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FOREWORD

This report represents a response to the 6 November 1986 request by DCI Casey to the Director of the Intelligence Community Staff to look at and "come up with some guidelines on commercial imagery issues." Terms of reference for an examination of such issues by an ad hoc interagency group were approved by the Director of the Intelligence Community Staff and forwarded for information to Acting DCI Gates on 18 December 1986. The latter endorsed these activities as a "Good plan" on 22 December 1986.

The ad hoc interagency group met for the first time on 9 January 1987. The initial group included representatives from national security, foreign affairs, and intelligence organizations. To help ensure both a maximum of pertinent information exchange and a national outlook, participation from the key federal departments with civil remote sensing interests and concerns was subsequently invited.

The chairman of the group also interacted with the DoD National Operations Security Advisory Committee's Working Group on Security Implications of Civil Satellite Remote Sensing Programs, and with the project leaders of the Congressional Office of Technology Assessment Project Staff on Commercial Newsgathering From Space.

The results of the group's analyses, deliberations, and findings have been summarized in the form of the 8 recommendations that follow on pages xx. These recommendations are supported by the succeeding text. (Except where specifically noted) The views, assessments, and recommendations developed in the report represent a consensus of the group as a whole, and not necessarily the views of individual organizations.

The issuance of the report at this time should make it a useful contribution to the Administration's ongoing reassessment of national space policy.

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Attachment D

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INTRODUCTION

Civil remote sensing programs from space satellites are entering an especially dynamic period. During the past decade many such programs have transitioned from the planning to the implementation phase. Technology, previously available to only the US and the USSR for their classified satellite reconnaissance imagery programs, is now being used by other countries to produce imagery products which have information and intelligence collection capabilities that are greatly increased over past civil photographic products. And further increases in capabilities are to be expected.

These developments are generating high levels of visibility and attention worldwide. Domestically, they are raising questions among US senior officials relative to national security, legal, and intelligence issues, foreign affairs, and international obligations. The following report, prepared under the aegis of the Director of the Intelligence Community Staff by an interagency group of individuals who monitor civil satellite remote sensing activities, is a systematic attempt to identify the implications of these developments on relevant aspects of US national space policy. Where feasible, options for policy changes have been identified, and where appropriate, recommendations have been developed to facilitate policymaker focus, discussion, and decisionmaking.

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RECOMMENDATIONS

The interagency group has analyzed the defense, intelligence, and foreign policy issues arising from recent civil satellite remote sensing developments, including possible development and operation of a "MEDIASAT," and has developed the following recommendations.

RECOMMENDATION 1:

Within the bounds of prudence and common sense, the US should continue the long term support of ever more sophisticated programs of civil earth remote sensing from space, and continue to promote vigorously our traditional policies and practices of open, equal, and non-discriminatory data dissemination from all civil earth remote-sensing systems, foreign and domestic.

RECOMMENDATION 2:

The nominal 10-meter constraint on the resolution of private sector satellite remote sensing systems should be relaxed or removed. The existing authorization in the National Security Decision Directive 42 on National Space Policy should be applied to effect this relaxation or removal.

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RECOMMENDATION 3:

Of the three policy options available for implementing Recommendation 2, the interagency group recommends the complete elimination of any spatial resolution limit. This recommendation was made after considering two other options of dropping the resolution limit to a specific level such as 5 meters, or adopting an ad hoc approach of dropping the limit to the extent necessary to permit US operated systems to be competitive with foreign civil satellite imaging

RECOMMENDATION 4:

If some fixed resolution limit should be imposed for panchromatic imagery, then the same limit should be applied to other types of imaging (multi-spectral, radar, or other non-conventional, non-literal imagery) capabilities. There should be no additional spectral resolution constraint.

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RECOMMENDATION 5:

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RECOMMENDATION 6: ([Redacted] DISCUSSION APPEARS TO REJECT THIS)

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If national policy continues the imposition of some restrictions on domestic operators of satellite imaging programs, efforts should be initiated by the State Department to achieve agreements with friendly nation operators of civil satellite remote sensing systems on parallel restrictions concerning the collection and/or dissemination of high quality imagery that would adversely affect the national security of any of the agreeing parties.

RECOMMENDATION 7:

[Redacted]

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RECOMMENDATION 8:

Until the civil imaging satellite situation stabilizes, the expertise of the interagency group should be preserved. The group should meet at monthly or bi-monthly intervals to continue to exchange information required by the federal organizations represented, and be on call for addressing new issues that require the expertise of the group's representatives.

The analyses of the arguments for and against these recommendations are indicated in the following text.

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OVERVIEW OF GROUP'S ACTIVITIES

The interagency group carried on its activities during an especially dynamic period of civil satellite remote sensing developments. The group began its work by systematically concentrating on several specific issues that were identified in the Terms of Reference (Attachment A). However, this systematic approach was barely gathering momentum when it was sidetracked by the pressure of ongoing events and the concomitant need to provide immediate support on specific issues. The Terms of Reference had foreseen the need for and provided flexibility for the preparation and issuance of quick-reaction studies on specific issues as required. This flexibility was exercised on several occasions.

One such occasion was in response to the proposal by the Director of the Defense Intelligence Agency to include LANDSAT and SPOT imagery in the 1987 edition of the widely disseminated DoD publication Soviet Military Power. The issue was important because inclusion of the LANDSAT imagery would represent a break with a historic national policy of keeping the US civil program free from any taint of intelligence collection. The pro and con arguments, considered in the context of the contemporary civil satellite situation, were forwarded to the DCI action officer, and subsequently transmitted for the consideration of the Acting DCI. His decision to permit the proposed inclusions provided the group with one benchmark for applications to other intelligence uses of civil satellite products.

The precarious situation relative to the continuity of the LANDSAT program also demanded the early attention of the interagency group. The group summarized the impact of a demise of the LANDSAT program, specifically on defense, intelligence, and foreign policy activities, and on the broader aspects of achieving broader aspects of existing national space policy. The group's findings on this issue was subsequently incorporated in a memorandum forwarded by the Acting DCI to the President's National Security Advisor. The findings were also disseminated informally to the representatives of the various departments who briefed two Congressional subcommittees on their interests in, and concerns about, LANDSAT program continuity on 31 March and 2 April, and who subsequently met with OMB on 29 April. The development of this national outlook apparently influenced OMB to reverse its previous position and authorize some funding to continue the LANDSAT program.

Throughout this dynamic period the interagency group facilitated and promoted the exchange of information among the various interested federal organizations so that the LANDSAT continuity issue was addressed as a national space policy issue rather than a narrow matter of interest to one or several departments, or an issue to be decided solely on budgetary grounds specifically restricted to those individual departments without consideration of broad national space policy objectives and concerns.

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LANDSAT CONTINUITY ISSUE

The terms of reference included the following provisions relative to the issue of maintaining the continuity of the LANDSAT program:

- o Is an operational civil earth remote sensing program from space sufficiently important to the national interest that we should maintain an internationally competitive technology or regain our international leadership?
- o Alternatively, what are the implications for the national interest of a demise of the LANDSAT program?
- o To what extent will the US Intelligence Community require use of LANDSAT data in future years? At what level of resolution and in how many spectral bands?
- o If LANDSAT operations should cease, what are the pros and cons of using imagery collected by foreign imaging systems?

As indicated in the Overview section, the interagency group addressed and developed findings on the various aspects of this issue. Mr. Gates, the Acting Director of Central Intelligence, incorporated these findings into his 16 March 1987 memorandum to Mr. Carlucci, Assistant to the President for National Security Affairs. A copy of this memorandum and the response memorandum that indicates that the decision depends on resolving budgetary considerations is provided in Attachment B. (ALTERNATIVE: INCORPORATE DIRECTLY INTO TEXT AS FOUR FOLLOWING PAGES)

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TEN-METER RESOLUTION ISSUE

The terms of reference included the following provisions relative to the 10-meter resolution issue:

- o What are the pros and cons for relaxing the 10-meter criterion for the LANDSAT program? Is there likely to be a commercial market need for such data at resolutions better than 10 meters? What other policy constraints on imaging system technical parameters (e.g., timeliness, substantive content) need to be defined?

In view of the emergence of the MEDIASAT concept, the interagency group generalied the phrasing of this issue in the following manner:

- o Should the 10-meter resolution constraint be relaxed for private sector applicants for a license to operate remote-sensing space systems?

The interagency group concluded that in the past decade since the imposition of the 10-meter resolution constraint the worldwide scene relative to civil remote sensing from space had changed so drastically that the constraint is no longer valid. Therefore the 10-meter constraint should be relaxed or removed. The existing authorization in the National Security Decision Directive 42 on National Space Policy should be applied to effect this relaxation or removal.

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BACKGROUND

On 17 July 1984 Congress enacted the Land Remote-Sensing Commercialization Act of 1984* to provide a framework for a phased, orderly commercialization of land remote-sensing technologies using satellites in space. Title IV of the Act authorizes the Secretary of Commerce, in consultation with other appropriate Federal agencies, to license private-sector parties to operate private remote-sensing systems in space. As a condition for granting the license, Section 402.(b)(1) requires the licensee to "operate the system in such manner as to preserve and promote the national security of the United States and to observe and implement the international obligations of the

*Originally designated as Public Law 98-365, now integrated into United States Code as #4201-4292 (1982 & Supp. 1986)

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United States in accordance with Section 607." The latter Section makes the Secretary of Defense responsible for determining those conditions necessary to meet national security concerns of the United States and the Secretary of State responsible for determining the conditions necessary to meet international obligations and policies of the United States. The provisions of existing national space policy would of course be key factors in making these determinations. One such provision establishes a nominal 10-meter limit on the resolution of civil satellite imaging systems.

Rigid adherence to this 10-meter rule, which was originally established in a completely different stage of imaging satellite capabilities, would have considerable adverse impacts under current technological conditions. Therefore, the validity of the 10-meter rule under present day conditions is examined in considerable detail.

DISCUSSION:

Current national space policy includes a 10-meter resolution limit as a baseline for commercial imaging satellites. National Security Decision Directive 42 on National Space Policy, which was approved by President Reagan on 4 July, 1982, spells out this constraint in the following words:

Civil Earth-imaging from space, at resolutions at or better than ten meters, will be permitted under controls and when such needs are justified and assessed in relation to civil benefits, national security, and foreign policy." [redacted]

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In actuality, this 10-meter limit as national space policy has a longer history since it dates back to May 11, 1978, when Presidential Directive/NSC-42 was issued. This Directive stated:

"Federal civil earth imaging from space, at resolutions at or better than ten meters, will be permitted under controls and when such needs are justified and assessed in relation to civil benefits, national security, and foreign policy."

The text of the two versions is virtually the same. The only difference is that the 1978 version is directed to federally operated systems, whereas the 1982 version was broadened to include commercially operated systems.

This 10-meter limit was established after considering various contemporary foreign relations, technological, and other national security concerns and factors, which are briefly summarized in the following paragraphs.

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Foreign Relations Considerations

A major consideration was to allay the concerns of foreign countries about the unrestricted dissemination of high resolution US LANDSAT satellite imagery that would reveal details of their territory that they considered important to their economy or national security. In international forums these concerns were resulting in efforts to impose restrictions on the LANDSAT program.

Among the less developed countries economic concerns were the dominant factors. It was feared that the US LANDSAT system would permit the United States and other major developed countries to unilaterally collect information -- without their knowledge -- about their minerals and other resources that would be exploited to their disadvantage.

The Soviet Union and the Warsaw Pact countries were concerned about the threat that unrestricted dissemination of high resolution satellite imagery would pose to the secrecy surrounding their military forces. They reluctantly accepted the capabilities of the US classified reconnaissance satellite program as long as its products were not declassified and openly distributed; however, they were concerned about other countries getting similar information from unclassified satellites. Thus, in 1977 the Soviet Union proposed limiting worldwide dissemination of civil satellite imaging systems to sensing data coarser than 50 meters of ground resolution. For better resolution imagery, they favored a regime that would require the consent of the imaged country before being released to any other country.

For a more detailed discussion of foreign reactions in the late 1970's see:

- the section on Foreign Reactions, pages 19-23, in the Options Paper on the Declassification of Photoreconnaissance Imagery, prepared in March 1979 by the DCI Task Force on the Declassification of Photoreconnaissance Imagery, [redacted]

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Technological Considerations

The 10-meter limit also provided considerable latitude for improving the resolution of the US unclassified civil satellite program. At that time the US LANDSAT program, with its 80-meter MSS sensor, had a monopoly in providing the world with unclassified satellite imagery. However, some foreign countries, notably France and Japan, were initiating plans to develop their own satellite imaging systems. To maintain the undisputed US technological lead in civil imaging systems from space, national space policy provided room for increasing the resolution. A 10-meter resolution was estimated to be around the level where significant intelligence about military installations and deployments would begin to surface. The objective of having an improved LANDSAT resolution system was subsequently achieved by the 1984 launch and operation of the 30-meter Thematic Mapper sensor.

National Security Considerations

Another consideration in imposing the 10-meter limit was to provide a sizeable buffer between the resolutions of the classified and unclassified satellites so that individuals using the latter imagery would find it difficult to accurately estimate the actual resolution of the classified imagery. (The specific scenario of using the commercial system imagery as a cover for releasing information from the classified system was not a factor, since one objective was to keep the unclassified system free from intelligence implications.)

However, the following extract from a 1984 COMIREX study emphasizes the point that from an intelligence viewpoint the 10-meter limit is not a hard and fast dividing line. (LOCATE HERE ? OR ELSEWHERE?)

"There is no magic boundary line between imagery which is useful and that which is not useful for intelligence purposes. Virtually any imagery, no matter how old it is or how poor the resolution, has some intelligence value. The construction of large missile test ranges, to use an extreme example, can be detected on even poor quality civil satellite imagery, and since the construction cycle of such a facility is measured in terms of years, even old imagery would be useful if nothing newer was available.

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"As perhaps a more relevant example, the position of an aircraft carrier underway could be detected (at least by its wake, if not by the ship itself) by a medium quality civil satellite system. And some of the better quality planned civil systems will probably have the capability to detect the presence/absence of large aircraft on runways or large ships in known docking areas.

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The judgments in the last paragraph have been subsequently validated by the 10-meter quality SPOT imagery.

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To summarize, the 10-meter limit has never been a hard and fast barrier. It was a limit judged to be reasonable at a particular point in time. In formulating NSDD-42, it was specifically recognized that changing circumstances could make it necessary to revise this 10-meter criterion, as the following text indicates:

"Civil remote sensing system constraints on spatial resolution, timeliness, spectral resolution, substantive content, or other appropriate parameters will be periodically reviewed to determine when policy constraints should be revised or imposed."

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Current Situation

The national space policy considerations, objectives, and concerns relevant to civil satellite imaging outlined in the preceding paragraphs have to a major degree been overtaken by events. The following update of these considerations indicates that circumstances have changed to such an extensive degree that the 10-meter constraint is no longer valid.

- o Foreign reactions to satellite imaging at higher resolutions have been tested by both the 30-meter LANDSAT Thematic Mapper resolution since 1984 and the 10- and 20-meter resolutions of the French SPOT system since 1986. Despite the high visibility that the imagery from these systems have achieved, which included major Soviet installations that have never been seen in unclassified media, no significant negative reactions have surfaced. Therefore the fact of higher-resolution imaging from space now appears to be accepted worldwide.
- o The ability to build and launch satellite systems that image the earth from space is no longer the exclusive domain of the United States and the Soviet Union. Additional space imaging programs are being planned by Canada, Japan, the European Space Agency, the PRC, India, and Brazil (?).
- o Both the existing LANDSAT and SPOT capabilities are based upon older technology.
- o Technology available to all interested foreign countries permits development of imaging systems from space with resolutions considerably better than 10 meters. Further improvements in imaging capabilities by French, Japanese, Canadian, and European Space Agency systems are planned for the near future. These improvements will include better spatial resolution for photo systems and lower resolution day-night all-weather radar capabilities.

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o The USSR, which in the past has been a strong opponent of unrestricted dissemination of higher resolution satellite imagery--without the approval of the imaged country, has just announced its own program to sell 6-meter resolution satellite photographs of individual countries. Considering the momentum achieved by the rapid evolving civil satellite imaging capabilities in recent years, this Soviet move should be viewed as a realistic and pragmatic approach to become a major competitor on a worldwide basis. The Soviet program tie-in with their well-developed technical mapping capabilities would facilitate making satellite products in photomap formats that would be easy to read and use, and thus be of maximum value to both technical and non-technical customers. Thus, the Soviet program may become a primary source for worldwide sales of good quality satellite photographic coverage. This program could earn them foreign currency, prestige, and additional influence in many countries. In addition, the bilateral relationships that such a program will develop could facilitate Soviet collection of basic intelligence data on each country that it maps. []

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o As satellite imaging systems become more sophisticated, the ability of nations to protect important military and economic security information will inevitably decline, and traditional aspects of national security will be increasingly compromised. This trend is less disadvantageous to open societies such as the US where national security thresholds are inevitably low, while working to the detriment of closed societies, such as the USSR, where national security thresholds are high.

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o Applying the 10-meter constraint to any US licensee of a private sector satellite imaging system would make the US system unable to compete effectively against the aggressive foreign competition. Thus this constraint would be counter-productive to the US national space policy objective of maintaining (or more accurately, attempting to regain some) technological leadership in space remote sensing matters.

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POLICY OPTIONS FOR CHANGING THE 10-METER CONSTRAINT:

The preceding overview of the current situation relative to the civil satellite remote sensing developments summarizes why the 10-meter constraint is no longer valid. Therefore it is recommended that the constraint be relaxed or eliminated. Acceptance of this judgment leads to the question of exactly how should the constraint be changed. Should it be relaxed somewhat or completely removed? There are three principal policy options to implement this recommendation, namely:

- Option A. Dropping the 10-meter spatial limit to a specific lower figure such as 5 or 3 meters.
- Option B. Adopting a "sliding rule" approach whereby the permitted resolution would be relaxed to a level competitive with foreign civil satellite imaging systems.
- Option C. Complete elimination of any spatial resolution limit

The arguments for and against each of these options are outlined below (in the following text):

Option A: Dropping the 10-meter spatial limit to a specific lower figure such as 5 or 3 meters.

PRO:

- o Promotes national security. Moderate resolution levels help keep most detailed imagery information from terrorists and other elements capable of taking hostile actions against US and Allied installations and facilities.
- o Provides a specific figure that facilitates the approval or rejection of licenses.
- o National policymakers maintain maximum control. Decision-making on potential exceptions remains at the National Security Council level.

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CON:

- o Technology is changing so rapidly that any figure is arbitrary, difficult to obtain consensus on, and will probably become obsolete quickly.
- o A resolution limit that is fixed at too poor a resolution level would tend to hinder potential US operators from being competitive with foreign systems.
- o A resolution limit that is fixed as national policy does not facilitate making the rapid changes required to respond to changing circumstances and technological developments in a field that is especially dynamic. (Changes would require obtaining interagency consensus -- a usually cumbersome procedure.)
- o A fixed resolution limit will generate media opposition because of the potential adverse impact on future media uses of satellite imagery. The fact of media opposition is not a CON argument, but the ensuing litigation, which can be expected, over a limit that would be difficult to justify from a technical viewpoint is a negative factor .
- o Strength of national security pro argument cited above is undercut by the fact that imagery from foreign satellite systems and high quality imagery collected by domestic aircraft is readily available.

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OPTION B: Adopting a "sliding rule" approach whereby the permitted resolution would be relaxed to a level competitive with foreign civil satellite imaging systems.

PROS:

- o Permits US operators to be competitive with foreign operators because adjustments on the resolution figure will invariably be in direction of better resolution.
- o More flexible than Option A in that it would not require continuing evaluation at the National Security Council level.
- o Would probably be practical and reasonable for several years.

CONS:

- o Would require additional effort on part of licensing authority to monitor and assess the details of evolving technology, most of which are not significant from an overall national and international perspective.

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OPTION C: Complete elimination of any spatial resolution.PRO:

- o Maximizes potential for achieving national space policy objective of demonstrating US technological excellence. The context of an unclassified civil satellite remote sensing program is especially desirable for maximum impact on world opinion.
- o Provides maximum flexibility and opportunity for US potential operators to compete with foreign operated systems. Superior US systems will probably result in US retaining greater share of value-added activities, to the benefit of US economy.
- o Completely eliminates any need for establishing administrative/bureaucratic mechanism to evaluate evolving technology.
- o Resolution will be determined by market mechanism. Cost-benefit ratio considerations will tend to limit actual resolution -- probably to the 3 to 5 meter range.
- o From a national security viewpoint the 10 meter level represents a particularly pertinent threshold for beginning to detect deployments of major military combat forces. Whether that level is further breached at 8, 6, or 4 meters is not as significant except for being able to differentiate specific categories of military equipment, e.g., one type of tank, artillery piece, or aircraft from another.
- o Given the ongoing increasingly extensive operations of foreign unclassified systems such as SPOT and classified systems such as the Soviet satellites, national security concerns about US and Allied military forces and installations will need to be protected by concealment measures rather than by unilateral constraints on only US operated systems
- o Ad hoc restraints/constraints on timeliness of imagery collection and timeliness of disseminating data are more critical than constraints on resolution.

CONS

- o Surrenders all control with reference to resolution limits.

RECOMMENDATION:

In view of the existing and planned foreign-controlled civil satellite imaging systems the interagency group believes that the arguments for Option C carry the most weight and therefore recommend this Option.

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In other words, the conclusion is that if policymakers were to establish a 5-meter criterion, it would be reasonable to apply it across the board to all portions of the electromagnetic spectrum. Such an approach is given additional validity by the estimate that economic viability may be more useful determinant and would tend to naturally limit the practical resolutions of sensors using different parts of the spectrum to approximately the following levels:

- | | | | |
|---|-------------------|----|---|
| - | Thermal infrared | -- | technical feasibility and economic viability (50-100 meters) |
| - | Passive microwave | -- | same as above, but even coarser resolution |
| - | Multispectral | -- | Economic viability (many channels with sharpening band; 3-5 meters in next ten years) |
| - | Panchromatic | -- | Same as above -- used as sharpening band |

(OTHER POLICY CONSTRAINTS?)

Although the 10-meter is no longer a realistic mechanism for protecting US national security interests, there appear to be two principal methods for imposing ad hoc limitations on privately-operated satellite imaging to provide some measure of protection to these national security concerns:

- o Imposing constraints on the timeliness of data dissemination in specific situations or specific geographic areas where personally directed for national security or international relations/foreign affairs reasons by the Secretary of Defense or the Secretary of State, or their respective Undersecretaries. In peacetime such constraints should be in writing and limited to specific periods of time.
- o Imposing constraints on the collection of imagery in such specific situations or specific geographic areas.

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