

~~TOP SECRET~~



Declassified and Released by the N R C

In Accordance with E. O. 12958

Copy [REDACTED]
28 July 1969

on NOV 26 1997

MEMORANDUM FOR: [REDACTED], NPIC

THROUGH : Director of Special Projects

SUBJECT : Prognostications on Color in the NRP

Per your request, I have attempted to forecast the potential use of color in the NRP. My thoughts are as follows.

1.0 DIFFICULTIES IN FORECASTING

The difficulties associated in making a forecast such as this are numerous. This is particularly true since the significant opposition to color that existed 12-18 months ago has been continually disappearing. What makes the problem difficult is that while the opposition is eroding, the requirements have not been worked in any systematic way. This means, I suspect, that near term uses of color (12-18 months) will most certainly continue to be for very specific and justified purposes. The difficulty in forecasting is further compounded by the ever changing status of the film products. As higher and higher resolution color films are available, the use of color is bound to increase markedly.

2.0 SYSTEM CONSIDERATIONS

In attempting to forecast color film usage, consideration must be given to system capabilities and the film products themselves.

2.1 CORONA

The CORONA system has the greatest engineering flexibility for handling color films because of its changeable filter/slit assembly. On the other hand, the CORONA system is really not well suited for color usage. The scale is such that color is probably of limited value except in very specific cases, such as

GROUP 1
Excluded from automatic
downgrading and
declassification

CORONA [REDACTED]

~~TOP SECRET~~

HANDLE VIA [REDACTED]
CONTROL SYSTEM ONLY

SUBJECT: Prognostications on Color in the NRP

that on 1106 and the economic intelligence field. Even with significant improvements in color film resolution, the resolution of the final product will never be better than about 10 feet due to the poor color correction of the Petzval lenses (particularly in the blue). This problem is going to become even worse with CR-13 where we switch to third generation lenses on both the FWD and AFT cameras. What this means is that while the quality of the color films will continue to improve (and probably significantly so), the color correction of the lenses will get worse.* This problem is most significant, of course, with SO-121 type of natural color films. With the IR type (SO-180) of color films, significant improvements in the product could be expected to produce an improved final result. The shift toward the red of the spectrum with the third generation lens tends to improve performance with this type of film. Even with an improved IR color film, however, I do not anticipate that the resolution of CORONA could be much better than 15 feet.**

2.2 [REDACTED]

[REDACTED]

* You will remember that the third generation lenses were corrected for the red region to optimize resolution for use with a w/25 filter. While this significantly helps B&W performance, it hurts color performance.

**Really, this is driven by what film improvements one could expect before CORONA phases out.

[REDACTED]
Page Two

CORONA [REDACTED] [REDACTED]

HANDLE VIA [REDACTED]
CONTROL SYSTEM ONLY

~~TOP SECRET~~

SUBJECT: Prognostications on Color in the NRP

2.3 [REDACTED]

[REDACTED]

2.4 Films

I am sure that [REDACTED] has given you a good summary of his feelings about new films. However, from my vantage point on the CCB, I offer the following thoughts.

I believe that in the next five years we are going to see significant changes and improvements in color films for satellite use. I believe that we might see films of the characteristics shown in Table 1. I feel reasonably safe in my predictions down to improved 121 and 180. One prediction not included is the potential of obtaining (say, in 1973-74) a two layer very high (400-500c/mm) resolution natural color film.

3.0 PREDICTIONS

My predictions are shown in Table 2. The assumptions that these predictions are based on are elucidated below.

3.1 CORONA

The resolution and scale associated with color in the CORONA system make its further use questionable. I believe that this is particularly true considering the phase out of CORONA and the impending reduction of yearly flights from six to five. However, to cover all one's

CORONA [REDACTED]

~~TOP SECRET~~

[REDACTED]
Page Three

HANDLE VIA [REDACTED]
CONTROL SYSTEM ONLY

SUBJECT: Prognostications on Color in the NRP

bets, you cannot rule out a requirement such as occurred on 1106, hence the estimate of 2,000 feet of SO-121 during 1970.

3.2 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
Page Four

CORONA [REDACTED]

HANDLE VIA [REDACTED]
CONTROL SYSTEM ONLY

~~TOP SECRET~~

SUBJECT: Prognostications on Color in the NRP

3.3 [REDACTED]

[REDACTED]

I hope that this is beneficial to your planning exercise.
If I can be of further assistance, please call.

[REDACTED]

Staff Scientist
H/OSP

Distribution:

[REDACTED]

H/OSP/ [REDACTED]

[REDACTED]

Page Five

CORONA [REDACTED] [REDACTED]

~~TOP SECRET~~

HANDLE VIA [REDACTED]
CONTROL SYSTEM ONLY

CORONA

~~TOP SECRET~~

TABLE 1

PROGNOSTICATION ON CHARACTERISTICS OF ANTICIPATED COLOR FILMS

Film	When Available	Spectral Sensitivity	Speed (AEI)	Resolution (High Contrast)	Other Characteristics
S0-121	Now	R, G, B	16	170 c/mm	On STB.
S0-180	Now	G, R, Near IR	40	60 c/mm	On STB.
New Duping Film	1969	R, G, B	NA	~200 c/mm	Marked improvement over current duping films.
Improved 121	Early 1970	R, G, B	2-3	~250 c/mm	On STB.
Improved 180	Middle 1970	R, G, Near IR	10-15	~150 c/mm	On STB.
New IR Color Film	1971	R, G, Near IR	~5	~200 c/mm	On UTB with proper filter coated as part of emulsion.
New High Resolution Color Film	1972	B, G, R	2-3	~300 c/mm	On UTB.

CORONA

~~TOP SECRET~~

CORONA

~~TOP SECRET~~

TABLE 2

PREDICTIONS OF COLOR FILM USE IN THE NRP

(Based on assumptions in memo)

CORONA

Calendar Year	121 Type	180 Type	121 Type	180 Type	121 Type	180 Type
1969	0	0	[REDACTED]	0	-	-
1970	2,000 ft.	0	[REDACTED]	[REDACTED]	0	0
1971	0	0	[REDACTED]	[REDACTED]	0	0
1972	-	-	[REDACTED]	[REDACTED]	0	0
1973	-	-	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

CORONA

~~TOP SECRET~~

HANDLE VIA
CONTROL SYSTEM ONLY