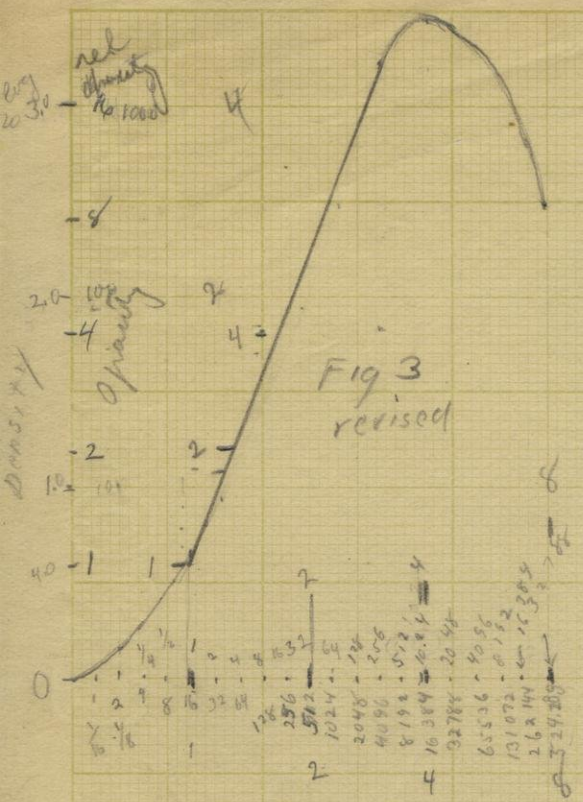
Correspondence re: "Field photography for geologists". 1933-1937



Brighter Triangular part depends on amt of silver on plate

table sunlight June 9A-3P f16

Normal 1/15"

Landscape 1/30 1/2

Sea, clouds, snow 1/50 1/10

	June	May July	Apr Aug	Mar Sept	Feb Oct	Jan Nov	Dec
12	1	1	1¼	1.5	2	3.5	4
11-1	1	1	1¼	1.5	2½	4	5
10-2	1	1	1¼	1¾	3	5	6
9-3	1	1¼	1½	2	4	12	
8-4	1½	1.5	2	3	10		
7-5	2	2.5	3	6			
6-6	2½	3	6				
5-7	5	6					

Sea 1/8

Distant landscape 1/4

open " 1/2

Normal

Light Intense Bright Dull No shadow clouds

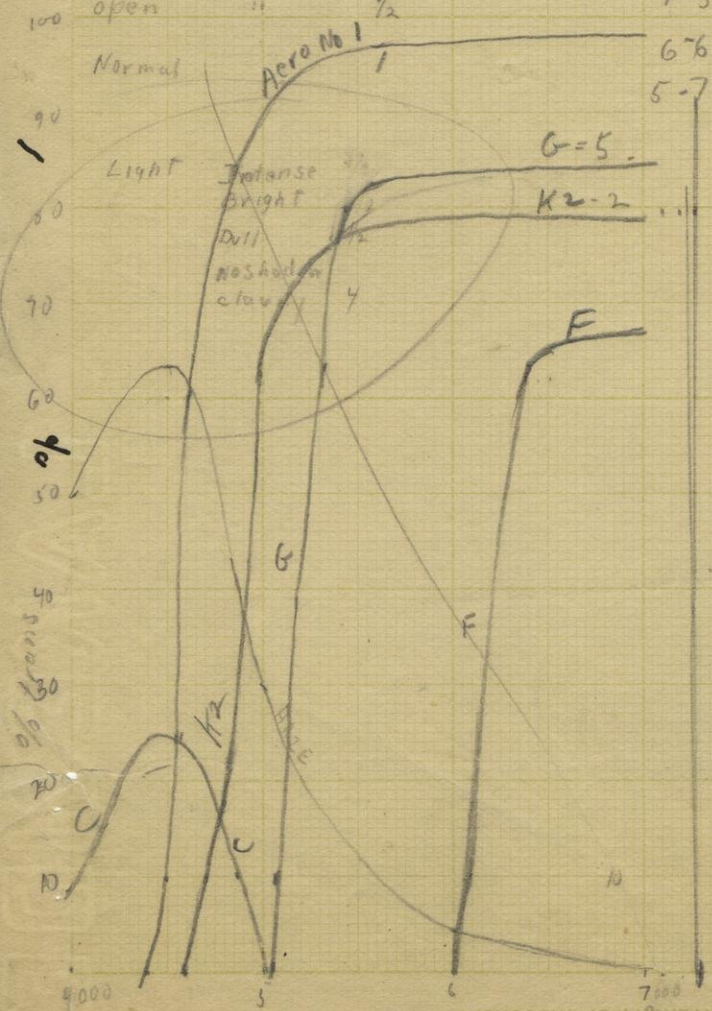


Fig 5

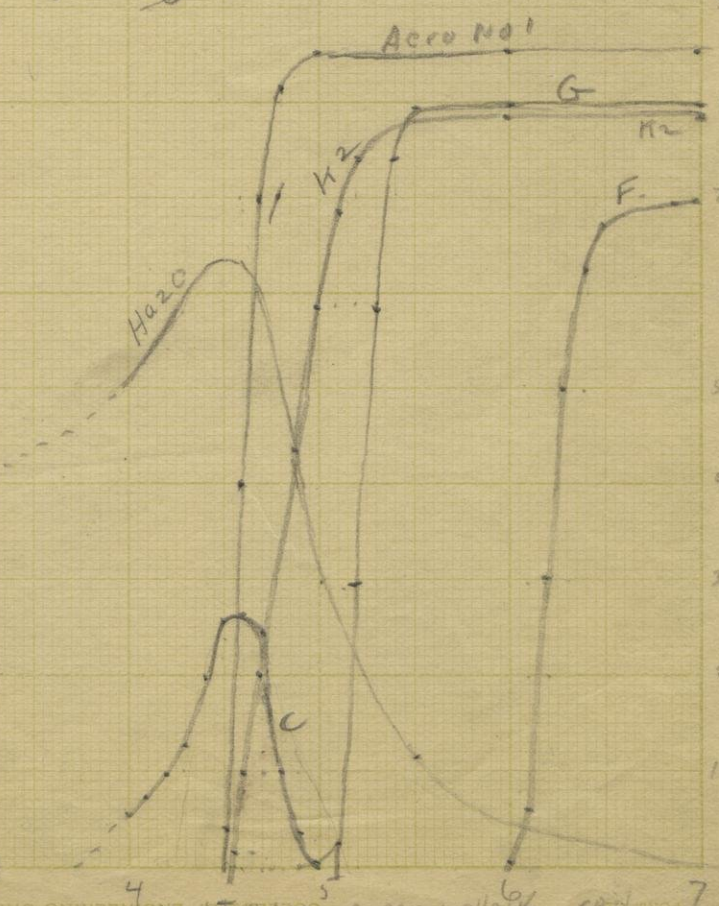


Fig 6

.....CO. REPORT NO.....LOCATION NO.....

DATE May 23, 31 .....GEOLOGIST.....

The.....¼ of the.....¼ of Sec.....Tp.....R.....

Plenachrome film

1	G	f 22	1/2 sec	- across lake	
2	"	f 32	"	" "	better
3	K2	f 32	"	lakes	
4	"	f 45	"	"	better
5	C	f 22	"	terrace	better
6	C	f 32	"	"	

G X 10

K2 X 1

C X 5

pans. C short long

3 K2 3· 12

5 G 1-f45 4-f45

25 F 5 " 20 "

fld Sid P Hall - Chainmen engineer.

x L. G. Arnold Seattle - contractor

x W. A. Rowe Wisota S&G Co

(re) A. Owen Ayres E C S&G Co

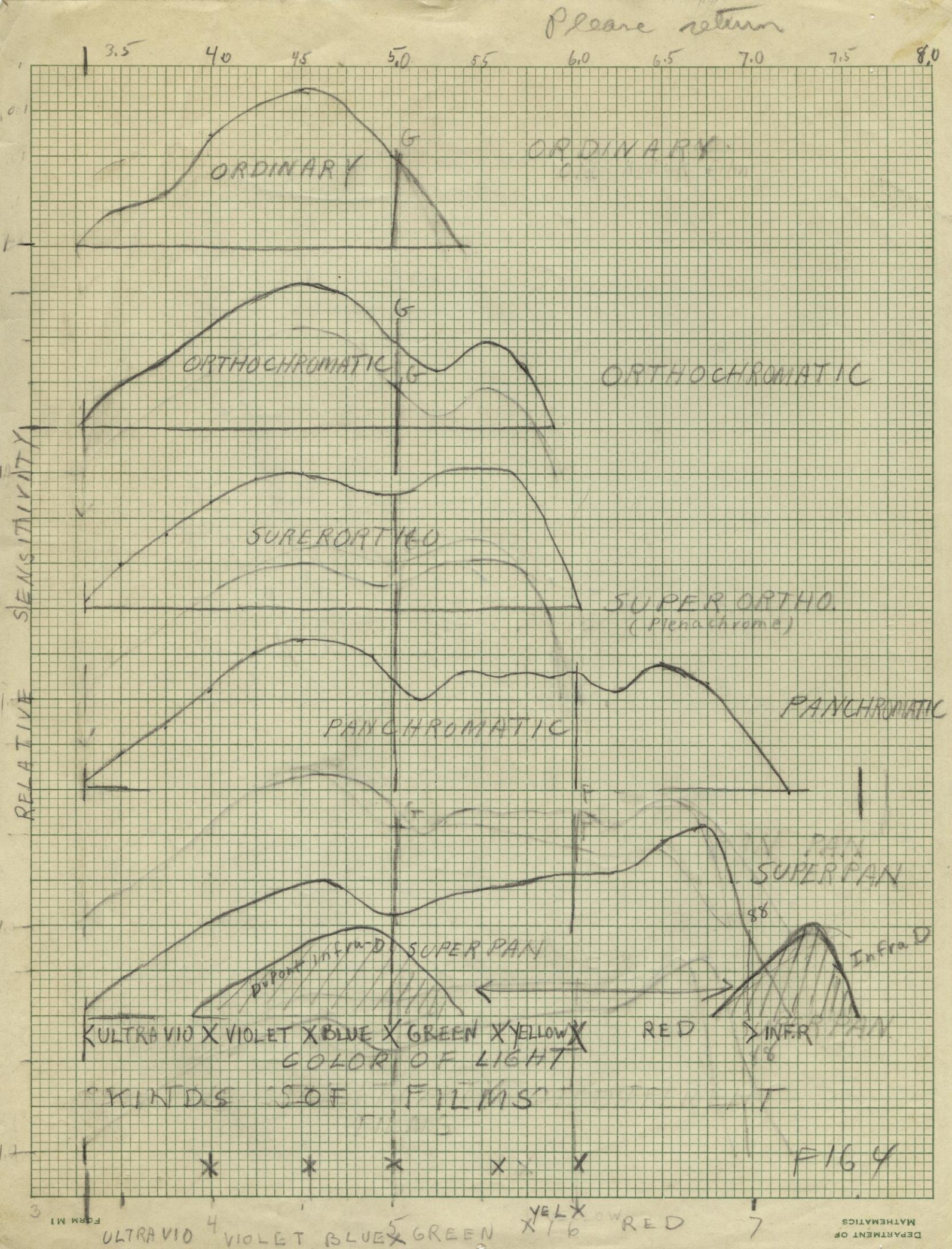
A R Gamwell contractor

Fred Stussy City Hall dep asst.

Send report to Hall

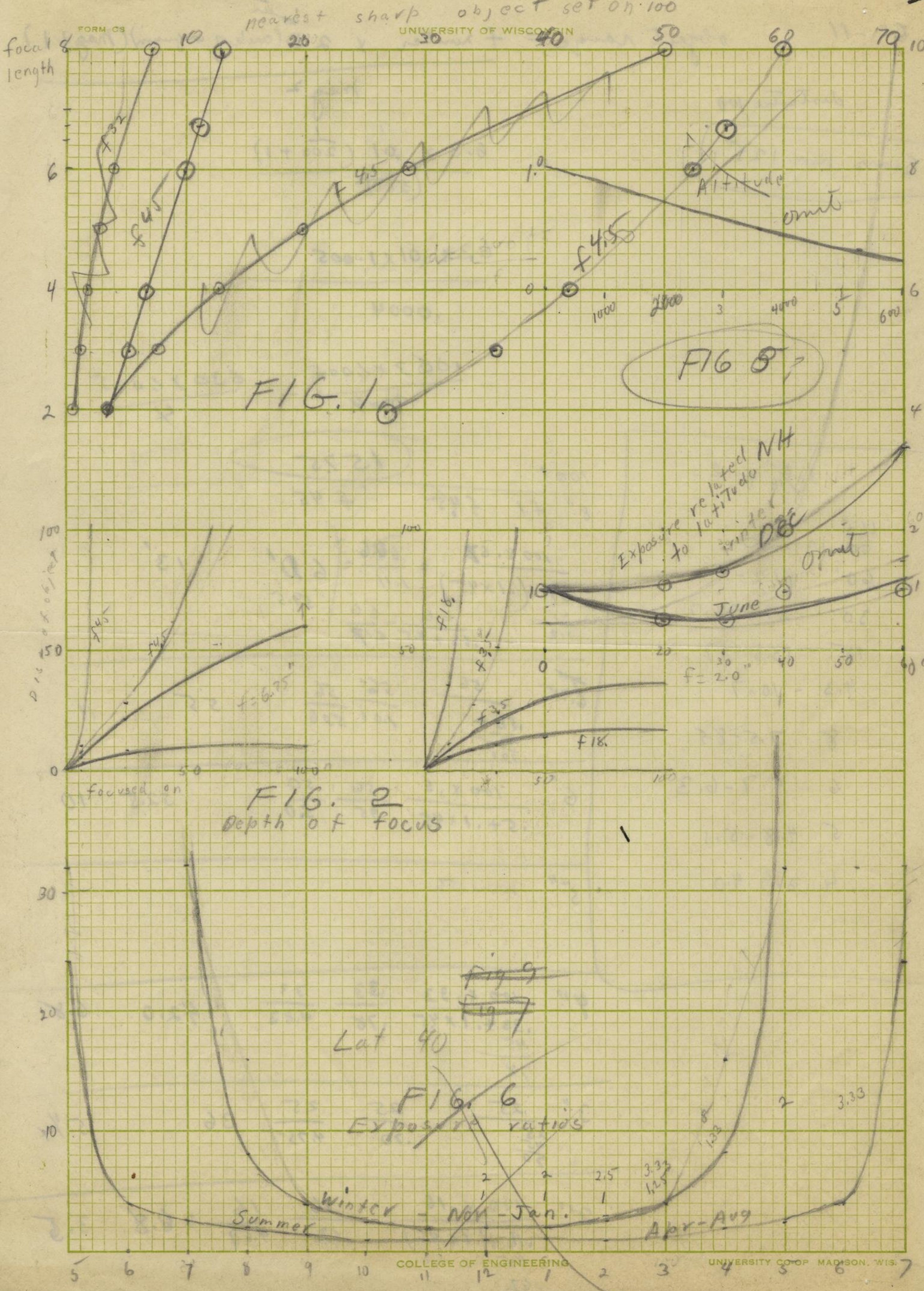
AJ Brunman Washington DC

Please return



FORM CS

UNIVERSITY OF WISCONSIN



COLLEGE OF ENGINEERING

UNIVERSITY CO-OP MADISON, WIS.

6" - f1 object range = f number × 2 D (circle of confusion) (mag + 1) / mag²

distance 100

Sears Rm 125 = $\frac{6.3 \times .01 \left(\frac{1}{200} + 1\right)}{\left(\frac{1}{200}\right)^2}$

$\frac{6.3 \times .01 \times 1.005}{.0004}$

$\frac{.063 \times 1.005}{.0004} = \frac{630 \times 1.005}{4}$

157.5

5.5/16 f. l.

4.5
∞ 131 - ∞
60' 41.2 - 110
30 24.4 - 38.7
15 13.5 - 17
9.3 - 10.7
8 7.5 - 8.5
6 5.7 - 6.3
5 4.8 - 5.1
4 3.9 - 4.0

100'

	f 45			
8" f1	$\frac{100 \times .67}{.67 + (.1 \times 45)}$	$\frac{66.6}{1.11}$	60'	13'
	45/112	66/.66 + 4.5	66/5.17	59.5
6.75	$\frac{56}{.56 + 45/101}$	$\frac{56}{1.01}$	$\frac{56}{5.06}$	55 11
6"	$\frac{100 \times .5}{.5 + .1 \times 45}$	$\frac{50}{.95}$	$\frac{50}{5.0}$	52.5 10
5 1/2"	100 × .55			
4"	$\frac{100 \times .33}{.33 + .1 \times 45}$	$\frac{33}{.78}$	$\frac{33}{4.83}$	42.0 6.8
	.45/78			
3"	$\frac{25}{25/45/50}$	$\frac{25}{.70}$	$\frac{25}{4.75}$	36 5 1/4
2"	$\frac{100 \times .16}{.16 + (.1 \times 45)}$	$\frac{16}{.62}$	$\frac{16}{4.67}$	26.8 3.5
	45/62			

photography

Lights	Blue	Green	Red
Daylight	1	1	1
Open arc	1	1½	2
Mazda	1	7	20
Carbon	1	20	100

Rel. exposure 2" lens, 50mm.

Extension	Exp.	dist from lens	mag.
none	1	271 mm	X .22
12mm	1.4	154	.46
38mm	2.2	108	.82
42mm	2.8 (4x)	94	1.06
60	3.9	82	1.42
90	6.1 (9x	71	2.02
192	17.2 ([illegible])	58	4.06

$Exp = \left(1+\frac{di}{do}\right)^2$ or $\left(\frac{di}{do}\right)^2$ for lens reverse

271 + 50 = 331 tot dist to object

136 from normal lens $\frac{92}{94}$

94 + 50 + 42 = 186 tot dist or = 1.67   1 + .67 = .67 = $\frac{1}{1.5}$

71 + 90 = 161 = 211 tot $\sqrt{6.1}$ = 2.46 $\frac{140}{71}$ 1.46 = $\frac{1}{.685}$

$\sqrt{17.2}$ = 4.15

58 + 192 = 250 = 300 tot 315

~~$\frac{292}{58}$~~ = 3.3

$\frac{242}{58}$ 4.3

This only is for a short distance.

my figures

more closely $E = \left(1+\frac{dist.}{work\ dist}\right)^2$

Filter Data	K1	K2 ✓	G ✓	A	B	C ✓	F ✓	-Blue	70
Agfa Plen	2	2.5	8?			6?			
" Superpan	1.5	2.0	2.2	3.6	14	17	5.1	2.4	
DuPont pan	2.2	3.1	5	7	16	12	10		60
" spec-pan	2.2	3.1	5	7	16	12	10		60
" Superior	1.9	2	2.9	8.5	5.6	11	17	2.7	300
" infra-D				64.			64		64
Eastman ortho	4	9	48		40				
" pan	1.5	2	2.5						
" super pan	1.5	2	2.5	4.5	8	24	8	2.5	
Gevaert ortho	3	5							
" express	3	5							

Notes on photography

Weston Photronic exposure meter – photoelectric type B 22.5°

H & D to Scheiner

H & D	72	310	650	1300	2700
Scheiner	11	17	20	23	26

Approx speeds – ° Scheiner – daylight

Agfa f-g plenachrome	20
" Superpan	23
Du Pont Trupa-D	17
" Reg pan	18
" Superior	23
Eastman ortho	17 (sled well)
" pan	20
supersensitive pan	23
Gavaert Superchrome ortho	20

Filters wratten

	K1	K2	A
agfa plen	2	2.5	–
" Superpan	1.5	2	4
Du Pont Superpan	1.9	2	8.5
Eastman 55 pan	1.8	2	3

	A	F	70	88
Trupa D	64	64	64	90

Rel. speeds:

° Scheiner. (sled well) (plenachrome) (superpan)

15	16	17	18	19	20	21	22	23	24
7	5	4	3	2½	2	1½	1¼	1	¾

Leica recom. speeds f6.3 – double speeds 9–11 AM and 2–5 PM . 20° S. film

	Jan Nov Dec	Feb Oct	Mar Sept	Apr. Aug	May June July
Sea	1/200 (1/4)	1/500	1/500	1/500 (1/10)	1/500 (1/10)
Landscape	1/60 N	1/100 (1/2)	1/100 (1/2)	1/100 (1/2)	1/200 (1/4)
Normal	1/20 (2½ N)	1/40 N	1/40 N	1/60 N	1/100 (1/2)

N = 1/100

Photography

without filter	1¼	1.5	2	Factor 2.5	3	4	5	6	8	10	16
16	14.3	13.1	11.3	10.1	9.2	8.0	7.2	6.5	5.6	5.1	4.0
11.3	10.1	9.2	8.0	7.2	6.5	5.6	5.1	4.6	4.0	3.6	2.8
8	8.8	5.3	4.6	4.1	3.8	3.3	29	2.7	2.3	2.1	1.6

Film speeds

Rel.	Scheiner	H & D	Watkins	
1	1	7	11	
8.86	10	64	94	
29.8	15	216	317	
37.9	16	276	405	} Standard roll ordinary
48.3	17	351	515	
61.6	18	448	660	
78.5	19	570	840	} panchromatic
100.	20	727	1065	
127.	21	800	—	
162	22	1050		
207	23	1300		} Superpan
264	24	1700		
336	25	2100		

Agfa given

Std. roll film 16-18

Panachrome roll 19-21

Superpan roll 23-25

Com. Pan cut 22-24

(Superpan cut pan. 22-24)

Superpan motion pic 23-25

Pan. " " 20-22

Fine grain pan. roll 20-22

agfa rel. speeds.

Superpan 1

Fine grain 2

Panachrom } 3

Com. ortho }

Com pan 4

Standard roll 6

White D.R. Photographic effects obtained with infra D negative

Journ. Soc. Motion Picture Engineers 20, 5-4-59, 1933

film green blind

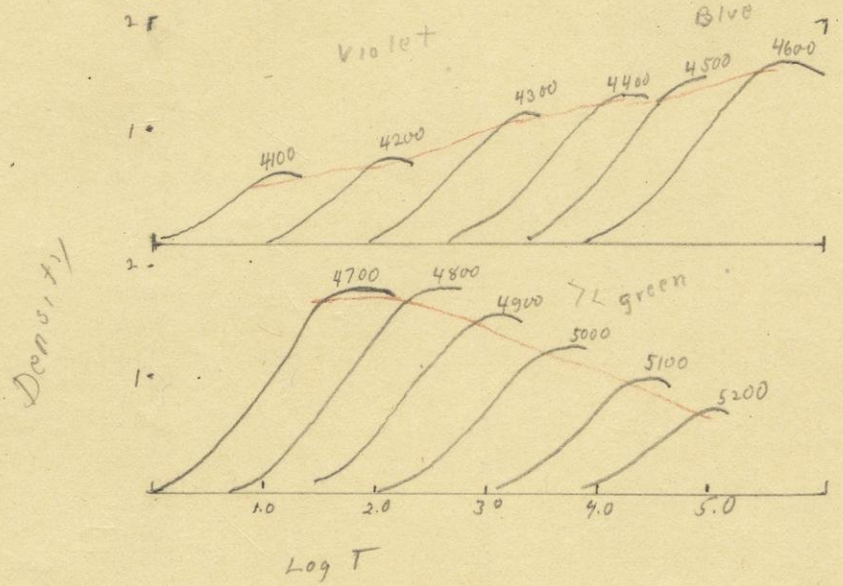
made by DuPont Film Mfg Co, Parlin, N.J.

Sharpness aff by blue and violet - Zeiss Handbook p 107

Aerial haze etc

p 26 - after Ross

Astrophy. Journ 52, 86, 1920



decrease of latitude with increase of wave length

AGFA ANSCO CORPORATION
Agfa Photographic Materials and Equipment
GENERAL OFFICES
BINGHAMTON, N.Y.

June 7, 1933

Prof. F. T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Prof. Thwaites:

The experiences given in your letter of June 3rd with Agfa Supersensitive Plenachrome film are very interesting, even though they do not agree with our findings.

Filter factors are always a bone of contention, probably due to the climate in various parts of the country, haze, light conditions, etc. For exterior work all we can do is to give approximate figures and then let the photographer work out the actual exposures for himself.

If your negatives are satisfactory using the factors as given in your letter, we would certainly hesitate to recommend any change. You must also remember that filters, particularly of the yellow variety, have an unfortunate habit of fading with age or upon exposure to sunlight. Of course they lose some of their efficiency in this way, although we find as a rule they hold up very well, considering the extensive and rough treatment some of them receive.

The reason for suggesting simple language for your pamphlet was due to our own experience in writing booklets and literature of all description for the trade. As a rule, the more technical the terms and the more information of a technical nature you try to include, the more grief and questions you will cause and receive. The curves for the different types of emulsions will be sent to you later on.

We would also be interested in a description of the field developing outfit for roll film after you have perfected it.

Cordially yours,

AGFA ANSCO CORPORATION

R. E. Thompson

RTT:JD Product Information Department.

AGFA ANSCO CORPORATION
Agfa Photographic Materials and Equipment
GENERAL OFFICES
BINGHAMTON, N.Y.

September 5, 1933

Prof. F. T. Thwaites
The University of Wisconsin
Dept. of Geology
Madison, Wisconsin

Dear Prof. Thwaites:

Immediately upon receipt of your letter of August 24th we submitted your suggestions and blueprints to our Research Laboratory, who replies as follows:

> "The blue prints of Prof. F. T. Thwaites, of the University of Wisconsin, in our opinion should well serve the purpose to give an easily understandable illustration of some photographic and filter properties.
>
> As there are no quantitative figures given and as "daylight" varies in intensity and quality to such a great extent, we consider the curves to correspond to any average conditions. We accept the offer with thanks, and retain the blueprints for our files."

Thank you very much for your interest in regard to the curves, and rest assured we will be glad to hear from you again at any time in the future.

Cordially yours,

AGFA ANSCO CORPORATION

R. T. Thompson
Product Information Department.

RTT:JD

Reprinted from Agfa Ansco News, January, 1933

Some Fundamentals in the Use of Filters

A Non-Technical Article for Those Who Feel the Need of a General Outline of the Subject

The great progress during the past few years in the provision of new and better color-sensitive films, both panchromatic and orthochromatic, has occasioned much new inquiry as to filters and their use.

The questions asked are natural and to the point, but many of them reveal the need of a presentation which will lay out the general principles that apply in the use of filters. Hence this article, which, avoiding technical terminology as much as possible, seeks only to clarify the subject as a whole, especially for those who feel a bit bewildered by it.

Any discussion of this kind must start with the subject of color itself.

We all understand that without light there would be no color. We also understand that white light is a combination or blend of light-rays of different wave-lengths, somewhat as a chord of music is a combination of notes of different vibrations. We also know that when white light is refracted or bent by passing through a prism, its component rays are spread apart according to their wave-lengths, giving us what is called the *spectrum*, as illustrated in nature by the rainbow. As we check off the "colors" in this, we note that the pronounced bands appear in the following order: Violet, blue, green, yellow, orange, red. This, with intermediate blends, we call the visible spectrum. We know that beyond the violet and below the red are rays of light in wave-lengths that produce no sensation through the eye. These we call ultra-violet and infra-red rays, but while they have great importance in certain kinds of photographic work, we do not think of them ordinarily when we think of "color." Color (as we think of it) is rather a matter of the visible spectrum.

Knowing all this about light, we also know that the "colored" objects about us do not actually have color, but have varying capacities to absorb some of the rays making up white light and to reflect others. We know that an object is blue because it absorbs light of all wave-lengths except those represented visually by blue, which it reflects. In ordinary parlance, we talk of its absorbing all the *colors* except blue. Likewise we speak of grass as absorbing all colors except green, and of reflecting this. In the same way we explain a red dress as absorbing all colors except red, which it reflects.

White and black we explain by the fact that one reflects all colors while the other absorbs all colors.

All the above is in regard to objects as viewed by white light, so-called. We know that by viewing an object by light of a color different from that which it reflects we can change its color. If, for example, we view a red object by blue light, it is seen as black, for the blue is absorbed and there is no red light to reflect. This is why blue lights when used in portraiture give the subject as seen by the eye so ghastly an effect. Everything red looks black.

When we turn to the matter of filters the one thing to remember is that the principle is the same. That is, for example, just as a red object reflects red and absorbs other colors, so a red filter *transmits* red light and filters out other light.

This point can be fixed in mind by noting that we use a red safelight (actually a red filter) in developing ordinary or orthochromatic films because these films are but slightly sensitive to red. We can see by the red light, but the film itself sees almost no light at all. Therefore the light is called "safe." But if we used a red safelight for panchromatic films we would be out of luck, since such films are highly sensitive to red.

At this point it should be said that most of the confusion in regard to filters arises from the fact that most photographers use only a few filters, and these for specific purposes, more or less by rule of thumb. Therefore, instead of proceeding next to a consideration of yellow filters such as are commonly used, let us imagine a perfect theoretical case of three-color separation photography. For any use of filters will be a modification of this.

The subject to be photographed is a full-color subject. That is, it incorporates all the colors in the visible spectrum. It does not matter whether these colors are in bands or in mixtures and blends so long as all the colors are incorporated.

The job is a job of three-color separation. We make it a three-color job because we know that while we differentiate the visible spectrum into six principal colors, we can get all of these (and intermediate and complementary colors) by combinations or blends of three—blue, green, and red—except that to do this we must modify the blue a bit to make it include the violet. This last is usually assumed.

To accomplish our purpose we must accordingly photograph the subject three times, each time on a separate panchromatic negative. First, let us say, we photograph it to record only the red, second to record only the green, and third to record only the blue.

To separate the desired color from the others we interpose what is called a "screen" or "filter" between the lens and the subject. In each case we use a filter of the same color that we desire to record. This filter transmits its own color but "filters out" other colors. Thus with a red filter we record the red, filtering out or eliminating the green and the blue; with a green filter we record the green, eliminating the blue and red; and with a blue filter we record the blue, eliminating the green and red. Thus we obtain three separate negatives, recording respectively the three primary colors of the subject, red, green, and blue.

(In passing, it may help to point out that this is essentially what happens in exposing an Agfa Color Plate, the difference being that in the case of the latter the three filters—myriads of each in tiny form—are incorporated in the "screen" of the plate itself, so that the colors are separately recorded in microscopic scattered areas on one negative instead of being gathered into three distinct negatives, one for each color.)

We now have our three separation negatives and, to obtain from these a full-color reproduction of the original subject, we resort to one of several methods of putting Humpty-Dumpty together again. As this is not a treatise on three-color photography, we shall not go into that here. What we are interested in here is the effect of filters.

Therefore, let us now take our three negatives and print them, whether on paper or on film. On the red-filter negative we have a record of the red and nothing else. When we print this everything is reversed. The red is light in the print, the blue and green are dark. Likewise, when we print the green-filter negative, the green prints light, the blue and red print dark. And when we print the blue-filter negative, the blue prints light, the green and red print dark. It could not be otherwise. In the case of a print on film or plate, substitute the word *transparent* for *light*. (In the case of the Agfa Color Plate, we get our transparency to the color of the screen at each tiny filter point by reversal.)

Table I presents the foregoing in form for easy comparison and reference. The term "absorbed" is used instead of "filtered out" because it is the regular laboratory term.

We have not yet said anything about "complementary" colors, but these, as will be noted from the last column, are in each case a combi-

FILTER TRANSMISSION AND ABSORPTION—TABLE I

Showing effect of each filter in relation to all three primary colors in the subject—assuming sharp-cut filtration without overlap in each instance.

Filter	Original Colors in Subject	Color Absorbed or Transmitted	Registration on Negative	Registration on Print	Complementary Color
Red	Blue	Absorbed	None	Dark	
	Green	Absorbed	None	Dark	
	Red	Transmitted	*Strong*	*Light*	*Blue-Green*
Green	Blue	Absorbed	None	Dark	
	Green	Transmitted	*Strong*	*Light*	*Magenta*
	Red	Absorbed	None	Dark	
Blue	Blue	Transmitted	*Strong*	*Light*	*Yellow*
	Green	Absorbed	None	Dark	
	Red	Absorbed	None	Dark	

FILTER TRANSMISSION AND ABSORPTION—TABLE II

Showing effect of each filter in relation to all three primary colors in the subject—assuming sharp-cut filtration without overlap in each instance.

Filter	Original Colors in Subject	Color Absorbed or Transmitted	Registration on Negative	Registration on Print	
Blue-Green	Blue	Transmitted	*Strong*	*Light*	
	Green	Transmitted	*Strong*	*Light*	
	Red	Absorbed	None	Dark	See text of article for explanation of tables.
Magenta	Blue	Transmitted	*Strong*	*Light*	
	Green	Absorbed	None	Dark	
	Red	Transmitted	*Strong*	*Light*	
Yellow	Blue	Absorbed	None	Dark	
	Green	Transmitted	*Strong*	*Light*	
	Red	Transmitted	*Strong*	*Light*	

nation of the colors not transmitted by the filter. Thus blue-green is complementary to red, magenta (a combination of blue and red) is complementary to green, and yellow (a combination of green and red) is complementary to blue. Plainly, the three complementary colors must together contain all the original colors, a fact of great importance in three-color photography by the subtractive system, which, however, is not our subject here.

If now, for the sake of clarity, we take these three complementary colors and make filters of them, we shall get a filter action as shown in Table II, which explains a great deal that is of practical application in photographing colored subjects in black and white.

It will be seen from Table I that yellow is a combination of green and red but has no blue in it. Therefore, as shown in Table II, a yellow filter will absorb or filter out the blue and transmit the green and the red, whether as separate colors or in a yellow combination.

This is why yellow filters are so commonly used. The blue-violet rays are so much stronger than they seem that we use a yellow filter to filter them out to some extent, selecting a yellow filter of what we judge to be the right strength to filter out just the right amount of blue and violet to make the subject look as in nature or as desired in the picture. The stronger filters will have more red in them.

A glance at the tables will show, however, that the filter, whatever it is, can do no more than absorb or transmit. The actual recording on the film will depend on its color sensitivity. Thus to use a yellow filter with a plate or film which is neither orthochromatic nor panchromatic is "love's labor lost." It is an attempt to photograph by light to which the film is not sensitive.

As an offset to this it should be stated that few filters are absolutely complete or sharp-cut in their filtration and that almost no films or plates nowadays are absolutely insensitive to colors other than violet and blue, so that by prolonged exposure with a yellow filter a film not rated as orthochromatic *may* be made to yield a result more pleasing than would be obtained without the filter.

In like manner, we have had quite a number of pictures sent to us, made on Plenachrome and Supersensitive Plenachrome with a filter designated as red—the red filter in a separation series not our own. But this red filter is not sharp-cut on the red; it overlaps (by design) into the orange and orange-yellow. At the same time, Plenachrome goes miraculously close to pure red in its sensitivity without being panchromatic—one of the reasons why no attempt to match it has succeeded. Thus the impossible seems to be achieved—getting good pictures with a "red" filter on a film not rated as sensitive to red!

We have had some questions as to light blue-green and light green filters. We have not featured such filters ourselves, but their function will be seen from the tables. Both are utilized to offset the high sensitivity to red in panchromatic films, the blue-green filters cutting out some of the red, the green filter also cutting out some of the blue as well as some of the red.

The purpose of these filters in portraiture, is to prevent over-correction of red in lips, etc. Our recommendation is to use Supersensitive Plenachrome instead of pan. When with the lighting used in connection with this film a softer effect is desired on a certain type of subject with warm coloring or sharp color contrasts in the face, then an Agfa No. 2 or No. 3 yellow filter may be used. The multiplying factor for the No. 2 is only 1.75 by Mazda and 2.5 by daylight. The factors for the No. 3 are respectively 2 and 3. The yellow filter will cut out some of the over-active blue, permitting the registration of warm tones—tans and browns—to build up beautifully in the negative, ironing out any color contrasts that may be objectionable in such a subject.

In such a case, holding back the blue with a yellow filter on Supersensitive Plenachrome is greatly preferred by most photographers to holding back the red on pan with a blue-green filter or holding back the red and blue together with a green filter. Part of the preference is due to the fact that you can tell better just what you are doing (it is certainly a simpler method of working), and part is due, of course, to the high sensitivity of Plenachrome in the yellow-orange region.

We also get questions in regard to blue Mazda lights. These of course have the same general effect as blue filters. The blue glass of the bulb is really a filter. By consulting the tables, any reader can answer such questions for himself. The blue cuts out some of the red registration in pans. But it also cuts out some of the green. For this reason we do not recommend blue lights with Supersensitive Plenachrome, and while recognizing that many photographers seem well pleased with the results from blue Mazdas and pan, we just know that if they would use white Mazdas and Supersensitive Plenachrome they would, like so many others, be *better* pleased. Wherever they think that pan film might be needed, with such subjects in such light, the use of a yellow filter with Plenachrome will serve their purpose.

But if they do want pan, then where can they get as good a one as Agfa Supersensitive Pan? We think it can't be had—and aren't self-satisfied either.

In this presentation of filters we haven't begun to cover the subject. The purpose has been to present the filter scheme in general outline, so that the reader may drop into its proper place each bit of filter information which he now has or which he may pick up later.

June 3, 1933

Mr. R. T. Thompson,
Product information Department,
Agfa Ansco Corporation,
Binghamton, New York

Dear Sir:

I wish to thank you for yours of May 25 and enclosed information.

The filter factors for Agfa are interesting for I had up to now used those for Eastman film. For instance I used a factor of 25 for the F filter with commercial pan and got good results. I note that you recommend only 15 and rate the film as faster than the old roll film. My field determinations of factors for Wratten filters used with plenachrome do not check yours at all and yet I have had good results with them for two years under a great variety of conditions. I got 1.5 for K2, and 10 for G which figures out at $\frac{1}{5}$ sec. for f32 for distand landscapes in bright sunlight. This has worked from Oklahoma to northern Wisconsin in summer time.

With regard to technicality , I do not have in mind anything very abstruse or complex. But for those who are accustomed to think in terms of curves and charts I felt that an adaptation of fig. 15 in "Photography of colored objects" by Eastman Kodak Co. would help a lot. I infer from the filter factors and from advertising that Plenachrome has a curve which lies somewhere between ordinary ortho and ordinary pan. I also wondered if your superpan has a curve which is materially different from ordinary pan. With regard to variation of different wave lengths in daylight, I had made this discovery myself. For instance it seems as if yellow filters all need a higher factor on a cloudy day when there is relativly more blue in the light and a still higher factor indoors or in deep shade.

The matter of variation of latitude whith different kinds of light, i.e. by using different sharp cut filters, is a possible explanation of the difficulty in getting correct exposure with certain kinds of film when the strong red filters are used.

I neglected to state above that the commercial pan film is of your make. I found the latitude of Eastman pan very small when the F filter is used although much of my trouble may have been due to light leaking in around the lens board which could not be detected by the eye but affected the negative during the 20 second exposures which are often needed.

I am enclosing the paper applying for the Agfa Ansco New and will greatly appreciate recieving the same.

At present I am designing a field developing outfit for roll film which will, I hope, avoid the difficulties with the Eastman tank developer.

Very truly yours.

August 24, 1933

Mr. R. T. Thompson,
Product Information Dept.,
Agfa Ansco Corporation,
Binghamton, New York

Dear Sir:

I finially received some information in regard to sensitivity of different films to different colors of light which was sent to the McVicar Photo Service of this city by you.

Enclosed are some curves which I deduced from this data used in connection with curves published by Eastman showing daylight sensitivity. I used these for the left hand ends. I went on the assumption that this part of the curve only would be affected by the change from Mazda to daylight. I would be glad to have your criticism. You may keep the blueprint if desired. To avoid technicality I left out the wave larth figures although I marked the places for them. Vertical lines marked G, F, and 88 refer to Wratten filters.

I am also enclosing other drawings showing relation of cut of filters to haze and of exposure to intensity of light. Will be glad for any suggestions or corrections.

The final use of this information is uncertain. It may be published if there is any demand for it but if not will be used for students only.

Very truly yours,

F. T. Thwaites

(b). A booklet is now being prepared which will give full information in regard to the cut of the Agfa filters.

(c). A filter factor sheet for the Plenachrome and Panchromatic emulsions is inclosed, together with a leaflet giving the relative speeds of the various types of emulsions.

(d). The latitude of the new emulsions is really astonishing, and very good prints may be obtained even with extremely overexposed film. To obtain the maximum latitude it is well to develop for a rather low gamma or contrast.

Please understand the suggestions as given in the first part of our letter are not intended as criticisms, as we are merely trying to assist you in preparing this pamphlet so that it will prove to be not only extremely valuable but also interesting to the geologists in the field.

Cordially yours,

AGFA ANSCO CORPORATION

R. T. Thompson

RTT:JD Product Information Department.
Inc.

AGFA ANSCO CORPORATION
Agfa Photographic Materials and Equipment
GENERAL OFFICES
BINGHAMTON, N.Y.

May 25, 1933

Mr. F. T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

We were very much interested in your letter of recent date, in regard to preparing a short manual covering the subject of field photography for geologists, but wonder if you are not making this a little too technical for the average geologist, who probably knows little or nothing about photography.

Why not write it in simple language similar to the inclosed article on "Some Fundamentals in the Use of Filters", and merely tell your geologists for what colors and types of exposures the different kinds of emulsions are best suited.

For instance, Panchromatic covers the full range of the spectrum from blue-violet to red, while the ordinary orthochromatic emulsion is sensitive only through the orange, and Plenachrome, another extremely orthochromatic emulsion, is highly sensitive to the yellows and greens. Also give them a short article on the uses of the various filters and the subjects for which they should be used.

Answering your questions in detail:

(a). The illumination by daylight varies so much that any information on color sensitivity with it may be misleading, and we have found that spectrum photographs by Mazda light are much more satisfactory.

AGFA ANSCO CORPORATION

Photographic Materials and Equipment

GENERAL OFFICES
BINGHAMTON, N.Y.

July 18, 1933

McVicar's Photo Service
723 University Ave.
Madison, Wisconsin

Gentlemen:

Our representative, Mr. Robert Howse, has just written to us stating that one of your customers, who is a professor in Madison University, is very much interested in our film and desires a few spectrographs for insertion in a book which he is writing. These we are inclosing, and for his information would state they were made with a Mazda lamp.

Some of them cover more than one type of film, and they are listed as follows:

1. Agfa Commercial Film

2. Agfa Commercial Ortho
   Agfa Portrait
   Agfa Standard Rollfilm

3. Agfa Plenachrome Film

4. Agfa Commercial Panchromatic Film
   Agfa Portrait Panchromatic

5. Agfa Portrait Super Pan

6. Agfa Supersensitive Panchromatic

If there is any other information we can give you along this line, please write to us and we will do whatever we can.

Cordially yours,

AGFA ANSCO CORPORATION

R. E. Thompson

RTT:JD

Product Information Department.

Inc.

Lat 40

	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6
June	28	28	28	27	26	24	21
May - July	28	28	28	27	26	23	19
Apr. Aug	28	28	28	27	25	22	16
March Sept	28	28	27	26	24	20	
Feb. Oct	27	27	26	24	22	18	
Jan Nov	26	26	25	23	20		
Dec	24	24	23	21	16		

decrease all by 2 ?

26 "normal" bright. table is for "brilliant"

C = 28
D = 27

26/22

1 = 1/25 @ f16 or 1/4 @ f45

T = 12
S = 13
R 14
Q 15
P 16
O 17
N 18
M 19
L 20
K 21
J 22
H 23
G 24
F 25
E 26
D 27
C 28
B 29
A 30

WELL LOGS IN THE NORTHERN PENINSULA OF MICHIGAN SHOWING THE CAMBRIAN SECTION

F. T. Thwaites, University of Wisconsin

Introduction. In 1910 the writer was assigned to the problem of the age and strat-

Data for fig. 9.

60

60N	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6 / 6	5 / 7	60S
June	C¹	C¹	D 1.25	D 1.25	E 1.33	F 1.66	H 2.5	L⁴	Dec
May-July	D 1.25	D 1.25	D 1.25	E 1.33	F 1.66	H 2.5	K 3.33	O⁷	N-J
Apr Aug	E 1.33	E 1.33	E 1.33	G 2	H 2.5	K 3.33	N⁶		O-F
March Sept	F 1.66	F 1.66	G 2	H 2.5	K 3.33	N⁶			SM
Feb Oct	G²	G²	H 2.5	L⁴	N⁶				AA
Jan Nov	H 2.5	I³	L⁴	O⁷					JM
Dec	K 3.33	N⁶	S¹⁵						June

40

40N	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6 / 6	40S
June	C¹	C¹	C¹	D 1.25	E 1.33	2 / G	K 3.33	Dec
May-July	C¹	C¹	C¹	D 1.25	E 1.33	H 2.5	M⁵	
Apr Aug	C¹	C¹	C¹	D 1.25	F 1.66	3 / I	P⁸	
Mar Sept	C¹	C¹	D 1.25	E 1.33	G 2.0	L⁴		
Feb Oct	D 1.25	D 1.25	E 1.33	G 2.	I 3	O⁷		
Jan Nov	E 1.33	E 1.33	F 1.66	H 2.5	L⁴			
Dec	G²	G²	H 2.5	K 3.33	P⁸			June

30

30N	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6 / 6	
June	A.5	B.8	C 1.0	D 1.25	E 1.33	G 2	N⁶	Dec
May-July	B.8	C¹	C¹	D 1.25	E 1.33	H 2.5	P⁸	
A-A	C¹	C¹	C¹	D 1.25	F 1.66	3 / I	S¹⁵	N-J
M S	C¹	C¹	C¹	D 1.25	G 2	L⁴		O F
F Oct	C¹	C¹	D 1.25	E 1.33	H 2.5	N⁶		SM
J N	D 1.25	D 1.25	E 1.33	F 1.66	I³			AA
Dec	E 1.33	E 1.33	F 1.66	H 2.5	M⁵			JM

20

20N	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6 / 6	
June	A½	B.8	C¹	C¹	E 1.33	G²	N⁶	Dec
	A½	B.8	C¹	C¹	E 1.33	H 2.5	O⁷	N-J
	A½	B.8	C¹	D 1.25	E 1.33	I³	R¹²	O F
	B.8	B.8	C¹	D 1.25	F 1.66	K 3.33		SM
	C¹	C¹	D 1.25	E 1.33	G²	L⁴		AA
	C¹	D 1.25	D 1.25	F 1.66	H 2.5	O⁷		JM
Dec	D 1.25	D 1.25	E 1.33	F 1.66	I³	S¹⁵		June

to 100

10N	12	11 / 1	10 / 2	9 / 3	8 / 4	7 / 5	6 / 6	10S
June	C¹	C¹	C¹	E 1.33	G²	K 3.33		Dec
M J	B.8	C¹	C¹	D 1.25	F 1.66	I³		
A-Aug	A.5	C¹	C¹	D 1.25	F 1.66	I³		
M-S	A.5	B.8	C¹	D 1.25	F 1.66	I³		
F-O	A.5	C¹	C¹	D 1.25	F 1.66	I³		
J N	B.8	C¹	C¹	D 1.25	F 1.66	K 3.33		
Dec	C¹	C¹	C¹	E 1.33	G²	K 3.33		

Y = 1/10

1S = 1/10

24 = 9/10

26 = 3/4

28 = 1

30 = 1½

T = 12 P 16 L 20 6 24 normal C 28 26 = 1 22 = ½

S = 13 O 17 K 21 F 25 B 29 30 = 2 13 = 1/10

R 14 J 22 E 26 A 30 18 = ¼

Q 15 N 18 D 27

M 19 A 23

June 1932

WELL LOGS IN THE NORTHERN PENINSULA OF MICHIGAN SHOWING THE CAMBRIAN SECTION

F. T. Thwaites, University of Wisconsin

Introduction. In 1910 the writer was assigned to the problem of the age and strat-

table	value normal sun	exp.	Recip
A	24	2	1/2
B	27	1 1/4	1.8
C	26 normal	1	1
D	25	4/5	1.25
E	24	3/4	1.33
F	23	3/5	1.66
G	22	1/2	2
H	21	2/5	2.5
I	20	1/3	3
K	19	3/10	3.33
L	18	1/4	4
M	17		5
N	16		6
O	15	1/7	7
P	14		8
Q	13	1/10	10
R	12		12
S	11		15
T	10	1/16	16

midday of lat 40 summer March-Sept
10 AM - 2 PM

weak sun sub. 2 x 1.3
clouds 4x2
gray sky 6x3
Dull sky 8x4

1500 - 3000 ft ascend by 2 = X .66
3000 - 4500 4 X .5
4500 - 6000 6 X .33

Factor
Filter 0 1 2 3
Roll film 2 3 6 8
Superpan 1.4 1.6 1.8 2.0

Diff. comp of light with diff hours
Degrees and film parts.

Photo

April 26, 1933

Agfa Ansco Corporttion,
Binghamton, New York

Gentlemen:

I am now preparing a short manual covering the subject of field photography for geologists replacing a mimeographed edition prepared in 1927. There seems to be no published work which meets the needs of this profession.

In this work I do not intend to go into theory to any extent more than is absolutely needed for an understanding of the why of methods.

Although I have used your films (plates are out of the question most of the time on account of weight) since 1927 and found them more satisfactory than other makes, I have never had anything like the amount of scientific information regarding them which I received from Eastman.

What I am in the dark on is particularly:

(a) the sensitivity curves for daylight of different wave lengths for Plenachrome and the new Super-Pan films.

(b) the cut of Agfa filters compared with Wratten filters.

(c) filter factors for the above new films to check with those I have determined by experiment (have had no super-pan as yet).

(d) information on relative latitude of exposure of Agfa and other films, also comparative curves for different wave lengths of light, a subject which is of practical importance when strong filters are used.

Any information you can furnish along these lines will not only be greatly appreciated by me but when the manual is completed should be a help to your goods.

Very truly yours,

F. T. Thwaites, Lecturer in Geology

March 12, 1936

Mr. J. P. D. Hull, Business Manager,
The American Association of Petroleum Geologists,
P. O. Box 1852,
Tulsa, Oklahoma

Dear Mr. Hull:

Ever since my paper on "Field Photography for geologists" came out last month I have been deluged with requests for separates. However, no separates have ever come and I ordered 235 on the regular blank which I returned with the proof.

I suppose the matter has been delayed by the preparations for the meeting which is soon to be held but in case of a slip I wanted to remind you before the type is all destroyed.

I would have like to attend the meeting but we still have the well-known Depression with us here and besides it is hard to get away at this time of the year.

Sincerely,

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
INCORPORATED

ASSOCIATION HEADQUARTERS
J. P. D. HULL, BUSINESS MANAGER
P. O. BOX 1852
TULSA, OKLAHOMA

November 8, 1935

Professor F. T. Thwaites
R. F. D. # 4
Madison, Wisconsin

Dear Professor Thwaites:

Your letter of November 5 is at hand. I am glad to know that you will soon send me your manuscript and fifteen illustrations, "Field Photography for Geologists." I suggest you send it to Dr. L. C. Snider, 60 Wall Street, New York City, first so that he may instruct me without delay about publication in the Bulletin. Our press schedule requires new manuscripts immediately, therefore I hope you can shortly complete yours.

Cordially yours,

J P D Hull

Business Manager

JPDH:R

cc - L. C. Snider

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

INCORPORATED

ASSOCIATION HEADQUARTERS
J. P. D. HULL, BUSINESS MANAGER
P. O. BOX 1852
TULSA, OKLAHOMA

November 26, 1935

Professor F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Professor Thwaites:

Some time ago you wrote me that you had practically completed your paper "Field Photography for Geologists." We are in great need of Bulletin manuscripts. Can you not send this to me now?

Cordially yours,

J. P. D. Hull

Business Manager

JPDH:R

Dec. 16, 1935

Dr. L. C. Snider,
60 Wall St.,
New York City

Dear Dr. Snider:

In response to letters from Mr. Hull at Tulsa dated Nov. 8 and Nov. 26 I am at last able to send you the manuscript of "Field Photography for Geologists" which I promised last summer.

I am sorry that the manuscript is not letter perfect but I was obliged to have it typed by more than one person. It has, however, been edited by Mrs. Thwaites who used to be editor for our State Survey in the "days of prosperity." In making changes in it to suit your publication I wish that you would bear in mind that the material was first written for use in one of my classes which is almost entirely composed of the younger students. It may easily be that I have not removed from it some material which should be cut out. If so, I would be glad to make such deletions as seem best. The illustrations are in part sent as blueprints. This is to avoid handling of the original drawings which are also sent during editorial work. None of the illustrations need be returned.

I greatly appreciate your offer to publish this paper.

The trip to Limestone Mountain proved a great surprise. Instead of the normal horizontal strata we found a syncline with one side vertical! The structure is similar to Glovers Bluff, Wisconsin and the Des Plaines structure, Illinois. The problem of origin will lead us into consideration of the converse structures many of which are called "crypto-volcanic". This problem should have an important bearing on oil accumulation in the older formations of the Michigan field but we have as yet no final or even tentative solution.

With best regards and the best wishes of the season, I am,

Sincerely,

Copy to J. P. D. Hull

December 28, 1935

Mr. J. P. D. Hull, Business Manager,
The American Association of Petroleum Geologists,
P. O. Box 1852,
Tulsa, Oklahoma.

Dear Mr. Hull:

In reply to yours of December 23, 1935 I am sorry I forgot the abstract. My only excuse is that I was in a great hurry to get the manuscript in the mail. The abstract is inclosed herewith.

Yours very truly,

FTT-T

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
INCORPORATED

December 23, 1935.

ASSOCIATION HEADQUARTERS
J. P. D. HULL, BUSINESS MANAGER
P. O. BOX 1852
TULSA, OKLAHOMA

Dr. F. T. Thwaites,
R. F. D. 4,
Madison, Wisc.

Dear Dr. Thwaites:

In preparing your manuscript "Field Photography for Geologists" I find you did not prepare the usual brief abstract which we print at the beginning of major papers in the Bulletin. This need be only 150 to 200 words in order to give the reader at a glance the contents of the paper. Will you please prepare this for me and mail it to me at your convenience?

Appreciating your prompt sending of the manuscript and illustrations and hoping that you will receive galley proof about the middle of January at your address as given above, I am

Cordially yours,

J.P.D. Hull

Business Manager.

JPDH:os

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, Box 1852, Tulsa, Oklahoma

December 23, 1935.

Dr. L. C. Snider,
Cities Service Co.,
60 Wall St.,
New York City.

Dear Dr. Snider:

This is to acknowledge receipt of the manuscript and 15 illustrations "Field Photography for Geologists" by F. T. Thwaite. I am sending this immediately to the printer for inclusion in the February Bulletin.

Thanking you, I am

Very truly yours,

J. P. D. Hull

Business Manager.

JPDH:os
cc/ Dr. F. T. Thwaites.

FIELD PHOTOGRAPHY FOR GEOLOGISTS

Abstract.- Many, if not most geologists, make use of photography in their field work but, as they have many other duties to perform, cannot use the heavy equipment commonly used by professional photographers. The following paper presents some of the basic principles of photography, the materials which are commonly used in the field, apparatus which is adapted to the needs of geologists, and some hints on proper practice in taking photographs. Particular attention is given to the use of filters which are essential to successful work on both distant landscapes and the details of rock exposures. The blurring effect of haze and dust may be minimized by using only the color with the longest wave length to which the film is sensitive. The narrower the range in colors used, the greater the sharpness of the picture. ~~To~~ secure details in pictures of rocks a filter of the same color should be used. The mottoes of the field photographer must be "Always be careful" and "Practice makes perfect."

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

INCORPORATED

November 1, 1935.

ASSOCIATION HEADQUARTERS
J. P. D. HULL, BUSINESS MANAGER
P. O. BOX 1852
TULSA, OKLAHOMA

Prof. Frederik T. Thwaites,
Science Hall,
Madison, Wisc.

Dear Prof. Thwaites:

We have to be ever on the lookout for new material to be published in our monthly A.A.P.G. Bulletin. President Levorsen has suggested that you might have a contribution for us on some subject, perhaps photographic methods for the field geologists.

As you probably know, our Bulletin is recognized as the authority in the field of petroleum geology and it has a monthly circulation of 2200 copies in this country and abroad. Our membership is now approximately 2200.

We should be very glad to have from you a manuscript; in fact the earlier the better inasmuch as we are now in need of papers for early numbers of the Bulletin. I should be very pleased to hear from you at an early date.

Very truly yours,

J. P. D. Hull

Business Manager.

JPDH:os
encls.

The American Association of Petroleum Geologists

(Office of the Business Manager)

Box 1852, Tulsa, Oklahoma

PREPARATION OF MANUSCRIPTS[1]

.....(Author)[2]

.....(City and state)

ABSTRACT

Helpful suggestions to authors issued by other scientific societies are here adapted to the requirements of the Association *Bulletin*. The arrangement is that of a correctly prepared manuscript. Abstracts, which are to be submitted with titles offered for inclusion on Association programs, should consist of brief statements covering essential points and conclusions of the paper.

INTRODUCTION

It is taken for granted that authors of papers offered for printing in the *Bulletin* desire to give all possible aid in achieving the highest possible publication standards and in lightening editorial burdens. Consideration of the suggestions presented here, and conformation to the arrangement and style of current papers in the *Bulletin* will assist very materially the work of the editorial staff.

---

[1]Read before the Association at the.....meeting, ...[Date].

Manuscript received, ...[Date]. [This safeguards the author's priority].

[2][Give business or professional connection in this footnote].

THE MANUSCRIPT

WRITING

In scientific writing, clearness and conciseness are of prime importance. Careful examination to see that what one desires to say is said without ambiguity or circumlocution, that construction is correct, and that sentences are neither too long and involved nor too short and choppy, will improve a paper greatly. Correction and criticism by a friend may be very helpful.

Usage of the *Bulletin* should be followed in preparing manuscript for publication in it. Generally, abbreviations and the like are not good form: write 1,990 feet, not 1990′; well No. 3, not #3; Sec. 12, T. 6 S., R. 5 E., not 12-6-5 or 12-6S-5E. It is desirable to avoid use of the first person.

TYPEWRITTEN FORM

All contributions should, of course, be typewritten, and because the copy for the printer should be perfectly clear, a direct imprint should be submitted by the author, never a carbon copy. Probably the most vexing task for an editor is the paper written in single space; it may be necessary to re-type before required clearness for the printer is obtained. Double-space, or still better, triple-space any manuscript intended for publication; even tables and footnotes should not be single-spaced. Remember that paper is cheap and that confused, obscure "copy" is expensive.

HEADINGS

Rank.—Headings have first, second, third, or fourth rank, dependent on their relative importance. They have corresponding positions in the manuscript and certain styles and sizes of type are used for the printer for each rank of heading. Attention by the author to the rank of headings which are introduced will aid him in logical arrangement and presentation of his paper and will assist editor, printer, and reader.

Though a table of contents is not printed at the beginning of the published paper, it is inadvisable to attempt to prepare a manuscript without first carefully making an outline; this will make for desirable condensation and logical arrangement in presentation of a theme.

Means of designation.—A first heading should be written in capitals midway across the page. A heading of second rank may also be placed centrally as illustrated by the caption "Headings" at the beginning of this section; if so placed it is set by the printer in small capitals. If no headings of lower rank are used, it is common practice to place subordinate headings at the side as shown at the beginning of this paragraph.

FOOTNOTES AND REFERENCES

Footnotes and references should be inserted at any place in the text where needed, continuous reference numbers being used, and the notation being made between two lines. References should be abbreviated and should follow the form used in current numbers of the *Bulletin*. Following[2] is a typical, correctly arranged reference:

[2]N. H. Darton, "Deep Borings in the United States," *U. S. Geol. Survey Water-supply Paper 149* (1905), p. 127.

An exception to this arrangement is permissible if a long reference list in bibliographic form is printed at the end of the paper, in which case numbers are inserted thus (1) throughout the text, no other notations being used.

ILLUSTRATIONS

Title and location.—Each illustration should bear the author's name, the title, and amount of reduction desired, due regard being given to the size of the *Bulletin* page. The position of each illustration in the manuscript should be indicated by writing the title across the page between two ruled lines, thus:

FIG. 1.—Proper manner of recording title and its location.

Legibility after reduction.—Because photographic reduction of about one-half size minimizes undesirable irregularities in drafting, illustrations intended for publication should, in general, be approximately twice the size in linear dimensions of the figure as it will appear in the *Bulletin*. Most important is forethought by the author

concerning size and legibility after reduction. No printing should appear on the original drawing which after reduction will be less than 1-50 inch in height.

Preparation of drawings.—The *Bulletin* page available for illustrations is 4⅛ inches wide and 6½ inches long. All illustrations should be so prepared that they may be reduced to dimensions not greater than these and yet be perfectly legible. Illustrations so large, or of such shape that it is necessary to fold them into the *Bulletin* are costly; authors should avoid them. Drawings should be in black, preferably India ink, not in colors. Black-line Vandyke prints, if clear, make satisfactory "copy." Photostat copies of drawings are generally "muddy" and are generally not desirable for reproduction. Where cross-section paper is used, it is important to take into account the effect of reduction on the appearance of a graph; a fine-ruled paper is undesirable, and even a coarse-ruled paper may give an unsatisfactory result on reduction. It is perhaps best to prepare a graph on tracing cloth or paper, ruling in only the lines desired in the published figure. Orange, red, and green lines photograph black; blue lines do not appear in a photograph. Failure of authors to consider some of these matters has caused expensive re-drafting.

Photographs.—Photographs should be very clear, show moderate contrast, and should be finished with glossy surface.

Summary.—Planning of each illustration with the size and shape of the page in the *Bulletin* in view will improve greatly the appearance and value of the published figure.

PUBLICATION

Papers submitted for publication in the *Bulletin*, or for presentation at Association meetings, are the property of the Association. Members desiring prior publication of such papers in trade journals, or elsewhere than in the *Bulletin*, should submit to the Business Manager complete duplicate copies of the paper and the illustrations, together with the name of the periodical in which publication is desired. Papers printed in trade journals without having been submitted to the Business Manager are not eligible for publication in the *Bulletin*.

CONCLUSIONS

These simple suggestions are only a few of those which might perhaps advantageously, be made. The contributors to the pages of the *Bulletin* desire the best for their papers, and the publication as a whole. The editorial staff appreciates their assistance, courtesy, and patience.

AAPG

Nov. 5, 1935

Mr. J. P. D. Hull, Business Manager,
American Association of Petroleum Geologists,
Box 1852,
Tulsa, Oklahoma

Dear Mr. Hull:

In reply to yours of the first I will be very glad to send you a manuscript entitled "Field photography for geologists" as soon as I can finish it.

The manuscript requires retyping and one drawing needs to be done over. Otherwise I am confident that it is all in order for publication. I had talked the matter over with Dr. Snider when he was up here and he urged me to send in the paper.

As it stands now the manuscript is 24 pages of double spaced and the figures number 15 of which 7 are line drawings. The smallest lettering is Wrico 90 which will stand considerable reduction.

I wish to thank you for the opportunity to publish this paper.

Very truly yours,

Neue Adresse: Inselstr. 20

MAX WEG / LEIPZIG, KÖNIGSTRASSE 3

BUCHHANDLUNG U. ANTIQUARIAT FÜR NATURWISSENSCHAFTEN / GEGR. 1890

POSTSCHECKKONTEN: LEIPZIG 1469 / WIEN 156708 / PRAG 79766 / WARSCHAU 191366
BANKKONTO: DRESDNER BANK, LEIPZIG / FERNSPRECHER: 27701

Leipzig C 1, den 2. August 37

Mr.

Frederik T. Thwaites,

Science Hall, Madison,

Wisconsin,

U.S.A.

Betrifft: 4 Exemplare Ihrer Arbeit:
Re: copies of your paper:
En référence à exemplaires de votre travail:

Field Photography for Geologists.
(1936)

— Stets Faktur beilegen! — All consignments with invoice —
— Tout envoi avec facture. —

Sehr geehrter Herr!

Hierdurch möchte ich mir erlauben, Sie um gütige Übersendung der oben angegebenen Schriften zu bitten. Den Betrag dafür werde ich – je nach Wunsch – sofort nach Erhalt einsenden oder Ihrem Konto gutschreiben.

Für freundliche Erfüllung meiner Bitte im Voraus verbindlichst dankend, zeichne ich, stets gern zu Ihren Diensten

hochachtungsvoll und ergebenst

MAX WEG.

Dear Sir:

I beg to ask you to be so kind as to send me the paper mentioned above. On receipt I shall remit the amount or, of you like, place it to your favour.

I am with my sincere thanks in anticipation and presenting you my best respects.

Faithfully yours

MAX WEG.

Monsieur,

par la présente je me permets de vous prier de bien vouloir m'adresser les tirés à part mentionnés ci-dessus.

Le montant vous sera remis à réception ou, à volonté, porté à votre crédit.

En vous remerciant bien à l'avance j'ai l'honneur, Monsieur, de vous présenter mes compliments distingués.

Votre tout dévoué

MAX WEG.

P.S. Falls die Arbeiten nicht lieferbar sind, wäre ich für freundliche Benachrichtigung dankbar.

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, Box 1852, Tulsa, Oklahoma

February 21, 1936.

Dr. F. T. Thwaites,
R. F. D. 4,
Madison, Wisc.

Dear Dr. Thwaites:

Under separate cover I am returning the illustrations used in your paper in the February Bulletin. Thanking you very much for this contribution to our Bulletin and hoping that the printing appeared to your satisfaction, I am

Cordially yours,

J. P. O'Harrell

Business Manager.

JPDH:os

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, Box 1852, Tulsa, Oklahoma

March 14, 1936.

Dr. F. T. Thwaites,
R.F.D. No. 4,
Madison, Wisconsin.

Dear Dr. Thwaites:

Your letter of March 12 is at hand. The printers have been exceptionally busy so far this year and our February reprints have not yet been delivered. If yours do not reach you within a week or so I hope you will remind us again. Regretting any inconvenience this may have caused you, I am

Cordially yours,

J. P. O. Hull

Business Manager.

JPDH:os

envelope

UNIVERSITY OF MINNESOTA
MINNEAPOLIS

MAR 2 1936

To:

From:

813 Univ ave S E

Subject:

Dear Mr. Thwaites,

I saw your Photography for Geologists in the February 1936 Bull. of the A. A. P. G. Will you kindly send me a reprint, if you have one handy?

Haven't heard from Wis. for quite a time. Hope everything is as satisfactory with you as it is with me.

Yours truly,
Ashley

The University of Chicago

Department of Geology

March 18, 1936.

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Dr. Thwaites:

I was much interested in your recent paper on photography in the A. A. P. G. Bulletin. If you have any extra reprints, I would very much appreciate a copy.

I thought your discussion of filters quite lucid, and it definitely cleared up my notions about some of the factors involved.

Sincerely yours,

W. C. Krumbein

WILLARD H. PARSONS
THE GRADUATE COLLEGE
PRINCETON, NEW JERSEY

March 5th, 1936

Dear Mr. Thwaites,

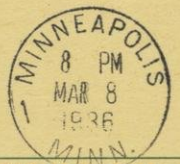
I wonder if you would be so kind as to send me a reprint of your article in the A.A.P.G. Journal on "Field Photography for Geologists". I don't know very much about Photography but I am interested in getting better geologic pictures, and I have a friend who I know will also be glad to see your article. I am a graduate student here in Geology majoring in Petrology.

I have felt for sometime that an article like yours was needed and I am very glad to see that you have done the good work. Congratulations.

I thank you very much.

Yours sincerely,

Willard H. Parsons



THIS SIDE OF CARD IS FOR ADDRESS

Mr. F. T. Thwaites

Madison, Wisconsin

R. F. D. 4

Dear Sir:

I have read your article on FIELD PHOTOGRAPHY FOR GEOLOGISTS, and should be greatly appreciative to receive a reprint of it. I find this subject quite interesting.

Very truly yours,

Duncan McConnell

Duncan McConnell

DEPT. OF GEOLOGY
UNIV. OF MINNESOTA
MINNEAPOLIS, MINN.

7 March 1936.

The University of Chicago

Department of Geology

March 5, 1936

Prof. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin

Dear Sir:

I have read with considerable interest your recent paper on field photography published in the Bulletin of the A. A. P. G. It is the best short paper dealing with the subject that I have seen. I would appreciate very much a reprint of this paper if you have any available. A copy in my files will be both useful to my students and to myself in our field work.

Most sincerely,

F. J. Pettijohn

DEPARTMENT OF
REGISTRATION AND EDUCATION
JOHN J. HALLIHAN, DIRECTOR
SPRINGFIELD

BOARD OF NATURAL RESOURCES
AND CONSERVATION
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STATE UNIVERSITY
PRESIDENT ARTHUR CUTTS WILLARD

STATE OF ILLINOIS
HENRY HORNER, GOVERNOR
STATE GEOLOGICAL SURVEY DIVISION
M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS
URBANA

March 11, 1936

Mr. F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Fred:

I have read with considerable interest your article entitled "Field Photography for Geologists" in the February issue of the Bulletin of the American Association of Petroleum Geologists, and I find that it contains so much of value that I should appreciate it if I might have a reprint, provided you have any available, for handy reference.

With best regards,

Cordially yours,

George E. Ekblaw

George E. Ekblaw
Geologist and Head
Areal and Engineering Geology Division

Chicago Illinois
March 3, 1936

Dr. F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Doctor Thwaites;

Your recent article in the A. A. P. G. on photography is the thing I have been hoping to run across for the last two or three years. As a student geologist I have found it impossible to spare the time needed for the accumulation of data and experience essential to the successful photograpny of the material you discuss. I feel that your article will in a large way take the place of this information and experience which I and many others have been unable to obtain.

I would be deeply appreciative of a reprint of this article.

Very truly,

Edward C. Cram

Edward C. Cram

Dept. of Geology
University of Chicago

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Wash. DC.

Mr. F. T. Thwaites
Madison. Wis

Dear Sir!-

If convenient would like to receive a copy of your paper "Field Photography for Geologists" in AAPG Vol 20 No 2 Feb 1936.

Yours truly
R K Bailey
% U.S. Geol. Survey
Wash DC.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON

February 18, 1936.

Mr. F. T. Thwaites,
R.F.D.4,
Madison, Wis.

Dear Mr. Thwaites,-

Will you be good enough to send me a separate copy of your interesting paper in the A.A.P.G. Bulletin entitled "Field Photography for Geologists." I shall profit greatly by the information contained therein.

Cordially yours,

M. M. Knechtel

M. M. Knechtel.

THE STATE UNIVERSITY OF IOWA
IOWA CITY
DEPARTMENT OF GEOLOGY

PLEASE ADDRESS
REPLY TO WRITER

February 22, 1936

Prof. F. T. Thwaites,
Geology Department,
University of Wisconsin,
Madison, Wisconsin.

Dear Professor Thwaites:

I have read with a great deal of interest your article on field photography for geologists, published recently in the A. A. P. G. Bulletin, and I am writing to ask if you have a reprint of it that you can send me.

Thanking you in advance for any consideration you may give this request, I remain,

Cordially yours,

A. K. Miller

A. K. Miller.

AKM:F

The OIL and GAS JOURNAL
PRODUCING REFINING ENGINEERING MARKETING

L. G. E. BIGNELL
PETROLEUM ENGINEERING EDITOR

TULSA, OKLAHOMA March 9, 1936.

Mr. F. T. Thwaites,
R. F. D. #4,
Madison, Wisconsin.

Dear Sir:--

May I have two copies of your paper on "Field Photography for Geologists" published in the February Bulletin of the A. A. P. G?

I should like one copy for my file and one to carry with me if this is not imposing. The article is very instructive and I hope it will assist me in using my 4 x 5 Graflex to better advantage.

Yours truly,

L. G. E. Bignell

HARVARD UNIVERSITY
DEPARTMENT OF GEOLOGY AND GEOGRAPHY
GEOLOGICAL MUSEUM

OXFORD STREET
CAMBRIDGE, MASSACHUSETTS

Feb. 21, 1936.

Dr. F. T. Thwaites
University of Wisconsin
Department of Geology.
Madison, Wisconsin.

Dear Dr. Thwaites:

I have just read your recent paper on "Field Photography for Geologists". I shall be in charge of a summer field course in Colorado this summer and would like to have two or three copies of your paper for reference around camp. I shall be glad to pay you for the separates if you can spare them.

Sincerely-

Chalmer J. Roy

Reply to discussion by Duncan McConnell

In reply to the discussion by Duncan McConnell of "Field Photography for Geologists" it seems necessary to state that the paper was first prepared in 1927 for use with a class in field mapping at the University of Wisconsin. This course was intended to cover the use of instruments (except geophysical instruments) which are commonly used by geologists. The paper has been revised several times since. Experience has made the writer feel that his presentation of the complex subject of photography does actually help persons who have been trained in other branches of science to understand the basic reasons which cause certain practices to be advised. Every effort was made to avoid so far as possible all mention of trade names of apparatus in order to prevent any charge of advertising the products of any particular firm. This fact explains most of the omissions mentioned in the discussion.

The use of filters mounted in metal cells was advised after field experience with bothy types of mountings. Fittings which are well adapted for the studio or to large cameras on special photographic expeditions are too cumbersome for use with limited equipment and with small cameras. Mr. McConnell's suggestion of the use of square filters in ~~the~~ a special lens hood is a good one. The writer has designed other forms of mounting ~~for a number of filters~~ but abandoned them because they require too much special construction. The experience of the writer indicates that red filters are absolutely necessary under bad haze conditions.

Other points raised by Mr. McConnell in his discussion are either matters which were specifically excluded from the paper, for instance problems of development, or were mentioned in general language only for reasons stated above.

F. T. Thwaites, March 31, 1936

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, Box 1852, Tulsa, Oklahoma

March 28, 1936.

Mr. Duncan McConnell,
University of Minnesota,
Minneapolis, Minnesota.

Dear Sir:

Your letter of March 25 is at hand with your discussion of "Photography for Geologists" by F. T. Thwaites. I shall be glad to submit this to our editorial board for publication in our Bulletin.

As there is no indication of you having sent a copy to the author I am having a copy made and shall send it to him.

Thanking you for this contribution, I am

Cordially yours,

J. P. D. Hull

Business Manager.

JPDH:os

Prof. Thwaites: If you care to reply for publication with this discussion please let me have your copy within a week.
Cordially yours,

J.P.D.H.

PHOTOGRAPHY FOR GEOLOGISTS

In a recent paper on photography, F. T. Thwaites[1] has attempted to cover an extremely broad subject in rather limited space. Although this attempt probably has its justification in the encouragement of better geologic photographs, the presentation is rather too detailed and too complicated for those with very limited experience in photography, and yet, it contains little, if anything, which is new to the more thorough students of photographic methods.

It is surprising that no mention is made of a collection of tables as valuable as those to be found in the 'Wellcome' Photographic Calculator, Handbook and Diary[2]. Although there are other good tables which contain such information as: filter factors, relative exposures for different types and makes of emulsions, depth of focus tables, etc., some such handbook is indispensable to those with limited experience. In connection with laboratory methods, another publication which is very useful is Photomicrography[3].

Thwaites (p. 195) gives an illustration of a filter mounted in a metal cell. This is not a very convenient way of using filters if the number of filters to be used interchangably is greater than three. Filters mounted in this manner are so expensive as to make it worth while to obtain a combination filter holder and lens hood. Quite inexpensive, yet servicable, filters may be made by cementing Wratten gelatin filters between selected microslides[4]

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[1] Thwaites (F. T.): Field photography for geologists. Amer. Assoc. Petr. Geol. Bull., vol. 20, pp. 186-214, 1936.

[2] Published annually by Burroughs Wellcome & Co., New York City; price 75 cents.

[3] Published by Eastman Kodak Co., Rochester, New York; price 50 cents.

[4] Selected for their plane surfaces and uniform thickness. Only a small percent of the better grade slides are suitable for this purpose. They may be tested by examining their interference rings when in contact with an optical plane or by the manner in which they reflect a regulat pattern. The first method is more critical.

(2 by 3 inches) with Canada balsam. Great care must be used if the drying of the balsam is to be hastened by heating, since heat in an amount above that comfortable to the hand will cause the gelatin to buckle. Such filters will fit the old-style filter holders adaptable to square and rectangular filters.

No mention is made of Wratten filters $\underline{X}_1$ and $\underline{X}_2$, although these are the filters recommended for correct rendering in monochrome with the newer panchromatic emulsions. Surely a green filter of some sort is useful in certain types of work. Blackwelder[5] has pointed out the value of the violet

already mentioned

---

[5] Blackwelder (Eliot): Hint for better geological photographs. Science, vol. 73, p. 214, 1931.

---

filter for increasing the contrast of light-colored outcrops, sand dunes, etc. Of the Wratten series, $\underline{K}_1$, $\underline{K}_2$, and $\underline{K}_3$ ($\underline{K}_3$ is now considered obsolete), $\underline{K}_2$ is probably the most useful. If some penetration of haze is desired, a $\underline{G}$ filter should be employed. It is a question whether or not there is any real advantage to be gained by the use of filters denser than $\underline{G}$ for ordinary purposes, since these require long exposures (when used with a small aperture) and perturb the tonal values in the monochromatic rendering of colors, e.g., fields of yellow grain become snow-white, the sky blackens, water becomes dark.

It was correctly stated that lenses of shorter focal lengths have greater depth of focus, but these lenses have a very objectionable feature. They produce appreciable distortion of perspective, especially when used for near objects which have considerable depth.

Already mentioned

Although undoubtedly aware of the fact, Thwaites did not point out one precaution necessary in the use of extremely rapid emulsions. The inexperienced person is likely to over-expose these emulsions, due to lack of familiarity with their extreme speed, with the result that the pictures are totally lacking in contrast or brilliancy.

It is always best to make new exposures, where possible, in case of failures due to improper exposure or development but, nevertheless, it is frequently practicable to correct these mistakes (except both under-exposure and under-development) by means of intensification or reduction. Intensification increases contrast, whereas reduction either increases or decreases it (or neither), depending upon the particular process employed. These processes are not more difficult than ordinary development and require only a few additional chemicals.

Not discussed

Although Thwaites' paper is one of the best papers on photography to have appeared in the geological journals, it is indeed difficult, if not impossible, to summarize the photographic problems of geologists in a paper of even moderate length. At best a short paper cannot hope to cover the vast sources of information which are contained in a number of inexpensive publications on photography, and most of these have already come to light.

Most geologists have access to adequate photographic equipment, and the results can only be improved through determination on the part of the geologist.

Duncan McConnell

Department of Geology,
University of Minnesota,
Minneapolis, Minnesota

March 31, 1936

Mr. Duncan McConnell,
Dept. of Geology,
University of Minnesota,
Minneapolis, Minnesota

Dear Sir:

Thank you for your recent letter with enclosure of discussion of my paper on "Field Photography for Geologists".

I fully realize what one is up against in offering such a paper. It must be different from usual material put out for amateurs and must not advertise any particular goods. In writing I had advice from Blackwelder, MacClintock and other experienced photographers.

Enclosed is copy of my reply which will, I hope, make my position clear.

Very truly yours,

The papers never arrived

March 31, 1936

Mr. J. P. D. Hull, Business Manager,
The American Association of Petroleum Geologists,
Box 1852, Tulsa, Oklahoma

Dear Sir:

Thank you for yours of the 28th with copy of discussion of my recent paper by Duncan McConnell.

I am enclosing a reply which I hope will make my position clear provided you think it worth while to publish all of his discussion. My paper had been gone over carefully by Prof. Roebuck of our Physics Department as well as by others but I did not want to take space to mention all names. None of the points raised by Mr. McConnel is of any great consequence. once so far as I can see. Am sending him a copy

Very truly yours,

Figure 5.—Field kit of accessories. A = bag with zipper which contains all apparatus. B = a small and inexpensive exposure meter of the actinometer type. C = filter in metal cell with box and cloth for cleaning. D = self timer. E = lens hood designed by the writer.

Figure 6.— Spilling of light caused by long exposure required for part of subject in deep shadow whereas another part was in bright light. This effect may be minimized by (a) keeping the exposure for the shadows at a minimum, (b) using a yellow filter, and (c) individual development but it is best to avoid such views.

Figure 9.- Photograph of rock exposure taken with superorthochromatic film and yellow filter (Wratten G). Zones A and D are dark yellow-gray, zone B is blue-gray, and zone C is light buff. Note that B and C are indistinguishable and that there is little detail in the shadows. Similar results were obtained with no filter.

Figure 10.- Photograph of same exposure as figure 9 taken with super-orthochromatic film and blue filter (Wratten C). Note the much better contrast between the buff and blue zones, especially between B and C, and the greater amount of detail in the shadows.

Engraver. Please use best of care to retain lights & shade effects

Same size

P89

Figure 12.– Distant landscape taken with orthochromatic film and no filter with exposure reduced from "normal." Note underexposure of foreground and poor detail in background.

AAPG Feb. Thwaites Fig. 12

Same size.

Cut off top 1/8

P89

Figure 13.– Same landscape as figure 12 taken with orthochromatic film and yellow filter (Wratten G). Note improvement in middle distance which is due in large part to intensification of shadows.

AAPG Feb. Thwaites Fig. 13

Engraver- please use heavy screen to retain light and shade effects

Same size

Figure 14.- Distant landscape taken with superorthochromatic film and yellow filter (Wratten G). The principal advantage of this kind of film over orthochromatic film is the reduction in length of exposure.

A.A.P.G. Feb. Thwaites Fig. 14.

Same size

Figure 15.- Same landscape as figure 14 taken with commercial panchromatic cut film and red filter (Wratten F). Note the improvement over figure 14 especially in the far distance.

A.A.P.G. Feb. Thwaites Fig. 13

UNIVERSITY OF MINNESOTA
COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS
MINNEAPOLIS

26 March 1936.

DEPARTMENT OF GEOLOGY AND MINERALOGY

Dr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Doctor Thwaites:

Thank you most kindly for the reprint of your article on photography. It is quite interesting. There were a few places where the emphasis might have been different.

I noted that you refer to the 1924 edition of "Wratten Light Filters". My edition of this pamphlet is 1932 and I am not certain that it is the most recent.

I have written a short discussion of your paper, which I am sending to you at this time. Possibly you may have some comments to make on the discussion and, if so, I shall be glad to hear from you. I must apologize for the appearance of the paper inclosed but it hardly seems justifiable to have it typed at this time.

I trust that you have received the several reprints which I sent to you a few days ago.

Sincerely yours,

Duncan McConnell

Duncan McConnell

~~Discussion of Field~~ Photography for Geologists

In a recent paper on photography, F. T. Thwaites[1] has

[1]Thwaites (F. T.): Field photography for geologists. Amer. Assoc. Petr. Geol. Bull., 20, 186-214, 1936.

attempted to cover an extremely broad subject in rather limited space. Although this attempt probably has its justification in the encouragement of better geologic photographs, the presentation is rather too detailed and too complicated for those with very limited experience in photography, and yet it contains little, if anything, which is new to the more thorough students of photographic methods.

It is surprising that no mention is made ~~to~~ of a collection of tables as valuable as those to be found in the 'Wellcome' Photographic Calculator, Handbook and Diary[2]. Although

[2]Published annually by Burroughs Wellcome & Co., New York City; price 75 cents.

there are other good pocket tables which contain such information as: filter factors, relative exposures for different types and makes of emulsions, depth of focus tables, etc., some such handbook is indispensable to those with limited experience. In connection with laboratory methods, ~~two other~~ another publications, ~~are quite~~ which is very useful, ~~those are~~ is Photomicrography[3] ~~and Wratten Light Filters~~[3].

[3]Published by Eastman Kodak Co., Rochester, New York; price 50 cents ~~each.~~

Thwaites (p. 195) gives an illustration of a filter mounted in a metal cell. This is not a very convenient way of using filters if the number of filters to be used interchangably is greater than three. Filters mounted in this manner are so expensive as to make it worth while to buy a combination filter holder and lens hood, ~~such as, the 'Hollywood' lens hood. This employs circular unmounted filters of glass or gelatin cemented between glass. Very~~ Quite inexpensive, yet servicable, filters may be made by cementing Wratten gelatin filters between selected[4] micro-slides

[4]Selected for their plane surfaces and uniform thickness. Only a small percent of the better grades of slides are suitable for this purpose. They may be tested by examining their interference rings when in contact with an optical plane or by examining the reflection of a regular pattern. The first method is more critical.

(2 by 3 inches) with Canada balsam. Great care must be used if the drying of the balsam is to be hastened by heating since heat in an amount above that comfortable to the hand will cause the gelatin to buckle. Such filters will fit the old-style filter holders adaptable to square and rectangular filters.

~~Thwaites makes~~ No mention is made of Wratten filters X_1 and X_2, although these are the filters recommended for correct rendering in monochrome with the newer panchromatic emulsions. Surely a green filter of some sort is useful in certain types of work. Blackwelder[5] has pointed out

[5]Blackwelder (Eliot): Hint for better geological photographs. Science, vol. 73, p. 214, 1931.

the value of the violet [magenta?] filter for increasing the contrast of light-colored outcrops, sand dunes, etc. Of the Wratten series, K1, K2 and K3 [K3 is now considered obsolete], K2 is probably the most useful. If some penetration of haze is desired, Wratten G should be employed. It is a question whether or not there is any real advantage to be gained by the use of filters denser than G for ordinary purposes, since these require long exposures (when used with a small aperture) and perturb the tonal values in monochromatic rendering of colors.

The half-tone illustrations, Figures 14 and 15 (p. 210), fail to prove Thwaites' point — that the Wratten F filter with commercial panchromatic film produces clearer distant views than does a G filter when superorthochromatic film is employed. Certainly there should be some difference, but that this difference is not sufficient to be clearly reproduced in a half-tone seems evident. Why an orthochromatic or superorthochromatic emulsion should be used in preference to a panchromatic emulsion when employing a G filter is difficult to imagine.

TP It was correctly stated that lenses with shorter focal lengths have greater depth of focus but these lenses have a very objectionable feature. They produce appreciable distortion of perspective, especially when used for near objects which have considerable depth.

Filters as dense as the A or F, although useful for penetration of haze, have decided disadvantages. They require long exposures when used with a small aperture and they greatly distort the tonal values in the monochromatic rendering of colors, e. g., fields of yellow grain become snow-white, the sky blackens, water becomes dark.

Although undoubtedly aware of the fact, Thwaites did not point out one precaution necessary in the use of extremely rapid emulsions. The inexperienced person is liable to over-expose these emulsions, due to lack of

familiarity with their extreme speed, with the result that the pictures are totally lacking in contrast or brilliancy.

It is always best to make new exposures, where possible, in case of failures due to improper exposure or development but, nevertheless, it is possible to correct these mistakes (except both under-exposure and under-development) by means of intensification or reduction. Intensification increases contrast, whereas reduction either increases or decreases it (or neither), depending upon the particular process employed. These processes are no more difficult than ordinary development and require only a few additional chemicals.

Although Thwaites' paper is one of the best on photography to have appeared in the geological journals, it is indeed difficult, if not impossible, to summarize the problems of geologists in a paper of even moderate length. photography in a short paper. At best they cannot hope to cover the vast sources of information which are contained in a number of inexpensive publications on photography, and most of these have already come to light.

Most geologists have access to adequate photographic equipment, and the results can only be improved through determination on the part of the geologist.

Duncan McConnell

Department of Geology
University of Minnesota
Minneapolis, Minnesota

P. O. Box 92
Shreveport, La.
April 7, 1936

Mr. F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Sir:

I have read with much pleasure your recent paper on "Field Photography for Geologists", published in the Feb. bulletin of the A.A.P.G., vol. 20. If possible, I should be very happy to receive a reprint of this paper.

At present, I am working as an engineer for the Schlumberger Well Surveying Corp., making electrical logs on well holes. There is very little surface geology connected with this work, but at various times I have taken pictures, not only of oil well equiptment, etc., but also pictures of sedimentary outcrops. These have not always turned out as I would have wished, for it has taken me a little time to become acquainted with the light conditions in this part of the country. I am from New England, where the light is less bright and intense as it is here.

Hoping that it will be possible to receive a reprint of your paper, I remain

Sincerely yours,
Milton W. Corbin
Milton W. Corbin

Dr. F. J. Thwaites,
Dept of Geology,
U. of Wisconsin,
Madison,
Wis.

Lincoln, Nebraska
May 23, 1936

Dear Dr Thwaites

The reprints of your recent papers on:
Field Photography, and Dev. of Theory of Multiple Glac.
has been received and ~~is~~ greatly appreciated.

Please accept my thanks.

Respectfully yours,

A. L. Lugn

A. L. Lugn,
Associate Professor of Geology,
University of Nebraska.

COMMONWEALTH OF VIRGINIA

State Commission on Conservation and Development

WILBUR C. HALL, Chairman, Richmond
BRADEN VANDEVENTER, Vice-Chairman, Norfolk
MARSHALL B. BOOKER, Halifax
C. S. CARTER, Bristol
D. D. HULL, Jr., Roanoke

RICHARD A. GILLIAM, Richmond
Executive Secretary and Treasurer

Geological Survey

AT THE
UNIVERSITY OF VIRGINIA
CHARLOTTESVILLE

ARTHUR BEVAN, State Geologist
WILLIAM M. McGILL, Asst. State Geologist

BUREAUS OF THE COMMISSION
Forest Service
Geological Survey
History and Archaeology
Parks and Landscape Engineering
State Publicity
Water Resources and Power

ADDRESS REPLY TO UNDERSIGNED
BOX 1428
UNIVERSITY, VA.

May 20, 1936

Dr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisc.

Dear Doctor Thwaites:

I appreciate very much your kindness in sending me so promptly a separate of your paper, "Field Photography for Geologists." I shall read it as soon as possible with a great deal of interest and no doubt with much profit.

With kind regards,

Sincerely yours,

Arthur Bevan

AB:M

State Geologist

THE STATE UNIVERSITY OF IOWA
IOWA CITY
DEPARTMENT OF GEOLOGY

PLEASE ADDRESS
REPLY TO WRITER

May 19, 1936

Dr. F. T. Thwaites
Science Hall
University of Wisconsin
Madison, Wisconsin

Dear Fred:

Many thanks for your paper on photography. This is an interesting and important contribution, and I am glad to have it for my personal files.

Cordially yours,

A. C. Trowbridge.

ACT:f

COMMONWEALTH OF VIRGINIA
State Commission on Conservation and Development

WILBUR C. HALL, Chairman, Richmond
BRADEN VANDEVENTER, Vice-Chairman, Norfolk
MARSHALL B. BOOKER, Halifax
C. S. CARTER, Bristol
D. D. HULL, Jr., Roanoke

RICHARD A. GILLIAM, Richmond
Executive Secretary and Treasurer

Geological Survey
AT THE
UNIVERSITY OF VIRGINIA
CHARLOTTESVILLE

ARTHUR BEVAN, State Geologist
WILLIAM M. McGILL, Asst. State Geologist

BUREAUS OF THE COMMISSION
Forest Service
Geological Survey
History and Archaeology
Parks and Landscape Engineering
State Publicity
Water Resources and Power

ADDRESS REPLY TO UNDERSIGNED
BOX 1428
UNIVERSITY, VA.

May 7, 1936

Dr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisc.

Dear Doctor Thwaites:

I have just noticed a reference to your article, "Field Photography for Geologists," which was published recently in the Bulletin of the American Association of Petroleum Geologists. If you have a separate of this paper that you can spare, I certainly would appreciate having a copy of it. I know that it will be full of ideas that will be useful to me in the field. I used to carry on some experimentation in field photography but have not had time to do much with it in the last few years. I am particularly interested in the use of filters and color photography for the more accurate representation of certain geologic features.

I trust that everything has been going well with you during the past year.

With kind regards and best wishes,

Sincerely yours,

Arthur Bevan

AB:M

State Geologist

GENERAL OFFICES
120 BROADWAY NEW YORK

AMERADA PETROLEUM CORPORATION

PETROLEUM BUILDING

TULSA, OKLA.

May 4, 1936

Professor F. T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Professor Thwaites:

Some time ago I received your complimentary copy of Field Photography for Geologists. I read your paper in the February number of the American Association of Petroleum Geologists Bulletin, and am glad to have it in seperate form.

I like the way you discuss field photography in your contribution, and feel there is lots of good advise for us that are less experienced.

Thank you very much for your kind rememberance.

Very truly yours,

Jess Vernon

JV:bb

SCHLUMBERGER WELL SURVEYING CORPORATION

ESPERSON BUILDING

HOUSTON, TEXAS

April 17, 1936

SHREVEPORT REPRESENTATIVE
1218 CITY BANK BUILDING
P. O. BOX 92 TEL. 6655

Mr. F. T. Thwaite
R. F. D. 4
Madison, Wisconsin

Dear Sir:

I wish to thank you for a reprint of your recent paper on "Field Photography for Geologists", published in the February issue of the Bull. of the A. A. P. G. It was received this morning.

Thanking you for the courtesy, I remain

Yours very truly,

Milton W. Corbin

Milton W. Corbin

Dr. P. T. Thwaites

Professor of Geology

University of Wisconsin

MADISON

WISCONSIN

Wichita, Kansas

Dear friend Thwaites:-

The reprint of your paper has been received. I wish to assure you that your courtesy is very much appreciated.

Field Photography for geologists

Very respectfully yours,

W. A. Ver Wiebe.

THIS SIDE OF CARD IS FOR ADDRESS

Prof. F. T. Thwaites
University of Wisconsin
Madison, Wis.

ILLINOIS STATE GEOLOGICAL SURVEY

Urbana, Ill., April 4, 1936

Receipt of the following publication is gratefully acknowledged:

"Field Photography for Geologists"

Chief, Ill. State Geological Survey

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

INCORPORATED

April 2, 1936.

ASSOCIATION HEADQUARTERS
J. P. D. HULL, BUSINESS MANAGER
P. O. BOX 1852
TULSA, OKLAHOMA

Mr. F. T. Thwaites,
R. F. D. No. 4,
Madison, Wisconsin.

Dear Mr. Thwaites.

Your letter of March 31 is at hand with your reply to McConnell's discussion. I am submitting both to our editorial board for their decision about publication. Thanking you, I am

Cordially yours,

J. P. D. Hull

Business Manager.

JPDH:os

UNIVERSITY OF MINNESOTA
COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS
MINNEAPOLIS

1 April 1936.

DEPARTMENT OF GEOLOGY AND MINERALOGY

Mr. F. T. Thwaites
R. F. D. 4
Madison, Wisconsin

Dear Sir:

Thank you kindly for your letter and reply to the discussion on photography.

The reprints which I sent to you were of small value but, nevertheless, I am sorry to learn that they did not arrive — too many Farleys connected with the Post Office, I guess. They were addressed to you care of the Department at the University, but I am sending the same two again under separate cover.

Sincerely yours,

Duncan M. Farrell

OKLAHOMA
AGRICULTURAL AND MECHANICAL COLLEGE
SCHOOL OF SCIENCE AND LITERATURE
DEPARTMENT OF GEOLOGY
STILLWATER, OKLAHOMA

June 15,1936.

Dr. F.T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Professor Thwaites:-

I would greatly appreciate a copy of a reprint of your very excellent article on "Field Photography for Geologists" which appeared in the A.A.P.G. Bull Vol. 20, No. 2, Feb., '36.

Thanking you in advance, I am,

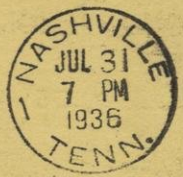
Fraternally yours,

Ray L. Six

Ray L. Six

mailed June 20, 36

	Comparative Exposure Factors		Weston Meter Setting		
	Dayl.	Mazda	Dayl.	Mazda	Scheiner
Rolls and Packs					
Plena Roll	2	4	16	6	21
Standard Roll	3.5	10	10	-	19
Fine Grain Plena. Roll	2.5	4	16	6	21
Superpan Rolls and Packs	1	1	24	20	23
Super Plenachrome Packs	1	1.5	32	16	24
Cut Films					
Portrait	3	6	16	6	21
Supersensitive Plenachrome	1	1.5	24	16	23
Superpan Portrait	1	1	24	20	23
Isopan	1.5	1.5	20	16	22
Supersensitive Panchromatic	1	1	24	20	23
Super Plena Press	1	1.5	24	16	23
Commercial Films					
Commercial	4	10	12	2	20
Commercial Ortho	2	2.5	16	6	21
Commercial Panchromatic	2.5	2.5	12	6	20
Process Films					
Process	10	100	3	0.3	14
16 mm Films					
Fine Grain Rev. Plenachrome	3	5	12	-	20
Rev. Panchromatic	3	5	12	6	20
Fine Grain Rev. Superpan	2	2	16	12	21
Fine Grain Pan Negative	4	5	12	4	20
Positive	10	100	--	0.3	4 (Mazda only)
35 mm Films					
Fine Grain Plenachrome	2.5	4	16	8	21
Fine Grain Superpan	1	1	24	16	23
Finopan	4	5	12	4	20
Infrared	16	-	2	--	--
Fine Grain Rev. Superpan (Leica)	2	2	16	12	21
Positive	10	100	--	0.3	4
Aeropan	1.5	--	24	16	23



THIS SIDE OF CARD IS FOR ADDRESS

Dr. F. F. Thwaites
Department of Geology
University of Wisconsin
Madison
Wisconsin

TENNESSEE DIVISION OF GEOLOGY
Nashville
July 31 19 36

If separates are available I shall appreciate your sending me a reprint of your publication:

"Field photography for geologists"

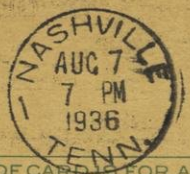
which appeared in: Bull. AAPG, February, 1936

Very truly yours,

sent Aug 4

Kendall E. Born

Kendall E. Born
Assistant Geologist



THIS SIDE OF CARD IS FOR ADDRESS

Dr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison
Wisconsin

TENNESSEE DIVISION OF GEOLOGY
Nashville

August 7 19 36

I wish to acknowledge with thanks receipt of publication:

"Field Photography for Geologists"

I thank you for this addition to my files and appreciate your courtesy.

Very truly yours,

Kendall E. Born

Kendall E. Born
Assistant Geologist

May 18, 1936

Max Weg,
Buchhandlung und Antiquariat,
Königstrasse 3,
Leipzig C 1
Deutschland.

Dear Sir:

A sample copy of my publication "Field Photography" was mailed to you on May 1. Additional copies will be ten (10¢) each.

Yours very truly,

F. T. Thwaites

Drucksache – Imprimé – Printed Matter

Vergiß nicht Straße
und Hausnummer
anzugeben.

F. T. Thwaites, Esq.,
Lecturer,
University of Wisconsin
Madison, Wis.,
U.S.A.

Max Weg
Buchhandlung und Antiquariat
Leipzig C 1
Königstraße 3

Max Weg · Buchhandlung und Antiquariat · **Leipzig,** Königstraße 3

Dear Sir!

In order to complete the Bibliographia geologica of my journal „Der Geologe" please send me a sample-copy of your publication

Field Photography

reprinted from Bull.

and inform me at what price I could get other copies and how many there will be available.

With thank in advance sent 4/1/36 10 ℳ each

Yours faithfully

Leipzig, 10 März 193

Königstr. 3

Reichsschrifttums-Kammer 23 13152

Max Weg.

THE CALIFORNIA COMPANY

Room 330,
Continental Oil Bldg.,
Denver, Colorado.

Mr. F. T. Thwaites,
R.F.D. #4,
Madison, Wisconsin.

Dear Mr. Thwaites:

I have read with interest your excellent article of February, 1936, entitled: "Field photography for geologists". A photographic bug, I am anxious to obtain a copy of this article for reference to its many helpful pointers. So far, however, I have been unable to secure a copy from the Association and am writing to you in the hope that you may have an extra separate.

If so, I should greatly appreciate your kindness in sending me a copy.

Yours truly,

Stanford L. Rose

Stanford L. Rose

sent Nov 4, 36

Coe College
Cedar Rapids, Iowa

DEPARTMENT OF PHYSICS

February 18, 1937

Professor F. T. Thwaites
Wisconsin State University
Madison, Wisconsin

Dear Sir:

Professor Wilson of our Geology department has referred me to you regarding an article on "Photography for Geologists" appearing in the Petroleum Geologists' Bulletin of which you are the author. If possible I should like to procure a reprint of this article.

I am attempting to develop some sort of interdepartmental training in the rudiments of photography for those who are planning to go on to graduate school. These people are going to use photography no matter what scientific field they enter. The application of photography to the different divisions of science must be made through such sources as the article to which I refer. The literature produced by the photographic industry seems to be with the artistic point of view. We can easily obtain material on the optics and chemistry of the subject but the use of filters and specialized emulsions in scientific application seems to be scarce in the literature.

Sincerely yours,

Alfred W. Meyer

Assistant Professor of Physics

lp

Sent Feb 23, 37

Coe College, Cedar Rapids, Iowa

Dear Professor Thwaites:

I wish to acknowledge with many thanks the receipt of your Reprint of "Field Photography for Geologists".

Sincerely yours,

Alfred W. Meyer

330 Continental Oil Bldg.
Denver, Colorado
February 25, 1937

Mr. F. T. Thwaites,
R.F.D. 4
Madison, Wisconsin

Dear Sir:

I read with considerable interest the paper on "Field Photography for Geologists", which was published some time ago in the bulletin of the A.A.P.G. I find that this paper would be of considerable value if I could carry it with me at times, so I shall greatly appreciate receiving a separate of the same if you have any more of them available.

Yours very truly,

H. N. Hickey

H. N. Hickey

Sent Mar 1, 37

INFORMATION FOR THE USE OF

SUPERPAN PRESS ROLL FILM

IMPORTANT — Always load and unload camera in subdued light, never in direct sunlight. Keep red windows of camera covered except when turning film to next number.

This is an extremely fast film especially valuable under unfavorable light conditions or when small diaphragm openings and fast shutter speeds are desirable.

AVERAGE EXPOSURES—OUTDOORS IN DAYLIGHT

Recommended shutter speed under each diaphragm opening is indicated in fractions of second

Light Conditions	f6.3	f8.	f11.	f16.	f22.
Intense Sunshine	—	—	600th	300th	150th
Bright Sunshine	—	600th	300th	150th	50th
Cloudy-Bright	350th	300th	150th	50th	25th
Dull-Cloudy	200th	150th	50th	25th	15th
Very Dull	100th	50th	25th	15th	5th

For brilliantly lighted subjects such as landscapes, seascapes, beach scenes, give half the exposure indicated. For close-ups, subjects in shade and dark foregrounds, give two to four times the exposure. If great depth of field is desired, select smaller opening (larger f number) and corresponding shutter speed. For moving objects, use fast shutter speeds.

BOX CAMERAS AND READYSETS—Non-adjustable shutters are usually fixed at 1/25th second; non-adjustable lens openings at f16. Using Superpan Press under average outdoor conditions with these cameras, over-exposure may be avoided by pulling out the diaphragm bar, if available, or by using a filter.

PICTURES INDOORS

Be careful to avoid under-exposure when taking pictures indoors. Even on the brightest days, the normal light intensity indoors, from a photographic standpoint, is but a fraction of outdoor light intensity.

EXPOSURES—INDOORS UNDER MAZDA LIGHT

Lens Opening	Suggested exposure in seconds; average distance from subject of two 20c floodlamps with reflectors. 4 ft.	6 ft.	10 ft.
f22	1/10	1/5	1/2
f16	1/20	1/10	1/5
f11	1/40	1/15	1/10
f8	1/50	1/25	1/10
f6.3	1/100	1/50	1/20
f4.5	1/200	1/100	1/40
f3.5	1/400	1/200	1/100

Double the exposure when using only one lamp, when no reflectors are used or when interiors with dark walls are photographed.

EXPOSURES—FLASH LAMPS IN REFLECTOR

Lens Opening	Distance from Flash Lamp to Subject: Small Size Bulb	Medium Size Bulb
f32	6 to 8 ft.	8 to 12 ft.
f22	8 to 12 ft.	12 to 16 ft.
f16	12 to 16 ft.	16 to 25 ft.
f11	16 to 25 ft.	25 to 35 ft.
f8	25 to 35 ft.	35 to 50 ft.

DEVELOPMENT—Superpan Press may be developed in any standard film developer, but for best results, we recommend Agfa 47 or Agfa 17. These developers are available in prepared, package form.

Handle and develop Superpan Press in total darkness.

MADE BY

AGFA ANSCO CORPORATION

IN BINGHAMTON, N. Y.

PRINTED IN U. S. A. 49-300 T. M. REG.

THIS SIDE OF CARD IS FOR ADDRESS

Dr. F.T. Thwaites
R.F.D. 4
Madison Wisconsin

DEPARTMENT OF GEOLOGY AND GEOGRAPHY
MICHIGAN STATE COLLEGE
EAST LANSING, MICH.

Sent June 10, 37

Dear Sir:

June 4 1937

I shall greatly appreciate having you send us for our department library a reprint of your paper.

Field Photography for Geologists

which appeared in Bul of American Ass of Petroleum Geologists Vol 20 1936 #2

and any others which you may have available.

Very truly yours,

S. G Berggust

Head of Department

THIS SIDE OF CARD IS FOR ADDRESS

Dr. F. T. Thwaites,

Wisconsin Geological and Natural History
Survey,

Madison,

Wisc.

MR. HAROLD S. PALMER ACKNOWLEDGES WITH THANKS COPY OF YOUR PAPER ENTITLED:

"Field Photography for Geologists,"

sent in response to my recent request.

UNIVERSITY OF HAWAII
HONOLULU, T. H.

May 1, 1937

DEPARTMENT OF GEOLOGY
THE UNIVERSITY OF HAWAII
HONOLULU, HAWAII

March 27, 1937

Prof. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madision, Wisconsin.

Dear Sir:-

The Annotated Bibliography of Economic Geology that came to me recently, notes your "Field photography for geologists," published in the A. A. P. G.

Inasmuch as there is no petroleum in Hawaii and our periodical allotment is not too extensive, this is a journal that I do not see.

Would it be possible for you to send me a reprint of this paper? If so, I would greatly appreciate it.

Yours very truly,

Harold S. Palmer

Harold S. Palmer.

Sent 4/6/37

Figure 9. Picture taken with superortho film and K_2 filter. Note that weathered zone is lightened in tone and detail shows well.

Figure 10. Picture taken with superortho film and C filter (blue). Note that weathered zone is made dark obscuring detail and that the detail of the gravel is better than with the yellow filter of fig. 9.

Figure 12. Distant landscape taken with orthochromatic film and no filter. Exposure reduced for distance resulting in underexposure of foreground.

Figure 13. Distant landscape taken with orthochromatic film and G filter. Note the improvement over figure 12.

Figure 14. Distant landscape taken with superortho film and G filter. Compare with figure 13 to note improvement resulting from greater sensitivity to yellow. Also note intense shadows.

Figure 15. Distant landscape taken with panchromatic film and F filter. Note that many things are shown that are not rendered at all in figure 14 and that haze is more completely eliminated.

Dec 13/33

Mr. Thwaites

If you will look in my text book p 54 Art 36 you will find the estimates of 60 & 30 I was citing today. Also a couple of references. I think Mees article in Nelson's Photographic Magazine Dec 1913 may help you. I have no other reprints now.

J. R. Robuck

p13 ~ Rubbing will probably do more damage than dust.

p13 ~ Dry box

p14 ~ Why pressure high?

p16 ~ I question this. Halation

p16 ~ Aerial haze

p18 Table ? speeds

p20 ~ explan. ?

p22 - what is a "strong" filter

F. T. Thwaites

p3. why ① neglect "art film" – great variety of emulsions,

---

p3 – 6 lines from foot "differences of brightness" as well as differences of color", by difference of shading"

---

p4 – top "correct tons" – meaning visually correct

Fig 1 Help to have color boundries marked on each abscissa.

---

p4 #3. ? largely because of diff. methods of develop.

- p4 "Grain is also important" in printing papers.

- p4 "Latitude of Exposure" — define

- p5 - opacity : log exposure not O : E

- p5 - "negatives" all the exposures on which fall within the period of correct exposure --"

- p.5 "lack detail" in the shadows.

p5 Latitude of exposure is repeated as a heading

- p5 (foot) why limit the exam. to negative — the prints are the final test of negative quality.

p5 (foot) why not cite some latitudes & some ranges of illum. in subjects.

---

p6 "original" — meaning?

---

p6 "anastigmatic" means without astigmatism & does not exclude spherical ab., distortion curved field etc.

---

p6 "its" refers to what.

---

p6 "the largest diameter" of opening at which is measured by the ratio of the focal length to the largest — —

---

p6 "exactly" better omit as dispute "largest diam — —".

p6 "a device" why not say "an adjustable diaphram"

p6 cheap lenses - good images ?

p6 F values & 2 - ?

p7 "The distance throughout objects - " meaning?

Fig 4 is not clear to me

p7 Does not enlargement bring depth of focus to same state as with long focus lens ?

p7 ?

p7 My Camera

p11. - not easy to understand

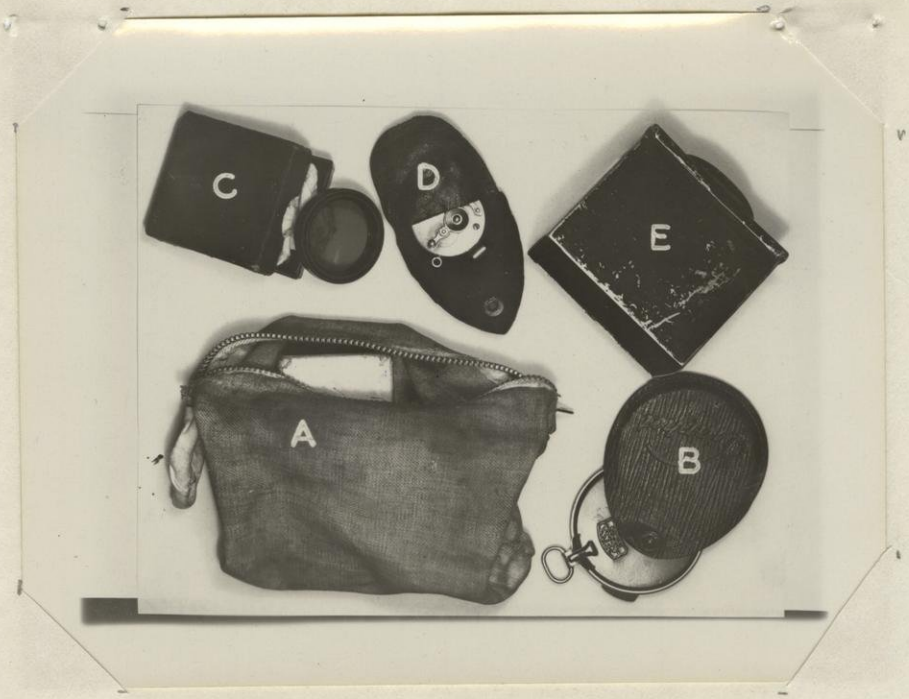


Figure 5. Field kit of acessories used by the writer. A = bag with zipper which contains all apparatus. B = a small and inexpensive exposure meter of the actinometer type, C = filter in metal cell with box and cloth for cleaning. D = self timer. E = special lens hood.

Fig. 6 Fogging caused by spilling over of light above the bank which was in deep shadow and required a long exposure. Sky should be excluded.