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PHOTOGRAPHIC EVALUATION REPORT

MISSION 1050

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MISSION 1050

AUGUST 1969

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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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 the 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 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 text 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.
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 continuous 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 objects distinguishable as independent point images, expressed in lines/mm.

[redacted]

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."

INDEX OF PHOTOGRAPHIC EVALUATION REPORTS AND SPECIAL STUDIES

PER	DOCUMENT NUMBER	SPECIAL STUDY
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 KH4A Camera System
1042	[redacted]	None
1043		Scan Speed Deviation Analysis of the Forward Camera, Mission 1043
1044	[redacted]	Dual Gamma/Viscose Vs Conventional/Spray Processing Analysis (Mission 1044)
1045	[redacted]	None
1046		SO-230 Vs 3404 Evaluation
1047		None
1048		None
1050		None
1101		Slant Range Computations Related to Universal Grid Coordinates for the KH4B Camera System
1102	[redacted]	None
1103		None
1104		SO-180 Evaluation Mission 1104
1105		SO-121 Evaluation Mission 1105
1106	[redacted]	SO-180 Evaluation Supplement Photo Interpretability of SO-121 (Color) from Mission 1106

SYNOPSIS

Mission 1050, a two part satellite reconnaissance mission, was launched on 19 March 1969 at 2139Z. Both buckets were recovered dry, the first on 22 March 1969 at 0032Z and the second on 23 March 1969 at 0004Z.

The main cameras operated properly throughout both missions. However, due to abnormal rotational rates after revolution 22, the mission was terminated after a total of three photographic days. The image quality prior to rev 22 is considered to be fair to good (MIP 85). After revolution 22, the imagery is smeared in varying degrees, with isolated instances of good imagery.

All auxiliary cameras operated normally throughout the mission. However, the imagery provided by the auxiliary cameras is considered to be for the most part unusable for attitude determination after rev 22.

PART I. GENERAL SYSTEM INFORMATION

A. Camera Numbers

Fwd-Looking Panoramic Camera	210
Aft-Looking Panoramic Camera	211
Stellar/Index Camera (Mission 1050-1)	D113/141/145
Stellar/Index Camera (Mission 1050-2)	D114/142/143

B. Launch and Recovery Dates

	Mission 1050-1	Mission 1050-2
Launch	2139Z/19 Mar 69	*
Recovery	0032Z/22 Mar 69	0004Z/23 Mar 69
Recovery Rev	34	50

C. Orbit Elements

Element	Planned	Actual 1050-1	Actual 1050-2	Photo Range
Period (min)	NA	88.816	**	
Perigee (nm)	NA	98.999	**	93.41
Apogee (nm)	NA	141.000	**	123.89
Eccentricity	NA	0.00591	**	
Inclination (deg)	NA	82.988	**	
Perigee Latitude	NA	36.842	**	

*Not Applicable.
**Same as for Mission 1050-1.
NA--Not Available.

D. Photographic Operations

1. Panoramic Cameras

Type	Mission Revs	1050-1 Frames	Mission Revs	1050-2 Frames	Total Revs	Total Frames
Operational						
Fwd	18	1,371	10	2,465	28	3,836
Aft	18	1,378	10	2,475	28	3,853
Operational/Domestic						
Fwd	1	158	2	418	3	576
Aft	1	159	2	419	3	578
Domestic						
Fwd	3	155	3	223	6	378
Aft	3	156	3	226	6	382
Engineering (no imagery)						
Fwd	2	30	0	0	2	30
Aft	2	30	0	0	2	30
Totals						
Fwd	24	1,714	15	3,106	39	4,820
Aft	24	1,723	15	3,120	39	4,843

2. Secondary Cameras

Camera	Frames
Stellar (Mission 1050-1)	362
Index (Mission 1050-1)	361
Stellar (Mission 1050-2)	465
Index (Mission 1050-2)	464

E. Film Usage

	Film Load (Total, ft)	Pre-Flight Footage	Processed Footage
Fwd-Looking (Mission 1050-1)	16,300*	219	4,710
Aft-Looking (Mission 1050-1)	16,300*	124	4,720
Fwd-Looking (Mission 1050-2)	NA	NA	8,207
Aft-Looking (Mission 1050-2)	NA	NA	8,240
Stellar (Mission 1050-1)	75	5	35
Stellar (Mission 1050-2)	75	2.5	54
Index (Mission 1050-1)	135	10	66
Index (Mission 1050-2)	135	6	109

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

F. Vehicle Attitude Control Failure

1. The abnormal attitude of the vehicle during part of Mission 1050-1 (after rev 22) and all of Mission 1050-2 caused various problems in the mission readout. Among these problems were:

a) Smeared imagery.
b) Lack of proper stereo coverage.
c) Difficulty in locating targets.
d) Predicted targets not covered.

2. Anomaly: During rev 22, the gas jet cluster that controls the yaw of the vehicle remained open. This caused the vehicle to rotate in a positive yaw direction at an average rate of 0.5 degrees per second. The vehicle also had abnormal roll and pitch rates.

3. Cause: This anomaly was caused by faulty gas jets.

PART II. IMAGE ANALYSIS

A. Fwd-Looking Panoramic Camera

Note: Items 1, 2, and 3 relate to that part of the mission prior to and including rev 22.

1. The film density is considered to be generally medium to heavy. The reason for this is a combination of film type (SO-230) and the terrain photographed (snow and ice covered terrain). Dual gamma chemistry was used to process this mission. As a result, the density range is compressed compared with conventional three level processing.

2. Due to the processing, there is very little high contrast imagery.

3. Acuity: The image acuity varies across the format from good to poor. The material displays a soft focus area along the data block edge of each frame throughout the mission. The change in focus does not exhibit specific boundaries. The best imagery is located along the frequency mark edge of format.

4. Image Degradations:

a. Light Leaks: Light leak induced fog patterns of various sizes and shapes are present on the first, fifth, fifth from last, and next to last frame of most camera operations. These patterns cause some degradation to the imagery. Examples of these patterns are on pass 3D, frame 1; pass 3D, frame 5; and pass 9D, frames 112, 115, and 116. These patterns are displayed in Graphics 1 and 2, page 9.

b. Static: Dendritic static is present intermittently along both edges of the material. The static is severe at times and on occasion enters the format. See Graphic 1, page 9 (Example: 9D, frame 15).

c. Other: Minor banding is noticeable near the take-up end of some frames. Minus density bands, perpendicular to the major axis of the film and varying in width, are present intermittently throughout the mission. Similar bands have been observed on Missions 1046 and 1049 (both using film type SO-230). These bands seem to be characteristic of the film and are images of the system film path components. They are formed as a function of environment

and are not the result of light leaks.

5. Physical Degradation: Emulsion buildup on the inboard film rails caused the time word format edge to be ragged from the take-up end of each frame to the middle fiducial. The middle fiducial is almost obscured by the end of the mission. Rail scratches are present throughout the mission.

6. Product Quality: The combined effect of the aforementioned anomalies did not significantly degrade the overall quality of the mission (revs 1-22 only). After rev 22, unstable vehicle attitude conditions adversely affected the image quality.

B. Aft-Looking Panoramic Camera

Note: Paragraphs 1, 2, and 3 refer to that part of the mission prior to and including rev 22.

1. Density: The density of the aft-looking material is similar to that of the fwd-looking material. Minor differences can be attributed to look angle and solar azimuth.

2. Contrast: The contrast is similar to that of the fwd-looking camera record.

3. Acuity: The aft-looking panoramic camera exhibits imagery comparable to that of the fwd-looking camera (frequency mark edge only). The aft camera imagery is consistent across the format and exhibits no out-of-focus area.

4. Image Degradations:

a. Light Leaks: Fog patterns are present on the fifth, second from last, and next to last frame of most camera operations. (Examples: Pass 1D, frame 4; pass 11D, frames 5, 21, and 22.) These patterns are illustrated in Graphic 3, page 9.

b. Static: Dendritic static is present intermittently along both edges and within the format throughout both missions.

c. Other: A minus density streak (0.25 inch wide), nearly parallel to the major axis of the film, is present intermittently throughout the missions. (Graphic 4, page 9.) Minus density bands, similar to those occurring in the fwd-looking material, are also present on the aft-looking material.

[redacted]

5. Physical Degradations: Emulsion build-up on the inboard film guide rails caused a ragged format edge along the binary edge of each frame. The center fiducial is almost totally obscured by the emulsion build-up. Rail scratches are present throughout the mission.

6. Product Quality: The overall quality is good and comparable to the better 1000 series. The aforementioned anomalies do not seriously degrade the product quality (revs 1-22). After rev 22, the overall image quality is considered to be poor due to the abnormal attitude of the vehicle.

C. Stellar Camera (Mission 1050-1, revs 1-22 only)

1. Density: The density of the active format is normal and adequate for the detection of stellar images.

2. Contrast: The contrast is adequate for the detection of stellar images.

3. Image Shape: The stellar images are generally point type and are suitable for attitude reduction.

4. Images Per Frame: There are approximately 25 stellar images per frame, a majority of which are considered suitable for attitude reduction.

5. Flare Level: Approximately 55 percent of the format is affected by flare. Stellar images can be detected within this flared area.

6. Image Degradations:

a. Light Leaks: None noted.
b. Static: None noted.
c. Other: Two distinct minus density spots are present throughout the mission. These spots are located 0.6 and 1.0 inch from the camera number edge.

7. Physical Degradations: None noted.

8. Product Quality: A sufficient number of stellar images are present to satisfactorily perform attitude reduction.

D. Stellar Camera (Mission 1050-1 (rev 23-31) and Mission 1050-2)

1. Density: The density varies from adequate to overexposed.

2. Contrast: The contrast varies from medium to low.

3. Image Shape: When stellar images are present, they are for the most part elongated in varying degrees.

4. Images Per Frame: The number of images per frame varies from none to about 25, depending upon vehicle orientation.

5. Flare Level: The flare level varies from normal (approximately 55 percent) to completey flared stellar frames.

6. Image Degradations:

a. Light Leaks: None noted.

b. Static: Dendritic static is present along both edges intermittently on Mission 1050-2.

7. Physical Degradations: Heat from an almost direct observation of the sun caused a 0.1 inch piece of emulsion to be bonded to the reseau plate. This occurred on frame 133 of Mission 1050-2. The emulsion piece was imaged on the remaining stellar frames as a minus density spot.

8. Product Quality: All of this material is unusable because of elongated stellar images or lack of stellar images due to overexposure.

E. Index Camera (Mission 1050-1)

1. Density: Generally medium.

2. Contrast: Generally medium.

3. Acuity: The acuity is good and comparable to that of recent missions. The abnormal vehicle attitude rates (after rev 22) did not adversely affect the general acuity of the imagery.

4. Image Degradations:

a. Light Leaks: None noted.

b. Static: Minor dendritic static is present along the camera number edge at the end of the mission.

5. Physical Degradations: None noted.

6. Product Quality: The product quality is generally good. However, the abnormal attitude rates (after rev 22) affected the image orientation and overlap which vary according to vehicle orientation.

F. Index Camera (Mission 1050-2)

1. Density: Generally medium.

2. Contrast: Generally medium.

3. Acuity: The acuity is good and is not adversely affected by the abnormal vehicle attitude rates.

4. Image Degradations:

a. Light Leaks: None noted.

b. Static: None noted.

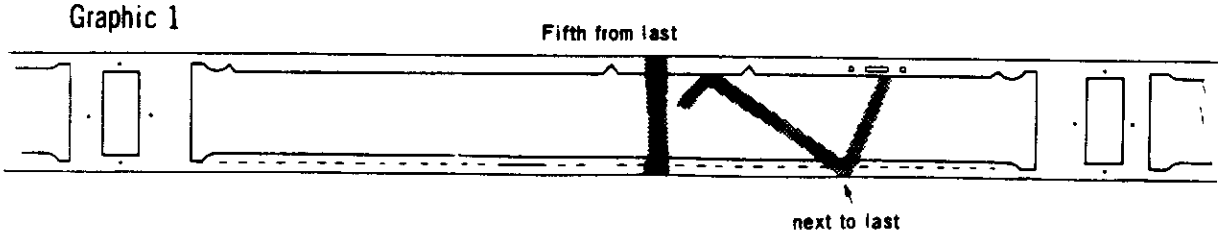
5. Physical Degradations: None noted.

6. Product Quality: The vehicle attitude anomaly did not seriously affect the quality except for image orientation and overlap.

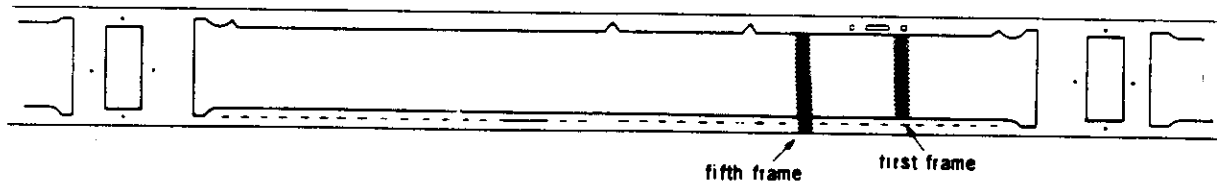
G. Graphic Display (Mission 1050)

The patterns illustrated below are referenced in the text of this report.

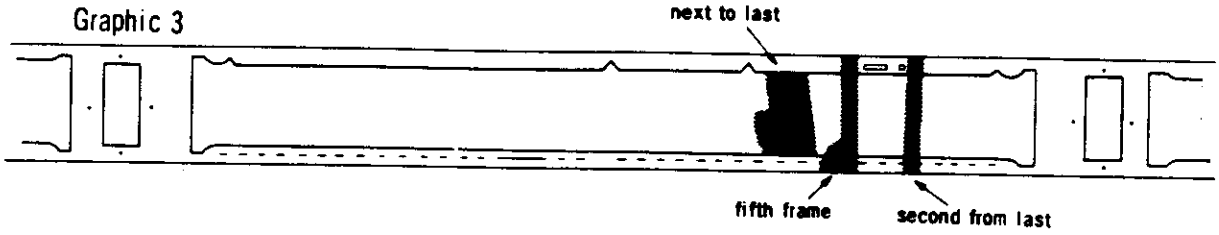
Graphic 1



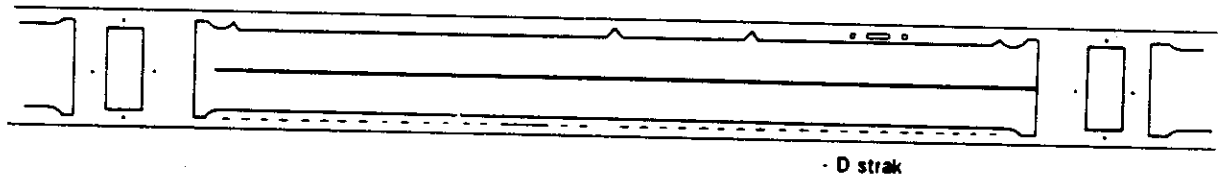
Graphic 2



Graphic 3



Graphic 4



NPIC M-6955

PART III. IMAGE AUXILIARY DATA

A. Fwd-Looking Panoramic Camera

1. Horizon Cameras:

a. Starboard-Looking

(1) Imagery: The horizon format is vignetted in one corner throughout the mission. The vignetting does not affect the image of the earth's curvature. The image (after rev 22) is displaced within the format to varying degrees, depending upon the vehicle attitude.

(2) Fiducials: The fiducials are sharp and well defined throughout the mission.

b. Port-Looking

(1) Imagery: Same as reported for the starboard looking.

(2) Fiducials: The fiducials are sharp and well defined throughout the mission.

2. Frequency marks: Imaged properly throughout the mission.

3. Binary Time Word: The binary word was imaged properly throughout the mission. No problems were encountered during the automatic read-out phase.

4. Binary Index: Imaged properly to insure adequate binary read-out.

5. Camera Number: Adequately imaged and readable throughout the mission.

6. Pan Geometry Dots: Not applicable.

7. Nodal Traces: Not applicable.

8. Nod Indicators: Not applicable.

B. Aft-Looking Panoramic Camera

1. Horizon Cameras:

a. Starboard-Looking

(1) Imagery: The horizon image is vignetted in one corner throughout the mission. The image of the earth's curvature varies in shape and orientation, depending upon vehicle attitude (after rev 22).

(2) Fiducials: Sharp and well defined.

b. Port-Looking

(1) Same as for the starboard.

(2) Same as for the starboard.

2. Frequency Marks: The time track is missing at the beginning of scan in varying lengths of up to 12 inches.

3. Binary Time Word: Same as for the forward camera.

4. Binary Index: Same as for the forward camera.

5. Camera Number: Readable throughout the mission.

6. Pan Geometry Dots: Not applicable.

7. Nodal Traces: Not applicable.

8. Nod Indicators: Not applicable.

C. Stellar Camera (Mission 1050-1)

1. Grid Image Quality: The grid is sharp and well defined except on those frames (after rev 22) that are overexposed.

2. Correlation Lamp Image Quality: Good.

D. Stellar Camera (1050-2)

1. Grid Image Quality: The quality varies from sharp and well defined to completely obscured by overexposure.

2. Correlation Lamp Image Quality: Good.

E. Index Camera (Mission 1050-1)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Good.

3. Camera Number Legibility: Readable.

F. Index Camera (Mission 1050-2)

1. Grid Image Quality: Sharp and well defined.

2. Correlation Lamp Image Quality: Good.

3. Camera Number Legibility: Readable.

PART IV. MENSURATION QUALITY

A. Fwd-Looking Panoramic Camera

The mensuration quality of Mission 1050 ranges from fair to good (revs 1-22). There were two mensuration requests during the initial readout of the mission. After rev 22, the material is considered to be unusable for mensuration purposes due to poor image quality and the lack of attitude data.

B. Aft-Looking Panoramic Camera

See fwd-looking information.

PART V. FILM PROCESSING

A. Processing Machines and Process Gamma

Film	Machine	Gamma
Fwd (Mission 1050-1)	Yardleigh	1.80
Aft (Mission 1050-1)	Yardleigh	1.98
Fwd (Mission 1050-2)	Yardleigh	1.76
Aft (Mission 1050-2)	Yardleigh	1.84
Stellar (Mission 1050-1)	Trenton	2.20
Stellar (Mission 1050-2)	Trenton	2.12
Index (Mission 1050-1)	Drape	.91
Index (Mission 1050-2)	Drape	.88

B. Processing Levels

1. Panoramic Cameras: The entire record was processed in dual gamma chemistry.

2. Secondary Cameras:

a. The stellar records were processed at a single level of development.

b. The index records were processed at a single level of development.

C. Film Handling Summary

1. Fwd-Looking Camera:

a. Capsule Defilming:

(1) Mission 1050-1: The material was defilmed in a normal manner without incident.

(2) Mission 1050-2: The material was defilmed in a normal manner; however, severe intermittent static discharges were observed.

b. Pre-Processing Inspection:

(1) Mission 1050-1: No problems encountered.

(2) Mission 1050-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1050-1: Frame 7, pass 16D.

(2) Mission 1050-2: Frame 37, pass 36D; frame 87, pass 39D; and frame 142, pass 42D.

d. Processing Splices:

(1) Mission 1050-1: None other than normal.

(2) Mission 1050-2: None other than normal.

e. Manufacturing Defects:

(1) Mission 1050-1: None noted.

(2) Mission 1050-2: None noted.

f. Processing Anomalies:

(1) Mission 1050-1: None.

(2) Mission 1050-2: None.

g. Breakdown: The material was handled in a normal manner for revs 1-22. After rev 22, the material was broken down into individual passes and spooled onto 1,000 foot composite rolls. Short (10 feet) head and tail idents were used instead of regular length (20 feet) idents.

2. Aft-Looking Camera:

a. Capsule De-Filming:

(1) Mission 1050-1: The material was despooled in a normal manner without incident.

(2) Mission 1050-2: Despooling was accomplished in a normal manner. Severe intermittent static discharges were observed.

b. Pre-Processing Inspection:

(1) Mission 1050-1: No problems encountered.

(2) Mission 1050-2: No problems encountered.

c. Manufacturing Splices:

(1) Mission 1050-1: Frame 33, pass 14D and frame 221, pass 30D.

(2) Mission 1050-2: Frame 59, pass 39D and frame 138, pass 42D.

d. Processing Splices:

(1) Mission 1050-1: None other than normal.

(2) Mission 1050-2: None other than normal.

e. Manufacturing Defects:

(1) Mission 1050-1: None.

(2) Mission 1050-2: None.

f. Processing Anomalies: None.

g. Breakdown: See explanation under fwd-looking camera.

3. Index Camera: No problems were encountered during capsule defilming, pre-processing inspection, and breakdown. There were no manufacturing splices, defects, or processing anomalies. There were no processing splices other than normal.

4. Stellar Camera: Same as for the index camera.

D. Timetable

Film	Recovered	Received at Processing Site	Spec Ship at NPIC Recd	Priority 1* at NPIC Recd
Fwd (Mission 1050-1)	22 Mar 69/ 0032Z	23 Mar 69/ 1605Z	None	25 Mar 69/ 1649Z
Aft (Mission 1050-1)	"	"	"	"
Stellar (Mission 1050-1)	"	"	"	"
Index (Mission 1050-1)	"	"	"	"

Film	Recovered	Received at Processing Site	Spec Ship at NPIC Recd	Priority 1A* at NPIC Recd
Fwd (Mission 1050-2)	22 Mar 69/ 0032Z	23 Mar 69/ 1605Z	None	25 Mar 69/ 1649Z
Aft (Mission 1050-2)	"	"	"	"
Stellar (Mission 1050-2)	"	"	"	"
Index (Mission 1050-2)	"	"	"	"

*One copy of the passes after rev 22 was received at the above time. The remaining copies (revs 23-48) were received on 28 March 1969 at 1349Z.

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 material.

PI suitability ratings are categorized as Excellent, Good, Fair, Poor, and Unusable. 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.

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

B. PI Statistics

1. Target Coverage:

	Missions 1050-1 & 2
Priority 1 Targets Programmed	No specific targets were programmed for this mission.
Priority 1 Targets Covered	37

2. PI Quality Appraisal:

Rating	Missiles	Nuclear Energy	Air Facilities	Ports	Elect Commo	Milit Act	Complex
Good	0	0	0	0	0	0	0
Fair	3	1	3	0	0	0	1
Poor	15	1	10	1	0	0	2

3. Summary of PI Quality Ratings:

Good None
Fair 8 or 21.6 percent
Poor 29 or 78.4 percent

C. PI Comments

1. Atmospheric Attenuation: The following is an analysis of the atmospheric conditions affecting the priority targets as reported by the photo interpreters during the initial readout of this mission.

Weather	Number of Targets
a. Clear	11 or 29.7 percent
b. Scattered Clouds	11 or 29.7 percent
c. Heavy Clouds	3 or 8.1 percent
d. Haze	9 or 24.4 percent
e. Cloud Shadow	3 or 8.1 percent

2. Terrain Conditions: The terrain conditions were considered to be fair. The terrain in the northern latitudes was snow covered to some extent, thereby limiting interpretation suitability.

3. PI Suitability: Due to the questionable intelligence value of the imagery acquired after rev 22, the breakdown team decided to send one duplicate positive (revs 23-48) to this facility for intelligence evaluation by the photo interpreters. The photo interpreters decided that the intelligence value of the material warranted full distribution of the entire mission. However, the usefulness of the material is limited in varying degrees due to the smeared imagery. Of the 37 priority targets reported out initially, 22 were located on the material acquired after rev 22. Seventeen of these targets were reported out as being of poor interpretation suitability. However, within four of the target areas, over 35 missile launch sites were newly identified.

FIGURE 1. BEST IMAGE QUALITY

Image quality comparable to the best of this mission.

FIGURE 2. CORRESPONDING COVERAGE

	FIGURE 1	FIGURE 2
Camera	210	211
Pass	14D	14D
Frame	3	3
Date of Photography (GMT)	20 Mar 69	20 Mar 69
Universal Grid Coordinates	33.9-11.8	58.0-12.8
Enlargement Factor	20X	20X
Geographic Coordinates	22-14S 68-28W	22-13S 68-35W
Altitude (ft)	652,978	655,452
Camera Attitude:		
Pitch	14°40'	-15°21'
Roll	0°03'	0°12'
Yaw	-2°43'	-2°29'
Local Sun Time	1403	1403
Solar Elevation	54°25'	54°27'
Solar Azimuth	131°	131°06'
Exposure (sec)	1/652	1/817
Vehicle Azimuth	175°43'	175°39'
Processing Level	Dual Gamma	Dual Gamma

[redacted]

[redacted]

[redacted]

[redacted]

FIGURES 3 & 4. EXAMPLES OF SMEARED IMAGERY

	FIGURE 3	FIGURE 4
Camera	210	210
Pass	31	31
Frame	28	28
Date of Photography (GMT)	21 Mar 69	21 Mar 69
Universal Grid Coordinates	32-13.4	34.2-9.8
Enlargement Factor	20X	20X

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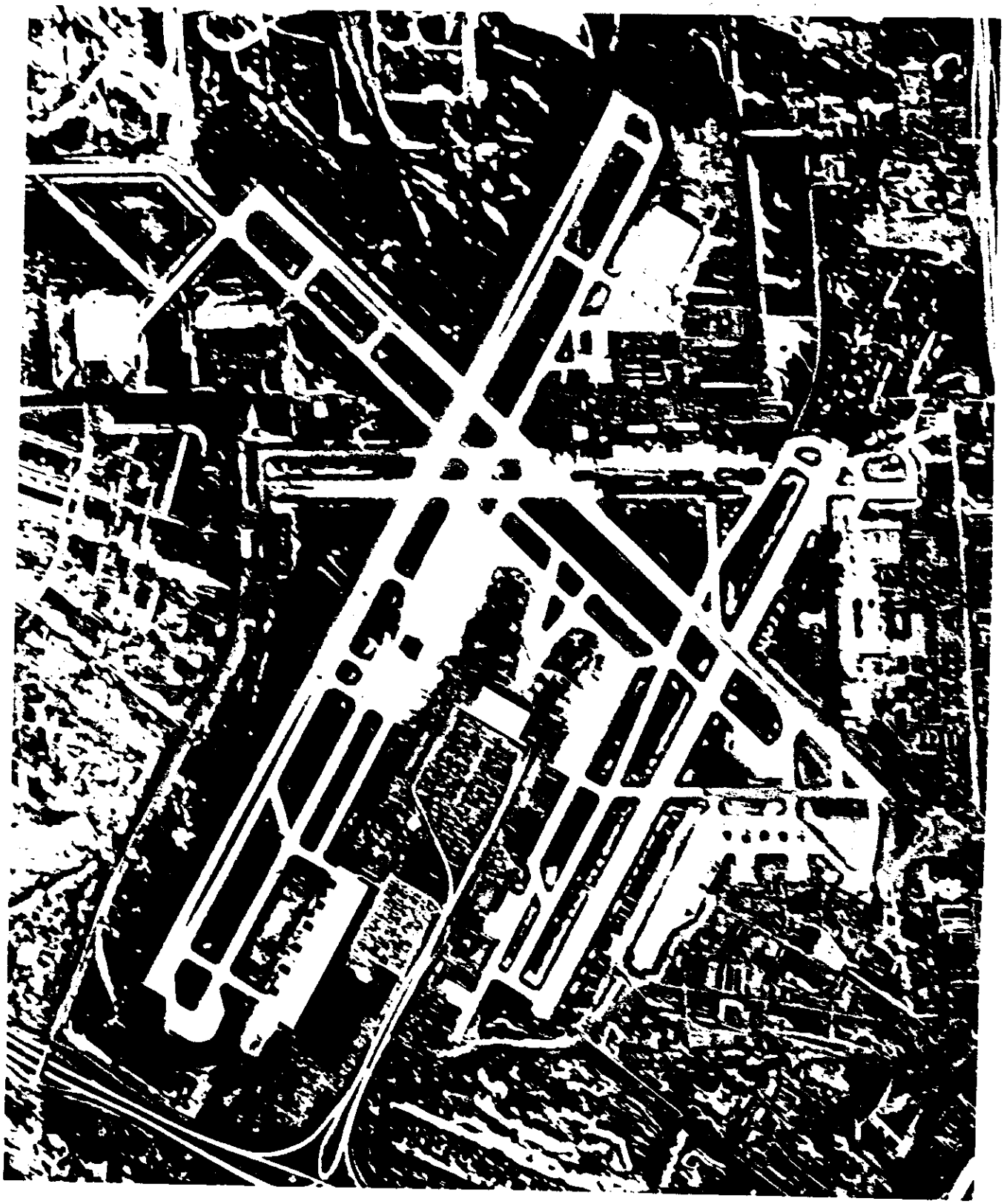

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