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TECHNICAL REPORT

Evaluation of S190A Radiometric Exposure Test Data

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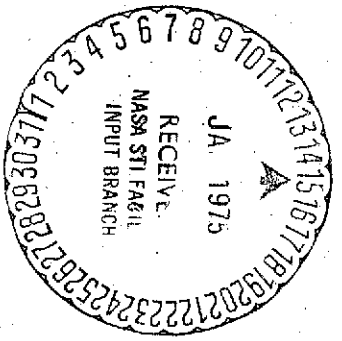

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Evaluation of S190A Radiometric
Exposure Test Data

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TABLE OF CONTENTS

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SECTION I

Introduction

The S190A preflight radiometric exposure test data generated at Kennedy Space Center as part of preflight and system test of KM-002 Sequence 29 on flight camera S/N 002 was analyzed.

The purpose of the analysis was to determine camera system transmission using available data which included:

- Films exposed to a calibrated light source subject.
- Filter transmission data.
- Calibrated light source data.
- Density vs. Log_{10} Exposure curves for the films.
- Spectral sensitometric data for the films.

This report outlines the procedure used, includes the data and a transmission matrix as a function of field position for nine measured points on each station-film-filter-aperture-shutter speed combination.

SECTION II

Procedure

The Photographic Technology Division (PTD) received six rolls of film and a series of documents, as follows, from which S190A camera system transmission was to be determined.

- Itek system resolution report
- Spectral radiometric calibration of S190A light source
- Evaluation of KM-002 film
- Sensor Performance Report, MSC #05526

The procedure was as follows:

A. Organize Spectral Radiometric and Photometric Data

The calibration data of the S190A light source was reviewed and correlated with the imagery. Data included measurements recorded in watts/cm^2/10nm units taken from the source at 9 positions as drawn:

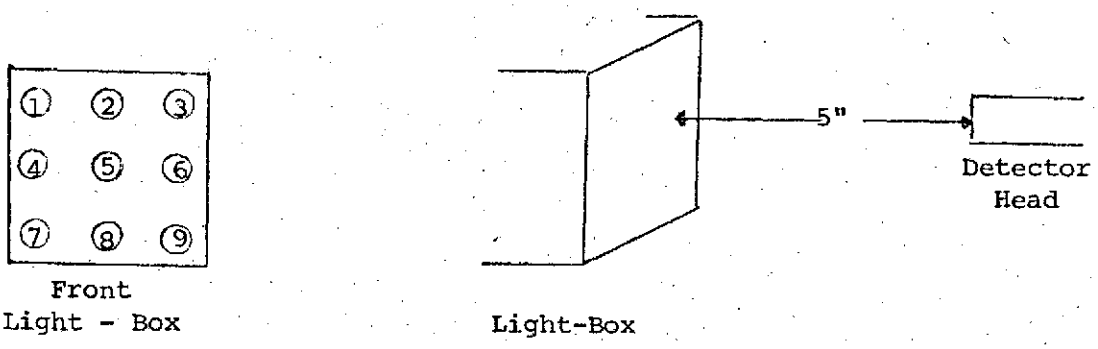

FIGURE 1

Light Measurement Orientation

It was assumed that each camera frame recorded this array, and nine density measurements in the image should correlate with the nine light box positions.

The data from each station-film-filter-aperture-shutter speed combination was correlated to determine the parameters used for each image exposure.

Reviewing the S190A light source data raised some questions.

- The report suggests that to convert radiometer meter readings to watts/cm^2/10nm one should multiply by the spectral response of the radiometer in amps/watt. It is believed that division rather than multiplication will give the correct result.

- There is some doubt regarding the model number 580-11A listed for the radiometer IR detector head. It may be 580-23A.

- The physical dimensions of the light box and the test layout are described in insufficient detail to accurately determine box position versus image position. The assumption shown above in Figure 1 was made for data recorded and calculated here.

- The configuration of the EG&G radiometer used to measure the calibrated light source was not specified. The angular acceptance of the

instrument is required to calculate illumination from source angular radiance in watts per cm^2-steradian-nm. It was deduced from the equipment list that the radiometer was used by placing the filter holder against the lightbox and neither field limiting cone nor other attachments were used. An acceptance angle of 51° was derived by measuring the EG&G radiometer maintained by PTD.

B. Inspect and Read Imagery

Each of the six rolls of S190A imagery was examined and its frames were correlated with summary sheets showing the order of exposure.

Some questions in correlation did arise because extra exposures were made on some of the rolls and notations were absent in the summary sheets. Using densitometry as a guide these questions were resolved.

Visual density of each black-and-white image and red-green-blue densities of each color image were measured on the MacBeth TD-217 densitometer with a 2 mm aperture.

The film was oriented on the densitometer emulsion- up and readings were as shown in Figure 2.

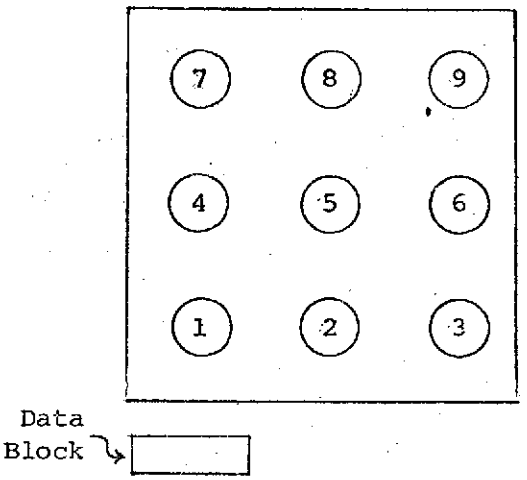

FIGURE 2

FILM ORIENTATION FOR READING

C. Calculate Camera System Transmission

The normal method, film density values and D-log E data, was used to determine the camera system transmission, T_{cs}, by the formula

$$T_{cs} = \frac{4 f^2 E \ 10^{-7} \int d_\lambda}{t \int N_\lambda F_\lambda d_\lambda}$$

f = camera aperture

E = exposure to produce film density measured from D-log E curves

N = subject brightness

t = camera shutter open time

F = filter transmission

Because the D-log E curves were derived using filters in the sensitometer (Table 1) which were simulations, not reproductions, of only some of the S190A camera filters this method was not feasible for all the data, therefore, an alternate method was used to determine T_{cs}.

TABLE 1

Camera vs. Sensitometer Filters

Station	Film	S190A Filter	Sensitometer Filter
1	2424	CC	5500°K + 89B
2	2424	DD	5500°K + 89B
3	2443	EE	5500°K + W12*
4	SO-356	FF	5500°K*
5	SO-022	BB	5500°K + 25A*
5	SO-022	JJ	5500°K + 25A
6	SO-022	AA	5500°K + 25A
7	SO-022	GG+MM	5500°K + 25A

* Reasonable Simulation

Camera system transmission was calculated by determining the exposure to be expected on the film using Van Kreveld's[2,4] Law and available exposure data as follows:

The camera exposure equation is

$$E = It$$

where

E = exposure

I = irradiance at the image plane

t = time of exposure

Irradiance at the image plane for a perfect lens[4] is

$$I = \frac{\pi N_o}{4f^2}$$

where

N_o = apparent object radiance

f = camera aperture

Exposure is the reciprocal of film sensitivity,

$$E = \frac{1}{S}$$

Since $E = I \cdot t$, this becomes

$$E = \frac{1}{S} = \frac{t\pi N_o}{4 f^2}$$

Apparent object radiance, N_o, is the actual object radiance, N, reduced by the camera filter transmission, F, and lens transmission, T, at any wavelength, λ, to give

$$N_o = N_\lambda T_\lambda F_\lambda$$

By substitution,

$$\frac{1}{S_\lambda} = \frac{t\pi N_\lambda T_\lambda F_\lambda}{4f^2}$$

therefore, the lens transmission for any wavelength, T_λ, is

$$T_\lambda = \frac{4f^2}{t \pi S_\lambda N_\lambda F_\lambda}$$

The camera system transmission, T_{cs}, for a series of wavelengths requires the integration of T_λ, for each wavelength interval, d_λ.

$$T_{cs} = \frac{4f^2}{t\pi \int S_\lambda N_\lambda F_\lambda d_\lambda}$$

This formula applies in general. This specific case required the following factors:

- To convert ergs/cm^2 to watt sec/cm^2 $= 10^7$
- To correct radiometric acceptance angle of 51°; $\pi \sin^2\phi = 1.88$
- To correct for image density Log E vs. spectral sensitometric density Log E $= \frac{E_m}{E_s}$
- To correct for gamma differences for each S_λ density $= K$

Exposure Correction Factor

Spectral sensitometric data, Appendix B, is determined at a limited series of discrete densities therefore a correction for actual image density was necessary. This was done by determining the exposure factor required to produce the difference between spectral sensitometric and camera densities as measured on the film-filter D-log E data, Appendix A.

Gamma Correction Factor

A comparison of the spectral sensitometric data and the film-filter D-log E curves shows a discrepancy in gamma.

The differences in log E required to produce the densities used for determining spectral sensitivity are not proportional to the differences in log E required to produce the same densities on the D-log E curve. They should be proportional by $E = \frac{1}{S}$. For example, with 2424 film-filter D-log E data, a log E factor of 0.11 is required to increase density from 1.0 to 1.2, but a log spectral sensitivity (S_λ) increase of 0.135 is necessary to produce the same change in density.

Curves were derived for each film type using log S_λ differences on the log E axis. In all cases, log S_λ differences were greater than Log E differences required to produce equal densities resulting in lower gamma. With SO-022 film, the 25A filter data derived using sensitometer exposure could be used to calculate the gamma correction curve because it correlated with the S190 camera filter BB. For other films the relationship of the sensitometric and spectral sensitometric curves could only be estimated. These curves, included in Appendix B, were used to determine a correction Log E factor for each S_λ reference density shown in Table . These factors, K, were applied to the formula resulting in:

$$T_{cs} = \frac{E_m K\ 7.52\ f^2}{E_s 10^7\ t\pi \int S_\lambda N_\lambda F_\lambda d_\lambda}$$

This formula was applied to all data except SO-022 film with a BB filter.

TABLE

GAMMA CORRECTION FACTORS

2424 Film

Density	Factor
0.4	0.955
0.6	0.850
0.8	0.813
1.0	0.759
1.2	0.724
1.4	0.617
1.6	0.617
1.8	0.562
2.0	0.537

SO-022 Film

Density	Factor
0.4	1.387
0.6	1.318
0.8	1.070
1.0	1.070
1.2	0.983
1.4	0.955
1.6	0.933
1.8	0.895
2.0	0.851

SO-356 Film

Density	Factor
Red Layer	
1.0	1.047
1.5	1.122
Green Layer	
1.0	1.096
1.5	1.202
Blue Layer	
1.0	1.148
1.5	1.585

2443 Film

Density	Factor
Red Layer	
1.0	1.047
1.5	1.096
2.0	1.259
Green Layer	
1.0	1.096
1.5	1.230
2.0	1.622
Blue Layer	
1.0	1.072
1.5	1.202
2.0	1.380

T_{cs} for the remaining eight density points in each transmission matrix was calculated using relative log E data.

Transmission Using Sensitometric Exposure Data

Because the BB and 25A filters are essentially the same, it was valid to calculate transmission in one case, SO-022 with a BB filter, using the D-log E curve for a 25A filter and SO-022 film to determine exposure then solving

$$T_{cs} = \frac{4f^2 \, E \, 10^{-7} \int d_\lambda}{t \int N_\lambda F_\lambda \, d_\lambda}$$

where

E = exposing energy from Density versus Log E curve at measured density, D

f = camera aperture

t = camera shutter speed

N = effective light source

F = filter transmission

The results of these calculations were used to determine the location of the gamma correction curve relative to the D-log E for SO-022. The gamma correction factors derived from this curve were then applied to SO-022 film with the JJ, MM + GG, and AA filters.

The results of calculations using this formula are shown in the SO-022 film-BB filter data.

SECTION III

Results

Tabulated in this section are the results as measured and calculated for nine in-frame locations for each film-filter-aperture-shutter speed.

A. Transmission Matrix with Exposure Data

The camera system transmission calculated for each station-film-filter-shutter speed are included on the following pages.

STATION 1 APERTURE 9.5

FILTER CC SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2586 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.33}{2.24} = 1.23 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{834.9}{812} \text{ @ center position}$$

D = 2.03	D = 2.06	D = 2.04
T_{cs} = 0.515	T_{cs} = 0.534	T_{cs} = 0.521
D = 2.06	D = 2.08	D = 2.07
T_{cs} = 0.534	T_{cs} = 0.548	T_{cs} = 0.542
D = 2.05	D = 2.06	D = 2.05
T_{cs} = 0.528	T_{cs} = 0.534	T_{cs} = 0.528

STATION 1 APERTURE 9.5

FILTER CC SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3920 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.04}{2.10} = 0.87 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{591.11}{615.44} \text{@ center position}$$

$D = 1.64$	$D = 1.67$	$D = 1.65$
$T_{cs} = 0.483$	$T_{cs} = 0.501$	$T_{cs} = 0.489$
$D = 1.69$	$D = 1.73$	$D = 1.72$
$T_{cs} = 0.514$	$T_{cs} = 0.54$	$T_{cs} = 0.533$
$D = 1.68$	$D = 1.73$	$D = 1.69$
$T_{cs} = 0.507$	$T_{cs} = 0.54$	$T_{cs} = 0.514$

STATION 1 APERTURE 9.5

FILTER CC SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1017 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.78}{1.77} = 1.023 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{694.5}{798.35} @ \text{ center position}$$

D = 1.17	D = 1.17	D = 1.11
T_{cs} = 0.584	T_{cs} = 0.584	T_{cs} = 0.804
D = 1.23	D = 1.23	D = 1.17
T_{cs} = 0.629	T_{cs} = 0.629	T_{cs} = 0.584
D = 1.18	D = 1.19	D = 1.14
T_{cs} = 0.592	T_{cs} = 0.599	T_{cs} = 0.563

STATION 1 APERTURE 13.0

FILTER CC SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3920 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.09}{2.10} = .977 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1241.95}{1230.88} \text{@ center position}$$

D = 1.74	D = 1.73	D = 1.68
T_{cs} = 0.533	T_{cs} = 0.527	T_{cs} = 0.495
D = 1.79	D = 1.79	D = 1.75
T_{cs} = 0.566	T_{cs} = 0.566	T_{cs} = 0.54
D = 1.76	D = 1.78	D = 1.72
T_{cs} = 0.546	T_{cs} = 0.56	T_{cs} = 0.52

STATION 1 APERTURE 13.0

FILTER CC SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1017 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.81}{1.77} = 1.096 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1393.5}{1596.7} @ \text{ center position}$$

D = 1.16	D = 1.20	D = 1.16
T_{cs} = 0.557	T_{cs} = 0.585	T_{cs} = 0.557
D = 1.23	D = 1.26	D = 1.24
T_{cs} = 0.607	T_{cs} = 0.63	T_{cs} = 0.614
D = 1.20	D = 1.24	D = 1.20
T_{cs} = 0.585	T_{cs} = 0.614	T_{cs} = 0.585

STATION 1 APERTURE 13.0

FILTER CC SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2009 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.51}{1.55} = 0.912 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1159.06}{1577.06} @ \text{ center position}$$

D = 0.63	D = 0.68	D = 0.68
T_{cs} = 0.51	T_{cs} = 0.541	T_{cs} = 0.541
D = 0.69	D = 0.76	D = 0.76
T_{cs} = 0.549	T_{cs} = 0.598	T_{cs} = 0.598
D = 0.67	D = 0.72	D = 0.69
T_{cs} = 0.535	T_{cs} = 0.569	T_{cs} = 0.549

STATION 1 APERTURE 16.0

FILTER CC SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.5467 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.00}{1.97} = 1.07 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{2059.87}{1716.6} @ \text{ center position}$$

D = 1.51	D = 1.56	D = 1.44
T_{cs} = 0.624	T_{cs} = 0.663	T_{cs} = 0.573
D = 1.59	D = 1.65	D = 1.50
T_{cs} = 0.688	T_{cs} = 0.74	T_{cs} = 0.616
D = 1.52	D = 1.58	D = 1.45
T_{cs} = 0.631	T_{cs} = 0.679	T_{cs} = 0.579

STATION 1 APERTURE 16.0

FILTER CC SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1412 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.66}{1.68} = 0.955 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2}{t\pi 10^7} \frac{1.88}{\int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1838.5}{2216.8} \quad \text{@ center position}$$

D = 0.89	D = 0.88	D = 0.85
T_{cs} = 0.597	T_{cs} = 0.594	T_{cs} = 0.59
D = 0.97	D = 0.98	D = 0.93
T_{cs} = 0.626	T_{cs} = 0.629	T_{cs} = 0.612
D = 0.92	D = 0.94	D = 0.90
T_{cs} = 0.608	T_{cs} = 0.616	T_{cs} = 0.601

STATION 1 APERTURE 16.0

FILTER CC SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2924 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.24}{1.40} = 0.69 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1331.8}{2295.34} \text{ @ center position}$$

D = 0.42	D = 0.46	D = 0.56
T_{cs} = 0.521	T_{cs} = 0.547	T_{cs} = 0.619
D = 0.57	D = 0.47	D = 0.66
T_{cs} = 0.626	T_{cs} = 0.554	T_{cs} = 0.699
D = 0.45	D = 0.52	D = 0.49
T_{cs} = 0.541	T_{cs} = 0.589	T_{cs} = 0.567

STATION 2 APERTURE 8.0

FILTER DD SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1914 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.64}{2.24} = 2.5 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1208.9}{600.99} \text{ @ center position}$$

D = 2,23	D = 2,24	D = 2.23
T_{cs} = 1.053	T_{cs} = 1.069	T_{cs} = 1.053
D = 2.25	D = 2.25	D = 2.24
T_{cs} = 1.08	T_{cs} = 1.08	T_{cs} = 1.069
D = 2.23	D = 2.24	D = 2.22
T_{cs} = 1.053	T_{cs} = 1.069	T_{cs} = 1.04

STATION 2 APERTURE 8.0

FILTER DD SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1914 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.24}{2.24} = 1.0 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{481.28}{300.49} \text{ @ center position}$$

D = 1.98	D = 2.00	D = 2.00
T_{cs} = 0.827	T_{cs} = 0.849	T_{cs} = 0.849
D = 2.00	D = 2.01	D = 2.00
T_{cs} = 0.849	T_{cs} = 0.859	T_{cs} = 0.849
D = 1.98	D = 1.99	D = 1.98
T_{cs} = 0.827	T_{cs} = 0.838	T_{cs} = 0.827

STATION 2 APERTURE 8.0

FILTER DD SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.4675 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.96}{1.97} = 0.977 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{470.32}{366.99} \quad @ \text{ center position}$$

D = 1.51	D = 1.54	D = 1.51
T_{cs} = 0.716	T_{cs} = 0.74	T_{cs} = 0.716
D = 1.56	D = 1.59	D = 1.55
T_{cs} = 0.759	T_{cs} = 0.79	T_{cs} = 0.753
D = 1.51	D = 1.56	D = 1.53
T_{cs} = 0.716	T_{cs} = 0.759	T_{cs} = 0.734

STATION 2 APERTURE 11.0

FILTER DD SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1914 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.32}{2,24} = 1.20 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1091.9}{600.99} \text{ @ center position}$$

D = 2.03	D = 2.05	D = 2.04
T_{cs} = 0.929	T_{cs} = 0.956	T_{cs} = 0.94
D = 2.06	D = 2.07	D = 2.05
T_{cs} = 0.967	T_{cs} = 0.977	T_{cs} = 0.956
D = 2.03	D = 2.05	D = 2.02
T_{cs} = 0.929	T_{cs} = 0.956	T_{cs} = 0.918

STATION 2 APERTURE 11.0

FILTER DD SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.4675 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.98}{1.97} = 1.02 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{928.11}{733.98} \text{ @ center position}$$

D = 1.60	D = 1.62	D = 1.58
T_{cs} = 0.747	T_{cs} = 0.765	T_{cs} = 0.734
D = 1.65	D = 1.63	D = 1.61
T_{cs} = 0.795	T_{cs} = 0.777	T_{cs} = 0.759
D = 1.62	D = 1.61	D = 1.59
T_{cs} = 0.765	T_{cs} = 0.759	T_{cs} = 0.74

STATION 2 APERTURE 11.0

FILTER DD SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1200 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.73}{1.67} = 1.15 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1044.7}{942} \text{@ center position}$$

D = 1.02	D = 1.06	D = 1.07
T_{cs} = 0.767	T_{cs} = 0.805	T_{cs} = 0.812
D = 1.06	D = 1.10	D = 1.13
T_{cs} = 0.805	T_{cs} = 0.842	T_{cs} = 0.873
D = 1.03	D = 1.07	D = 1.17
T_{cs} = 0.774	T_{cs} = 0.812	T_{cs} = 0.918

STATION 2 APERTURE 16.0

FILTER DD SHUTTER 0.010

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.4675 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.99}{1.97} = 1.047 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{2015.84}{1467.95} \text{ @ center position}$$

D = 1.58	D = 1.59	D = 1.57
T_{cs} = 0.796	T_{cs} = 0.802	T_{cs} = 0.784
D = 1.63	D = 1.63	D = 1.60
T_{cs} = 0.845	T_{cs} = 0.845	T_{cs} = 0.814
D = 1.59	D = 1.60	D = 1.56
T_{cs} = 0.802	T_{cs} = 0.814	T_{cs} = 0.778

STATION 2 APERTURE 16.0

FILTER DD SHUTTER 0.005

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1200 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.70}{1.67} = 1.071 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{2062.3}{1884} \quad @ \text{ center position}$$

D = 1.03	D = 1.05	D = 1.02
T_{cs} = 0.789	T_{cs} = 0.805	T_{cs} = 0.782
D = 1.07	D = 1.07	D = 1.06
T_{cs} = 0.827	T_{cs} = 0.827	T_{cs} = 0.82
D = 1.05	D = 1.05	D = 1.01
T_{cs} = 0.805	T_{cs} = 0.805	T_{cs} = 0.767

STATION 2 APERTURE 16.0

FILTER DD SHUTTER 0.0025

FILM 2424

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2469 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.39}{1.40} = 0.977 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} \quad \frac{1881.29}{1938} \text{@ center position}$$

D = 0.56	D = 0.56	D = 0.53
T_{cs} = 0.795	T_{cs} = 0.795	T_{cs} = 0.766
D = 0.61	D = 0.59	D = 0.56
T_{cs} = 0.845	T_{cs} = 0.825	T_{cs} = 0.795
D = 0.58	D = 0.56	D = 0.53
T_{cs} = 0.814	T_{cs} = 0.795	T_{cs} = 0.766

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.010

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{3.00}{1.81} = 15.49 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{3652.5}{3278} @ \text{ center position}$$

D = 0.08	D = 0.08	D = 0.08
T_{cs} = 1.16	T_{cs} = 1.16	T_{cs} = 1.16
D = 0.08	D = 0.08	D = 0.08
T_{cs} = 1.16	T_{cs} = 1.16	T_{cs} = 1.16
D = 0.08	D = 0.08	D = 0.08
T_{cs} = 1.16	T_{cs} = 1.16	T_{cs} = 1.16

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.005

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.84}{1.81} = 10.715 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{2526.9}{1639} @ \text{ center position}$$

D = 0.11	D = 0.11	D = 0.11
T_{cs} = 1.612	T_{cs} = 1.612	T_{cs} = 1.612
D = 0.10	D = 0.11	D = 0.10
T_{cs} = 1.623	T_{cs} = 1.612	T_{cs} = 1.623
D = 0.10	D = 0.11	D = 0.10
T_{cs} = 1.623	T_{cs} = 1.612	T_{cs} = 1.623

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.0025

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.53}{1.81} = 5.24 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1237.64}{819.5} \text{ @ center position}$$

D = 0.19	D = 0.18	D = 0.19
T_{cs} = 1.560	T_{cs} = 1.570	T_{cs} = 1.560
D = 0.18	D = 0.17	D = 0.18
T_{cs} = 1.570	T_{cs} = 1.58	T_{cs} = 1.570
D = 0.19	D = 0.18	D = 0.19
T_{cs} = 1.560	T_{cs} = 1.570	T_{cs} = 1.560

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.010

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.84}{1.81} = 10.715 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{3822.94}{3278} @ \text{ center position}$$

D = 0.12	D = 0.12	D = 0.12
T_{cs} = 1.214	T_{cs} = 1.214	T_{cs} = 1.214
D = 0.12	D = 0.11	D = 0.12
T_{cs} = 1.214	T_{cs} = 1.22	T_{cs} = 1.214
D = 0.12	D = 0.12	D = 0.12
T_{cs} = 1.214	T_{cs} = 1.214	T_{cs} = 1.214

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.005

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.53}{1.81} = 5.24 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{2525.8}{1639} @ \text{ center position}$$

D = 0.20	D = 0.21	D = 0.21
T_{cs} = 1.591	T_{cs} = 1.581	T_{cs} = 1.581
D = 0.20	D = 0.18	D = 0.20
T_{cs} = 1.591	T_{cs} = 1.61	T_{cs} = 1.591
D = 0.20	D = 0.20	D = 0.21
T_{cs} = 1.591	T_{cs} = 1.591	T_{cs} = 1.581

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.0025

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.16}{1.81} = 2.238 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1077.45}{819.5} \text{ @ center position}$$

D = 0.43	D = 0.42	D = 0.42
T_{cs} = 1.340	T_{cs} = 1.350	T_{cs} = 1.350
D = 0.40	D = 0.39	D = 0.40
T_{cs} = 1.361	T_{cs} = 1.37	T_{cs} = 1.361
D = 0.42	D = 0.40	D = 0.42
T_{cs} = 1.350	T_{cs} = 1.361	T_{cs} = 1.350

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.010

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.47}{1.81} = 4.57 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{4159}{3278} \text{ @ center position}$$

D = 0.22	D = 0.22	D = 0.22
T_{cs} = 1.305	T_{cs} = 1.305	T_{cs} = 1.305
D = 0.21	D = 0.20	D = 0.21
T_{cs} = 1.311	T_{cs} = 1.319	T_{cs} = 1.311
D = 0.21	D = 0.22	D = 0.23
T_{cs} = 1.311	T_{cs} = 1.305	T_{cs} = 1.297

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.0025

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.85}{1.81} = 1.096 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{997.7}{819.5} \quad @ \text{ center position}$$

D = 0.98	D = 0.93	D = 0.99
T_{cs} = 1.213	T_{cs} = 1.248	T_{cs} = 1.207
D = 0.94	D = 0.89	D = 0.93
T_{cs} = 1.241	T_{cs} = 1.28	T_{cs} = 1.248
D = 0.97	D = 0.93	D = 0.99
T_{cs} = 1.219	T_{cs} = 1.248	T_{cs} = 1.207

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.005

FILM 2443, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1044 \times 10^{-1}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.15}{1.81} = 2.188 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1990.68}{1639.1} \text{ @ center position}$$

D = 0.43	D = 0.41	D = 0.43
T_{cs} = 1.238	T_{cs} = 1.253	T_{cs} = 1.238
D = 0.41	D = 0.39	D = 0.41
T_{cs} = 1.253	T_{cs} = 1.27	T_{cs} = 1.253
D = 0.44	D = 0.41	D = 0.43
T_{cs} = 1.232	T_{cs} = 1.253	T_{cs} = 1.238

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.010

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.54}{1.72} = 6.6 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1558.09}{1049} \quad @ \text{ center position}$$

D = 0.15	D = 0.14	D = 0.15
T_{cs} = 1.63	T_{cs} = 1.644	T_{cs} = 1.63
D = 0.15	D = 0.15	D = 0.15
T_{cs} = 1.63	T_{cs} = 1.63	T_{cs} = 1.63
D = 0.15	D = 0.15	D = 0.15
T_{cs} = 1.63	T_{cs} = 1.63	T_{cs} = 1.63

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.005

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.29}{1.72} = 3.71 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{876.18}{524.5} @ \text{ center position}$$

D = 0.18	D = 0.18	D = 0.18
T_{cs} = 1.83	T_{cs} = 1.83	T_{cs} = 1.83
D = 0.18	D = 0.18	D = 0.18
T_{cs} = 1.83	T_{cs} = 1.83	T_{cs} = 1.83
D = 0.18	D = 0.18	D = 0.18
T_{cs} = 1.83	T_{cs} = 1.83	T_{cs} = 1.83

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.0025

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.03}{1.72} = 2.04 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{481.49}{262.2} @ \text{ center position}$$

D = 0.43	D = 0.40	D = 0.43
T_{cs} = 1.962	T_{cs} = 2.004	T_{cs} = 1.962
D = 0.42	D = 0.39	D = 0.41
T_{cs} = 1.976	T_{cs} = 2.02	T_{cs} = 1.989
D = 0.43	D = 0.40	D = 0.41
T_{cs} = 1.962	T_{cs} = 2.004	T_{cs} = 1.989

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.010

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.29}{1.72} = 3.715 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1788.12}{1049} @ \text{ center position}$$

D = 0.19	D = 0.18	D = 0.18
T_{cs} = 1.85	T_{cs} = 1.86	T_{cs} = 1.86
D = 0.18	D = 0.18	D = 0.18
T_{cs} = 1.86	T_{cs} = 1.86	T_{cs} = 1.86
D = 0.19	D = 0.18	D = 0.18
T_{cs} = 1.85	T_{cs} = 1.86	T_{cs} = 1.86

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.005

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.03}{1.72} = 2.04 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{982.65}{524.5} \text{ @ center position}$$

D = 0.45	D = 0.41	D = 0.44
T_{cs} = 1.96	T_{cs} = 2.02	T_{cs} = 1.98
D = 0.41	D = 0.39	D = 0.41
T_{cs} = 2.02	T_{cs} = 2.05	T_{cs} = 2.02
D = 0.43	D = 0.41	D = 0.43
T_{cs} = 1.99	T_{cs} = 2.02	T_{cs} = 1.99

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.0025

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.74}{1.72} = 1.047 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{503.96}{262.26} \text{ @ center position}$$

D = 1.03	D = 0.99	D = 1.01
T_{cs} = 1.99	T_{cs} = 2.04	T_{cs} = 2.02
D = 0.99	D = 0.95	D = 0.98
T_{cs} = 2.04	T_{cs} = 2.10	T_{cs} = 2.06
D = 1.03	D = 0.97	D = 1.02
T_{cs} = 1.99	T_{cs} = 2.07	T_{cs} = 2.01

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.010

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.05}{1.72} = 2.08 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1901.09}{1049.1} @ \text{ center position}$$

D = 0.42	D = 0.40	D = 0.40
T_{cs} = 1.92	T_{cs} = 1.95	T_{cs} = 1.95
D = 0.39	D = 0.37	D = 0.39
T_{cs} = 1.96	T_{cs} = 1.98	T_{cs} = 1.96
D = 0.41	D = 0.39	D = 0.41
T_{cs} = 1.94	T_{cs} = 1.96	T_{cs} = 1.94

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.005

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3341 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.75}{1.72} = 1.07 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{974.9}{524.5} \quad @ \text{ center position}$$

D = 1.00	D = 0.95	D = 0.98
T_{cs} = 1.92	T_{cs} = 1.98	T_{cs} = 1.94
D = 0.98	D = 0.92	D = 0.95
T_{cs} = 1.94	T_{cs} = 2.03	T_{cs} = 1.98
D = 1.01	D = 0.96	D = 0.99
T_{cs} = 1.91	T_{cs} = 1.97	T_{cs} = 1.94

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.0025

FILM 2443, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7151 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.48}{1.55} = 0.85 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{774.47}{561.4} \text{ @ center position}$$

D = 1.85	D = 1.80	D = 1.84
T_{cs} = 1.57	T_{cs} = 1.62	T_{cs} = 1.58
D = 1.79	D = 1.75	D = 1.79
T_{cs} = 1.63	T_{cs} = 1.50	T_{cs} = 1.63
D = 1.85	D = 1.80	D = 1.85
T_{cs} = 1.57	T_{cs} = 1.62	T_{cs} = 1.57

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.010

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.37}{1.69} = 4.79 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1128.74}{1922} \text{ @ center position}$$

D = 0.23	D = 0.22	D = 0.22
T_{cs} = 0.63	T_{cs} = 0.634	T_{cs} = 0.634
D = 0.23	D = 0.23	D = 0.22
T_{cs} = 0.63	T_{cs} = 0.63	T_{cs} = 0.634
D = 0.22	D = 0.23	D = 0.23
T_{cs} = 0.634	T_{cs} = 0.63	T_{cs} = 0.63

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.005

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.16}{1.69} = 2.95 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{695.9}{961} \quad @ \text{ center position}$$

D = 0.34	D = 0.32	D = 0.33
T_{cs} = 0.76	T_{cs} = 0.77	T_{cs} = 0.76
D = 0.32	D = 0.32	D = 0.32
T_{cs} = 0.77	T_{cs} = 0.77	T_{cs} = 0.77
D = 0.33	D = 0.31	D = 0.32
T_{cs} = 0.76	T_{cs} = 0.723	T_{cs} = 0.77

STATION 3 APERTURE 5.6

FILTER EE SHUTTER 0.0025

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.90}{1.69} = 1.62 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{382.46}{480.5} @ \text{ center position}$$

D = 0.61	D = 0.58	D = 0.60
T_{cs} = 0.834	T_{cs} = 0.843	T_{cs} = 0.837
D = 0.60	D = 0.57	D = 0.59
T_{cs} = 0.837	T_{cs} = 0.846	T_{cs} = 0.840
D = 0.59	D = 0.55	D = 0.57
T_{cs} = 0.840	T_{cs} = 0.853	T_{cs} = 0.846

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.010

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.17}{1.69} = 3.02 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{1453.4}{1922.3} \text{ @ center position}$$

D = 0.33	D = 0.33	D = 0.33
T_{cs} = 0.811	T_{cs} = 0.811	T_{cs} = 0.811
D = 0.32	D = 0.32	D = 0.32
T_{cs} = 0.815	T_{cs} = 0.815	T_{cs} = 0.815
D = 0.33	D = 0.32	D = 0.33
T_{cs} = 0.811	T_{cs} = 0.815	T_{cs} = 0.811

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.005

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.91}{1.69} = 1.66 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{798.73}{961.1} \text{ @ center position}$$

D = 0.64	D = 0.60	D = 0.62
T_{cs} = 0.862	T_{cs} = 0.875	T_{cs} = 0.869
D = 0.59	D = 0.56	D = 0.59
T_{cs} = 0.879	T_{cs} = 0.890	T_{cs} = 0.879
D = 0.61	D = 0.59	D = 0.61
T_{cs} = 0.872	T_{cs} = 0.899	T_{cs} = 0.872

STATION 3 APERTURE 8.0

FILTER EE SHUTTER 0.0025

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.9422 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.61}{1.58} = 1.072 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{515.70}{739.6} \text{ @ center position}$$

D = 1.53	D = 1.46	D = 1.49
T_{cs} = 0.787	T_{cs} = 0.808	T_{cs} = 0.800
D = 1.44	D = 1.37	D = 1.41
T_{cs} = 0.838	T_{cs} = 0.838	T_{cs} = 0.824
D = 1.50	D = 1.41	D = 1.47
T_{cs} = 0.796	T_{cs} = 0.824	T_{cs} = 0.806

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.010

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6122 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.92}{1.69} = 1.69 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} \quad \frac{1545.27}{1922.3} @ \text{ center position}$$

D = 0.60	D = 0.58	D = 0.58
T_{cs} = 0.84	T_{cs} = 0.847	T_{cs} = 0.847
D = 0.57	D = 0.54	D = 0.56
T_{cs} = 0.851	T_{cs} = 0.86	T_{cs} = 0.854
D = 0.58	D = 0.55	D = 0.57
T_{cs} = 0.847	T_{cs} = 0.856	T_{cs} = 0.851

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.005

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.9422 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.62}{1.58} = 1.096 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{997.7}{1479} \quad @ \text{ center position}$$

D = 1.49	D = 1.40	D = 1.43
T_{cs} = 0.76	T_{cs} = 0.78	T_{cs} = 0.78
D = 1.42	D = 1.33	D = 1.37
T_{cs} = 0.78	T_{cs} = 0.81	T_{cs} = 0.79
D = 1.46	D = 1.38	D = 1.44
T_{cs} = 0.77	T_{cs} = 0.79	T_{cs} = 0.77

STATION 3 APERTURE 11

FILTER EE SHUTTER 0.0025

FILM 2443, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.9422 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.35}{1.58} = .8544 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{535.8}{739.6} \quad \text{@ center position}$$

D = 3.13	D = 3.01	D = 3.07
T_{cs} = 0.92	T_{cs} = 0.96	T_{cs} = 0.94
D = 3.02	D = 2.90	D = 2.96
T_{cs} = 0.96	T_{cs} = 1.0	T_{cs} = 0.98
D = 3.07	D = 2.97	D = 3.02
T_{cs} = 0.94	T_{cs} = 0.97	T_{cs} = 0.96

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.010

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.23}{1.62} = 4.07 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{240.17}{687.03} @ \text{ center position}$$

D = 0.29	D = 0.28	D = 0.27
T_{cs} = 0.352	T_{cs} = 0.355	T_{cs} = 0.360
D = 0.27	D = 0.25	D = 0.26
T_{cs} = 0.360	T_{cs} = 0.365	T_{cs} = 0.372
D = 0.25	D = 0.25	D = 0.26
T_{cs} = 0.365	T_{cs} = 0.365	T_{cs} = 0.372

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.005

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.95}{1.62} = 2.137 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{126.05}{343.5} @ \text{ center position}$$

D = 0.59	D = 0.55	D = 0.57
T_{cs} = 0.359	T_{cs} = 0.373	T_{cs} = 0.366
D = 0.57	D = 0.53	D = 0.54
T_{cs} = 0.366	T_{cs} = 0.38	T_{cs} = 0.376
D = 0.55	D = 0.52	D = 0.54
T_{cs} = 0.373	T_{cs} = 0.384	T_{cs} = 0.376

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.0025

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.62}{1.62} = 1.0 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{58.95}{171.76} \text{ @ center position}$$

D = 1.08	D = 1.04	D = 1.08
T_{cs} = 0.331	T_{cs} = 0.344	T_{cs} = 0.331
D = 1.03	D = 0.99	D = 1.03
T_{cs} = 0.347	T_{cs} = 0.359	T_{cs} = 0.347
D = 1.03	D = 1.01	D = 1.05
T_{cs} = 0.347	T_{cs} = 0.353	T_{cs} = 0.341

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.010

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.11}{1.62} = 3.09 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} \quad \frac{284.67}{687.03} \quad \text{@ center position}$$

D = 0.39	D = 0.39	D = 0.39
T_{cs} = 0.355	T_{cs} = 0.355	T_{cs} = 0.355
D = 0.38	D = 0.35	D = 0.38
T_{cs} = 0.422	T_{cs} = 0.433	T_{cs} = 0.422
D = 0.38	D = 0.35	D = 0.36
T_{cs} = 0.422	T_{cs} = 0.433	T_{cs} = 0.429

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.005

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.81}{1.62} = 1.55 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} \quad \frac{142.68}{343.52} \text{ @ center position}$$

D = 0.77	D = 0.77	D = 0.77
T_{cs} = 0.412	T_{cs} = 0.412	T_{cs} = 0.412
D = 0.76	D = 0.71	D = 0.73
T_{cs} = 0.415	T_{cs} = 0.435	T_{cs} = 0.427
D = 0.73	D = 0.71	D = 0.73
T_{cs} = 0.427	T_{cs} = 0.435	T_{cs} = 0.427

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.0025

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.50}{1.62} = 0.759 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} \quad \frac{69.88}{171.76} \quad \text{@ center position}$$

D = 1.34	D = 1.30	D = 1.30
T_{cs} = 0.389	T_{cs} = 0.404	T_{cs} = 0.404
D = 1.29	D = 1.24	D = 1.28
T_{cs} = 0.408	T_{cs} = 0.426	T_{cs} = 0.411
D = 1.27	D = 1.27	D = 1.29
T_{cs} = 0.415	T_{cs} = 0.415	T_{cs} = 0.408

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.010

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.95}{1.62} = 2.137 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{257.24}{687.03} @ \text{ center position}$$

D = 0.57	D = 0.53	D = 0.58
T_{cs} = 0.378	T_{cs} = 0.392	T_{cs} = 0.374
D = 0.55	D = 0.53	D = 0.55
T_{cs} = 0.385	T_{cs} = 0.392	T_{cs} = 0.385
D = 0.54	D = 0.52	D = 0.54
T_{cs} = 0.389	T_{cs} = 0.395	T_{cs} = 0.389

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.005

FILM WO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2188 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.63}{1.62} = 1.023 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{123.12}{343.52} \quad @ \text{ center position}$$

D = 1.08	D = 1.07	D = 1.06
T_{cs} = 0.340	T_{cs} = 0.342	T_{cs} = 0.345
D = 1.01	D = 0.97	D = 1.03
T_{cs} = 0.362	T_{cs} = 0.375	T_{cs} = 0.355
D = 1.05	D = 1.00	D = 1.04
T_{cs} = 0.349	T_{cs} = 0.365	T_{cs} = 0.352

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.0025

FILM SO-356, Red Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2423 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.39}{1.40} = 0.977 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{117.58}{190.2} @ \text{ center position}$$

D = 1.60	D = 1.58	D = 1.60
T_{cs} = 0.656	T_{cs} = 0.669	T_{cs} = 0.656
D = 1.55	D = 1.54	D = 1.55
T_{cs} = 0.687	T_{cs} = 0.693	T_{cs} = 0.687
D = 1.55	D = 1.53	D = 1.56
T_{cs} = 0.687	T_{cs} = 0.701	T_{cs} = 0.682

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.010

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{2.09}{1.61} = 3.02 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{178.04}{314.94} \text{ @ center position}$$

D = 0.35	D = 0.33	D = 0.33
T_{cs} = 0.597	T_{cs} = 0.608	T_{cs} = 0.608
D = 0.33	D = 0.31	D = 0.32
T_{cs} = 0.608	T_{cs} = 0.619	T_{cs} = 0.613
D = 0.31	D = 0.31	D = 0.32
T_{cs} = 0.619	T_{cs} = 0.619	T_{cs} = 0.613

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.005

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.78}{1.61} = 1.48 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{87.20}{157.47} @ \text{ center position}$$

D = 0.75	D = 0.71	D = 0.73
T_{cs} = 0.574	T_{cs} = 0.597	T_{cs} = 0.585
D = 0.74	D = 0.69	D = 0.70
T_{cs} = 0.579	T_{cs} = 0.607	T_{cs} = 0.602
D = 0.72	D = 0.68	D = 0.71
T_{cs} = 0.590	T_{cs} = 0.613	T_{cs} = 0.597

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.0025

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.49}{1.61} = 0.759 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{44.72}{78.74} \quad @ \text{ center position}$$

D = 1.37	D = 1.33	D = 1.36
T_{cs} = 0.626	T_{cs} = 0.651	T_{cs} = 0.632
D = 1.31	D = 1.28	D = 1.31
T_{cs} = 0.664	T_{cs} = 0.683	T_{cs} = 0.664
D = 1.33	D = 1.31	D = 1.35
T_{cs} = 0.651	T_{cs} = 0.664	T_{cs} = 0.638

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.010

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.87}{1.61} = 1.82 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{167.63}{314.94} \text{ @ center position}$$

D = 0.49	D = 0.47	D = 0.48
T_{cs} = 0.556	T_{cs} = 0.567	T_{cs} = 0.561
D = 0.46	D = 0.44	D = 0.47
T_{cs} = 0.572	T_{cs} = 0.583	T_{cs} = 0.567
D = 0.47	D = 0.44	D = 0.46
T_{cs} = 0.567	T_{cs} = 0.583	T_{cs} = 0.572

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.005

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.64}{1.61} = 1.071 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{98.71}{157.47} @ \text{ center position}$$

D = 0.99	D = 0.98	D = 0.98
T_{cs} = 0.649	T_{cs} = 0.655	T_{cs} = 0.655
D = 0.98	D = 0.93	D = 0.95
T_{cs} = 0.655	T_{cs} = 0.687	T_{cs} = 0.674
D = 0.95	D = 0.92	D = 0.95
T_{cs} = 0.674	T_{cs} = 0.694	T_{cs} = 0.674

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.0025

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1829 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.26}{1.39} = 0.74 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{68.29}{143.58} \text{ @ center position}$$

D = 1.65	D = 1.62	D = 1.60
T_{cs} = 0.525	T_{cs} = 0.541	T_{cs} = 0.551
D = 1.59	D = 1.56	D = 1.56
T_{cs} = 0.557	T_{cs} = 0.572	T_{cs} = 0.572
D = 1.57	D = 1.59	D = 1.61
T_{cs} = 0.566	T_{cs} = 0.557	T_{cs} = 0.546

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.010

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.78}{1.61} = 1.479 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{177.97}{314.94} \text{ @ center position}$$

D = 0.73	D = 0.69	D = 0.74
T_{cs} = 0.596	T_{cs} = 0.619	T_{cs} = 0.591
D = 0.71	D = 0.69	D = 0.72
T_{cs} = 0.607	T_{cs} = 0.619	T_{cs} = 0.659
D = 0.71	D = 0.68	D = 0.69
T_{cs} = 0.607	T_{cs} = 0.625	T_{cs} = 0.619

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.005

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1003 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.44}{1.61} = 0.676 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{81.35}{157.47} @ \text{ center position}$$

D = 1.36	D = 1.36	D = 1.34
T_{cs} = 0.521	T_{cs} = 0.521	T_{cs} = 0.53
D = 1.31	D = 1.27	D = 1.32
T_{cs} = 0.546	T_{cs} = 0.567	T_{cs} = 0.54
D = 1.34	D = 1.30	D = 1.33
T_{cs} = 0.53	T_{cs} = 0.55	T_{cs} = 0.534

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.0025

FILM SO-356, Green Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1829 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.24}{1.39} = 0.7079 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{85.18}{143.58} \quad @ \text{ center position}$$

D = 1.93	D = 1.92	D = 1.92
T_{cs} = 0.679	T_{cs} = 0.686	T_{cs} = 0.686
D = 1.86	D = 1.88	D = 1.88
T_{cs} = 0.726	T_{cs} = 0.713	T_{cs} = 0.713
D = 1.92	D = 1.85	D = 1.87
T_{cs} = 0.686	T_{cs} = 0.733	T_{cs} = 0.72

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.010

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3230 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.33}{1.57} = 0.575 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{33.93}{101.4} \quad @ \text{ center position}$$

D = 0.87	D = 0.84	D = 0.85
T_{cs} = 0.363	T_{cs} = 0.373	T_{cs} = 0.37
D = 0.83	D = 0.81	D = 0.81
T_{cs} = 0.371	T_{cs} = 0,383	T_{cs} = 0.383
D = 0.84	D = 0.82	D = 0.84
T_{cs} = 0.373	T_{cs} = 0.38	T_{cs} = 0.373

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.005

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3230 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.44}{1.57} = 0.741 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{43.71}{50.7} @ \text{ center position}$$

D = 1.33	D = 1.31	D = 1.33
T_{cs} = 0.936	T_{cs} = 0.954	T_{cs} = 0.936
D = 1.31	D = 1.27	D = 1.30
T_{cs} = 0.954	T_{cs} = 0.989	T_{cs} = 0.962
D = 1.32	D = 1.28	D = 1.31
T_{cs} = 0.945	T_{cs} = 0.98	T_{cs} = 0.954

STATION 4 APERTURE 2.8

FILTER FF SHUTTER 0.0025

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6497 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.22}{1.25} = 0.933 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{55.01}{51.0} \quad @ \text{ center position}$$

D = 1.94	D = 1.90	D = 1.94
T_{cs} = 1.559	T_{cs} = 1.618	T_{cs} = 1.559
D = 1.89	D = 1.85	D = 1.90
T_{cs} = 1.634	T_{cs} = 1.70	T_{cs} = 1.618
D = 1.90	D = 1.87	D = 1.90
T_{cs} = 1.618	T_{cs} = 1.664	T_{cs} = 1.618

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.010

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3230 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.58}{1.57} = 1.024 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{94.27}{101.4} \quad \text{@ center position}$$

D = 1.04	D = 1.01	D = 1.04
T_{cs} = 1.018	T_{cs} = 1.047	T_{cs} = 1.018
D = 1.02	D = 0.99	D = 1.02
T_{cs} = 1.037	T_{cs} = 1.067	T_{cs} = 1.037
D = 1.03	D = 1.00	D = 1.02
T_{cs} = 1.027	T_{cs} = 1.056	T_{cs} = 1.037

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.005

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6497 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.25}{1.25} = 1.0 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{92.12}{102.0} @ \text{ center position}$$

D = 1.59	D = 1.57	D = 1.59
T_{cs} = 1.328	T_{cs} = 1.354	T_{cs} = 1.328
D = 1.56	D = 1.51	D = 1.54
T_{cs} = 1.366	T_{cs} = 1.43	T_{cs} = 1.392
D = 1.55	D = 1.52	D = 1.55
T_{cs} = 1.379	T_{cs} = 1.419	T_{cs} = 1.379

STATION 4 APERTURE 3.5

FILTER FF SHUTTER 0.0025

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6497 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.09}{1.25} = 0.69 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{63.56}{51.00} \text{ @ center position}$$

D = 2.20	D = 2.16	D = 2.17
T_{cs} = 1.84	T_{cs} = 1.902	T_{cs} = 1.891
D = 2.15	D = 2.12	D = 2.14
T_{cs} = 1.927	T_{cs} = 1.98	T_{cs} = 1.945
D = 2.15	D = 2.16	D = 2.18
T_{cs} = 1.927	T_{cs} = 1.902	T_{cs} = 1.873

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.010

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3230 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.45}{1.57} = 0.759 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{91.27}{101.4} \quad @ \text{ center position}$$

D = 1.31	D = 1.27	D = 1.31
T_{cs} = 0.985	T_{cs} = 1.023	T_{cs} = 0.985
D = 1.29	D = 1.26	D = 1.29
T_{cs} = 1.003	T_{cs} = 1.032	T_{cs} = 1.003
D = 1.30	D = 1.28	D = 1.30
T_{cs} = 0.994	T_{cs} = 1.013	T_{cs} = 0.994

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.005

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6497 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.21}{1.25} = 0.912 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{109.73}{102.0} @ \text{ center position}$$

D = 1.95	D = 1.92	D = 1.92
T_{cs} = 1.568	T_{cs} = 1.612	T_{cs} = 1.612
D = 1.89	D = 1.86	D = 1.91
T_{cs} = 1.656	T_{cs} = 1.704	T_{cs} = 1.626
D = 1.91	D = 1.89	D = 1.93
T_{cs} = 1.626	T_{cs} = 1.656	T_{cs} = 1.596

STATION 4 APERTURE 4.0

FILTER FF SHUTTER 0.0025

FILM SO-356, Blue Layer

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6497 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{0.95}{1.25} = 0.501 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{60.3}{51.0} \quad @ \text{ center position}$$

D = 2.43	D = 2.42	D = 2.43
T_{cs} = 1.805	T_{cs} = 1.823	T_{cs} = 1.805
D = 2.40	D = 2.39	D = 2.41
T_{cs} = 1.856	T_{cs} = 1.873	T_{cs} = 1.839
D = 2.43	D = 2.38	D = 2.40
T_{cs} = 1.805	T_{cs} = 1.891	T_{cs} = 1.856

STATION 5 APERTURE 3.5

FILTER JJ SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.4244 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.86}{1.77} = 1.23 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{113.33}{133.26} @ \text{ center position}$$

D = 2.07	D = 2.08	D = 2.05
T_{cs} = 0.657	T_{cs} = 0.666	T_{cs} = 0.642
D = 2.10	D = 2.15	D = 2.12
T_{cs} = 0.682	T_{cs} = 0.602	T_{cs} = 0.698
D = 2.09	D = 2.11	D = 2.07
T_{cs} = 0.673	T_{cs} = 0.689	T_{cs} = 0.657

STATION 5 APERTURE 3.5

FILTER JJ SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7236 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.58}{1.56} = 1.047 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{96.46}{113.6} \quad @ \text{ center position}$$

D = 1.57	D = 1.60	D = 1.56
T_{cs} = 0.703	T_{cs} = 0.729	T_{cs} = 0.694
D = 1.64	D = 1.67	D = 1.62
T_{cs} = 0.764	T_{cs} = 0.722	T_{cs} = 0.746
D = 1.60	D = 1.65	D = 1.60
T_{cs} = 0.729	T_{cs} = 0.733	T_{cs} = 0.729

STATION 5 APERTURE 3.5

FILTER JJ SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1256 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.33}{1.35} = 0.955 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{87.97}{98.596} \quad @ \text{ center position}$$

D = 1.04	D = 1.08	D = 1.03
T_{cs} = 0.75	T_{cs} = 0.787	T_{cs} = 0.741
D = 1.12	D = 1.17	D = 1.11
T_{cs} = 0.826	T_{cs} = 0.795	T_{cs} = 0.816
D = 1.08	D = 1.13	D = 1.08
T_{cs} = 0.787	T_{cs} = 0.836	T_{cs} = 0.787

STATION 5 APERTURE 4.7

FILTER JJ SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7236 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.58}{1.56} = 1.047 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{173.9}{227.2} \text{ @ center position}$$

D = 1.56	D = 1.61	D = 1.54
T_{cs} = 0.626	T_{cs} = 0.665	T_{cs} = 0.611
D = 1.62	D = 1.67	D = 1.60
T_{cs} = 0.673	T_{cs} = 0.652	T_{cs} = 0.657
D = 1.61	D = 1.64	D = 1.59
T_{cs} = 0.665	T_{cs} = 0.689	T_{cs} = 0.649

STATION 5 APERTURE 4.7

FILTER JJ SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1256 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.32}{1.35} = 0.933 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{155.03}{197.19} @ \text{ center position}$$

D = 1.03	D = 1.07	D = 1.02
T_{cs} = 0.669	T_{cs} = 0.702	T_{cs} = 0.662
D = 1.08	D = 1.15	D = 1.08
T_{cs} = 0.711	T_{cs} = 0.70	T_{cs} = 0.711
D = 1.07	D = 1.12	D = 1.07
T_{cs} = 0.702	T_{cs} = 0.745	T_{cs} = 0.702

STATION 5 APERTURE 4.7

FILTER JJ SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3283 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.03}{0.97} = 1.148 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{190.7}{257.7} @ \text{ center position}$$

D = 0.58	D = 0.62	D = 0.58
T_{cs} = 0.865	T_{cs} = 0.908	T_{cs} = 0.865
D = 0.64	D = 0.68	D = 0.64
T_{cs} = 0.929	T_{cs} = 0.975	T_{cs} = 0.929
D = 0.62	D = 0.65	D = 0.62
T_{cs} = 0.908	T_{cs} = 0.941	T_{cs} = 0.908

STATION 5 APERTURE 6.3

FILTER JJ SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1256 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.30}{1.35} = 0.89 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{266.01}{394.38} @ \text{ center position}$$

D = 1.01	D = 1.05	D = 0.99
T_{cs} = 0.574	T_{cs} = 0.602	T_{cs} = 0.56
D = 1.07	D = 1.13	D = 1.08
T_{cs} = 0.616	T_{cs} = 0.601	T_{cs} = 0.624
D = 1.04	D = 1.09	D = 1.04
T_{cs} = 0.595	T_{cs} = 0.631	T_{cs} = 0.595

STATION 5 APERTURE 6.3

FILTER JJ SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3283 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.02}{0.97} = 1.12 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{334.89}{515.43} @ \text{ center position}$$

D = 0.57	D = 0.61	D = 0.57
T_{cs} = 0.759	T_{cs} = 0.796	T_{cs} = 0.759
D = 0.63	D = 0.67	D = 0.63
T_{cs} = 0.816	T_{cs} = 0.855	T_{cs} = 0.816
D = 0.61	D = 0.64	D = 0.61
T_{cs} = 0.796	T_{cs} = 0.825	T_{cs} = 0.796

STATION 5 APERTURE 6.3

FILTER JJ SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.6195 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{0.74}{0.76} = 0.955 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{285}{486.31} \quad \text{@ center position}$$

D = 0.33	D = 0.34	D = 0.32
T_{cs} = 0.775	T_{cs} = 0.784	T_{cs} = 0.766
D = 0.35	D = 0.37	D = 0.35
T_{cs} = 0.793	T_{cs} = 0.813	T_{cs} = 0.793
D = 0.34	D = 0.36	D = 0.34
T_{cs} = 0.784	T_{cs} = 0.803	T_{cs} = 0.784

STATION 5 APERTURE 4.0

FILTER BB SHUTTER 0.010

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.91 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.768$$ @ center position

D = 2.17	D = 2.17	D = 2.16
T_{cs} = 0.763	T_{cs} = 0.763	T_{cs} = 0.761
D = 2.19	D = 2.20	D = 2.18
T_{cs} = 0.766	T_{cs} = 0.768	T_{cs} = 0.765
D = 2.17	D = 2.16	D = 2.15
T_{cs} = 0.763	T_{cs} = 0.761	T_{cs} = 0.759

STATION 5 APERTURE 4.0

FILTER BB SHUTTER 0.005

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.63 @ center position

$$T_{cs} = \frac{4 f^2 \quad E \quad \int d_\lambda}{t \quad 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.78 \quad \text{@ center position}$$

D = 1.70	D = 1.71	D = 1.70
T_{cs} = 0.769	T_{cs} = 0.771	T_{cs} = 0.769
D = 1.74	D = 1.75	D = 1.71
T_{cs} = 0.778	T_{cs} = 0.78	T_{cs} = 0.771
D = 1.71	D = 1.72	D = 1.70
T_{cs} = 0.771	T_{cs} = 0.773	T_{cs} = 0.769

STATION 5 APERTURE 4.0

FILTER BB SHUTTER 0.0025

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.37 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.875$$ @ center position

D = 1.19	D = 1.22	D = 1.19
T_{cs} = 0.854	T_{cs} = 0.865	T_{cs} = 0.854
D = 1.22	D = 1.25	D = 1.22
T_{cs} = 0.865	T_{cs} = 0.875	T_{cs} = 0.865
D = 1.21	D = 1.22	D = 1.20
T_{cs} = 0.861	T_{cs} = 0.865	T_{cs} = 0.858

STATION 5 APERTURE 5.6

FILTER BB SHUTTER 0.010

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.63 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.78$$ @ center position

D = 1.71	D = 1.72	D = 1.69
T_{cs} = 0.773	T_{cs} = 0.776	T_{cs} = 0.792
D = 1.73	D = 1.74	D = 1.71
T_{cs} = 0.778	T_{cs} = 0.78	T_{cs} = 0.773
D = 1.71	D = 1.73	D = 1.70
T_{cs} = 0.773	T_{cs} = 0.778	T_{cs} = 0.771

STATION 5 APERTURE 5.6

FILTER BB SHUTTER 0.005

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.36 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.838$$ @ center position

D = 1.19	D = 1.20	D = 1.18
T_{cs} = 0.824	T_{cs} = 0.828	T_{cs} = 0.821
D = 1.22	D = 1.23	D = 1.20
T_{cs} = 0.835	T_{cs} = 0.838	T_{cs} = 0.828
D = 1.20	D = 1.21	D = 1.19
T_{cs} = 0.828	T_{cs} = 0.831	T_{cs} = 0.824

STATION 5 APERTURE 5.6

FILTER BB SHUTTER 0.0025

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.08 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.879$$ @ center position

D = 0.71	D = 0.72	D = 0.71
T_{cs} = 0.856	T_{cs} = 0.861	T_{cs} = 0.856
D = 0.72	D = 0.75	D = 0.73
T_{cs} = 0.861	T_{cs} = 0.879	T_{cs} = 0.867
D = 0.72	D = 0.73	D = 0.71
T_{cs} = 0.861	T_{cs} = 0.867	T_{cs} = 0.856

STATION 5 APERTURE 8.0

FILTER BB SHUTTER 0.010

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.36 @ center position

$$T_{cs} = \frac{4 f^2 \quad E \quad \int d_\lambda}{t \quad 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.855$$ @ center position

D = 1.17	D = 1.19	D = 1.17
T_{cs} = 0.837	T_{cs} = 0.844	T_{cs} = 0.837
D = 1.22	D = 1.22	D = 1.19
T_{cs} = 0.855	T_{cs} = 0.855	T_{cs} = 0.844
D = 1.18	D = 1.20	D = 1.18
T_{cs} = 0.841	T_{cs} = 0.848	T_{cs} = 0.841

STATION 5 APERTURE 8.0

FILTER BB SHUTTER 0.005

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 1.07 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.878$$ @ center position

D = 0.70	D = 0.71	D = 0.69
T_{cs} = 0.86	T_{cs} = 0.866	T_{cs} = 0.854
D = 0.72	D = 0.73	D = 0.71
T_{cs} = 0.872	T_{cs} = 0.878	T_{cs} = 0.866
D = 0.70	D = 0.71	D = 0.70
T_{cs} = 0.86	T_{cs} = 0.866	T_{cs} = 0.86

STATION 5 APERTURE 8.0

FILTER BB SHUTTER 0.0025

FILM SO-022

$$\int N_\lambda F_\lambda d_\lambda = 0.1014 \times 10^{-2}$$

E_{rel} = 0.79 @ center position

$$T_{cs} = \frac{4 f^2 E \int d_\lambda}{t \ 10^7 \int N_\lambda F_\lambda d_\lambda} = 0.921$$ @ center position

D = 0.38	D = 0.39	D = 0.38
T_{cs} = 0.898	T_{cs} = 0.909	T_{cs} = 0.898
D = 0.40	D = 0.40	D = 0.39
T_{cs} = 0.921	T_{cs} = 0.921	T_{cs} = 0.909
D = 0.38	D = 0.38	D = 0.37
T_{cs} = 0.898	T_{cs} = 0.898	T_{cs} = 0.886

STATION 6 APERTURE 4.0

FILTER GG + MM SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.8744 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.57}{1.55} = 1.047 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{125.9}{274.56} \quad \text{@ center position}$$

D = 1.59	D = 1.60	D = 1.57
T_{cs} = 0.408	T_{cs} = 0.412	T_{cs} = 0.397
D = 1.61	D = 1.63	D = 1.60
T_{cs} = 0.417	T_{cs} = 0.427	T_{cs} = 0.412
D = 1.59	D = 1.61	D = 1.58
T_{cs} = 0.408	T_{cs} = 0.417	T_{cs} = 0.402

STATION 6 APERTURE 4.0

FILTER GG + MM SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1146 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.32}{1.35} = 0.933 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{112.28}{179.9} @ \text{ center position}$$

D = 1.09	D = 1.12	D = 1.09
T_{cs} = 0.571	T_{cs} = 0.592	T_{cs} = 0.571
D = 1.12	D = 1.15	D = 1.11
T_{cs} = 0.592	T_{cs} = 0.613	T_{cs} = 0.585
D = 1.10	D = 1.12	D = 1.09
T_{cs} = 0.578	T_{cs} = 0.592	T_{cs} = 0.571

STATION 6 APERTURE 4.0

FILTER GG + MM SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2291 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.05}{1.11} = 0.87 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{104.79}{179.84} @ \text{ center position}$$

D = 0.67	D = 0.69	D = 0.67
T_{cs} = 0.595	T_{cs} = 0.609	T_{cs} = 0.595
D = 0.69	D = 0.71	D = 0.69
T_{cs} = 0.609	T_{cs} = 0.624	T_{cs} = 0.609
D = 0.67	D = 0.69	D = 0.67
T_{cs} = 0.595	T_{cs} = 0.609	T_{cs} = 0.595

STATION 6 APERTURE 5.6

FILTER GG + MM SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1147 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.31}{1.35} = 0.912 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{215.07}{360.16} @ \text{ center position}$$

D = 1.08	D = 1.10	D = 1.08
T_{cs} = 0.552	T_{cs} = 0.566	T_{cs} = 0.552
D = 1.11	D = 1.13	D = 1.09
T_{cs} = 0.573	T_{cs} = 0.587	T_{cs} = 0.559
D = 1.09	D = 1.12	D = 1.09
T_{cs} = 0.559	T_{cs} = 0.58	T_{cs} = 0.559

STATION 6 APERTURE 5.6

FILTER GG + MM SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.2291 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.04}{1.11} = 0.85 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{200.72}{359.69} \text{ @ center position}$$

D = 0.66	D = 0.67	D = 0.66
T_{cs} = 0.569	T_{cs} = 0.576	T_{cs} = 0.569
D = 0.68	D = 0.70	D = 0.67
T_{cs} = 0.583	T_{cs} = 0.597	T_{cs} = 0.576
D = 0.67	D = 0.69	D = 0.67
T_{cs} = 0.576	T_{cs} = 0.59	T_{cs} = 0.576

STATION 6 APERTURE 5.6

FILTER GG + MM SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7658 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{0.81}{0.79} = 1.047 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 \, 1.88 \int d_\lambda}{t \, \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{246.94}{601.15} \text{ @ center position}$$

D = 0.40	D = 0.41	D = 0.40
T_{cs} = 0.556	T_{cs} = 0.569	T_{cs} = 0.556
D = 0.41	D = 0.42	D = 0.41
T_{cs} = 0.569	T_{cs} = 0.583	T_{cs} = 0.569
D = 0.41	D = 0.42	D = 0.41
T_{cs} = 0.569	T_{cs} = 0.583	T_{cs} = 0.569

STATION 6 APERTURE 3.5

FILTER AA SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.5837 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.94}{1.77} = 1.48 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{136.26}{183.28} \text{ @ center position}$$

D = 2.19	D = 2.21	D = 2.18
T_{cs} = 0.596	T_{cs} = 0.61	T_{cs} = 0.588
D = 2.22	D = 2.24	D = 2.21
T_{cs} = 0.617	T_{cs} = 0.632	T_{cs} = 0.61
D = 2.20	D = 2.22	D = 2.18
T_{cs} = 0.603	T_{cs} = 0.617	T_{cs} = 0.588

STATION 6 APERTURE 3.5

FILTER AA SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7828 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.66}{1.65} = 1.023 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{94.27}{122.89} @ \text{ center position}$$

D = 1.72	D = 1.75	D = 1.71
T_{cs} = 0.617	T_{cs} = 0.639	T_{cs} = 0.609
D = 1.78	D = 1.81	D = 1.76
T_{cs} = 0.662	T_{cs} = 0.686	T_{cs} = 0.646
D = 1.73	D = 1.78	D = 1.73
T_{cs} = 0.624	T_{cs} = 0.662	T_{cs} = 0.624

STATION 6 APERTURE 3.5

FILTER AA SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1827 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.40}{1.35} = 1.12 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{103.36}{143.42} @ \text{ center position}$$

D = 1.22	D = 1.26	D = 1.23
T_{cs} = 0.644	T_{cs} = 0.675	T_{cs} = 0.652
D = 1.26	D = 1.30	D = 1.27
T_{cs} = 0.675	T_{cs} = 0.709	T_{cs} = 0.684
D = 1.23	D = 1.27	D = 1.24
T_{cs} = 0.652	T_{cs} = 0.684	T_{cs} = 0.66

STATION 6 APERTURE 4.7

FILTER AA SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.7828 \times 10^{-3}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.65}{1.65} = 1.0 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{166.11}{245.79} \text{ @ center position}$$

D = 1.69	D = 1.71	D = 1.67
T_{cs} = 0.543	T_{cs} = 0.557	T_{cs} = 0.53
D = 1.74	D = 1.78	D = 1.72
T_{cs} = 0.576	T_{cs} = 0.605	T_{cs} = 0.563
D = 1.69	D = 1.73	D = 1.69
T_{cs} = 0.543	T_{cs} = 0.57	T_{cs} = 0.543

STATION 6 APERTURE 4.7

FILTER AA SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1779 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.39}{1.35} = 1.096 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{182.14}{279.3} @ \text{ center position}$$

D = 1.18	D = 1.21	D = 1.18
T_{cs} = 0.575	T_{cs} = 0.597	T_{cs} = 0.575
D = 1.23	D = 1.27	D = 1.22
T_{cs} = 0.61	T_{cs} = 0.641	T_{cs} = 0.604
D = 1.20	D = 1.24	D = 1.19
T_{cs} = 0.55	T_{cs} = 0.619	T_{cs} = 0.582

STATION 6 APERTURE 4.7

FILTER AA SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3321 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.11}{1.11} = 1.0 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{166.11}{260.6} \quad @ \text{ center position}$$

D = 0.73	D = 0.76	D = 0.73
T_{cs} = 0.627	T_{cs} = 0.649	T_{cs} = 0.627
D = 0.77	D = 0.80	D = 0.76
T_{cs} = 0.657	T_{cs} = 0.682	T_{cs} = 0.649
D = 0.73	D = 0.77	D = 0.73
T_{cs} = 0.627	T_{cs} = 0.657	T_{cs} = 0.627

STATION 6 APERTURE 6.7

FILTER AA SHUTTER 0.010

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.1827 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.37}{1.35} = 1.047 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{353.48}{573.67} @ \text{ center position}$$

D = 1.17	D = 1.20	D = 1.17
T_{cs} = 0.55	T_{cs} = 0.57	T_{cs} = 0.55
D = 1.21	D = 1.25	D = 1.21
T_{cs} = 0.577	T_{cs} = 0.606	T_{cs} = 0.577
D = 1.17	D = 1.22	D = 1.18
T_{cs} = 0.55	T_{cs} = 0.584	T_{cs} = 0.56

STATION 6 APERTURE 6.7

FILTER AA SHUTTER 0.005

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.3321 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{1.09}{1.11} = 0.955 \quad \text{@ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{322.37}{521.39} \text{ @ center position}$$

D = 0.71	D = 0.74	D = 0.71
T_{cs} = 0.615	T_{cs} = 0.638	T_{cs} = 0.615
D = 0.74	D = 0.77	D = 0.74
T_{cs} = 0.638	T_{cs} = 0.661	T_{cs} = 0.638
D = 0.72	D = 0.75	D = 0.71
T_{cs} = 0.623	T_{cs} = 0.645	T_{cs} = 0.615

STATION 6 APERTURE 6.7

FILTER AA SHUTTER 0.0025

FILM SO-022

$$\int W_\lambda F_\lambda S_\lambda d_\lambda = 0.8934 \times 10^{-2}$$

$$\frac{E_{measure}}{E_{sensitometry}} = \frac{0.85}{0.79} = 1.148 \quad @ \text{ center position}$$

$$T_{cs} = \frac{4 f^2 1.88 \int d_\lambda}{t \pi 10^7 \int W_\lambda F_\lambda S_\lambda d_\lambda} \cdot \frac{E_m}{E_s} = \frac{387.59}{701.32} @ \text{ center position}$$

D = 0.42	D = 0.44	D = 0.43
T_{cs} = 0.731	T_{cs} = 0.749	T_{cs} = 0.739
D = 0.44	D = 0.46	D = 0.44
T_{cs} = 0.749	T_{cs} = 0.739	T_{cs} = 0.749
D = 0.42	D = 0.44	D = 0.42
T_{cs} = 0.731	T_{cs} = 0.749	T_{cs} = 0.731

SECTION IV

DISCUSSION

The results show large variance, over 100% in camera system transmission, between stations along with some discrepancies within some stations.

The T_{cs} data have been analyzed for systematic and calculation error and the following potential discrepancies are worthy of note.

1. Radiometric data: As stated in the Introduction, the method used to measure and record the calibrated light source is not clear. The acceptance angle of the radiometer was assumed to be 51°, as measured on a very similar PTD instrument. Any error in this angle affects T_{cs} proportionally by a $\sin^2$ function. The positioning of the radiometer relative to the light source was unclear. For calculations here the instrument was assumed to be in contact with the source. Should that not be the case, the values for radiance could vary.

2. Spectral sensitometric data: A gamma correction factor was necessary for each density level of spectral sensitometric data. As described in Section II, the gamma of spectral sensitometric data and the gamma of the I-B sensitometer data were not the same, the possible cause being inherent in the relationship between the two instruments.

   This factor is variable with density level depending on the relationship of the curves resulting from the two sets of data.

   In the case of the SO-022, an alternate calculation method was possible because the 25 filter used for the sensitometric

data was very similar, if not the same as the BB camera filter. The gamma corrections for SO-022 were calculated on this basis. As observed in the D-log E curves, the curves cross at a density of 1.2.

The gamma corrections for the remainder of the films were estimated by assuming a "normal" relationship of a series of film-process curves at differing gammas. T_{cs} results would obviously show the result of any misplacement of these curves. Within 2424 data, however, the T_{cs} variability covers only a small range indicating the curve relationships are close.

3. Analytical Densities: The red, green, and blue densities read and recorded for the color films, 2443 and SO-356, represent incomplete separation of colors and a resultant error in T_{cs}.

Overlapping of dye layers, as shown below, causes densities of one layer to be affected by one or both of the remaining layers. For example, at 450nm in the illustration the blue density of the predominant yellow dye is affected by both the magenta and cyan dye layers.

Radiometric analysis requires the use of analytical densities where the dye concentrations are isolated and the influence of radiation on that dye layer may be determined.

T_{cs} results shown here were obviously in error for this reason.

4. Camera apertures: The relationship of camera apertures for the S190A cmaeras is not clear. Nominal apertures were included in the calculations here and data indicates some error in the result. The experiment layout tends to indicate selection of camera apertures at one-half or full f-stop increments. If this is the case, 2424 film with a CC filter

at a nominal f/9.5 aperture and a shutter speed of 0.005 seconds produced a 1.73 density whereas a density of 1.79 was produced at f/13.0 with a shutter speed of 0.01 seconds. This represents an exposure difference of 11% which would be expected at f/13.0, because this is not a full f-stop less than f/9.5. If half stop detents were used on the lens and T-stops were calculated, f/9.5 and 13.0 could be erroneous values.

5. Camera shutter: There are instances where discrepancies result when all parameters are equal except shutter speed. For example, 2424 film with a CC filter at f/16 results in a density of 0.98 at a shutter speed of 0.005 seconds and 1.65 at a shutter speed of 0.01 seconds. This density difference represents an exposure difference of 2.2 times when the shutter speed change was only 2.0 times.

6. Gamma correction factor: The gamma correction factors are limited to the densities used for spectral sensitometric data. At either extreme of the D-log E curve this factor could be large and could produce large discrepancies. For example, 2424 film with a DD filter, 0.010 shutter, f/11 produces a density of 2.07 and a T_{cs} of 0.977 compared to T_{cs} results 18% lower for different densities and the same film-filter combination.

7. Exposure: In at least one case, 2443, the camera exposure placed some data on the extreme toe of the curve. Density differences may not change with an exposure change causing large T_{cs} discrepancies.

Results were checked for each black-and-white film-filter combination using the following method:

$$T_{cs} = \frac{A\ 4f^2\ E \int d_\lambda}{t\ 10^7 \int N_\lambda F_\lambda d_\lambda}$$

where

T_{cs} = camera system transmission

A = filter factor determined as difference between camera and sensitometer filter integrated over useful range of 10nm intervals.

f = camera aperture

E = sensitometric exposure to produce measured density

t = shutter speed

$\frac{\int d_\lambda}{\int N_\lambda F_\lambda d_\lambda}$ = light source and filter integrated over 10nm intervals

This check showed that the T_{cs} results were consistent relative to each film-filter combination.

SECTION V

CONCLUSIONS

The following are concluded from this task of determination of camera system transmission from available data:

- Extreme care must be taken that sensitometric and spectral sensitometric calibration films are processed the same as the camera films.
- It is essential to know how calibrations were made and to have ready access to the data. The prime example here is the calibrated light source.
- Filters used for camera exposures should be matched and made available for sensitometric exposures.
- T_{cs} may be determined using the data available here. The results would leave the question of absolute T_{cs} unanswered but the results would be acceptable for relative T_{cs} which would normally be applicable to real data.
- Gamma correction curves should be derived for all appropriate film-filter combinations.
- Analytical densities are necessary for absolute radiometric calculations involving color films.

SECTION VI

RECOMMENDATIONS

These recommendations result from this task.

- Where radiometric determinations are to be made, careful consideration of processing the calibration and the data films must be made so that they are processed identically. Ideally, calibration exposures should be made on the data film as is the current case with S190A data.

- Data reduction of films requiring radiometric data should be coordinated closely such that adequate information and proper access to calibration and measuring instruments are available. These calibration instruments would include the I-B sensitometer, spectral sensitometer, and radiometer, as well as measuring instruments which might include densitometers and microdensitometers.

- Should absolute values for camera system transmission be required, the entire task, including lamp source calibration, film calibration, film processing, film reading and T_{cs} calculations should be closely coordinated, ideally within the same group.

- The capability should be developed for routinely supplying analytical densities for color films used in projects where radiometric determinations are to be made.

APPENDICES

APPENDIX A

DENSITY VERSUS LOG E CURVES

Density versus log exposure curves for the sensitometric exposures and for the gamma correction curves are included here.

The sensitometric curves are representative of the process gamma used for the camera exposed films. The gamma corrected curves are representative of the gamma displayed by the spectral sensitometric data.

DATE 13 Jan 73 CONTROL # Station 6 TASK KSC KM00.2 PREPARED BY Pre Sensi

FILM SO-022 EMULSION # 1-1 MFG _____ EXPIRATION DATE _____

772-150 EXPOSURE DATA 3010		PROCESSING DATA		DENSITOMETRY			
SENSITOMETER	I-B	PROCESSOR	Fultron #2	INSTRUMENT	MacBeth	SPEED ( )	
ILLUMINANT	2850 °K	CHEMISTRY	MX-819	TYPE	TD217DR	D-MAX	
TIME	1/5 SEC.	SPEED	TANKS 9 FPM	APERTURE SIZE	2 MM	GAMMA	
FILTER	5500 ±25	TEMP °F 82	TIME	FILTER	Visual	BASE + FOG	

CHEMICAL ANALYSIS

SP GR

pH

TA

TRP

KB_r

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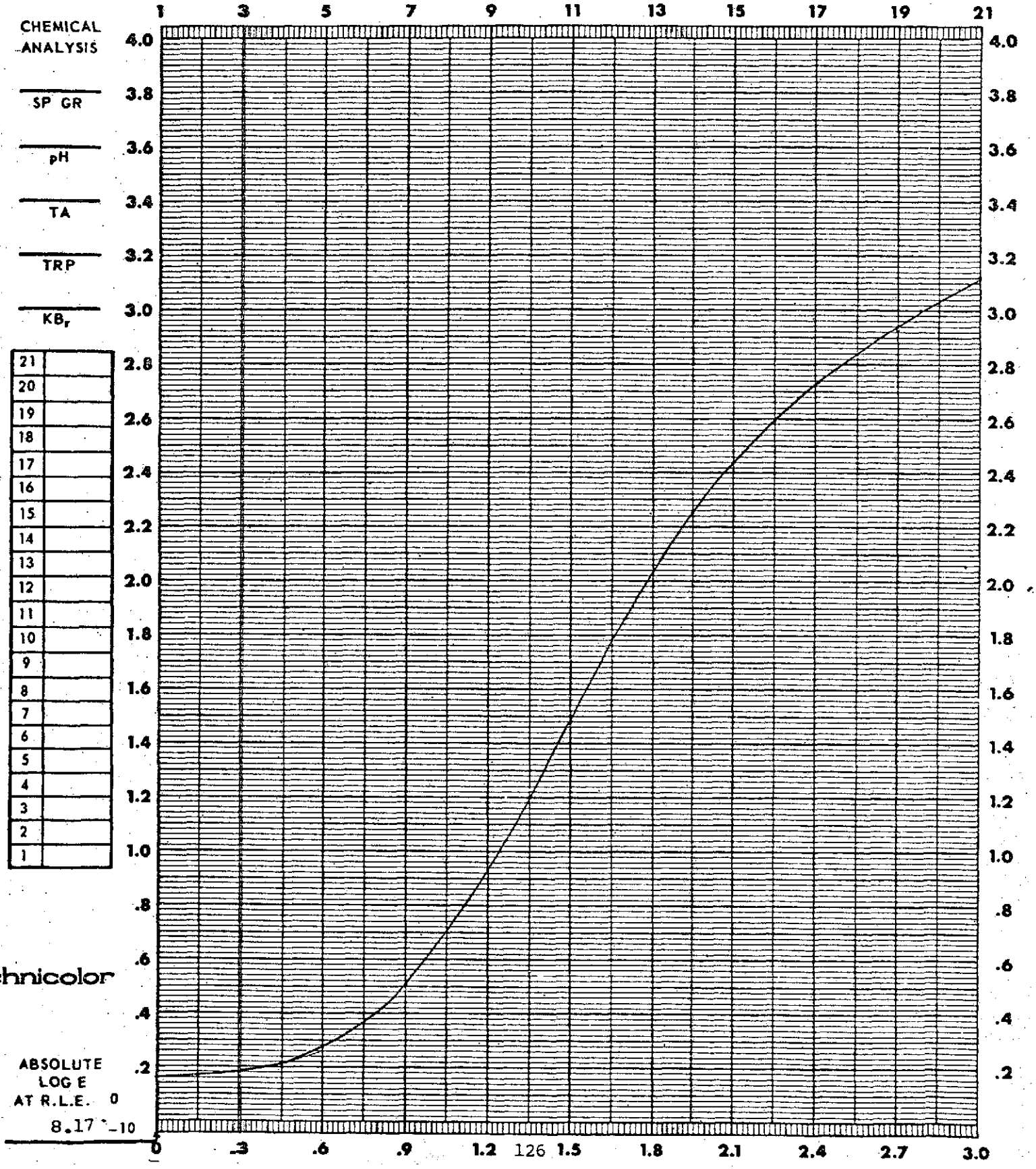

Technicolor

ABSOLUTE LOG E AT R.L.E. 0

8.17 -10

126

DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA		PROCESSING DATA		DENSITOMETRY	
SENSITOMETER _____		PROCESSOR _____		INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____	°K	CHEMISTRY _____		TYPE _____	D-MAX _____
TIME _____	SEC.	SPEED _____ TANKS _____	FPM	APERTURE SIZE _____	MM GAMMA _____
FILTER _____		TEMP °F _____ TIME _____		FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

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_____ TRP

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GAMMA CORRECTION CURVE FOR SO-022

Actual data

Extrapolated data

Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

—10

DATE 13 Jan 73 CONTROL # Station 2 TASK KSC KM0C 2 PREPARED BY Pre Sensi

FILM 2424 EMULSION # 43-1 MFG _____ EXPIRATION DATE _____

EXPOSURE DATA		PROCESSING DATA		DENSITOMETRY	
772-150 3010					
SENSITOMETER I-B		PROCESSOR Hi-Speed		INSTRUMENT MacBeth	SPEED ( )
ILLUMINANT 2850 °K		CHEMISTRY D-19		TYPE TD217DR	D-MAX
TIME 1/50 SEC.		SPEED TANKS 4 FPM		APERTURE SIZE 2 MM	GAMMA
FILTER 5500°K + 89B		TEMP °F 70 TIME		FILTER Visual	BASE + FOG

CHEMICAL ANALYSIS

SP GR

pH

TA

TRP

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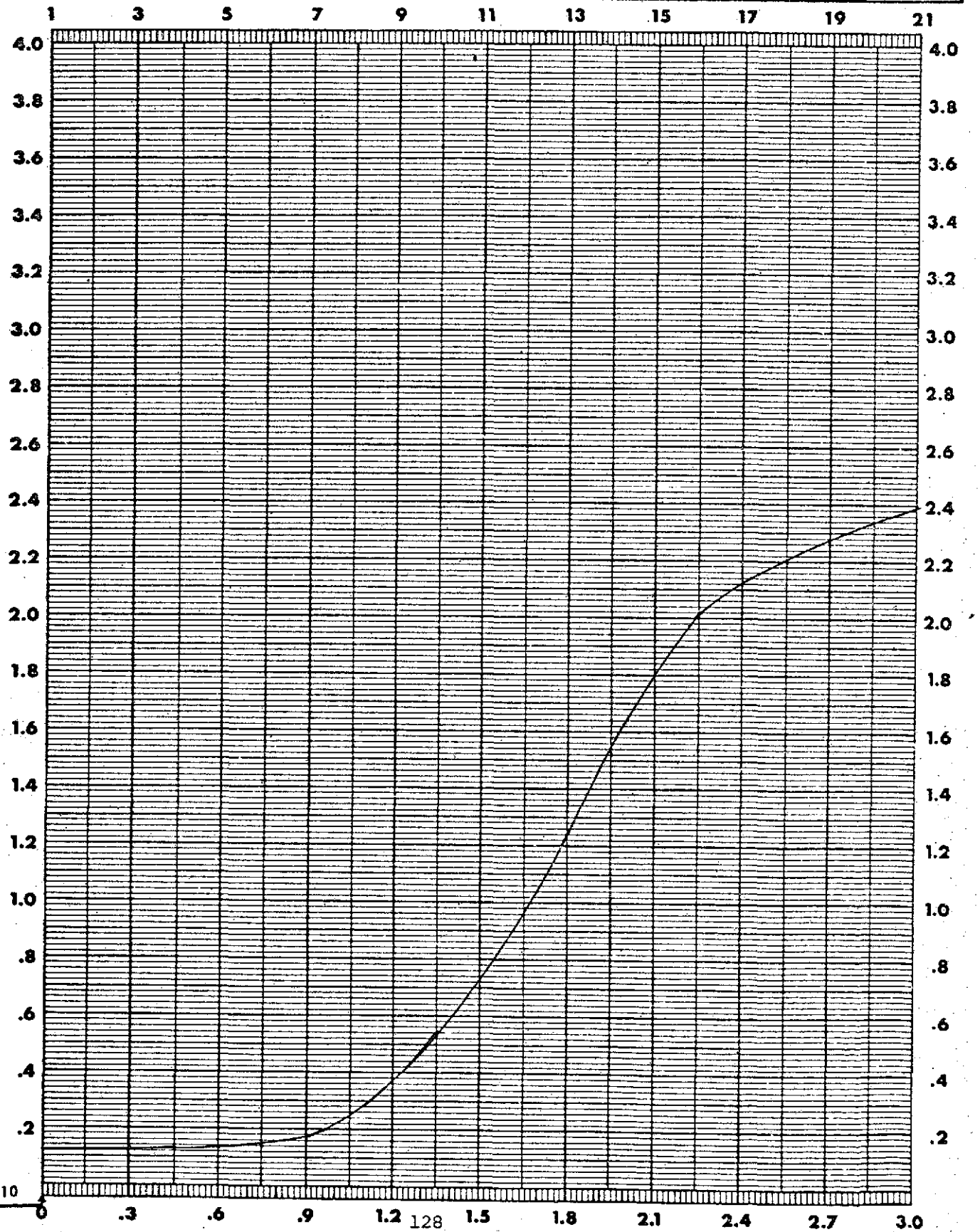

Technicolor

ABSOLUTE LOG E AT R.L.E. 7.17 0 -10

DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

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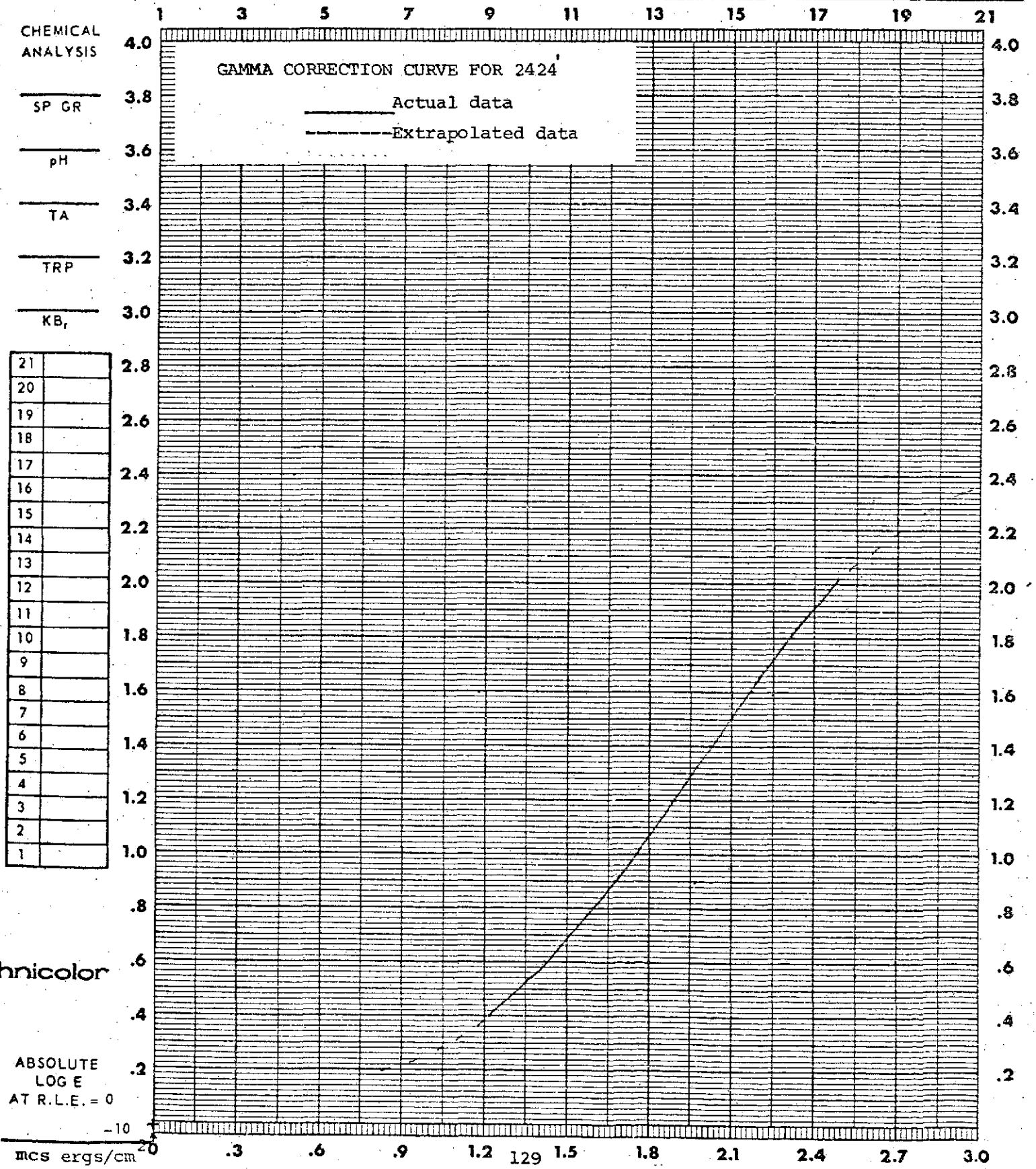
_____ TRP

_____ KB_r



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DATE 13 Jan 73 CONTROL # Station 4 TASK KSC KM00 2 PREPARED BY Pre Sensi

FILM SO-356 EMULSION # 16-4 MFG _____ EXPIRATION DATE _____

772-150 EXPOSURE DATA 3010		PROCESSING DATA		DENSITOMETRY	
SENSITOMETER	I-B	PROCESSOR	Houston	INSTRUMENT	MacBeth
ILLUMINANT	2850 °K	CHEMISTRY	ME-4	TYPE	TD217DR
TIME	1/5 SEC.	SPEED ____ TANKS	15 FPM	APERTURE SIZE	2 MM
FILTER	5500	TEMP °F	98 TIME	FILTER	Visual

SPEED ( ) _____
D-MAX _____
GAMMA _____
BASE + FOG _____

CHEMICAL ANALYSIS

SP GR _____

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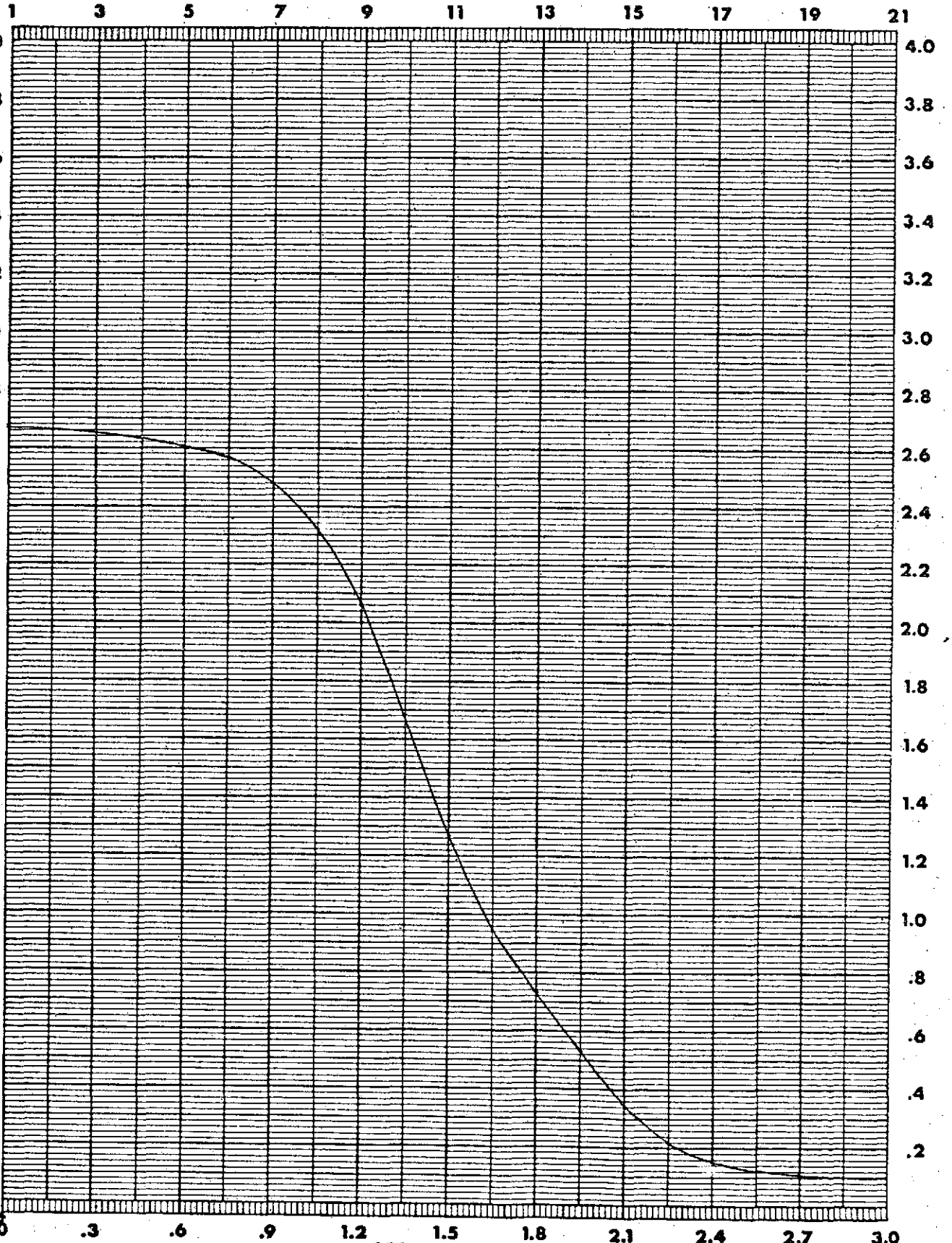

Technicolor

ABSOLUTE LOG E AT R.L.E. 0

8.17 -10

DATE 13 Jan 73 CONTROL # Station 4 TASK KSC KM002 PREPARED BY Pre Sensi.

FILM SO-356 EMULSION # 16-4 MFG _____ EXPIRATION DATE _____

772-150 EXPOSURE DATA 30IO		PROCESSING DATA		DENSITOMETRY			
SENSITOMETER	1-B	PROCESSOR	Houston	INSTRUMENT	MacBeth	SPEED ( )	
ILLUMINANT	2850 °K	CHEMISTRY	ME-4	TYPE	TD217DR	D-MAX	
TIME	1/5 SEC.	SPEED	TANKS 15 FPM	APERTURE SIZE	2 MM	GAMMA	
FILTER	5500	TEMP °F	98 TIME	FILTER	Status A	BASE + FOG	

CHEMICAL ANALYSIS

SP GR

pH

TA

TRP

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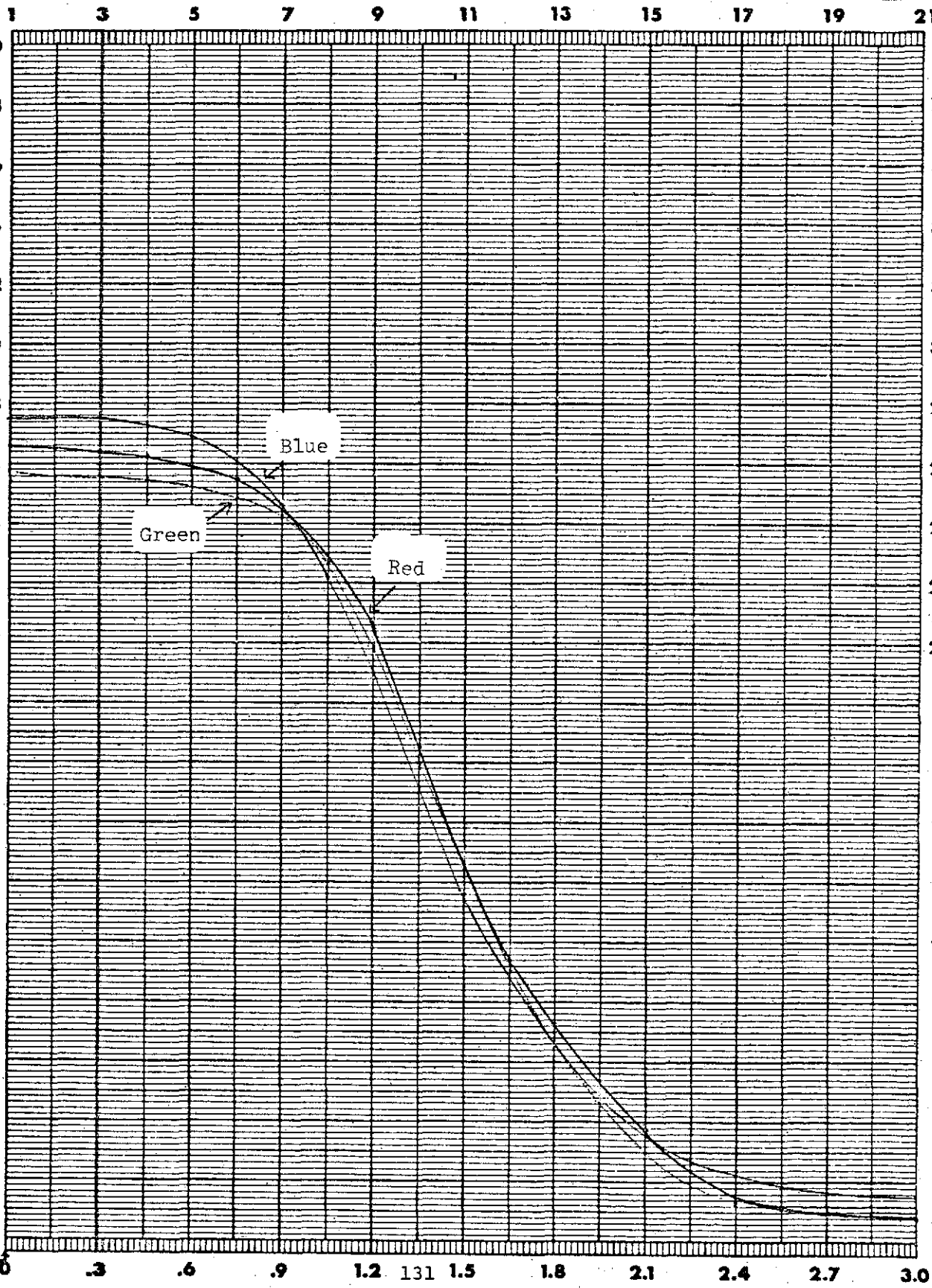

Technicolor

ABSOLUTE LOG E AT R.L.E. 0

8.17 -10

DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

_____ TA

_____ TRP

_____ KB_r

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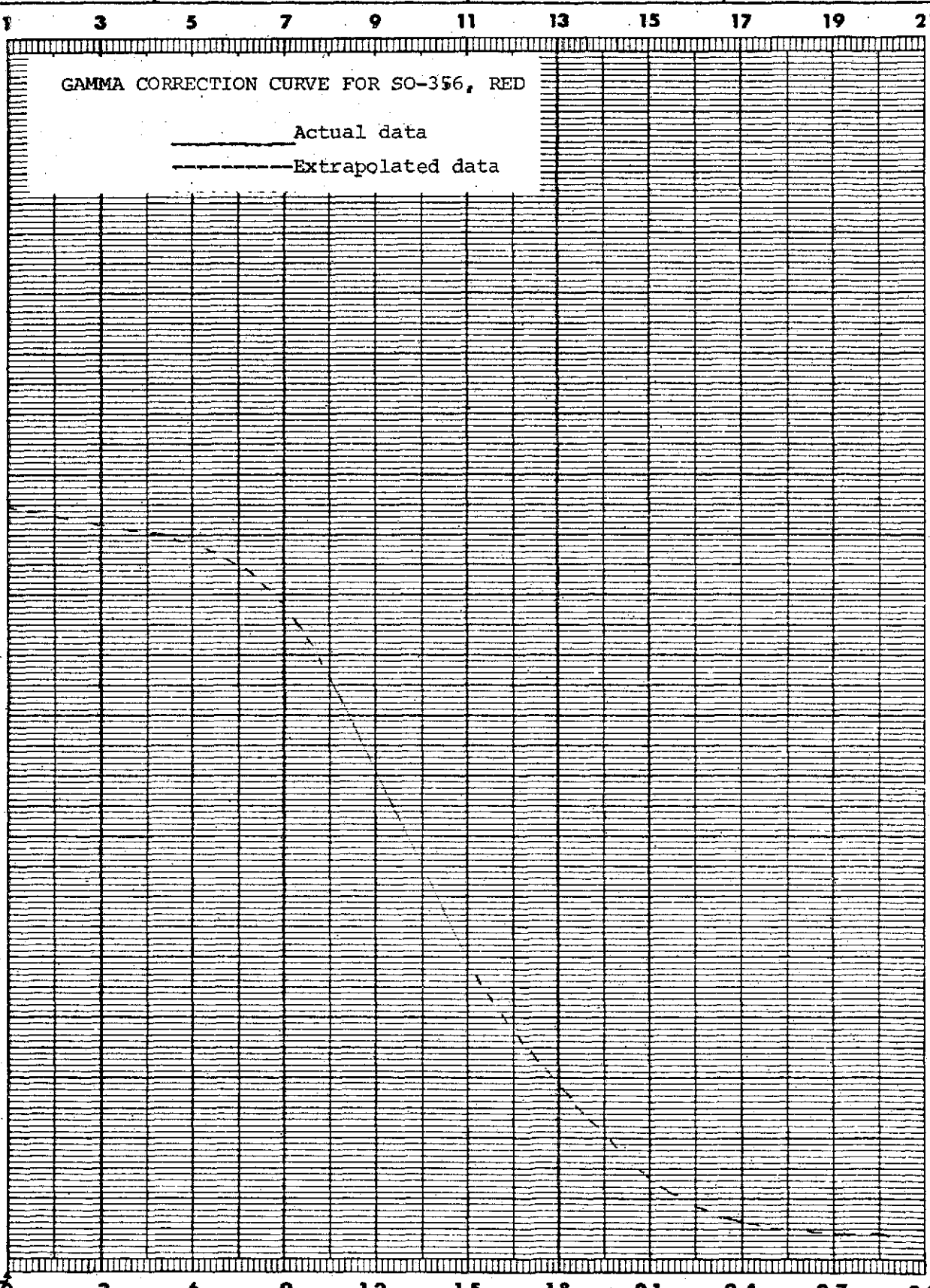

Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

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DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

_____ TA

_____ TRP

_____ KB_r

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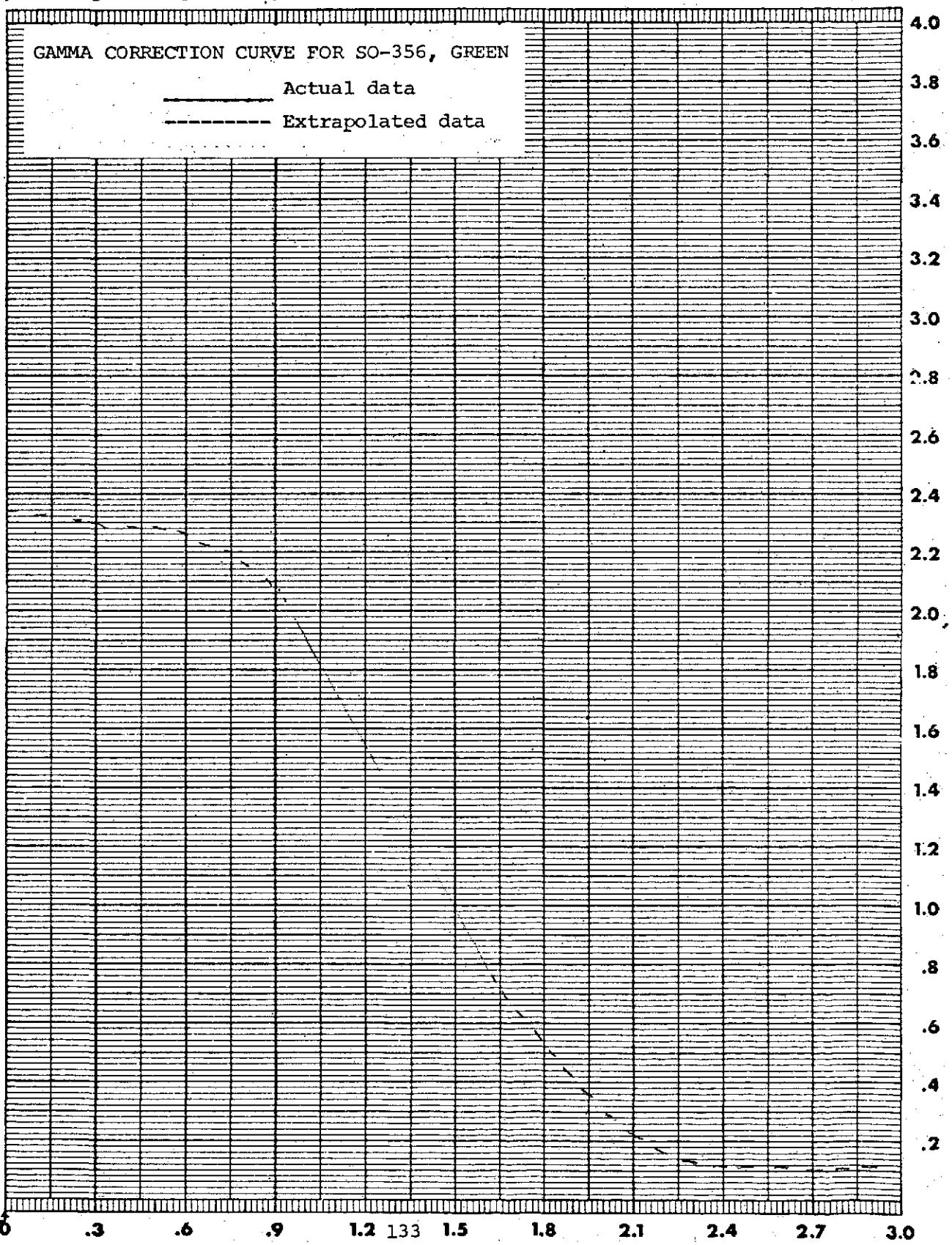

Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

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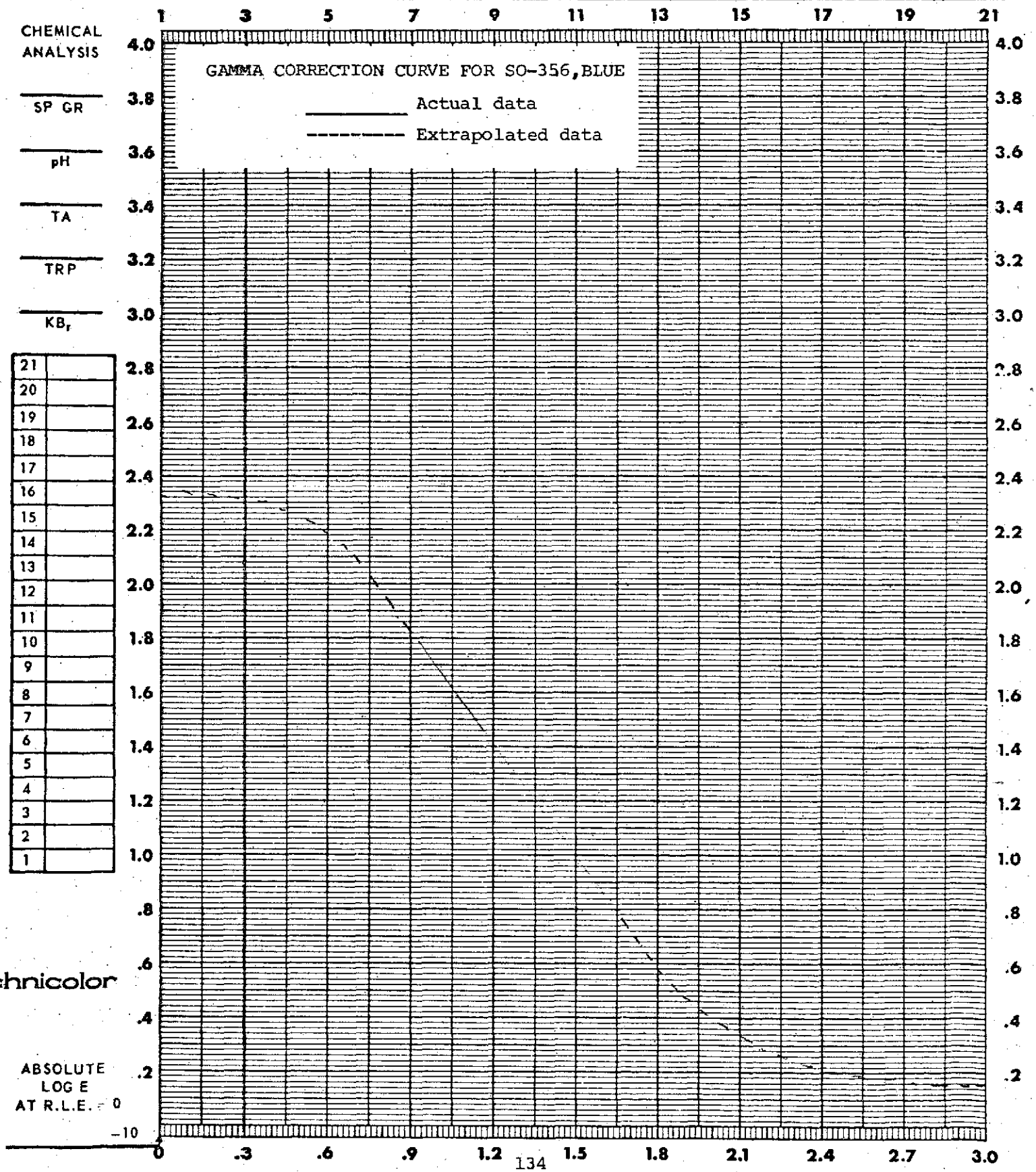
DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____



Technicolor

DATE 13 Jan 73 CONTROL # Station 3 TASK KSC KM002 PREPARED BY Pre-Sensi

FILM 2443 EMULSION # 116-2 MFG _____ EXPIRATION DATE _____

772-150 EXPOSURE DATA 3010		PROCESSING DATA		DENSITOMETRY	
SENSITOMETER	I-B	PROCESSOR	1811 #2	INSTRUMENT	MacBeth
ILLUMINANT	2850 °K	CHEMISTRY	EA-5	TYPE	TD217DR
TIME	1/50 SEC.	SPEED	5 TANKS FPM	APERTURE SIZE	2 MM
FILTER	5500+W12	TEMP °F	104.5 TIME	FILTER	Visual
				SPEED ( )	
				D-MAX	
				GAMMA	
				BASE + FOG	

CHEMICAL ANALYSIS

SP GR

pH

TA

TRP

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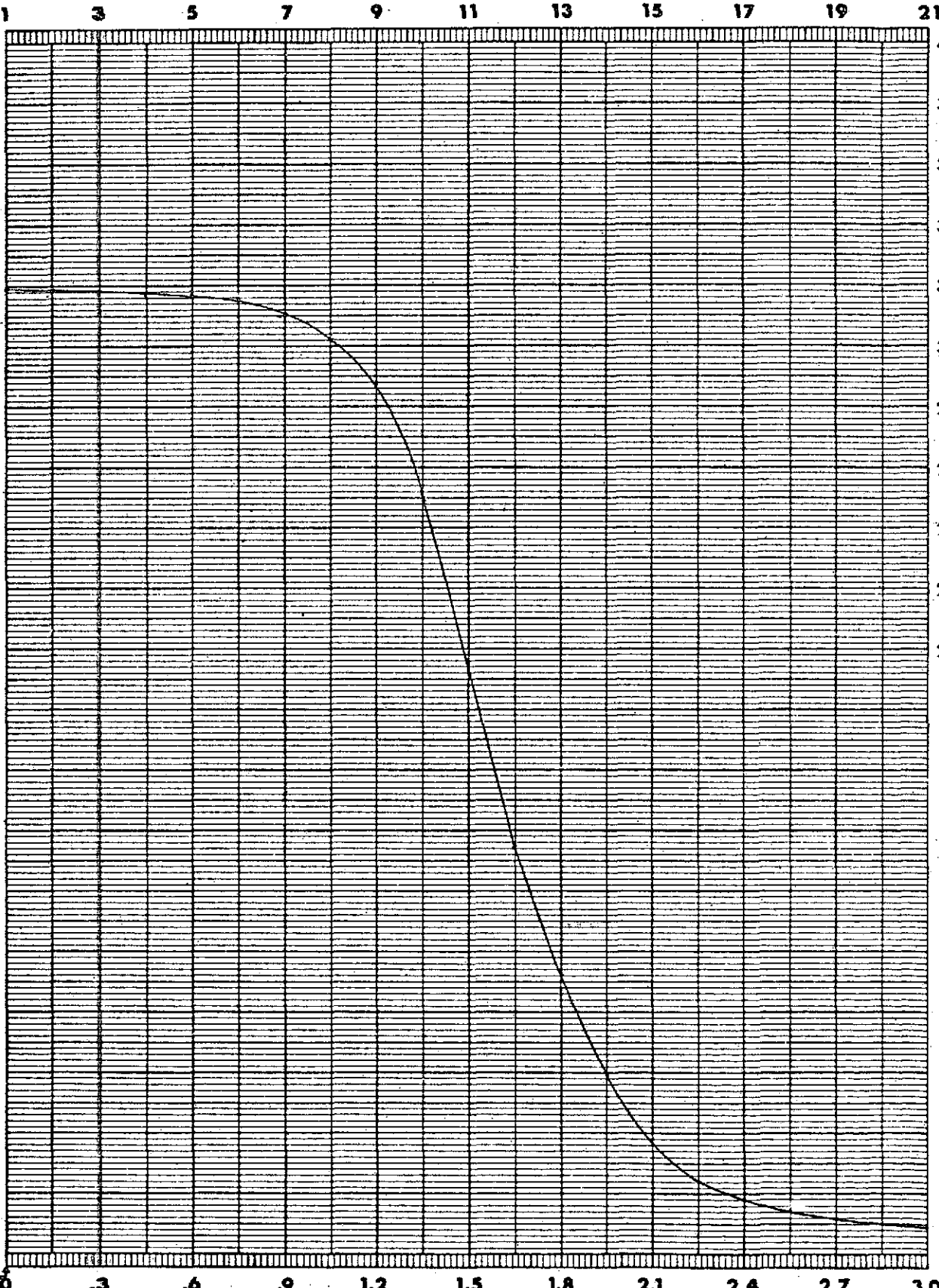

Technicolor

ABSOLUTE LOG E AT R.L.E. 0

7 17 -10

DATE 13 Jan 73 CONTROL # Station 3 TASK KSC KM002 PREPARED BY Pre-Sensi

FILM 2443 EMULSION # 116-2 MFG _____ EXPIRATION DATE _____

772-150 EXPOSURE DATA 3010		PROCESSING DATA		DENSITOMETRY			
SENSITOMETER	I-B	PROCESSOR	1811 #2	INSTRUMENT	MacBeth	SPEED ( )	
ILLUMINANT	2850 °K	CHEMISTRY	EA-5	TYPE	TD217DR	D-MAX	
TIME	1/50 SEC.	SPEED	TANKS 5 FPM	APERTURE SIZE	2 MM	GAMMA	
FILTER	5500 + W12	TEMP °F 104	TIME	FILTER	Status A	BASE + FOG	

CHEMICAL ANALYSIS

SP GR

pH

TA

TRP

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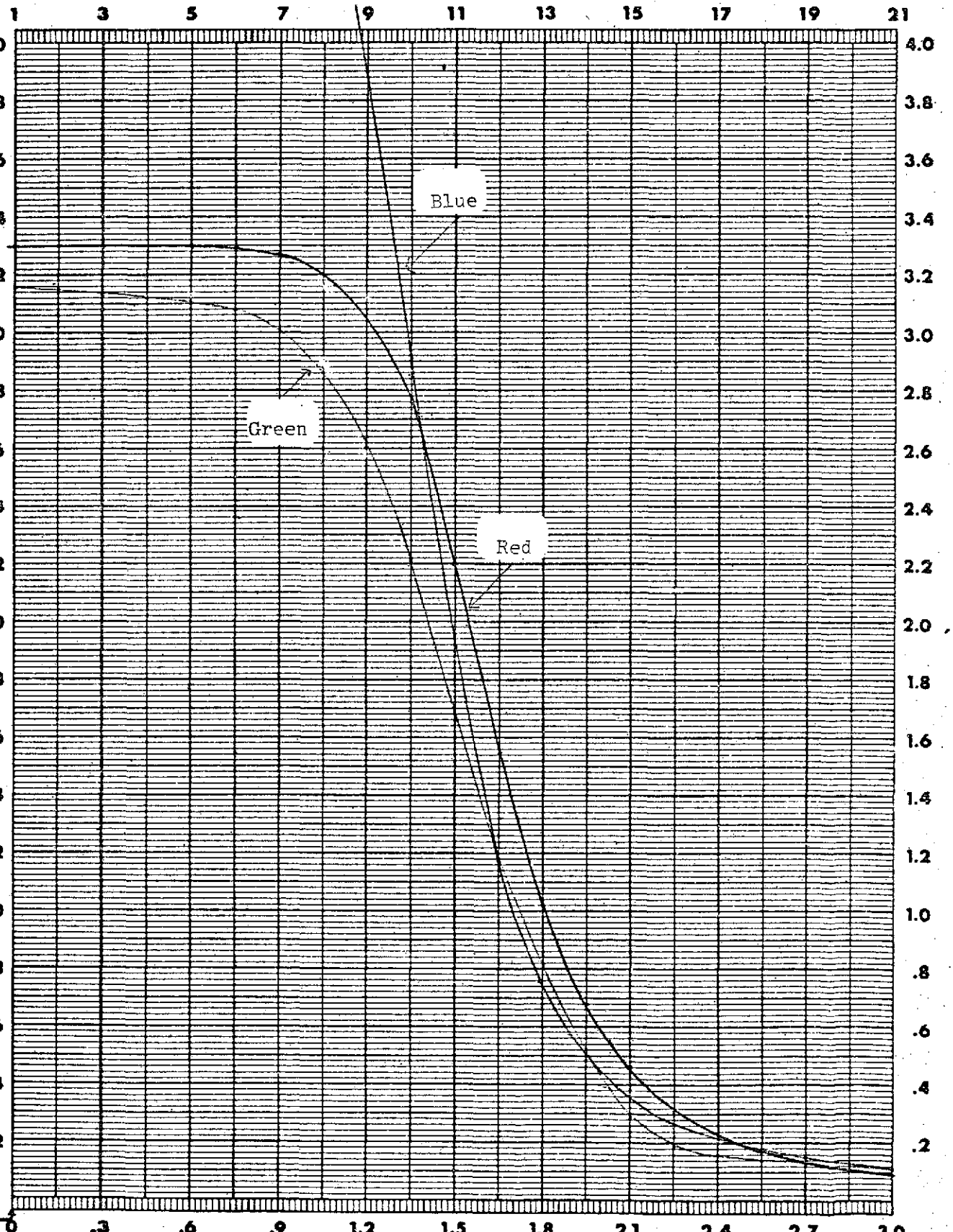

Technicolor

ABSOLUTE LOG E AT R.L.E. 0

7.17 -10

DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

_____ TA

_____ TRP

_____ KB_r

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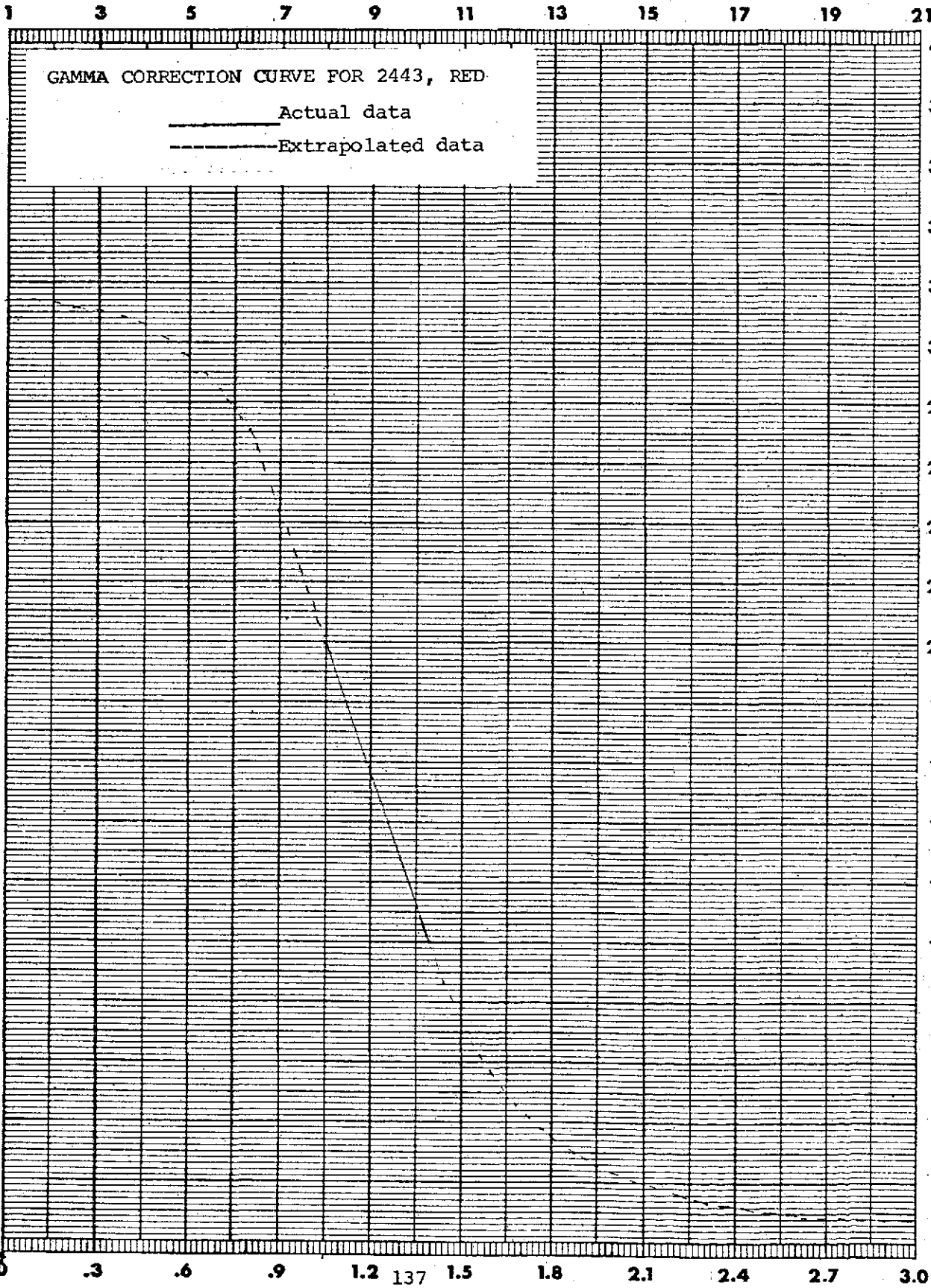

Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

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DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA		PROCESSING DATA		DENSITOMETRY	
SENSITOMETER _____		PROCESSOR _____		INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K		CHEMISTRY _____		TYPE _____	D-MAX _____
TIME _____ SEC.		SPEED _____ TANKS _____ FPM		APERTURE SIZE _____ MM	GAMMA _____
FILTER _____		TEMP °F _____ TIME _____		FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

_____ SP GR

_____ pH

_____ TA

_____ TRP

_____ KB_r

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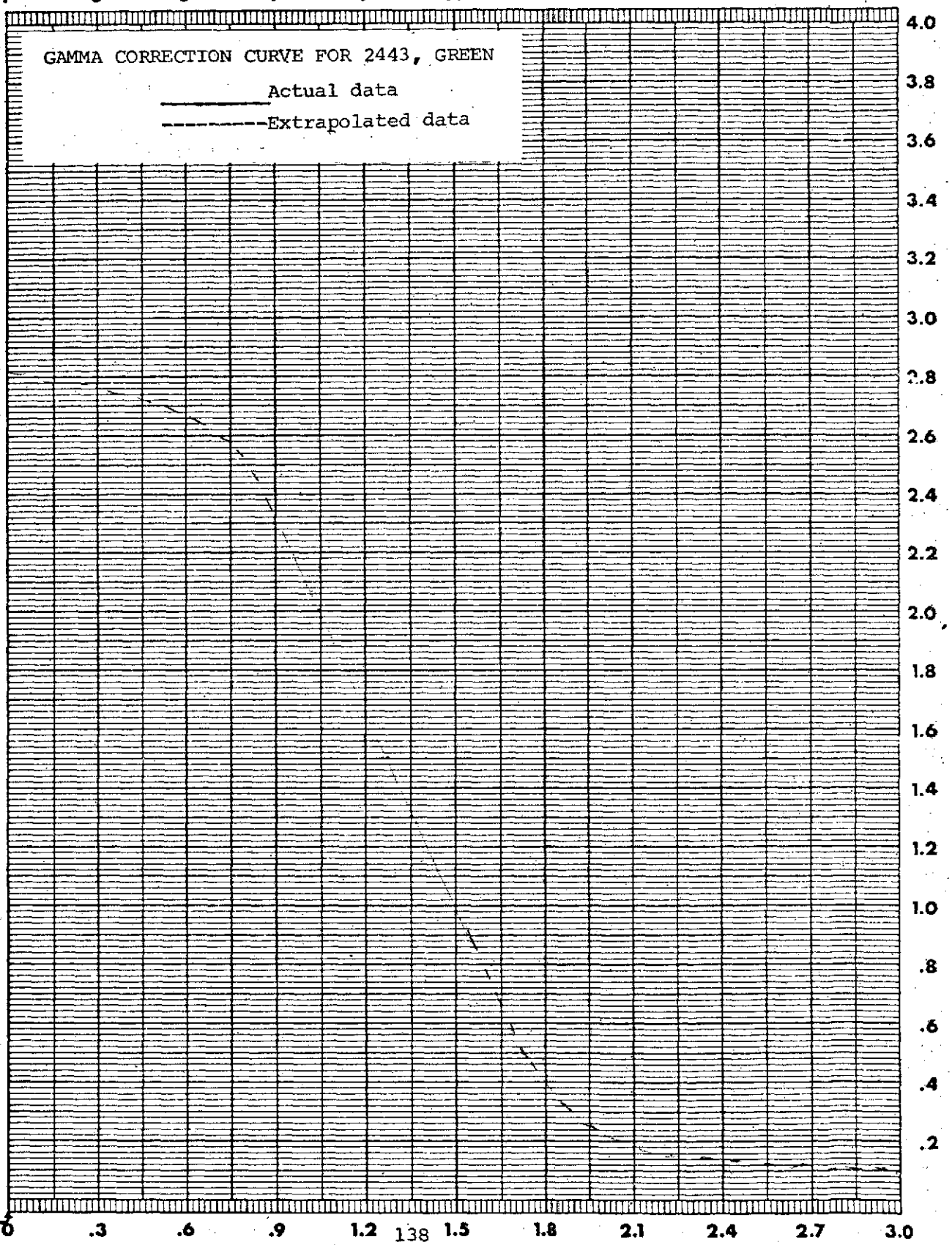

Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

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DATE _____ CONTROL # _____ TASK _____ PREPARED BY _____

FILM _____ EMULSION # _____ MFG _____ EXPIRATION DATE _____

EXPOSURE DATA	PROCESSING DATA	DENSITOMETRY	
SENSITOMETER _____	PROCESSOR _____	INSTRUMENT _____	SPEED ( ) _____
ILLUMINANT _____ °K	CHEMISTRY _____	TYPE _____	D-MAX _____
TIME _____ SEC.	SPEED _____ TANKS _____ FPM	APERTURE SIZE _____ MM	GAMMA _____
FILTER _____	TEMP °F _____ TIME _____	FILTER _____	BASE + FOG _____

CHEMICAL ANALYSIS

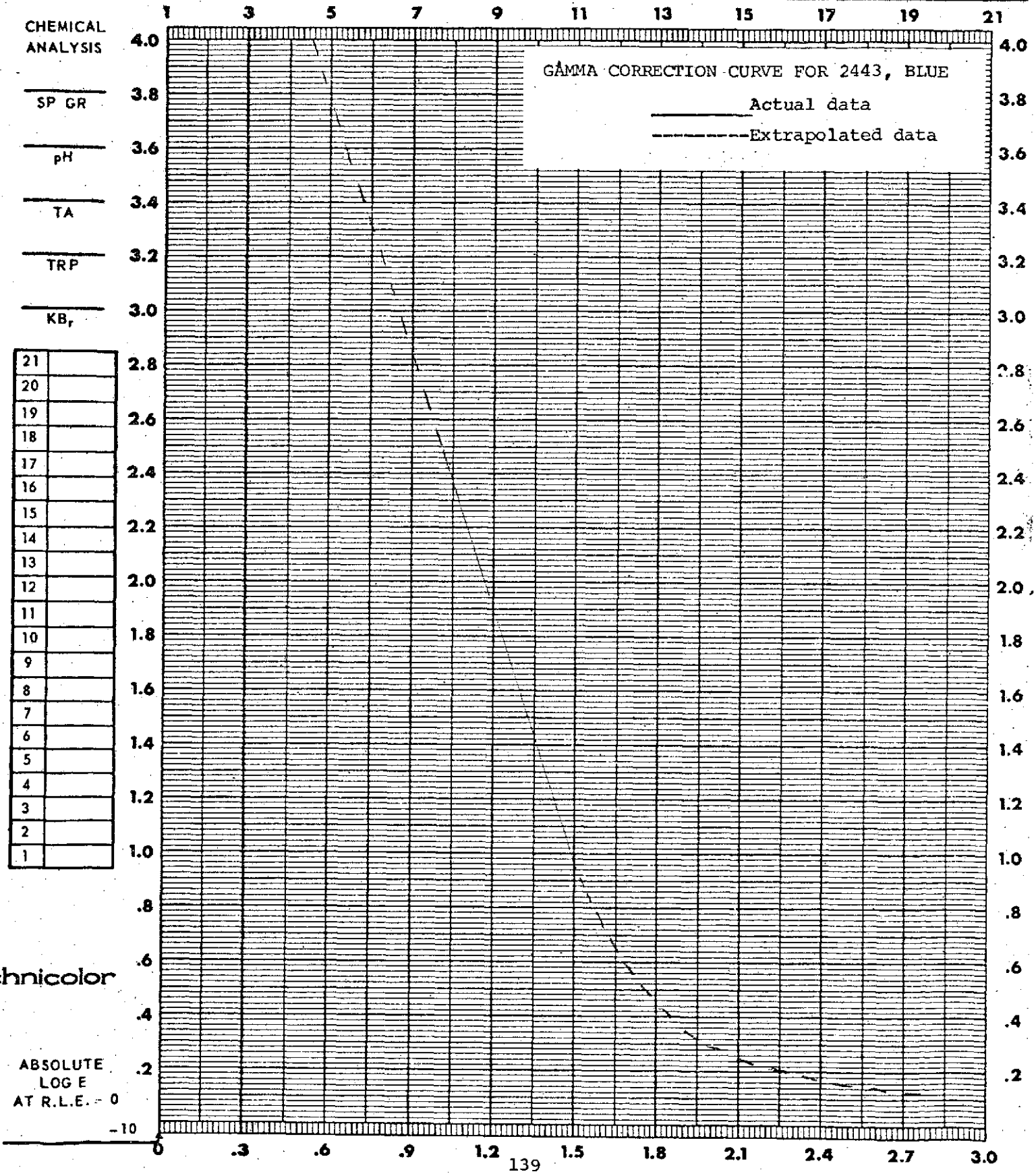
_____ SP GR

_____ pH

_____ TA

_____ TRP

_____ KB_r



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Technicolor

ABSOLUTE LOG E AT R.L.E. = 0

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APPENDIX B

SPECTRAL SENSITOMETRIC DATA

This data, absolute spectral sensitivity in cm^2/erg at specified density levels for each film type, was used to calculate the camera system lens transmission.

A 10^{-7} conversion factor is necessary to $ergs/cm^2$ to watt-seconds/cm^2 to make the units consistent with the radiometric data for the calibrated light source.

DATE: 3/1/72 FACILITY: PTO TASK: EK2424 PREPARED BY: GOODDING
FILM: 2424 EMULSION NUMBER: 43-1 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 18 SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 11 DAYLIGHT + 1.00 ND FILTER CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HI SPEED CHEMISTRY: D-19 TEMPERATURE: 70
TRANSPORT SPEED: 4 REMARKS: KSC SCRATCH TEST

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: VISUAL DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY •••	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
WAVELENGTH									
700	1.2657	1.0577	.8858	.7344	.5955	.4628	.3310	.1931	.0260
710	1.2957	1.1027	.9392	.7869	.6478	.5169	.3863	.2473	.0770
720	1.3306	1.1278	.9601	.8104	.6717	.5378	.4020	.2559	.0769
730	1.3377	1.1323	.9634	.8157	.6767	.5414	.4078	.2704	.1030
740	1.3555	1.1716	1.0040	.8387	.6917	.5571	.4257	.2875	.1136
750	1.3554	1.1596	.9920	.8368	.6921	.5543	.4195	.2801	.1059
760	1.4040	1.2078	1.0375	.8775	.7338	.5994	.4646	.3182	.1285
770	1.3982	1.2087	1.0469	.8938	.7527	.6189	.4838	.3372	.1501
780	1.4362	1.2546	1.0965	.9402	.7939	.6568	.5198	.3725	.1878
790	1.4843	1.3008	1.1418	.9872	.8421	.7060	.5702	.4244	.2433
800	1.5030	1.3144	1.1507	.9984	.8555	.7187	.5806	.4314	.2475
810	1.4557	1.2686	1.1130	.9679	.8323	.7034	.5720	.4251	.2366
820	1.4767	1.2839	1.1212	.9717	.8327	.6999	.5653	.4189	.2357
830	1.4496	1.2606	1.1020	.9530	.8081	.6652	.5246	.3811	.2037
840	1.4333	1.2333	1.0689	.9212	.7815	.6452	.5086	.3634	.1740
850	1.4118	1.2231	1.0546	.8977	.7540	.6181	.4854	.3449	.1572
860	1.3623	1.1845	1.0250	.8773	.7417	.6105	.4765	.3285	.1307
870	1.3493	1.1709	1.0099	.8652	.7351	.6096	.4799	.3339	.1324
880	1.2638	1.0811	.9117	.7586	.6193	.4901	.3628	.2181	-.0053
890	.9785	.7673	.5921	.4415	.3022	.1597	.0039		
900	.6034	.3830	.1957	.0229					
910	.1546								
920									
930									
940									
950									
960									
970									
980									
990									
1000									

DATE: 3/1/72 FACILITY: PTD TASK: EK2424 PREPARED BY: GOODDING
FILM: 2424 EMULSION NUMBER: 43-1 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT + 1.00 ND FILTER CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HI SPEED CHEMISTRY: D-19 TEMPERATURE: 70
TRANSPORT SPEED: 4 REMARKS: KSC SCRATCH TEST

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: VISUAL DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY ••• WAVELENGTH	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
350									
360	1.6752	1.4061	1.1296						
370	1.7684	1.5351	1.3259	1.1197	.9358	.7578			
380	1.8278	1.6107	1.4182	1.2352	1.0697	.9197	.7773	.6307	.4387
390	1.8521	1.6897	1.5134	1.2947	1.1330	1.0066	.8827	.7427	.5685
400	1.8558	1.6657	1.5053	1.3527	1.2063	1.0719	.9477	.8190	.6566
410	1.8272	1.6521	1.4869	1.3346	1.2020	1.0804	.9598	.8312	.6785
420	1.8279	1.6523	1.4946	1.3485	1.2198	1.1035	.9880	.8609	.7018
430	1.8427	1.6614	1.5116	1.3779	1.2562	1.1431	1.0301	.9056	.7455
440	1.8243	1.6591	1.5107	1.3679	1.2391	1.1254	1.0160	.8965	.7364
450	1.8181	1.6319	1.4795	1.3456	1.2259	1.1162	1.0076	.8882	.7317
460	1.7385	1.5716	1.4263	1.2936	1.1725	1.0591	.9449	.8190	.6606
470	1.6195	1.4282	1.2757	1.1510	1.0447	.9437	.8371	.7102	.5416
480	1.4788	1.2976	1.1403	.9909	.8623	.7553	.6565	.5506	.4035
490	1.2941	1.0996	.9379	.7973	.6707	.5511	.4334	.3091	.1536
500	1.0682	.8453	.6569	.4936	.3516	.2206	.0935	-.0401	-.2102
510	.9006	.6522	.4526	.2741	.1219	-.0135	-.1509	-.3081	-.4061
520	.8551	.5773	.3526	.1730	.0232	-.1181	-.2663	-.4004	-.4011
530	.8703	.6147	.4086	.2324	.0872	-.0455	-.1859	-.3531	-.3998
540	.9272	.6876	.4979	.3316	.1855	.0544	-.0774	-.2326	-.3943
550	.9963	.7740	.5839	.4206	.2766	.1455	.0186	-.1229	-.3330
560	1.0303	.8223	.6387	.4763	.3329	.2003	.0727	-.0636	-.2517
570	1.0774	.8623	.6820	.5235	.3819	.2493	.1192	-.0184	-.1975
580	1.0961	.8906	.7147	.5568	.4160	.2843	.1536	.0143	-.1643
590	1.1314	.9164	.7381	.5844	.4496	.3225	.1925	.0476	-.1425
600	1.1455	.9457	.7704	.6122	.4735	.3447	.2154	.0745	-.1080
610	1.1511	.9406	.7467	.5812	.4420	.3133	.1856	.0464	-.1421
620	1.1442	.9206	.7255	.5655	.4286	.3014	.1756	.0379	-.1489
630	1.1756	.9605	.7871	.6341	.4921	.3574	.2274	.0914	-.0858
640	1.1939	.9942	.8033	.6384	.5005	.3726	.2444	.1030	-.0928
650	1.2343	1.0150	.8170	.6568	.5230	.3971	.2681	.1229	-.0808
660	1.2159	1.0101	.8180	.6523	.5097	.3789	.2520	.1133	-.0853
670	1.2206	1.0119	.8320	.6756	.5366	.4056	.2755	.1322	-.0751
680	1.2422	1.0312	.8499	.6895	.5457	.4111	.2802	.1413	-.0429
690	1.2577	1.0538	.8788	.7238	.5860	.4566	.3276	.1894	.0134

DATE: 3/28/73 FACILITY: JSC-P50 TASK: SO-356 RED PREPARED BY: PERRY
FILM: SO356 RED EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 18 SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: RED-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY ••• WAVELENGTH	1.00	1.50
350		
360		
370		
380		
390		
400		
410		
420	-1.3711	-1.0952
430	-1.0942	-.8349
440	-1.1501	-.8388
450	-1.2359	-.9785
460	-1.3301	-1.0715
470	-1.4431	-1.1970
480	-1.4667	-1.2135
490	-1.4616	-1.2089
500	-1.4693	-1.2011
510	-1.3777	-1.1057
520	-1.2844	-1.0308
530	-1.1732	-.9316
540	-1.1026	-.8398
550	-1.0338	-.7616
560	-.8298	-.5668
570	-.6718	-.4091
580	-.5260	-.2581
590	-.3607	-.1191
600	-.2184	.0297
610	-.1020	.1664
620	.0417	.3606
630	.2969	.5179
640	.4769	.7095
650	.5355	.7843
660	.3212	.5847
670	-.2034	.0590
680	-.5911	-.3134
690	-1.2896	-.9115

DATE: 3/28/73 FACILITY: JSC-P50 TASK: SO-356 RED PREPARED BY: PERRY
FILM: SO356 RED EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: RED-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY 1.00 1.50

•••

WAVELENGTH

700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000

DATE: 3/28/73 FACILITY: JSC-PSO TASK: SO-356 GRN PREPARED BY: PERRY
FILM: SO356 GRN EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD#217
APERTURE SIZE: 2 MM FILTER: GREEN-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY ••• WAVELENGTH	1.00	1.50
350		
360		
370		
380		
390		
400	**********	-1.4205
410	-1.5919	-1.2439
420	-1.0440	-.7617
430	-.8345	-.5678
440	-.9026	-.6104
450	-.9698	-.6944
460	-1.0233	-.7619
470	-1.0590	-.7613
480	-.9437	-.6703
490	-.7403	-.4619
500	-.5387	-.2828
510	-.3605	-.0821
520	-.1577	.1246
530	.0790	.3551
540	.2505	.5285
550	.3536	.6173
560	.0858	.3528
570	.0708	.3185
580	-.1102	.1498
590	-1.1279	-.8839
600	**********	-1.6648
610		
620		
630		
640		
650		
660		
670		
680		
690		

DATE: 3/28/73 FACILITY: JSC-PSD TASK: SO-356 GRN PREPARED BY: PERRY
FILM: SO356 GRN EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 18 SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: GREEN STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY 1.00 1.50

••• WAVELENGTH
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000

DATE: 3/28/73 FACILITY: JSC-PSO TASK: SO-356 BL PREPARED BY: PERRY
FILM: SO356 BL EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 18 SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: BLUE-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY •••	1.00	1.50
WAVELENGTH		
350		
360		
370		
380		
390	**********	-1.1968
400	-1.0069	-.6919
410	-.6612	-.2835
420	-.0450	.2986
430	.1000	.4767
440	.0311	.3983
450	-.1000	.2951
460	-.1885	.1671
470	-.3298	.0297
480	-.3592	-.0227
490	-.3824	-.0802
500	-.5011	-.2138
510	-.7157	-.4096
520	-1.0807	-.7220
530	-1.5462	-1.1890
540	**********	-1.7075
550		
560		
570		
580		
590		
600		
610		
620		
630		
640		
650		
660		
670		
680		
690		

DATE: 3/28/73 FACILITY: JSC-P50 TASK: SO-356 BL PREPARED BY: PERRY
FILM: SO356 BL EMULSION NUMBER: 16-4 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 1B SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: HOUSTON CHEMISTRY: ME-4 TEMPERATURE: 98
TRANSPORT SPEED: 15 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: BLUE-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM••2/ERG)

GROSS DENSITY 1.00 1.50
•••
WAVELENGTH
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000

DATE: 4/3/73 FACILITY: JSC-PSO TASK: 2443 RED PREPARED BY: PERRY
FILM: 2443 RED EMULSION NUMBER: 116-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 1B SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: VMAT 181: CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: RED-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY *** WAVELENGTH	1.00	1.50	2.00
350	*********	.5613	.8118
360	.8205	1.0934	1.2811
370	1.1147	1.3298	1.4884
380	1.2473	1.4610	1.6302
390	1.2034	1.4646	1.7566
400	1.2442	1.4245	1.9444
410	1.1826	1.4100	1.6441
420	1.1729	1.6422	1.8126
430	1.2162	1.4449	1.6098
440	1.0984	1.3828	1.7422
450	1.0377	1.2386	1.4126
460	.9128	1.0846	1.2339
470	.7360	.9203	1.0722
480	.5059	.6779	.8278
490	.3286	.5119	.6578
500	.1113	.2862	.4344
510	-.0478	.1329	.2717
520	-.1059	.0766	.2238
530	-.1200	.0749	.2250
540	-.1426	.0555	.2112
550	-.2193	-.0275	.1326
560	-.1877	.0043	.1602
570	-.1183	.0701	.2215
580	-.0134	.1789	.3303
590	.1038	.2655	.4007
600	.1658	.3225	.4599
610	.2182	.3718	.5073
620	.2523	.4024	.5378
630	.2474	.3964	.5321
640	.2783	.4296	.5715
650	.3111	.4616	.6062
660	.3463	.4978	.6410
670	.3726	.5311	.6613
680	.3648	.5275	.6520
690	.3917	.5680	.6937

DATE: 4/3/73 FACILITY: JSC-PSO TASK: 2443 RED PREPARED BY: PERRY
FILM: 2443 RED EMULSION NUMBER: 114-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 11

PROCESSING DATA:
PROCESSOR: VMAT 1811 CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: RED-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY •••	1.00	1.50	2.00
WAVELENGTH			
700	.4561	.6426	.7810
710	.4956	.6899	.8325
720	.5493	.7311	.8660
730	.5316	.7193	.8579
740	.5179	.7052	.8402
750	.4481	.6389	.7771
760	.3982	.6183	.7558
770	.3536	.5724	.7173
780	.3747	.5901	.7370
790	.3950	.6164	.7589
800	.4103	.6254	.7718
810	.3954	.6114	.7628
820	.3808	.6120	.7565
830	.3304	.5614	.7197
840	.2847	.5062	.6636
850	.2624	.4965	.6454
860	.2607	.4914	.6536
870	.2282	.4658	.6212
880	.0462	.2992	.4687
890	-.3896	-.1204	.0605
900	-.8337	-.5365	-.3501
910			
920			
930			
940			
950			
960			
970			
980			
990			
1000			

150

*** SPECTRAL SENSITIVITY REPORT *** PAGE 1 OF 2

DATE: 4/3/73 FACILITY: JSC-PSD TASK: 2443 GREEN PREPARED BY: PERRY
FILM: 2443 GREEN EMULSION NUMBER: 116-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 11 DAYLIGHT CONTROL NO.: REP. 11

PROCESSING DATA:
PROCESSOR: VMAT 1811 CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: GREEN-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY *** WAVELENGTH	1.00	1.50	2.00
350			
360			
370			
380	**********	-.3870	-.0685
390	-.1703	.0818	.3396
400	.1285	.3698	.6252
410	.2249	.4642	.7134
420	.3574	.5992	.8337
430	.4638	.6912	.9189
440	.5133	.7570	1.0019
450	.5447	.7682	.9862
460	.5082	.7233	.9312
470	.3878	.6070	.8106
480	.2945	.5104	.7232
490	.1743	.3952	.6107
500	-.0235	.1936	.4076
510	-.1543	.0688	.2870
520	-.2361	.0067	.2248
530	-.2672	-.0282	.2008
540	-.1963	.0065	.2162
550	-.1519	.0111	.2151
560	-.0161	.2034	.4165
570	.1275	.3415	.5606
580	.3051	.5176	.7280
590	.4130	.6110	.7938
600	.4069	.6198	.8214
610	.4345	.7039	.9248
620	.3980	.7541	.9891
630	.6145	.9447	1.1602
640	.7170	1.1350	1.3805
650	.8140	1.2414	1.5374
660	.4793	.7548	.9901
670	-.1297	.1944	.4122
680	-1.0115	-.5326	-.1367
690	-1.0411	-.5730	-.1562

DATE: 4/3/73 FACILITY: JSC-PSD TASK: 2443 GREEN PREPARED BY: PERRY
FILM: 2443 GREEN EMULSION NUMBER: 114-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: VMAT 1811 CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

Ddensitometry:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: GREEN-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY	1.00	1.50	2.00	
***				
WAVELENGTH				
700	**********	**********		.8436
710				
720				
730				
740				
750				
760				
770				
780				
790				
800				
810				
820				
830				
840				
850				
860				
870				
880				
890				
900				
910				
920				
930				
940				
950				
960				
970				
980				
990				
1000				

*** SPECTRAL SENSITIVITY REPORT *** PAGE 1 OF 9

DATE: 4/3/73 FACILITY: JSC-PSO TASK: 2443 BLUE PREPARED BY: PERRY
FILM: 2443 BLUE EMULSION NUMBER: 116-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION 18 SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: VMAT 181 CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: BLUE-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY	1.00	1.50	2.00
***			
WAVELENGTH			
350			
360			
370	*********	-.1923	.1479
380	.0367	.3902	.6498
390	.4053	.7066	.8765
400	.6953	.9027	1.0536
410	.7708	.9667	1.1135
420	.8584	1.0485	1.2009
430	.9122	1.1376	1.3137
440	.9441	1.1204	1.2901
450	.9832	1.1602	1.2913
460	.9560	1.1172	1.2447
470	.8972	1.0746	1.2021
480	.8748	1.0562	1.1855
490	.8203	1.0202	1.1592
500	.7718	.9834	1.1244
510	.8330	1.0380	1.1629
520	.9178	1.1417	1.3006
530	.9808	1.1769	1.3166
540	1.0313	1.2211	1.3775
550	1.0346	1.2173	1.3880
560	1.0250	1.2145	1.4170
570	1.0013	1.1813	1.3579
580	.9221	1.1128	1.2494
590	.3538	.5082	.6235
600	-.1672	-.0050	.1234
610	-.8322	-.5883	-.3919
620	**********	**********	-1.1364
630			
640			
650			
660			
670			
680			
690			

DATE: 4/3/73 FACILITY: JSC-PSD TASK: 2443 BLUE PREPARED BY: PERRY
FILM: 2443 BLUE EMULSION NUMBER: 116-2 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0100 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: VMAT 1811 CHEMISTRY: EA-5 TEMPERATURE: 110
TRANSPORT SPEED: 7 FPM REMARKS:

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: BLUE-STATUS A DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY *** WAVELENGTH	1.00	1.50	2.00
700			
710			
720			
730			
740			
750			
760			
770			
780			
790			
800			
810			
820			
830			
840			
850			
860			
870			
880			
890			
900			
910			
920			
930			
940			
950			
960			
970			
980			
990			
1000			

DATE: 3/13/73 FACILITY: JSC-PSO TASK: EK SO-022 PREPARED BY: PERRY
FILM: SO-022 EMULSION NUMBER: 1-1 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.1 REP. 1:

PROCESSING DATA:
PROCESSOR: FULTRON CHEMISTRY: MX-819 TEMPERATURE: 82 F
TRANSPORT SPEED: 9 FPM REMARKS: SO-022

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: VISUAL DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY *** WAVELENGTH	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
350	.9407	.5751	.2184	-.0398	.2559	.0534	-.1382	-.3204	
360	1.2481	.9292	.6757	.4622	.5347	.3843	.2299	.0674	-.1053
370	1.3867	1.1275	.8936	.6956	.7464	.5895	.4475	.3119	.1731	.0172
380	1.4908	1.1771	.9352	.7424	.5934	.8758	.3706	.2612	.1185
390	1.5279	1.2107	.9424	.7424	.5934	.8758	.3706	.2612	.1185
400	1.4962	1.1821	.9604	.7849	.6373	.5045	.3764	.2461	.1064
410	1.4590	1.1316	.9067	.7211	.5684	.4398	.3194	.1940	.0500
420	1.4475	1.1245	.8952	.7108	.5552	.4234	.3025	.1790	.0386
430	1.4484	1.1057	.8907	.7240	.5779	.4450	.3193	.1917	.0511
440	1.4154	1.0898	.8578	.6884	.5473	.4210	.3017	.1787	.0364
450	1.3631	.9699	.7825	.6282	.4912	.3666	.2482	.1263	-.0115
460	1.3064	.8831	.6880	.5335	.4001	.2801	.1647	.0451	-.0890
470	1.1375	.7747	.5925	.4371	.2965	.1647	.0366	-.0923	-.2259
480	.9309	.6926	.5220	.3718	.2318	.0983	-.0291	-.1526	-.2813
490	.8615	.6123	.4236	.2686	.1350	.0130	-.1028	-.2186	-.3433
500	.8191	.5803	.4082	.2658	.1396	.0204	-.0980	-.2209	-.3544
510	.8247	.6110	.4453	.3026	.1771	.0605	-.0549	-.1735	-.3020
520	.8939	.6592	.4873	.3380	.2081	.0902	-.0244	-.1422	-.2688
530	.9686	.6896	.5282	.3869	.2553	.1288	.0054	-.1161	-.2399
540	1.0268	.7637	.5860	.4389	.3067	.1843	.0654	-.0568	-.1904
550	1.0678	.7909	.6134	.4659	.3308	.2083	.0943	-.0208	-.1487
560	1.0931	.8283	.6378	.4983	.3698	.2473	.1282	.0076	-.1221
570	1.0825	.8628	.6646	.5258	.4041	.2886	.1745	.0574	-.0691
580	1.0931	.8701	.6839	.5446	.4177	.2964	.1794	.0637	-.0588
590	1.0873	.8314	.6547	.5180	.3874	.2639	.1484	.0338	-.0919
600	1.0626	.7560	.6063	.4697	.3392	.2191	.1068	-.0070	-.1333
610	1.0289	.7260	.5755	.4371	.3075	.1869	.0702	-.0485	-.1750
620	.9874	.6992	.5516	.4340	.3085	.1405	-.0054	-.1097	-.2084
630	.9394	.6533	.4996	.3649	.2292	.0931	-.0273	-.1337	-.2418
640	.8863	.6581	.4906	.3457	.2195	.1045	-.0047	-.1133	-.2298
650	.8683	.6514	.4956	.3615	.2356	.1160	.0026	-.1091	-.2288
660	1.0121	.7384	.5794	.4360	.3116	.2000	.0905	-.0256	-.1538
670	1.1393	.8029	.6488	.5175	.3958	.2800	.1661	.0482	-.0801
680	1.1248	.8590	.6871	.5549	.4329	.3182	.2079	.0954	-.0287
690	1.0446	.7630	.5963	.4572	.3321	.2155	.1022	-.0122	-.1334

DATE: 3/13/73 FACILITY: JSC-PSO TASK: EK SO-022 PREPARED BY: PERRY
FILM: SO-022 EMULSION NUMBER: 1-1 MFG: EK EXPIRATION DATE:

EXPOSURE DATA:
INSTRUMENT: DATA CORPORATION IB SPECTROSENSITOMETER MODEL 7001
EXPOSURE TIME: .0333 SECONDS
FILTRATION: REP. 1: DAYLIGHT CONTROL NO.: REP. 1:

PROCESSING DATA:
PROCESSOR: FULTRON CHEMISTRY: MX-819 TEMPERATURE: 82 F
TRANSPORT SPEED: 9 FPM REMARKS: SO-022

DENSITOMETRY:
INSTRUMENT: MACBETH TYPE: TD-217
APERTURE SIZE: 2 MM FILTER: VISUAL DENSITY CALIBRATION PERFORMED: NO

LOG10(ABSOLUTE SPECTRAL SENSITIVITY) (CM**2/ERG)

GROSS DENSITY ••• / WAVELENGTH	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00
700	.4556	.2206	.0496	-.0869	-.2108	-.3334	-.4581	-.5861	-.7232
710	-.1580	-.3835	-.5819	-.7658	-.9478	-1.1207	-1.2787	-1.4421	-1.6533
720	-.7869	-1.2297	-1.5458	••••••	••••••	••••••	••••••	••••••	••••••
730	-1.3803	••••••	••••••	••••••	••••••	••••••	••••••	••••••	••••••
740									
750									
760									
770									
780									
790									
800									
810									
820									
830									
840									
850									
860									
870									
880									
890									
900									
910									
920									
930									
940									
950									
960									
970									
980									
990									
1000									

APPENDIX C

CALCULATIONS FOR INTEGRATION USING SIMPSON'S RULE

A print of the calculations used to integrate source radiance, filter factor, and log spectral sensitivity at 10nm intervals using integration by Simpson's Rule are included here.

The integral was used in the T_{cs} calculation.

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Fast
D = 0.76
f = 13.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.849900000000ex 00	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.878800000000ex 00	.129964026935ex-05
700	.105000000000ex-04	.250000000000ex 00	.885800000000ex 00	.201803785095ex-04
710	.114000000000ex-04	.590000000000ex 00	.939200000000ex 00	.584732001781ex-04
720	.129000000000ex-04	.780000000000ex 00	.960100000000ex 00	.917876631134ex-04
730	.151000000000ex-04	.870000000000ex 00	.963400000000ex 00	.120752519178ex-03
740	.176000000000ex-04	.890000000000ex 00	.100400000000ex 01	.158089372075ex-03
750	.196000000000ex-04	.880000000000ex 00	.992000000000ex 00	.169331885212ex-03
760	.209000000000ex-04	.840000000000ex 00	.103750000000ex 01	.191392789483ex-03
770	.215000000000ex-04	.820000000000ex 00	.104690000000ex 01	.196404897166ex-03
780	.215000000000ex-04	.850000000000ex 00	.109650000000ex 01	.228221936248ex-03
790	.212000000000ex-04	.910000000000ex 00	.114180000000ex 01	.267409759401ex-03
800	.208000000000ex-04	.890000000000ex 00	.115070000000ex 01	.261910760499ex-03
810	.202000000000ex-04	.590000000000ex 00	.111300000000ex 01	.154597825515ex-03
820	.199000000000ex-04	.230000000000ex 00	.112120000000ex 01	.605035576799ex-04
830	.196000000000ex-04	.900000000000ex-01	.110200000000ex 01	.223099491693ex-04
840	.194000000000ex-04	.400000000000ex-01	.106890000000ex 01	.909414179200ex-05
850	.191000000000ex-04	.200000000000ex-01	.105460000000ex 01	.433174978899ex-05
860	.190000000000ex-04	.100000000000ex-01	.102500000000ex 01	.201258207784ex-05
870	.189000000000ex-04	.000000000000ex 00	.100990000000ex 01	.000000000000ex 00

INTEGRAL .200867735546ex-01

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER ; Medium
D = 0.98
f = 16.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.689500000000ex 00	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.723800000000ex 00	.909542840187ex-06
700	.105000000000ex-04	.250000000000ex 00	.734400000000ex 00	.142406334428ex-04
710	.114000000000ex-04	.590000000000ex 00	.786900000000ex 00	.411772048539ex-04
720	.129000000000ex-04	.780000000000ex 00	.810400000000ex 00	.650255917364ex-04
730	.151000000000ex-04	.870000000000ex 00	.815700000000ex 00	.859401683132ex-04
740	.176000000000ex-04	.890000000000ex 00	.838700000000ex 00	.108044502591ex-03
750	.196000000000ex-04	.880000000000ex 00	.838600000000ex 00	.118942960386ex-03
760	.209000000000ex-04	.840000000000ex 00	.877500000000ex 00	.132411459374ex-03
770	.215000000000ex-04	.820000000000ex 00	.893800000000ex 00	.138055054676ex-03
780	.215000000000ex-04	.850000000000ex 00	.940200000000ex 00	.159241912792ex-03
790	.212000000000ex-04	.910000000000ex 00	.987200000000ex 00	.187317025699ex-03
800	.208000000000ex-04	.890000000000ex 00	.998400000000ex 00	.184439247478ex-03
810	.202000000000ex-04	.590000000000ex 00	.967900000000ex 00	.110688724021ex-03
820	.199000000000ex-04	.230000000000ex 00	.971700000000ex 00	.428825805862ex-04
830	.196000000000ex-04	.900000000000ex-01	.953000000000ex 00	.158306439349ex-04
840	.194000000000ex-04	.400000000000ex-01	.921200000000ex 00	.647234593188ex-05
850	.191000000000ex-04	.200000000000ex-01	.897700000000ex 00	.301830666628ex-05
860	.190000000000ex-04	.100000000000ex-01	.877300000000ex 00	.143236467189ex-05
870	.189000000000ex-04	.000000000000ex 00	.865200000000ex 00	.000000000000ex 00

INTEGRAL .141196660090ex-01

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Fast
D = 0.52
f = 16.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.103120000000ex 01	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.105380000000ex 01	.194456811110ex-05
700	.105000000000ex-04	.250000000000ex 00	.105770000000ex 01	.299798397942ex-04
710	.114000000000ex-04	.590000000000ex 00	.110270000000ex 01	.852033877491ex-04
720	.129000000000ex-04	.790000000000ex 00	.112780000000ex 01	.136778174006ex-03
730	.151000000000ex-04	.870000000000ex 00	.113230000000ex 01	.178154255205ex-03
740	.176000000000ex-04	.890000000000ex 00	.117160000000ex 01	.232542680619ex-03
750	.196000000000ex-04	.880000000000ex 00	.115960000000ex 01	.249079934880ex-03
760	.209000000000ex-04	.840000000000ex 00	.120780000000ex 01	.283286300029ex-03
770	.215000000000ex-04	.820000000000ex 00	.120870000000ex 01	.285070522865ex-03
780	.215000000000ex-04	.850000000000ex 00	.125460000000ex 01	.328441015034ex-03
790	.212000000000ex-04	.910000000000ex 00	.130080000000ex 01	.385635719180ex-03
800	.208000000000ex-04	.890000000000ex 00	.131440000000ex 01	.381815312545ex-03
810	.202000000000ex-04	.590000000000ex 00	.126860000000ex 01	.221209299807ex-03
820	.199000000000ex-04	.230000000000ex 00	.128390000000ex 01	.879996434324ex-04
830	.196000000000ex-04	.900000000000ex-01	.126060000000ex 01	.321439009240ex-04
840	.194000000000ex-04	.400000000000ex-01	.123330000000ex 01	.132788884088ex-04
850	.191000000000ex-04	.200000000000ex-01	.122310000000ex 01	.638503618633ex-05
860	.190000000000ex-04	.100000000000ex-01	.118450000000ex 01	.290571891819ex-05
870	.189000000000ex-04	.000000000000ex 00	.117090000000ex 01	.000000000000ex 00

INTEGRAL .292445388171ex-01

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Slow Med
D = 1.79 1.73
f = 13.0 9.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.141300000000ex 00	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.189400000000ex 00	.265719336595ex-06
700	.105000000000ex-04	.250000000000ex 00	.193100000000ex 00	.409476806657ex-05
710	.114000000000ex-04	.590000000000ex 00	.247300000000ex 00	.118865785041ex-04
720	.129000000000ex-04	.780000000000ex 00	.255900000000ex 00	.181377876477ex-04
730	.151000000000ex-04	.870000000000ex 00	.270400000000ex 00	.244847796477ex-04
740	.176000000000ex-04	.890000000000ex 00	.287500000000ex 00	.303670548895ex-04
750	.196000000000ex-04	.880000000000ex 00	.280100000000ex 00	.328729548695ex-04
760	.209000000000ex-04	.840000000000ex 00	.318200000000ex 00	.365279729191ex-04
770	.215000000000ex-04	.820000000000ex 00	.337200000000ex 00	.383223658220ex-04
780	.215000000000ex-04	.850000000000ex 00	.372500000000ex 00	.430881041311ex-04
790	.212000000000ex-04	.910000000000ex 00	.424400000000ex 00	.512598408243ex-04
800	.208000000000ex-04	.890000000000ex 00	.431400000000ex 00	.499865705109ex-04
810	.202000000000ex-04	.590000000000ex 00	.425100000000ex 00	.317178237206ex-04
820	.199000000000ex-04	.230000000000ex 00	.418900000000ex 00	.120082829454ex- 4
830	.196000000000ex-04	.900000000000ex-01	.381100000000ex 00	.424227268613ex-05
840	.194000000000ex-04	.400000000000ex-01	.363400000000ex 00	.179168526184ex-05
850	.191000000000ex-04	.200000000000ex-01	.344900000000ex 00	.845207540433ex-06
860	.190000000000ex-04	.100000000000ex-01	.328500000000ex 00	.404812207832ex-06

INTEGRAL .391999812243ex-02

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Med Fast
D = 1.26 1.23
f = 13.0 9.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.545700000000ex 00	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.586000000000ex 00	.662251818470ex-06
700	.105000000000ex-04	.250000000000ex 00	.595500000000ex 00	.103425899756ex-04
710	.114000000000ex-04	.590000000000ex 00	.647800000000ex 00	.298921300451ex-04
720	.129000000000ex-04	.780000000000ex 00	.671700000000ex 00	.472480961039ex-04
730	.151000000000ex-04	.870000000000ex 00	.676700000000ex 00	.624016681952ex-04
740	.176000000000ex-04	.890000000000ex 00	.691700000000ex 00	.770198510608ex-04
750	.196000000000ex-04	.880000000000ex 00	.692100000000ex 00	.848865227083ex-04
760	.209000000000ex-04	.840000000000ex 00	.733800000000ex 00	.951098665198ex-04
770	.215000000000ex-04	.820000000000ex 00	.752700000000ex 00	.997590517393ex-04
780	.215000000000ex-04	.850000000000ex 00	.793900000000ex 00	.113699193893ex-03
790	.212000000000ex-04	.910000000000ex 00	.842100000000ex 00	.134114968906ex-03
800	.208000000000ex-04	.890000000000ex 00	.855500000000ex 00	.132725185687ex-03
810	.202000000000ex-04	.590000000000ex 00	.832300000000ex 00	.810034247970ex-04
820	.199000000000ex-04	.230000000000ex 00	.832700000000ex 00	.311372972338ex-04
830	.196000000000ex-04	.900000000000ex-01	.808100000000ex 00	.113396220773ex-04
840	.194000000000ex-04	.400000000000ex-01	.781500000000ex 00	.469204016643ex-05
850	.191000000000ex-04	.200000000000ex-01	.754000000000ex 00	.216802039265ex-05
860	.190000000000ex-04	.100000000000ex-01	.741700000000ex 00	.104822279782ex-05
870	.189000000000ex-04	.000000000000ex 00	.735100000000ex 00	.000000000000ex 00

INTEGRAL .101698510984ex-01

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Slow
D = 2.08
f = 9.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	-.429000000000ex-01	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.134000000000ex-01	.177183452351ex-06
700	.105000000000ex-04	.250000000000ex 00	.260000000000ex-01	.278695083765ex-05
710	.114000000000ex-04	.590000000000ex 00	.770000000000ex-01	.803076399059ex-05
720	.129000000000ex-04	.780000000000ex 00	.769000000000ex-01	.120111423209ex-04
730	.151000000000ex-04	.870000000000ex 00	.103000000000ex 00	.166531425618ex-04
740	.176000000000ex-04	.890000000000ex 00	.113600000000ex 00	.203471072590ex-04
750	.196000000000ex-04	.880000000000ex 00	.105900000000ex 00	.220109477828ex-04
760	.209000000000ex-04	.840000000000ex 00	.128500000000ex 00	.236007373756ex-04
770	.215000000000ex-04	.820000000000ex 00	.150100000000ex 00	.249087717080ex-04
780	.215000000000ex-04	.850000000000ex 00	.187500000000ex 00	.281421572637ex-04
790	.212000000000ex-04	.910000000000ex 00	.243300000000ex 00	.337813696025ex-04
800	.208000000000ex-04	.890000000000ex 00	.247500000000ex 00	.327305528946ex-04
810	.202000000000ex-04	.590000000000ex 00	.236600000000ex 00	.205496003964ex-04
820	.199000000000ex-04	.230000000000ex 00	.235700000000ex 00	.787555035083ex-05
830	.196000000000ex-04	.900000000000ex-01	.203700000000ex 00	.281967192922ex-05
840	.194000000000ex-04	.400000000000ex-01	.174000000000ex 00	.115840846183ex-05
850	.191000000000ex-04	.200000000000ex-01	.157200000000ex 00	.548609549411ex-06
860	.190000000000ex-04	.100000000000ex-01	.130700000000ex 00	.256716392343ex-06
870	.189000000000ex-04	.000000000000ex 00	.132400000000ex 00	.000000000000ex 00

INTEGRAL .258579630066ex-02

FILM TYPE : 2424
FILTER : CC
STATION : 1
SHUTTER : Slow
D = 1.65
f = 16.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
680	.883000000000ex-05	.000000000000ex 00	.280200000000ex 00	.000000000000ex 00
690	.859000000000ex-05	.200000000000ex-01	.327600000000ex 00	.365277699923ex-06
700	.105000000000ex-04	.250000000000ex 00	.331000000000ex 00	.562508782794ex-05
710	.114000000000ex-04	.590000000000ex 00	.386300000000ex 00	.163703084686ex-04
720	.129000000000ex-04	.780000000000ex 00	.402000000000ex 00	.253912635326ex-04
730	.151000000000ex-04	.870000000000ex 00	.407800000000ex 00	.335966673961ex-04
740	.176000000000ex-04	.890000000000ex 00	.425700000000ex 00	.417448278536ex-04
750	.196000000000ex-04	.880000000000ex 00	.419500000000ex 00	.453146618485ex-04
760	.209000000000ex-04	.840000000000ex 00	.464600000000ex 00	.511711965330ex-04
770	.215000000000ex-04	.820000000000ex 00	.483800000000ex 00	.537096487637ex-04
780	.215000000000ex-04	.850000000000ex 00	.519800000000ex 00	.604863510420ex-04
790	.212000000000ex-04	.910000000000ex 00	.570200000000ex 00	.717095922822ex-04
800	.208000000000ex-04	.890000000000ex 00	.580600000000ex 00	.704779627215ex-04
810	.202000000000ex-04	.590000000000ex 00	.572000000000ex 00	.444839538061ex-04
820	.199000000000ex-04	.230000000000ex 00	.565300000000ex 00	.168221271949ex-04
830	.196000000000ex-04	.900000000000ex-01	.524600000000ex 00	.590335065517ex-05
840	.194000000000ex-04	.400000000000ex-01	.508600000000ex 00	.250300502364ex-05
850	.191000000000ex-04	.200000000000ex-01	.485400000000ex 00	.116805518855ex-05
860	.190000000000ex-04	.100000000000ex-01	.476500000000ex 00	.569185202561ex-06
870	.189000000000ex-04	.000000000000ex 00	.479900000000ex 00	.000000000000ex 00

INTEGRAL .546689359420ex-02

FILM TYPE : 2424
FILTER : DD
STATION : 2

SHUTTER	Slow	Slow	Med
D =	2.07	2.25	2.01
f =	11.0	8.0	8.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
750	.196000000000ex-04	.000000000000ex 00	.105900000000ex 00	.000000000000ex 00
760	.209000000000ex-04	.100000000000ex-01	.128500000000ex 00	.280961159234ex-06
770	.215000000000ex-04	.200000000000ex-01	.150100000000ex 00	.607531017269ex-06
780	.215000000000ex-04	.500000000000ex-01	.187800000000ex 00	.165656493489ex-05
790	.212000000000ex-04	.130000000000ex 00	.243300000000ex 00	.482590994321ex-05
800	.208000000000ex-04	.310000000000ex 00	.247500000000ex 00	.114005296599ex-04
810	.202000000000ex-04	.530000000000ex 00	.236600000000ex 00	.184598105256ex-04
820	.199000000000ex-04	.720000000000ex 00	.235700000000ex 00	.246538967504ex-04
830	.196000000000ex-04	.840000000000ex 00	.203700000000ex 00	.263169380061ex-04
840	.194000000000ex-04	.910000000000ex 00	.174000000000ex 00	.263537925067ex-04
850	.191000000000ex-04	.940000000000ex 00	.157200000000ex 00	.257846488223ex-04
860	.190000000000ex-04	.950000000000ex 00	.130700000000ex 00	.243880572726ex-04
870	.189000000000ex-04	.960000000000ex 00	.132400000000ex 00	.246112140278ex-04
880	.186000000000ex-04	.960000000000ex 00	.530000000000ex-02	.180752443603ex-04

INTEGRAL .191407519392ex-02

FILM TYPE : 2424
FILTER : DD
STATION : 2

SHUTTER	Slow	Med	Fast
D	= 1.63	1.63	1.59
f	= 16.0	11.0	8.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
750	.196000000000ex-04	.000000000000ex 00	.419500000000ex 00	.000000000000ex 00
760	.209000000000ex-04	.100000000000ex-01	.464600000000ex 00	.609180911107ex-06
770	.215000000000ex-04	.200000000000ex-01	.483800000000ex 00	.130999143326ex-05
780	.215000000000ex-04	.500000000000ex-01	.519800000000ex 00	.355802064953ex-05
790	.212000000000ex-04	.130000000000ex 00	.570200000000ex 00	.102442274688ex-04
800	.208000000000ex-04	.310000000000ex 00	.580600000000ex 00	.245485038693ex-04
810	.202000000000ex-04	.530000000000ex 00	.572000000000ex 00	.399601618936ex-04
820	.199000000000ex-04	.720000000000ex 00	.565300000000ex 00	.526605720886ex-04
830	.196000000000ex-04	.840000000000ex 00	.524600000000ex 00	.550979394483ex-04
840	.194000000000ex-04	.910000000000ex 00	.508600000000ex 00	.569433642879ex-04
850	.191000000000ex-04	.940000000000ex 00	.485400000000ex 00	.548985938620ex-04
860	.190000000000ex-04	.950000000000ex 00	.476500000000ex 00	.540725942433ex-04
870	.189000000000ex-04	.960000000000ex 00	.479900000000ex 00	.547813886817ex-04
880	.186000000000ex-04	.960000000000ex 00	.362800000000ex 00	.411703138053ex-04
890	.184000000000ex-04	.960000000000ex 00	.390000000000ex-02	.178233385316ex-04
900	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
910	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .467493827346ex-02

FILM TYPE : 2424
FILTER : DD
STATION : 2

SHUTTER	Med	Fast
D =	1.07	1.10
f =	16.0	11.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
750	.196000000000ex-04	.000000000000ex 00	.836800000000ex 00	.000000000000ex 00
760	.209000000000ex-04	.100000000000ex-01	.877500000000ex 00	.157632689732ex-05
770	.215000000000ex-04	.200000000000ex-01	.893800000000ex 00	.336719645551ex-05
780	.215000000000ex-04	.500000000000ex-01	.940200000000ex 00	.936717134072ex-05
790	.212000000000ex-04	.130000000000ex 00	.987200000000ex 00	.267595750999ex-04
800	.208000000000ex-04	.310000000000ex 00	.998400000000ex 00	.642428839531ex-04
810	.202000000000ex-04	.530000000000ex 00	.967900000000ex 00	.994322436123ex-04
820	.199000000000ex-04	.720000000000ex 00	.971700000000ex 00	.134241121835ex-03
830	.196000000000ex-04	.840000000000ex 00	.953000000000ex 00	.147752676726ex-03
840	.194000000000ex-04	.910000000000ex 00	.921200000000ex 00	.147245869950ex-03
850	.191000000000ex-04	.940000000000ex 00	.897700000000ex 00	.141860413315ex-03
860	.190000000000ex-04	.950000000000ex 00	.877300000000ex 00	.136074643829ex-03
870	.189000000000ex-04	.960000000000ex 00	.865200000000ex 00	.133024929433ex-03
880	.186000000000ex-04	.960000000000ex 00	.758600000000ex 00	.102419859859ex-03
890	.184000000000ex-04	.960000000000ex 00	.441500000000ex 00	.488190198842ex-04
900	.184000000000ex-04	.950000000000ex 00	.229000000000ex-01	.184264396159ex-04

INTEGRAL .120037668642ex-01

FILM TYPE : 2424
FILTER : DD
STATION : 2
SHUTTER : Fast
D = 0.59
f = 16.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
750	.196000000000ex-04	.000000000000ex 00	.115960000000ex 01	.000000000000ex 00
760	.209000000000ex-04	.100000000000ex-01	.120780000000ex 01	.337245595273ex-05
770	.215000000000ex-04	.200000000000ex-01	.120870000000ex 01	.695293958209ex-05
780	.215000000000ex-04	.500000000000ex-01	.125460000000ex 01	.193200597079ex-04
790	.212000000000ex-04	.130000000000ex 00	.130080000000ex 01	.550908170257ex-04
800	.208000000000ex-04	.310000000000ex 00	.131440000000ex 01	.132991850437ex-03
810	.202000000000ex-04	.530000000000ex 00	.126860000000ex 01	.198713438810ex-03
820	.199000000000ex-04	.720000000000ex 00	.128390000000ex 01	.275477144658ex-03
830	.196000000000ex-04	.840000000000ex 00	.126060000000ex 01	.300009741957ex-03
840	.194000000000ex-04	.910000000000ex 00	.123330000000ex 01	.302094711300ex-03
850	.191000000000ex-04	.940000000000ex 00	.122310000000ex 01	.300096700757ex-03
860	.190000000000ex-04	.950000000000ex 00	.118450000000ex 01	.276043297228ex-03
870	.189000000000ex-04	.960000000000ex 00	.117090000000ex 01	.268926151704ex-03
880	.186000000000ex-04	.960000000000ex 00	.108110000000ex 01	.215220768221ex-03
890	.184000000000ex-04	.960000000000ex 00	.767300000000ex 00	.103368700375ex-03
900	.184000000000ex-04	.950000000000ex 00	.383000000000ex 00	.422222553860ex-04
INTEGRAL	.246887346193ex-01			

FILM TYPE : 2443
FILTER : EE
STATION : 3
LAYER : Blue

SHUTTER :	Fast	Fast	Med
D =	1.37	2.90	1.33
f =	8.0	11	11

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
500	.878000000000ex-05	.000000000000ex 00	.983400000000ex 00	.000000000000ex 00
510	.907000000000ex-05	.100000000000ex 00	.103800000000ex 01	.989936385160ex-05
520	.922000000000ex-05	.520000000000ex 00	.114170000000ex 01	.664407099876ex-04
530	.944000000000ex-05	.780000000000ex 00	.117690000000ex 01	.110653867319ex-03
540	.974000000000ex-05	.890000000000ex 00	.122110000000ex 01	.144227794864ex-03
550	.989000000000ex-05	.930000000000ex 00	.121730000000ex 01	.151697785218ex-03
560	.100000000000ex-04	.950000000000ex 00	.121450000000ex 01	.155676695821ex-03
570	.101000000000ex-04	.955000000000ex 00	.118130000000ex 01	.146428207288ex-03
580	.103000000000ex-04	.960000000000ex 00	.111280000000ex 01	.128206031658ex-03
590	.106000000000ex-04	.965000000000ex 00	.508200000000ex 00	.329634894190ex-04
600	.108000000000ex-04	.965000000000ex 00	-.500000000000ex-02	.103027003525ex-04
610	.104000000000ex-04	.965000000000ex 00	-.588300000000ex 00	.258976676178ex-05
620	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .942212594920ex-02

FILM TYPE : 2443
FILTER : EE
STATION : 3
LAYER : Blue

SHUTTER	Fast	Med	Slow	Med	Slow	Slow
D =	0.57	0.32	0.23	0.56	0.32	0.54
f =	5.6	5.6	5.6	8.0	8.0	11.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
500	.878000000000ex-05	.000000000000ex 00	.771800000000ex 00	.000000000000ex 00
510	.907000000000ex-05	.100000000000ex 00	.833000000000ex 00	.617457808335ex-05
520	.922000000000ex-05	.520000000000ex 00	.917800000000ex 00	.396765831473ex-04
530	.944000000000ex-05	.780000000000ex 00	.980800000000ex 00	.704476640380ex-04
540	.974000000000ex-05	.890000000000ex 00	.103130000000ex 01	.931641795108ex-04
550	.989000000000ex-05	.930000000000ex 00	.103460000000ex 01	.996045643166ex-04
560	.100000000000ex-04	.950000000000ex 00	.102500000000ex 01	.100629103892ex-03
570	.101000000000ex-04	.955000000000ex 00	.100130000000ex 01	.967441571587ex-04
580	.103000000000ex-04	.960000000000ex 00	.922100000000ex 00	.826434536104ex-04
590	.106000000000ex-04	.965000000000ex 00	.353800000000ex 00	.231011275812ex-04
600	.108000000000ex-04	.965000000000ex 00	-.167200000000ex 00	.709171165028ex-05
610	.104000000000ex-04	.965000000000ex 00	-.832200000000ex 00	.147693251824ex-05
620	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .612202052796ex-02

FILM TYPE : 2443
FILTER : EE
STATION : 3
LAYER : Red

SHUTTER	Fast	Med	Slow	Fast	Med	Slow	Fast	Med	Slow
D =	0.17	0.11	0.08	0.39	0.18	0.11	0.89	0.39	0.20
f =	5.6	5.6	5.6	8.0	8.0	8.0	11	11	11

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
500	.8780000000000ex-05	.0000000000000ex 00	.1113000000000ex 00	.0000000000000ex 00
510	.9070000000000ex-05	.1000000000000ex 00	-.4780000000000ex-01	.8124699124340ex-06
520	.9220000000000ex-05	.5200000000000ex 00	-.1059000000000ex 00	.3756940047100ex-05
530	.9440000000000ex-05	.7800000000000ex 00	-.1200000000000ex 00	.5585558400430ex-05
540	.9740000000000ex-05	.8900000000000ex 00	-.1426000000000ex 00	.6242362191870ex-05
550	.9890000000000ex-05	.9300000000000ex 00	-.2193000000000ex 00	.5551102418000ex-05
560	.1000000000000ex-04	.9500000000000ex 00	-.1877000000000ex 00	.6166285166730ex-05
570	.1010000000000ex-04	.9550000000000ex 00	-.1183000000000ex 00	.7345557207090ex-05
580	.1030000000000ex-04	.9600000000000ex 00	-.1340000000000ex-01	.9587568011850ex-05
590	.1060000000000ex-04	.9650000000000ex 00	.1038000000000ex 00	.1299071869740ex-04
600	.1080000000000ex-04	.9650000000000ex 00	.1658000000000ex 00	.1526690730860ex-04
610	.1040000000000ex-04	.9650000000000ex 00	.2182000000000ex 00	.1658672531770ex-04
620	.9900000000000ex-05	.9650000000000ex 00	.2523000000000ex 00	.1707900272960ex-04
630	.9390000000000ex-05	.9650000000000ex 00	.2474000000000ex 00	.1601743261530ex-04
640	.9060000000000ex-05	.9650000000000ex 00	.2783000000000ex 00	.1659416908620ex-04
650	.8690000000000ex-05	.9650000000000ex 00	.3111000000000ex 00	.1716512971900ex-04
660	.8540000000000ex-05	.9650000000000ex 00	.3463000000000ex 00	.1829301051570ex-04
670	.8720000000000ex-05	.9650000000000ex 00	.3726000000000ex 00	.1984466620380ex-04
680	.8830000000000ex-05	.9650000000000ex 00	.3648000000000ex 00	.1973731248110ex-04
690	.8590000000000ex-05	.9650000000000ex 00	.3917000000000ex 00	.2042774731720ex-04
700	.1050000000000ex-04	.9650000000000ex 00	.4561000000000ex 00	.2896120397660ex-04
710	.1140000000000ex-04	.9650000000000ex 00	.4956000000000ex 00	.3443754349220ex-04
720	.1290000000000ex-04	.9650000000000ex 00	.5493000000000ex 00	.4409781017420ex-04
730	.1510000000000ex-04	.9650000000000ex 00	.5316000000000ex 00	.4955691473080ex-04
740	.1760000000000ex-04	.9650000000000ex 00	.5179000000000ex 00	.5596802491850ex-04
750	.1960000000000ex-04	.9650000000000ex 00	.4481000000000ex 00	.5307419120550ex-04
760	.2090000000000ex-04	.9650000000000ex 00	.3982000000000ex 00	.5045144382690ex-04
770	.2150000000000ex-04	.9650000000000ex 00	.3536000000000ex 00	.4683448761430ex-04
780	.2150000000000ex-04	.9650000000000ex 00	.3747000000000ex 00	.4916610148540ex-04
790	.2120000000000ex-04	.9650000000000ex 00	.3950000000000ex 00	.5079993706800ex-04
800	.2080000000000ex-04	.9650000000000ex 00	.4103000000000ex 00	.5162863563470ex-04
810	.2020000000000ex-04	.9650000000000ex 00	.3954000000000ex 00	.4844831562600ex-04
820	.1990000000000ex-04	.9650000000000ex 00	.3808000000000ex 00	.4615092284990ex-04
830	.1960000000000ex-04	.9650000000000ex 00	.3304000000000ex 00	.4047467635330ex-04
840	.1940000000000ex-04	.9650000000000ex 00	.2847000000000ex 00	.3606027573830ex-04
850	.1910000000000ex-04	.9650000000000ex 00	.2624000000000ex 00	.3372567733020ex-04
860	.1900000000000ex-04	.9650000000000ex 00	.2607000000000ex 00	.3341803536610ex-04
870	.1890000000000ex-04	.9650000000000ex 00	.2282000000000ex 00	.3084530845090ex-04
880	.1860000000000ex-04	.9650000000000ex 00	.4620000000000ex-01	.1996366426360ex-04
890	.1840000000000ex-04	.9650000000000ex 00	-.3896000000000ex 00	.7240109530030ex-05
900	.1840000000000ex-04	.9650000000000ex 00	-.8337000000000ex 00	.2604024921930ex-05

INTEGRAL .1043613488400ex-01

FILM TYPE : 2443
FILTER : EE
STATION : 3
LAYER : Green

SHUTTER :	Fast	Med	Slow	Fast	Med	Slow	Med	Slow
D =	0.39	0.18	0.15	0.95	0.39	0.18	0.92	0.37
f =	5.6	5.6	5.6	8.0	8.0	8.0	11	11

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
500	.878000000000ex-05	.000000000000ex 00	-.235000000000ex 03	.000000000000ex 00
510	.907000000000ex-05	.100000000000ex 00	-.154300000000ex 00	.635780622247ex-06
520	.922000000000ex-05	.520000000000ex 00	-.236100000000ex 00	.278377586147ex-05
530	.944000000000ex-05	.780000000000ex 00	-.267200000000ex 00	.397984902043ex-05
540	.974000000000ex-05	.890000000000ex 00	-.196300000000ex 00	.551631380154ex-05
550	.989000000000ex-05	.930000000000ex 00	-.151900000000ex 00	.648304804558ex-05
560	.100000000000ex-04	.950000000000ex 00	-.161000000000ex-01	.915426763372ex-05
570	.101000000000ex-04	.955000000000ex 00	-.127500000000ex 00	.719158711061ex-05
580	.103000000000ex-04	.960000000000ex 00	.305100000000ex 00	.199622025419ex-04
590	.106000000000ex-04	.965000000000ex 00	.413000000000ex 00	.264748299090ex-04
600	.108000000000ex-04	.965000000000ex 00	.406900000000ex 00	.265981278259ex-04
610	.104000000000ex-04	.965000000000ex 00	.434500000000ex 00	.272935893264ex-04
620	.990000000000ex-05	.965000000000ex 00	.398000000000ex 00	.238870494130ex-04
630	.939000000000ex-05	.965000000000ex 00	.614500000000ex 00	.372986321808ex-04
640	.906000000000ex-05	.965000000000ex 00	.717000000000ex 00	.455675323971ex-04
650	.869000000000ex-05	.965000000000ex 00	.814000000000ex 00	.546445796833ex-04
660	.854000000000ex-05	.965000000000ex 00	.479300000000ex 00	.248476421621ex-04
670	.872000000000ex-05	.965000000000ex 00	-.129700000000ex 00	.624228794928ex-05
680	.883000000000ex-05	.965000000000ex 00	-.101100000000ex 01	.830783795351ex-06
690	.859000000000ex-05	.965000000000ex 00	-.104110000000ex 01	.754085304095ex-06
700	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .334096155820ex-02

FILM TYPE : 2443
FILTER : EE
STATION : 3
LAYER : Green

SHUTTER : Fast
D = 1.75
f = 11

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
500	.878000000000ex-05	.000000000000ex 00	.193600000000ex 00	.000000000000ex 00
510	.907000000000ex-05	.100000000000ex 00	.688000000000ex-01	.106269169623ex-05
520	.922000000000ex-05	.520000000000ex 00	.670000000000ex-02	.486893822780ex-05
530	.944000000000ex-05	.780000000000ex 00	-.282000000000ex-01	.690027814209ex-05
540	.974000000000ex-05	.890000000000ex 00	.650000000000ex-02	.879931699704ex-05
550	.989000000000ex-05	.930000000000ex 00	.111000000000ex-01	.943581114780ex-05
560	.100000000000ex-04	.950000000000ex 00	.203400000000ex 00	.151748219918ex-04
570	.101000000000ex-04	.955000000000ex 00	.341400000000ex 00	.211701894923ex-04
580	.103000000000ex-04	.960000000000ex 00	.517600000000ex 00	.325618039949ex-04
590	.106000000000ex-04	.965000000000ex 00	.611000000000ex 00	.417669900280ex-04
600	.108000000000ex-04	.965000000000ex 00	.619800000000ex 00	.434261240705ex-04
610	.104000000000ex-04	.965000000000ex 00	.703900000000ex 00	.507528754515ex-04
620	.990000000000ex-05	.965000000000ex 00	.754100000000ex 00	.542328600176ex-04
630	.939000000000ex-05	.965000000000ex 00	.944700000000ex 00	.797797930868ex-04
640	.906000000000ex-05	.965000000000ex 00	.113500000000ex 01	.119304139048ex-03
650	.869000000000ex-05	.965000000000ex 00	.124140000000ex 01	.146199904789ex-03
660	.854000000000ex-05	.965000000000ex 00	.754800000000ex 00	.468581549364ex-04
670	.872000000000ex-05	.965000000000ex 00	.194400000000ex 00	.131656952542ex-04
680	.883000000000ex-05	.965000000000ex 00	-.532600000000ex 00	.249970072933ex-05
690	.859000000000ex-05	.965000000000ex 00	-.573000000000ex 00	.221574856736ex-05
700	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .715083876866ex-02

FILM TYPE: SO-356
FILTER : FF
STATION : 4
LAYER : Red
SHUTTER: Fast
D = 1.54
f = 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
420	.364000000000ex-05	.310000000000ex 00	-.109520000000ex 01	.906281422137ex-07
430	.455000000000ex-05	.640000000000ex 00	-.834900000000ex 00	.425884045335ex-06
440	.532000000000ex-05	.780000000000ex 00	-.888800000000ex 00	.536051153623ex-06
450	.657000000000ex-05	.850000000000ex 00	-.978500000000ex 00	.586792149966ex-06
460	.685000000000ex-05	.890000000000ex 00	-.107150000000ex 01	.517107192113ex-06
470	.746000000000ex-05	.910000000000ex 00	-.111970000000ex 01	.515323822748ex-06
480	.803000000000ex-05	.930000000000ex 00	-.121350000000ex 01	.456770969188ex-06
490	.853000000000ex-05	.940000000000ex 00	-.120890000000ex 01	.495652024915ex-06
500	.878000000000ex-05	.950000000000ex 00	-.120110000000ex 01	.524950218948ex-06
510	.907000000000ex-05	.945000000000ex 00	-.110570000000ex 01	.671953306877ex-06
520	.922000000000ex-05	.945000000000ex 00	-.103080000000ex 01	.811638668180ex-06
530	.944000000000ex-05	.945000000000ex 00	-.931600000000ex 00	.104424836223ex-05
540	.974000000000ex 00	.950000000000ex-05	-.839800000000ex 00	.133808148729ex-05
550	.989000000000ex-05	.955000000000ex 00	-.761600000000ex 00	.163530838347ex-05
560	.100000000000ex-04	.965000000000ex 00	-.566800000000ex 00	.261653960837ex-05
570	.101000000000ex-04	.960000000000ex 00	-.409100000000ex 00	.378000702380ex-05
580	.103000000000ex-04	.955000000000ex 00	-.258100000000ex 00	.542925945435ex-05
590	.106000000000ex-04	.945000000000ex 00	-.119100000000ex 00	.761443482582ex-05
600	.108000000000ex-04	.940000000000ex 00	.297000000000ex-01	.108705522810ex-04
610	.104000000000ex-04	.940000000000ex 00	.166400000000ex 00	.143403976068ex-04
620	.990000000000ex-05	.940000000000ex 00	.360600000000ex 00	.213482877619ex-04
630	.939000000000ex-05	.940000000000ex 00	.517900000000ex 00	.290866326392ex-04
640	.906000000000ex-05	.940000000000ex 00	.709500000000ex 00	.436270704607ex-04
650	.869000000000ex-05	.940000000000ex 00	.784300000000ex 00	.497104426142ex-04
660	.854000000000ex-05	.940000000000ex 00	.584700000000ex 00	.308521706084ex-04
670	.872000000000ex-05	.940000000000ex 00	.590000000000ex-01	.938954047847ex-05
680	.883000000000ex-05	.940000000000ex 00	-.313400000000ex 00	.403356033094ex-05
690	.859000000000ex-05	.940000000000ex 00	-.911500000000ex 00	.989967682829ex-06
700	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .242387016130ex-02

FILM TYPE : SO-356
FILTER : FF
STATION : 4
LAYER : Red

SHUTTER	Fast	Med	Slow	Fast	Med	Slow	Med	Slow
D =	0.99	0.53	0.25	1.24	0.71	0.35	0.97	0.53
f =	2.8	2.8	2.8	3.5	3.5	3.5	4.0	4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
420	.364000000000ex-05	.310000000000ex 00	-.137110000000ex 01	.480134681554ex-07
430	.455000000000ex-05	.640000000000ex 00	-.109420000000ex 01	.234418223635ex-06
440	.532000000000ex-05	.780000000000ex 00	-.115010000000ex 01	.293701547621ex-06
450	.657000000000ex-05	.850000000000ex 00	-.123590000000ex 01	.324402576818ex-06
460	.685000000000ex-05	.890000000000ex 00	.133010000000ex 01	.130370874334ex-03
470	.476000000000ex-05	.910000000000ex 00	-.144310000000ex 01	.156152285478ex-06
480	.803000000000ex-05	.930000000000ex 00	-.146670000000ex 01	.254975524502ex-06
490	.853000000000ex-05	.940000000000ex 00	-.146160000000ex 01	.276998160354ex-06
500	.878000000000ex-05	.950000000000ex 00	-.146930000000ex 01	.283085823553ex-06
510	.907000000000ex-05	.945000000000ex 00	-.137770000000ex 01	.359202289035ex-06
520	.922000000000ex-05	.945000000000ex 00	-.128440000000ex 01	.452650213514ex-06
530	.944000000000ex-05	.945000000000ex 00	-.117320000000ex 01	.598692479547ex-06
540	.974000000000ex-05	.950000000000ex 00	-.110260000000ex 01	.730604868994ex-06
550	.989000000000ex-05	.955000000000ex 00	-.103380000000ex 01	.873775097460ex-06
560	.100000000000ex-04	.965000000000ex 00	-.829800000000ex 00	.142799706012ex-05
570	.101000000000ex-04	.960000000000ex 00	-.671800000000ex 00	.206439408872ex-05
580	.103000000000ex-04	.955000000000ex 00	-.526000000000ex 03	.000000000000ex 00
590	.106000000000ex-04	.945000000000ex 00	-.360700000000ex 00	.436553700351ex-05
600	.108000000000ex-04	.940000000000ex 00	-.218400000000ex 00	.613976302478ex-05
610	.104000000000ex-04	.940000000000ex 00	-.102000000000ex 00	.772967426732ex-05
620	.990000000000ex-05	.940000000000ex 00	.417000000000ex-01	.102438461717ex-04
630	.939000000000ex-05	.940000000000ex 00	.262900000000ex 00	.161693829137ex-04
640	.906000000000ex-05	.940000000000ex 00	.476900000000ex 00	.255361870753ex-04
650	.869000000000ex-05	.940000000000ex 00	.535500000000ex 00	.280315833943ex-04
660	.854000000000ex-05	.940000000000ex 00	.321200000000ex 00	.168184405456ex-04
670	.872000000000ex-00	.940000000000ex-05	-.203400000000ex 00	.513150006253ex-05
680	.883000000000ex-05	.940000000000ex 00	-.591100000000ex 00	.212808297435ex-05
690	.859000000000ex-05	.940000000000ex 00	-.128960000000ex 01	.414496642878ex-06
700	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .218776423242ex-02

FILM TYPE : SO-356
FILTER : FF
STATION : 4
LAYER : Green
SHUTTER : Fast Fast
D = 1.56 1.88
f = 3.5 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.124000000000ex-05	.000000000000ex 00	-.142050000000ex 01	.000000000000ex 00
410	.247000000000ex-05	.300000000000ex-01	-.124390000000ex 01	.422589019275ex-08
420	.364000000000ex-05	.310000000000ex 00	-.761700000000ex 00	.195327358740ex-06
430	.455000000000ex-05	.640000000000ex 00	-.567800000000ex 00	.787755366862ex-06
440	.532000000000ex-05	.780000000000ex 00	-.610400000000ex 00	.101766827275ex-05
450	.657000000000ex-05	.850000000000ex 00	-.694400000000ex 00	.112871499650ex-05
460	.685000000000ex-05	.890000000000ex 00	-.761900000000ex 00	.105482539795ex-05
470	.746000000000ex-05	.910000000000ex 00	-.761300000000ex 00	.117619741283ex-05
480	.803000000000ex-05	.930000000000ex 00	-.670300000000ex 00	.159550619142ex-05
490	.853000000000ex-05	.940000000000ex 00	-.461900000000ex 00	.276806882876ex-05
500	.878000000000ex-05	.950000000000ex 00	-.282800000000ex 00	.434928754514ex-05
510	.907000000000ex-05	.945000000000ex 00	-.821000000000ex-01	.709478265433ex-05
520	.922000000000ex-05	.945000000000ex 00	.124600000000ex 00	.116081424668ex-04
530	.944000000000ex-05	.945000000000ex 00	.355100000000ex 00	.202070912582ex-04
540	.974000000000ex-05	.950000000000ex 00	.528500000000ex 00	.312451462748ex-04
550	.989000000000ex-05	.955000000000ex 00	.617300000000ex 00	.391290823659ex-04
560	.100000000000ex-04	.965000000000ex 00	.352800000000ex 00	.217433928888ex-04
570	.101000000000ex-04	.960000000000ex 00	.318500000000ex 00	.201879679610ex-04
580	.103000000000ex-04	.955000000000ex 00	.149800000000ex 00	.138880284113ex-04
590	.106000000000ex-04	.945000000000ex 00	-.883900000000ex 00	.130869268157ex-05
600	.108000000000ex-04	.940000000000ex 00	-.166480000000ex 01	.219660318555ex-06

INTEGRAL .182928209198ex-02

FILM TYPE : SO-356
FILTER : FF
STATION : 4
LAYER : Green

SHUTTER : Fast	Med	Slow	Med	Slow	Med	Slow
D = 1.28	0.69	0.31	0.93	0.44	1.27	0.69
f = 2.8	2.8	2.8	3.5	3.5	4.0	4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
410	.247000000000ex-05	.300000000000ex-01	-.159190000000ex 01	.189634874236ex-08
420	.364000000000ex-05	.310000000000ex 00	-.144000000000ex 01	.409697277001ex-07
430	.455000000000ex-05	.640000000000ex 00	-.834500000000ex 00	.426276479734ex-06
440	.532000000000ex-05	.780000000000ex 00	-.902600000000ex 00	.519285546653ex-06
450	.657000000000ex-05	.850000000000ex 00	-.969800000000ex 00	.598665588228ex-06
460	.685000000000ex-05	.890000000000ex 00	-.102330000000ex 01	.577804045366ex-06
470	.746000000000ex-05	.910000000000ex 00	-.105900000000ex 01	.592625343141ex-06
480	.803000000000ex-05	.930000000000ex 00	-.943700000000ex 00	.850155744770ex-06
490	.853000000000ex-05	.940000000000ex 00	-.740300000000ex 00	.145806499887ex-05
500	.878000000000ex-05	.950000000000ex 00	-.538700000000ex 00	.241278220525ex-05
510	.907000000000ex-05	.945000000000ex 00	-.380500000000ex 00	.356893875735ex-05
520	.922000000000ex-05	.945000000000ex 00	-.157700000000ex 00	.605986193556ex-05
530	.944000000000ex-05	.945000000000ex 00	.790000000000ex-01	.107004933835ex-04
540	.979000000000ex-05	.950000000000ex 00	.250500000000ex 00	.165579397162ex-04
550	.989000000000ex-05	.955000000000ex 00	.353600000000ex 00	.213206118227ex-04
560	.100000000000ex-04	.965000000000ex 00	.858000000000ex-01	.117578337001ex-04
570	.101000000000ex-04	.960000000000ex 00	.708000000000ex-01	.114128105154ex-04
580	.103000000000ex-04	.955000000000ex 00	-.110200000000ex 00	.763203926933ex-05
590	.106000000000ex-04	.945000000000ex 00	-.112790000000ex 00	.772587493829ex-05
INTEGRAL	.100288250556ex-02			

FILM TYPE : SO-356
FILTER : FF
STATION : 4
LAYER : Blue
SHUTTER : Fast

	Fast	Medium	Fast	Medium
D =	1.85	2.12	1.51	2.39	1.86
f =	2.8	3.5	3.5	4.0	4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.124000000000ex-05	.000000000000ex 00	-.691900000000ex 00	.000000000000ex 00
410	.247000000000ex-05	.300000000000ex-01	-.283500000000ex 00	.385760901522ex-07
420	.364000000000ex-05	.310000000000ex 00	.298600000000ex 00	.224420785171ex-05
430	.455000000000ex-05	.640000000000ex 00	.476700000000ex 00	.872753040813ex-05
440	.532000000000ex-05	.780000000000ex 00	.398300000000ex 00	.103826026841ex-04
450	.657000000000ex-05	.850000000000ex 00	.295100000000ex 00	.110175313581ex-04
460	.685000000000ex-05	.890000000000ex 00	.167100000000ex 00	.895737132517ex-05
470	.746000000000ex-05	.910000000000ex 00	.297000000000ex-01	.726909290931ex-05
480	.803000000000ex-05	.930000000000ex 00	-.227000000000ex-01	.708758848415ex-05
490	.853000000000ex-05	.940000000000ex 00	-.802000000000ex 03	.000000000000ex 00
500	.878000000000ex-05	.950000000000ex 00	-.213800000000ex 00	.509821470384ex-05
510	.907000000000ex-05	.945000000000ex 00	-.409600000000ex 00	.333763695652ex-05
520	.922000000000ex-05	.945000000000ex 00	-.722000000000ex 00	.165258090209ex-05
530	.944000000000ex-05	.945000000000ex 00	-.118900000000ex 01	.577302984655ex-06
540	.974000000000ex-05	.950000000000ex 00	-.170750000000ex 01	.181460691766ex-06
INTEGRAL	.649657584726ex-03			

FILM TYPE : SO-356
FILTER : FF
STATION : 4
LAYER : Blue

SHUTTER	Med	Slow	Slow	Slow
D =	1.27	0.81	0.99	1.26
f =	2.8	2.8	3.5	4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
390	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
400	.124000000000ex-05	.000000000000ex 00	-.100690000000ex 01	.000000000000ex 00
410	.249000000000ex-05	.300000000000ex-01	-.661200000000ex 00	.162974854435ex-07
420	.364000000000ex-05	.310000000000ex 00	-.450000000000ex-01	.101733287167ex-05
430	.455000000000ex-05	.640000000000ex 00	.100000000000ex 00	.366599079913ex-05
440	.532000000000ex-05	.780000000000ex 00	.311000000000ex-01	.445765275978ex-05
450	.657000000000ex-05	.850000000000ex 00	-.100000000000ex 00	.443592602682ex-05
460	.685000000000ex-05	.890000000000ex 00	-.188500000000ex 00	.394984977281ex-05
470	.746000000000ex-05	.910000000000ex 00	-.329800000000ex 00	.317672938128ex-05
480	.803000000000ex-05	.930000000000ex 00	-.359200000000ex 00	.326586699541ex-05
490	.853000000000ex-05	.940000000000ex 00	-.382400000000ex 00	.332412146527ex-05
500	.872000000000ex-05	.950000000000ex 00	-.501100000000ex 00	.261300409429ex-05
510	.907000000000ex-05	.945000000000ex 00	-.715700000000ex 00	.164944977331ex-05
520	.922000000000ex-05	.945000000000ex 00	-.108070000000ex 01	.723540306579ex-06
530	.944000000000ex-05	.945000000000ex 00	-.154620000000ex 01	.253631857787ex-06

INTEGRAL .322998829740ex-03

FILM TYPE : SO-022	FILM TYPE : SO-022	FILM TYPE : SO-022
FILTER : BB	FILTER : BB	FILTER : BB
STATION : 5	STATION : 5	STATION : 5
SHUTTER : Slow	SHUTTER : Medium	SHUTTER : Fast
D = 1.22	D = 1.23	D = 1.25
f = 8.0	f = 5.6	f = 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
570	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
580	.103000000000ex-04	.000000000000ex 00	.417700000000ex 00	.000000000000ex 00
590	.106000000000ex-04	.100000000000ex 00	.387400000000ex 00	.258646058899ex-05
600	.108000000000ex-04	.600000000000ex 00	.339200000000ex 00	.141506049228ex-04
610	.104000000000ex-04	.860000000000ex 00	.307500000000ex 00	.181564856416ex-04
620	.990000000000ex-05	.940000000000ex 00	.308500000000ex 00	.189349014105ex-04
630	.939000000000ex-05	.960000000000ex 00	.229200000000ex 00	.152804739665ex-04
640	.906000000000ex-05	.970000000000ex 00	.219500000000ex 00	.145679999717ex-04
650	.869000000000ex-05	.960000000000ex 00	.235600000000ex 00	.143512922822ex-04
660	.854000000000ex-05	.960000000000ex 00	.311600000000ex 00	.168007668005ex-04
670	.872000000000ex-05	.960000000000ex 00	.395800000000ex 00	.208251298474ex-04
680	.883000000000ex-05	.960000000000ex 00	.432900000000ex 00	.229684631322ex-04
690	.859000000000ex-05	.960000000000ex 00	.332100000000ex 00	.177159480000ex-04
700	.105000000000ex-04	.960000000000ex 00	-.210800000000ex 00	.620383919268ex-05
710	.114000000000ex-04	.960000000000ex 00	-.947800000000ex 00	.123417312291ex-05

INTEGRAL .184524018497ex-02

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Fast
D = 0.40
f = 8.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
570	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
580	.103000000000ex-04	.000000000000ex 00	.109310000000ex 01	.000000000000ex 00
590	.106000000000ex-04	.100000000000ex 00	.108730000000ex 01	.129600257750ex-04
600	.108000000000ex-04	.600000000000ex 00	.106260000000ex 01	.748471048064ex-04
610	.104000000000ex-04	.860000000000ex 00	.102890000000ex 01	.955942544729ex-04
620	.990000000000ex-05	.940000000000ex 00	.987400000000ex 00	.903988796658ex-04
630	.939000000000ex-05	.960000000000ex 00	.939400000000ex 00	.784037482134ex-04
640	.906000000000ex-05	.970000000000ex 00	.886300000000ex 00	.676394288813ex-04
650	.869000000000ex-05	.960000000000ex 00	.868300000000ex 00	.616014605819ex-04
660	.854000000000ex-05	.960000000000ex 00	.101210000000ex 01	.843002968116ex-04
670	.872000000000ex-05	.960000000000ex 00	.113930000000ex 01	.115368625364ex-03
680	.883000000000ex-05	.960000000000ex 00	.112480000000ex 01	.112987899927ex-03
690	.859000000000ex-05	.960000000000ex 00	.104460000000ex 01	.913827865370ex-04
700	.105000000000ex-04	.960000000000ex 00	.455600000000ex 00	.287779949543ex-04
710	.114000000000ex-04	.960000000000ex 00	-.158000000000ex 00	.760634613166ex-05
720	.129000000000ex-04	.960000000000ex 00	-.786900000000ex 00	.202283725413ex-05
730	.151000000000ex-04	.960000000000ex 00	-.138030000000ex 01	.603876571012ex-06
INTEGRAL	.923445379953ex-02			

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Medium
D = 0.73
f = 8.0

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Fast
D = 0.75
f = 5.6

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
580	.103000000000ex-04	.000000000000ex 00	.683900000000ex 00	.000000000000ex 00
590	.106000000000ex-04	.100000000000ex 00	.654700000000ex 00	.478636556395ex-05
600	.108000000000ex-04	.600000000000ex 00	.606300000000ex 00	.261742957839ex-04
610	.104000000000ex-04	.860000000000ex 00	.575500000000ex 00	.336536203068ex-04
620	.990000000000ex-05	.940000000000ex 00	.551600000000ex 00	.331408046065ex-04
630	.939000000000ex-05	.960000000000ex 00	.449600000000ex 00	.253826420489ex-04
640	.906000000000ex-05	.970000000000ex 00	.490600000000ex 00	.271956805992ex-04
650	.869000000000ex-05	.960000000000ex 00	.495600000000ex 00	.261150588882ex-04
660	.854000000000ex-05	.960000000000ex 00	.579400000000ex 00	.311264150174ex-04
670	.872000000000ex-05	.960000000000ex 00	.648800000000ex 00	.372895994159ex-04
680	.883000000000ex-05	.960000000000ex 00	.687100000000ex 00	.412412610701ex-04
690	.859000000000ex-05	.960000000000ex 00	.596300000000ex 00	.325510046313ex-04
700	.105000000000ex-04	.960000000000ex 00	.496000000000ex-01	.112995339698ex-04
710	.114000000000ex-04	.960000000000ex 00	-.581900000000ex 00	.286599932894ex-05
720	.129000000000ex-04	.960000000000ex 00	-.154580000000ex 01	.352420321737ex-06

INTEGRAL .330428521048ex-02

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Slow
D = 2.20
f = 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
570	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
580	.103000000000ex-04	.000000000000ex 00	.588000000000ex-01	.000000000000ex 00
590	.106000000000ex-04	.100000000000ex 00	-.919000000000ex-01	.857839155156ex-06
600	.108000000000ex-04	.600000000000ex 00	-.133300000000ex 00	.476732770079ex-05
610	.104000000000ex-04	.860000000000ex 00	-.175000000000ex 00	.597766799874ex-05
620	.990000000000ex-05	.940000000000ex 00	-.208400000000ex 00	.575921177105ex-05
630	.939000000000ex-05	.960000000000ex 00	-.241800000000ex 00	.516579092867ex-05
640	.906000000000ex-05	.970000000000ex 00	-.229800000000ex 00	.517725947918ex-05
650	.869000000000ex-05	.960000000000ex 00	-.228800000000ex 00	.492596145805ex-05
660	.854000000000ex-05	.960000000000ex 00	-.153800000000ex 00	.575346007484ex-05
670	.872000000000ex-05	.960000000000ex 00	-.801000000000ex-01	.696125780724ex-05
680	.883000000000ex-05	.960000000000ex 00	-.287000000000ex-01	.793472604047ex-05
690	.859000000000ex-05	.960000000000ex 00	-.133400000000ex 00	.606546913179ex-05
700	.105000000000ex-04	.960000000000ex 00	-.723200000000ex 00	.190660414173ex-05
710	.114000000000ex-04	.960000000000ex 00	-.165330000000ex 01	.243151013636ex-06

INTEGRAL .617818269336ex-03

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Slow
D = 1.74
f = 5.6

FILM TYPE : SO-022
FILTER : BB
STATION : 5
SHUTTER : Medium
D = 1.75
f = 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
570	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
580	.103000000000ex-04	.000000000000ex 00	.637000000000ex-01	.000000000000ex 00
590	.106000000000ex-04	.100000000000ex 00	.338000000000ex-01	.114579221004ex-05
600	.108000000000ex-04	.600000000000ex 00	-.700000000000ex-02	.637639196533ex-05
610	.104000000000ex-04	.860000000000ex 00	-.485000000000ex-01	.799892805362ex-05
620	.990000000000ex-05	.940000000000ex 00	-.109700000000ex 00	.722874738482ex-05
630	.939000000000ex-05	.960000000000ex 00	-.133700000000ex 00	.662577715739ex-05
640	.906000000000ex-05	.970000000000ex 00	-.113300000000ex 00	.677017557957ex-05
650	.869000000000ex-05	.960000000000ex 00	-.109100000000ex 00	.648919775834ex-05
660	.854000000000ex-05	.960000000000ex 00	-.256000000000ex-01	.772910315787ex-05
670	.872000000000ex-05	.960000000000ex 00	.482000000000ex-01	.935379220860ex-05
680	.882000000000ex-05	.960000000000ex 00	.954000000000ex-01	.105472640376ex-04
690	.859000000000ex-05	.960000000000ex 00	-.122000000000ex-01	.801796944444ex-05
700	.105000000000ex-04	.960000000000ex 00	-.586100000000ex 00	.261433075580ex-05
710	.114000000000ex-04	.960000000000ex 00	-.144210000000ex 01	.395435890708ex-06

INTEGRAL .815741336916ex-03

FILM TYPE : SO-022
FILTER : JJ
STATION : 5

SHUTTER :	Fast	Med	Slow
D =	1.17	1.15	1.13
f =	3.5	4.7	6.3

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
590	.106000000000ex-04	.000000000000ex 00	.387400000000ex 00	.000000000000ex 00
600	.108000000000ex-04	.100000000000ex-01	.339200000000ex 00	.235843415380ex-06
610	.104000000000ex-04	.290000000000ex 00	.307200000000ex 00	.611830801838ex-05
620	.990000000000ex-05	.640000000000ex 00	.308500000000ex 00	.128918477689ex-04
630	.939000000000ex-05	.820000000000ex 00	.229200000000ex 00	.130520715131ex-04
640	.906000000000ex-05	.880000000000ex 00	.219500000000ex 00	.132163298712ex-04
650	.869000000000ex-05	.870000000000ex 00	.235600000000ex 00	.130058586308ex-04
660	.854000000000ex-05	.820000000000ex 00	.311600000000ex 00	.143506549754ex-04
670	.872000000000ex-05	.810000000000ex 00	.395800000000ex 00	.175712033088ex-04
680	.883000000000ex-05	.890000000000ex 00	.432900000000ex 00	.212936793621ex-04
690	.859000000000ex-05	.670000000000ex 00	.332100000000ex 00	.123642553750ex-04
700	.105000000000ex-04	.180000000000ex 00	-.210800000000ex 00	.116321984862ex-05
710	.114000000000ex-04	.500000000000ex-01	-.947800000000ex 00	.642798501518ex-07

INTEGRAL .125631324835ex-02

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Medium
D = 1.67
f = 3.5

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Slow
D = 1.67
f = 4.7

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
590	.106000000000ex-04	.000000000000ex 00	.148400000000ex 00	.000000000000ex 00
600	.108000000000ex-04	.100000000000ex-01	.106800000000ex 00	.138109564397ex-06
610	.104000000000ex-04	.290000000000ex 00	.702000000000ex-01	.354512323941ex-05
620	.990000000000ex-05	.640000000000ex 00	-.540000000000ex-02	.625770619233ex-05
630	.939000000000ex-05	.820000000000ex 00	-.273000000000ex-01	.723068504085ex-05
640	.906000000000ex-05	.880000000000ex 00	-.470000000000ex-02	.788698236620ex-05
650	.869000000000ex-05	.870000000000ex 00	.260000000000ex-02	.760569716307ex-05
660	.854000000000ex-05	.820000000000ex 00	.905000000000ex-01	.862525062094ex-05
670	.872000000000ex-05	.810000000000ex 00	.166100000000ex 00	.103538412958ex-04
680	.883000000000ex-05	.890000000000ex 00	.207900000000ex 00	.126838386924ex-04
690	.859000000000ex-05	.670000000000ex 00	.102200000000ex 00	.728228994695ex-05
700	.105000000000ex-04	.180000000000ex 00	-.458100000000ex 00	.658205950445ex-06
710	.114000000000ex-04	.500000000000ex-01	-.127870000000ex 01	.300037028510ex-07

INTEGRAL .723552168726ex-03

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Slow
D = 2.15
f = 3.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
590	.106000000000ex-04	.000000000000ex 00	-.919000000000ex-01	.000000000000ex 00
600	.108000000000ex-04	.100000000000ex-01	-.133300000000ex 00	.794554616798ex-07
610	.104000000000ex-04	.290000000000ex 00	-.175000000000ex 00	.201572525539ex-05
620	.990000000000ex-05	.640000000000ex 00	-.208400000000ex 00	.392116546114ex-05
630	.939000000000ex-05	.820000000000ex 00	-.241800000000ex 00	.441244641824ex-05
640	.906000000000ex-05	.880000000000ex 00	-.229800000000ex 00	.469689519761ex-05
650	.869000000000ex-05	.870000000000ex 00	-.228800000000ex 00	.446415257135ex-05
660	.854000000000ex-05	.820000000000ex 00	-.153800000000ex 00	.491441381393ex-05
670	.872000000000ex-05	.810000000000ex 00	-.801000000000ex-01	.587356127486ex-05
680	.883000000000ex-05	.890000000000ex 00	-.287000000000ex-01	.735615226669ex-05
690	.859000000000ex-05	.670000000000ex 00	-.133400000000ex 00	.423319199823ex-05
700	.105000000000ex-04	.180000000000ex 00	-.723200000000ex 00	.357488276574ex-06
710	.114000000000ex-04	.500000000000ex-01	-.165330000000ex 01	.126641152935ex-07
INTEGRAL	.000000000000ex 00	.424377003533ex-03		

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Fast
D = 0.37
f = 6.3

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
590	.106000000000ex-04	.000000000000ex 00	.108730000000ex 01	.000000000000ex 00
600	.108000000000ex-04	.100000000000ex-01	.106260000000ex 01	.124745174677ex-05
610	.104000000000ex-04	.290000000000ex 00	.102890000000ex 01	.322352718571ex-04
620	.990000000000ex-05	.640000000000ex 00	.987400000000ex 00	.615481733894ex-04
630	.939000000000ex-05	.820000000000ex 00	.939400000000ex 00	.669698682656ex-04
640	.906000000000ex-05	.880000000000ex 00	.886300000000ex 00	.613636055831ex-04
650	.869000000000ex-05	.870000000000ex 00	.868300000000ex 00	.558263236523ex-04
660	.854000000000ex-05	.820000000000ex 00	.101210000000ex 01	.720065035265ex-04
670	.872000000000ex-05	.810000000000ex 00	.113930000000ex 01	.973422776510ex-04
680	.883000000000ex-05	.890000000000ex 00	.112480000000ex 01	.104749198891ex-03
690	.859000000000ex-05	.670000000000ex 00	.104460000000ex 01	.637775697706ex-04
700	.105000000000ex-04	.180000000000ex 00	.455600000000ex 00	.539587405394ex-05
710	.114000000000ex-04	.500000000000ex-01	-.158000000000ex 00	.396163861024ex-06
720	.129000000000ex-04	.200000000000ex-01	-.786900000000ex 00	.421424427944ex-07
730	.151000000000ex-04	.100000000000ex-01	-.138030000000ex 01	.629038094804ex-08

INTEGRAL .619504346336ex-02

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Fast
D = 0.68
f = 4.7

FILM TYPE : SO-022
FILTER : JJ
STATION : 5
SHUTTER : Medium
D = 0.67
f = 6.3

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
580	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
590	.106000000000ex-04	.000000000000ex 00	.831400000000ex 00	.000000000000ex 00
600	.108000000000ex-04	.100000000000ex-01	.756000000000ex 00	.615777414063ex-06
610	.104000000000ex-04	.290000000000ex 00	.726000000000ex 00	.160483850994ex-04
620	.990000000000ex-05	.640000000000ex 00	.699200000000ex 00	.316967816829ex-04
630	.939000000000ex-05	.820000000000ex 00	.653300000000ex 00	.346560805729ex-04
640	.906000000000ex-05	.880000000000ex 00	.658100000000ex 00	.362836417151ex-04
650	.869000000000ex-05	.870000000000ex 00	.651400000000ex 00	.338796588889ex-04
660	.854000000000ex-05	.820000000000ex 00	.738400000000ex 00	.383417316317ex-04
670	.872000000000ex-05	.810000000000ex 00	.802900000000ex 00	.448643627878ex-04
680	.883000000000ex-05	.890000000000ex 00	.859000000000ex 00	.568003105556ex-04
690	.859000000000ex-05	.670000000000ex 00	.763000000000ex 00	.333478597654ex-04
700	.105000000000ex-04	.180000000000ex 00	.220600000000ex 00	.314095564947ex-05
710	.114000000000ex-04	.500000000000ex-01	-.383500000000ex 04	.000000000000ex 00
720	.129000000000ex-04	.200000000000ex-01	-.122970000000ex 01	.152026643103ex-07

INTEGRAL .328319662805ex-02

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Slow
D = 2.24
f = 3.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	-.225900000000ex 00	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	-.281300000000ex 00	.420160813502ex-07
490	.853000000000ex-05	.230000000000ex 00	-.343300000000ex 00	.889973073702ex-06
500	.878000000000ex-05	.600000000000ex 00	-.354400000000ex 00	.232940909221ex-05
510	.907000000000ex-05	.760000000000ex 00	-.302000000000ex 00	.343891054894ex-05
520	.922000000000ex-05	.840000000000ex 00	-.268800000000ex 00	.417071205332ex-05
530	.944000000000ex-05	.890000000000ex 00	-.239900000000ex 00	.483572951720ex-05
540	.974000000000ex-05	.920000000000ex 00	-.190400000000ex 00	.578025215410ex-05
550	.989000000000ex-05	.910000000000ex 00	-.148700000000ex 00	.639054185945ex-05
560	.100000000000ex-04	.890000000000ex 00	-.122100000000ex 00	.671877359331ex-05
570	.101000000000ex-04	.880000000000ex 00	-.691000000000ex-01	.758060811290ex-05
580	.103000000000ex-04	.890000000000ex 00	-.588000000000ex-01	.800621468329ex-05
590	.106000000000ex-04	.720000000000ex 00	-.919000000000ex-01	.617644191712ex-05
600	.108000000000ex-04	.220000000000ex 00	-.133300000000ex 00	.174802015695ex-05
610	.104000000000ex-04	.500000000000ex-01	-.175000000000ex 00	.347538837136ex-06
620	.990000000000ex-05	.200000000000ex-01	-.208400000000ex 00	.122536420660ex-06
630	.939000000000ex-05	.100000000000ex-01	-.241800000000ex 00	.538103221736ex-07
640	.906000000000ex-05	.000000000000ex 00	-.229800000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .583662817713ex-03

C-4

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Medium
D = 1.81
f = 3.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	-.923000000000ex-01	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	-.152600000000ex 00	.565087297891ex-07
490	.853000000000ex-05	.230000000000ex 00	-.218300000000ex 00	.118679816782ex-05
500	.878000000000ex-05	.600000000000ex 00	-.220900000000ex 00	.316771255785ex-05
510	.907000000000ex-05	.760000000000ex 00	-.173500000000ex 00	.462296791550ex-05
520	.922000000000ex-05	.840000000000ex 00	-.142200000000ex 00	.558226188616ex-05
530	.944000000000ex-05	.890000000000ex 00	-.116100000000ex 00	.643075554596ex-05
540	.974000000000ex-05	.920000000000ex 00	-.568000000000ex-01	.786224882391ex-05
550	.989000000000ex-05	.910000000000ex 00	-.208000000000ex-01	.857902007174ex-05
560	.100000000000ex-04	.890000000000ex 00	.760000000000ex-02	.905711759731ex-05
570	.101000000000ex-04	.880000000000ex 00	.574000000000ex-01	.101438786681ex-04
580	.103000000000ex-04	.890000000000ex 00	.637000000000ex-01	.106151767863ex-04
590	.106000000000ex-04	.720000000000ex 00	.338000000000ex-01	.824970391230ex-05
600	.108000000000ex-04	.220000000000ex 00	-.700000000000ex-02	.233801038728ex-05
610	.104000000000ex-04	.500000000000ex-01	-.485000000000ex-01	.465053956606ex-06
620	.990000000000ex-05	.200000000000ex-01	-.109700000000ex 00	.153803135847ex-06
630	.939000000000ex-05	.100000000000ex-01	-.133700000000ex 00	.690185120561ex-07
640	.906000000000ex-05	.000000000000ex 00	-.113300000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .782752510383ex-03

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Slow
D = 1.78
f = 4.7

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	-.923000000000ex-01	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	-.152600000000ex 00	.565087297891ex-07
490	.853000000000ex-05	.230000000000ex 00	-.218600000000ex 00	.118597863978ex-05
500	.878000000000ex-05	.600000000000ex 00	-.220900000000ex 00	.316771255785ex-05
510	.907000000000ex 00	.760000000000ex-05	-.173500000000ex 00	.462296791550ex-05
520	.922000000000ex-05	.840000000000ex 00	-.142200000000ex 00	.558226188616ex-05
530	.944000000000ex-05	.890000000000ex 00	-.116100000000ex 00	.643075554596ex-05
540	.974000000000ex-05	.920000000000ex 00	-.568000000000ex-01	.786224882391ex-05
550	.989000000000ex-05	.910000000000ex 00	-.208000000000ex-01	.857902007174ex-05
560	.100000000000ex-04	.890000000000ex 00	.760000000000ex-02	.905711759731ex-05
570	.101000000000ex-04	.880000000000ex 00	.574000000000ex-01	.101438786681ex-04
580	.103000000000ex-04	.890000000000ex 00	.637000000000ex-01	.106151767863ex-04
590	.106000000000ex-04	.720000000000ex 00	.338000000000ex-01	.824970391230ex-05
600	.108000000000ex-04	.220000000000ex 00	-.700000000000ex-02	.233801038728ex-05
610	.104000000000ex-04	.500000000000ex-01	-.458000000000ex-01	.467954193651ex-06
620	.990000000000ex-05	.200000000000ex-01	-.109700000000ex 00	.153803135847ex-06
630	.939000000000ex-05	.100000000000ex-01	-.133700000000ex 00	.690185120561ex-07
640	.906000000000ex-05	.000000000000ex 00	-.113300000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .782766381776ex-03

FIIM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Fast
D= 0.46
f= 6.7

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	.113750000000ex 01	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	.930900000000ex 00	.684881673565ex-06
490	.853000000000ex-05	.230000000000ex 00	.861500000000ex 00	.142618829301ex-04
500	.878000000000ex-05	.600000000000ex 00	.819100000000ex 00	.347332775134ex-04
510	.907000000000ex-05	.760000000000ex 00	.824700000000ex 00	.460384696909ex-04
520	.922000000000ex-05	.840000000000ex 00	.893900000000ex 00	.606610896326ex-04
530	.944000000000ex-05	.890000000000ex 00	.968600000000ex 00	.781559418224ex-04
540	.974000000000ex-05	.920000000000ex 00	.102680000000ex 01	.953118247517ex-04
550	.989000000000ex-05	.910000000000ex 00	.106780000000ex 01	.105205315696ex-03
560	.100000000000ex-04	.890000000000ex 00	.109310000000ex 01	.110278285791ex-03
570	.101000000000ex-04	.880000000000ex 00	.108250000000ex 01	.107474156659ex-03
580	.103000000000ex-04	.890000000000ex 00	.109310000000ex 01	.113586634365ex-03
590	.106000000000ex-04	.720000000000ex 00	.108730000000ex 01	.933121855801ex-04
600	.108000000000ex-04	.220000000000ex 00	.106260000000ex 01	.274439384290ex-04
610	.104000000000ex-04	.500000000000ex-01	.102890000000ex 01	.555780549261ex-05
620	.990000000000ex-05	.200000000000ex-01	.987400000000ex 00	.192338041842ex-05
630	.939000000000ex-05	.100000000000ex-01	.939400000000ex 00	.816705710556ex-06
640	.906000000000ex-05	.000000000000ex 00	.886300000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .893379392473ex-02

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Slow
D = 1.25
f = 6.7

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Fast
D = 1.30
f = 3.5

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	.296500000000ex 00	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	.231800000000ex 00	.136935340259ex-06
490	.853000000000ex-05	.230000000000ex 00	.135000000000ex 00	.267717565567ex-05
500	.878000000000ex-05	.600000000000ex 00	.139600000000ex 00	.726516975479ex-05
510	.907000000000ex-05	.760000000000ex 00	.177100000000ex 00	.103638442892ex-04
520	.922000000000ex-05	.840000000000ex 00	.208100000000ex 00	.125057633778ex-04
530	.944000000000ex-05	.890000000000ex 00	.255300000000ex 00	.151238374498ex-04
540	.974000000000ex-05	.920000000000ex 00	.306700000000ex 00	.181571124910ex-04
550	.989000000000ex-05	.910000000000ex 00	.330800000000ex 00	.192769217260ex-04
560	.100000000000ex-04	.890000000000ex 00	.369800000000ex 00	.208540306086ex-04
570	.101000000000ex-04	.880000000000ex 00	.404100000000ex 00	.225374121013ex-04
580	.103000000000ex-04	.890000000000ex 00	.417700000000ex 00	.239843101382ex-04
590	.106000000000ex-04	.720000000000ex 00	.387400000000ex 00	.186225162407ex-04
600	.108000000000ex-04	.220000000000ex 00	.339200000000ex 00	.518855513837ex-05
610	.104000000000ex-04	.500000000000ex-01	.307500000000ex 00	.105560963032ex-05
620	.990000000000ex-04	.200000000000ex-01	.308500000000ex 00	.402870242778ex-05
630	.939000000000ex-05	.100000000000ex-01	.229200000000ex 00	.159171603818ex-06
640	.906000000000ex-05	.000000000000ex 00	.219500000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .182705098165ex-02

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Medium
D = 0.77
f = 6.7

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Fast
D = 0.80
f = 4.7

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	.592500000000ex 00	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	.522000000000ex 00	.267125621295ex-06
490	.853000000000ex-05	.230000000000ex 00	.423600000000ex 00	.520327605004ex-05
500	.878000000000ex-05	.600000000000ex 00	.408200000000ex 00	.134848390204ex-04
510	.907000000000ex-05	.760000000000ex 00	.445300000000ex 00	.192185615673ex-04
520	.922000000000ex-05	.840000000000ex 00	.487300000000ex 00	.237853861848ex-04
530	.944000000000ex-05	.890000000000ex 00	.528200000000ex 00	.283505834446ex-04
540	.974000000000ex-05	.920000000000ex 00	.586000000000ex 00	.345419446737ex-04
550	.989000000000ex-05	.910000000000ex 00	.613400000000ex 00	.369519774252ex-04
560	.100000000000ex-04	.890000000000ex 00	.637800000000ex 00	.386536052088ex-04
570	.101000000000ex-04	.880000000000ex 00	.664600000000ex 00	.410585914013ex-04
580	.103000000000ex-04	.890000000000ex 00	.683900000000ex 00	.442718052494ex-04
590	.106000000000ex-04	.720000000000ex 00	.654700000000ex 00	.344618320604ex-04
600	.108000000000ex-04	.220000000000ex 00	.606300000000ex 00	.959724178743ex-05
610	.104000000000ex-04	.500000000000ex-01	.575500000000ex 00	.195660583179ex-05
620	.990000000000ex-05	.200000000000ex-01	.551600000000ex 00	.705123502267ex-06
630	.939000000000ex-05	.100000000000ex-01	.499600000000ex 00	.296664508310ex-06
640	.906000000000ex-05	.000000000000ex 00	.490600000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .332074823188ex-02

FILM TYPE : SO-022
FILTER : AA
STATION : 6
SHUTTER : Medium
D = 1.27
f = 4.7

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
470	.746000000000ex-05	.000000000000ex 00	.296500000000ex 00	.000000000000ex 00
480	.803000000000ex-05	.100000000000ex-01	.231800000000ex 00	.136935340259ex-06
490	.853000000000ex-05	.230000000000ex 00	.135000000000ex 00	.267717565567ex-05
500	.878000000000ex-05	.600000000000ex 00	.139600000000ex 00	.726516975479ex-05
510	.907000000000ex-05	.760000000000ex 00	.177100000000ex 00	.103638442892ex-04
520	.922000000000ex-05	.840000000000ex 00	.208100000000ex 00	.125057633778ex-04
530	.944000000000ex-05	.890000000000ex 00	.255300000000ex 00	.151238374498ex-04
540	.974000000000ex-05	.920000000000ex 00	.306700000000ex 00	.181571124910ex-04
550	.989000000000ex-05	.910000000000ex 00	.330800000000ex 00	.192769217260ex-04
560	.100000000000ex-04	.890000000000ex 00	.369800000000ex 00	.208540306086ex-04
570	.101000000000ex-04	.880000000000ex 00	.404100000000ex 00	.225374121013ex-04
580	.103000000000ex-04	.890000000000ex 00	.417700000000ex 00	.239843101382ex-04
590	.106000000000ex-04	.720000000000ex 00	.387400000000ex 00	.186225162407ex-04
600	.108000000000ex-04	.220000000000ex 00	.339200000000ex 00	.518855513837ex-05
610	.104000000000ex-04	.500000000000ex-01	.307500000000ex 00	.105560963032ex-05
620	.990000000000ex-05	.200000000000ex-01	.308500000000ex 00	.402870242778ex-06
630	.939000000000ex-05	.100000000000ex-01	.229200000000ex 00	.159171603818ex-06
640	.906000000000ex-05	.000000000000ex 00	.219500000000ex 00	.000000000000ex 00
650	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
INTEGRAL	.177870655252ex-02			

FILM TYPE	:	SO-022	
FILTER	:	GG + MM	
STATION	:	6	
SHUTTER	:	Medium	Fast
D =		0.70	0.71
F =		5.6	4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.124000000000ex-05	.452400000000ex 00	.960400000000ex 00	.512087625615ex-05
410	.247000000000ex-05	.553000000000ex 00	.906700000000ex 00	.110184900689ex-04
420	.364000000000ex-05	.615600000000ex 00	.895200000000ex 00	.176035393257ex-04
430	.455000000000ex-05	.647400000000ex 00	.890700000000ex 00	.229025632773ex-04
440	.532000000000ex-05	.705500000000ex 00	.857800000000ex 00	.270525775317ex-04
450	.675000000000ex-05	.748200000000ex 00	.782500000000ex 00	.306070502603ex-04
460	.685000000000ex-05	.774300000000ex 00	.688000000000ex 00	.258582917272ex-04
470	.746000000000ex-05	.682500000000ex 00	.592500000000ex 00	.199223920921ex-04
480	.803000000000ex-05	.783200000000ex 00	.522000000000ex 00	.209212786598ex-04
490	.853000000000ex-05	.623000000000ex 00	.423600000000ex 00	.140940912138ex-04
500	.878000000000ex-05	.231400000000ex 00	.408200000000ex 00	.520065291553ex-05
510	.907000000000ex-05	.442500000000ex 00	.445300000000ex 00	.111897545968ex-04
520	.922000000000ex-05	.880000000000ex 00	.487300000000ex 00	.249180236222ex-04
530	.944000000000ex-05	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
540	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .229055656618ex-02

FILM TYPE : SO-022
FILTER : GG + MM
STATION : 6

SHUTTER	Slow	Medium
D = 1.13		1.15
f = 5.6		4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.1240000000000ex-05	.4524000000000ex 00	.6373000000000ex 00	.2433572456960ex-05
410	.2470000000000ex-05	.5530000000000ex 00	.5684000000000ex 00	.5056174855640ex-05
420	.3640000000000ex-05	.6156000000000ex 00	.5552000000000ex 00	.8046369921200ex-05
430	.4550000000000ex-05	.6474000000000ex 00	.5779000000000ex 00	.1114510313490ex-04
440	.5320000000000ex-05	.7055000000000ex 00	.5473000000000ex 00	.1323453388970ex-04
450	.6570000000000ex-05	.7482000000000ex 00	.4912000000000ex 00	.1523291691870ex-04
460	.6850000000000ex-05	.7743000000000ex 00	.4001000000000ex 00	.1332600066960ex-04
470	.7460000000000ex-05	.6825000000000ex 00	.2965000000000ex 00	.1007723724620ex-04
480	.8030000000000ex-05	.7832000000000ex 00	.2318000000000ex 00	.1072477584910ex-04
490	.8530000000000ex-05	.6230000000000ex 00	.1350000000000ex 00	.7251654058630ex-05
500	.8780000000000ex-05	.2314000000000ex 00	.1396000000000ex 00	.2801933802100ex-05
510	.9070000000000ex-05	.4425000000000ex 00	.1771000000000ex 00	.6034211971050ex-05
520	.9220000000000ex-05	.8800000000000ex 00	.2081000000000ex 00	.1310127591960ex-04
530	.9440000000000ex-05	.0000000000000ex 00	.2553000000000ex 00	.0000000000000ex 00
540	.0000000000000ex 00	.0000000000000ex 00	.0000000000000ex 00	.0000000000000ex 00

INTEGRAL .1146975150980ex-02

FILM TYPE : SO-022
FILTER : GG + MM
STATION : 6
SHUTTER : Fast
D = 0.42
f = 5.6

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.124000000000ex-05	.452400000000ex 00	.149600000000ex 01	.17576980924 8ex-04
410	.247000000000ex-05	.553000000000ex 00	.145900000000ex 01	.39302672686 6ex-04
420	.364000000000ex-05	.615600000000ex 00	.144750000000ex 01	.62791375217 4ex-04
430	.455000000000ex-05	.647400000000ex 00	.144840000000ex 01	.82714965268 6ex-04
440	.532000000000ex-05	.705500000000ex 00	.141540000000ex 01	.97680674627 9ex-04
450	.657000000000ex-05	.748200000000ex 00	.136310000000ex 01	.11341828432 0ex-03
460	.685000000000ex-05	.774300000000ex 00	.130640000000ex 01	.10739889938 0ex-03
470	.746000000000ex-05	.682500000000ex 00	.113750000000ex 01	.69878163599 3ex-04
480	.803000000000ex-05	.783200000000ex 00	.930900000000ex 00	.53639932673 6ex-04
490	.853000000000ex-05	.623000000000ex 00	.861500000000ex 00	.38631100284 7ex-04
500	.878000000000ex-05	.231400000000ex 00	.819100000000ex 00	.13395467361 0ex-04
510	.907000000000ex-05	.442500000000ex 00	.824700000000ex 00	.26805293208 2ex-04
520	.922000000000ex-05	.880000000000ex 00	.893900000000ex 00	.63549712948 4ex-04
530	.944000000000ex-05	.000000000000ex 00	.968600000000ex 00	.000000000000ex 00
540	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00
INTEGRAL	.765830340923ex-02			

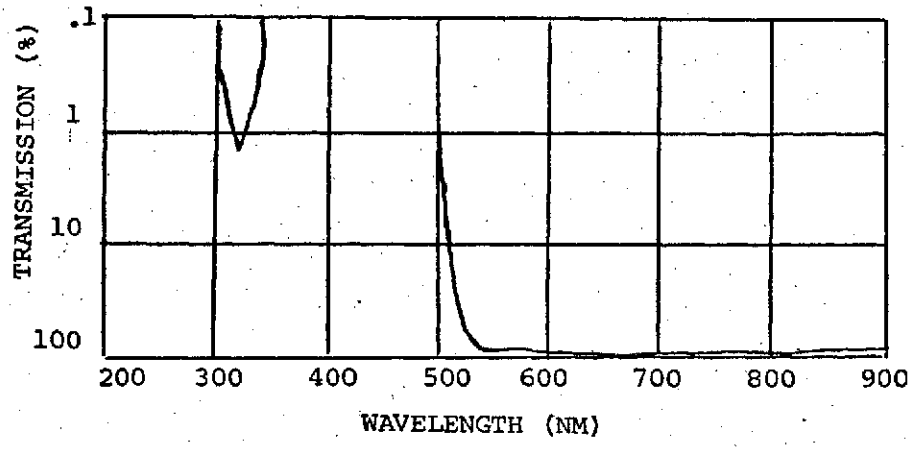
FILM TYPE: SO-022
FILTER : GG + MM
STATION : 6
SHUTTER : Slow
D = 1.63
f = 4.0

WL	RADIANCE	FILTER FACTOR	LOG SPECT.SENSI.	PRODUCT
400	.124000000000ex-05	.452400000000ex 00	.376400000000ex 00	.133457898340ex-05
410	.247000000000ex-05	.553000000000ex 00	.319400000000ex 00	.284985054308ex-05
420	.364000000000ex-05	.615600000000ex 00	.302500000000ex 00	.449676295801ex-05
430	.455000000000ex-05	.647400000000ex 00	.319000000000ex 00	.614022225962ex-05
440	.532000000000ex-05	.705500000000ex 00	.301700000000ex 00	.751810956120ex-05
450	.685000000000ex-05	.774300000000ex 00	.164700000000ex 00	.774996659861ex-05
460	.685000000000ex-05	.774300000000ex 00	.164700000000ex 00	.774996659861ex-05
470	.746000000000ex-05	.682500000000ex 00	.366000000000ex 00	.118260982618ex-04
480	.803000000000ex-05	.783200000000ex 00	.291000000000ex 00	.122910284539ex-04
490	.853000000000ex-05	.623000000000ex 00	-.102800000000ex 00	.419408355063ex-05
500	.878000000000ex-05	.231400000000ex 00	-.980000000000ex 00	.212744269404ex-06
510	.907000000000ex-05	.442500000000ex 00	.544000000000ex 00	.140449617923ex-04
520	.922000000000ex-05	.880000000000ex 00	-.244000000000ex 00	.462608483957ex-05
530	.944000000000ex-05	.000000000000ex 00	.540000000000ex 00	.000000000000ex 00
540	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00	.000000000000ex 00

INTEGRAL .874482347886ex-03

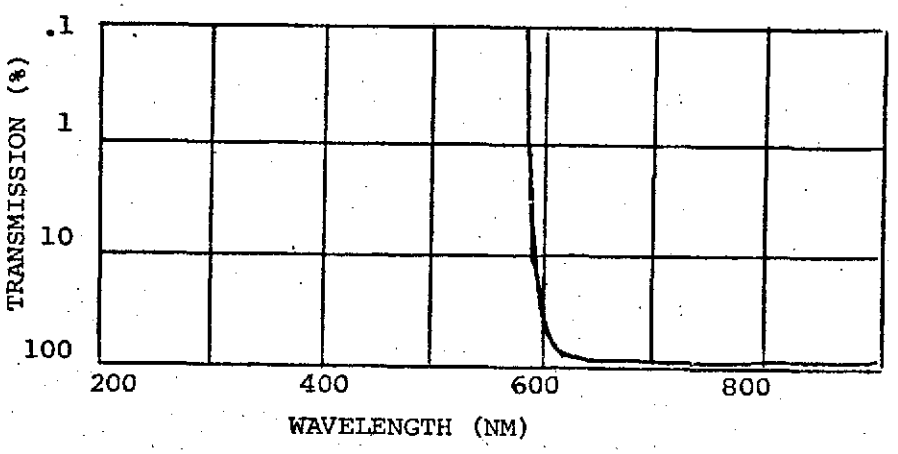
APPENDIX D

FILTER CURVES



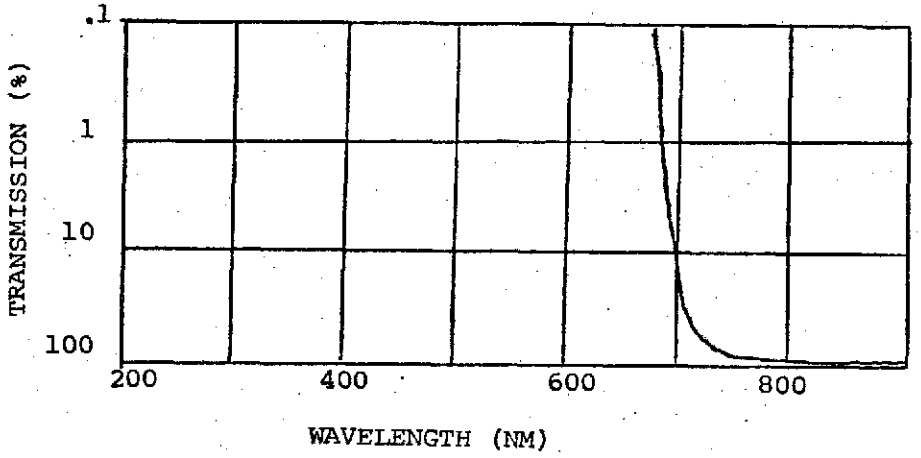
WRATTEN 12 FILTER

Wavelength	Percent Transmittance
490	0
500	1.5
510	17.3
520	55.0
530	77.8
540	86.0
550	88.4
560	89.4
570	89.7
580	90.1
590	90.3
600	90.4
610	90.5
620	90.7
630	90.8
640	90.9
650	91.0
660	91.1
670	91.2
680	91.2
690	91.2
700	91.3



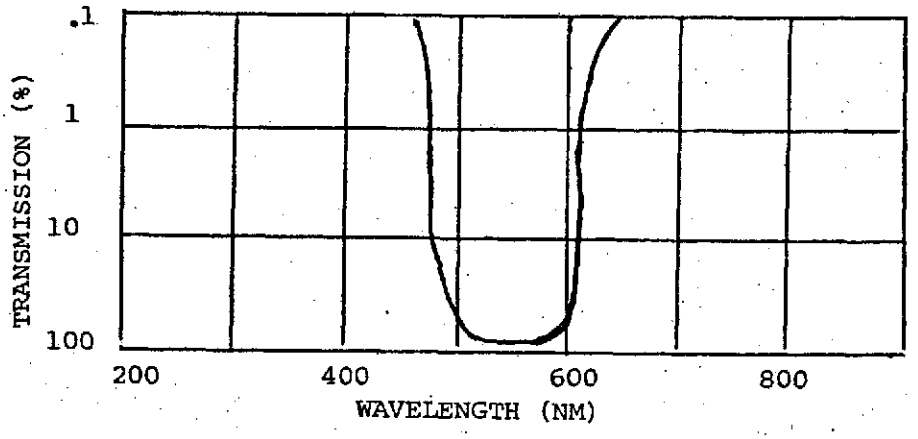
WRATTEN 25 FILTER

Wavelength	Percent Transmittance
580	0
590	12.6
600	50.0
610	75.0
620	82.6
630	85.5
640	86.7
650	87.6
660	88.2
670	88.5
680	89.0
690	89.3
700	89.5



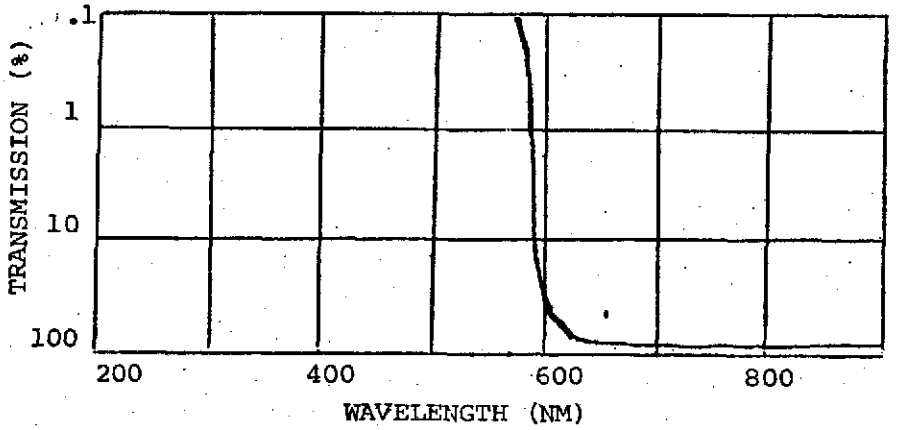
89B FILTER

Wavelength	Percent Transmittance
670	0
680	0.10
690	1.58
700	11.2
710	32.4
720	57.6
730	69.1
740	77.6
750	83.1
760	85.0
770	86.1
780	87.0
790	87.7
800	88.1
810	88.4
820	88.6
830	88.8
840	89.0
850	89.2
860	89.4
870	89.6
880	89.8
890	89.9
900	90.0
910	90.1
920	90.2
930	90.3
940	90.4
950	90.5



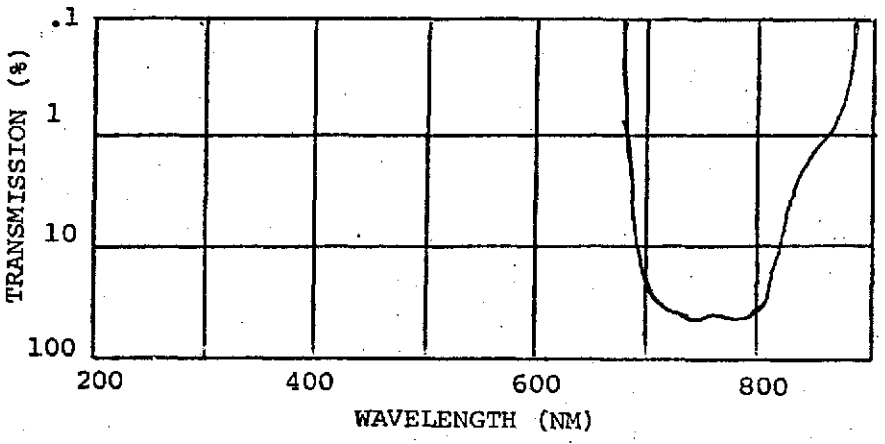
AA FILTER

Wavelength	Percent Transmittance
470	0
480	1
490	23
500	60
510	76
520	84
530	89
540	92
550	91
560	89
570	88
580	89
590	72
600	22
610	5
620	2
630	1
640	0



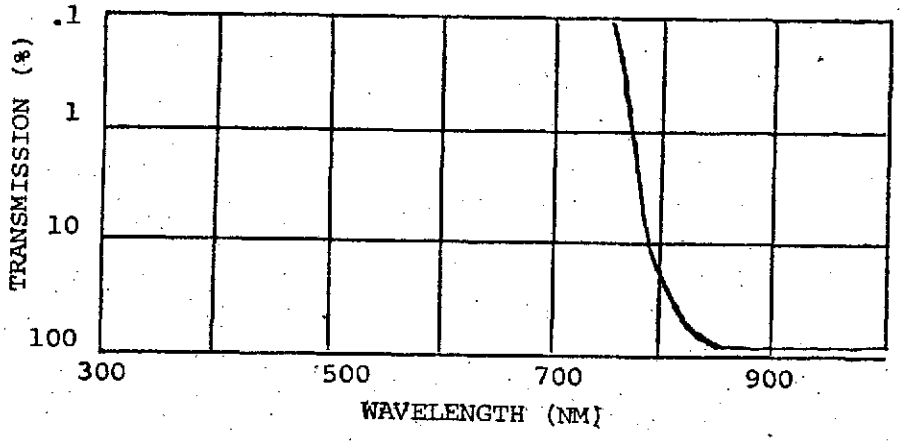
BB FILTER

Wavelength	Percent Transmittance
580	0
590	10
600	60
610	86
620	94
630	96
640	97
650	96
660	96
670	96
680	96
690	96
700	96
710	96
720	96
730	96



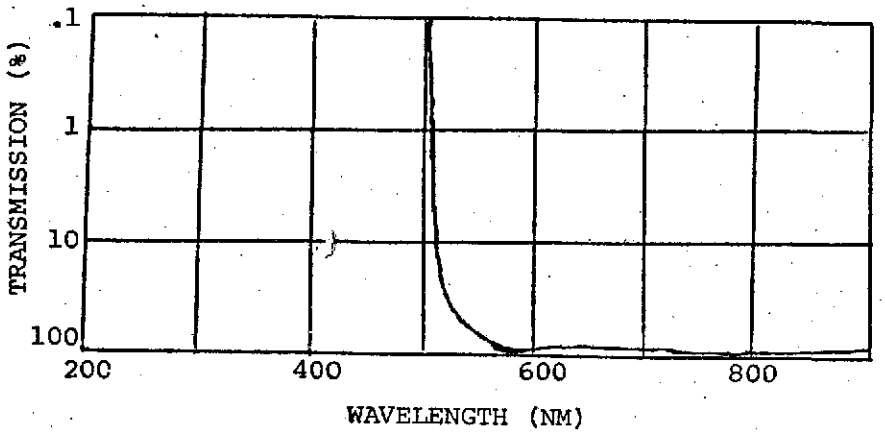
CC FILTER

Wavelength	Percent Transmittance
680	0
690	2
700	25
710	59
720	78
730	87
740	89
750	88
760	84
770	82
780	85
790	91
800	89
810	59
820	23
830	9
840	4
850	2
860	1
870	0
880	0



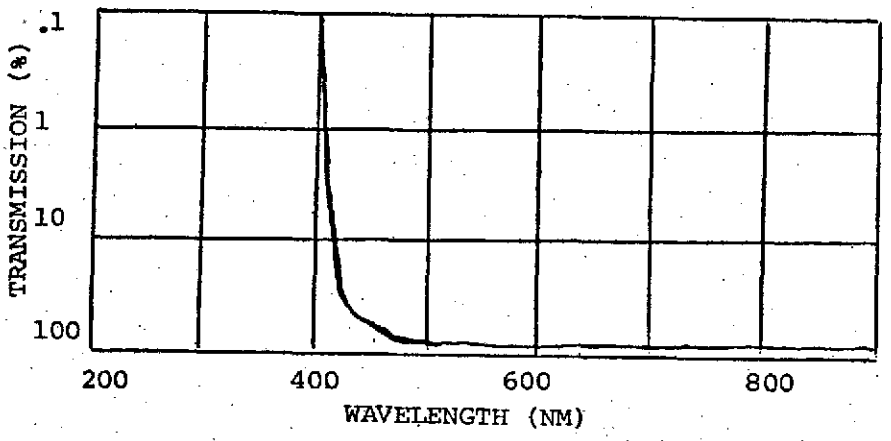
DD Filter

Wavelength	Percent Transmittance
750	0
760	1
770	2
780	5
790	13
800	31
810	53
820	72
830	84
840	91
850	94
860	95
870	96
880	96
890	96
900	95
910	95
920	95



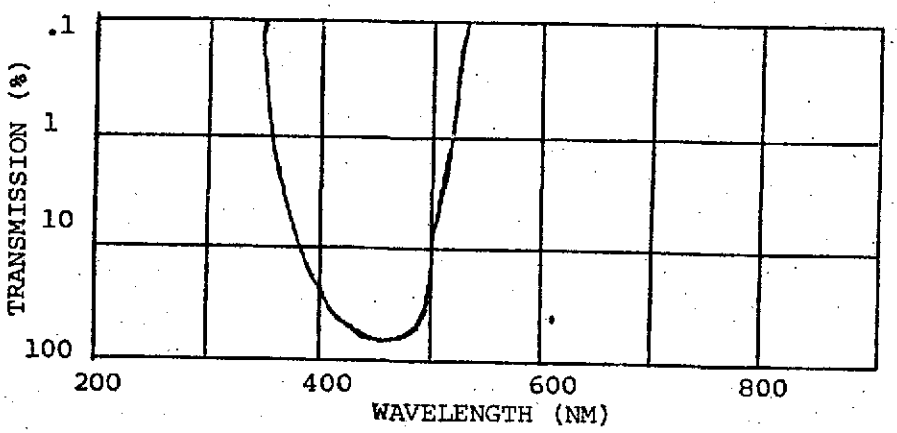
EE FILTER

Wavelength	Percent Transmittance
500	0
510	10
520	52
530	78
540	89
550	93
560	95
570	95.5
580	96
590	96.5
600	96.5



FF FILTER

Wavelength	Percent Transmittance
400	0
410	3
420	31
430	64
440	78
450	85
460	89
470	91
480	93
490	94
500	95
510	94.5
520	94.5
530	94.5
540	95
550	95.5
560	96.5
570	96
580	95.5
590	94.5
600	94
610	94
620	94



GG FILTER

Wavelength	Percent Transmittance
360	0
370	1
380	13
390	36
400	58
410	70
420	76
430	78
440	83
450	87
460	89
470	78
480	89
490	70
500	26
510	5
520	1
530	0