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DEFENSE INTELLIGENCE AGENCY
WASHINGTON, D.C. 20301

MINUTES OF
DIA SCIENTIFIC ADVISORY COMMITTEE
MEETING

21-22 MAY 1970

I. (U) GENERAL: A meeting of the DIA/SAC was held on 21-22 May in Room 3E267 in the Pentagon. The meeting convened at 0900 hours on 21 May and adjourned at 1545 hours on 22 May.

II. (U) ATTENDEES: A list of attendees is attached (Encl 1). The DIA/SAC Secretariat representative was (b)(3):10 USC 424

III. (U) AGENDA: Copies of the tentative and actual agendas are attached (Encls 2 and 3).

IV. ~~(S)~~ SUMMARY:

A. The meeting proceeded as indicated on the "Actual Agenda" (Encl 3). During the course of the SAO Update briefing, the Committee requested of DIA a future briefing by DIAXX on the coverage probabilities and assurance, for certain specific areas. This would up-date information of this sort presented to the DIA/SAC Arms Limitation Panel in September 1969.

B. The second agenda item was a comprehensive review of Chinese missile developments, testing, and manufacturing, leading to postulated characteristics and IOC for the initial CPR ICBM. The presentation stimulated the observation from Committee members that the SAC should devote some discussion to evaluating the impact of the Chinese missile progress on the SALT position that the US should take (and Soviets too perhaps) on the question of ABM. At the conclusion of the briefing, the SAC requested DIA to present at the next meeting a briefing covering:

1. A revised estimate of the probable impact areas for CPR ICBM test flights.

2. A discussion of launch azimuth indicators.

(b)(1),1.4(c)

3. [redacted]

C. [redacted] briefing indicated that a team of [redacted] (b)(1),1.4(c) personnel will be sent to the site in July to investigate upgrading the capability of the radar. The Committee expressed the belief that some U.S. technical personnel might be needed permanently on-site to improve the RADINT performance.

(b)(1),1.4(c)

D. On [redacted] much discussion centered around the questioned utility of the capability as being developed. It was agreed that some benefit would accrue to US ECM design from use of the intelligence data obtained via this capability.

(b)(3):10 USC 424

E. [redacted] reviewed the background for and the approach being taken in relation to the [redacted] requested study of collection against ICBM reentry. [redacted] stated that the study output being pursued is two-fold:

(b)(1),1.4(c)

1. Comments on the utility and effectiveness of [redacted] collection systems.

2. Alternative cost-level package proposals with associated assessed capabilities and risks.

To make the study more manageable with limited resources and time, (b)(3):10 USC 424 suggested an inverse approach to the study, ie starting with [redacted] (b)(1),1.4(c) collection systems and working backward toward the known intelligence requirements to see which approaches appear most effective. Much discussion ensued. It appeared that most felt that the study would have to be finally presented as a progression from identified intelligence requirements through to best proposed collection approaches and systems, and that the study should therefore be structured according to this pattern.

F. (b)(3):10 USC 424 discussed the issues associated with [redacted] (b)(1),1.4(c) "Soviet Forces for Intercontinental Attack" and [redacted] on Soviet homeland defense forces.

G. The real-time/near-real-time collection presentation addressed the application of such a capability to the following: crisis intelligence, combat support, event analysis, intelligence production, and strategic warning. [redacted] emphasized the need in connection with such a system to consider thoroughly what is to be done with the data as it is obtained. [redacted] discussed the DIA approach to evaluation of such a capability and indicated the formation of an ad hoc committee to prepare a preliminary report to DIADR by 1 Sept 70 and a final report by 1 Nov 70.

(b)(3):10 USC 424

H. The results from (b)(3):10 USC 424 verbal report to the Committee on the "New Soviet ABM Efforts" are reflected in the conclusions and Recommendations from the Executive Session (Encl 4).

I. A letter reporting on the findings of the Committee was prepared by the Chairman and forwarded to the Director, DIA. It is attached as Enclosure 5.

CERTIFIED:

(b)(3):10 USC 424,(b)(6)

4 Enclosures a/s

Secretary, DIA/SAC

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REVIEW PANEL ON DETERMINATION OF YIELDS OF FOREIGN UNDERGROUND NUCLEAR TESTS

(U) A panel was convened by the Director, Defense Intelligence Agency, to address the question of how best to determine foreign underground nuclear test yields. Panel membership is shown at Attachment 1.

(U) The Panel met three times in August and September, 1985, and restricted its study to the yield regime relevant (b)(1),1.4(c)

(U) The Panel received an extensive series of briefings on (b)(1),1.4(c) (b)(1),1.4(c) methodologies and made the following observations:

~~(S/NF)~~ Over the past two decades, (b)(1),1.4(c) increasingly mature as a methodology for yield estimation. Impressive advances have been made in both data acquisition and its interpretation, but significant uncertainties still result in (b)(1),1.4(c) being uncertain by about a "factor

~~(S/NF)~~ Results (b)(1),1.4(c) primarily of US and French origin, show that a simple relationship exists between the yield of the explosion and the magnitude of (b)(1),1.4(c) at least for yields below about [redacted] Thus, specific calibration curves can be developed for each distinct test site which allow yields to be estimated (b)(1),1.4(c) (b)(1),1.4(c) While these curves have been assigned essentially the same slope, the absolute values are expected to differ from site to site and sometimes within a site, chiefly because differences exist in the physical properties of the rock in which the explosions occur or through which the (b)(1),1.4(c) ~~propagate deep~~ under the test sites. In order to simplify procedures, a standard calibration curve was devised and is adjusted for each particular test site. This adjustment is commonly known as the (b)(1),1.4(c) (b)(1),1.4(c) Such a bias must be established for each test site, including the Nevada Test Site (NTS), before yields can be reliably estimated (b)(1),1.4(c)

~~(S/NF)~~ Where yields are known, e.g., U.S. tests at NTS and Amchitka, [redacted] a bias value can be directly estimated. For Soviet test sites [redacted] where yields are not known, all available sources of information should be considered in estimating the appropriate value of bias. (b)(1),1.4(c) based on very Since that time a number of significant studies have been completed in the following subject areas:

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(b)(1),1.4 (c)

- The availability of high quality digital data from (b)(1),1.4 (c) which have made the (b)(1),1.4 (c) more reliable.

- Determinations of site-dependent attenuation of seismic body waves.

- Use of revised yield information from the [redacted]

(b)(1),1.4 (c)

~~(S/NF)~~ In addition to focusing on surface disturbances as a potential complement (b)(1),1.4 (c) the Panel considered specific yield evidence derived from [redacted] While it is not compelling evidence, the collection community is encouraged to continue their efforts.

~~(S/NF)~~ As a result of examining (b)(1),1.4 (c) the panel found only one instance [redacted] the cratering shot [redacted] which had (b)(1),1.4 (c)

(U) The panel considered crater phenomenology and explored the use of surface disturbances to complement (b)(1) If there exists a depth of burial at which, for a specific yield in a specific medium such as hard rock, a distinct surface effect such as a crater will result if the detonation takes place above that burial depth and no crater will result at detonation depths below that depth, then this so called "critical depth of burial" (DOB) may allow one to estimate yields in the yield regime of interest. The key question at issue is the magnitude of the difference in burial depth in hard rock which will either result in a crater or not. If the difference is small, this surveillance method could complement the

~~(S/NF)~~ Unfortunately, the understanding of crater phenomenology is least in the vicinity of the postulated critical DOB for hard rock. It is not certain that a sharp threshold exists; if it does , the scaled critical DOB may depend on yield, local geology, topography, test configuration, and other factors. No applicable U.S. hard rock data exists in the important scaled DOB range of and the data between are inadequate to resolve the issue.

~~(S/NF)~~ There exists some evidence that the concept of a critical DOB has validity. It is noted that surface-disturbance observations can be grouped into two classes, throw-out craters and other surface disturbances including spall (where all the disturbed material lies above the original ground plane but is not displaced laterally from its original position). These two classes appear to be separated by a boundary in the DOB versus yield plane. The boundary is well defined by a line. Certain investigators have assumed a particular value for the relationship between yield and depth of burial in hard rock and from these assumptions have come to the conclusion that (b)(1),1.4(c) at least for the test area should be reduced rather than increased. However, until additional data are available, (b)(1),1.4(c) (b)(1),1.4(c) imprecise as it is.

~~(S/NF)~~ It is possible that carefully controlled high-explosive experiments combined with calculational efforts could improve the understanding of cratering phenomenology in the relevant yield regime. Provided the understanding can be quantified, existing craters at could be used as an independent check of the bias.

~~(S/NF)~~ In the absence of such necessary understanding, cratering data cannot be used to improve on or bound (b)(1),1.4(c) Research on cratering phenomenology and depth of burial should be encouraged and supported.

~~(S/NF)~~ Since this technique's sensitivity requires the existence of a well defined critical DOB, the Soviets could deny us additional information at Degelen Mountain or other test areas by modest increases in the scaled burial depth. Existing data from Degelen Mountain Test Area would still be useful, however, as a rough calibration of the entire Semipalatinsk area.

~~(S/NF)~~ It has been suggested in the intelligence community that a gap exists between Soviet nuclear test yields and the assessed yields of modern Soviet strategic warheads. The Panel addressed this issue. The US and the USSR each stated in 1976 that it would adhere to the provisions (b)(1),1.4 (c) (b)(1),1.4 (c) At approximately the same time, the test program at (b)(1),1.4 (c) yields localized in the abruptly ceased.

~~(S/NF)~~ At this time the SS-17-1 and the SS-19-1 RVs, which had been first flight tested in 1973-74, were being deployed. These RVs were very similar in profile and size to modern RVs (SS-17-3, SS-18-4, and SS-19-3) such that a common warhead, or one with small modifications could have been used in all. From the geometries, and using modern U.S. weapon design technology, the expected yields (oralloy loaded) would be a nominal (b)(1),1.4 (c),1.4 (e) (b)(1),1.4 (c) The next-generation weapons technology might permit increasing the yield to as much as The panel concludes that the apparent yield gap between cessation of the higher yield testing at and the deployments has no significance.

~~(S/NF)~~ Regarding official community yield statements, (b)(1),1.4 (c)

~~(S)~~ The panel notes with concern the absence of any centralized management of research and analysis of determination of foreign test yields from remote locations. Over the years, each involved Department and Agency has tended to find its niche. While there appears to be reasonable interchange of information among these organizations, no single entity takes responsibility for identifying new requirements, for supporting new approaches for yield determination, for prioritizing these new approaches, for assuring that resources are properly applied to these new approaches, and for insuring that the various resulting methodologies are used to complement one another.

~~(S/NF)~~ In conclusion, technologies available to us today do not provide the precision to determine, in a legalistic manner, whether or (b)(1),1.4(c) Further, without calibration explosions which are independently verified by the U.S. at the specific Soviet test sites, it is not anticipated that one will ever be able to determine an equivalent high-explosive yield to better than [redacted] even with on-site instrumentation. From a national security standpoint, however, a precise determination of Soviet nuclear test yields is not critical. For hard point targets, an improvement in RV accuracy of only [redacted] is equivalent to a factor [redacted] Moreover, to the present, yields assessed for Soviet strategic delivery vehicles have been derived (b)(1),1.4(c) (b)(1)

~~(S/NF)~~ We should indeed continue to improve (b)(1),1.4(c) we should devote increased resources [redacted] we should centralize responsibility for research and analysis of foreign test yield determination; but most important is the need to recognize our inability to monitor precisely the existing (b)(1),1.4(c) agreement and the President should be so advised.