine was a failed project, but also adds that failed investments were a common practice across Yugoslavia.¹⁰⁴⁵ However, even if the opening of the uranium mine in Kalna was a rational decision at the time and in the given circumstances, it seems evident that the mine itself was not the target of the Report, but rather the person who decided to open it.

The political demise of Ranković officially began on July 1, 1966, with the opening of the Fourth Plenary Meeting of the Central Committee of the LCY (*Brionski Plenum*), where he was confronted with trumped-up charges of wiretapping Tito and other top-ranking politicians, among other accusations. The final decision about Kalna's destiny was reached only a few days earlier, on June 27. It is also true that during and after the meeting Tito came down on Ranković with a hammer and sickle and that the entire network of his closest collaborators was almost completely disbanded. This action demonstrated Tito's understanding only too well that Ranković's political strength did not rest with formal functions he performed. This was the case with the entire structure of the UDB, as well as with the SKNE, which was in effect operating as a specialized department of the secret police, even after 1962 when Ranković was removed from the nuclear program.

This may be a coincidence, although chances for that are slim. The scenario about Ranković's alleged betrayal had to be prepared well in advance, as was the case

¹⁰⁴⁴ Hymans, *Achieving Nuclear Ambitions*, 178

¹⁰⁴⁵ Bondžić, *Između ambicija i iluzija*, 173, 187.

with closing down of Kalna which took almost a full year filled with reports, letters, meetings and removal of some high ranking persons in the nuclear establishment. One of them was Miladin Radulović, the Director of the ZNS and the person who was the key figure in the uranium business in Yugoslavia. During the summer of 1965, he was simply moved to a position of the president of the *Savet za koordinaciju naučnih delatnost Socijalističke Republike Srbije* [Council for Coordination of Scientific Work of the Socialist Republic of Serbia].¹⁰⁴⁶ This may be considered as his demotion, since he was moved from the almighty SKNE and ZNS, which had all prerogatives of a ministry of the Yugoslav government, to a relatively insignificant position in Serbia. Regarding the deconstruction of the entire uranium mining superstructure, soon after Radulović left, the ZNS was also disbanded, in January 1966.¹⁰⁴⁷

One reason can be the fact that in the summer of 1965, in the middle of the heated debate about the destiny of Kalna, Radulović was the only person defending the project and fighting to keep the mine open.¹⁰⁴⁸ In the given circumstances, this could have only been read by those present as proof of his support for Ranković, which evidently was the case and which did not surprise anybody. On the other hand, his move to an insignificant position while nominally being a sort of a punishment, may have been a clever move by Ranković to protect and save one of his most loyal collaborators. During 1965, it became evident that Ranković was in an open conflict with Tito, and even years before that he would move his closest collaborators “to a

¹⁰⁴⁶ Bondžić, Živković, „Miladin Radulović-Krcun. Prilozi za biografiju“, 137.

¹⁰⁴⁷ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 21. The ZNS was divided once again on two main institutions it was made from in 1961, only with changed names; the Institute for Geological and Mining Research and Exploration of Nuclear Raw Materials (*Institut za geološko-rudarska istraživanja i ispitivanja nuklearnih sirovina*) and the Institute for Technology of Nuclear and Other Mineral Raw Materials (*Institut za tehnologiju nuklearnih i drugih mineralnih sirovina*).

¹⁰⁴⁸ AJ, 177, f. 13-34. Letter of Miladin Radulović, the member of the Plenum of the SKNE to the director of the SKNE, June 11, 1965.

suitable position” in order to save them from Tito’s wrath.¹⁰⁴⁹ There is no evidence that this is what happened with Radulović, but the timing is almost perfect: he was moved to a position in Serbia where Ranković had most political influence, and with his open defense of the Kalna project, Radulović indirectly criticized economic reforms which could not have gone unnoticed. The true reason will probably never be known, but it becomes clearer that the decision to close the uranium mine in Kalna was also a significant component in the deconstruction of Ranković and his powerbase.

The decision to close the only uranium mine in Yugoslavia necessarily had to come from Tito who was the only person capable of pushing it down the chain of command against Ranković’s will, thus using it in the deconstruction of Ranković’s powerbase and his “network of apparatchiks”. It is also worth noting that the scenario behind closing Kalna and the political demise of Ranković were basically the same. Based on invented accusations of a betrayal in the case of Ranković, and economic performance in the case of Kalna, the momentum and support for the ultimate abandonment of both were patiently gathered for a full year or even more. These actions had all the components of a classic Soviet show trial that also included careful management of the public opinion,¹⁰⁵⁰ although it has to be stressed that in the Yugoslav version mass executions were replaced by mass layoffs and early retirements.

¹⁰⁴⁹ Pirjevec, *Tito i drugovi*, 494. Pirjevec insists that Tito was often paranoid about ill intentions of people in his close political vicinity and that Ranković often saved many of them from the prosecution considering them innocent. Although he does not insist that he was using that strategy to save his closest collaborators, in a situation where the rift between him and Tito was growing, it is not impossible that he was using exactly that strategy.

¹⁰⁵⁰ AJ, 177, f. 13-34. *Istina i činjenice o rudniku urana u Kalni* [Truth and Facts about the Uranium Mine in Kalna], 1968. This unsigned report mentions that at the time the press claimed that a lot of money from the federal budget was spent on useless investments in Kalna instead on three nuclear institutes, that “an entire city with 100 buildings [...], a hotel with air-conditioning”, and that some experts who were against the project were “removed.” It seems that Ranković never was never directly accused in the press for this, but it was evident that all the critique was directed to him.

This deep similarity in destinies of Kalna and Ranković is also an indirect proof that both decisions came from the same source, even though it may also be argued that this similarity was a consequence of a simple process of a system replicating itself on various levels and for different purposes. On the other hand, considering that Kalna's poor economic performance was the main official reason for its shutdown, at the time when Tito and his inner circle had to defend failed economic reforms, the uranium mine also became a perfect scapegoat. Making it an example allowed the Yugoslav political leadership to demonstrate that they were dedicated to fixing the country's economy and solving the problem of failed investments and "political factories" that burdened it for a long time. As Pirjevec noted, "Ranković and his collaborators became scapegoats for everything that was wrong in the state and the Party."¹⁰⁵¹

Save me some of the yellowcake for later

Kalna was an almost perfect option for Tito to solve all these problems simultaneously, but its fate also strongly suggests that by 1965 Tito had definitely decided to abandon the atomic bomb project. Without a domestic source of uranium, it would be next to impossible for Yugoslavia to continue working on the bomb. This may be attributed to the changes in the international political environment about the nuclear weapons proliferation and promising signs that in the near future nuclear weapons might be globally banned. The decision to abandon the long desired atomic bomb project, based only on a few vague promises by the superpowers and negotiations in international forums which had only started in earnest in the summer of 1965, would suggest Tito was politically naïve. That could not be farther from the

¹⁰⁵¹ Pirjevec, *Tito i drugovi*, 512.

truth, and his own reasoning must have been more sophisticated. This topic will be treated in the closing sub-chapter, but even focusing exclusively on the Yugoslav uranium business offers still more clues to be investigated.

The SKNE itself continued to exist but it was rapidly robbed of its power and field of activities. Legislation in the field of scientific development introduced on the wave of ambitious market-oriented economic reform of 1965, first established the Federal Council for Coordination of Scientific Activities [*Savezni savet za koordinaciju naučnih delatnosti*] with corresponding Federal Fund for Financing of Scientific Activities [*Savezni fond za finansiranje naučnih delatnosti*]. This basically downgraded the SKNE's field of activities, leaving it only the supervision in the research in nuclear energy, or applied science, while it also lost its status of the independent federal body. Beside the formal and symbolic downgrade in status, in practice this meant significant budget cuts and enhanced control of its use. Unsurprisingly, the deconstruction of the SKNE gained its momentum in days before Ranković's fall. On June, 15, 1966, the Federal Executive Council adopted new Program for Financing of Scientific Research in the Field of Nuclear Energy which significantly cut the budget of the SKNE, forcing nuclear institutes to cooperate closely with industry and governments in their respective republics. This action spelled disaster for their existence as it would be next to impossible to quickly, or at all, orient themselves to a competition on open market. On the other hand, even with the limited power, budget and field of action, it was still kept alive, while nuclear institutes received reduced but still significant funds through the Federal Council for

Coordination of Scientific Activities and Federal Fund for Financing of Scientific Activities.¹⁰⁵²

Mining and production of uranium-oxide in Kalna was stopped in the beginning of 1966, followed by the final decision to shut it down a couple of months later. However, it was not completely abandoned. Between 1966 and 1971, the entire enterprise in Kalna with the related equipment was still under the control of the SKNE. Although the production was never reestablished, already in March 1967 the decision was reached that the Institute for Technology of Nuclear and Other Raw Materials (ITNMS), as one of successors of the defunct ZNS, should “perform works on conservation of the facility and maintenance in Gabrovnica”.¹⁰⁵³ The contract between these two institutions clearly mentions that beside “full conservation of the entire facility”, a “permanent monitoring service” should be established that would intervene in case of any damage to the equipment and facilities.¹⁰⁵⁴

The entire work on conservating the enterprise in Kalna was finished in January 1968. The detailed report on full fifteen pages reveals that this task was taken very seriously and that every piece of equipment was meticulously checked and protected from the elements, starting with the most complex machines and instruments, down to the simple replacement of burnt light bulbs in offices.¹⁰⁵⁵ The

¹⁰⁵² Bondžić, *Između ambicija i iluzija*, 224-228.

¹⁰⁵³ AJ, 177, f. 13-34. Zapisnik sa sednice likvidacione komisije koja je imenovana rešenjem Savezne komisije za nuklearnu energiju za likvidaciju preostale imovine bivšeg preduzeća u Kalni, tj. hidrometalurških postrojenja [The report from the meeting of the liquidation comission of the SKNE], June 30, 1971; AJ, 177, f. 13-34. Contract between the SKNE and the Institute for Technology of Nuclear and Other Mineral Raw Materials, March 6, 1967.

¹⁰⁵⁴ AJ, 177, f. 13-34. Contract between the SKNE and the Institute for Technology of Nuclear and Other Mineral Raw Materials, March 6, 1967.

¹⁰⁵⁵ AJ, 177, f. 13-34. Detaljan izveštaj po vrstama radova i specifikacija poslova konzervacije na svakom osnovnom sredstvu u postrojenju H.M.P. Gabrovnica u vezi ugovora broj 04-25/1 [Detailed Report on Types of Works and Specification of Works on Conservation on Every Main Mean of Production in the Facility H.M.P. Gabrovnica in relation to the Contract no. 04-25/1]. During this work, every bearing was properly oiled and every piece of rust was removed and the given machine was protected with anticorrosive paint.

decision to preserve the equipment for ore processing had some inherent economic logic as it would be a complete waste to abandon it to rust and decay. It is also a fact that the decision to close the uranium mine in Kalna included suggestions that the existing machinery should be used by some other, conventional mining enterprise in the country.¹⁰⁵⁶

This somewhat reasonable suggestion never was realized. But the fact that the entire facility was conserved points to a conclusion that it was supposed to be kept operational and in reserve for some other conventional purposes, or for restarting uranium mining if that decision would be reached in the future. This deeply resembles the strategy with the radioactive coal ash less than a decade earlier. In relation to Tito's plans about the future production of nuclear weapons, it seems that his idea was to be prepared for it and keep this option open in case international negotiations on the control of nuclear weapons should fail. The indirect confirmation of this hypothesis may be found in the fact that only after Yugoslavia had signed the Non-Proliferation Treaty in 1968 and ratified it in the National Assembly in 1970 was the mine in Kalna completely abandoned.

By the summer of 1971, the Federal Executive Council had decided to transfer the ownership of the entire equipment of the hydrometallurgical facility in Kalna to the ITNMS in Belgrade, effectively removing it from the patronage of the federal government and transferring it to authorities of the Republic of Serbia. This decision was reached after the institute's formal request for that transfer, based on the argument that it was them who had developed the entire technology used in Kalna and necessary

¹⁰⁵⁶ AJ, 177, f. 13-34. Informacija o rudniku urana u Kalni i razlozima za obustavljanje njegovog rada [Information about the uranium mine in Kalna and the reasons for stopping its production], undated, after June 27, 1966.

facilities.¹⁰⁵⁷ Even in the final days of the Yugoslav nuclear program the old concept of competition among different republics for investments was still alive! The entire facility in Kalna was financed with the federal budget and when Kalna was closed, it made perfect sense that the equipment would be used in a different location in any republic that would be able to utilize it. One member of the commission that was debating on the destiny of Kalna's facility in 1971, even suggested that the smaller hydrometallurgical facility from *Mezdreja* should be transferred to *Žirovski vrh* in Slovenia, but this suggestion was rejected.¹⁰⁵⁸

Finally, it is necessary to mention what happened with other promising sources with higher content of uranium in ore than in Kalna. The ITNMS was investigating several different locations in the country: *Bukulja* and *Iverak* in Serbia, *Zletovska reka* in Macedonia, and *Žirovski vrh* in Slovenia, all of them discovered in the period 1961-1965.¹⁰⁵⁹ The only location in which a uranium mine was eventually established was *Žirovski vrh* in Slovenia, which started its operations only in 1982 and managed to produce 457 tons of uranium-oxide by 1989 when the production ended, with estimated additional 16,000 tons of uranium-oxide still remaining in the deposits. On the other hand, this was not a federal project, but an enterprise established by the Republic of Slovenia which invested in the site during the 1970s when Yugoslavia was already decentralized and the national nuclear program was already abandoned.¹⁰⁶⁰ More importantly, *Žirovski vrh* can also be understood as symbolic

¹⁰⁵⁷ AJ, 177, f. 13-34. Likvidacija preostale imovine bivšeg preduzeća u Kalni [Liquidation of the remaining property of the former enterprise in Kalna], September 1, 1971.

¹⁰⁵⁸ AJ, 177, f. 13-34. Zapisnik sa sednice likvidacione komisije koja je imenovana rešenjem Savezne komisije za nuklearnu energiju za likvidaciju preostale imovine bivšeg preduzeća u Kalni, tj. hidrometalurških postrojenja [The report from the meeting of the liquidation commission of the SKNE], June 30, 1971.

¹⁰⁵⁹ Spasić (ed.), *ITNMS: 65 godina sa vama, 1948-2013*, 19. According to authors, *Bukulja* had on average 500 grams of uranium per one ton of ore, *Iverak* somewhere in the range 230-1,000 g/t, *Zletovska reka* 820 g/t, while *Žirovski vrh* had the richest deposits of over 1,000 g/t.

¹⁰⁶⁰ "Rudnik urana Žirovski vrh - zgodovina", <http://www.rudnik-zv.si/zgodovina/> (accessed on July 22, 2019).

victory for Edvard Kardelj, a person who contributed the most to Ranković's fall. The uranium deposits in *Žirovski vrh* were discovered and tested during the 1960s using the federal funds through the SKNE programs, only to be exploited after the finalized decentralization of Yugoslavia with new Constitution of 1974, and after Ranković's project to establish the same basic industry in Serbia using the same logic had failed.

Starting without any experience and knowledge in this field immediately after the Second World War, by the mid-1960s, Yugoslavia was only a step away from establishing a substantial uranium mining industry. If all three main sources of uranium were developed and combined with others that were discovered, Yugoslavia would indeed have enough of uranium to make a small, but respectable nuclear arsenal or to support operation of a nuclear power plant. On the other hand, it would have had to be a completely different country, either more comparable to a strong Stalinist dictatorship, or to Western democracies. Neither option was possible, but the main problem was that, by the end of the 1960s, Tito had enough of his yellowcake.

5.4 Tito and the NPT: The End of a Nightmare and Nuclear Dreams

“Our deepest interest in the use of nuclear energy is connected to the struggle of our entire country for universal disarmament and international cooperation.”¹⁰⁶¹

Piecing together the puzzle of the Yugoslav nuclear policy is an extremely challenging and frustrating task. The biggest obstacle is that nothing of a sort actually existed until the early 1960s, at least not as an organized system of long-term goals. What did exist was more of an adaptable logic, or more precisely, the logic of independence as explained earlier. A much bigger problem was that Tito seems to have communicated most of this logic to his closest associates and foreign observers or diplomats only when it was necessary, or when important changes happened, on international level or as a consequence of Tito's own strategic thinking. While this approach suggests a lack of structure of the Yugoslav foreign policy in this field, it also allows for a flexibility and adaptation to changed circumstances. It can also be argued that despite unavoidable blunders and even big mistakes, this approach had served Yugoslavia and Tito well. His independence remains a powerful myth even in the post-Yugoslav period. More broadly, Yugoslavia did manage to keep a high level of independence in the most challenging period of the Cold War.

Focusing on the evolution of the Yugoslav nuclear policy, several important components have already been identified in previous chapters. While the initial fear of an imminent Soviet attack had sparked the desire for nuclear weapons as a powerful deterrent, this motive had dissipated relatively quickly after Stalin's death in 1953.

¹⁰⁶¹ AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962.

Momentous as it may have been, the temperature continued to rise in Cold War divisions, necessarily reflecting on Tito's nuclear policies. By the mid-1950s, Yugoslav leaders, above all Tito, had identified that further nuclear weapons proliferation, and particularly in Europe, might erase the Yugoslav independence, first and foremost by neutralizing its hard-earned conventional military deterrence, thus spelling the end of the equally hard-earned independence and collapse of Tito's regime. Their potential nightmare was being surrounded by countries armed with nuclear weapons, an outcome of a specific domino effect, triggered by successful nuclear weapons programs in the Federal Republic of Germany and perhaps also Italy. Tito did what was possible to support any initiative during the 1950s that would guarantee this would not happen, as attested in the episode with the ambitious Rapacki plan of 1957, while simultaneously accelerating the nuclear weapons program, fearing or perhaps even anticipating failure of these initiatives.

This subchapter will focus on the evolution of Yugoslav nuclear policy during the 1960s, as the final piece of Tito's proliferation puzzle. The following analysis reveals that an understanding gradually grew in Yugoslavia that stopping nuclear weapons proliferation, and global nuclear disarmament as the final goal, would serve Yugoslav independence better than having a nuclear arsenal which proved to be much more expensive and complicated to develop than initially expected and promised. The solution was found in the Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty - NPT) which Yugoslavia signed in 1968, and ratified in the National Assembly in 1970. This treaty eventually led to the almost complete abandonment of the Yugoslav nuclear program and its rapid deconstruction symbolized in the final dissolution of the once almighty SKNE by the end of the year.

Making a structure of a nuclear policy

The establishment of the Eighteen Nation Disarmament Committee (EDNC) by the United Nations in 1961 marked the beginning of negotiations on “general and complete disarmament”. This Committee led to several interim agreements, such as 1963 Partial/Limited Test Ban Treaty (PTBT/LTBT), and eventually to the establishment of the global international regime, embodied in the 1968 Non-Proliferation Treaty (NPT).¹⁰⁶² In Yugoslavia, this event sparked the need for defining or redefining of the country’s position and on this issue, which was a sensible step to be taken, although it was not without its problems. Already in April 1962, the Ministry of Foreign Affairs organized a joint meeting with representatives of the JNA, the Institute for International Politics and the SKNE, with an aim to “establish permanent cooperation and coordination between aforementioned institutions,” which would allow the representatives of the Ministry of Foreign Affairs “to participate with more complete argumentation in international negotiations in United Nations, on conferences for disarmament” and other activities related to the problem of nuclear weapons proliferation.¹⁰⁶³

This rather short document reveals several important issues regarding the Yugoslav position regarding the question of global disarmament. First, the representatives of the Ministry of Foreign Affairs “emphasized that they do not have experts who could follow sophisticated problems and materials being negotiated.” The problem was quite acute, since it was also revealed that the entire Yugoslav diplomatic core had no experience or understanding about size of nuclear weapons arsenals in the world, global reserves of nuclear raw materials or capacities for

¹⁰⁶² Goldblat, *Arms Control*, 48, 56; U.N. Resolution 1722 (XVI), “Question of disarmament”, December 20, 1961, [https://undocs.org/en/A/RES/1722\(XVI\)](https://undocs.org/en/A/RES/1722(XVI)) (accessed on March 15, 2021).

¹⁰⁶³ AJ, 177, f. 11. Poverljivi izveštaj DSIP-a o sastanku kod druga Đure Ničića [Classified Report on Meeting with Comrade Đura Ničić], April 2, 1962.

production of “nuclear and thermonuclear weapons”, as well as methods for detection of nuclear explosions.¹⁰⁶⁴ In other words, they had very little, if any, knowledge on the key topics negotiated in the EDNC, which indirectly reveals that global disarmament, and particularly the nuclear weapons proliferation problem, was not studied with any depth in the previous period. This adds a fresh perspective on initiatives Yugoslavia supported in the previous period, such as the Rapacki plan, which could have only focused on the most pressing issue at the time, stopping the armament of the FRG with nuclear weapons, probably without having a wider perspective in mind. This statement may seem too harsh, but it does not suggest that there were not people who did understand the full significance of such initiatives, starting with Tito and trickling down to some of his closest associates. What it does suggest is that the problem of nuclear weapons proliferation was not treated in a methodical way, at the very least not by the Ministry of Foreign Affairs, which is an important conclusion on its own, and which is indirectly supported by the fact that very few records can be found on these issues in its archives prior to the early 1960s.

The second important discovery is that “the problem of disarmament and control of nuclear explosives production and detection of explosions”, was often repeated as a burning question the Ministry of Foreign Affairs wanted to cover. This is not surprising considering that negotiations about the PTBT/LTBT were necessarily very technical, which did require a significant understanding of the related science and technologies from persons engaged in negotiations.¹⁰⁶⁵ In the Yugoslav case this problem had an additional perspective. As a country deeply invested into the development of the atomic bomb, having a deep understanding of negotiations and

¹⁰⁶⁴ AJ, 177, f. 11. Poverljivi izveštaj DSIP-a o sastanku kod druga Đure Ničića [Classified Report on Meeting with Comrade Đura Ničić], April 2, 1962.

¹⁰⁶⁵ AJ, 177, f. 11. Poverljivi izveštaj DSIP-a o sastanku kod druga Đure Ničića [Classified Report on Meeting with Comrade Đura Ničić], April 2, 1962; Goldblat, *Arms Control*, 56.

activities directed to stopping or slowing down of nuclear weapons proliferation was crucial in planning of its activities in the field, such as the choice of the type or size of the plutonium producing nuclear reactors, to mention just the most obvious.

On the other hand, successful negotiations in the ENDC could potentially lead to a complete abandonment of these plans, which eventually did happen in Yugoslavia, although back in 1962 this decision was still far from being reached. The report clearly states that coordination between these institutions was being prepared only “in case our government decides to engage itself in the disarmament action,” which clearly suggests that not a single position regarding the disarmament negotiations in the ENDC had been reached at the time, and that the whole idea was to follow the evolution of idea on order to be prepared to make an informed foreign policy decision on this issue when the time comes. A more pressing reason for following the ENDC activities at the time was that, “besides India”, Yugoslavia was “the most advanced non-aligned country in the field of peaceful uses of nuclear energy,” and that it would be “opportune” to be updated on the question of disarmament. The comment clearly indicated the desire for maintenance of the Yugoslav leadership aspirations within the NAM, which was somewhat undermined by the fact that both India and Egypt (United Arab Republic/UAR) were members of the ENDC.¹⁰⁶⁶

Indeed, the Indian Ambassador in Belgrade noticed that the inclusion of “as many as eight of the non-aligned countries [...] was, naturally, a cause of gratification to her [Yugoslavia]”, but also that “one could hardly miss the under-tone of

¹⁰⁶⁶ AJ, 177, f. 11. Poverljivi izveštaj DSIP-a o sastanku kod druga Đure Ničića [Classified Report on Meeting with Comrade Đura Ničić], April 2, 1962; U.N. Resolution 1722 (XVI), “Question of disarmament”, December 20, 1961. Brazil, Bulgaria, Burma, Canada, Czechoslovakia, Ethiopia, France, India, Italy, Mexico, Nigeria, Poland, Romania, Sweden, Union of Soviet Socialist Republics, United Arab Republic, United Kingdom of Great Britain and Northern Ireland and United States of America

disappointment at the exclusion of Yugoslavia from the committee, while two others (namely India and the U.A.R.) of the so-called 'non-aligned Big Three' seemed to enjoy the confidence of both the East and the West." However, regarding the Yugoslav early formulation of the policy regarding disarmament, the Indian Ambassador commented that "Yugoslav views have always been somewhat extreme, rather in support of the Moscow line," and that "there could be no choice between 'total peace' and 'total war'." The argument was, as understood by the Indian Ambassador, that with growing sophistication, strength and sheer numbers of nuclear arsenals, the only solution for the Yugoslav security dilemma would be a total nuclear disarmament, showing also understanding that "by and large Yugoslav attitude was determined by her own geography."¹⁰⁶⁷

In following months, the Yugoslav diplomacy became particularly active in Geneva where the ENDC negotiations were taking place. Even though it was not a member of the committee, Yugoslav diplomats had the access to all classified documents "through the UAR delegation or by other means." Anticipating that the mail of the Yugoslav mission in the U.N. was being censored by the Swiss authorities, official ENDC publications and public statements were sent to Belgrade using mail, while classified documents were sent through "various delegates" who came to Geneva on other tasks and acted as couriers.¹⁰⁶⁸

The Yugoslav position regarding the test-ban negotiations in the ENDC was relatively quickly based on two principles. Already in January 1963, the Yugoslav Embassy in Moscow reported that the Soviet position was that the agreement on this

¹⁰⁶⁷ NAI, Transfer List 225, Ministry of External Affairs, Historical Division (R&I Section) 1959-1981 (Research and Intelligence Section). 6/59/ R&I/61 – Annual reports from Belgrade for 1961. Political Report of the Indian Embassy in Belgrade, for the Month of December 1961, January 8, 1962

¹⁰⁶⁸ DA MSPRS, PA, 1963, f. 140 (UN). Report of the Yugoslav Delegation with the U.N. in Geneva, January 15, 1963.

topic would be “an obstacle to [nuclear] arming of West Germany”, which “in the USSR is still considered as a particular danger.” In addition, the Soviets would be happy to use such an agreement as a means of putting “a political and moral pressure” on China. Although it was also emphasized that “they have no illusions that China can be stopped from performing tests (and building its own atomic power)”, it was expected this would take “a lot of time”.¹⁰⁶⁹ This strategy of reminding the Yugoslavs how dangerous arming of the FRG with nuclear weapons can be in order to support the Soviet proposals had already been seen, and the Soviets continuously used it. For example, at least on one occasion the Soviets justified any stalling in negotiations with the desire of the West to “draw W. Germany into the circle of nuclear powers” before the test-ban agreement is signed, which was once again a signal for Yugoslavia which proposal to support.¹⁰⁷⁰ What can also be read between the lines was the Soviet desire to use Yugoslavia as a tool of its diplomacy among the non-aligned nations in order to gain their support as well, even if only indirectly. It also has to be emphasized that Yugoslavia shared this interest even without the Soviet delicate or direct pressure which continued along the same lines in following months.

An additional and related Yugoslav fear was that the lack of agreement between the Soviet Union and the United States would lead to growing tensions. Yugoslavia wanted to avoid these tensions, which would necessarily complicate any similar negotiations in the future and perhaps even lead to connecting the test-ban problem with other open international questions, and eventually to lumping several problems as bargaining chips of the one or the other side, an approach considered to

¹⁰⁶⁹ DA MSPRS, PA, 1963, f. 140 (UN). Telegram Ambasade FNRJ u Moskvi, br. 69 [Telegram of the FPRY Embassy in Moscow, no. 69], January 29, 1963.

¹⁰⁷⁰ DA MSPRS, PA, 1963, f. 140 (UN). Telegram delegacije FNRJ u Ženevi, DSIP-u [Telegram of the FPRY Delegation in Geneva to the State Secretariat for Foreign Affairs, no. 51], br. 51, February 28, 1963

be totally unacceptable to Yugoslavia.¹⁰⁷¹ Yugoslav logic on this issue was very simple. While other European nations were members of one or the other bloc and could hide under the nuclear and conventional military umbrella of their respective patron superpower, Yugoslavia, Albania, and by the mid-1960s Romania, were in a sort of a ‘grey area’ of the Soviet interest sphere and could easily become its prey in case of destabilization in relations between two superpowers, in Europe or elsewhere.¹⁰⁷²

Yugoslavia was competing with India for the leading position within the NAM, indirectly confirmed already in the episode of procurement of classified documents through the UAR representatives. Without access to the ENDC negotiations, Yugoslavia wanted to be vocal among the non-aligned countries, and the main policy was basically formulated by March 1963. The policy was rather simple: it included strong support and promotion of a potential joint proposal of non-aligned nations, promotion of the test-ban negotiations in case joint proposal cannot be reached, or transfer the initiative to the United Nations if potential initiatives of the non-aligned nations fail in the ENDC.¹⁰⁷³

The Indian diplomacy used a surprisingly similar approach as the Soviet did in mobilizing Yugoslavia to provide adequate support. Already in February 1963, the Yugoslav Embassy in New Delhi reported in informal conversations Indian diplomats raised their concerns that China might conduct its first atomic bomb test during 1963, and that in that case “India too will be forced to construct the bomb (reassuring us that

¹⁰⁷¹ DA MSPRS, PA, 1963, f. 140 (UN). Telegram Državnog sekretarijata za inostrane poslove svim diplomatškim predstavništvima, br. 425476 [Telegram of the State Secretariat for Foreign Affairs to all Diplomatic Missions, no 425476], August 3, 1963; DA MSPRS, PA, 1963, f. 140 (UN). Izveštaj Odeljenja za međunarodne organizacije [Reports of the Department for International Organizations], March 11, 1963.

¹⁰⁷² Dragan Bogetić, *Jugoslovensko-američki odnosi 1961-1971* [Yugoslav-American Relations, 1961-1971] (Beograd: Institut za savremenu istoriju, 2012), 265.

¹⁰⁷³ DA MSPRS, PA, 1963, f. 140 (UN). Izveštaj Odeljenja za međunarodne organizacije, March 11, 1963.

I[ndia] is capable to construct the bomb of the Hiroshima capacity in six months,” arguing that the test-ban and related inspections has to be agreed between two superpowers very soon.¹⁰⁷⁴

The Indian atomic bomb would necessarily secure them a leadership position in the NAM, and it would take many years before Yugoslavia would be able to develop its own bomb and respond to this challenge in the realm of prestige. This necessarily added to the complexity of the issue, since a successful test-ban treaty would make it very complicated for India to pursue this option; this would make the competition for leadership among the non-aligned nations between India and Yugoslavia open and more balanced. On the other hand, the Indians did not shy away from playing the ‘West German’ card, explaining that in case of the prolongation of negotiations, other problems will be included, “first and foremost the German complex in its entirety and particularly arming of Germany with nuclear weapons.”¹⁰⁷⁵

Starting with nothing even remotely close to a policy, by the end of July 1963 Yugoslavia officially announced its readiness to sign the treaty even before the final agreement had been reached.¹⁰⁷⁶ Although many nations wanted to lure Yugoslavia to support their own proposals and arguments, with the visible absence of the United States, it seems that Yugoslavia managed to develop its own position regarding the wider issue of nuclear weapons proliferation and disarmament:

¹⁰⁷⁴ DA MSPRS, PA, 1963, f. 140 (UN). Telegram Ambassade FNRJ u Nju Delhiju, February 1, 1963.

¹⁰⁷⁵ DA MSPRS, PA, 1963, f. 140 (UN). Telegram Ambassade FNRJ u Ženevi, br. 242. Razgovor sa Arturom Lalom, June 9, 1963.

¹⁰⁷⁶ DA MSPRS, PA, 1963, f. 140 (UN). Zabeleška o razgovoru M.D.D. Brown, savetnikom britanske ambasade u Beogradu sa drugom Dr. Đ. Ninčićem, načelnikom Uprave za međunarodne organizacije, July 30, 1963.

“Convergence of views and readiness for limited agreements between the USA and USSR is met and will continue to be met with resistance of W[est] G[ermany] and France (the German problem, resistance to the USA-USSR bilateralism, etc.), but this development had already imposed certain evolution in their positions. [...] All this requires as wide as possible and more active inclusion of the rest, and above all, non-aligned countries, in presently initiated positive processes.”¹⁰⁷⁷

The report and explanation included was sent to Yugoslav embassies and other diplomatic missions abroad and it does represent the Yugoslav official policy regarding disarmament. This position indirectly suggests that by this time Yugoslavia had definitively abandoned the atomic bomb ambitions, although the evolution of the country's nuclear program continued without any immediate changes, which is a cause for caution in making any firm claims. The international climate regarding nuclear weapons proliferation obviously started to change soon after the Cuban Missile Crisis in October 1962, although this was only a culmination of the period of rapidly worsening relations between two superpowers. In the meantime, both vertical and horizontal nuclear proliferation was continuing unimpeded, all of which was a sign that in order to avoid a global disaster, the question of disarmament would have to be taken seriously.

It seems that nobody understood this better than Ivan Supek who roughly in this period abandoned the Yugoslav nuclear program and became a vocal activist against nuclear weapons. During his fateful appearance before the SKNE in April 1962, he left a visionary and cautious message regarding the future of the Yugoslav nuclear ambitions:

¹⁰⁷⁷ DA MSPRS, PA, 1963, f. 140 (UN). Telegram Državnog sekretarijata za inostrane poslove svim diplomatshim predstavništvima, br. 425476, August 3, 1963.

“In choosing the path which our nuclear energy [program] should go, it is important to perceive the world as it will be formed around 1980, as well as all other developmental tendencies in following decades. If around 1980, and after, if general disarmament ensues, or if the world remains even more entrenched in its block contradictions, the development of the nuclear energy in our country would be completely different. Besides these two extremes, it is possible for our [current] world to continue to exist in forms of semi-coexistence and with certain amount of international cooperation, or with zones of atomic disarmament. All these moments are of significant influence in development of our perspective plan, and these political moments and their impact on the plan should be considered, one by one.”¹⁰⁷⁸

Anticipating that changes might occur in the international community, Supek suggested not only caution but also a concern that all of the preparations for the potential construction of atomic bombs might easily be in vain and that ambitious Perspective Plan must be reconsidered with this in mind. That changes were occurring in the positions of more internationally oriented politicians can be found in occasional comments and documents, although in the early 1960s it is difficult to speak about any firm decisions in that respect. Similar to Supek’s comments were suggestions of the Yugoslav Minister of Foreign Affairs, Koča Popović, expressed in a letter to General Ivan Gošnjak, the Minister of Defense and a person deeply involved and interested in the country’s nuclear program:

“These new characteristics of disarmament negotiations require studying of various proposals and submitting of new suggestions formulated on the basis of continuous

¹⁰⁷⁸ AJ, 177, f. 17-58. Postavke perspektivnog plana nuklearne energije [Outline of the Perspective Plan of Nuclear Energy], April 28, 1962.

elaboration of particular aspects of disarmament, taking into account constant and rapid changes on the general political, but also on the military and scientific field."¹⁰⁷⁹

Making any firm claims of what was happening behind the closed doors and among Yugoslav politicians regarding the country's peaceful or military nuclear ambitions is a challenging task, but some hypotheses can be suggested. A number of politicians seemed to be questioning the feasibility and utility of such ambitions in the gradually changing circumstances on a global level. Scientists were discouraged with the almost exclusive emphasis on applied research, reformists were concerned with the highly centralized system which was very expensive and in which the SKNE and the nuclear program became symbols of oppression, financial if not openly political. Career diplomats and politicians with extensive international contacts became more aware of the changed circumstances and the necessity for Yugoslavia to take active if not leading role in these processes, and avoid becoming a pariah and even a 'rogue state' as China was at the time. All of this meant that the momentum against the construction of atomic bombs or nuclear program in general, or at least of this magnitude, started to grow, and it included powerful figures from different groups and with different motives. What must have been evident to them was that the most powerful obstacle to introduction of changes was Aleksandar Ranković who symbolized everything they fought against. This is not to say that his downfall was exclusively related to his role in the Yugoslav nuclear program, but this was an important and so far completely overlooked factor. At least in the field of foreign policy, a strong support to international disarmament efforts by a particular politician

¹⁰⁷⁹ DA MSPRS, PA, 1963, f. 140 (UN). Pismo Državnog sekretara za inostrane poslove, Koče Popovića, Državnom sekretaru za poslove narodne odbrane, drugu Ivanu Gošnjaku, February 23, 1963.

or a group, may be taken as a litmus test of their relation towards the Yugoslav nuclear program and Ranković.

The 37th Signatory of the NPT

During the heated debate about details and provisions of the future Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the anchoring points of the Yugoslav foreign policy did not change dramatically. Within such a framework the strategies of the Soviet Union or the United States towards Yugoslavia did not change either; while the Soviet Union was attempting to secure the support from, indirectly also the control over the NAM, the United States were more active than earlier, but far less than the Soviets. The only significant change was visible in relations with India, which was a strong opponent of such a treaty, formally signaling the inequality the NPT enforces and formalizes between nuclear haves and have-nots, while keeping the nuclear weapons construction option open as an answer to future challenges. Considering the Yugoslav continuous, albeit occasionally grumbling support of the NPT, it seems safe to argue that, unlike his Indian allies, Tito had long abandoned his atomic bomb dreams.

Following its already defined policies in this field, Yugoslavia formally expressed its support to conclusion of the international non-proliferation treaty in its Memorandum of the Government of the Socialist Federal Republic of Yugoslavia to the U.N. Disarmament Commission, delivered on May 3, 1965.¹⁰⁸⁰ Even though Yugoslavia started to seriously analyze and wholeheartedly support non-proliferation

¹⁰⁸⁰ *United Nations Disarmament Commission. Official Records. Supplement for January to December 1965* (New York: United Nations, 1966). Document DC/216. "Memorandum of the Government of the Socialist Federal Republic of Yugoslavia on Necessary Immediate Measures in the Field of Disarmament," May 3, 1965, 34-35, <https://s3.amazonaws.com/unoda-web/documents/library/Supplement%20for%201965.pdf> (accessed on April 18, 2021).

of nuclear weapons and nuclear disarmament during negotiations for the PTBT in 1962 and 1963, the date of submission of this Memorandum may be taken as a specific ‘point of no return’ which definitively defined the Yugoslav foreign policy in this field, and which necessarily had to reflect on the country’s nuclear program.

The 1965 Memorandum contained the usual formulae in support of “general and complete disarmament” and critique of previously failed initiatives, but it strongly criticized the apparent lack of interest among superpowers to contain the nuclear arms race. The Memorandum requested, “urgent and concrete actions [to] be undertaken both on the national and international plane.” One of the explanations for the necessity of urgent action was the fear of an arrested economic progress of less developed nations due to nuclear and conventional arms race, a goal common to the non-aligned nations, but very important to Yugoslavia as well. More importantly, it confirms that Yugoslavia was not only supporting this initiative, but wanted it to succeed in shortest period of time. In that respect, the Yugoslav Government insisted on “a minimum number of measures” that could be quickly adopted in order to break almost two decades of stalemate in negotiations. This included: “a) the obligation not to use nuclear weapons, b) the banning of all nuclear weapon tests with no exception, c) the prevention of the further spread of nuclear weapons in any form whatever, with an agreement to begin solving the problem of denuclearization of nuclear Powers themselves.”¹⁰⁸¹

The Yugoslav suggestion tried to find the middle ground between policies supported by the non-aligned nations and Yugoslavia’s own security concerns, while

¹⁰⁸¹ *United Nations Disarmament Commission. Official Records. Supplement for January to December 1965* (New York: United Nations, 1966). Document DC/216. “Memorandum of the Government of the Socialist Federal Republic of Yugoslavia on Necessary Immediate Measures in the Field of Disarmament,” May 3, 1965, 34-35, <https://s3.amazonaws.com/unoda-web/documents/library/Supplement%20for%201965.pdf> (accessed on April 18, 2021).

having a semblance of an original policy. This was particularly visible in the continuous and strong insistence on total nuclear disarmament, which was characteristic of Yugoslav foreign policy at least since the early 1960s. The 1965 Memorandum also reflected enthusiasm after relatively quick and successful PTBT, which was most likely the underlying reason of the “minimum number of measures” logic.

The Indian Embassy in Belgrade was continuously monitoring any Yugoslav initiative in this field, particularly regarding Yugoslav activities among the non-aligned countries and any potential changes of the general policy regarding ongoing disarmament negotiations within the ENDC. The relaxation of the Yugoslav attitude became visible by April 1967, when the Soviet Union and the United States agreed on a draft of the nuclear non-proliferation treaty. Admitting that the agreement had its shortcomings, the Yugoslav diplomacy stressed that it “can be an important contribution to the policy of peaceful co-existence and negotiations without which it would be impossible to reach an agreement on general disarmament.” In that respect, the adapted Yugoslav position was that “the agreement must not be an end in itself but a means for starting the process of disarmament which includes the de-nuclearization of the existing atomic powers.”¹⁰⁸²

By the beginning of 1968, Yugoslavia’s own estimates became even more realistic and better informed. It was understood that both the United States and the Soviet Union had no intention to accept amendments of the non-aligned countries and that the draft will probably not be significantly changed. The ‘take it or leave it’ approach usually did not sit well with the Yugoslavs, but the understanding had been

¹⁰⁸² NAI, TL 224, Ministry of External Affairs, Historical Division (R&I Section), 1950-1972 [Research and Intelligence Section]. HI/1012/59/67 – Monthly Political Reports (other than Annual reports) from the Embassy of India, Belgrade. Monthly Political Report for March 1967, April 17, 1967.

reached in previous months that “it is more important to receive the acceptance of the FRG.” It was also begrudgingly accepted that the United States and the Soviet Union will start negotiations regarding “freezing of nuclear weapons and on antimissile systems” only after the non-proliferation treaty is signed and ratified. The same disillusionment was present about discussions on “the bases, ban on the use of nuclear weapons, and particularly general disarmament”, where there were “no real perspectives for progress.”¹⁰⁸³

In following weeks and months, the Yugoslav Ministry of Foreign Affairs was very active in an attempt to secure the necessary support to the treaty among the non-aligned nations, obviously being satisfied with reassurances that it would deny nuclear weapons to the FRG. According to the estimate of the Yugoslav Embassy in Washington D.C., “the most serious opponents were India, Brazil and Romania,” and the Yugoslav diplomatic activities were tailored accordingly. It was suggested that with India the only realistic goal was “to secure that it does not initiate action against the treaty”, while regarding Brazil it was commented that it would sign the contract “with some reserves (peaceful explosions).” It was also expected that the safeguards were “the question on which can spark the most serious resistance of non-nuclear countries.”¹⁰⁸⁴

The relations among the non-aligned nations was particularly tense, as they could not agree on a unique position on the draft of the treaty, being immersed in their own policies, such as India or Sweden, or presenting very drastic amendments, such as Brazil and Argentina who defended their right to conduct peaceful nuclear explosions

¹⁰⁸³ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi šifrovani telegram, br. 23, Njujork, January 17, 1968.

¹⁰⁸⁴ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi telegram Ambasade FNRJ u Vašingtonu, DSIP-u, br. 50, January 29, 1968.

(PNE).¹⁰⁸⁵ In the given circumstances, the Yugoslav Ministry of Foreign Affairs was questioning the expediency of submitting any additional amendments and expressing doubt “that in this phase it would contribute to the improvement of the treaty.” A related problem was that Yugoslavia simply did not have any concrete suggestions or complaints which could be formulated as constructive amendments.¹⁰⁸⁶ Main components of the Yugoslav nuclear policy were already promulgated in the 1965 Memorandum, and were eventually only further elaborated in the Statement of the Socialist Federal Republic of Yugoslavia Government on Non-Proliferation of Nuclear Weapons from April 11, 1968. The 1968 Statement focused on the nuclear disarmament, international cooperation in peaceful uses of nuclear energy, “including nuclear explosions for peaceful purposes”, and firm security guarantees to non-nuclear weapons states that nuclear weapons will not be used against them.¹⁰⁸⁷

Not having particularly fresh ideas, or realistic chances to voice for significant changes in the draft treaty, it seems that the Yugoslav decision makers wanted to exploit the opportunity to gain some prestige points among non-aligned nations. The 1968 Statement seem to have been directed towards (if not against) India and its prominent role in the ENDC and NAM, but also in consideration to its significant capacities to develop nuclear weapons in the relatively near future. Canadian diplomats helped solving the latter dilemma and a burning issue for Yugoslavia, warranting that India would not break the agreement and use plutonium from the CANDU reactor they sold to them for construction of the atomic bomb, while the

¹⁰⁸⁵ For the Swedish experience with the NPT negotiations, please see Thomas Jonter, *The Key to Nuclear Restraint: The Swedish Plans to Acquire Nuclear Weapons During the Cold War* (London: Palgrave Macmillan, 2016), 216-250; Matias Spektor, “The evolution of Brazil’s nuclear intentions”, *The Nonproliferation Review* 23, no. 5-6 (2016), 638.

¹⁰⁸⁶ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi šifrovani telegram, br. 96, Njujork, February 19, 1968.

¹⁰⁸⁷ DA MSPRS, PA, 1968, f. 222 (UN). Saopštenje Vlade SFRJ o neširenju nuklearnog oružja [Statement of the SFRY Government on Non-Proliferation of Nuclear Weapons], April 11, 1968.

independent production of plutonium in India would not start before 1975, all of which was accepted as sufficient guarantee that such a scenario would not happen.¹⁰⁸⁸ Roughly at the same time, Indian diplomats in New York assured their Yugoslav counterparts that “India will not develop atomic weapons, but is interested to continue use of atomic energy for peaceful purposes unimpeded.”¹⁰⁸⁹

The two superpowers had clear messages for Yugoslavia. The Head of the U.S. delegation in the ENDC reassured the Yugoslavs that the FRG would sign the treaty, and that it would also make it impossible for the United States share their nuclear weapons with countries on whose territory it is located.¹⁰⁹⁰ Similar guarantees were received from the Head of the U.S. delegation in the U.N. Disarmament Commission, who admitted that the treaty was not perfect, but that it was the best possible in the given circumstances, expressing hope that Yugoslavia would support it.¹⁰⁹¹ American diplomats also emphasized that “détente between USA-USSR” was more important than any problems non-nuclear countries raised, particularly regarding the safeguards.¹⁰⁹²

This was the main rationale and logic on which the U.S. policies regarding the NPT had been developed. The importance attached to détente directed the decision of the U.S. Government even after the Soviet invasion of Czechoslovakia to avoid “any

¹⁰⁸⁸ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi telegram Ambasade FNRJ u Vašingtonu, br. 317 [Strictly confidential telegram from the Embassy of the Federal People's Republic of Yugoslavia in Washington, no. 317], March 20, 1968.

¹⁰⁸⁹ DA MSPRS, PA, 1968, f. 223 (UN). Strogo poverljivi šifrovani telegram Ambasade FNRJ u Vašingtonu, br. 159 [Strictly confidential encrypted telegram of the Embassy of the Federal People's Republic of Yugoslavia in Washington, no.159], March 15, 1968.

¹⁰⁹⁰ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi telegram predstavnika FNRJ u Ženevi, br. 110 [Strictly confidential telegram from the representative of the Federal People's Republic of Yugoslavia in Geneva, no. 110], February 23, 1968.

¹⁰⁹¹ DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi telegram predstavnika FNRJ u Ženevi, DSIP-u, br. 141 [Strictly confidential telegram from the representatives of the Federal People's Republic of Yugoslavia in Geneva, DSIP, no. 141], March 8, 1968.

¹⁰⁹² DA MSPRS, PA, 1968, f. 221 (UN). Strogo poverljivi telegram predstavnika FNRJ u Ženevi, DSIP-u, br. 72 [Strictly confidential telegram from the representative of the Federal People's Republic of Yugoslavia in Geneva, no. 72], February 12, 1968.

intimation of heavy-handed pressure or arm twisting” in gathering support to the NPT among other nations, “especially the Federal Republic of Germany”. The two-prong problem, as it was identified, was that any such pressure could result in expectations and even demands for the stronger U.S. security guarantees, consequently complicating conversations with the Soviets. The other prong of the problem was that the Soviet invasion of Czechoslovakia had “demonstrated their disregard for treaty obligations such as those contained in the NPT”, which suggests that at least President Nixon’s administration considered the NPT more as a mean to détente, than an actual functional international treaty. The same logic can be identified in the U.S. Government’s signing and ratifying the NPT, as the haste and expedience in this matter aimed primarily to “pre-empt efforts by allies and neutrals to reopen earlier issues on the NPT”, while simultaneously denying this topic as a bargaining chip in any future negotiations by the Soviets.¹⁰⁹³ The reasoning behind such decisions was obviously more complex than presented here, but for the purpose of this analysis it is useful in explaining next to a complete lack of pressure by the U.S. on Yugoslavia to sign the NPT.

The Soviet diplomacy was, unsurprisingly, more direct than their American counterparts. The advisor of the Soviet Embassy in Berlin bluntly expressed his worry that “the behavior of the FRG recalls the avoidance of obligations and camouflage [seen] in German policies after the First World War”, expressing also his doubt that they would sign the treaty. Obviously attempting to reinforce Yugoslav fears of German revisionism, only armed with nuclear weapons, the Soviet delegation described the FRG as “expansionist, against the socialist countries, wants revision of

¹⁰⁹³ RNPLM, H-019. Schedule of NSC Meeting 2/1969 to 12/1970 [1 of 2] to NSC Meeting Non-Proliferation Treaty 1/29/69. Top Secret. List of Actions Resulting from Meeting of the National Security Council on January 29, 1969; RNPLM, H-019. Schedule of NSC Meeting 2/1969 to 12/1970 [1 of 2] to NSC Meeting Non-Proliferation Treaty 1/29/69, Summary of the NPT Issues Paper, January 28, 1969.

borders and does not recognize post-war realities, strives for atomic weaponry.” Thus the Soviet Union was trying to secure the Yugoslav support to the treaty and promotion of this idea among the non-aligned countries, much like many times before. The approach definitively worked with the Yugoslav diplomat in Berlin who reported back to Belgrade that he believed “that in this period there really is a great understanding of two countries in policy towards the FRG and West Berlin.”¹⁰⁹⁴

Having received reassurances from both superpowers that the FRG would sign the treaty and give up on potential independent development of nuclear weapons, that the treaty would also guarantee that the United States would not share their weapons with the FRG (or any other country for that matter), and that India would not be able to construct the atomic bomb in the foreseeable future, all the most important boxes were ticked on the Yugoslav agenda. In addition, the beginning of the détente between the Soviet Union and United States, a process in which the NPT was an important milestone, was only an added benefit to the Yugoslav foreign policy goals as it spelled stability in the potential political status quo in which Yugoslavia proved to be capable of surviving.

All of these calculations influenced the Yugoslav decision not to sign the NPT immediately after the treaty was opened for signatures on July 1, 1968. The delay of several days served the purpose of stressing aforementioned Yugoslav reservations regarding the NPT, as well as its symbolic support to other non-aligned nations which were openly against the treaty. The Yugoslav Ministry of Foreign Affairs also suggested not to condition signing of the NPT with the FRG’s accession to the treaty, expecting it to happen soon, although in one of the official estimates it was also

¹⁰⁹⁴ DA MSPRS, PA, 1968, f. 222 (UN). Šifrovani strogo poverljivi telegram ambasade FNRJ u Berlinu, br. 154 [Encrypted strictly confidential telegram of the Embassy of the Federal People's Republic of Yugoslavia in Berlin, no. 154], April 16, 1968.

emphasized that “this probably will not be the case with ratification”.¹⁰⁹⁵ After the first thirty-six countries had signed the NPT on July 1, 1968, Yugoslavia did the same on July 10, signing the treaty simultaneously in Moscow as the thirty-seventh signatory and in London as the thirtieth.¹⁰⁹⁶ The final estimate about the utility of the NPT for fulfillment of the Yugoslav foreign policy goals summarizes the Yugoslav strategy as it evolved since the early 1950s, but also reveals a rather realistic estimate about the Yugoslav nuclear program and capabilities in that field, which seldom was the case:

“Our security in relation to the FR Germany and Italy is increasing [original emphasis]. Namely, if there were no Treaty and if nuclear weapons proliferation would occur in Europe, FR Germany and Italy would be the first to acquire it. We, if in a particular set of circumstances would be forced to go for the military nuclearization, it would be a lot slower and less efficient, considering our much weaker financial and technological capabilities. Therefore, our security is, according to our opinion, greatest if none of our potential enemies has nuclear weapons. Consequently it is in interest of Yugoslavia to directly advocate the absolute prevention of further nuclear weapons proliferation. Since our concept of non-proliferation of nuclear weapons is more comprehensive than the one in the treaty, Yugoslavia must constantly insist on a wider concept which would aspire for withdrawal of nuclear weapons from foreign territories, from seas and oceans, suspension of training of foreign armies in handling nuclear weapons and in general, stopping of the so-called ‘vertical’ nuclear

¹⁰⁹⁵ DA MSPRS, PA, 1968, f. 222 (UN). Informacija i predlog u vezi sa potpisivanjem Ugovora o neširenju nuklearnog oružja [Information and Suggestion Regarding the Signing of the Treaty of Non-Proliferation of Nuclear Weapons], June 27, 1968.

¹⁰⁹⁶ DA MSPRS, PA, 1968, f. 223 (UN). Šifrovani strogo poverljivi telegram ambasade SFRJ u Moskvi, br. 565 [Encrypted strictly confidential telegram of the SFRY embassy in Moscow, no. 565], July 10, 1968; DA MSPRS, PA, 1968, f. 223 (UN). Šifrovani strogo poverljivi telegram ambasade SFRJ u Londonu, br. 478 [Encrypted strictly confidential telegram of the SFRY embassy in London, no. 478], July 10, 1968.

weapons proliferation, that is to say, its further sophistication and multiplication among existing nuclear powers.”¹⁰⁹⁷

Other benefits and motives identified by the Yugoslav Ministry of Foreign Affairs included the possibility to “significantly improve development of modern [nuclear] technology”, as stipulated in Articles IV and V of the NPT. Like many times before, it was also emphasized that the main precondition for the fulfillment of these ambitions was “clearly conceived long-term and short-term plan” for the development of nuclear program.¹⁰⁹⁸ The NPT (Article VI) also allowed Yugoslavia “better conditions for more direct engagement in efforts to achieve certain disarmament and security measures”. This was particularly important for Yugoslavia, whose core foreign policy and defense strategy was based on the notion that “military alliances and blocs are not the form through which security should be pursued”, focusing instead on “disarmament and development of fresh and far-reaching forms of collective security through the U.N.”¹⁰⁹⁹

Considering the continuous debate about different variants and drafts of so-called Perspective Plans, which stretched back to the late 1950s, as well as the fact

¹⁰⁹⁷ DA MSPRS, PA, 1968, f. 222 (UN). Pitanje ratifikacije ugovora o neširenju nuklearnog oružja. Uprava za međunarodne organizacije (UMO). Grupa za razoružanje, međunarodnu bezbednost i miroljubivo korišćenje nuklearne energije [Question of Ratification of the Non-Proliferation Treaty. International Organizations Administration. Disarmament, International Security and Peaceful Uses of Nuclear Energy Group], May 12, 1969

¹⁰⁹⁸ DA MSPRS, PA, 1968, f. 222 (UN). Pitanje ratifikacije ugovora o neširenju nuklearnog oružja. Uprava za međunarodne organizacije (UMO). Grupa za razoružanje, međunarodnu bezbednost i miroljubivo korišćenje nuklearne energije [Question of Ratification of the Non-Proliferation Treaty. International Organizations Administration. Disarmament, International Security and Peaceful Uses of Nuclear Energy Group], May 12, 1969; United Nations, Office for Disarmament Affairs, “Treaty on the Non-Proliferation of Nuclear Weapons (NPT)”, <https://www.un.org/disarmament/wmd/nuclear/npt/text/>, accessed on April 20, 2021.

¹⁰⁹⁹ DA MSPRS, PA, 1968, f. 222 (UN). Pitanje ratifikacije ugovora o neširenju nuklearnog oružja. Uprava za međunarodne organizacije (UMO). Grupa za razoružanje, međunarodnu bezbednost i miroljubivo korišćenje nuklearne energije [Question of Ratification of the Non-Proliferation Treaty. International Organizations Administration. Disarmament, International Security and Peaceful Uses of Nuclear Energy Group], May 12, 1969

that the development of nuclear weapons had definitively been abandoned, it may be argued that the both acute and chronic lack of strategy for development of nuclear energy and science in Yugoslavia was highly dependent on the attitude of Tito and his inner circle of associates towards indigenous development of nuclear weapons. This notion also indirectly confirms that throughout the 1950s and 1960s, the only strategy Yugoslavia was following was the development of latent nuclear capability and nuclear hedging.

The previous discussion reveals underlying motives and logic in the process of formulation of the Yugoslav nuclear policy in general and towards the NPT in particular. It also suggest that the entire process was rather linear and unequivocal, which could not be farther from the truth, although it was equally faraway from an open exchange of ideas between various state actors institutions. Nevertheless, the process reveals that at several important state institutions stressed their concerns regarding the NPT, most notably the IBK in Vinča and the UNO, thus indirectly revealing which state structures still considered the construction of nuclear weapons a viable goal, or minimally did not want to abandon this option completely. It also revealed and confirmed the remnants of the network of clients and other civilian structures dedicated to the Yugoslav nuclear program, developed by Ranković through his almighty SKNE.

In preparation for the ratification of the NPT, on November 19, 1969, the Yugoslav Ministry of Foreign Affairs forwarded the text of the treaty to a number of ministries, scientific institutes, republic governments and other institutions with a request to give their opinion and suggestions regarding ratification of the treaty.¹¹⁰⁰

¹¹⁰⁰ DA MSPRS, PA, 1968, f. 222 (UN). Dopis Državnog sekretarijata za inostrane poslove [Letter of the State Secretariat for Foreign Affairs], November 19, 1969. The letter was addressed to the Government Secretariat for Legislation and Organization, State Secretariat for People's Defense

Most of them provided short written confirmation that they do not have any reservations regarding the ratification of the NPT. Surprisingly the UNO's biggest concern was that the NPT provisions would make it impossible for "small countries" to avoid control of nuclear power plants "and other nuclear installations, [...] control over the fission material which can be used in nuclear power plants as well as in atomic bombs", thus forcing these countries to "renounce the possibility of the peaceful use of nuclear explosions (in mining, construction of underground reservoirs, in construction, etc.". Naturally, these comments were wrapped in the concern for the unfavorable trading position of Yugoslavia, if the NPT is ratified, although the UNO begrudgingly commented that, "if political reasons prevail over the technical-commercial, we do not object the proposal for ratification."¹¹⁰¹

The IBK in Vinča nominally supported the ratification "in case other necessary conditions had been met", although avoiding to identify these conditions. On the other hand, they did not waste the opportunity to stress their concerns regarding the implementation of the NPT and particularly the "exchange of technical and scientific information, availability of the most modern technologies, materials and in general wider use of nuclear energy for peaceful purposes." The latter comment aimed particularly at peaceful nuclear explosions, and the IBK suggested it had already established cooperation with the Mining and Smelting Basin in Bor (Serbia) "for

(Ministry of Defense), State Secretariat for Internal Affairs (Ministry of Internal Affairs), State Secretariat for Economy (Ministry of Economy), SKNE, Federal Chamber of Commerce, six republic governments, IBK, IRB, IJS, faculties of law in Belgrade, Zagreb and Ljubljana, Federal Council for Coordination of Scientific Activities, Institute of Spatial Engineering DSNO, Yugoslav Association for the Design and Installation of Nuclear Equipment and Plants (UNO), Institute for Scientific-Technical Documentation and Information, Institute for International Politics and Economy.

¹¹⁰¹ DA MSPRS, PA, 1968, f. 222 (UN). Dopis UNO Državnom sekretarijatu za inostrane poslove [The UNO's Letter to the State Secretariat for Foreign Affairs], November 26, 1969.

investigating possibilities for use of nuclear explosives ‘in situ’ for more economical exploitation of low-grade ores”, anticipating also “other similar ventures.”¹¹⁰²

The security implications of the NPT and its ratification loomed as most prominent in the formulation of the Yugoslav nuclear policy, and particularly in relation to the FRG. This fact made the opinion of the JNA the most important and the process of ratification was initiated only after it had approved it. The JNA’s only concern was that the ratification should not be initiated before “this treaty is ratified by neighboring countries, as well as the FR Germany”, although the JNA’s letter which had only two full sentences does confirm that no real objections existed among the Yugoslav generals.¹¹⁰³

Whichever concerns and reservations different state actors and institutions had raised regarding the ratification of the NPT, the Ministry of Foreign Affairs included only their most general comments in its final proposal for ratification, such as the inherent inequality or “discriminatory character of the treaty”, and focused instead on received approvals.¹¹⁰⁴ This suggests that the decision had already been made and that the entire ‘discussion’ was a simple formality and show designed to hide the fact that Yugoslavia still kept the main characteristics of a centralized decision-making system. More importantly, two other important conditions had also been met by that time. The FRG signed the NPT on November 28, 1969, which was a big relief to the Yugoslavs, and it was also in accordance with the earlier decision that the ratification of the NPT in Yugoslavia will be conditioned by the FRG’s signing of the treaty. The importance

¹¹⁰² DA MSPRS, PA, 1968, f. 222 (UN). Dopis IBK Državnom sekretarijatu za inostrane poslove [The IBK’s Letter to the State Secretariat for Foreign Affairs], December 3, 1969. The Mining and Smelting Basin in Bor was a surface copper mine and one of the biggest mining companies in Yugoslavia.

¹¹⁰³ DA MSPRS, PA, 1968, f. 222 (UN). Dopis Državnog sekretarijata za narodnu odbranu Državnom sekretarijatu za inostrane poslove [The Letter of the State Secretariat for People’s Defense to the State Secretariat for Foreign Affairs], December 18, 1969.

¹¹⁰⁴ DA MSPRS, PA, 1968, f. 222 (UN). Informacija o pokretanju postupka za ratifikaciju Ugovora o neširenju nuklearnog oružja [Information on Initiating the Procedure for Ratification of the Treaty on the Non-Proliferation of Nuclear Weapons], January 6, 1970.

attached to this event is also visible in the fact that the translation of the official statement of the FRG Government after the signing of the NPT was included in the package of materials prepared for the ratification deliberation process in the Yugoslav Ministry of Foreign Affairs. The second important condition was that by the beginning of 1970, ambassadors of the United States, Soviet Union and Great Britain in Belgrade, made a joint request for Yugoslavia “to ratify the Treaty as soon as possible.”¹¹⁰⁵ No details about the Yugoslav reactions to these requests have been recorded, but it is safe to assume that they would not make much difference or logic to confront in any way such a united front of powers, but some hypotheses can be made.

The question of security guarantees of nuclear powers to non-nuclear nations was often raised by the Yugoslav in international forums during the process of negotiating and drafting the NPT, but its was formulated in an official document only in the 1968 Statement. The Yugoslav Government wanted to support initiatives to find a solution which would obligate nuclear powers “not to use nuclear weapons against treaty signatory states on whose territory there are no nuclear weapons”, as well as to secure that the U.N. mechanisms could provide “efficient protection of non-nuclear countries who could become victims of attacks or threats of the nuclear weapons attack.”¹¹⁰⁶ Even though this was the final point in the 1968 Statement, the events in Czechoslovakia in the summer of that year, definitively raised the importance of such a request and pushed it higher on the list.

¹¹⁰⁵ DA MSPRS, PA, 1968, f. 222 (UN). Informacija o pokretanju postupka za ratifikaciju Ugovora o neširenju nuklearnog oružja [Information on Initiating the Procedure for Ratification of the Treaty on the Non-Proliferation of Nuclear Weapons], January 6, 1970; DA MSPRS, PA, 1968, f. 222 (UN). Materijal za izradu predloga za ratifikaciju Ugovora o neširenju nuklearnog oružja [Materials for Drafting a Proposal for Ratification of the Treaty on the Non-Proliferation of Nuclear Weapons], n.d. 1970.

¹¹⁰⁶ DA MSPRS, PA, 1968, f. 222 (UN). Saopštenje Vlade SFRJ o neširenju nuklearnog oružja [Statement of the SFRY Government on Non-Proliferation of Nuclear Weapons], April 11, 1968.

The Soviet invasion of Czechoslovakia made a huge impact on Tito and the Yugoslav political leadership, forcing them to dramatically change the country's foreign policy course and direct it once again more towards the United States and West in general, but it had equally important consequences on the formulation of the Yugoslav security policy. Much like after conflict with Stalin in 1948, the solution was found in securing clear, yet informal security guarantees from the United States and NATO. Tito's biggest fear was that Brezhnev could use the same logic as in Czechoslovakia and provide direct or indirect support to "dogmatists led by Ranković", often derogatory named "the Rankoviés", as so-called "healthy forces" in Yugoslavia and topple his regime.¹¹⁰⁷ Bogetić does not comment how realistic these fears of "the Rankoviés" really were, although it has already been shown that by the late 1960s, the inter-republican competition turned into open animosity among respective republican party leaders. Other authors who wrote about Ranković's downfall all agree that after his political demise in 1966, he withdrew into himself as a common private citizen.¹¹⁰⁸

In order to secure the necessary guarantees from the United States, Tito organized a swift political campaign against the Soviet Union. Already on August 22, 1968, the Plenum of the Central Committee of the League of Communists of Yugoslavia (Communist Party) made a public statement in which it condemned the invasion of Czechoslovakia, defining it as an "act of aggression", "trampling on the sovereignty of a sovereign country", "a clear indicator of the Soviet hegemonic aspiration", requesting the immediate withdrawal of the Soviet troops.¹¹⁰⁹ The next step was to show both to the West and the Soviets that a potential similar invasion of

¹¹⁰⁷ Bogetić, *Jugoslovensko-američki odnosi, 1961-1971*, 257-258.

¹¹⁰⁸ Dimitrijević, *Ranković: Drugi čovek*; Pirjevec, *Tito i drugovi*.

¹¹⁰⁹ Bogetić, *Jugoslovensko-američki odnosi, 1961-1971*, 259

Yugoslavia would meet an organized and decisive resistance of the JNA and entire population. This national defense doctrine, better known as the ‘Total People’s Defense’ (*Opštenarodna odbrana*), was formally adopted as a Law on People’s Defense by the Yugoslav Government on September 18, 1968, although it was based on certain general provisions in the 1963 Constitution and experiences of the partisan guerilla warfare during the Second World War. More importantly, it was designed as a powerful conventional deterrent primarily against the potential Soviet attack. In one of the conversations with the U.S. Under Secretary of State, Nicholas Katzenbach in October 1968, Tito emphasized that Yugoslavia could immediately count on two million of troops, out of which 1.2 million was the regular army and that any aggressor would probably need three to four times more troops to successfully invade the country.¹¹¹⁰

These initiatives were complemented by a range of activities of the Yugoslav diplomacy. In a series of meetings between the Yugoslav and American representatives during September and October 1968, which included the aforementioned meeting between Tito and Katzenbach, as well as with the U.S. Ambassador in Belgrade, Elbrick, Yugoslavia eventually did receive necessary security guarantees and reassurances that the United States and NATO will not sit idle in case of the Soviet invasion of Yugoslavia. Much like in the aftermath of the Tito-Stalin split of 1948, these included a combination of strong, yet informal guarantees and several public statements. The most direct was the Ambassador Elbrick assured Tito during one of the meetings that the West will not allow occupation of

¹¹¹⁰ Bogetić, *Jugoslovensko-američki odnosi, 1961-1971*, 259; Robert ‘Bo’ Kent, “Banking On Belgrade: Nixon’s Foreign Aid Policy With Yugoslavia (1970-1974)”, *Voces Novae*, Vol. 12 (2020), Art. 3, 8-9, <https://digitalcommons.chapman.edu/vocesnovae/vol12/iss1/3> (accessed on April 25, 2021), The ‘Total People’s Defense’ system was based on organized involvement of the entire civilian population into so-called ‘territorial defense units’, starting with the communal and expanding to the republican level, under the command of local or regional political leaders.

Yugoslavia, as this would directly jeopardize the security of the NATO South Wing (Greece, Turkey and Italy). From the Yugoslav perspective, informal security guarantees were the perfect solution, as they did not compromise the country's non-alignment policy, while providing enough amount of deterrence directed towards the Soviet Union. The newly inaugurated U.S. President Nixon and his administration only expanded the cooperation with Yugoslavia, supplementing the security guarantees with credit lines through the Eximbank and other lucrative loans and commercial deals, supporting both the Yugoslav economic stability and the ongoing decentralization and related internal political and economic reforms.¹¹¹¹

Thus, by the beginning of the new decade, Tito finally managed to solve his proliferation puzzle, and on March 4, 1970, Yugoslavia officially ratified the NPT.¹¹¹² Having received strong security guarantees from the United States, supported with the growing confidence in the global NPT regime, and the détente between two superpowers, all of which spelled stability and solidification of existing Cold War divisions, the utility of nuclear weapons for the Yugoslav security became close to insignificant. The other side of the proverbial coin is that with the turbulent internal political development, combined with the growing economic crisis, the development of nuclear weapons as a powerful deterrent became an unobtainable goal for Yugoslavia. With everything that has been said about different motives and underlying logic in formulation of the Yugoslav nuclear policy, the full support to the emerging NPT regime seemed like the only sensible decision, despite its inherent

¹¹¹¹ Bogetić, *Jugoslovensko-američki odnosi, 1961-1971*, 266-267, 272-273; Kent, "Banking On Belgrade", 12-24.

¹¹¹² Bondžić, *Između ambicija i iluzija*, 193; United Nations. Office for Disarmament Affairs, "Serbia: Succession to Treaty on the Non-Proliferation of Nuclear Weapons (NPT)", <https://treaties.unoda.org/a/npt/serbia/SUC/washington> (accessed on April 26, 2021). The dates of the ratification differ in various sources. The Law on Ratification of the Treaty on the Non-Proliferation of Nuclear Weapons was delivered on February 28, but it came into force on March 5, 1970, while instruments of ratification were deposited on March 4.

flaws and all the efforts and investments of human and material resources into the country's nuclear program.

By the beginning of the 1970s, the final remnant of the Yugoslav nuclear program and the somewhat embarrassing monument to Tito's nuclear ambitions was the SKNE. This once almighty federal institution gradually withered and faded into insignificance soon after Ranković's political downfall in 1966, although continued to exist as its immediate dissolution would have probably sent shockwaves throughout the scientific community it supported under various names since the late 1940s, with negative impact in other fields as well. It is also true that the continued to play SKNE an important role in the formulation of the Yugoslav nuclear policy related to the global nuclear disarmament and the NPT negotiations, implementation of the NPT provisions and other related activities as a consultative body and the only institution with the necessary scientific and technical expertise. The same can be said about its role in communication and cooperation with the IAEA and other nations' nuclear energy commissions, while remaining the main institution for coordination of nuclear research in the country, even if without any say in formulation and direction of particular programs.

Bondžić details the SKNE's gradual decline and dissolution in the late 1960s and early 1970s, but explains it almost exclusively in the context of "decentralization of the state and declining jurisdiction of federal organs and transfer of competencies to republics." Even though he does mention "diminishing investments and interest of the state in nuclear energy affairs" as an additional factor, he does not elaborate on this important issue.¹¹¹³ While it is true that decentralization of Yugoslavia and economic

¹¹¹³ Bondžić, *Između ambicija i iluzija*, 228-240. In his own research, Hymans does not deal with this topic.

reform based on market principles did have an impact on the country's nuclear program, particularly regarding financial aspect of ambitious plans in the field, the fact remains that during 1960s this obstacle was navigated with relative ease through joint projects with the IAEA and other foreign partner institutions. This makes the diminishing interest of the state in development of the nuclear program in general, and construction of the atomic bombs in particular, the most important factor for dissolution of the SKNE and requires further elaboration.

The SKNE's destiny was actually deeply related to the Yugoslav accession to the NPT in 1968 and eventual ratification in 1970. The Yugoslav Government conducted first analyses about the future role of the SKNE in March 1968, but had decided to "postpone delivering definitive decision [...] until responsible bodies specify interests of federation in the field of nuclear energy".¹¹¹⁴ This comment fits perfectly with the Yugoslav strategy of waiting for the FRG and other countries considered important from the perspective of the country's security to accede to the NPT, before committing fully to the emerging non-proliferation regime. Before the decision to ratify the NPT had been reached, the SKNE still had to perform its practical duty of a consultative body, and it would have been politically irrational and impractical to dissolve the institution so deeply involved in the NPT negotiations. On the symbolic level, its continuous existence showed both to the friends and foes that Yugoslavia did not intend to abandon research in the field and development of related technologies, all of which fits well with the country's general nuclear hedging strategy.

¹¹¹⁴ AJ, 177, f. 13, a. j. 37. Rezime materijala. Položaj i zadaci saveznih komisija [Resume of Materials. Position and Tasks of Federal Commissions], March 12, 1968; AJ, 177, f. 13, a. j. 37. Analiza položaja Savezne komisije za nuklearnu energiju, Savezne komisije za fizičku kulturu i Savezne komisije za pregled filmova [Analysis of the Position of the Federal Commission for Nuclear Energy, the Federal Commission for Physical Culture and the Federal Film Review Commission], April 13, 1970; Bondžić, *Između ambicija i iluzija*, 234.

However, soon after Yugoslavia ratified the NPT (March 4, 1970), all of the aforementioned reasons lost their relevance and the dissolution of the SKNE became a matter of time. The response was actually surprisingly rapid. In what seems a classic case of a staged political trial, already on March 16, 1970, a Federal Assembly representative, Dr. Jože Marsel, posed a very direct question to the government:

“Organization of financing of the scientific research within the federation, since 1965 falls under jurisdiction of the Federal Council for Coordination of Scientific Activities [*Savezni savet za koordinaciju naučnih delatnosti*] and Federal Fund for Financing of Scientific Activities [*Savezni fond za finansiranje naučnih delatnosti*]. This includes organization and financing in the field of ‘nuclear energy’. Since beside aforementioned bodies /Federal Council and Federal Fund/ the Federal Nuclear Energy Commission [SKNE] also exists, I raise the question to the Federal Executive Council [Yugoslav Government]: What place does the Federal Nuclear Energy Commission have in the federal structure, and is its existence still necessary?”¹¹¹⁵

On April 13, 1970, the Yugoslav Government revived consultations about the future of the SKNE. Adding insult to injury, the government’s analysis about the future of the SKNE was lumped together with two other, arguably less important federal institutions: Federal Commission for Physical Culture [*Savezna komisija za fizičku kulturu*] and Federal Film Review Commission [*Savezna komisija za pregled filmova*].¹¹¹⁶ Even though the existence of the SKNE was supported by the most

¹¹¹⁵ AJ, 130 SIV, f. 601. Poslaničko pitanje Dr. Jože Marsel, March 16, 1970.

¹¹¹⁶ AJ, 177, f. 13, a. j. 37. Analiza položaja Savezne komisije za nuklearnu energiju, Savezne komisije za fizičku kulturu i Savezne komisije za pregled filmova [Analysis of the Position of the Federal Commission for Nuclear Energy, the Federal Commission for Physical Culture and the Federal Film Review Commission], April 13, 1970. The Federal Film Review Commission was one of the central

important federal bodies (Ministry of Defense, Ministry of Foreign Affairs, Ministry of Economy, etc.), and the SKNE itself protested against the suggested “dislocation” of its jurisdiction on ten different federal organizations, which itself covered less than half of the SKNE’s existing activities, it seems that the decision about its fate had already been made.¹¹¹⁷ It is only at this stage that Bondžić’s explanation comes into play, although not as an actual reason for dissolution of the SKNE, but more as a convincing cover story.

The support of some important actors on the federal level did manage to buy some time for the SKNE, but did not significantly change its destiny, as it was finally and formally dissolved on October 1, 1971.¹¹¹⁸ The actual decision had obviously been made by the authority much higher than any ministry in the Yugoslav Government, and although there is no evidence to support the following claim, it is safe to assume that the decision came directly from Tito. Thus, the person who was crucial in establishment of the Yugoslav nuclear program, eventually was equally important not only for its complete abandonment, but also for the through deconstruction of the entire structure of the nuclear establishment, painstakingly developed over the period of more than two decades.

More importantly, this decision indirectly confirms that the exclusive goal of the Yugoslav nuclear program since its establishment, or at least after Tito hijacked it from Pavle Savić in 1949-1950, was the construction of the atomic bomb. Once Tito came to realization that the atomic bomb would be a politically and economically very

federal bodies in the state censorship mechanism. More in: Radina Vučetić, *Monopol na istinu* [Monopoly on Truth] (Belgrade: Clio, 2016).

¹¹¹⁷ AJ, 177, f. 13, a. j. 37. Analiza položaja Savezne komisije za nuklearnu energiju, Savezne komisije za fizičku kulturu i Savezne komisije za pregled filmova [Analysis of the Position of the Federal Commission for Nuclear Energy, the Federal Commission for Physical Culture and the Federal Film Review Commission], April 13, 1970; AJ, 177, f. 13, a. j. 37. Reminder for the Discussion about the SKNE Status, April 7, 1970.

¹¹¹⁸ Bondžić, *Između ambicija i iluzija*, 240.

expensive project which would not contribute significantly to the country's security, he lost any interest in nuclear energy and stopped, or at least seriously slowed down all activities in the field, saving limited funds the country had for other more conventional and obviously more important projects. The final, although important conclusion is that this was not a decision made on a whim or a telephone call as traditional scholarship suggests, but one which included serious consideration of a number of internal and international factors, a gray period between 1962 and 1966 where it was impossible to make any claims about how much Tito knew about the project, or how much Ranković did work on his own, and eventually a decision which took roughly a full decade to be reached.

Conclusion

This dissertation provides a detailed analysis of the long and arduous evolution of a nuclear program in Yugoslavia, a developing country that desired to follow its own vision of modernity and preserve its hard-won independence amidst Cold War divisions by joining the elite club of nuclear powers. The main questions it aims to answer are: Why did Yugoslavia want to develop nuclear weapons and a more general nuclear program? How did this process evolve over the period of roughly two decades, between late 1940s and late 1960s? Why was it completely abandoned and dismantled by the early 1970s? More generally, what lessons or conclusions can be extrapolated from the Yugoslav experience? How does it inform the utility of existing theories and hypotheses in political science, through the benefits of historical methodology, analyzing processes and changes based on verifiable facts? How much does this study contribute to or challenge the existing knowledge on history of socialist Yugoslavia?

Yugoslavia embarked on this journey in 1948 without meeting a single precondition for a successful nuclear program except a sheer determination to succeed. This low starting point was further compromised by a range of related underlying problems and deficiencies, stretching from insufficient and inadequate material and industrial capacities, problems arising from establishment of a new ideological and political system, to a set of geopolitical challenges which threatened the survival of the regime and country's independence. By the late 1960s, Yugoslavia managed to train and establish the necessary scientific community, not only in terms of sheer numbers or related infrastructure, but more importantly, to develop their general intellectual competence to a level comparable to that of developed nations.

The same can be said about development of sensitive technologies necessary for construction of atomic bombs or nuclear reactors, even if only on a laboratory or prototype level. The least progress was made by the civilian industry, which had very limited capacities to support such an ambitious program, although this was the only aspect of the nuclear program which was not managed by the country's nuclear establishment. This establishment, embodied in the all-powerful SKNE with its various names and guises included limited, but sufficient reserves of domestic uranium ore and the related technological and industrial capacities for ore mining and refinement. Leaving aside for the moment the problem of inadequate industrial capacities, the only pieces of the puzzle actually missing were the political decision to construct the atomic bomb, and to a lesser degree the financial means to support such a decision. Both comments require further qualification, but I shall focus first on question of the political decision.

The political will and determination to develop nuclear weapons, or the logic of independence as it was defined and used throughout the analysis presented here, was the main motive and driving force for both the surprising speed and successes in development of the Yugoslav nuclear program, as well as its eventual abandonment and deconstruction. The logic of independence relates well to the neorealist theory, which considers state security as the most important component in the decision of a state to pursue development of nuclear weapons.¹¹¹⁹ This theory is highly relevant to the Yugoslav decision to initiate the atomic bomb project. This decision was made in the face of a strong security challenge: the Tito-Stalin split of 1948. In the Yugoslav view the subsequent tension could have too easily exploded into an open invasion of Yugoslavia, for which plans were developed over the years by the Red Army

¹¹¹⁹ See Kenneth N. Waltz, *Theory of International Politics* (Reading, MA: Addison-Wesley, 1979).

commanders. Adding fuel to the fire and fear among the Yugoslav decision-makers was the Soviet successful test of the atomic bomb in 1949. Faced with a security challenge of such magnitude, it may be argued that the Yugoslav decision to develop its own nuclear arsenal seems rational, even if it was based on an irrational belief in the country's capacities. Moreover, the surprising finding is that a clear decision to pursue nuclear weapons development and a strong commitment to the task was enough to gradually, over the years, overcome the odds stacked high against such an endeavor and come very close to the achieving the goal.

The strong commitment to maintain the country's independence remained the main driving force of the Yugoslav nuclear program during the 1950s and early 1960s, although the program itself could not contribute to the country's security at the time. What saved Yugoslavia's independence was a combination of factors. Changed international political circumstances, of which the most important was the beginning of the Korean War in 1950, necessarily shifted the focus of Soviet foreign policy from Yugoslavia. This shift was followed by the death of Stalin in 1953, which left Tito without his main adversary. In the temporary power vacuum, personnel changes led to reformulation of Soviet policy towards Yugoslavia, symbolically manifested in the Khrushchev's 'Canossa' in 1955. The third factor were somewhat tacit, but tangible security guarantees extended by the United States. These security guarantees were probably the key factor against any Soviet invasion of Yugoslavia as they at least theoretically these guarantees included the American nuclear arsenal as a very powerful deterrent.

Regardless of how real these guarantees were, and particularly regarding potential use of nuclear weapons against the Soviet Union in defense of Yugoslavia, the tacit American security guarantees did blunt the edge of the Soviet pressure, But

they did nothing regarding Tito's desire to acquire nuclear weapons and it is important to understand why. Yugoslav reliance on the U.S. and NATO security guarantees rapidly drew the country into their orbit, which directly undermined Tito's fiercely independent policies. The development of the atomic bomb would necessarily allow Tito to distance Yugoslavia from NATO and provide enough leeway in future relations with both the West and the East. An additional motive for Tito's continuous desire for the atomic bomb was the fear of a potential horizontal proliferation of nuclear weapons among NATO and Warsaw Pact allies, which seemed a realistic possibility in the 1950s. Such a development would completely erase the significance of the Yugoslav conventional military deterrence and leave the country an easy prey for either superpower. The only problem was that the eventually successful testing of the Yugoslav atomic bomb would probably lead to a domino effect and spark the nuclear arms race in Europe, which was exactly what Tito wanted to avoid.

By the mid-1950s, it also became apparent to Tito and his closest associates that such a scenario would probably start with the FRG's acquisition or independent development of nuclear weapons. Combined with the existing and very realistic fears of German revisionism, based on a historical experience, any calculations and plans made by Tito regarding the further development of the Yugoslav nuclear program, gradually but firmly became related to developments in the FRG. Thus, while the U.S. security guarantees proved to be effective in deterring the Soviets from invading Yugoslavia, they were totally useless against a potential nuclearization of the FRG, and Tito wasted no time in trying to secure similar guarantees against such a scenario from the Soviet Union. This continued to be a general trait of the Yugoslav foreign policy between the late 1950s and late 1960s. Regarding Tito's desire for nuclear weapons it is important to emphasize that, even with the changed actors and scenario,

for Yugoslavia's policy makers the security challenge did not significantly lessen and this proved to be crucial in fueling Tito's desire for the atomic bomb.

Gradual establishment of the Non-Aligned Movement (NAM) in the late 1950s and early 1960s gave an additional, albeit Janus-faced incentive to the development of the Yugoslav nuclear program. The potential construction of nuclear power plants and other related facilities would support Yugoslav visions of modernity, while the equally potential status of a nuclear power would confirm Yugoslav military might and political power. Both of these components fit perfectly with Tito's policy of taking and maintaining a leadership role for Yugoslavia within the NAM, a demanding task considering the size of the country and its economic capacities. Conversely, nuclear disarmament stood high on the list of the movement's core values, and a decision to develop the nuclear arsenal would have to be delivered as a last resort in meeting a potential challenge. This would include destabilization of the international political system, loss of a credible conventional deterrence (including security guarantees from a superpower), along with horizontal nuclear weapons proliferation in Europe, or among leading NAM members.

Answering the question why the Yugoslav nuclear program was eventually abandoned is equally challenging and can be found only in the intersection and interplay of several domestic and international factors. In Yugoslavia, internal opposition to the development of the nuclear program in general, and construction of nuclear weapons in particular, grew from the Yugoslav-specific inter-republican competition. This unavoidably led to multiplication of facilities, research and training programs, as evident in the establishment of three nuclear institutes in three years and in three leading republics – IBK in Vinča (Serbia), IRB in Zagreb (Croatia) and IJS in Ljubljana (Slovenia). Additionally fueled by growing nationalisms, which were also to

a certain extent a consequence of this inter-republic rivalry and a suspended economic growth in the early 1960s, this competitiveness eventually led to formation of two different pressure groups: the ‘conservatives’ who wanted to maintain the classical centralized socialist state system and whose informal leader or a center of political gravity was Ranković, and the ‘reformists’ who advocated for decentralization and market-oriented economic reforms, led by Kardelj.

According to the ‘reformists’, the Yugoslav nuclear program was a bottomless pit which drew a lion’s share of federal investments without much accountability and, in that respect, it was a symbol of mismanagement of federal funds and unequal treatment of republics. Although it is difficult to find clues about this issue in the public sphere, Supek’s protest during one of the most important meetings of the SKNE in 1962 showed that behind the closed doors a charged debate was well underway. This growing internal political tension eventually led to Ranković’s political demise in 1966, along with economic and political reforms in accordance to the ‘reformists’ requests. More will be said later about the relevance of the Yugoslav nuclear program in the growing inter-republican conflict and its outcome, but here it is important to stress that this crisis and conflict contributed significantly to Tito’s abandonment of his nuclear ambitions, although this contribution was far from crucial.

On the international level, the 1960s saw growing demands for stopping the nuclear arms race between two superpowers, through the establishment of the global non-proliferation regime and even complete nuclear disarmament. Yugoslavia joined these initiatives, to a lesser extent due to their relevance regarding basic principles of the NAM, but to a much greater extent because their potential realization could solve the burning security challenge of the FRG’s and to a lesser degree Italian nuclearization and related potential consequences. Once these initiatives and

discussions within the ENDC and other international forums started to produce promised results, embodied in the PTBT/LTBT and the NPT, Yugoslavia became fully committed to the non-proliferation cause. More importantly, the utility of nuclear weapons for the country's security became questionable and the related ambitions, plans and projects were abandoned.

The Soviet invasion of Czechoslovakia in 1968 sent a shockwave through the Yugoslav political structures and defense community. Much like the aftermath of 1948, these were absorbed and offset by informal U.S. security guarantees, but once again, they had limited impact on Tito's decision to forego his nuclear ambitions. An important and related component in these calculations was the implementation of the 'Total People's Defense' as the Yugoslav national defense doctrine, which formally, if not practically, further enhanced the country's already strong conventional deterrence. Therefore, the importance of the U.S. security guarantees can be understood only as an additional stabilizing and complementing factor to Yugoslav conventional deterrence, the establishment of the global non-proliferation regime and the emerging détente between superpowers, both of which were actually crucial in solving the Yugoslav security puzzle.

Several important conclusions can be drawn from the previous discussion. The Yugoslav experience suggests that the superpower's security guarantees were able to influence the country's decision to halt or abandon the development of nuclear weapons as a deterrence only in a combination with a number of domestic and international factors. The Yugoslav case also indicates that the international cooperation in the creation and maintenance of the non-proliferation regime and the general stability of international political system were crucial for a country deciding to forego development of nuclear weapons, although this comment is not

straightforward. Yugoslavia dismantled the entire nuclear program because it seemed the best available solution for the country's security challenges. All the other motives in support of such a decision never were a part of the discussion about joining the NPT initiative. This does not mean that they did not contribute to the abandonment of the nuclear program but, as with the U.S. security guarantees, they were important only in combination with the perceived solution of the country's security challenges.

The importance of historical analysis lies in the obvious fact that every nuclear program is unique. The in-depth historical reconstruction of the Yugoslav nuclear program presented in this study aimed at answering the question how did this process evolve over the period of roughly two decades? Answering this question provides a solid foundation for understanding the motives behind decisions which led to initiation of the Yugoslav nuclear program, reasons behind its successes and failures, and for its eventual abandonment. The historical analysis of the Yugoslav experience confirms that even a relatively small and underdeveloped nation can navigate the existing obstacles to fulfilment of their nuclear ambitions, ranging anywhere between global non-proliferation norms, to particular sets of international relations which may hamper implementation of plans for development of a nuclear program. The Yugoslav case also suggests that a clear decision to embark on that journey and a strong determination to succeed was enough for the Yugoslav nuclear program to be successfully launched and rapidly developed, despite the initial acute lack of scientific, financial, technological and industrial capacities.

Besides the more 'conventional' options to enhance and accelerate the necessary research and development of related technologies, such as scientific exchange and training programs with foreign partners, joint research projects, industrial (or nuclear) espionage, the Yugoslav experience indicates the importance of

international forums and organizations as central hubs for dissemination of required technologies. This was particularly true about the IAEA, which proved to be an important resource of finances and technologies which fueled the Yugoslav nuclear program through official and more covert Yugoslav activities, as an alternative or additional source to bilateral cooperation with developed countries. While it may be argued that most of these projects with the IAEA were developed and executed in the period when the agency was not yet properly established, this notion does not warrant that similar scenarios may never happen again.

A related discovery is that nuclear powers will pursue their self interest in dissemination of sensitive technologies, regardless of their official policies or existing international non-proliferation norms. This was visible in the willingness of the U.S. administration to sell nuclear reactors and a hot-lab to Yugoslavia in the early 1960s without a bilateral contract, based only on secret exchange of letters of intent. The fact that this project partially failed had nothing to do with changes in the U.S. approach, but with Tito's careful balancing during the first NAM summit in Belgrade in 1961, which initiated a period of poor relations between the two countries. Following a similar logic as with the initial establishment of the IBK in Vinča, the Soviets were equally eager to sell sensitive technologies and entire facilities to Yugoslavia in order to bring it closer to its orbit, but also to have a better control over the development of the Yugoslav nuclear program. The Soviet non-proliferation strategies are seldom attested in scholarship, and the Yugoslav experience in that respect presents a valuable contribution.

A related but unexpected result of the historical analysis of the initial phase of the Yugoslav nuclear program is that it opens an additional perspective about the process of Sovietization of East Europe. The construction of the IBK in Vinča, the

first and central nuclear institute in the country, was actually a spin-off project of the Soviet frantic search for uranium in countries under their control. The specificity of the Yugoslav experience was that in the immediate postwar years of loyalty to the Soviet Union, the idea was to mold the Yugoslav science and scientific development according to the Soviet experience. Even though this project was abandoned before it had a chance to properly take-off, an important discovery is that the Sovietization process was initiated immediately after the war, much earlier than traditional scholarship suggests, and probably first in the nuclear sphere, even if only regarding the uranium prospection. More importantly, this study also shows that even this short-lived Sovietization left a permanent trace on the Yugoslav nuclear program, which despite the continuous communication and cooperation with partners from the West, kept the main premises of the Soviet model until the very end. While this can be attributed to the fact that Yugoslavia was a socialist country, it nevertheless opens or revives a question about the legacy of the Sovietization process on countries and societies in which it occurred.

This historical reconstruction can also provide a valuable contribution to the existing body of knowledge about socialist Yugoslavia. The most significant is the fact that Yugoslavia was developing the nuclear program with the sole intention of constructing nuclear weapons. The ‘smoking gun’ will probably never be found, even if it ever existed, but this study shows that already in 1949/50 the initially civilian nuclear program was hijacked by Tito and his ‘comrades’ in order to meet the pressing security challenges. The civilian program continued to exist, as a cover story, a source of necessary technologies and as a potentially lucrative industry which would finance the military component, similar to the experience of nuclear powers. Considering the fate of the civilian nuclear program, it is important to stress that after Yugoslavia

signed and ratified the NPT in 1968 and 1970, respectively, the civilian component of the Yugoslav nuclear program was also completely abandoned. This was partially a consequence of domestic pressures, but more importantly, it implies that the only reason why Yugoslav nuclear program was pursued in the entire period between 1949/50 and 1968/70, was the construction of the atomic bomb. Once Tito lost interest in this project, the remaining nuclear program was quickly abandoned, having no other purpose to serve.

Traditional historiography about the political downfall of Aleksandar Ranković barely mentions the role of the nuclear program in this most important political affair in socialist Yugoslavia which had deep and most last consequences on the political development of the country. The present study reveals that these relations are profound. The Yugoslav nuclear program was formally under Ranković's supervision since late 1940s, until 1962, although there is plenty of circumstantial evidence presented in this analysis to support the claim that Ranković continued to control the nuclear program through his network of clients until his ultimate political demise in 1966. It also suggests that the conflict between Tito and Ranković had already started by 1962, which is an important revelation and one which opens additional questions regarding the nature of relations between these two politicians as well as about the nature and beginning of their conflict.

Another important question is to what extent is Ranković's political downfall related to the abandonment of the Yugoslav nuclear program? The answer cannot be straightforward, but it can be found in the relation between the outcome of political conflict between the 'reformists' and 'conservatives', the consequences of the subsequent decentralization of the country and market-oriented reforms, and the gradually developing non-proliferation regime which was understood by Tito and his

remaining associates as the best solution for the country's security challenges with an added benefit of being a champion of these initiatives within the NAM. Putting all these factors in a different order, it may be argued that, had Tito decided to continue with the construction of the atomic bomb, he would not necessarily need Ranković for that. In that respect, the nuclear program was indeed a victim of Ranković's downfall, but only on a symbolic level and as a sort of a concession to those who opposed it.

One of very popular sayings in the post-Yugoslav space is that 'money is not a problem, because there is no money'. Considering the question about the availability of finances on the development of the Yugoslav nuclear program, a similar logic can be applied; although Yugoslavia was far from an economic powerhouse, this study has shown that, as long as the program had a proverbial 'green light', money truly was not a problem. Voices for economic reforms, fairer allocation of federal funds, higher accountability of their use, and their lowered contributions of republics to the federal budget, all put a pressure on shrinking or stopping of the nuclear program. However, these arguments were used only in justifying decisions already reached, as was the case with the episode of radioactive coal in the late 1950s, or the uranium mine in Kalna in mid-1960s.

The list of significant conclusions, evidence, questions and hypotheses presented in this study is much longer and they open a number of topics and questions that need to be further researched and answered. This is particularly true regarding the evolution of the Yugoslav foreign policy, which existing scholarship so far did not analyze in the context of the country's nuclear ambitions. A related and equally unexplored topic is the Yugoslav activity in the field in international organizations and forums, like the UN or the IAEA, which could better inform other open questions

about history of Yugoslavia. Similar comments can be made regarding the evolution of the country's military doctrine, economic or scientific development.

The final question to be answered is what lessons can be learned from the Yugoslav experience and what is their contribution to the wider field of study? The research about the history of the Yugoslav nuclear program followed Sagan's well-known approach in explaining the causes of nuclear weapons proliferation or abandonment of these ambitions. He suggests three different explanatory models, all of which can be used in the analysis of the Yugoslav experience: 'the security model', with its focus on national security considerations, 'the domestic politics model', which analyses domestic political and bureaucratic interests for construction of nuclear weapons, and 'the norms model', which considers the relation between nuclear weapons a symbol of the country's identity.¹¹²⁰

This study has shown that all three models are relevant in explaining Tito's decisions about the country's nuclear program, but that they are not sufficient, whether considered individually or in an aggregate analysis to fully explain decisions made. The underlying problem is that all these models are focused on explaining the underlying logic behind either positive or negative decision about the development of nuclear weapons, and do not include the gradual changes which unavoidably happen in all three spheres. Building on the metaphor of Tito's proliferation puzzle, the Yugoslav experience suggests that if Sagan's three models are taken as pieces of this puzzle, the size and even number of pieces was constantly changing, making it difficult to reconstruct the entire image, except perhaps in a fixed moment in time. This conundrum, however, may lead to wrong conclusions. In Yugoslavia, a strong

¹¹²⁰ Scott D. Sagan, "Why Do States Build Nuclear Weapons?: Three Models in Search of a Bomb", *International Security*, vol. 21, no. 3 (Winter, 1996-1997), 55.

motive to abandon nuclear program was the growing inter-republican conflict, which was insignificant in the early 1950s, but became very important a decade or so later; the same can be said about the national identity of a champion of global nuclear disarmament. Although security concerns were the most important factor in Tito's reasoning both for the initiation and eventual abandonment of the nuclear weapons program, without a growing internal economic and political crisis, the establishment of the NAM and implementation of its core principles, and development of the global non-proliferation regime, the program would probably have been continued until its eventual success.

The last comment raises a question about specificities of each case of successful or attempted nuclear weapons program. The Yugoslav experience shows that even the security concerns as the most important motive for initiation of the nuclear program cannot be explained in a conventional or neorealist framework. In the Yugoslav case, this was supplemented with an insatiable thirst for independence, or the logic of independence as it was called in this study, which cannot be explained in terms of a fear of a potential enemy attack, even though the relation obviously exists. Lacking in-depth historical analysis, it would be difficult to realize which motives eventually informed Tito's decision to abandon his ambitions about construction development of atomic bombs, even if they fall into general category of security concerns.

Combination of these realistic fears, interests and security needs is what further informed Tito's nuclear policy and evolution of the related strategy. The only viable option to be pursued within the given circumstances was the rapid training of 'cadres', development of necessary technologies, facilities, and other related capabilities, without an actual weaponization, a strategy better known as nuclear

latency.¹¹²¹ Even though it may be argued that Yugoslavia never reached the actual threshold of becoming a nuclear power, the explanation is still relevant in understanding the overall strategy employed in the development of the nuclear program. This was visible in a number of examples where required knowledge or technology was stored and preserved in case of a need to be employed in the future. That was the destiny of the technology for extraction of uranium from coal ash, development of natural uranium fuel rods, or the laboratory for extraction and refinement of plutonium. Limited financial, technical and industrial capacities were important reasons for choosing this strategy. Even though Yugoslavia was far from constructing either nuclear reactors or atomic bombs, it did manage to develop most if not all necessary technologies. Once again, this leaves the importance of the political decision and finances to raise the necessary capacities to an industrial level.

In one of his more recent works, Sagan suggests a “creative multidisciplinary research” which would engage both historians and political scientists and their respective set of analytical tools in investigation of a “complex technical, historical, and political phenomena such as the causes and consequences” of nuclear weapons proliferation.¹¹²² Several suggestions can be made about potential approach to multidisciplinary search in the field between historians and political scientists based on the present study, which would include a three-step analysis. Historical analysis must form the basis and the first step in any case study of an attempted or successful nuclear weapons project. This is a precondition for the next step, which is the

¹¹²¹ Joseph F. Pilat (ed.), *Nuclear Latency and Hedging: Concepts, History, and Issues* (Washington: Woodrow Wilson International Center for Scholars, Nuclear Proliferation International History Project, September 2019); Scott D. Sagan, “Nuclear Latency and Nuclear Nonproliferation”, in W. Potter, and G. Mukhatzhanova (eds.), *Forecasting Nuclear Proliferation in the 21st Century. Volume I, The Role of Theory* (Stanford Security Studies, Stanford, 2010), 80-101.

¹¹²² Scott D. Sagan, “Two Renaissances in Nuclear Security Studies,” Introduction to *H-Diplo/ISSF Forum*, No. 2 (2014), “What We Talk About When We Talk about Nuclear Weapons,” *Issforum.org*, June 15, 2014, <http://issforum.org/ISSF/PDF/ISSF-Forum-2.pdf> (accessed on April 28, 2021)

development of new and continuous improvement of existing theories and other related analytical tools. The final step would be actual use of these analytical tools in predicting potential future cases of nuclear weapons proliferation. The last step necessarily brings back the analysis to the understanding of a historical background to the extent it is possible in the current or future cases, as a material on which existing theories could be attested. Further elaboration of the suggested approach lies outside this study. What can be said is that this study represents the first step. I can only hope that it would be used as a source for formulation or development of future theories and research.

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Fond 317 Savet za nauku i kulturu vlade FNRJ [Federal Council for Science and Culture of the FPRY Government]

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National Archive of India, New Delhi

Nehru Memorial Museum & Library (NMML), New Delhi

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