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PHOTOGRAPHIC EVALUATION REPORT

MISSION 1045

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SEPTEMBER 1968
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TECHNICAL PUBLICATION

PHOTOGRAPHIC EVALUATION REPORT

MISSION 1045

SEPTEMBER 1968

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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1033	[redacted]	None
1034		None
1036		None
1037		None
1038		None
1039		None
1040		None
1041		Slant Range Computations Related to Universal Grid Coordinates for the J-1 Camera System
1042	[redacted]	None
1043		Scan Speed Deviation Analysis of the Forward Camera, Mission 1043
1101	[redacted]	Slant Range Computations Related to Universal Grid Coordinates for the J-3 Camera System
1044	[redacted]	Dual Gamma/Viscose Vs Conventional/Spray Processing Analysis (Mission 1044)
1102	[redacted]	None
1046		S0230 Vs 3404 Evaluation
1045		None

[redacted]

GLOSSARY OF TERMS

ABSOLUTE HEIGHT	Vertical distance from the vehicle to the mean ground level of the area being photographed.
ACUITY	Sharpness - Edge definition.
ACUTANCE	Measure of the ability of a lens to reproduce sharp images.
AIR BASE	Ground distance between 2 exposure stations.
ALTITUDE	Vertical distance from the vehicle to the Hough Ellipsoid at the time of exposure.
AZIMUTH OF THE PRINCIPAL RAY	Horizontal clockwise angle, measured from true north to the camera principal ray.
BASE HEIGHT RATIO	Ratio between air base and the absolute altitude of a stereoscopic pair of photographs.
CAMERA NADIR	Geodetic latitude and longitude of a point vertically beneath the perspective center of the camera lens on the Hough Ellipsoid.
CONE ANGLE	Angle between the principal ray and the vehicle nadir.
COPY GENERATION	Number of reproductive steps by which a negative or positive photographic copy is separated from the original, i.e. the original negative is copy 1, a positive made from the original negative is copy 2, etc.
DATE OF PHOTOGRAPHY	Indicates the day, month, and year (GMT) that the photography was acquired.
EXPOSURE*	Total quantity of light received per

[redacted]

unit area on a sensitized plate or film.

EXPOSURE DURATION — Time during which a light-sensitive material is subjected to the influence of light. Expressed in this test in fractions of a second. Formula: Exposure Time (sec) = $\frac{\text{Slit Width (in)}}{\text{Scan Rate (rads. per sec)}}$

EXPOSURE STATION — Position occupied by the camera lens at the moment of exposure.

FIDUCIAL MARK — A standard geometrical reference point imaged at the margin of a photograph. The intersection of the primary fiducial marks usually defines the principal point.

FOCAL LENGTH: CALIBRATED — Adjusted value of the equivalent focal length. Computed to distribute the effect of lens distortion over the entire field.

FOCAL LENGTH: EQUIVALENT — Distance measured along the lens axis from the rear nodal point to the plane of best average definition over the entire field. Points other than the rear nodal point may be used but must be specified for correct interpretation of data.

FOCAL PLANE — Plane perpendicular to the lens axis, in which images of points in the object field of the lens are focused.

FRAME — One of a series of full-format photographs comprising a roll of film.

GROUND RESOLUTION* — Resolved ground distance as determined from standard bar target resolution targets. A target is considered to be resolved when a grouping of 3 bars can be distinguished as 3 distinct lines. The lines need not have linear form.

HOLEY RAIL DOTS — Images of the rail holes associated with the pan geometry calibration of the camera.

[redacted]

IMC (Image Motion Compensation)	Correction for the forward motion of the vehicle while photographing the terrain.
ISODENSITOMETER	An instrument which is basically a microdensitometer with the capability of repeatedly scanning an image at pre-set intervals. Its output is in the form of a plot representing distance along 2 axes and density differences as code changes within each scan line.
LOCAL SUN TIME	Time of day computed from the position of the sun relative to the imaged terrain.
MICRODENSITOMETER	An instrument which measures the optical density of very small areas in an image. Its output is in the form of a continuous plot of density versus distance across an image. The microdensitometer used in NPIC can accurately measure distances as small as 1 micron and densities up to 5.0+.
NOD INDICATORS	A series of marks imaged in the border area of each frame for the purpose of defining the relative orientation of the optical axis and the ground scene.
NODAL TRACE	A continous line imaged along the major axis of each frame to define the optical axis of the lens relative to any given instant of exposure.
PANORAMIC CAMERA	Photographs a partial or complete panorama of the terrain in a transverse direction through a scanning motion of the lens system.
PARALLAX	Apparent displacement of the position of an object in relation to a reference point, caused by a change in the point of observation.
PASS	Operational portion of an orbital revolution. A suffix D indicates the descending node and a suffix A indicates

	the ascending node. An additional suffix E indicates that the associated photography was generated for engineering purposes.
PITCH	Rotation of the camera about its transverse axis. Positive pitch indicates nose-up attitude.
PROCESSING LEVEL	Degree of development. Three levels of processing are currently employed: Primary, intermediate, and full.
PRINCIPAL RAY	That ray of light which emanates from a point in object space and passes undeviated through the lens to become imaged at the principal point of the camera system. It is co-incident with the optical axis of the lens.
RESOLUTION	Measure of the smallest array of point objectsdistinguishable as independent point images, expressed in lines/mm.
ROLL	Rotation of the camera about its longitudinal axis. Positive roll indicates left wing up attitude.
SHADOW FACTOR	A constant for each frame, used to calculate heights from shadow lengths.
SHRINKAGE MARKERS	Calibrated reference points used to calculate deformations of the photographic material.
SOLAR ELEVATION	Vertical angle measured from a plane (tangent to the surface of the earth at the point of intersection of the principal ray) to the sun, the vertex being at the center of the format.
STELLAR CAMERA	Used simultaneously with the index camera to photograph stars in order to determine vehicle attitude.
SYSTEM TIME LABEL	Binary presentation of the accumulative system time.

UNIVERSAL GRID	X, Y coordinate system used to locate images on photographic formats.
VEHICLE AZIMUTH	Clockwise horizontal angle measured from true north to the vehicle ground track.
VIGNETTING	Gradual reduction in density of parts of a photographic image due to the stopping of some of the rays entering the lens.
YAW	Rotation of the camera about its vertical axis. Positive yaw represents nose-left attitude, as viewed from the top of the camera.

*Defined differently than in the "Glossary of NPIC Terminology."

[redacted]

SYNOPSIS

Mission 1045, a two part photographic satellite reconnaissance mission, was launched into orbit on 24 January 1968/2226Z. The first capsule (Mission 1045-1) was recovered dry on 1 February 1968/0017Z during revolution 112. The second capsule (Mission 1045-2) was recovered dry during revolution 223 on 8 February 1968/0005Z. Photography was obtained on 108 orbital revolutions, consisting of 97 operational passes, 8 domestic passes, and 3 engineering passes.

The standard camera configuration with pan-geometry modification was employed during the mission. All cameras operated satisfactorily with the exception of the stellar camera of Mission 1045-2. The shutter remained open on frames 2 to 6. The stellar/index cameras of Mission 1045-1 failed to respond to the film slew signal at the end of the first mission, resulting in the loss of several frames on each camera.

The image quality of the aft-looking camera is comparable to the best obtained by this camera system. The improved image quality is believed to be the result of a more correct focus setting prior to launch and a more favorable focus shift during flight. An MIP of 90 is assigned to the mission.

Approximately 20 percent of the mission is obscured by clouds.

[redacted]

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Forward-Looking Panoramic Camera 214
Aft-Looking Panoramic Camera 215
Stellar/Index Camera (Mission 1045-1) D109/137/138
Stellar/Index Camera (Mission 1045-2) D108/139/141

B. Launch and Recovery Dates

	Mission 1045-1	Mission 1045-2
Launch	24 Jan 1968/2226Z	NA
Recovery	1 Feb 1968/0017Z	8 Feb 1968/0005Z
Recovery Rev	112	223

C. Orbit Elements

Element	Planned	Actual 1045-1 (Rev 66)	Actual 1045-2 (Rev 172)	Photo Range
Period (min)	*	90.714	90.854	NA
Perigee (nm)	*	96.673	99.679	96.42
Apogee (nm)	*	240.860	253.530	163.90
Eccentricity	*	0.01997	0.02129	NA
Inclination (deg)	*	81.485	81.485	NA
Perigee Latitude (deg)	*	24.675N	50.682N	NA

* - Not Available.
NA - Not Applicable.

D. Photographic Operations

1. Panoramic Cameras

Type	Mission Revs	1045-1 Frames	Mission Revs	1045-2 Frames	Total Revs	Total Frames
Operational						
Fwd	46	2,618	51	2,980	97	5,598
Aft	46	2,609	51	2,899	97	5,508
Operational/Domestic						
Fwd	0	0	0	0	0	0
Aft	0	0	0	0	0	0
Domestic						
Fwd	3	86	5	121	8	207
Aft	3	84	5	116	8	200
Engineering (no imagery)						
Fwd	1	10	2	14	3	24
Aft	1	10	2	14	3	24
Totals						
Fwd	50	2,714	58	3,115	108	5,829
Aft	50	2,703	58	3,029	108	5,732

2. Secondary Cameras

Camera	Frames
Stellar (Mission 1045-1)	397
Index (Mission 1045-1)	409
Stellar (Mission 1045-2)	478
Index (Mission 1045-2)	478

E. Film Usage

	Film Load (Total, ft)	Pre-Flight Footage	Processed Footage
Fwd-Looking (Mission 1045-1)	16,300*	291	7,488
Aft-Looking (Mission 1045-1)	16,300*	283	7,449
Fwd-Looking (Mission 1045-2)	NA	NA	8,200
Aft-Looking (Mission 1045-2)	NA	NA	7,991
Stellar (Mission 1045-1)	75	5.9	47
Stellar (Mission 1045-2)	75	3.2	53
Index (Mission 1045-1)	135	12.9	94
Index (Mission 1045-2)	135	8.5	103

*Total Load for Both Buckets.
NA - Not Applicable.

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PART II. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

1. Density: Approximately 50 percent of the fwd-looking camera material is of heavy density. The remaining material is generally medium in density. The acquisition of photography over snow covered terrain is partially responsible for the higher percentage of heavy density.

2. Contrast: The contrast of the original negative is considered to be generally medium. However, snow covered terrain caused a larger than normal percentage of low contrast.

3. Acuity: The edge sharpness of the imagery from the fwd-looking camera is generally good throughout the mission. The resolution is typical for this type of camera system.

4. Imaged Degradations

a. Light Leak: Minor areas of fog are present on the first frame and sixth from last frame of a few passes. Two narrow bands of fog occur on the fifth frame of most passes. An equipment image is present on the last frame of some passes.

b. Static: None noted.

c. Other: Minor banding occurs intermittently near the take-up end of some frames.

5. Physical Degradations: Rail scratches are present along both film edges throughout the mission. Emulsion scratches caused by scan head rollers occur to an average extent. Pinholes and emulsion defects are present intermittently throughout the mission.

6. Product Quality: The above degradations are considered minor and the product quality is good.

B. Aft-Looking Panoramic Camera

1. Density: Same as reported for the fwd-looking camera.

2. Contrast: Same as reported for the fwd-looking camera.

3. Acuity: The edge sharpness of the imagery produced by the aft-looking camera is good. The image quality is comparable to the best obtained from this system and is attributed to a more precise focus setting and favorable weather conditions (80% cloud free photography).

4. Imaged Degradations

a. Light Leaks: Minor fogged areas appear on the seventh from last frame, third from last frame, and next to last frame of some passes.

b. Static: Dendritic static images appear intermittently along both film edges during pass 101.

c. Other: Minor banding is present near the take-up end of some frames. Minus density streaks occur intermittently throughout

[redacted]

the mission.

5. Physical Degradations: Rail scratches are present along both edges throughout the mission. Pinholes and emulsion defects are present to an average extent.

6. Product Quality: The above degradations have little effect on the product quality, which is considered to be good.

C. Stellar Camera (Mission 1045-1)

1. Density: Adequate for the detection of stellar images.
2. Contrast: Adequate for the detection of stellar images.
3. Image Shape: The stellar images are generally point type images.
4. Images per Frame: There are 20 or more images detectable on each frame.
5. Flare Level: Flare affects approximately 60 percent of each stellar frame, but stellar images are detectable at all times in the flared areas.
6. Imaged Degradations
   a. Light Leaks: None noted.
   b. Static: Minor corona static occurs intermittently throughout the mission.
7. Physical Degradations: The last six inches of the film were scratched and abraded by the cut-and wrap operation. The last 23 frames are missing, due to the failure of the S/I unit to respond to the film slew signal.
8. Product Quality: The product quality is considered good.

D. Stellar Camera (Mission 1045-2)

1. Density: Adequate for the detection of stellar images.
2. Contrast: Adequate for the detection of stellar images.
3. Image Shape: The stellar images are generally point type images.
4. Images per Frame: There are 10 to 20 stellar images detectable on each frame.
5. Flare Level: Minor flare affects approximately 60 percent of each frame.
6. Image Degradations
   a. Light Leaks: None noted.
   b. Static: Minor corona static occurs intermittently throughout the mission.
   c. Other: Frames 2 to 6 are more dense than normal. There is fog between these frames, indicating that the shutter remained open during these acquisitions.
7. Physical Degradations: None noted.

8. Product Quality: The product quality is good, except for frames 2 to 6.

E. Index Camera (Mission 1045-1)

1. Density: The density is generally medium.
2. Contrast: Mostly medium, with some low contrast.
3. Acuity: The image quality is good and compares with recent missions of this type.
4. Imaged Degradations
   a. Light Leaks: None noted.
   b. Static: None noted.
   c. Other: The S/I unit apparently failed to respond to the film slew signal, and approximately 11 frames were lost at the end of Mission 1045-1.
5. Physical Degradations: None noted.
6. Product Quality: Good.

F. Index Camera (Mission 1045-2)

1. Density: The density is generally medium.
2. Contrast: Mostly medium with some low contrast.
3. Acuity: The image quality is good and comparable to Mission 1045-1.
4. Imaged Degradations
   a. Light Leaks: None noted.
   b. Static: None noted.
   c. Other: Dirt on the grid caused minus density spots on most frames.
5. Physical Degradations: None noted.
6. Product Quality: Good.

[redacted]

PART III. IMAGED AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

1. Horizon Camera
   a. Starboard-Looking
      (1) Imagery: The imagery is good, and the earth's curvature is sharp and well defined.
      (2) Fiducials: Sharp and well defined. The fiducials are missing from frame 51, pass 8D to frame 3, pass 9D.
   b. Port-looking
      (1) Imagery: The imagery is good, and the earth's curvature is sharp and well defined.
      (2) Fiducials: Sharp and well defined. The fiducials are missing from frame 51, pass 8D to frame 3, pass 9D.
2. Frequency Marks: Operational throughout the mission.
3. Binary Time Word: All data block images are of good quality. However, the data block reader would not consistently read the 16th and 17th images. An evaluation of the two images indicated they were of the proper size and density. At this time, there is no explanation for this anomaly. The binary was not present on the following frames: 17, pass 36D; 6, pass 38D; 72, pass 69D; 4, pass 112D; and 52, pass 167D.
4. Binary Index: Good quality and readable.
5. Camera Number: Readable.
6. Rail Hole Images: Most of the images are of good quality. A few images are weak, and three are missing at the beginning of the mission. At the end of Mission 1045-2, 76 images are missing, and 54 images are thin in density.
7. Nodal Traces: The traces are present on pass 63; pass 172D part 2, and pass 173D. They appear sharp and well defined.
8. Nod Indicators: Not applicable.

B. Aft-Looking Panoramic Camera

1. Horizon Cameras
   a. Starboard-Looking
      (1) Imagery: A slight veiling condition is present throughout the first part of the mission. By the start of the second part, the veiling condition appears to have cleared. The earth's curvature is visible through the veiling.
      (2) Fiducials: Sharp and well defined.
   b. Port-Looking
      (1) Imagery: The imagery is good, and the earth's curvature is sharp and well defined.
      (2) Fiducials: Sharp and well defined.

[redacted]

2. Frequency Marks: Operational throughout the mission.

3. Binary Time Word: All lights of the data block appear to have produced good quality images. However, the data block reader would not consistently read the number 16 light. The binary block did not image on the following frames: 207, pass 102D; 61, pass 211D; and 33, pass 214D

4. Binary Index: Good quality and readable.

5. Camera Number: Readable.

6. Rail Hole Images: Most of the rail hole images are of good quality. A few images are thin in density, and two rail hole images are missing at the beginning of the mission. At the end of the mission, 126 rail hole images are missing.

7. Nodal Traces: The traces are present on passes 63D and 172D, (part 2). In general, the traces are sharp and well defined.

8. Nod Indicators: Not applicable.

C. Stellar Camera (Mission 1045-1)

1. Grid Image Quality: The grid image is sharp and well defined.
2. Correlation Lamp Image Quality: Good.

D. Stellar Camera (Mission 1045-2)

1. Grid Image Quality: The grid image is sharp and well defined.
2. Correlation Lamp Image Quality: Good.

E. Index Camera (Mission 1045-1)

1. Grid Image Quality: The grid image is sharp and well defined.
2. Correlation Lamp Image Quality: Good.
3. Camera Number Legibility: Readable.

F. Index Camera (Mission 1045-2)

1. Grid Image Quality: Sharp and well defined.
2. Correlation Lamp Image Quality: Good.
3. Camera Number Legibility: Readable.

[redacted]

PART IV. MENSURATION QUALITY

A. Fwd-Looking Panoramic Camera

There were 33 individual requests for mensuration support during the initial readout of the mission. Approximately 100 manhours and 1,000 individual machine pointings were required. The image quality is considered to be good for mensuration purposes.

B. Aft-Looking Panoramic Camera

Same as for the fwd-looking camera.

[redacted]

[redacted]

PART V. FILM PROCESSING

A. Processing Machines and Process Gamma

Film	Part: Machine	Entire Mission Gamma	Part: Machine	NA Gamma
Fwd (Mission 1045-1)	Trenton	2.22	NA	NA
Aft (Mission 1045-1)	Trenton	2.24	NA	NA
Fwd (Mission 1045-2)	Trenton	2.20	NA	NA
Aft (Mission 1045-2)	Trenton	2.20	NA	NA
Stellar (Mission 1045-1)	Trenton	2.13	NA	NA
Stellar (Mission 1045-2)	Trenton	2.20	NA	NA
Index (Mission 1045-1)	Drape	1.03	NA	NA
Index (Mission 1045-2)	Drape	1.02	NA	NA

B. Processing Levels

1. Panoramic Cameras

Film	Primary	Intermediate	Full	Transition	Processing Changes
Fwd (Mission 1045-1)	3 %	19 %	60 %	18 %	40
Aft (Mission 1045-1)	3 %	11 %	67 %	19 %	42
Fwd (Mission 1045-2)	7 %	15 %	58 %	20 %	53
Aft (Mission 1045-2)	3 %	31 %	50 %	16 %	40

NA - Not Applicable.

[redacted]

2. Secondary Cameras

a. Stellar Cameras: The stellar records were processed on the Trenton processor with no interruption in processing.

b. Index Cameras: The index records were processed on the Drape processor with no interruption in processing.

C. Film Handling Summary

1. Fwd-Looking Camera

a. Capsule De-Filming

(1) Mission 1045-1: When the capsule was weighed before defilming, it was found to be 10 pounds less than normal. A measurement of the amount of film on the take-up reels indicated that each side was 600 feet short of full capacity.

(2) Mission 1045-2: At recovery, some very minor dents and scratches were found on the capsule. For this reason, it was routed to the west coast for inspection, causing a 12-hour delay in receipt of the mission at the processing site.

b. Pre-Processing Inspection

(1) Mission 1045-1: No problems encountered.

(2) Mission 1045-2: No problems encountered.

c. Manufacturing Splices

(1) Mission 1045-1: Pass 52D, Frame 34.

(2) Mission 1045-2: Pass 149D, Frame 41.

d. Processing Splices

(1) Mission 1045-1: None other than for the head and tail idents.

(2) Mission 1045-2: None other than for the head and tail idents.

e. Manufacturing Defects

(1) Mission 1045-1: Only minor defects noted.

(2) Mission 1045-2: Only minor defects noted.

f. Processing Anomalies: None.

g. Breakdown: No major problems encountered. The start of the breakdown of Mission 1045-2 was delayed by 12 hours as explained in section a (2).

2. Aft-Looking Camera

a. Capsule De-Filming

(1) Mission 1045-1: Same as reported for the forward camera.

(2) Mission 1045-2: Same as reported for the forward camera.

b. Pre-Processing Inspection

(1) Mission 1045-1: No problems encountered.

(2) Mission 1045-2: No problems encountered.

c. Manufacturing Splices
(1) Mission 1045-1: Pass 72D, frame 25.
(2) Mission 1045-2: Pass 137D, frame 34 and pass 211D, frame 61.
d. Processing Splices
(1) Mission 1045-1: None other than for the head and tail idents.
(2) Mission 1045-2: None other than for the head and tail idents.
e. Manufacturing Defects
(1) Mission 1045-1: Only minor defects noted.
(2) Mission 1045-2: Only minor defects noted.
f. Processing Anomalies: None.
g. Breakdown: No problems encountered. (See Part I, g.)

3. Index Cameras
a. Capsule De-Filming
(1) Mission 1045-1: No problems encountered.
(2) Mission 1045-2: No problems encountered.
b. Pre-Processing Inspection
(1) Mission 1045-1: No problems.
(2) Mission 1045-2: No problems.
c. Manufacturing Splices
(1) Mission 1045-1: None.
(2) Mission 1045-2: None.
d. Processing Splices
(1) Mission 1045-1: None.
(2) Mission 1045-2: None.
e. Manufacturing Defects
(1) Mission 1045-1: None noted.
(2) Mission 1045-2: None noted.
f. Processing Anomalies: None.
g. Breakdown: No major problems.

4. Stellar Cameras
a. Capsule De-Filming:
(1) Mission 1045-1: No problems encountered.
(2) Mission 1045-2: No problems encountered.
b. Pre-Processing Inspection
(1) Mission 1045-1: No problems encountered.
(2) Mission 1045-2: No problems encountered.
c. Manufacturing Splices
(1) Mission 1045-1: None.
(2) Mission 1045-2: None.
d. Processing Splices
(1) Mission 1045-1: None.
(2) Mission 1045-2: None.
e. Manufacturing Defects

(1) Mission 1045-1: None noted.
(2) Mission 1045-2: None noted.

f. Processing Anomalies: None.

g. Breakdown: Nc major problems.

D. Timetable

Film	Recovered	Received at Processing Site	Spec Ship at NPIC Recd	Priority 1A at NPIC Recd
Fwd (Mission 1045-1)	1 Feb 68/0017Z	1 Feb 68/0925 EST	None	3 Feb 68/1710 EST
Aft (Mission 1045-1)	"	"	"	"
Stellar (Mission 1045-1)	"	"	"	"
Index (Mission 1045-1)	"	"	"	"
Fwd (Mission 1045-2)	8 Feb 68/0005Z	8 Feb 68/1930 EST	"	11 Feb 68/0356 EST
Aft (Mission 1045-2)	"	"	"	"
Stellar (Mission 1045-2)	"	"	"	"
Index (Mission 1045-2)	"	"	"	"

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PART VI. PI SUITABILITY

A. Definition of Photographic Interpretation (PI) Suitability

The PI suitability is an assessment of the information content of photographic reconnaissance material and its interpretability. A number of interrelated factors are involved, such as the quality of the photography, the extent of target coverage, scale, and weather limitations. However, the fundamental criteria for assigning a PI suitability rating may be reduced to (a) the scope of the photographic coverage and (b) the degree to which a photographic interpreter may extract useful and reliable information from the materials.

PI suitability ratings are categorized as Excellent, Good, Fair, Poor, and Unuseable. These ratings refer to the overall interpretive value of the photography obtained from a particular reconnaissance mission. Individual targets may also be assigned PI suitability ratings. The standards that determine assignment of the various ratings are:

Excellent: The photography is free of degradations by camera malfunctions or processing faults and the weather conditions are favorable throughout. The imagery contains sharp, well-defined edges and corners with no unusual distortions. Contrast is optimum and shadow details, as well as details in the highlight areas, are readily detectable. Observation of small objects and a high order of mensuration are made possible by the consistently good quality of the photography.

Good: The photography is relatively free of degradation or limiting atmospheric conditions. Edges and corners are well defined. No unusual distortions are present. Detection and accurate mensuration of small objects are feasible, but to a lesser degree than in material rated as "Excellent."

Fair: Degradation is present and the acuity of the photography is less than optimum. Edges and corners are not crisply defined and there is loss of detail in shadow and/or highlight areas. Detection and identification of small objects are possible, but accuracy of mensuration is reduced by the fall-off in image quality and the less-than optimum contrast that prevails.

Poor: Camera-induced degradations and/or weather limitations severely reduce the effectiveness of the photography. Definition of edges and corners is not sharp. Only gross terrain features and culture may be detected or identified and distortion of form may exist. Accurate mensuration of even large objects is doubtful.

Unuseable: Degradation of photography completely precludes detection, identification, and mensuration of cultural details.

[redacted]

B. PI Statistics

1. Target Coverage

	Mission 1045-1	Mission 1045-2	Totals
Priority I Targets Programmed	No specific priority I targets were programmed on this mission although specific areas were selected for initial readout.		
Pricrity I Targets Covered	295	244	539

2. PI Quality Appraisal

Rating	Missiles	Nuclear Energy	Air Facilities	Ports	Elect Commo	Military Activity	Complex	Bio/Chem Warfare
Good	21	3	22	14	1	26	3	0
Fair	104	10	84	12	0	99	73	16
Poor	52	3	36	6	1	32	21	2
Totals*	177	15	142	32	2	157	97	18

3. Summary of PI Quality Ratings

Good 90 or 13.9
Fair 398 or 62.1
Poor 153 or 24.0

*A discrepancy exists between the total number of targets covered and the total PI reports because some targets are covered repeatedly.

C. PI Comments

1. Atmospheric Attenuation: Listed below is the photo interpreter's report of weather conditions for the priority 1 targets covered on this mission.

Weather	Number of Targets
a. Clear:	481 or 75.0 %
b. Scattered clouds:	72 or 11.2 %
c. Heavy Clouds:	14 or 2.2 %
d. Haze:	57 or 8.9 %
e. Cloud Shadow:	17 or 2.7 %

2. Terrain Conditions: The terrain conditions of the imagery on this mission are normal for this time of year. Snow covered terrain represents approximately 40% of this mission. Desert and mountain areas account for 20% of the mission.

3. Product interpretability of both parts of Mission 1045 range from poor to good. In general, the snow covered terrain had an adverse effect on the interpretability of the photography. However, in some cases these same terrain conditions were helpful in target delineation. For the first time on photography from this system, micro-wave towers can be identified. When weather conditions were favorable, the cameras produced photography comparable to the best attained by this system.

4. Resolution Target Analysis

RESOLUTION TARGET DATA

Target Designator	A		B	
Camera (Looking)	Fwd	Aft	Fwd	Aft
Pass	126D	126D	173D	173D
Frame	5	5	6	5
Date of Photography	1 Feb 68	1 Feb 68	4 Feb 68	4 Feb 68
Universal Grid Coordinates	26.7-10.4	65.5-10.4	55.0-14.0	37.1-12.5
Geographic Coordinates of Format Center	36-51N 114-45W	36-44N 114-50W	33-02N 106-33W	33-06N 106-41W
Altitude (ft)	590,615	589,914	610,789	612,031
Camera				
Pitch (deg)	15° 13'	-14° 41'	15° 12'	-14° 43'
Roll (deg)	0° 11'	-0° 05'	0° 18'	0° 01'
Yaw (deg)	-2° 18'	-2° 30'	-2° 32'	-2° 38'
Local Sun Time	1302	1302	1239	1239
Solar Elevation (deg)	33° 37'	33° 43'	39° 28'	39° 25'
Solar Azimuth (deg)	198°	198°	192°	192°
Exposure (sec)	1/295	1/374	1/298	1/367
Processing Level	Full	Full	Full	Full
Vehicle Azimuth (deg)	172° 03'	172° 13'	172° 41'	172° 48'
Filter (Wratten)	23A	21	23A	21
Target Type	3 Bar Mil Std	3 Bar Mil Std	C	C
Target Contrast	High	High	10 to 1	10 to 1
Weather Conditions	Slight Haze	Slight Haze	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM THE SECOND GENERATION POSITIVE

	A				B			
	Along Track		Across Track		Along Track		Across Track	
	Fwd	Aft	Fwd	Aft	Fwd	Aft	Fwd	Aft
Observer 1	9' 8"	9' 8"	*	8' 7"	*	10' 1"	*	10' 1"
Observer 2	9' 8"	9' 8"	*	8' 7"	*	10' 1"	*	8' 11"
Observer 3	9' 8"	9' 8"	*	8' 7"	*	10' 1"	*	10' 1"

*No Bars Resolved.

Target Designator	C	
Camera (Looking)	Fwd	Aft
Pass	63D	63D
Frame	5	5
Date of Photography	28 Jan 68	28 Jan 68
Universal Grid Coordinates	53.0-11.0	39.0-11.0
Geographic Coordinates of Format Center	34-51N 117-56W	34-47N 118-02W
Altitude (ft)	606,012	603,786
Camera		
Pitch (deg)	15° 01'	-14° 56'
Roll (deg)	0° 19'	0° 11'
Yaw (deg)	-2° 43'	-2° 50'
Local Sun Time	1341	1341
Solar Elevation (deg)	31° 13'	31° 18'
Solar Azimuth (deg)	208	208
Exposure (Sec)	1/288	1/370
Processing Level	Full	Full
Vehicle Azimuth (deg)	172° 24'	172° 33'
Filter (Wratten)	23A	21
Target Type	B_2 and C	B_2 and C
Target Contrast	8 to 1 and 5 to 1	8 to 1 and 5 to 1
Weather Conditions	Clear	Clear

GROUND RESOLUTION IN FEET AS DETERMINED FROM SECOND GENERATION POSITIVE

	Along Track		Across Track	
	Fwd	Aft	Fwd	Aft
Observer 1	10'1"	10'1"	16'0"	16'0"
Observer 2	10'1"	10'1"	16'0"	16'0"
Observer 3	10'1"	10'1"	16'0"	14'3"

PART VII. MISSION DATA

	Fwd-Looking Pan	Fwd-Looking Take-up Horizon	Fwd-Looking Supply Horizon	Aft-Looking Pan	Aft-Looking Take-up Horizon	Aft-Looking Supply Horizon	Mission 1045-1 Stellar	Mission 1045-1 Index	Mission 1045-2 Stellar	Mission 1045-2 Index
Camera Number	214	*	*	215	*	*	D109	D109	D108	D108
Reseau Number	NA	NA	NA	NA	NA	NA	138	137	141	139
Lens Serial Number	2242435	19103	12854	2232435	12873	12829	11311	823770	11417	821941
Slit Width	.225	None	None	.175	None	None	None	None	None	None
Aperture	F3.5	F/8.0	F/6.3	F/3.5	F/6.3	F/8.0	F/1.8	F/4.5	F/1.8	F/4.5
Exposure Time (sec)	1/286 (Avg)	1/100	1/100	1/368 (Avg)	1/100	1/100	2.0	1/500	1.0	1/500
Filter (Wratten)	23A	25	25	21	25	25	None	21	None	21
Focal Length (mm)	609.613	55.0	55.0	609.613	55.0	55.0	85 nom	38.49	85 nom	38.89
Film Length (ft)	16,300	NA	NA	16,300	NA	NA	75	135	75	135
Splices	2	NA	NA	4	NA	NA	None	None	None	None
Emulsion	407-2-12-7	407-2-12-7	407-2-12-7	407-2-12-7	407-2-12-7	407-2-12-7	231-9-9-7	147-1-12-7	231-9-9-7	147-1-12-7
Film Type	3404	3404	3404	3404	3404	3404	3401	3400	3401	3400
Resolution Data (L/mm)										
Static										
High Contrast	*	209	208	*	209	209	*	73 (AWAR)	*	72 (AWAR)
Low Contrast	145	*	*	143	*	*				
Dynamic										
I High Contrast	192	*	*	198	*	*	*	*	*	*
I Low Contrast	133	*	*	118	*	*	*	*	*	*
P High Contrast	178	*	*	177	*	*	*	*	*	*
P Low Contrast	107	*	*	113	*	*	*	*	*	*

* - Not Available.
NA - Not Applicable.