



~~TOP SECRET~~

Handle Via Indicated Controls  
BYEMAN/TALENT-KEYHOLE/COMINT

**INTERFERENCE**

**WITH**

**U. S. SATELLITES**

~~EARPOP-HEXAGON~~  
~~GAMBIT-RUFF-ZARF-UMBRA~~

Handle Via Indicated Controls  
BYEMAN/TALENT-KEYHOLE/COMINT

Copy 2 of 3 Copies  
Control No. BYE-12957-70

~~TOP SECRET~~

~~TOP SECRET~~

BYEMAN/TALENT-KEYHOLE/COMINT

June 17, 1970



## INTERFERENCE WITH US SATELLITES

## THE PROBLEM

To assess the possibilities of Soviet non-physical interference with US reconnaissance satellites (including ground support facilities).

## INTRODUCTION

SNIE 11-10-68, "Likelihood of Interference with US Satellites," presented rationale to assist in determining what resources should be allocated to protect U.S. reconnaissance satellites against hostile actions in situations less than general war. The SNIE concluded that it is highly unlikely the Soviets would undertake wide-spread and continuing attacks on US reconnaissance satellites. The chances for selective or sporadic interference involving physical damage to US satellites were estimated to be about equally low.

The risk of retaliation as well as the potential cost of peacetime military action against satellites in orbit might in fact lead to a Soviet preference to other, less risky and less expensive ways of interfering with our satellites. Such interference need not be applied directly against the satellite in orbit. Interference could take more indirect forms against supporting ground facilities or by concealment of targets.

In this regard, however, SNIE 11-10-68 specifically did not consider passive countermeasures or diplomatic pressures that the Soviets might apply as interference. We believe that such Soviet tactics are very real and possible; indeed, they are typical of more credible forms of interference. We further believe that, by unwise acts on our part, we could increase the likelihood of such interference. It also is

006-17-009  
Page 1 of 15 Pages  
Copy 2 of 3 Copies  
Control No. BYE-12957-70

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

clear that the role of satellites as means of verification in a SALT environment must be carefully and astutely negotiated in order to avoid similar interference hazards.

This paper addresses some possible circumstances and forms for this type of interference and the implications for future space operations and policy. We need to devote more attention to the possibility of these forms of interference. On the other hand, the Soviets undoubtedly are concerned about the possibility of US interference with their satellites. But they must know that we have no non-nuclear anti-satellite capability. One must question whether our development and test of such a capability would be provocative or stabilizing. We believe that it probably would be stabilizing.

It is important, therefore, for the US to consider not only measures to protect our satellites against hostile acts, but also ways to avoid confrontation with the Soviets that might lead to these lesser, more subtle forms of interference. As a minimum, our estimates in this regard should help us to anticipate such Soviet moves and thus provide basis for developing appropriate alternatives and contingency plans. We strongly urge that the scope of SNIE 11-10-68 be expanded to include these considerations.

## DISCUSSION

### I. POSSIBLE CIRCUMSTANCES OF INTERFERENCE

#### A. Tacit Acceptance and the Deployment of New Satellite Systems

A fundamental consideration underlying satellite reconnaissance, and one which has permitted unimpeded operations throughout the life of the National Reconnaissance Program, is the existence of tacit acceptance and tacit agreement to mutual noninterference. The Soviets have long conveyed, by diverse and unmistakable means, their awareness and acceptance of U.S. satellite reconnaissance activities. Conversely, we

Page 2 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

~~TOP SECRET~~ BYEMAN/TALENT-KEYHOLE/COMINT

have tacitly accepted overflight of US territory by Soviet reconnaissance satellites. Each nation has seemed willing to tolerate the other's space activities in order to preserve its own freedom of operation in space. This probably also is so because neither side has yet perceived an immediate and intolerable threat to its own security from the activities of the other. Indeed, the Soviets have needed some degree of observation of the US to insure credibility of their strategic capability. Needless to say, this situation could change under conditions of a severe crisis or outbreak of actual war--or as a result of a unilateral change in reconnaissance activities allowed under tacit acceptance.

Beyond the "fact of" our satellite reconnaissance activities, the Soviets know that our program contains high and low resolution photographic satellites in near-earth orbit. They probably understand our photographic operations quite well. The Soviets probably underestimate, however, the resolution quality and film capacity of our new photographic systems. Our SIGINT satellite activity probably is more obscure to them; in particular, they probably do not know of the new generation of systems at synchronous altitude. Finally, the Soviets undoubtedly understand and appreciate our heavy reliance upon satellite reconnaissance for intelligence collection.

A critical point here is that we can assure Soviet tacit acceptance only of the present collection systems. One must ask whether the Soviets will also accept our new and planned systems which represent a new generation of satellites with significantly different operating conditions and dramatic, obvious improvements. Within the past year we have introduced the dual recovery vehicle GAMBIT and the synchronous altitude

[redacted] During the next twelve months, we will introduce a new generation of satellites which will be observed by the Soviets and noted as a dramatic upsurge in quality and quantity of our collection. These are: [redacted] HEXAGON, and 647. HEXAGON, for example, will be apparent as a much larger system with twice as many and much larger data return vehicles and twice the orbital life of any previous photo

BYEMAN/TALENT-KEYHOLE/COMINT

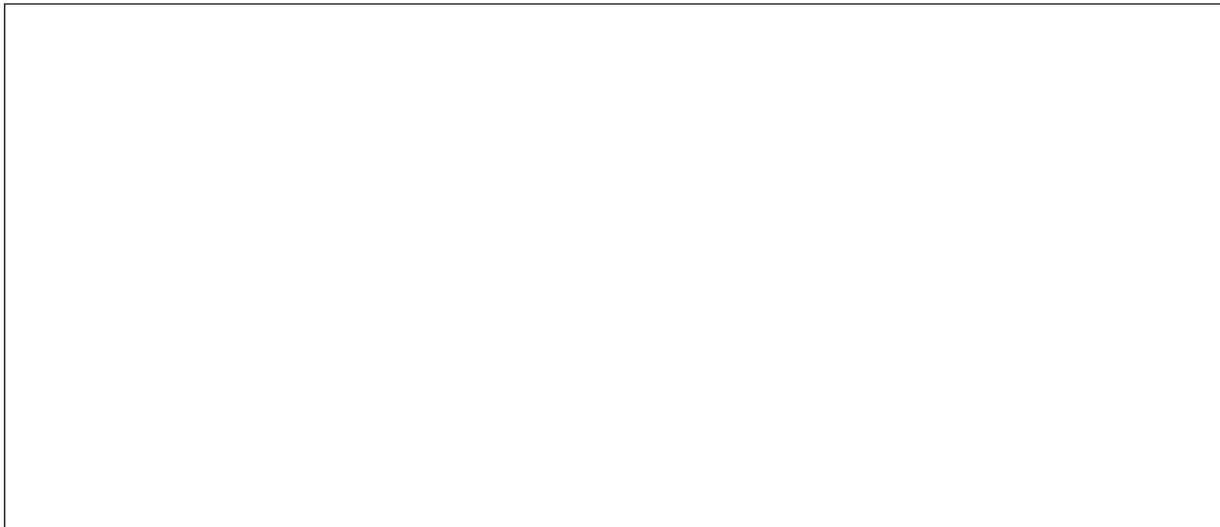
~~TOP SECRET~~

Page 3 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

system. These new and planned systems will provide capabilities for:



Combined, these systems should produce improved ability to monitor mobile and fixed missile deployments; improved detection of strategic missile launches; improved knowledge of missile characteristics; and improved knowledge of the capabilities of defensive missile systems.

Our new satellite systems differ from current ones in two important respects. First, they represent significant qualitative improvements, with increased emphasis upon SIGINT collection. Second, the new systems will provide near-continuous coverage and near real-time readout from synchronous altitudes and highly elliptical orbits. In their own space operations--to the best of our knowledge--the Soviets have not shown any interest in intelligence collection from synchronous orbits. They have concentrated their efforts in near-earth orbit operations. This focus may be attributed in part to their perception of our activities up to this time.

A new  system already is in limited operation. There have been no indications that the Soviets are aware of its purpose. The nature of the data that it is collecting has not changed since operations began, and there

are no indications that the satellite is being tracked by the Soviets. We may assume that current Soviet understanding of tacit acceptance does not include, therefore, this particular system. We probably can also assume that they will be unaware of the missions of other new systems which are scheduled to become operational within the next two years.

The Soviets can successfully track our current satellites in near-earth orbits, thus giving them some flexibility in choosing what they want or do not want us to see or hear. Thus, they "accept" our current activities in that context. The fact remains, however, that the Soviets may not accept, once they understand, the near continuous coverage and near real-time readout capabilities of our new systems. They may regard these expanded activities as an intolerable extension of an acceptable level of espionage.

A final significant consideration is the relative value of tacit acceptance to the Soviet Union. While there is an undeniable reciprocity in satellite reconnaissance, there is a distinct inequality in its importance to the U.S. and the Soviet Union. Our assessment is that the Soviet satellite reconnaissance program, although characterized by frequent launchings, in no way approaches the scope or quality of ours. With easy access to "open" countries of the West, and particularly the US, intelligence collection by satellite reconnaissance is not nearly as critical to them as it is to us. Consequently, the Soviets stand to lose considerably less by any diminution of tacit acceptance. Needless to say, they would not be reluctant to interfere openly with our satellites if the threat posed to their security became unbearable. In essence, this view suggests that tacit acceptance is valid for the Soviets only when it is useful to them. Such an attitude would conform to their ideology. This is not to minimize, however, the importance to the Soviets of their continued overflight of China and other countries on their border. Certainly, their continued need for reconnaissance of China would temper Soviet readiness to do anything that might broach tacit acceptance.

Page 5 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

~~TOP SECRET~~ BYEMAN/TALENT-KEYHOLE/COMINT

In summary, the Soviets are aware of the "fact of" US satellite reconnaissance. In addition, they understand and accept our current generation of satellites at low and medium altitudes. They may underestimate our high resolution capability. We can only be assured that they find this level of reconnaissance, as they understand it, acceptable. They probably do not yet understand and may not accept our new generation of satellites which will place the Soviet Union under near continuous coverage from highly elliptical orbits and synchronous altitudes. Once the Soviets understand our new collection activities, they may regard them as a new and unacceptable level of espionage.

#### B. Disclosure Policies

In response to various pressures within government to downgrade the "fact of" satellite reconnaissance and to liberalize control of the product (thus, its use and application), discretion might give way to compulsion to "show and tell." Such compulsion could manifest itself in several forms, any one of which might place the Soviets in an uncomfortable position and provide cause for them to object or interfere with US satellite programs.

To prove estimates of Soviet military posture and thus gain Congressional approval of requests for enhanced US defenses, it is conceivable that selected satellite photography might be openly disclosed to Congress\* in order to confirm beyond doubt the extent of Soviet ICBM development and dispersal. Such disclosure ultimately would extend to the press and public at large and might thus become a matter of intense national discussion.

In the broadest sense, unilateral public disclosure of satellite reconnaissance, the tacit covenants under which it has been conducted during the last ten years, or the actual quality of the data derived could prompt any of several

---

\*As opposed to private disclosure to key members.

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page 6 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

~~TOP SECRET~~

BYEMAN/TALENT-KEYHOLE/COMINT

reactions by the Soviet Union. Having emphasized vigilance and secrecy as vital elements of national security, the Soviets might feel compelled to undertake not only political reaction but also passive countermeasures (such as large-scale camouflage efforts) in order to offset the sudden impact on their general public and armed forces personnel in particular.

So far, Soviet camouflage and concealment activities have appeared to be largely experimental in nature and generally ineffective. If the Soviets were to become aware of the quality of our high resolution optical systems, it is nearly certain that they would immediately perfect their deception techniques and apply them in earnest. Better concealment could be very damaging to our ability to collect detailed information.

Any Soviet reaction, regardless of form, would be designed to counter both international and domestic impressions that the U.S. had significantly penetrated the protective layers of Soviet military security. It seems unlikely that the Soviets would feign ignorance, as such an attitude would suggest an unprotected vulnerability. Similarly, the Soviets would be hard-pressed to defend against an accusation (by the East Germans or Chinese, for example) of shared guilt with the U.S. in violating the national sovereignty of many nations.

Another point to be considered is the possibility that we might provoke Soviet interference by our initiatives in the United Nations. Such initiatives might involve proposals for internationalization of satellite reconnaissance capabilities, under UN control, for monitoring specific trouble spots in the world such as Suez or the Korean DMZ. Another potentially hazardous area is US discussions about multi-lateral participation in earth resources satellite surveys. This is not to say that the Soviets would not participate in UN consideration of such proposals. The point is they they would expect us to protect the principle of tacit acceptance by avoiding areas and suggestions which could lead to undesirable exposure. Once again, such application of satellite capabilities, possessed only by the two super-powers,

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page 7 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12857-70



~~TOP SECRET~~ BYEMAN/TALENT-KEYHOLE/COMINT

could imply US/Soviet duplicity against other countries and lead to an awkward confrontation.

The fact that the Soviets are particularly sensitive on this point is clearly apparent in a recent incident at the UN. In December 1969, our delegation informally circulated among members of the UN Outer Space Committee a draft resolution on earth resources satellite surveys. The resolution referred to President Nixon's address to the UN General Assembly in September 1969 in which he announced that we would propose before the UN the dedication of an earth resources satellite program, as it develops, to produce information for the world community as well as for the US.

The Soviets reacted with quiet determination. The Soviet Ambassador privately told the US Ambassador that the Soviets would neither cosponsor nor support the proposal. The Soviets urged that we not present the resolution. The Soviet Ambassador argued that it was premature not only in view of the wide review needed within governments, but also because it formally raised the fact that at least one superpower is photographing "secrets" of other states. He remarked that it was well known that both the U.S. and the Soviet Union have been photographing each other and other parts of the globe; but at least for its part the Soviet Union would not acknowledge this fact publicly. He thought it would be an error for us to formally acknowledge this fact in the UN and urged that we desist from presenting a resolution on the subject. Later, the Soviet Ambassador said that the Soviet Union would vote against our proposed resolution because it had not been studied sufficiently in the Space Committee and it "touched on sensitive aspects such as security and sovereignty."

In January, 1970 the resolution was adopted by the UN General Assembly. It seems clear from this incident that the Soviets have well defined limits in regard to the sharing of space technology and that they expect us to have similar feelings. Although they apparently have remained silent since the resolution was adopted against their dissenting vote, it is uncertain that they would tolerate further initiatives on our part without a more overt protest.

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page 8 of 15 Pages

Copy 2 of 3 Copies

Control No. DYE-12957-70

~~TOP SECRET~~ BYEMAN/TALENT-KEYHOLE/COMINT

In the tensions of a crisis situation involving a US/Soviet confrontation in a world trouble spot, the stakes might be of an order to warrant US disclosure of satellite reconnaissance, possibly leading to revelation of Soviet duplicity. It might become necessary to prove the US case, as in the Cuban situation, by producing satellite photography for world view and by indicating what it reveals of Soviet military actions and possible intent. A more timely example is the current Middle East crisis. We could be in serious trouble if we gave satellite photography of Arab military installations and preparations to Israel and the Arabs subsequently found out about it. The Arabs would object and embarrass the Soviets, who then would be obligated to object.

We can easily draw similar scenarios in other world trouble spots where open disclosure of the "fact of" satellite reconnaissance would have immediate, adverse impact. India, and especially Pakistan, probably would be very suspicious of what information on its military activities we and the Soviets are obtaining by tacit agreement.

In summary, disclosure policies--both what is said and what is withheld--about space programs and activities contain certain pitfalls for the unwary. The Soviets seem to have the advantage in this regard, since they are not as dependent on satellite reconnaissance and stand to lose less by disclosure. A final, but most important consideration, is the fact that any act of disclosure--in calm or crisis--is irreversible.

#### C. Definition of "Means" in SALT

Both our existing and programmed satellite reconnaissance capabilities will be a critical element in the monitoring and verification of a SALT agreement. Our satellite capabilities in fact constitute our "national means of verification." The US does not include "classical intelligence collection operations" in national means of verification, and we assume that the Soviets also do not. We are dependent on intelligence from

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page 9 of 15 Pages

Copy 2 of 3 Copies

GPO: 1970 O-32057-70

~~TOP SECRET~~ BYEMAN/TALENT-KEYHOLE/COMINT

our satellites during negotiations leading to an agreement. We may assume that during the negotiations the Soviets will be preparing for the SALT environment and presumably will be seeking to arrive at new levels of preparedness, force structure and arms dispersal before the agreement becomes operative. It is essential, of course, that we be aware of such Soviet preparations to the extent that we can.

Our previous statements about tacit acceptance and new satellite systems are equally pertinent here. Indeed, the panel which examined verification aspects of SALT placed great reliance in our new and planned systems. When viewed in a SALT context, those considerations take on added meaning. The question that now arises is, "When the phrase 'national means of verification' is used in the SALT talks, don't the Soviets interpret that to mean 'satellite reconnaissance in near-earth orbit'?" The strong Soviet play at Helsinki on exclusive reliance on "national means of verification" perhaps indicates that the Soviets believe that current "means" are adequate to verify certain quantitative restrictions on strategic arms in a rudimentary agreement.

Other questions which come to mind are: "When SALT negotiators speak of a clause about noninterference with national means, don't the Soviets also interpret that to mean 'at low altitude'?" "What, then, of our new and planned systems deployed at synchronous altitudes and in highly elliptical orbits?" "Aren't they vulnerable to interference if the Soviets should discover them and then decide that we may have 'tricked' them during negotiation of the agreement?" "When our negotiators at Helsinki expressed willingness to discuss qualitative restrictions on strategic arms, did they perhaps inadvertently suggest to the Soviets the sophistication of our technical intelligence collection, particularly SIGINT?"

With these questions in mind, it would be useful to cast some of the points they raise in a brief scenario. Assume that both sides agree on limiting the number of fixed, land-based ICBM launchers. This possibly is the easiest limitation to define and verify unilaterally. We have high confidence

Page 10 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

~~TOP SECRET~~

BYEMAN/TALENT-KEYHOLE/COMINT

that we can verify this restriction by "national means," essentially satellite photography. Assume the Soviets also plan to rely exclusively on satellite photography. We must also assume that the Soviets do not desire to license technical intelligence collection efforts beyond those required to ensure compliance. The Soviets probably will not accept laissez-faire satellite reconnaissance based on a limitation which can be readily verified by present satellite photography. There is no evidence to indicate that the Soviets have ceased to consider any intelligence collection operations as inimical to the preservation of their "closed" society.

Suppose the Soviets state that present "observation" satellites and modifications thereto are what they consider to be "national means of verification." Our options then are quite limited: we can agree, since photography is sufficient; or press for a more inclusive definition, although additional "means" are not absolutely necessary. The latter option obviously is a dangerous strategy to follow, for it places us on the defensive. In addition, we could easily be accused of duplicate negotiating under the guise of strategic arms limitations. The best situation we could hope for, based on this Soviet position, is an informal or formal acceptance of satellite photography with the status of other collectors remaining unchanged. Our advanced optical systems that are scheduled for deployment within the next year probably would be informally acceptable to the Soviets. However, the SIGINT sensors among our new systems would not be assured of acceptance. The status of the most advanced of our planned systems still under development would be indeterminate.

A variation on the scenario presents other problems. Suppose, for example, that the tentative agreement includes limits, bans and restrictions which would require a relatively high SIGINT collection effort on our part but not necessarily an equivalent Soviet effort. There are many cases in this category, e.g., SAM upgrading, MIRV testing. In this situation, our purposes would not be well served by delineating even a generic list of collection systems included under our

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page // of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12057-70

~~TOP SECRET~~

BYEMAN/TALENT-KEYHOLE/COMINT

"national means." Given this disparity in US/Soviet efforts required to monitor very complex limitations, there is cause for concern about Soviet interference in this scenario.

In summary, these scenarios illustrate the problem of interference that is implicit in differing US/Soviet interpretations of "national means." It is clear that the situation is not helped by attempts to spell out the content or substance of "national means." Nor is comfort to be found in attempting to get more specific with the Soviets about "active" or "passive" interference. The Soviets probably would balk at any explicit treatment of a mutually agreed principle of noninterference. They would likely state that given the broad definition of "national means," both sides understand what generally is considered interference; therefore, a specific agreement is not necessary. They might further suggest that individual cases which appear to be interference with verification capabilities can best be handled by a joint commission that would address suspect violations. The hazards of interference in a SALT environment would remain very real and possible.

#### D. Inadvertent Interference With Soviet Satellites

Another area of concern is the possibility that the Soviets might incorrectly blame us for interference with their satellites and thus retaliate against ours. One way this might occur is by inadvertent laser illumination of Soviet space traffic.

Several Department of Defense agencies are conducting research in laser technology. In addition, other government agencies plus industry and universities are engaged in research and development of laser devices. Progress in this field has been rapid. Laser tests and operations are becoming more extensive.

The possibility of incapacitating crew personnel or damaging sensor subsystems has now arisen. Optical devices are particularly vulnerable. Damage produced by lasers is

Page 12 of 15 Pages

Copy 2 of 3 Copies

Control No. BYE-12957-70

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

thermal. The extremely narrow beams achieved by lasers produce very high energy densities on the surface of an optical sensor. Power densities achieved in focusing certain laser beams are so high that damage from shock waves and electrical fields also can occur.

The implications for Soviet interference are serious. In one instance, a research experiment actually was leading toward deliberate laser illumination of a Soviet satellite. Fortunately, the intentions of the researcher were discovered in time to preclude any confrontation. A forthcoming memorandum calls for tighter controls of laser testing within activities under jurisdiction of the Department of Defense. A problem remains, however, in how to extend similar controls to other areas.

Soviet interference also could be triggered by attempts to "spoof" or deceive their satellites with overriding signals. An example of this would be efforts to pre-empt the command and control circuitry of a Soviet satellite, thus bringing it under countermanding direction from the ground. A recent government research project was committed to developing such a capability--with Soviet satellites as potential test targets. The project was cancelled for obvious reasons.

## II. POSSIBLE FORMS OF INTERFERENCE

Whatever its nature or form, any effective countermeasure constitutes interference. There is no doubt that the Soviets are capable of a wide variety of countermeasures, both active and passive. Typical active countermeasures that the Soviets could take would be clouding of photographic film by laser beams; interception or sabotage of satellites; and interference with satellite command and control systems. These measures would of course be considered a direct attack upon our satellites. Since the Soviets appreciate the risks that would accompany such countermeasures, it is unlikely that they would resort to them.

Our immediate concern is the possibility that the Soviets would not hesitate to use less provocative counter-measures. These could degrade technical collection systems and would be difficult to control, if not detect. This type of interference could take several forms. For example, collection of telemetry could be prevented by overt or covert jamming. [REDACTED]

As previously indicated, Soviet camouflage practices have been minimal and ineffective. The scope and type of Soviet activity that we have observed suggest possible experimentation or training in deception. But the Soviets could perfect their techniques quickly and inexpensively. They could introduce concealment and deception measures which would substantially alter weapons development, procurement and deployment. [REDACTED]

In the test and development stage, any step that broke the high dependence on radio communications and telemetry could degrade the possibility of detection. For example, selective telemetry suppression and--in aircraft--secure pilot-to-ground communications would be a case in point. In the case of missile development, the Soviets have sufficient launch areas to forego construction of the several new launchers and unique support areas that usually indicate that a new system is under way.

Finally, the Soviets may exert interference across a wide spectrum of political and diplomatic pressures. As

~~TOP SECRET~~

BYEMAN/TALENT-KEYHOLE/COMINT

one expert recently observed. [REDACTED]

[REDACTED] We may extend that line of reasoning to satellite collection, where ground support facilities in third countries are vulnerable to similar political interference.

BYEMAN/TALENT-KEYHOLE/COMINT

~~TOP SECRET~~

Page 15 of 15 Pages

Copy 4 of 3 Copies

Control No. BYE-12957-70