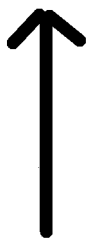


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PART II OF NIE 11-6-56

"CAPABILITIES AND TRENDS IN SOVIET SCIENCE AND TECHNOLOGY"

IV. SOVIET CAPABILITIES IN RESEARCH AND DEVELOPMENT RELATED TO MILITARY AND INDUSTRIAL TECHNOLOGY

- A. Soviet Nuclear Energy Program
- B. Soviet Guided Missiles Program 1 /

1. Known Soviet achievements and their high level and diversity of activity in the guided missile field indicates that Soviet science and technology are capable of mastering the difficult research and development problems inherent in a guided missile development program. We believe, on the basis of all available evidence, that the USSR is engaged in an extensive guided missile program, and that the USSR has the basic scientific and technical capabilities to support a comprehensive research and development program. We further believe that the USSR now has missile systems in all categories 2/ in at least limited operational status; however, we have very little intelligence on the specific characteristics and performance data of the missile types the USSR is presently developing or may now have in operational use.

2. Guided Missile Testing Facilities: The USSR is known to be engaged in an extensive ballistic missile flight testing program at the Kapustin Yar guided missile test range. We have practically no current information on the Kapustin Yar range facilities, instrumentation, and scientific and technical

1 /For more detailed information on Soviet guided missile capabilities, see NIE 11-12-55, dated 20 December 1955, and NIE 11-5-56 to be published in September 1956.

2 /Surface-to-surface, surface-to-air, air-to-air, air-to-surface.

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manpower. Nevertheless, on the basis of the type, magnitude and extensiveness of the known ballistic missile flight testing activities being conducted, we believe the Kapustin Yar range to be well equipped, modern, and operated by well-qualified missile scientists, engineers, and technicians in supporting activities. Very little is known concerning other Soviet guided missile test facilities.

3. Missile Guidance and Control: The USSR has demonstrated an excellent capability in the electronics field as evidenced by their rapid advances in radar and communications fields. Soviet ability to apply this demonstrated capability to the development of missile guidance and control systems, together with some limited intelligence on Soviet missile guidance and control systems, indicated that the USSR possesses the necessary scientific and technical knowledge and skills to develop advanced guidance and control systems for all categories of guided missiles. Evidence in at least two missile categories supports this belief. There has appeared around Moscow a complex system of installations concluded to be surface-to-air guided missile sites. The specifics of the guidance system employed here is currently unknown, but it is assumed that an original Soviet design is involved and that the USSR may have achieved a solution to the difficult problem of simultaneously controlling several missiles in the air. In the surface-to-surface field, the magnitude of their ballistic missile test program also indicates inferentially that guidance and control equipment being tested is probably meeting its basic requirements.

4. Guided Missile Propulsion Systems: Known Soviet achievement in both the solid and liquid propulsion fields indicated that they are well advanced in rocket propulsion techniques. The fact that the Soviets have fired numerous ballistic missiles at the Kapustin Yar guided missile test facility to ranges

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of 600,700 metric tons to a measure of their capability to convert their aims to hardware. The development program for a 100 metric ton thrust rocket engine, undertaken at Khimki and estimated to have been ready for static testing as early as 1952, is an outstanding example of Soviet advanced aims in rocket propulsion systems. We believe that the development of suitable propulsion systems for all categories of guided missiles is one of the USSR's strongest capabilities in the over-all missile system.

5. Guided Missile Aerodynamics and Structures: The USSR has an excellent capability in both aerodynamics and structural designs for supersonic and hypersonic vehicles. The USSR has acquired considerable experience from its extensive testing of ballistic missiles at the Kapustin Yar test range, which experience has undoubtedly enhanced their capabilities for solving the heating, aerodynamic and structural problems encountered upon re-entry of mid- and long-range (IRBM and ICBM) missiles. We believe that the USSR possesses, or is rapidly acquiring, the necessary data for successfully solving the aerodynamic and structural problems of IRBM's and ICBM's.

6. Earth Satellite Vehicles: Sometime prior to November 1954, a Permanent Inter-Agency Commission for Interplanetary Communications was established in the Soviet Academy of Sciences. Members of this Commission include some of the top Soviet scientists in the fields of physics, astronomy and gas dynamics. Formation of this Commission is the first known official indication of a coordinated survey of the theoretical problems involved in establishing a space satellite or in space travel, although many individual Soviet scientists have shown considerable interest in these fields. We estimate that the USSR possesses the basic scientific capabilities, technical skills, and other

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resources required to develop, build, and launch an unmanned earth satellite vehicle. With the exception of the non-existent re-entry problem and the requirement for a small, long-life power supply accomplishment of a successful earth satellite vehicle entails solving essentially the same scientific and technical problems encountered in a long-range ballistic missile program.

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