

SUMMARY OF INTERVIEW

Subject: Dr. Vitalii Nikolaevich Tsygichko

Position: Senior Analyst, All-Union Scientific-Technical Institute For Systems Studies (VNIISI), Academy of Sciences, USSR; Director, Center for National Security and Strategic Stability Studies

Location: Room 716, VNIISI Building, 9 Prospekt 60-let Oktiabria, Moscow

Interviewer: John G. Hines

Date/Time: December 13, 1990, 11:00 a.m.

Duration: 1.5 hours

Language: Russian

Prepared by: John G. Hines, based on notes

"Purpose of Interview"

- To review with Dr. Tsygichko his views on the product and process of Soviet military assessments in the 1970s and 1980s. Of special interest was the Soviets' thinking about military competition, assessments of Western capabilities and intentions relative to their own, and expectations of the nature of war should it occur. The role and expected efforts of strategic and theater weapons of mass destruction was of central concern as was conventional war.

"General"

Vitalii Tsygichko is a former artillery colonel who joined the Soviet General Staff in 1964 where he was involved in some of the early efforts to subject force structure and operations to systematic analysis using mathematically based methodologies and models. Between 1967 and 1977 he was head of the Theater Force Modeling Department within the Scientific Research Institute [*Nauchno-Issledovatel'skii Institut*] Number 6 (NII-6) of the Main Intelligence Directorate (GRU) that provided quantitative analytical support to the Ministry of Defense. (There are five such purely military institutes that support the Ministry of Defense in various areas). He left the institute and the Army in 1977 because he felt that the best work of his division was being suppressed or ignored. He became a senior analyst at VNIISI of the Soviet Academy of Sciences at that time.

His reputation as an analyst and an officer is very positive among both former and serving General Staff generals and officers who seem eager to associate themselves with him and his work. One senior General Staff colonel, Kabysh, who continues to work as a General Staff analyst knew of Tsygichko by reputation, identifying him as one of the principal architects of the General Staff's approach to quantitative analysis of force operations. General-Major Luzianin, a department head within the Center for Operational Strategic Studies (TsOSI) of the General Staff (and a colleague of Tsygichko's on the General Staff in the 1970s), called Dr. Tsygichko to the General Staff

on December 10, 1990, to offer him a contract to support the center's analysis. Dr. Tsygichko accepted and will be providing support over the next several months. (I learned indirectly from Andrei Kokoshin, who is fairly well connected to parts of the General Staff, that much of the work done in TsOSI is designed to meet the needs of General Ladygin's General Staff Directorate for Legal and Treaty Affairs.)

Some of Dr. Tsygichko's colleagues who had been present at an interview given by Minister of Defense Iazov to deputies of the RSFSR on November 5, 1990, reported that Tsygichko's name was brought up by Iazov during the discussion. Specifically, Marshal Iazov was complaining that self-described civilian defense analysts were demonstrating their incompetence whenever they attempted to deal with military analytical or operation questions. He specifically cited the work of Vitalii Tsygichko and his center as an exception to this general rule, stating that the center was doing very good work.

This is one of a series of interviews that I have conducted with Dr. Tsygichko. There is some duplication among interviews because I have revisited some themes to clarify points from previous discussions and I have tried to provide enough information to establish the context for his answers. This particular interview brings out the differences in understanding and attitudes about theater nuclear use among three groups of officers: the General Staff analysts and general officers routinely exposed to serious analysis of the operational and collateral effects of nuclear use; the "army" generals, those field generals who commanded armies, Fronts, military districts, and High Commands of Forces in TVDs;⁸⁶ and the top military leadership, the Ministry of Defense, the Chief of the General Staff and his deputies all of whom were exposed to the product of the analysis being done within the General Staff but whose attitudes were shaped by other than purely military analytical considerations.

"Three Views on Nuclear Warfare"

General Staff officers in the 1970s were very knowledgeable about the tremendous difficulties and uncertainties that would be involved in use of nuclear weapons at the strategic, operational, and tactical levels. In the 1960s and 1970s many of the best and brightest minds in the Soviet scientific community were working in uniform within the General Staff in the areas of analysis and planning. Several models had been developed and applied to test the operational and general collateral effects of nuclear use at various levels and on various scales of employment (some of these models are discussed below as well as in other interviews). The conclusions of the General Staff analysts and other officers involved was essentially that nuclear use was operationally counter-productive and generally self-destructive. Even these officers, to include Tsygichko, carried out their work without any systematic consideration of the social or economic implications of their findings. As a result, they were unable to gauge the importance of their research in any but a purely military context.

Senior General Staff generals were routinely exposed to this analytical work and *understood* the consequences of nuclear use. Thus, Marshals Grechko and Kulikov (Minister of Defense and Chief of the General Staff respectively in the early to mid-1970s) knew, understood, and believed that nuclear use at any level by either side would be catastrophic for the Soviet Armed Forces and the Soviet state they were required to protect. These senior Minister of Defense and General Staff generals nevertheless formally rejected the analysis to which they were exposed and typically suppressed it by

⁸⁶ TVD — *Teatr voennykh deistvii* — Theater of (Strategic) Military Action, for example, Central Europe from Ukraine to the western shore of Ireland.

assigning to the analytical products extremely high classifications and by denying further dissemination and discussion. The reasons for such denial and willful adherence to nuclear thinking [*iadernoe myshlenie*] were ideological, bureaucratic, and economic.

Dr. Tsygichko asserted that the Brezhnev Politburo delegated all military matters to the Ministry of Defense to include all force procurement decisions. Threat definition was also a military function carried out within the General Staff by the Main Political Directorate. There was essentially no political oversight over the force building process and no serious challenge from the Politburo to what was clearly a decision situation in which there were serious conflicts of interest. This "hands-off" attitude of the Brezhnev Politburo and the mindless nuclear force-building that resulted was strongly confirmed by General-Colonel Danilevich.

To officially acknowledge that nuclear use was senseless and basically catastrophic would require several changes in the entire Soviet political-military-economic system that were completely unacceptable to the senior officers who were the products and beneficiaries of that system. These changes would include:

- Acknowledgment that victory would be impossible in nuclear war—a violation of basic Marxist-Leninist dogma.
- Deep reductions in military spending.
- The nuclear weapons and weapons delivery [missiles, aircraft, submarines] industry was massive and important to the [already very distorted] economy. The logic of the General Staff analysis would undermine directly the program of quantitative competition with the U.S. that was being pushed by the senior military leadership and military industrialists at that time.
- Conventional armaments production was expanding as was the size of the Armed Forces based on expectations of high [but somehow acceptable] losses of conventional forces in the event of nuclear war.

The implications of deep reductions in nuclear and perhaps conventional forces and formal acknowledgment by the Soviet leadership that they were deterred by the prospect of an unwinnable nuclear war would have affected profoundly Soviet society in general and the military role in that system in particular:

- The Soviet economy would be forced to undergo radical adjustments which few were able or willing to contemplate.
- Forty percent of the Soviet GDP was being spent on the military. The MoD was spending 20 billion rubles per year on personnel costs alone. [An impressive number considering that the Soviet Armed Forces were comprised of very-low-paid conscripts.]
- The role of the military in general probably would be diminished.
- The dominant position of the military as an institution would be threatened.
- Reduction in the size of nuclear and conventional forces would eliminate 1,000s of officer and general officer positions.

The third group, to which Dr. Tsygichko frequently refers as the army generals [*armeiskie generaly*], could not, according to Tsygichko, imagine war without nuclear

weapons. Unlike the General Staff generals, however, who understood the consequences of nuclear use, the Ground Forces operational commanders and CINCs were basically uninformed and generally did not know or understand what would happen in the event of nuclear use. They routinely used expressions such as the need to be prepared "to attack to the thunder of nuclear strikes." [While it was clear that Tsygichko held them in low regard because of their ignorance and misplaced macho enthusiasm for self-destructive behavior, it is clear that these officers were kept in ignorance by the senior General Staff generals for the reasons cited above. As will be clear when some of the models are discussed, the real findings on nuclear effects and contamination never made it to the field in the 1970s, leaving the "army generals" with exercise scenarios that reinforced their impression that nuclear use in theater would be somehow manageable.]

"General Staff Modeling of Nuclear War in Europe"

Between 1972 and 1979 a tremendous amount of work was done in Tsygichko's institute and elsewhere in the General Staff's analytical support apparatus to analyze possible war in Europe, including nuclear war. In the course of doing this analysis, the General Staff constructed several different models designed to test various outcomes and effects. The overall purpose of the analysis was to determine what war might be like and, in particular, to determine the effects of losses on the conduct of operations and on the continuity of the availability of reserves and rear services. Some of the modeling work accomplished in this period and the manner in which the findings were received by the General Staff leadership are discussed below:

Modeling of Atmospheric and Other Effects from a Nuclear Exchange in Europe and on a Global Scale

In 1971 and 1972 the General Staff studied the climatic and contamination effects from a global exchange and concluded that there would be serious negative consequences for the USSR and for the northern hemisphere in general.

Dr. Tsygichko wanted to point out that "nuclear winter" was not discovered by Aleksandrov or Sagan in 1987 [sic].⁸⁷ The General Staff did not use the expression "nuclear winter," but the analysts considered many of the effects that received so much public attention almost 20 years later. These findings were summarized in a memo to the MoD and the Central Committee and were ignored because of the implications discussed earlier.

In 1972 and 1973, Dr. Tsygichko's institute did a great deal of work modeling nuclear war in Europe. In this work, which included the development of a model, the institute studied the operational effects of the expected high loss levels and disruption of the rear (discussed in detail in an earlier interview) but also calculated nuclear contamination given prevailing (eastward) wind patterns in Europe. The study found that, in executing even the basic plan to place a nuclear strike on every NATO airfield, the Soviet side would create extremely high levels of contamination in Europe. The worst effects would be upon Warsaw Pact forces, and upon the Pact's strategic military rear in Eastern Europe and the European USSR. Within a relatively short period of time, contamination would have a severely negative effect on the Warsaw Pact's ability to

⁸⁷ American scientist Carl Sagan, together with his colleagues, popularized the notion during the early 1980s that a global nuclear war would induce an artificial winter across the northern hemisphere. Aleksandrov conducted similar work in the Soviet Union in the early 1980s. Authors were not able to identify Aleksandrov's first name and position.

continue the war and would have mid- to long-term health consequences for the civilian populations of all members of the Pact.

This study was of sufficient importance that the institute and the Main Operations Directorate of the General Staff devoted an additional 6 months to an independent validation of the model and its findings. The validation process resulted in the considered confirmation of the analytical results achieved by the institute.

Dr. Tsygichko briefed the findings of the model to Marshal Kulikov, the Chief of the General Staff, in 1973. Kulikov ordered Tsygichko (then a lieutenant colonel) to modify the conclusions or face forced retirement. Tsygichko said he felt sufficiently secure to refuse (since he already had his doctorate). The director of his institute met with Tsygichko later on the same day he had his confrontation with Kulikov and asked him to be more flexible. Tsygichko refused. The findings were suppressed by means of overclassification and severe restrictions on dissemination. Tsygichko was not forced to retire.

Tsygichko pointed out that one of the consequences of this suppression was that the findings were never incorporated into routine Soviet exercises. As a consequence, exercise maps typically depicted neat, manageable balloon-shaped contamination patterns that could be circumvented easily by army commanders. Hence the exercise nuclear effects did not seriously affect operations, much less impose severe disruptions on the strategic rear and populations of the Warsaw Pact.

Vitalii Tsygichko stressed that, in his confrontation with Kulikov and his generals, it was clear to him that they all understood the correctness of his findings but were unwilling to accept and disseminate them because of what those findings implied for the General Staff in the areas of force development, doctrine, military investment, etc.

"The Competence of General Staff Modelers and Quantitative Analysts"

Dr. Tsygichko had commented earlier on the unfavorable impression he had of serving General Staff modelers and analysts when he participated, by invitation, in a General-Staff hosted analytical seminar in June 1990. In earlier conversations, he made it clear that he was commenting specifically on the work of the analysts from the TsOSI when he said that the quality of the modeling work had reverted to what it had been 20 years ago, before major advances in sophistication had been made. In a conversation we had on December 12, 1990 he clarified and expanded on his earlier comment. The June 1990 seminar included participants from TsOSI but also analysts from the Main Directorate for Organization and Mobilization (headed by General-Colonel Krivosheev) and the Main Operations Directorate (headed by General Omelichev). Dr. Tsygichko made it clear that Krivosheev's people were equivalent in their low level of competence to the TsOSI analysts. He added that the only *real* analysts that appear to be left on the General Staff are working for General Omelichev in the Main Operations Directorate which is concerned with doing the assessments of the correlation of forces globally and by region and which support directly General Staff decisions on force deployments and changes in readiness status. This must be considered in the context of the steady "brain drain" of top analysts who have left the General Staff and supporting analytical institutes for the Soviet Academy of Sciences since the mid-1970s.

General-Major Medvedev, Deputy Director for Science of the TsOSI, confirmed to me in Germany in November 1990, that this trend is continuing. He volunteered that they have over 60 slots in the General Staff institutes for civilian analysts and that few, if any, were filled.

Tsygichko's comments suggest that the remaining qualified analysts are being pulled out of the more theoretical or arms-control support positions to keep alive the operational core of the General Staff, the Main Operations Directorate, which is much more concerned with applications and exploitation of mathematical models than with their development or improvement.

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Subject: Dr. Vitalii Nikolaevich Tsygichko

Position: Senior Analyst, All-Union Scientific-Technical Institute For Systems Studies (VNIISI), Academy of Sciences, USSR; Director, Center for National Security and Strategic Stability Studies

Location: Moscow

Interviewer: John G. Hines

Date: December 17, 1990

Prepared by: John G. Hines, based on notes

Brezhnev and the Politburo left military doctrine to the professionals and gave the military great reign in determining resource allocation and threat definition.

General Staff officers understood that nuclear use would be operationally counterproductive, but Front and TVD commanders [*armeiskie generaly*] expected to fight with nuclear weapons.

Models showed that global nuclear war would have drastic effects on climate and that nuclear strikes against all NATO airfields would contaminate the atmosphere in Eastern Europe and the USSR. Memos about this were sent to MoD and the Central Committee but were ignored.

In the early 1970s, modeling predicted that use at the Front level of 15 - 20% of nuclear arsenals on both sides would cause enough destruction to end war at this level. Moreover, models were used to conduct sensitivity analysis on nuclear use at Front level to determine at what percentage of use the nuclear arsenal available to both sides would the operational impact be acceptable. That is, how much of the arsenal could each side absorb and have losses sufficiently low to allow the Soviet Front to continue military operations. The analysis was begun at 20% of the arsenals available to both sides and the exercise was halted when the modelers had exercised strikes comprised of 2% of the arsenal. The losses, even at an exchange of 2%, were so great that all operations and movement ceased for 2 days while surviving commanders and staff assessed the potential for regrouping and resuming operations. Even then, resumption of Front operations was problematical, depending upon assumption about losses of key command and control personnel and facilities.

- The main Operations Directorate spent 6 months to validate the model.
- Gareev challenged the findings (Gareev's work on the correlation of forces predicted losses [from nuclear strikes] that were small enough to permit the continuation of operations after each phase).
- Kulikov understood that the findings were true but suppressed them because their implications for defense spending were unacceptable.

- In exercises Soviet troops continued simply to move around areas contaminated by nuclear use.

Iazov in *Red Star* [*Krasnaia zvezda*] praised the work of Tsygichko's institute. In the 1960s and 1970s excellent analysts worked in General Staff planning and analysis but they had no serious reality reference (they did not know how to measure the social or economic value of their work).

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Location: Room 716, VNIISI Building, 9 Prospekt 60-let Oktiabria, Moscow

Interviewer: John G. Hines

Date/Time: December 20, 1990, 11:00 a.m.

Duration: 1 hour

Language: Russian

Prepared by: John G. Hines, based on notes

"Purpose of Interview"

- To review with Dr. Tsygichko his views on the product and process of Soviet military assessments in the 1970s and 1980s. Of special interest was the Soviets' thinking about military competition, assessments of Western capabilities and intentions relative to their own, and expectations of the nature of war should it occur. The role and expected efforts of strategic and theater weapons of mass destruction was of central concern as was the Soviet perceptions of the effect of qualitative improvements on the nature of conventional war.

This is one of a series of interviews that I have conducted with Dr. Tsygichko. There is some duplication among interviews because I have revisited some themes to clarify points from previous discussions and I have tried to provide enough information to establish the context for his answers. This interview expands on issues raised in the interview of December 13, 1990.

"Thinking About Nuclear War - Issues of Policy, Theory and Practice"

Until 1980, Soviet policy on nuclear retaliation as expressed in the General Staff Academy lectures called for a full nuclear response against the homeland of any state launching even tactical (battlefield) nuclear strikes on the territory of the Warsaw Pact (of any member, not only the USSR). This Dr. Tsygichko identified as the political approach to military doctrine in this area. In practice, no real planning was done for a massive nuclear response to the use of tactical nuclear weapons on a less than massive scale on the territory of a member of the Warsaw Pact. Tsygichko volunteered that he believed personally that the USSR would definitely lose the war if Soviet forces did not respond quickly to initial NATO nuclear use with all available nuclear capabilities. This is a statement from someone who personally believed that victory in such a war would be meaningless.

We revisited the question of who in the General Staff fully understood the consequences of a nuclear exchange. He responded that the effects were really well understood "at the Danilevich level." When asked he added that, in the mid- to late 1970s, General Danilevich served as Deputy Director of the Main Operations Directorate. The Chief of the General Staff had some idea of the consequences but Ustinov, the Minister of Defense, did not really comprehend the level of destruction involved.

According to Marxist-Leninist theory, victory was possible, even in nuclear war. In practice, the General Staff did not have any real working definition of victory in a nuclear war and the operation simply was not discussed in those terms. It was well understood on the General Staff that the Soviet Union would not come out of such a war in anywhere near the same state in which it began the war. The general hope was that some undestroyed pocket of civilization would survive, perhaps in Siberia that might form the basis for rebuilding the state. Dr. Tsygichko explained that General Staff thinking did not focus on the consequences of a nuclear exchange for the Soviet Union but concentrated instead on the amount of destruction the USSR could impose on the enemy.

Soviet published military doctrine called for continuous operations in a theater of strategic military action (TVD) regardless of whether or not nuclear weapons were used, as if such use would do little to change the battlefield environment. In practice, the General Staff did no actual planning beyond the initial exchange of nuclear weapons on a tactical or operational scale.

Soviet declaratory policy, at the Politburo level, rejected deterrence as a fallacious and even immoral concept. In fact, according to Dr. Tsygichko, the Politburo accepted deterrence in 1965 when the USSR first acquired ICBMs. This acceptance was evident in some speeches and in the lectures at the General Staff Academy. I raised with Tsygichko the distinction made in Soviet political discussions between *sderzhivanie* (restraint, or morally correct, Soviet deterrence) and *ustrashenie* (terrorizing, or immoral, Western deterrence). He replied that even on a theoretical level the distinction was meaningless. The *concept* adopted by the Politburo and hence by the General Staff was that war would not be initiated by either side because both sides were held at risk of highly destructive retaliation even after initial surprise use of nuclear weapons. Deterrence was based on mutual fear or terror. Rejection of *ustrashenie* in the press was propaganda.

Tsygichko offered the opinion that, even in the 1960s and 1970s, the Soviet political leadership would have supported negotiations to prevent the initiation of nuclear war. The General Staff, he believes, would have supported this approach. This is consistent with General Danilevich's assessment of Brezhnev's visceral fear of nuclear use.

Finally, Dr. Tsygichko explained that he and several others in the General Staff viewed the "U.S. policy of arms racing" as an indirect attempt to undermine and bleed white the Soviet economy. He acknowledged that the strategy worked because the Soviet leadership did not know how to deal with it effectively. He indicated that the effects of such economic warfare are evident today.

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Subject: Dr. Vitalii Nikolaevich Tsygichko

Position: Senior Analyst, All-Union Scientific-Technical Institute For Systems Studies (VNIISI), Academy of Sciences, USSR; Director, Center for National Security and Strategic Stability Studies

Location: Washington, D.C.

Interviewer: John G. Hines

Date/Time: March 21, 1991, 1:00 p.m.

Language: Russian

Prepared by: John G. Hines, based on notes

In 1974, Gen. Shabanov asked Tsygichko's Institute (NII-6)⁸⁸ at the General Staff to use modeling to analyze the benefits of various kinds of technologies and weapons. Shabanov wanted an analytical basis for placing orders for different types of weapons in various quantities. The models included weapons with various theoretical sets of technical characteristics (precision, range, destructiveness, and possibly control). Tsygichko reprogrammed existing models (which were designed primarily to test operational concepts) in order to build fictional forces that were changed in different runs of the model and thus to establish criteria for selecting and investing in weapons systems. The cost of weapons was also a serious consideration. The objective was to get the most combat effectiveness for the smallest investment.

Tsygichko and his colleagues made the models, prepared a set of recommendations, and briefed Shabanov. Shabanov found the recommendations sound and scientifically based but could not use them because they would seriously run afoul of the prerogatives of the Services and the VPK [military-industrial complex in this case] leaders responsible for production of armaments, missiles, and air defense systems.

Based upon his positive impression of Tsygichko's work, in 1976 Shabanov formed his own institute [*Institut Shabanova*] out of some of Tsygichko's best people for the specific purpose of doing force-development analysis. Dr. Tsygichko continued to work with his former subordinates in Shabanov's institute.

Although the Directorate for Armaments was not created until the late 1970s, Shabanov was responsible for armaments in MoD since the late 1960s. Shabanov had the authority to work on general criteria for weapons development.

The Union of VPK [military-industrial complex] Directors of Heavy Industry, [*Soiuz Direktorov VPKa Krupnykh Predpriatii*], was organized to lobby the USSR Supreme Soviet to liberalize export constraints on products from the heavy industry sector. As of March 1991, trade in finished (technical) products was still constrained by concerns about military secrecy, but firms were already carrying out a fairly large

⁸⁸ NII — *Nauchno-issledovatel'skii institut* — Scientific Research Institute.

business in exchanging half-finished products and raw materials for hard currency. Much of the hard currency earnings were stored overseas.

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Position: Senior Analyst, All-Union Scientific-Technical Institute For Systems Studies (VNIISI), Academy of Sciences, USSR; Director, Center for National Security and Strategic Stability Studies

Location: Washington, D.C.

Interviewer: John G. Hines

Date: March 30, 1991

Language: Russian

Prepared by: John G. Hines, based on notes

After he formally retired from the General Staff in 1977, and moved to the All-Union Scientific-Technical Institute For Systems Studies (VNIISI), Tsygichko continued to work part-time until 1982 for the General Staff Institute of Operations Research and kept his high-level clearances because people at the Institute did not know enough about the models Tsygichko had developed to keep them working.

The General Staff prepared a report on Russian and British imperial experiences in Afghanistan. The report concluded that an invasion was a very bad idea in terms of fulfilling possible strategic objectives, getting bogged down, and being compromised by involvement in the region. Ogarkov strongly endorsed the findings and forwarded them through the MoD to the Central Committee.

After Ustinov became Defense Minister, the influence of the General Staff's analysis on future forces development weakened appreciably over time relative to the Services working with the VPK.⁸⁹

The main consumer of the General Staff's Institute for Operations Research (NII-6)⁹⁰ was the General Staff's Main Operations Directorate, and within it, the Subdirectorate for Operational Planning [*Napravlenie Strategicheskogo Planirovaniia*].

- Col. Oleg Ponomarev, [later General-Colonel, who retired in 1987] Director for Operational Planning until 1987, supported modeling as an approach to decision making.
- Capt. Volosatov, who was assigned to Ponomarev by Tsygichko, really wrote the two articles (published in 1976 and 1977, respectively) that were signed by Ponomarev.
- Gen.-Col. Kozlov and others also supported the modeling effort.
- Col. Terekhov, an analyst at the Frunze Academy, took part in the 1987-89 debate on a new role for modeling. His models were designed to run in real time in order to

⁸⁹ VPK — *Voennaia Promyshlennaia Kommissiia* — (Military Industrial Commission).

⁹⁰ NII — *Nauchno-issledovatel'skii institut* — Scientific Research Institute.

validate or invalidate tactical-level decisions (by captains through colonels, platoon to regiment levels) as those decisions were being made during training and exercises. Terekhov's work addressed a different level of problem solving from that which was the subject of the work of Tsygichko and the General Staff Institute of Operations Research. Terekhov created tactical models, Tsygichko theater strategic and Front-level models.

- Marshal Nikolai Ogarkov - When asked about the issues that might have led to the removal of Marshal Ogarkov as Chief of the General Staff in September 1984, Tsygichko volunteered that Marshal Ogarkov authorized a study on the structure of the Armed Forces that was highly critical of their organization as well as manning practices. The study, circulated in the summer of 1984 among senior MoD military leaders as well as senior analysts advocated, among other changes, the following measures:

- Deep reductions in the size of the Armed Forces, as much as 50%.

- Professionalization of the Armed Forces. The paper cited among other justifications, the high maintenance costs associated with abuse of sophisticated weapons and equipment by inexperienced conscripts. The central control radar for an SA-2 surface-to-air missile system, for example, historically required capital repair after only 2 years of operations by a conscript crew. The same system would operate for 6 years before capital repair when crewed by professional soldiers.

- Reassignment of Air Defense Forces Command assets to other commands—PVO air assets to the Air Forces, SAMs and AAA to the Ground Forces.

In general, the paper took the position that the Armed Forces required more rapid modernization to be competitive and that modern forces required relatively fewer personnel with much better skills.

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Location: Washington, D.C.

Interviewer: John G. Hines

Date/Time: December 21, 1991, 8:00 p.m. and December 23, 1991, 11:00 a.m.

Duration: 3 hours

Language: Russian

Subjects discussed: ICBM Silo Vulnerability, Vulnerability of Personnel to Blast Overpressure, Modeling Comparisons of Soviet with Western Economies, the Role and Power of the Military Department of the Central Committee vis-à-vis the General Staff, Central Committee Independent Assessment of the Chinese Threat, Mobilization Modeling, Effect of Medical Support on Rate of Advance in Theater Operations, Stopping the War for 2 Weeks to Resupply, Persian Gulf Mobilization Modeling Applications for U.S., Review of Weapons Programs by the General Staff, Remarks on Previous Interviews

Prepared by: John G. Hines, based on notes

ICBM Silo Vulnerability

In the context of a discussion about modeling strategic nuclear warfare Dr. Vitalii Tsygichko explained that he was personally involved in a series of tests, carried out by the General Staff on an annual basis between 1964 and 1966, to test the vulnerability of silo-based ICBMs to ground-burst attack. The tests were conducted at Semipalatinsk. Each test in the series required months of preparation, including engineer preparation of an overhead screen (perhaps as large as one square kilometer) to conceal the test activities from U.S. satellite observation. Missiles identical to those in operation were put in silos designed to actual operational specifications. Charges were placed in the ground at various distances from 20 meters to over 1 kilometer) from the silos, and the effects of the blasts were measured. The charges used did not exceed the blast energy effect of a 500 kiloton nuclear warhead. The tests took geological conditions into account and tried to approximate the impact of an actual U.S. nuclear attack on Soviet ICBM silos.

The measure of effectiveness (MOE) for a missile kill was the post-strike ability of the entire missile system to be reliably launched in the prescribed time (measured in hours at that time) and to effectively destroy its target. A jammed silo door, a ruptured fuel system, a disoriented missile guidance system, or disruption of the launch control system would constitute a missile kill. (The damage was normally much more extensive

and required days, weeks, and even months to repair.) In general, the test data showed that ground bursts were extremely effective in destroying silo-based ICBM systems. (As a minimum, even with distant strikes, silo doors often jammed.) Under certain geological conditions, a ground wave from a strike as far away as 1 km was powerful enough to drive the entire silo 3 m out of the ground, rendering *completely* inoperable the missile system inside. Any ground burst closer than 1 km away was highly likely to "kill" a silo-based missile system. If two silos were less than 2 km apart, typically both would be disabled by one incoming strike.

Dr. Tsygichko was given the task of creating models to compare the effects of ground bursts and air bursts. He used the masses of data collected in 1963 and earlier (before implementation of the nuclear test ban treaty) from tests at Semipalatinsk on the impact of nuclear explosions on structures and silos. According to analysis performed with the help of his models, an air burst (80 plus meters above ground) was 15 - 25% as effective in killing an ICBM as a ground burst of the same yield going off at an equal distance from the target.⁹¹

In 1966, Dr. Tsygichko took part in briefing the General Staff on the tests and modeling of silo vulnerability. Because Soviet silo-based systems were shown to be extremely vulnerable to ground-burst strikes in empirical testing, the Soviet military leadership took a series of decisions to deal with the direct and indirect implications of the findings. First, they initiated a major program to rebuild silos, when feasible, at distances of greater than 2 km from each other. Second, they initiated a program for the development and deployment of mobile ICBMs. Third, scientists assumed that U.S. analysts "were not stupid" and had conducted similar experiments and reached similar conclusions regarding the relative effectiveness of ground bursts and air bursts. On the basis of satellite photography, Soviet planners observed that U.S. missiles were not very well protected by overhead cover and were grouped relatively close to each other as well as to the launch control center. These observations convinced the General Staff that U.S. land-based ICBMs were not intended to ride out an attack but instead were first-strike weapons [*vooruzheniia pervogo udara*] and were routinely referred to as such by Soviet military planners in all subsequent discussions and internal writings. Based on these conclusions, the Soviets took two initiatives, one operational and the other programmatic. First, they adopted a launch-under-attack doctrine, that is, to launch when it was clear that U.S. missiles had been launched. The doctrine could not be effectively executed, however, because Soviet missiles required a considerable time to launch. The Soviet Union's programmatic response was the initiation of a large-scale program in Ministry of General Machine Building to develop both solid- and liquid-fueled missile systems that could be launched within 5 minutes of a launch order. To describe the expected scenario, the USSR defined a new kind of strike, a retaliatory-meeting strike [*otvetno-vstrechnyi udar*] whereby Soviet missiles were expected to pass American missiles in mid-air on the way to targets on U.S. territory. Dr. Tsygichko explained that, to his knowledge, Soviet missiles were to strike at military targets other than silos and at U.S. infrastructure because of the assumption that U.S. silos would be empty under all launch scenarios.⁹²

⁹¹ This was the first comprehensive application of mathematical modeling to a major area of Soviet military planning. The success of the modeling of silo-vulnerability and of strategic exchanges in general created considerable enthusiasm in the General Staff for application of modeling to other problems, such as analysis of outcomes of theater war. According to Dr. Tsygichko, experience with modeling of strategic warfare and silo-vulnerability were of little or no help in modeling theater warfare but it did build considerable credibility for modeling as an analytical tool.

⁹² Some U.S. analysts regard the SS-18 as too powerful for employment against infrastructure and soft military targets. Likewise suspected Soviet missile-reload capability would be of little use in launching a retaliatory strike if all Soviet silos were expected to be destroyed under all considered scenarios. The strategic forces directorate within the Main Operations Directorate of the General Staff, at a decision level perhaps not accessible to Dr. Tsygichko, might have targeted U.S. silos with the most capable (highest yield) part of the arsenal and might have planned for the possibility of

Vulnerability of Personnel to Blast Overpressure

Dr. Tsygichko was aware of tests, conducted in the late 1950s and early 1960s, on the effects on animals of overpressure from both conventional and nuclear weapons. Based upon exploitation of pre-1946 German data and other testing, Soviet scientists concluded that a dog's response to overpressure was closest to that of humans. Based on this finding, the tests showed that 7 psi overpressure was sufficient to kill a person.

(b)(1), (b)(2)

Modeling Comparisons of Soviet with Western Economies

Around 1978, an American economist published a book⁹³ assessing the intersector-balance [*mezhdutorasloi balans*] within the Soviet economy and comparing the U.S. and Soviet economies. The book forecast a bleak future for the Soviet economy because of significant distortions, maldistribution of investment, and excessive nonproductive expenditures such as those devoted to defense. A Soviet policy or economics expert, Dr. Tsygichko believes, must have brought the book to the Politburo's attention. In 1979, General Chervov, then head of the Information Directorate [*upravlenie*] with the Main Intelligence Directorate (GRU), asked Dr. Tsygichko to determine whether the book's analysis was based upon open sources or on intelligence. Dr. Tsygichko examined the documentation over several weeks and concluded that the book was based upon openly-available sources.

The Central Committee then commissioned a study in 1979 to test the book's conclusions. Dr. Tsygichko is absolutely convinced the work was inspired by at least one influential member of the Politburo itself. The study went on at least until 1984. It was run by the Director of the Institute of Economics of the Soviet Academy of Sciences and carried out by several experts from several institutes to include the Institute of Economics, the Institute of Mathematics and Physics, and the VNIISI (the all-Union Institute for Systems Research) to which Dr. Tsygichko was assigned. The project commanded support from the Main Intelligence Directorate (GRU) of the General Staff, to include large amounts of data on Soviet military production, despite the fact that the military was suspicious of and even hostile, to the effort. Dr. Tsygichko played the role of *systemnik* in the effort, which means that he helped to structure the analysis and models to conduct the analysis. The study began with an assessment of the intersector balance within the Soviet economy and then compared the Soviet economy to the advanced industrial economies of the U.S., Japan, and Western Europe. The findings essentially confirmed the conclusions of the American economist. The Soviet GNP was estimated to be at around 40% the size of U.S. GNP, and the gap between U.S. and Soviet

Politburo authorization to launch early enough to limit damage to the USSR. Other interviews with Marshal of the Soviet Union Akhromeev and Marshal Ogarkov's special assistant, General Colonel Danilevich, strongly suggest, however, that General Staff planners assumed that they would *not* get authorization to launch in time to limit damage. Other interview subjects, such as Vitalii Kataev of the Soviet Central Committee, and General Illarionov, seemed to believe that Minister of Defense Grechko and others in the senior military leadership showed little interest in reducing the vulnerability of Soviet missiles because they expected to strike preemptively against U.S. launch preparation.

⁹³ Subsequent research did not serve to further identify the book in question.

output was widening at a nonlinear rate. Dr. Tsygichko was unaware of exactly what impact, if any, the study might have had on Soviet policy.⁹⁴

The Role and Power of the Military Department of the Central Committee vis-à-vis the General Staff

Dr. Tsygichko believes that U.S. analysts generally overestimated the General Staff's influence on military planning and force development and grossly underestimated the importance of the Central Committee (CC) and its Military Department [*voennyi otдел*]. At least 60% of the membership of the Central Committee's Military Department were defense industrialists, both ministers responsible for arms production and chief designers [*glavnye konstruktory*], and the remaining 40% were political officers [*politicheskie ofitsery*] who were very much the *party's* officers within the military. The officers within the Military Department of the CC wielded influence that far transcended their military rank. The Defense Minister and all chief designers (who virtually controlled military production) were members of the Central Committee and its Military Department. The Chief of the General Staff and the service chiefs were not members and, therefore, held a fraction of the authority and influence enjoyed by the Military Department of the CC, especially in the areas of military policy [*voennaia politika*] and force development [*voennoe stroitel'stvo*]. As Dr. Tsygichko explained it, the Military Department of the CC functioned as the *de facto* sitting Defense Council, setting military policy [*voennaia politika*] which governed military doctrine and force development, and supported the formal Defense Council comprised of the General Secretary and MoD, the chiefs of the KGB and MVD [internal troops], the Minister of Foreign Affairs, and several major military industrialists.

Central Committee Independent Assessment of the Chinese Threat

In late 1979, the Central Committee initiated an independent evaluation of the General Staff's assessment of the Chinese threat. Colonel Malashenko, then a member of the Central Committee's Military Department,⁹⁵ placed Dr. Tsygichko in charge of a major reevaluation and forecast of China's military potential and even tried unsuccessfully to convince Dr. Tsygichko to return to active duty to run the study. Dr. Tsygichko, then a senior analyst at VNIISI, ran the study out of the Institute of the Main Intelligence Directorate (GRU) [or NII-6, a GRU Operations Research Institute that primarily supported the Main Operations Directorate—GOU]. Backed by the authority of the Central Committee's Military Department, Dr. Tsygichko was able to collect all the information he needed from the military and to enlist analysts from the entire Academy of Sciences. At the GRU Institute, 20 analysts—mostly from VNIISI, the GRU, and the General Staff—worked on the project directly under Tsygichko's supervision. (Dr. Tsygichko said that the General Staff and GRU supported the work at Central Committee direction despite the essentially "hostile" purpose of the study.) Another 39 analysts from various institutes of the Academy of Sciences participated in the study and contributed data and analytical support at Dr. Tsygichko's direction. Dr. Tsygichko and his colleagues were excited by their power to command resources for the study and his enthusiasm was evident even as he discussed the effort in the interview. Work began in early 1980 and went on for 5 years. There was substantial high-level interest in the study.

⁹⁴ The nature and results of this work were probably known to Gorbachev and his supporters in the mid-1980s and could have provided "scientifically developed" analytical support to bolster Gorbachev's push against Party conservatives for radical change.

⁹⁵ Later a special assistant to President Gorbachev until the end of the latter's presidency.

Dr. Tsygichko conducted yearly briefings to senior officials of the Defense Ministry and the Military Department of the Central Committee. [He recalled that 1983 was the first year in which the work was sufficiently well-developed to provide a coherent story to the leadership.]

The study resulted in the development of four separate models that analyzed China's economic, mobilization and deployment, transportation, and TVD-scale warfare capabilities. Nuclear weapons were excluded from the study and might have been considered separately by other analysts. The models indicated that China did not pose a serious threat. Over the 15-year period projected by the analysis, China was found to lack the military-industrial capacity and the infrastructure to threaten the USSR. For example, China would need weeks to move its forces because of a lack of transportation networks. Moreover, Dr. Tsygichko and his colleagues did not detect any Chinese intention to attack the Soviet Far East. The General Staff and the GRU, whose assessments of China tended to be alarmist, did not support the findings of Dr. Tsygichko's study. Despite these disagreements, the Chief of the GRU and the General Staff signed off with approval on the study's findings without written reservations because of the authority of the Central Committee.

Mobilization Modeling

In analytical work they did in the 1970s at the General Staff's NII-6. Dr. Tsygichko and his colleagues made a distinction between logistics support (including resupply and attrition fills) during the course of combat operations, on the one hand, and strategic nationwide mobilization and deployment on the other. The model for war in the TVD encompassed a module to assess the second echelon and reserve commitments and logistics support. A separate model analyzed strategic mobilization and deployment [*strategicheskoe razvertyvanie*] in the USSR preceding, and more often following, the outbreak of war.

The strategic mobilization and deployment model estimated the time needed to make divisions combat-ready and to move them to the front lines. A number of factors were considered: the level of a given division's readiness at the moment that the mobilization order is issued; the time required to assign people to divisions, to get divisions up to strength, to prepare the equipment and to train troops and make them combat-ready (this consisted of individual and small-unit training as well as combined training [*slozhnaia ucheba*] at the division level); and the time spent transporting (through points of embarkation and disembarkation) and deploying troops. The model accounted for the delays expected in moving supplies through transshipment points (such as those at the Soviet-Polish border), and it assumed destruction of transshipment and disembarkation points as well as damage or destruction to downloading facilities on a wide scale, that varied in detail in modeled scenarios depending upon when and where the war began.

In the model, a division was not deployed until it was fully trained up to the division level and rated combat-ready [*boesposobnaia*]. Dr. Tsygichko expressed the conviction that deployment of noncombat-ready units (as defined) was not considered to make sense and was not seriously considered in the planning he was aware of.

Effect of Medical Support on Rate of Advance in Theater Operations

The TVD model showed that high levels of losses would quickly decrease combat readiness. Medical studies from the 1970s predicted substantial numbers of casualties in a war in Central Europe, which would require extensive mobile medical support. The TVD model, using the medical data, exposed a serious deficiency in Soviet mobile-hospital capabilities (including grossly inadequate numbers of doctors and medical technicians), and thus anticipated very high serious injury and fatality rates. Units whose losses exceeded 50% in a matter of hours were rated noncombat-ready and withdrawn. Their replacement by new units put a severe strain on a transport network already under attack. The declining combat readiness of first-echelon divisions due to unreplaced losses, combined with the time spent replacing first-echelon divisions with operational reserves and the shrinking availability of large-scale replacements in a war of high attrition, was expected to slow the Soviet advance dramatically. Dr. Tsygichko said that the work of medical services analysts and even the modeling applications of their findings did not influence the General Staff to correct deficiencies in field medical support because, ultimately, it was not as "interesting" as investment in military hardware. He sensed a reluctance on the part of senior General Staff generals to really deal with the reality of warfare and its consequences, and the inattention of the generals to the critical shortcoming in medical support was indicative of their indifference.

Stopping the War for 2 Weeks To Resupply

According to Dr. Tsygichko's modeling, an initial operation would last 9 to 12 days (this might put them at the French border in some locations and at the Rhine River in others) and *then come to a complete halt for 10-14 days* to permit resupply and troop replacement. The pause would be an unavoidable constraint on the offensive because the resupply would be too slow to maintain the momentum of the first echelon beyond the advance expected in the initial TVD operation.

When asked about the concept that second-echelon Fronts would simply pick up the offensive from exhausted first-echelon Fronts at the end of the initial operation, Tsygichko explained that there were basic real-world physical constraints and, to a lesser extent, organizational constraints that would make the "second-echelon Front" solution impossible to execute. The "commitment of second-echelon Fronts" was actually an assumption of command by second-echelon Fronts of first-echelon armies and divisions already in place, supplemented by some fresh divisions and perhaps armies. The functioning of the logistics support system in the TVD was, in most respects, insensitive to the identity of the Front or Fronts to which the logistics command structure was subordinated. In other words, fuel, ammunition, and food supplies were or were not available and transportable regardless of the identity of the command superstructure. Moreover, General Staff modeling and analysis conducted by Dr. Tsygichko's department indicated that basic supplies would *not* be available to sustain operations beyond approximately 2 weeks because of expected high losses and protracted transport times exacerbated by extensive destruction of the transportation infrastructure. Under these conditions, the number of Fronts did not matter.

Persian Gulf Mobilization Modeling Applications

In 1984, the General Staff asked Dr. Tsygichko to estimate how rapidly the United States could deploy 500,000 troops to the Persian Gulf (!). The General Staff had assumed that a half-million U.S. troops could reach the Gulf and be prepared to fight in 1 month. In contrast, Dr. Tsygichko's modeling indicated that the U.S. would need at least 4-1/2 months to carry out such a deployment. The U.S. would be constrained primarily by the transportation networks inside the U.S. and by the number of bottoms and aircraft available to carry the forces forward and to bring in the requisite logistics support. Combat readiness of U.S. units was rated fairly high at the unit and division levels when mobilization began.

Review of Weapons Programs by the General Staff

In the late 1960s and early 1970s, Dr. Tsygichko participated in an analytical support role in two separate weapons system program review board meetings. The purpose of such meetings was to develop a final recommendation on production, non-production or modification on a weapons system that was presented by its sponsoring design bureau as ready for series production. All participants were expected to have reviewed and evaluated all relevant materials and to have developed organizational positions before attending the decision meeting. Such meetings usually were chaired by a three-star general from the General Staff, often from the prestigious Main Operations Directorate (GOU) and attended by representatives of the "buying" service, the General Staff, and the military industrial commission.

The meetings Tsygichko attended were chaired by the Deputy Director of the General Staff's Main Operations Directorate. One system review meeting easily developed a consensus to support series production of the weapons system under review. The other just as clearly disapproved series production. In the second instance, the meeting chairman himself presented volumes of documentary evidence to establish the inability of the weapons system to meet operational requirements. His view reflected the consensus which recommended against production.

On the basis of his experience at the meetings, Dr. Tsygichko expected the supported system to be produced and the negatively evaluated system to be canceled. In fact, both systems went into production on schedule, leading Tsygichko to conclude that the review board meetings were an empty formality designed to mollify the General Staff and other players outside the military industrial commission (VPK)⁹⁶ but which had no real effect on program development.

Remarks on Previous Interviews

Dr. Tsygichko commented further on a paper he had prepared earlier, *Kommentarii k interv'iu V. N. Tsygichko v 1990-1991 godu*:⁹⁷ In the 1960s and 1970s, Vitalii Tsygichko explained, the Soviet Union had a comprehensive plan for retaliation against nuclear attack. The plan, which was updated every 6 months, called for a Soviet launch-

⁹⁶ VPK — *Voennaia Promyshlennaia Kommissiia* — (Military Industrial Commission).

⁹⁷ Remarks, in Russian, on the *Interviews of V.N. Tygichko given in 1990-1991* are in Appendix E: of this volume.

under-attack⁹⁸ [*otvetno-vstrechnyi udar*] using all Soviet silo-based systems. This annihilating retaliatory nuclear strike [*unichtozhaiushchii otvetno-iadernyi udar*] would be directed not against U.S. silos, which Soviet planners assumed would be empty, but rather against military targets (such as airfields, ports, and C³ facilities) and against the U.S. political and economic infrastructure (including transportation grids and fuel supply lines). Soviet doctrine relied on the threat of a massive response as the best way to prevent nuclear use.

Soviet analysis and modeling demonstrated that escalation to nuclear exchanges at the theater level was extremely disruptive to conventional defensive and certainly offensive operations (the war stopped for 2 days and strategic operations had to be replanned) and further escalation to global use was highly probable and counterproductive. Soviet planning assumed NATO initiation of nuclear use, so to control escalation the General Staff began to examine limited options. Nevertheless, the General Staff never planned in any detail actual extended combat on a nuclear battlefield. The Soviet buildup of theater nuclear forces in Europe was intended, in large part, to reduce the probability of NATO's first use and thereby to keep the war conventional where outcomes were relatively more predictable and where the USSR might enjoy a relative advantage.

Dr. Tsygichko was not aware of any Soviet notional employment of chemical weapons in military exercises after 1964. He attributes the existence of Soviet CW stockpiles to the VPK's interest in keeping the chemical industry healthy.

⁹⁸ An analogous U.S. usage of the term in discussions is "launch on tactical warning." Launch under attack refers to when missiles have been fired by the enemy.