DECLASSIFIED
Authority:
NND 67905

~~CONFIDENTIAL~~

BUAER ROUTE SHEET NAVAER-141A (REV. 5-52)

DIVISION	RTG. & ACT.	DATE RECD.	DATE RELD.	INIT.
CHIEF OF BUAER (AER)				
AIDE (A)				
GENERAL INSP. (GI)				
ASST. RES. TRA. (SR)				
SMALL BUS. SP (SB)				
DEPUTY & ASS'T CHIEF OF BUREAU (1)				
EXECUTIVE OFFICE (12)				
ADM. SERVICES (AS)				
AIRCRAFT LOG (AL)				
COUNSEL (CO)				
FISCAL (FI) FI-1				
MIL. REQUIREM. (MR)				
PERSONNEL (PE)				
PLANS COORD. (PC)				
ASS'T CHIEF FOR RES. & DEVEL. (2)				
DEP. ASST. CHIEF				
EXECUTIVE ASST.				
ASW COORD. ASST.				
RDB-SPEC. ASST.				
ADMINISTRATIVE ASST.				

DIVISION	RTG. & ACT.	DATE RECD.	DATE RELD.	INIT.
AERO. STDS. GP. (AG)				
AIRBORNE EQUIP. (AE)				
ARMAMENT (AR)				
DESIGN ELEMENTS (DE)				
ELECTRONICS (EL)				
EVALUATION (EV)				
EXP. PROGRAM (EP)				
GUIDED MISSILES (GM)				
AIRCRAFT (AC)				
POWER PLANT (PP)				
RESEARCH (RS)				
SHIPS INSTALL. (SI)				
TECHNICAL DATA (TD)				

DIVISION	RTG. & ACT.	DATE RECD.	DATE RELD.	INIT.
ASS'T CHIEF FOR MTL. & SERVICES (4)			5/4	
DEP. ASST. CHIEF				
CONTRACTS (CT)				
INDUSTRIAL PL. (IP)				
INSPECTION (IN)				
MAINTENANCE (MA)				
PHOTOGRAPHIC (PH)	1	5/20		no
PH I	2	5/19		A.
PH II	3	6/4		a
PRODUCTION (PD)				
PUBLICATIONS (PB)				
SHORE ESTAB. (SE)				
SUPPLY (SU)				
PATENT COUNSEL (PL)				
USAF LIAISON				

REVIEWED BY NAVAIR DECLASS PROJECT
ON 10/4/09
DECLASS IN FULL
PER EO 12958
OTHER EQUITIES
YES
LAT

SPACE FOR ADDITIONAL ROUTINGS

PH 5	4 5/15	5/18	WBm
PH-431		6/2	RTV
PH-4		6/2	RMT

RTG.	ACTION DESIRED	INIT.
	Expedite	
	24 hour reply requested	
	Confer with	

RTG.	ACTION DESIRED	INIT.
	Information and return	
	Recommendation and return	
	Return with information req.	

RTG.	ACTION DESIRED	INIT.
	Prepare reply for signature of:	

NO FURTHER ACTION NECESSARY

(Signature)

FILE NUMBERS 12

Enclosure's Rec'd

1. Red routings shall be made and changed only by Comm. & Files Br. All other routings shall be made in black.
2. Indicate order of routing for both incoming and outgoing correspondence by consecutive numbers.
3. X - Indicates activity preparing reply. (Place in "RTG & ACT," column. To left of column if numeral already inserted.)
4. O - Indicates routing of pink copy after correspondence is mailed. (If numerical sequence desired indicate to left of column.)
5. All numerical routings must be initialled prior to mailing.
6. Indicate instructions by placing numerical routings in appropriate box in lower right hand corner.
7. This form is UNCLASSIFIED when blank and unattached.

~~CONFIDENTIAL~~ **SECURITY INFORMATION** ~~CONFIDENTIAL~~

COMMENTS

1. In order that persons making comments may be readily identified, comments shall be numbered, dated, legibly signed with the Last Name and Initials, Rank if any, Section, and telephone extension.
2. By order of the Chief of the Bureau, material attached to this route sheet shall not be removed. (See AD 3-1)
3. Extra copies may be removed, but the Record Copy (identified by the control number) must remain attached at all times.

1953 MAY 14 AM 8 15
RECEIVED

U. S. NAVAL PHOTOGRAPHIC INTERPRETATION CENTER
U. S. NAVAL RECEIVING STATION
Washington 25, D. C.

Code 01/HWW/lbh
J12

MAY 4 1953

99

Serial: 0105

~~CONFIDENTIAL~~
SECURITY INFORMATION

From: Officer in Charge
To: Director of Naval Intelligence (OP-322H4D)

Subj: Interpretation of Movies of Unidentified Objects; progress report on

Ref: (a) Conf ltr DNI OP322Y5/rtm, dtd 27 Oct 1952 with enclosures thereto
(b) Conf memo, Chief, Topical Division, USAF, AFOIN 2A2, dtd 24 Nov 1952 with enclosures thereto
(c) PIC Conf ltr 01/HWW/gcl, ser 0263 dtd 5 Dec 1952
(d) Rest memo, Chief, Topical Division, USAF, AFOIN 2A2, dtd 16 Feb 1953

Encl: (1) Charts 2-13

Enclosure's Rec'd

DECLASSIFIED
Authority NND 67905
By BKT NARA, Date 6/25/76

1. Reference (a) is a request from U. S. Air Force for the interpretation of movies of unidentified objects taken in Utah, 2 July 1952. Included among the enclosures are approximately 30 feet of processed, 16mm color motion picture film and a list of questions for guidance in determining the type of analysis desired. Reference (b) requested interpretation of additional movies taken in Montana, 1950. This report supercedes reference (c) and presents the test procedures and methods designed to answer the questions contained in enclosure 7 of reference (a). The results and analysis were performed by the Photogrammetry Division, Evaluation Department of this Center and do not necessarily represent the official attitude of the Department of the Navy or this Center.

2. Tests and Procedure.

a. Plots.

The film exposed in Utah is in very poor condition; dry, brittle, and with a tendency to break. After initial viewing, duplication of the film was performed in order to preserve the film. In the duplication process some color correction was made to permit better viewing of the objects. To prepare plots of the objects, a stop frame projector was rigidly mounted at a fixed distance from a finely-ground glass screen. The magnification was 22 times giving a format size of 14.2" wide. This proved very satisfactory and provided a shadow free image upon which overlay plots could be made.

~~CONFIDENTIAL~~
SECURITY INFORMATION

Code 01/HWW/lbh
J12

Serial: 0105 MAY 4 1953

~~CONFIDENTIAL~~
SECURITY INFORMATION

Subj: Interpretation of Movies of Unidentified Objects; progress report on

A preliminary detailed study of the Utah film was made and it was decided that:

a. Brightly colored spots of red and green lasting only one or two frames were not to be considered.

b. Water spots could be detected easily and eliminated from the study.

c. The color of the objects was fairly constant as blue-white.

d. Size and luminosity of an object varied through-out the film.

For convenience in interpretation, the film was divided into three parts, each part being considered an entity. Part I consisted of the footage taken at f8; Part II, the footage taken at f16 with a panning motion; and Part III, the footage taken at f16 during which the camera was held steady. Three definite groups of lights were observed throughout the film and plots were recorded as follows:

TABLE I

PLOTS OF POSITIONS

	Parts	Control	Chart
Utah			
	I II III	Holding to lower group	Not enclosed
	I II	Holding to one object and azimuth of another	2 and 3
	I	Arbitrary 1/2 inch correction per frame for panning	4
	III	Holding to frame outline	5a and 5b
	I	One image held to base line. Every tenth frame to show changes within apparent formations	6
Montana			
	All	Terrestial Objects	7a and 7b

~~CONFIDENTIAL~~
SECURITY INFORMATION

Code 01/HWW/lbh
J12

Serial: 0105

MAY 4 1953

~~CONFIDENTIAL~~
SECURITY INFORMATION

Subj: Interpretation of Movies of Unidentified Objects; progress report on

b. Densitometric tests:

Densitometric data were obtained with a Densichron, Model 2150 manufactured by the Welch Scientific Company. The Densichron has a scale range of 0-3. The procedure was to project each frame at approximately 22 times magnification onto a finely-grained-glass screen. The background (sky) was then measured at several places and the density set to 3.0 (variations in background densities were in the order of 0.02 and were regarded as uniform). A set of three readings were made of each of seven objects in Part I, and of the single object in Part III of the Utah Film. Readings were made of the entire Montana film.

Enclosure (8a and 8b) are graphs of the density readings obtained of the two lower groups of objects in frames 1-129 of the Utah film. Enclosure (9) is a density graph of the single object (94 frames) in Part III. Enclosure (10) is a graph where six successive Densichron readings were averaged and advanced one reading each determinant.

Of the Montana film, densities were plotted as above and are enclosures (11) and (12).

The results of the density readings may be questioned in that these objects varied in size so that at the minimum sizes the densichron probe was measuring the entire object, and at the maximum size the probe was measuring only a portion of the objects. Because of this situation only the largest readings obtained by scanning the objects were used. It is understood that normal procedure would be to read the entire object. This was impossible with the equipment on hand.

In addition the film, with which this investigation was conducted, is a duplicate of a copy. This raises the question as to whether the central portion of the objects were burnt out during the duplication processing. Density readings were made to compare the clear areas and the objects. It was found that the minimum difference is 0.4. This indicates that relative luminosity may still be obtained with the procedure used. Concurrent with the density readings, relative sizes of the objects were noted in order to correlate distance and luminosity. Enclosure (13) is a plot of the same object wherein the relationship of distance and luminosity can be detected in Utah film.

3. Answers to Questions.

Answers keyed to the questions contained in enclosure (7) of reference (a) are hereby presented. They supercede those contained in reference (c) and present the final analysis as requested.

~~CONFIDENTIAL~~
SECURITY INFORMATION

Code 01/HWW/lbh
J12

Serial: 0105 MAY 4 1953

~~CONFIDENTIAL~~
SECURITY INFORMATION

Subj: Interpretation of Movies of Unidentified Objects; progress report on

1. Analysis of the graph correlating luminosity and size indicate that as the luminosity of the objects increase, the size is larger also. This could be the effect of viewing directly, a reflecting surface. This is considered not probable because of the length of time they were viewed continuously on the film, approximately 90 seconds, and because of the angle through which they were photographed, approximately 60 degrees.

It is felt that if these images are reflective surfaces, blinking would occur during a period of 90 seconds while passing through an angle of 60 degrees when photographed at the rate of 16 frames per second. This premise would permit highly reflective balloons or spheroids to be a possibility. However, the velocity and acceleration computations (sub paragraph 8) rule this possibility out. It appears, therefore, that if these objects are a reflecting surface, they are of a design, speed, and power not commonly known. The velocity and acceleration attributed to the objects may be caused by light reflected off a highly reflective surface onto an atomospheric screen where a slight angular turn of the reflective surface would appear as high acceleration. This possibility is considered not probable because of the sun angle and atmospheric condition reported at the time of photography and because of the variations in luminosity which, under the above conditions would remain constant.

It is the majority opinion of the group conducting this analysis that these images are light sources. This will explain the non-blinking and variations in luminosity - but not the velocity or acceleration factors. In either case, light source or reflective surface, it appears as if the objects are of a nature which we are not able to identify in terms of natural phenomena or commonly known man-made objects.

2. There is no indication of what kind of objects could have caused the images except that they must be of a construction, design, and material not commonly known. This is indicated by the computed acceleration rate and elocity (answer 8). For the same reasons, birds, aircraft and balloons are ruled out.

3. An analysis of the charts relative to movement indicate that there were group and individual movement. Within a group it appears as if the individual objects were moving counter-clock-wise along an elliptical or similar track. Thus when two objects crossed the camera line of sight they will appear to fuse into one. As they continued along their paths it will appear as if one object became two. This occured at reglar intervals at approximately every 25th frame as plotted in charts 5a and 5b.

Code 01/HWW/lbh
J12

MAY 4 1953

Serial: 0105

~~CONFIDENTIAL~~
SECURITY INFORMATION

Subj: Interpretation of Movies of Unidentified Objects; progress report on

4. All objects appear to have the same characteristics in regards to shape, color, size and relative motion.

5. The shape of the objects appears to be oblate or disk shaped, color; blue-white, and maximum and minimum size; 98 and 16 feet. The size is based on the assumption that the objects are five miles from the observer.

6. Fade in and fade out of the objects were analyzed as in 3 above. In this case the group movement was such that the distance between the objects and camera was increased so that the objects could not be recorded on the film thereby causing the apparent fade-out. Fade-in as attributed to a shortening of the distance from the fade-out area to the camera station.

7. Plots of the groups indicate that the objects move counter-clock-wise relative to the axis of flight path. However, nothing has been detected which indicates motion of the individual objects about their own axis although this motion appears to be likely.

8. In determining the velocity of the objects three assumptions were made:

a. The camera was held steady during Part III of the film.

b. The objects were moving perpendicular to the optical axis, and

c. The objects were five miles from the camera.

It is obvious that (b) is a fallacy; however, this assumption will give the minimum velocity and the actual velocity is greater than computed. The assumption that the objects are five miles from the camera is an arbitrary one. However, based on the emulsion speed and focal length, an object 50 feet in diameter and five miles from the camera will be recorded on the film with sufficient resolution to identify major details of the object. It is felt that if these objects were closer than five miles at the time of recording, details would appear on the film.

Velocity is computed to be 3780 mph for a shift of 1 mm per frame if the object is five miles from the observer. From 55 measurements taken from Part III of the Utah film, the maximum and minimum velocities

~~CONFIDENTIAL~~
SECURITY INFORMATION

were 2457 and 378 mph respectively. These figures differ from those given in reference (c) and were computed from measurements obtained under more controlled conditions. Acceleration was determined from the formula :

$$a = \frac{Vf - VO}{T}$$ where:

a = Acceleration

Vf = final velocity

VO = initial velocity

T = time = 1/16 second

Since "g" is equal to 32.17 ft/sec^2 it was computed that:

Maximum acceleration = 21,168 mph/sec = 965 g
Minimum acceleration = 1,104 mph/sec = 50 g
Maximum deceleration = 32,448 mph/sec = 1479 g
Minimum deceleration = 272 mph/sec = 12 g

Velocity and acceleration determinations were also made from the Montana film. In this case, terrestial objects appeared in the film and were held to as control. Subsequently, the velocity and acceleration determinations are considered to be more reliable. On the assumption of (b) and (c) above the maximum and minimum velocities of the left object are 1374 and 361 mph respectfully. For the right object they are 1117 and 189 mph. Accelerations were computed as:

	Left Object	Right Object
Maximum acceleration mph/sec	14,016 = 639 g	12640 = 576g
Minimum acceleration mph/sec	0 = 0 g	0 = 0g
Maximum deceleration mph/sec	13,184 = 601 g	14288 = 651g
Minimum deceleration mph/sec	0 = 0 g	0 = 0g

The above determinations were made from a total of 322 measurements. It was noted that the acceleration and determinations were in multiples of 12.5 approximately. This may be of significance although no study has been conducted to determine this.

9. Velocity and acceleration were treated in sub-paragraph 8 above. Paragraph 2a indicates the controls used during this investigation.

Code O1/HWW/lbh
J12

Serial: 0105

~~CONFIDENTIAL~~
SECURITY INFORMATION

Subj: Interpretation of Movies of Unidentified Objects; progress report on

10. a. There is no recurring pattern in the relative position of the objects in formation. It appears however, as if the shift in relative positions were regular and that the original formation would be recovered if the continuing action has been recorded.

b. No. However, the same formation is maintained with objects changing positions.

c. No detection of relative positions being maintained coincidental with movement about their axis.

d. No detection of undulating motion of objects in phase either in formation or tumbling motion.

e. There is evidence of abrupt changes in direction of flight path through fairly large angles.

f. Certain objects do appear to remain motionless while other move about.

g. Certain objects disappear while still well within the field of view. This is discussed in sub-paragraph 6 above.

4. Discussion.

During the study and investigation of the unidentified objects, the preliminary data uncovered were revealed to experts (with proper security clearance) in the fields of astronomy and physics. Although they presented certain natural phenomena theories to explain the cause of the objects under certain conditions they were not able to do so under the conditions during which the photography was taken, nor were they able to recognize these objects as man-made.

As to the results of the investigations being reported, no attempt was made to corroborate the opinions presented. Because of the lack of proper equipment, money and personnel, the investigation was limited. There are obvious tests which can be conducted to prove or disprove some of the findings presented. It is suggested that these be undertaken.

5. Reference (d) requests spectrophotometric analysis of the Utah film be made. Preliminary plan of test is underway.

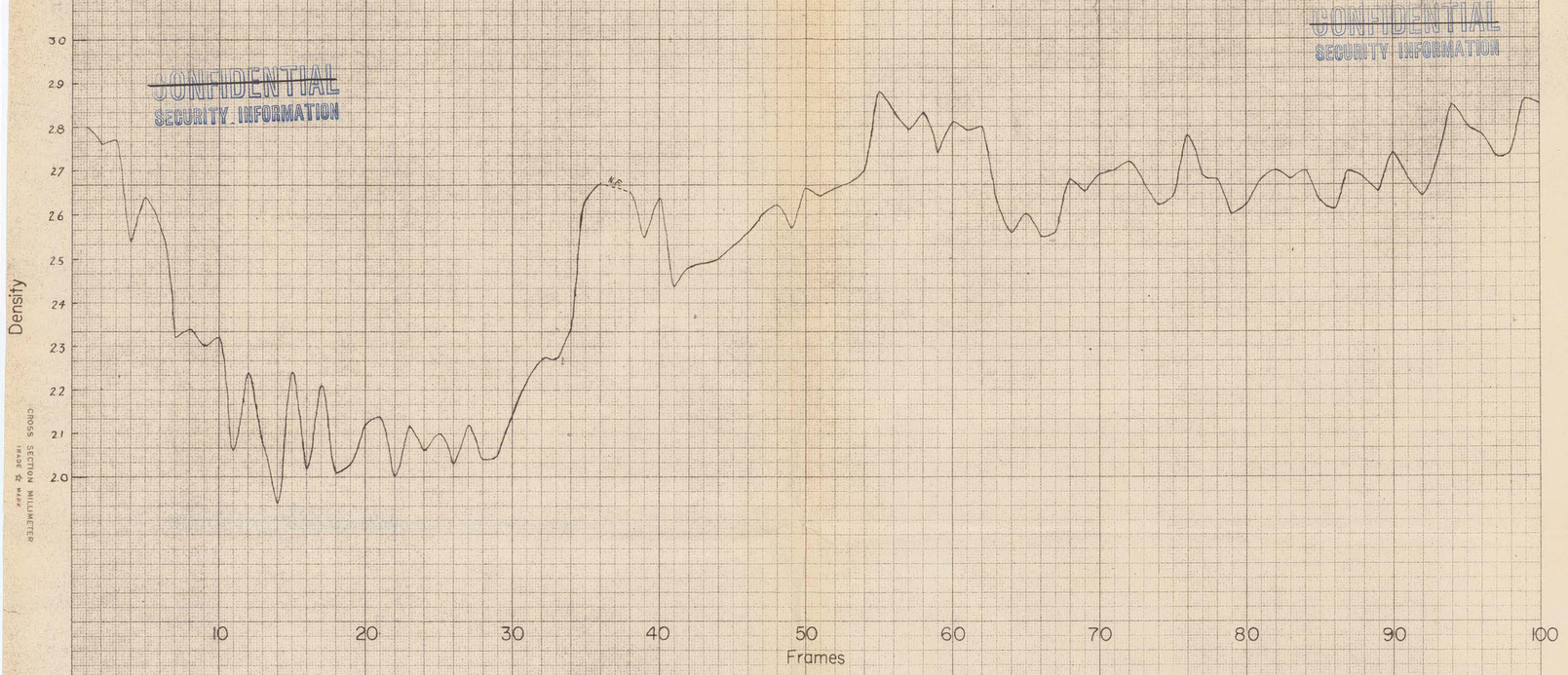
L. W. KEITH

Copy to:
CNO (OP553)
BuAer (PH)

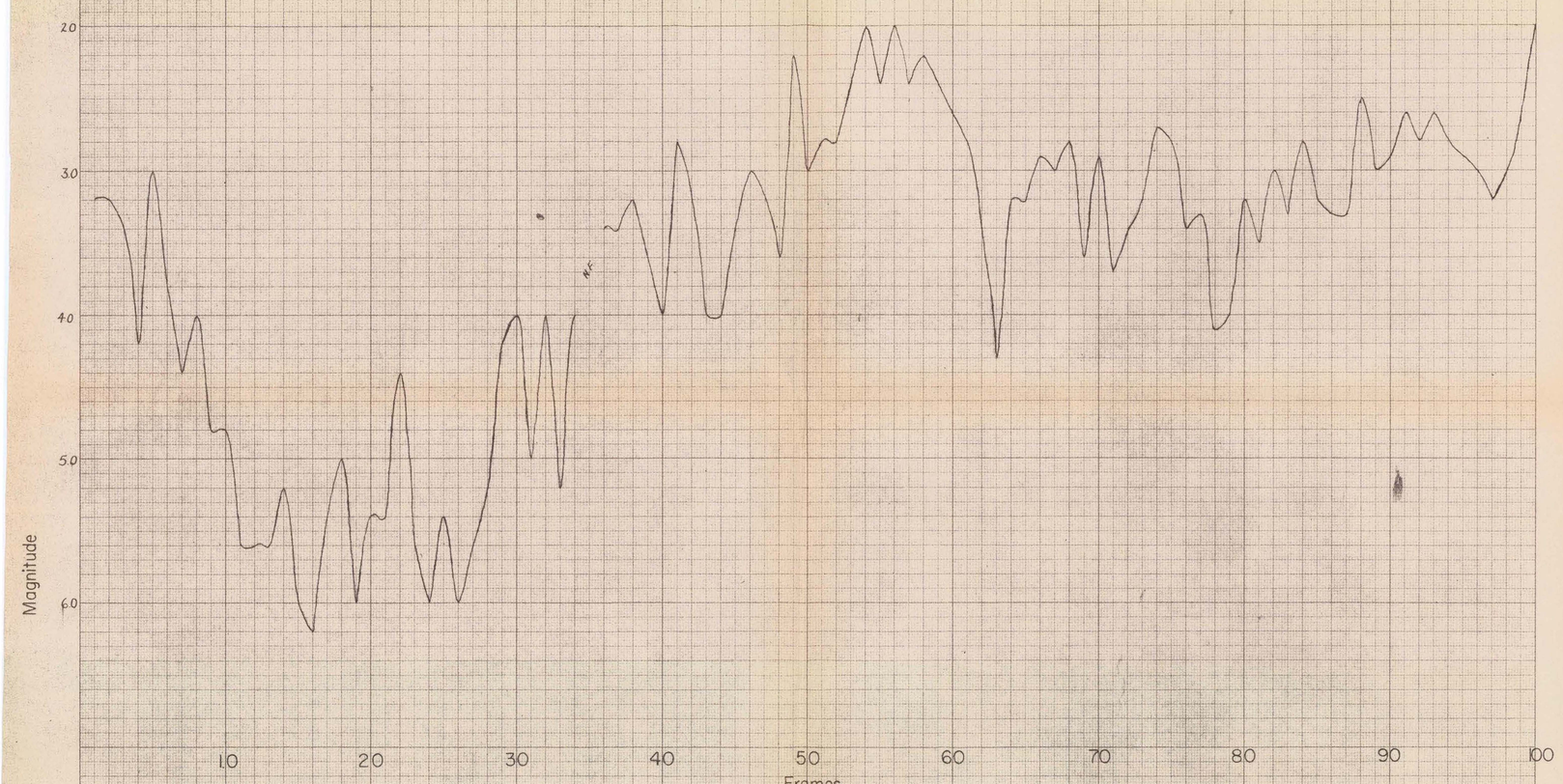
~~CONFIDENTIAL~~
SECURITY INFORMATION

PLOTS OF DENSITY AND MAGNITUDE (SIZE) OF AN OBJECT SHOWING POSSIBLE RELATIONSHIP

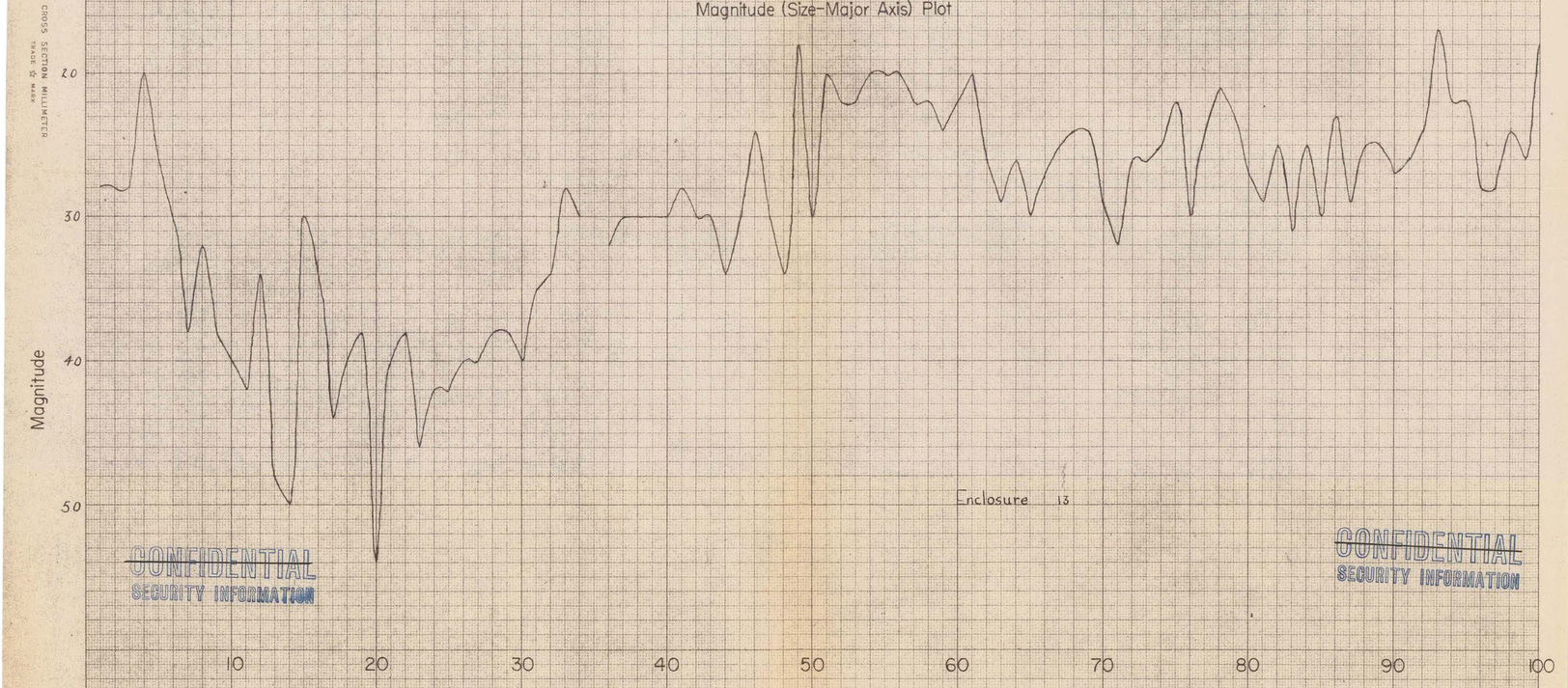
~~CONFIDENTIAL~~
SECURITY INFORMATION



Density Plot



Magnitude (Size-Major Axis) Plot



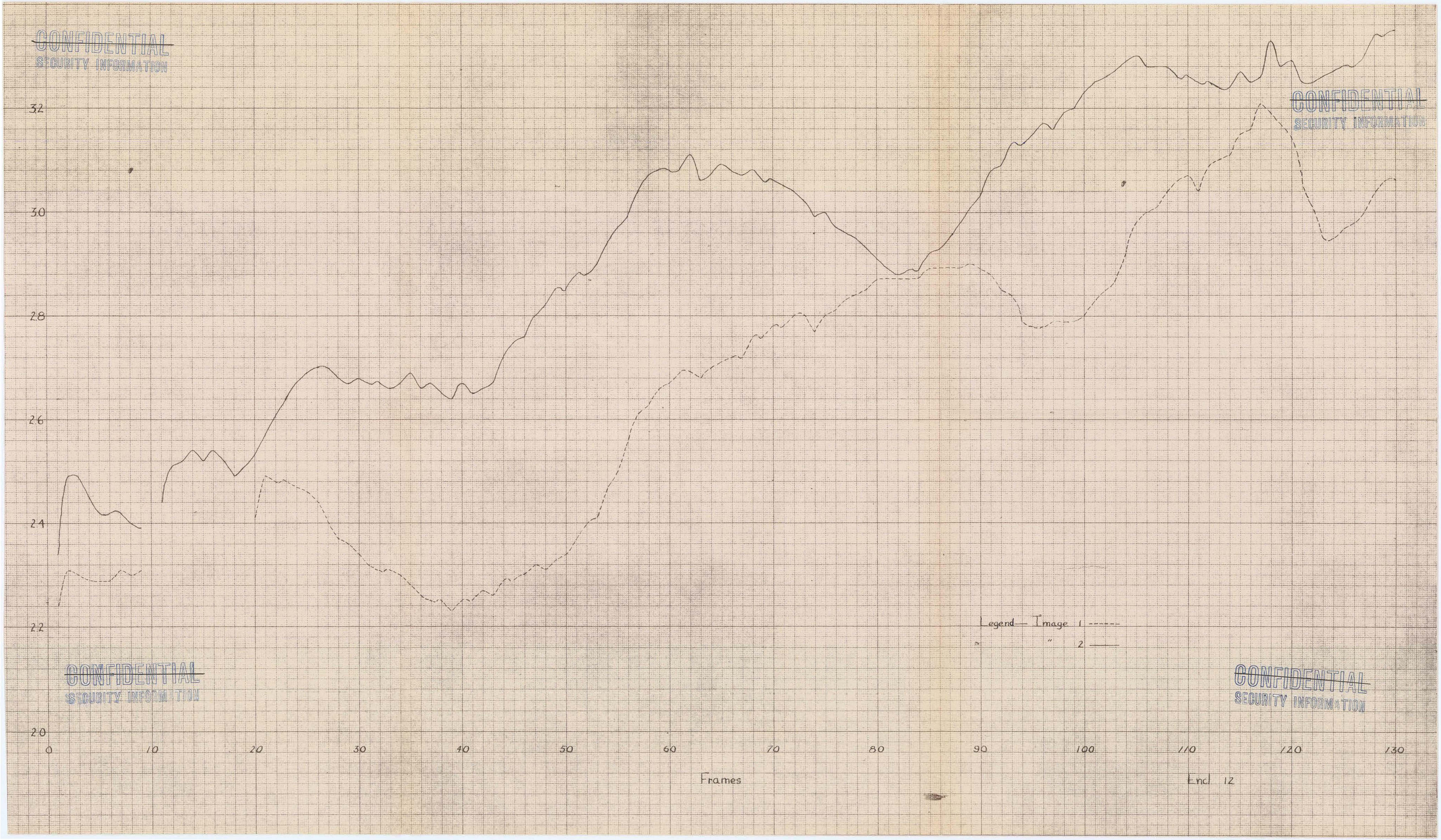
Magnitude (Size-Minor Axis) Plot

Enclosure 13

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION



~~CONFIDENTIAL~~
SECURITY INFORMATION

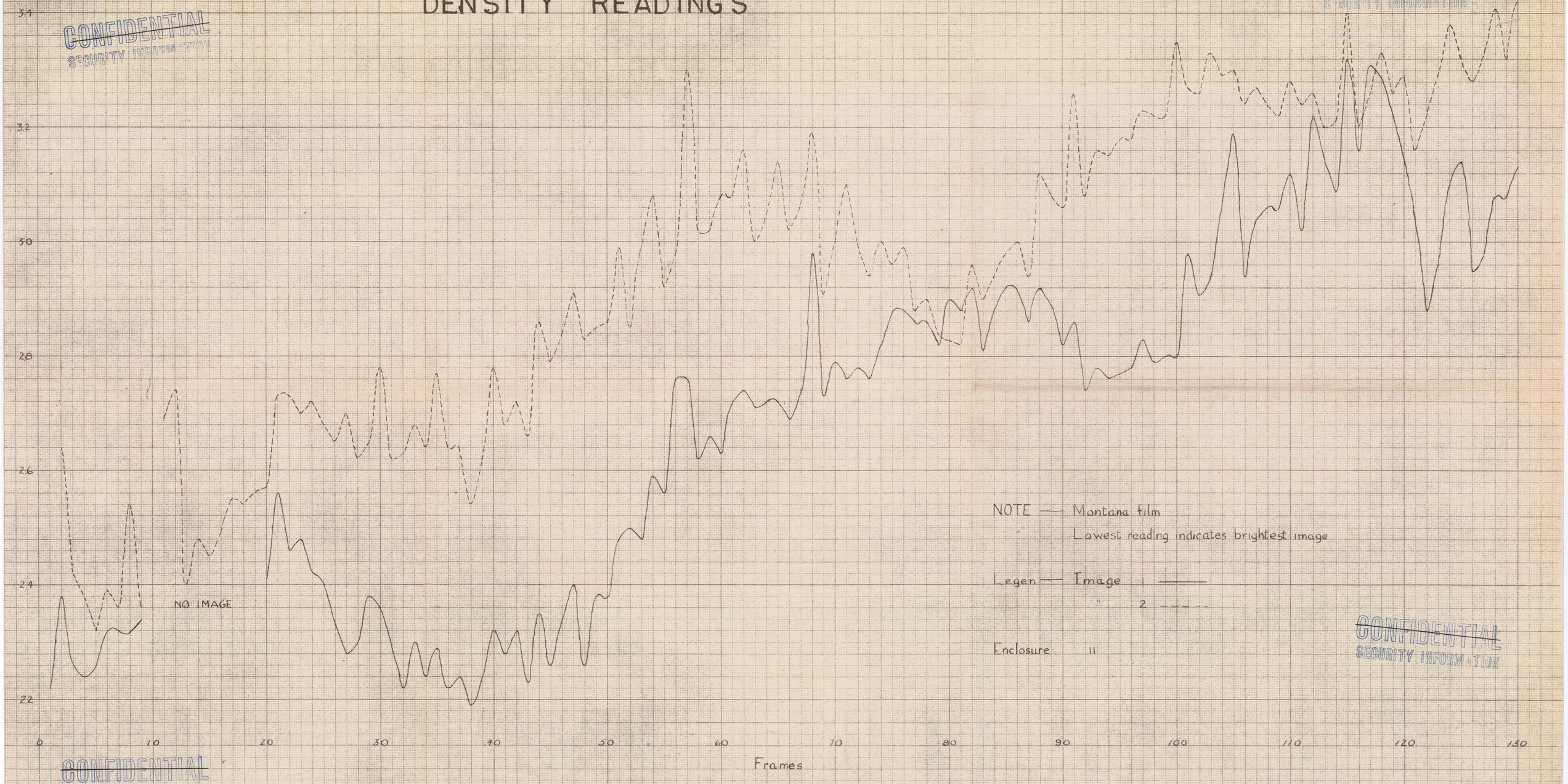
~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

Encl 12

CONFIDENTIAL
SECURITY INFORMATION

DENSITY READINGS



NOTE — Montana film
Lowest reading indicates brightest image

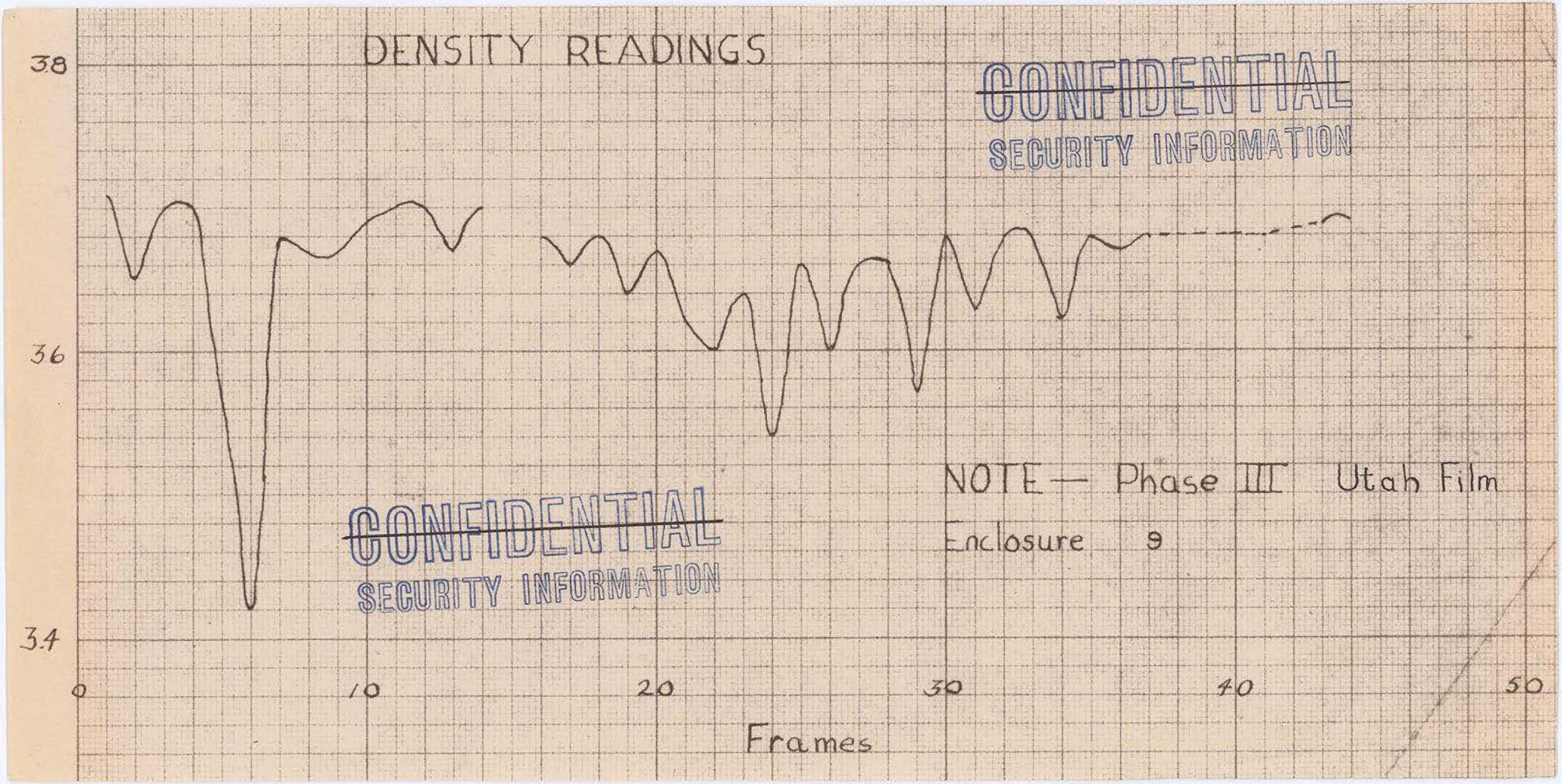
Legen — Image 1 ——
" 2 - - - -

Enclosure II

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

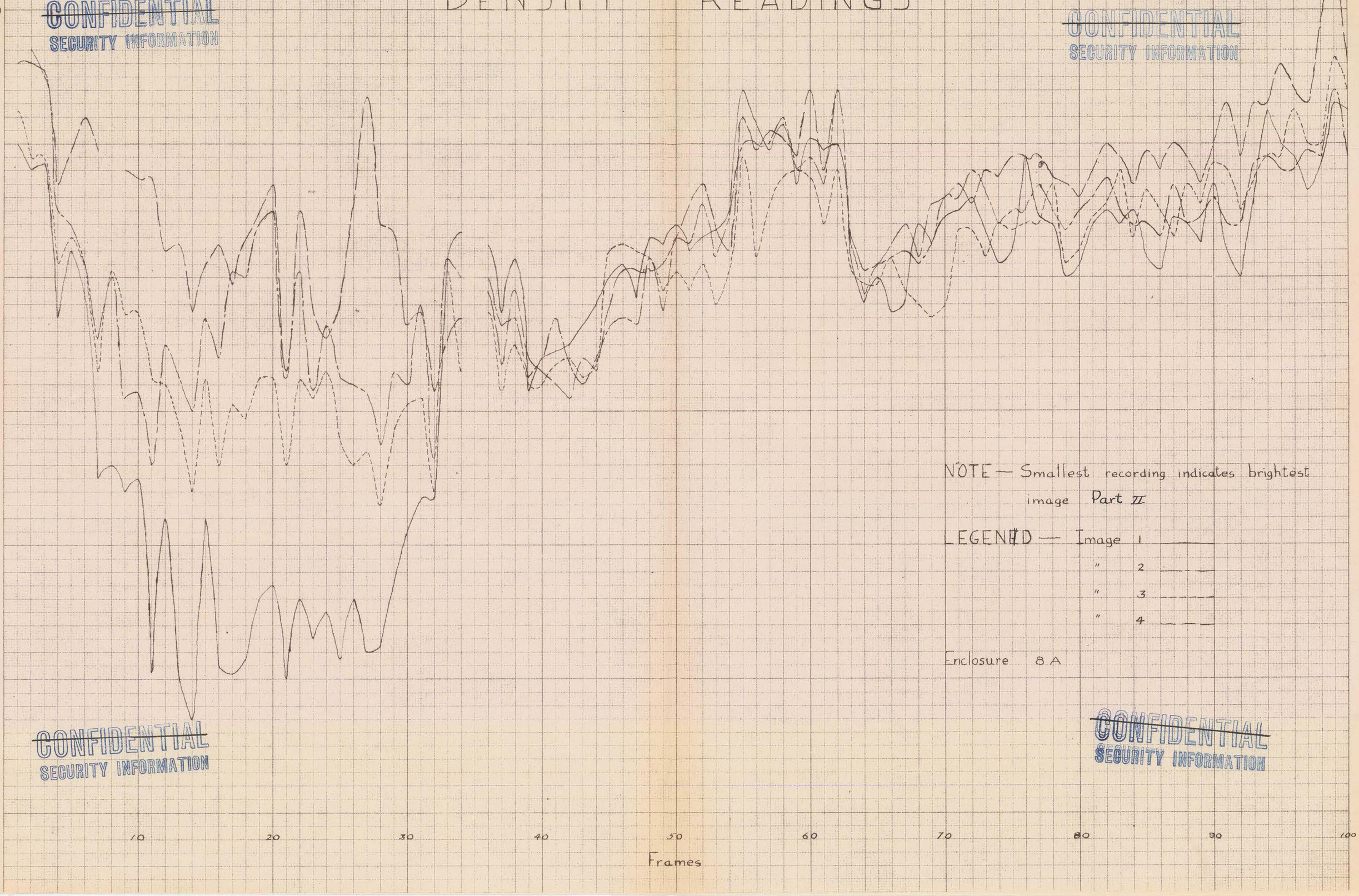
CONFIDENTIAL
SECURITY INFORMATION


DENSITY READINGS
CONFIDENTIAL
SECURITY INFORMATION
CONFIDENTIAL
SECURITY INFORMATION
NOTE — Phase III Utah Film
Enclosure 9
3.8
3.6
3.4
0
10
20
30
40
50
Frames

CONFIDENTIAL
SECURITY INFORMATION

DENSITY READINGS

CONFIDENTIAL
SECURITY INFORMATION



NOTE — Smallest recording indicates brightest image Part II

LEGEND — Image 1 ———
" 2 — — —
" 3 — — —
" 4 — — —

Enclosure 8 A

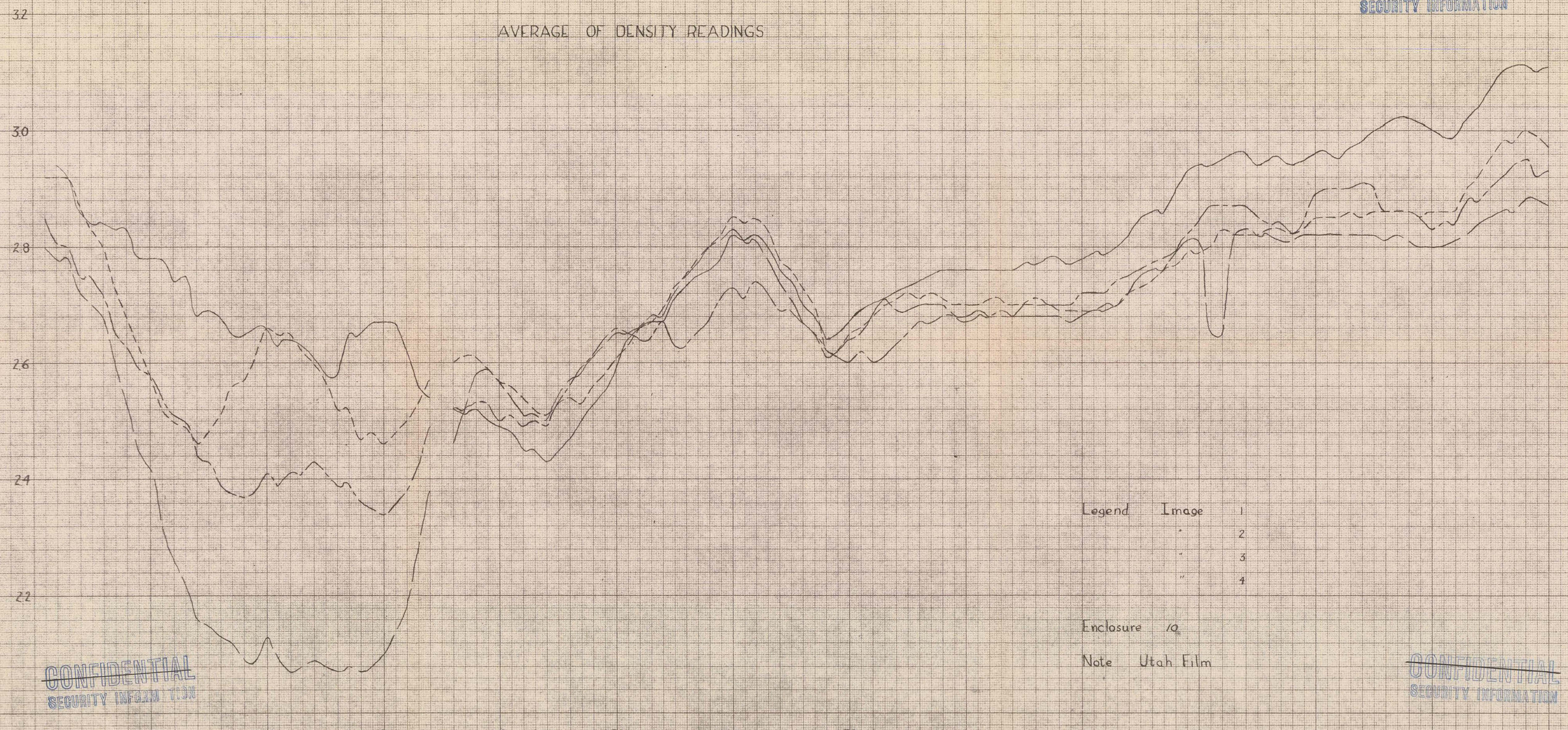
CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

AVERAGE OF DENSITY READINGS



Enclosure 10

Note Utah Film

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

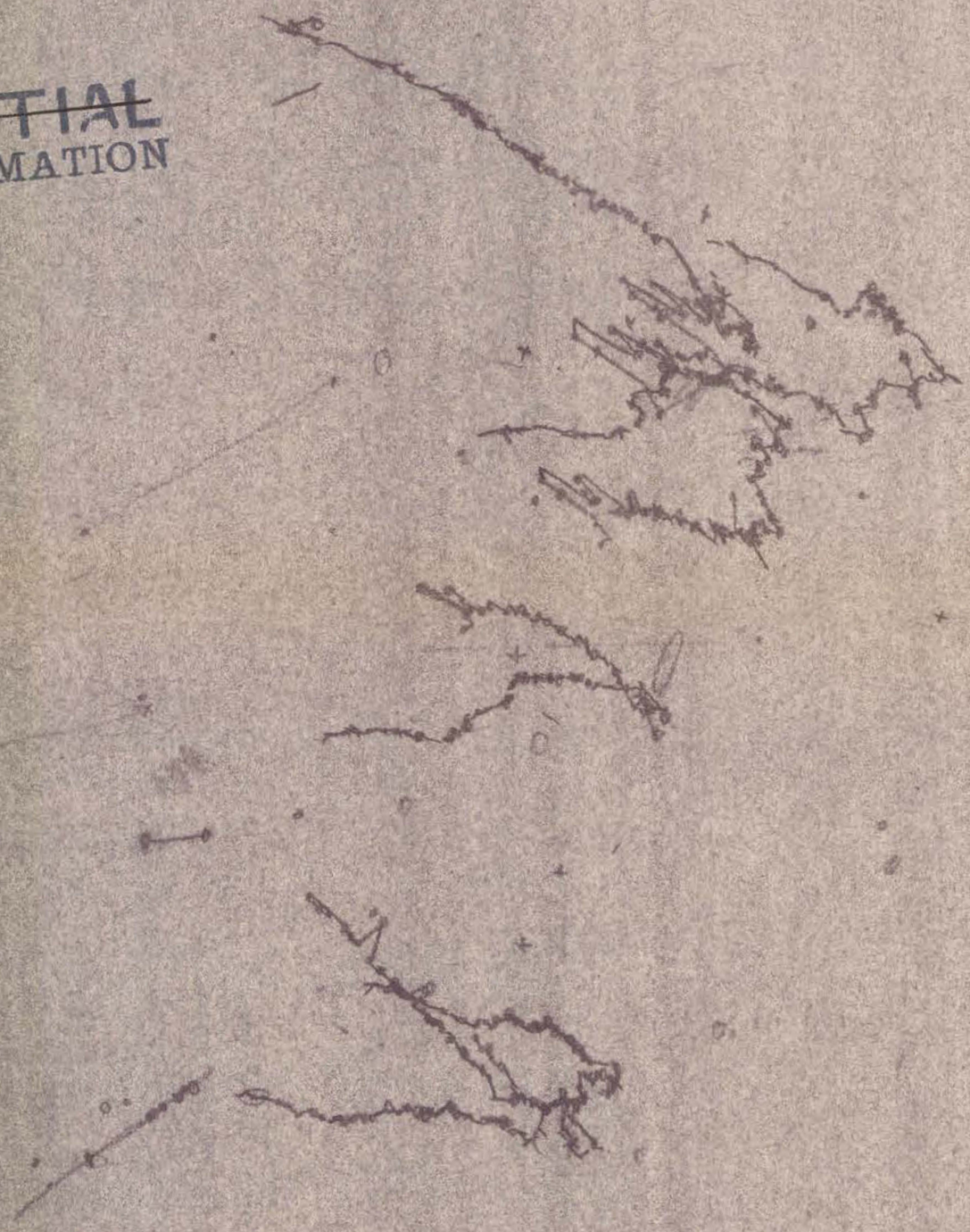


Enclosure #2

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

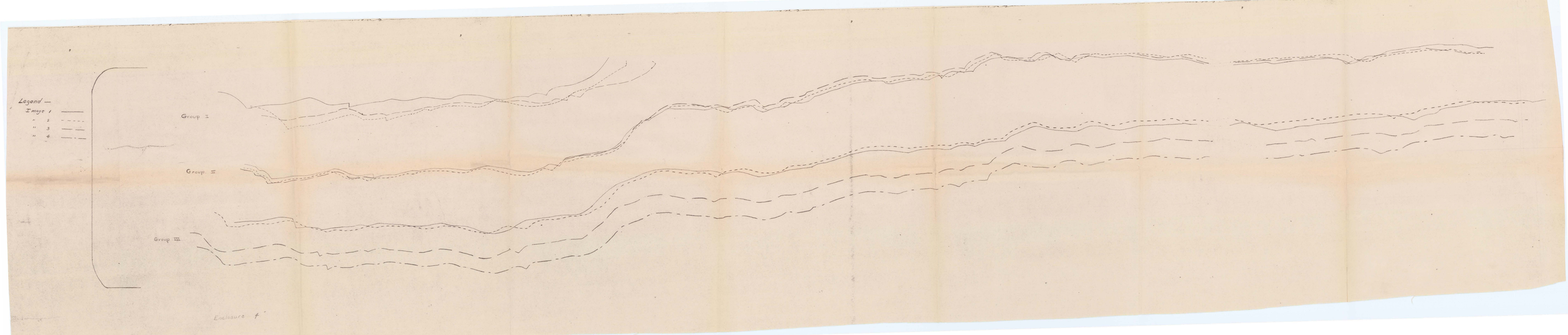
~~CONFIDENTIAL~~
SECURITY INFORMATION



Enclosure 3

~~CONFIDENTIAL~~
SECURITY INFORMATION

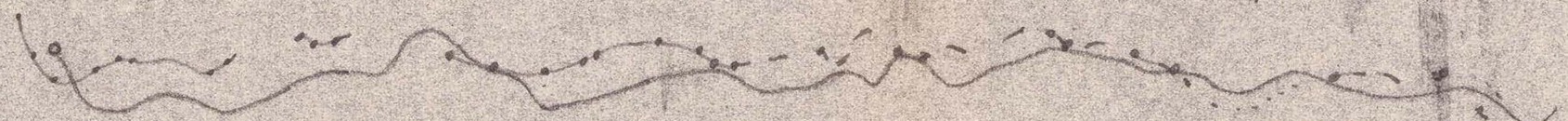
~~CONFIDENTIAL~~
SECURITY INFORMATION



Enclosure 4

~~CONFIDENTIAL~~
SECURITY INFORMATION

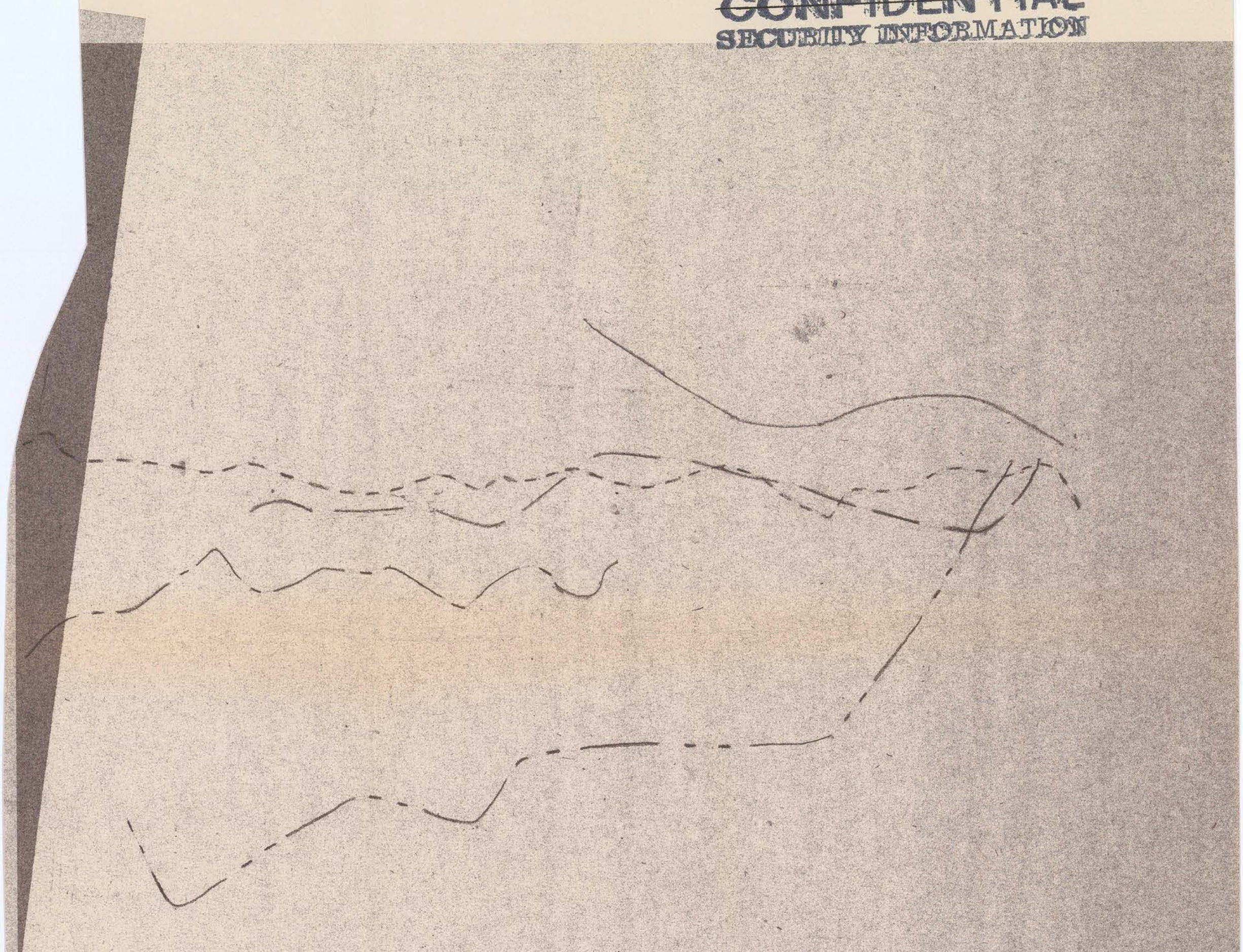
~~CONFIDENTIAL~~
SECURITY INFORMATION



~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION



Enclosure 5B Legend - Image 1 ———

" 2 - - - - - - -

" 3 — — —

" 4 — · — —

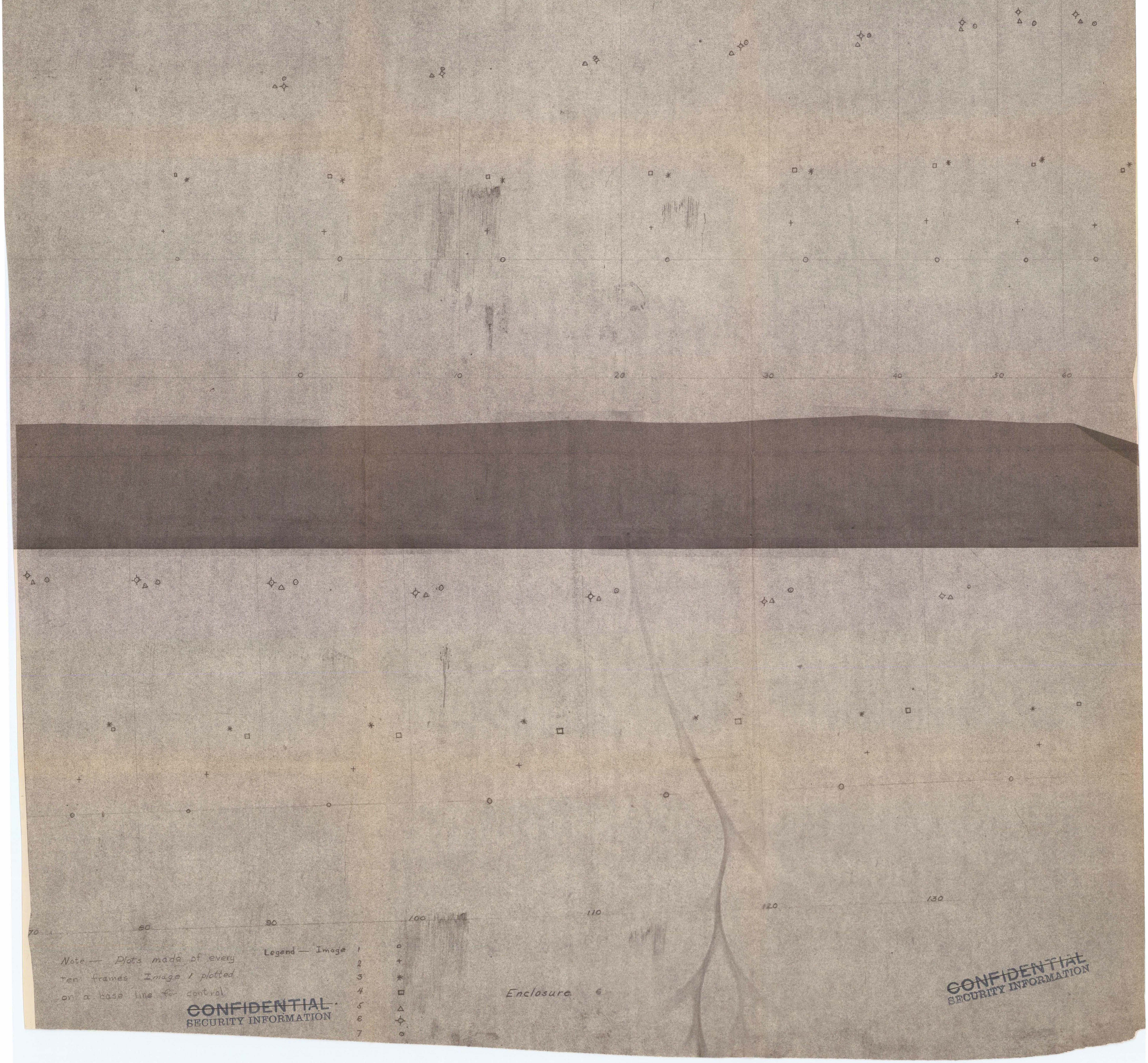
" 5 — — — —

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

RELATIVE IMAGE POSITION WITHIN A GROUP



Note — Plots made of every ten frames Image 1 plotted on a base line for control.

Legend — Image	
1	o
2	+
3	*
4	□
5	△
6	☼
7	⊙

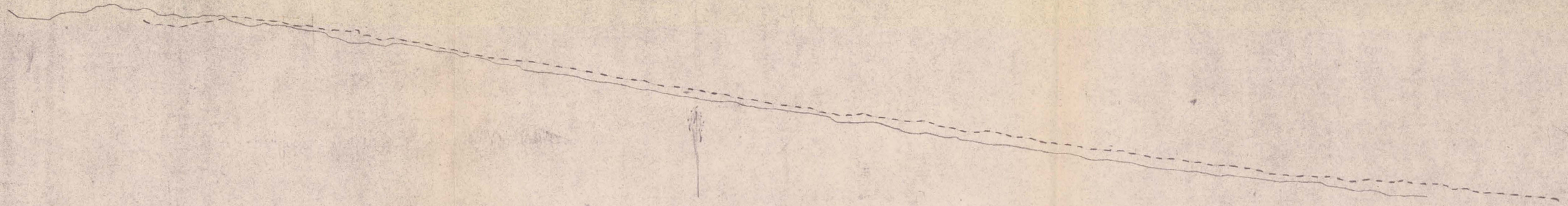
Enclosure 6

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION



Note — Montana Film

Enclosure 7

Legend Image 1 ——

" 2 – – –

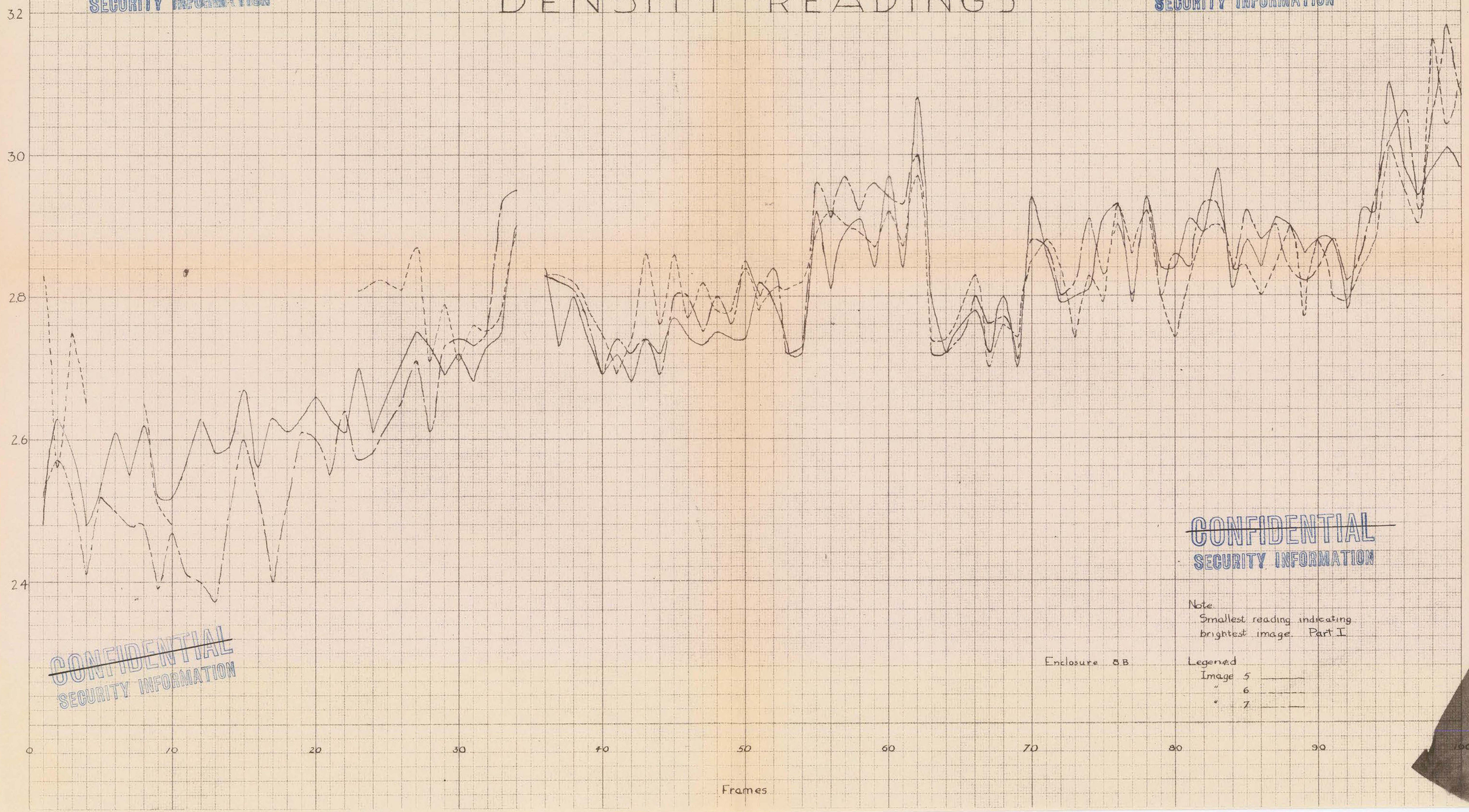
~~CONFIDENTIAL~~
SECURITY INFORMATION

~~CONFIDENTIAL~~
SECURITY INFORMATION

CONFIDENTIAL
SECURITY INFORMATION

DENSITY READINGS

CONFIDENTIAL
SECURITY INFORMATION



CONFIDENTIAL
SECURITY INFORMATION

Note
Smallest reading indicating brightest image. Part I

Enclosure 8B

Legened
Image 5 _____
" 6 _____
" 7 _____

CONFIDENTIAL
SECURITY INFORMATION