

KODAK MIN-R EV Film / 4354

1) Description

KODAK MIN-R EV Film is a fine-grain medium speed, dual coated, ortho-sensitive medical x-ray film for mammographic use with single green-emitting intensifying screens. It is coated on a blue, approximately 0.2 mm (7-mil) polyester base that has a base density of approximately 0.19. MIN-R EV Film provides contrast to view the dense breast parenchymal tissue together with exposure latitude to view overall breast anatomy. MIN-R EV Film is intended for standard or rapid cycle processing using hardened developers such as KODAK X-OMAT EX II or KODAK RP X-OMAT Developer and Replenisher. The MIN-R EV Film and Screen speeds have been optimized to provide the maximum resolution at the specified system speeds.

2) Safelight

Use a KODAK Mammography LED safelight or a KODAK GBX-2 Safelight Filter with a frosted 7.5-watt bulb located in a ceiling fixture at least 1.2 m (4 feet) from the film.

3) Storage and Handling

Handling:

Hands must be clean, dry and free of lotions, and other contaminants. Film should be handled carefully by the edges to avoid physical strains such as pressure, creasing, or buckling.

Storage:

Store unexposed film at 10 to 24°C (50 to 75°F), at 30 to 50 percent RH, and properly shielded from x-rays, gamma rays, or other penetrating radiation. Keep exposed film in a cool, dry place that is properly shielded from penetrating radiation. Process the film as soon as possible after exposure. Processed film should be stored at 16 to 27°C (60 to 80°F), at 30 to 50 percent RH.

4) Relative Film Systems Speed

Screen-Film Characteristics

KODAK Screen	KODAK Film	Relative Processing Cycle	Relative Speed		Contrast		D-Max
			RP	EX II	RP	EX II	
EV150	MIN-R EV	Standard/ Rapid	150	150	4.50	4.70	≥4.5
EV190	MIN-R EV	Standard/ Rapid	190	190	4.50	4.70	≥4.5

5) Sensitometric Parameters

Relative Speed:	Measured at a density of 1.00 above gross fog.
Contrast:	Measured as slope of the line between densities of 0.25 and 2.00 above gross fog.
Gross Fog:	Density of film base plus processing fog.
Net Fog:	Processing fog.

6) Process Variations

Changes to speed, contrast, and fog as a result of temperature variation from normal are included in the **Graphs** section.

7) Intermix

This film can be processed with intermixes of common medical x-ray films.

Variations of bromide and iodide ions in KODAK RP X-OMAT Developer cause sensitometric speed effects. With KODAK MIN-R EV Film, these changes are similar to those for T-MAT Films; included in GRAPH section.

8) Automated Processing

The following tables are for recommended film processors and replenishment rates for KODAK MIN-R EV Film using KODAK RP X-OMAT Chemicals or KODAK X-OMAT EX II Developer and KODAK RP X-OMAT LO Fixer.

Flooded Replenishment

For low use rates, if sensitometry does not stay within control limits, flooded replenishment may be needed. Flooded replenishment is intended to maintain the developer solution at a continuously fresh chemical activity. This is accomplished by replenishing not only when film is fed, but also on the basis of processor on time.

For KODAK MIN-R EV Film, KODAK RP X-OMAT Developer Starter is added to the replenishment tanks at the rate of 25 mL per litre, or 89 mL per gallon, or 3 fl. oz. per gallon. (Use KODAK RP X-OMAT Developer Starter only.) Fill the processor tanks with the solution from the replenishment tank. However, do not add extra starter to the processor developer tank.

For more detailed information on how to set up each processor for Flooded Replenishment, see the Installation or Service manual for each processor. The setup should be done by qualified service personnel.

DEDICATED PROCESSING ENVIRONMENTS -

This information is ONLY for KODAK MIN-R EV Film, and MAY NOT APPLY to other Kodak mammography films.

Also see Service Bulletin 30.

Processor	Film Size Processed	Average Number of 18x24 cm Films per 8 hrs of Processor Operation	Replenishment Rates per 35x43 cm Dev. /Fix*
270 RA, Multiloader300 Multiloader 700 460 RA, 480 RA, 3000 RA, 5000 RA Multiloader 300 Plus	18x24 cm and 24x30 cm	60 sheets or more	105- 120 mL / 105 mL
		60 sheets or less	Flooded
			Replenishment Rates per 24 cm of film travel**
MIN-R, M35A-M, M7B, M6A-N, M6AW, M6B, M35, M35-M, M7B-E, Miniloader 2000	18x24 cm and 24x30 cm Single Feed	60 sheets or more	30 - 40 mL / 30 mL
		60 sheets or less	Flooded 65 mL / 65 mL
	18x24 cm and 24x30 cm Double Feed	60 sheets or more	60 - 80 mL / 60 mL
		60 sheets or less	Flooded 65 mL / 65 mL

* If sensitometry does not stay within control limits, flooded replenishment may be needed.

** Use a single 18 x 24 cm film to set the replenishment rates listed. If processing a single 24 x 30 cm film, multiply the rate by 1.67.

NON-DEDICATED PROCESSING ENVIRONMENTS -

This information is ONLY for KODAK MIN-R EV Film, and MAY NOT APPLY to other Kodak mammography films.

Also see Service Bulletin 30.

Processor	Film Size Processed	Use Condition	Average Number of Films per 8 hours of Processor Operation	Replenishment Rates per 35x43 cm Dev. / Fix
270 RA, Multiloader300, Multiloader 700 460 RA, 480RA 3000 RA, 5000 RA Multiloader 300 Plus	All	Any	Any number ^[1]	60 mL / 85 mL
MIN-R, M35A-M, M7B, M6A-N, M6AW, M6B, M35, M35-M, M7B-E Miniloader 2000	Average size intermix	High Medium Low	115 sheets or more 40-115 sheets less than 40 ^[2]	50 mL / 70 mL 65 mL / 85 mL 80 mL /100 mL

^[1]Flooded replenishment should not be required due to the automatic compensation for use feature, but is available if needed to maintain sensitometry for low use conditions.

^[2]If sensitometry does not stay within control limits, flooded replenishment may be needed.

Notice: Observe precautionary information on product labels and on the Material Safety Data Sheets.

Fixer Retention

The ability to maintain a quality image over several years is dependent on the stability of the image you produce. Image stability begins in the processing cycle. A high level of residual fix (hypo) in processed film indicates insufficient washing, and this can significantly impact the stability of the film. Insufficient washing can be caused by improper wash flow rates, loss of fixer temperature control, inactive fixer, or improper film storage conditions. An analysis of fixer retention in film should be performed quarterly.

Drying

Use the lowest possible dryer temperature that will maintain proper film drying. The dryer temperature will vary depending on the processing cycle, the relative humidity, and the environmental temperature, and should be adjusted to meet individual conditions. Different processing cycles will require different dryer temperatures to compensate for varying times that the film is in the dryer section. Refer to the Operator Manual for dryer temperature adjustment instructions.

For dryer information see KODAK Publication *Dryer Venting Requirements - All KODAK X-OMAT Processors*, Service Bulletin 101 (October, 1990).

9) Graphs¹

Characteristic:

- A) RP X-OMAT Chemicals (7-03)
- B) X-OMAT EX II Developer (7-03)
- C) X-OMAT EX II Developer - Developer Temperature Series (7-03)

Process Variations from Normal Processing Temperature:

- D) Speed (7-03)
- E) Contrast (7-03)
- F) Fog (7-03)

Safelight Sensitivity:

- G) LED (Mammography) Safelight (1-08)
- H) GBX -2 (1-08)

Spectral Sensitivity:

- I) (7-03)

Bromide Effects:

- J) (7-03)

MTF:

- K) (7-03)

Inverse/Squared Sensitometry:

- L) RP X-OMAT Chemicals - Log Exposure vs. Gamma (7-03)
- M) RP X-OMAT Chemicals - Density vs. Gamma (7-03)

Note: The Kodak materials described herein for use with KODAK MIN-R EV Film are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.

The contents of this publication are subject to change without notice.

CARESTREAM, MIN-R, T-MAT and X-OMAT are trademarks of Carestream Health, Inc.

The Kodak trademarks and trade dress are used under license from Kodak.

Carestream Health, Inc. – Rochester, NY 14608

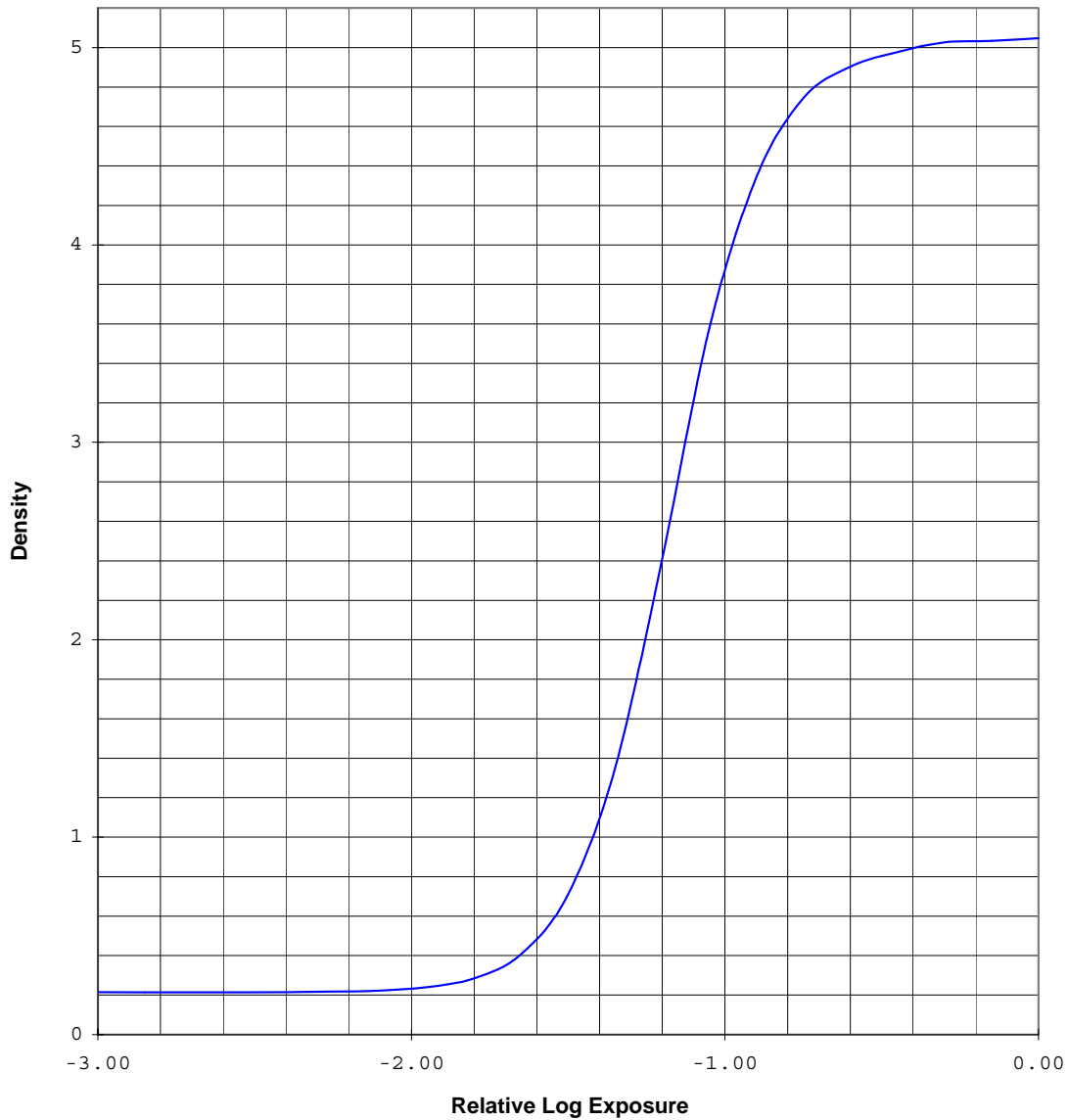
The contents of this publication are subject to change without notice.

End of Data Sheet

¹ **Notice:** The data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply to a particular box or roll of photographic material. They do not represent standards or specifications that must be met by Carestream Health, Inc. The company reserves the right to change and improve product characteristics at any time.

TI5015A 7-03
CHARACTERISTIC, For
Publication

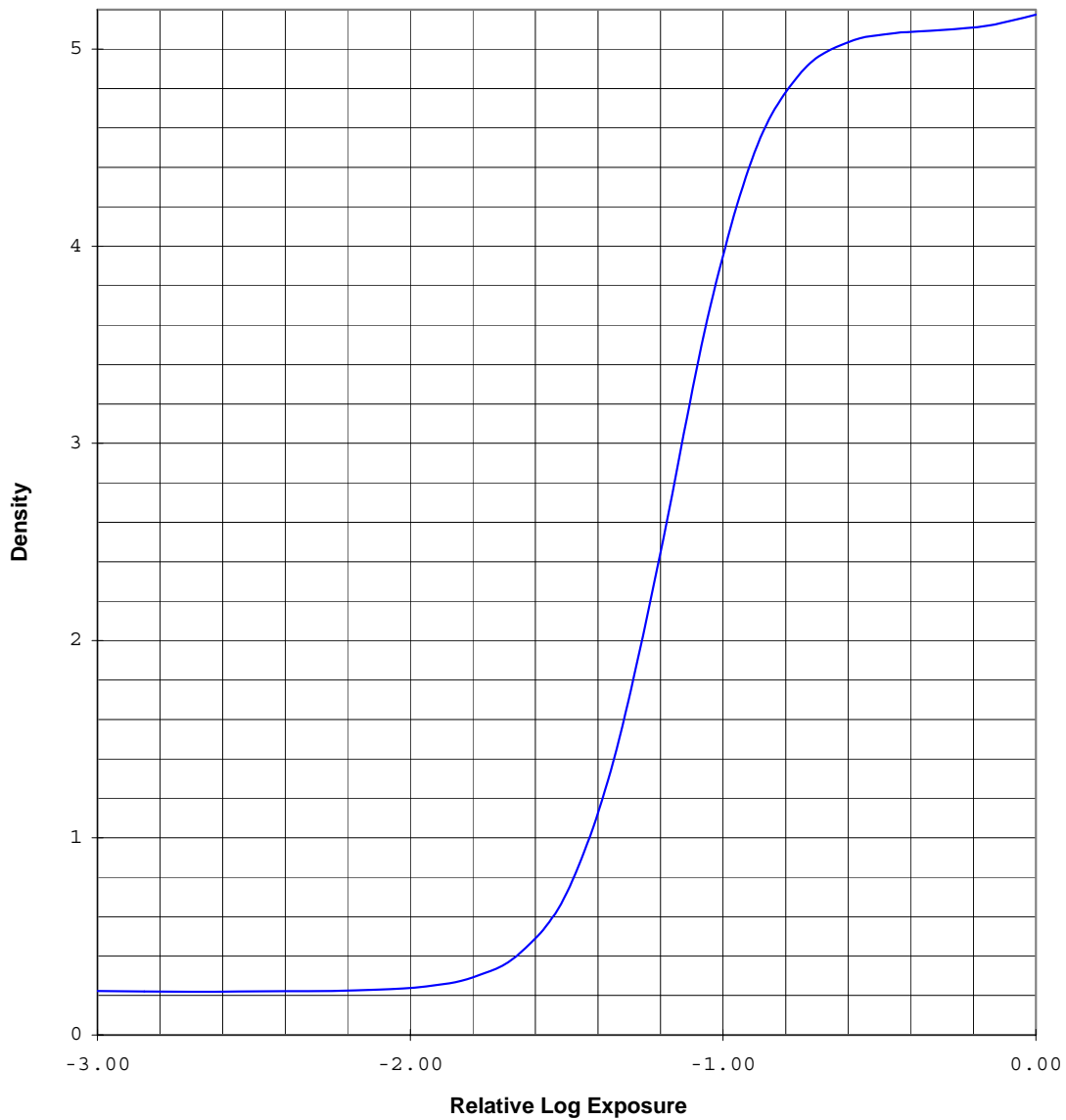
KODAK MIN-R EV Film / 4354
1/2 second simulated Green Screen Exposure,
KODAK RP X-OMAT Chemicals, 35 C (95 F), KODAK X-OMAT 480 RA Processor;
Diffuse Visual Densitometry



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc.. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

TI5015B 7-03
CHARACTERISTIC, For
Publication

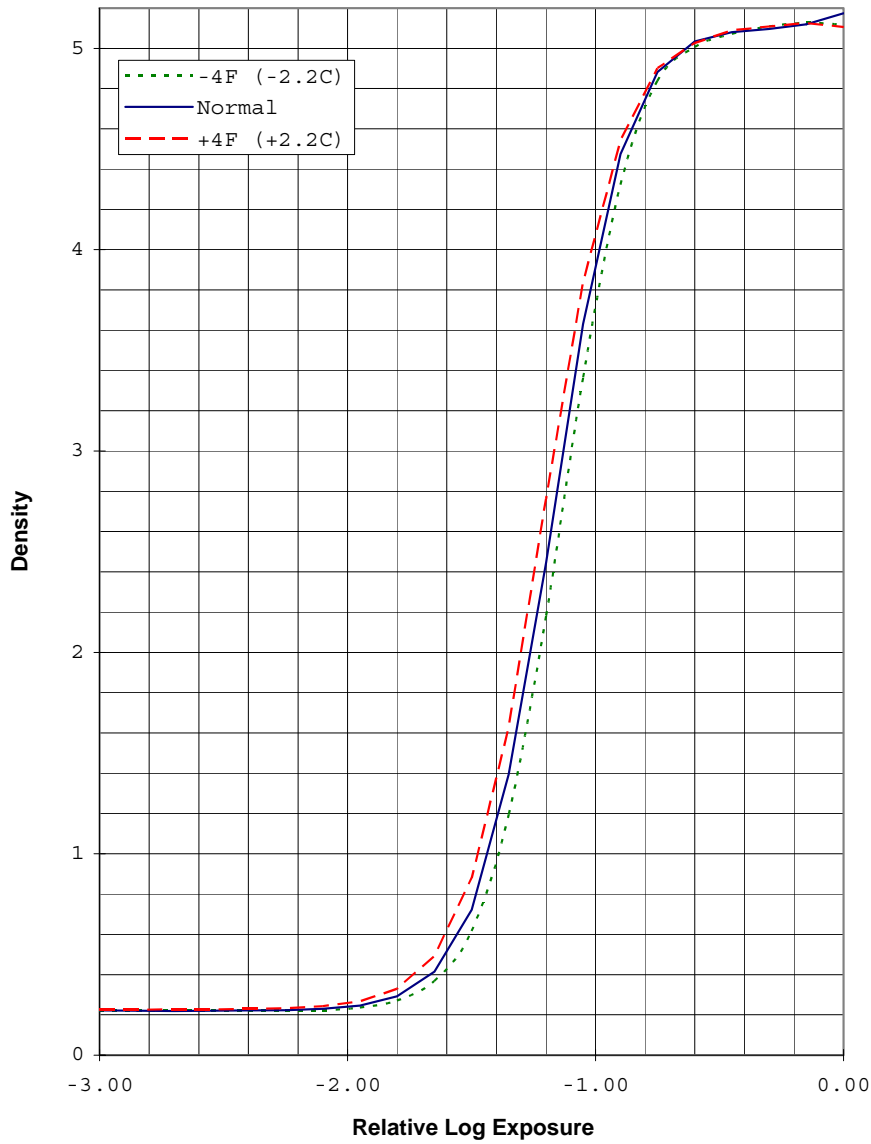
KODAK MIN-R EV Film / 4354
1/2 second simulated Green Screen Exposure,
KODAK X-OMAT EX II Chemicals, 35 C (95 F), KODAK X-OMAT 480 RA Processor;
Diffuse Visual Densitometry



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc.. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

TI5015C 7-03
CHARACTERISTIC, For
Publication

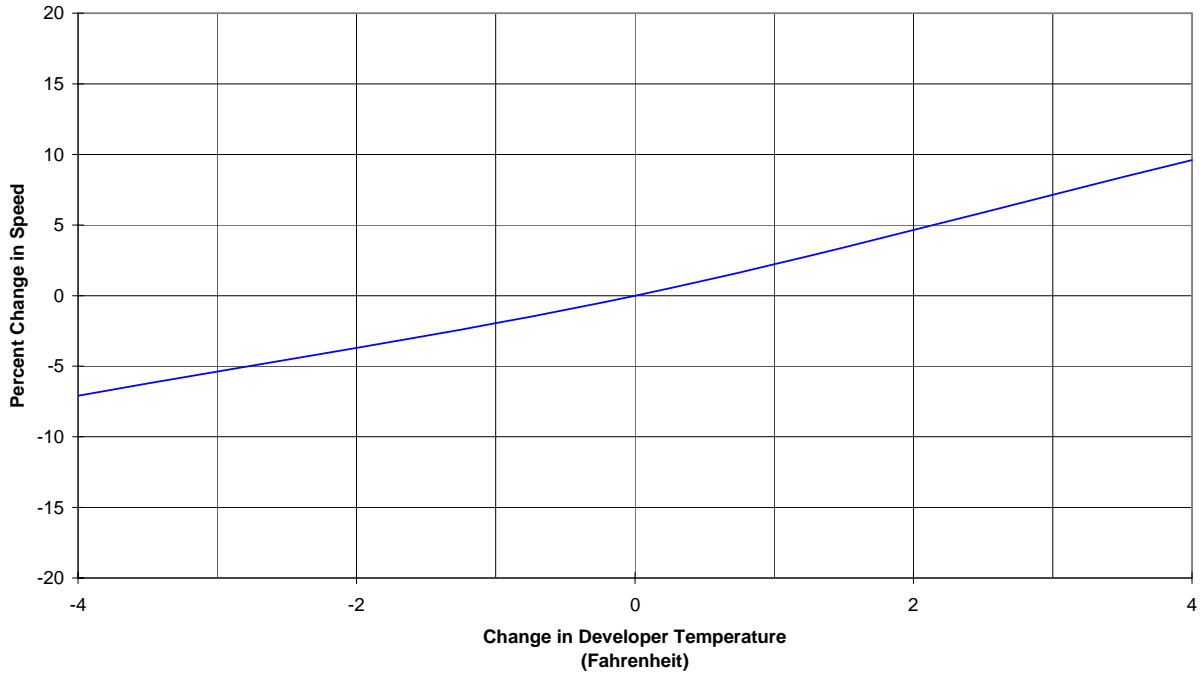
KODAK MIN-R EV Film / 4354
Developer Temperature Series
1/2 second simulated Green Screen Exposure,
KODAK X-OMAT EX II Chemicals, 35 C (95 F), KODAK X-OMAT 480 RA Processor;
Diffuse Visual Densitometry



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

TI5015D 7-03
TEMPERATURE VARIATION, For Publication

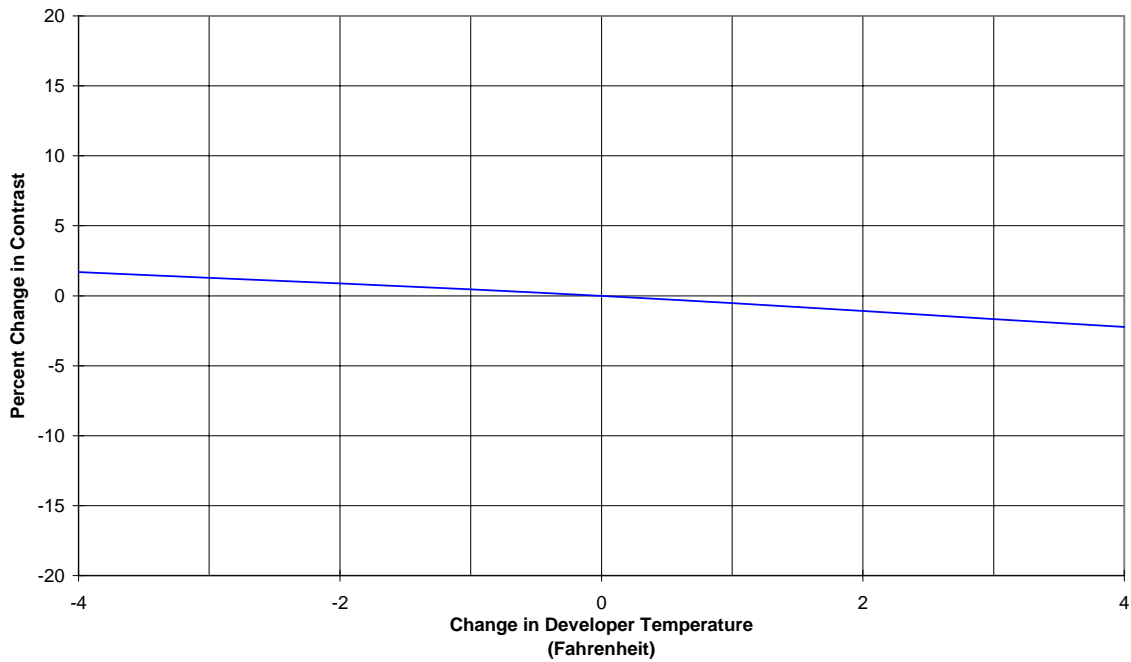
KODAK MIN-R EV Film / 4354
Percent Change in Relative Speed
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 480 RA Processor, 35 C (95 F);
(Reference: Normal Temp. = 0% Change)
(4 F = 2.2 C)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

TI5015E 7-03
TEMPERATURE VARIATION, For Publication

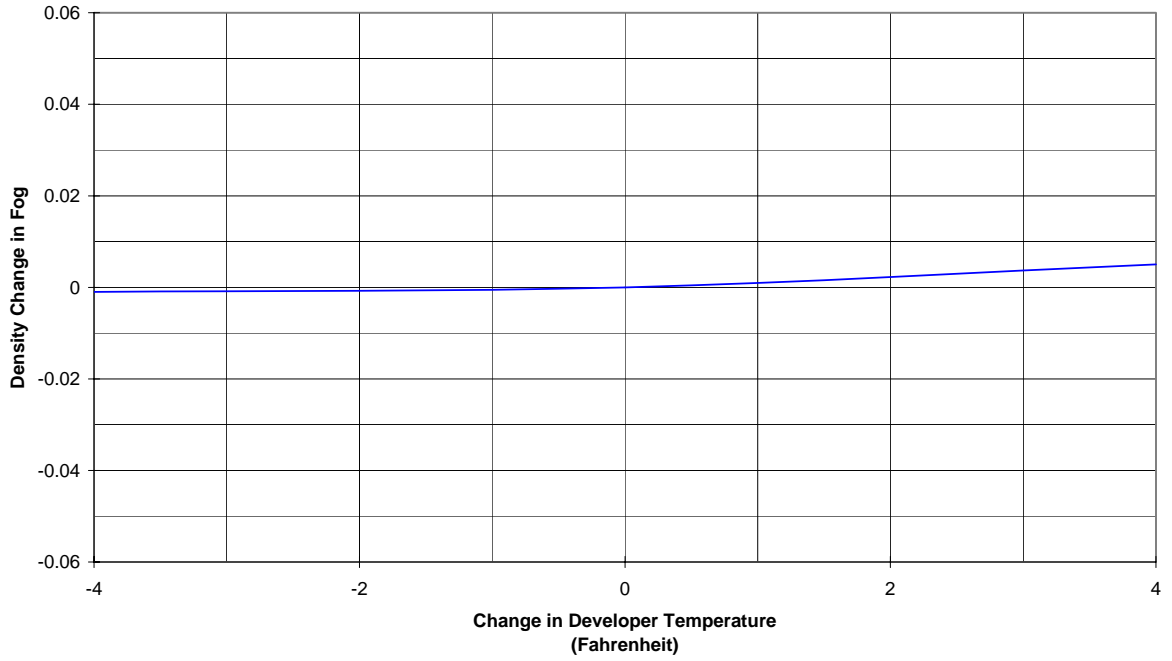
KODAK MIN-R EV Film / 4354
Percent Change in Contrast
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 480 RA Processor, 35 C (95 F);
(Reference: Normal Temp. = 0% Change)
(4 F= 2.2C)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc.. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

TI5015F 7-03
TEMPERATURE VARIATION, For Publication

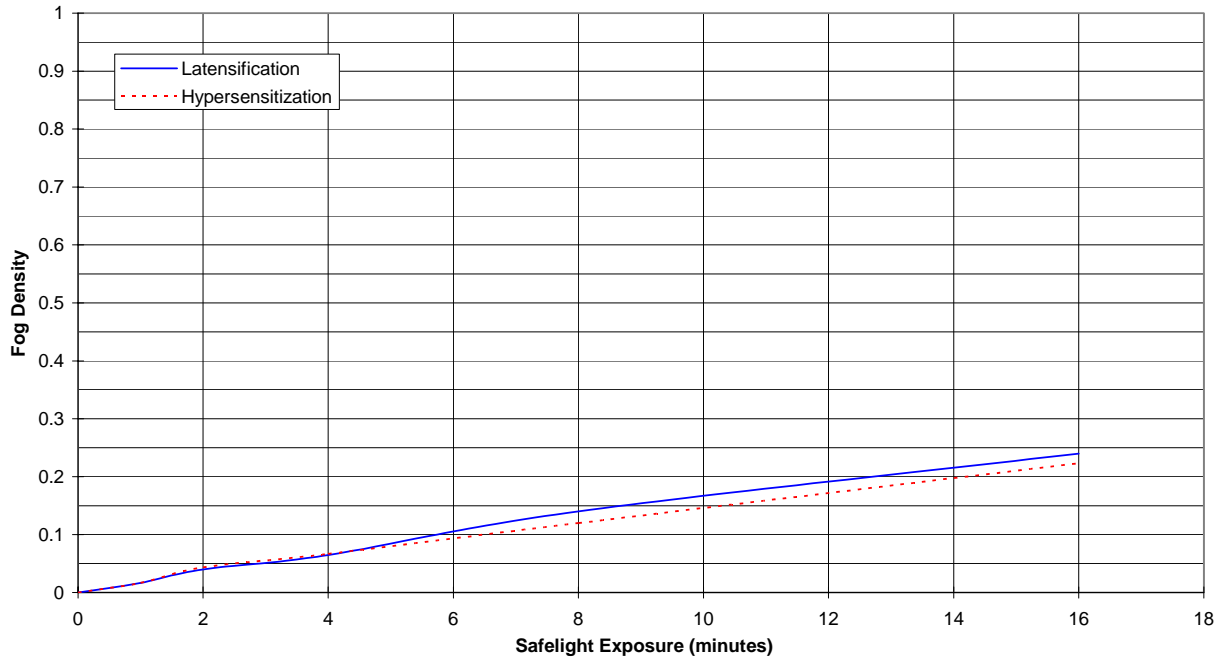
KODAK MIN-R EV Film / 4354
Density Change in Fog
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 480 RA Processor, 35 C (95 F);
(Reference: Normal Temp. = 0)
(4 F = 2.2 C)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

TI5015G 1-08
SAFELIGHT SENSITIVITY, For Publication

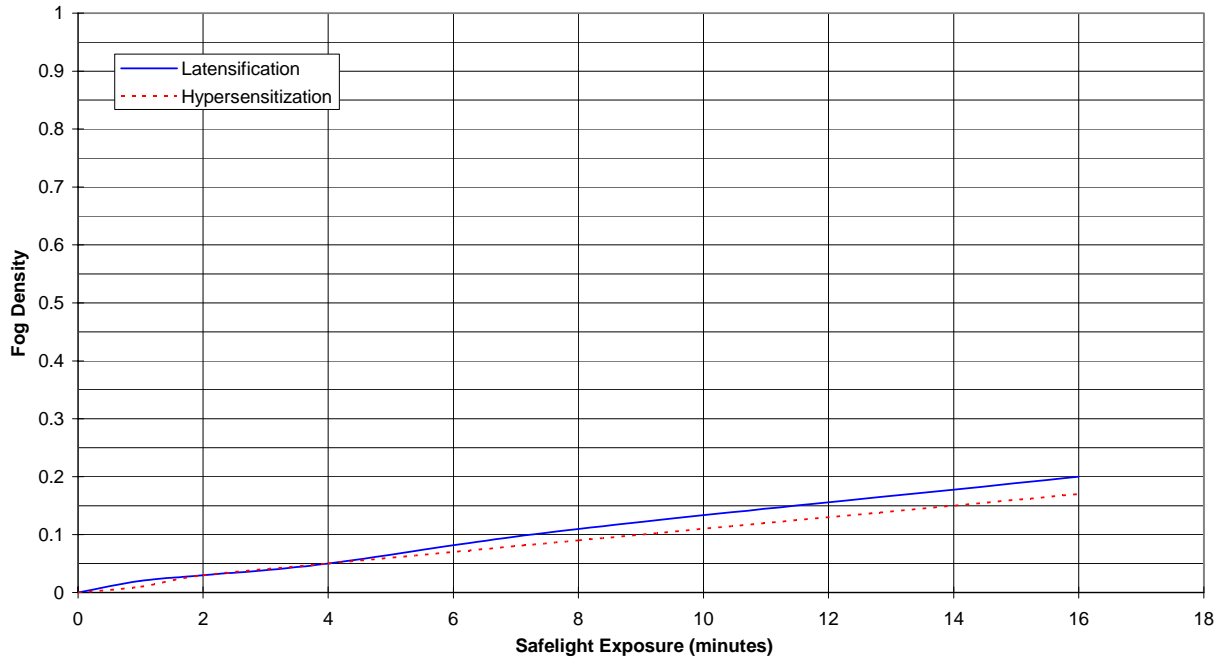
KODAK MIN-R EV Film / 4354
KODAK LED (Mammography) Safelight, located 4 feet from film;
KODAK X-OMAT 5000 RA Processor; KODAK RP X-OMAT Chemicals, 35 C (95 F);
(Fog Growth with Increasing Safelight Exposure)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

TI5015H 1-08
SAFELIGHT SENSITIVITY, For Publication

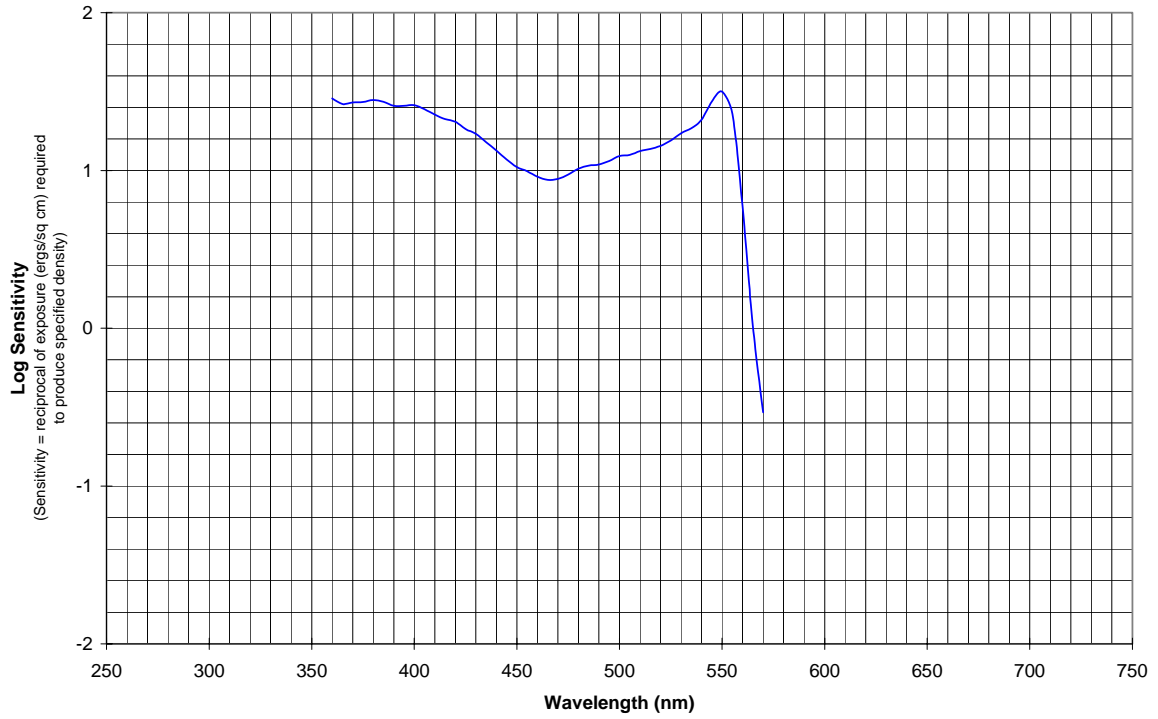
KODAK MIN-R EV Film / 4354
KODAK GBX-2 Safelight Filter, 7.5 watt lamp, located 4 feet from film;
KODAK X-OMAT 5000 RA Processor; KODAK RP X-OMAT Chemicals, 35 C (95 F);
(Fog Growth with Increasing Safelight Exposure)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

TI5015I 7-03
SPECTRAL SENSITIVITY, For Publication

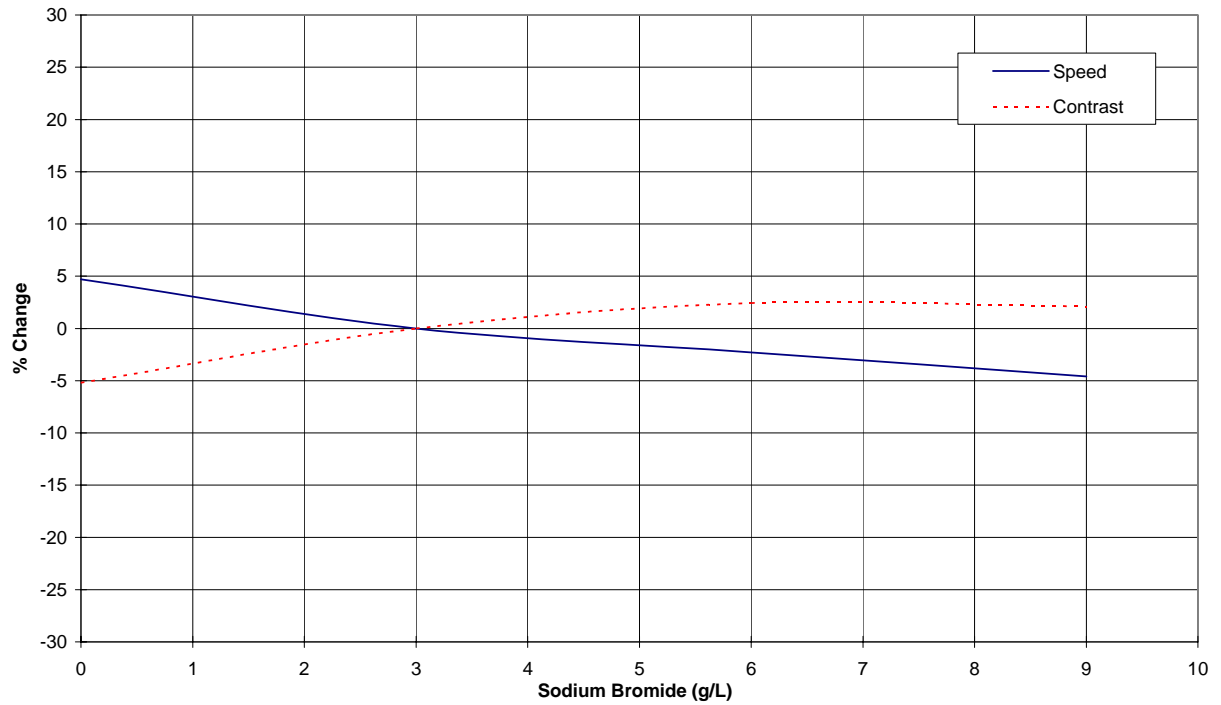
KODAK MIN-R EV Film / 4354
Effective Exposure 1.4 sec; Seasoned KODAK RP X-OMAT Chemicals,
KODAK X-OMAT 480 RA Processor, 35 C (95 F);
Diffuse Visual Densitometry, 1.0>Gross Fog



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

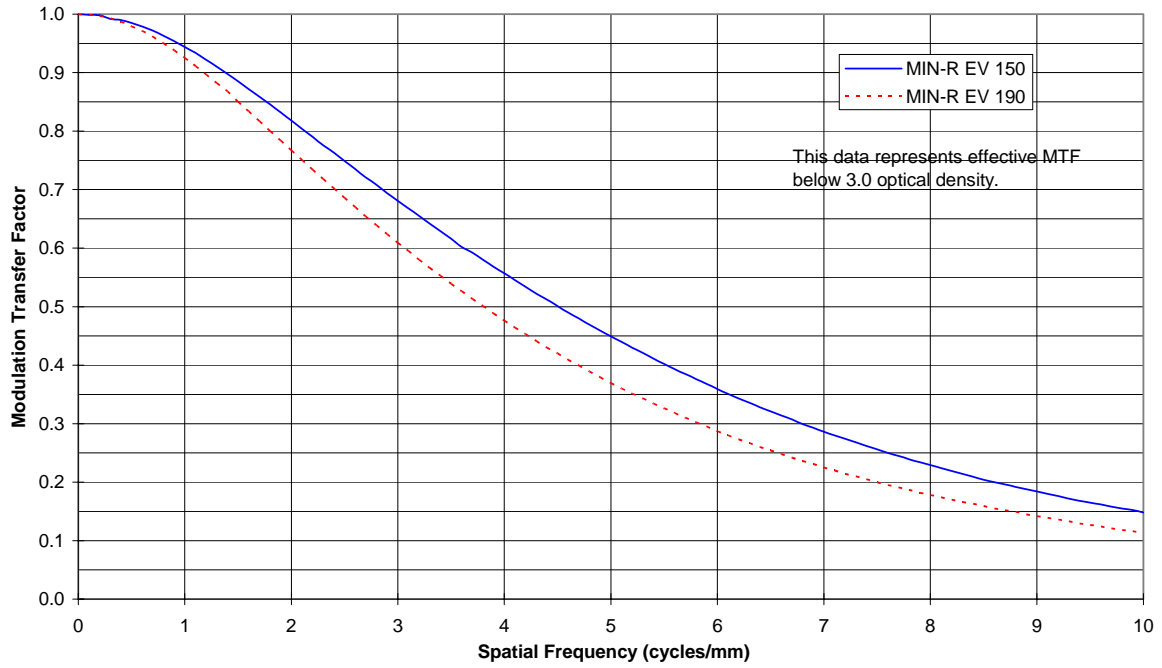
TI5015J 7-03
BROMIDE EFFECTS, For Publication

KODAK MIN-R EV Film / 4354
KODAK X-OMAT 480 RA Processor, Seasoned KODAK X-OMAT EX II Chemicals, 95 C (95 F);
Normal Level is 3.0 g/L



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

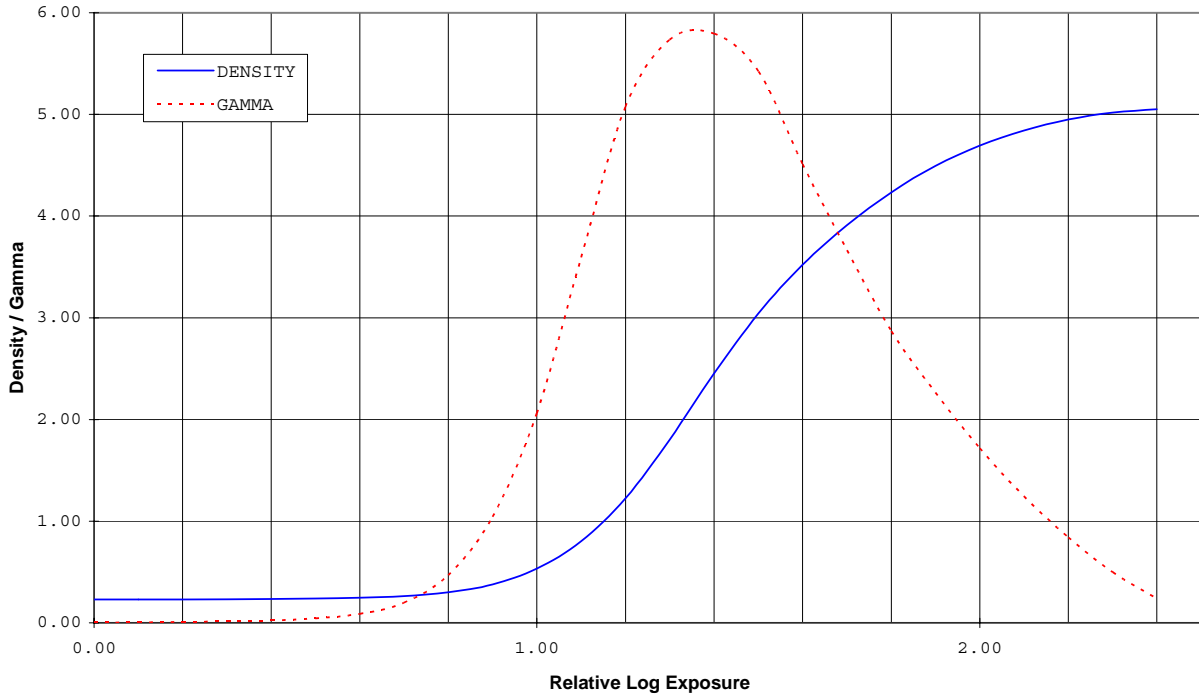
TI5015K 7-03
MTF, For Publication
KODAK MIN-R EV Film / 4354
Exposure: 28 kVp; KODAK RP X-OMAT Chemistry



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

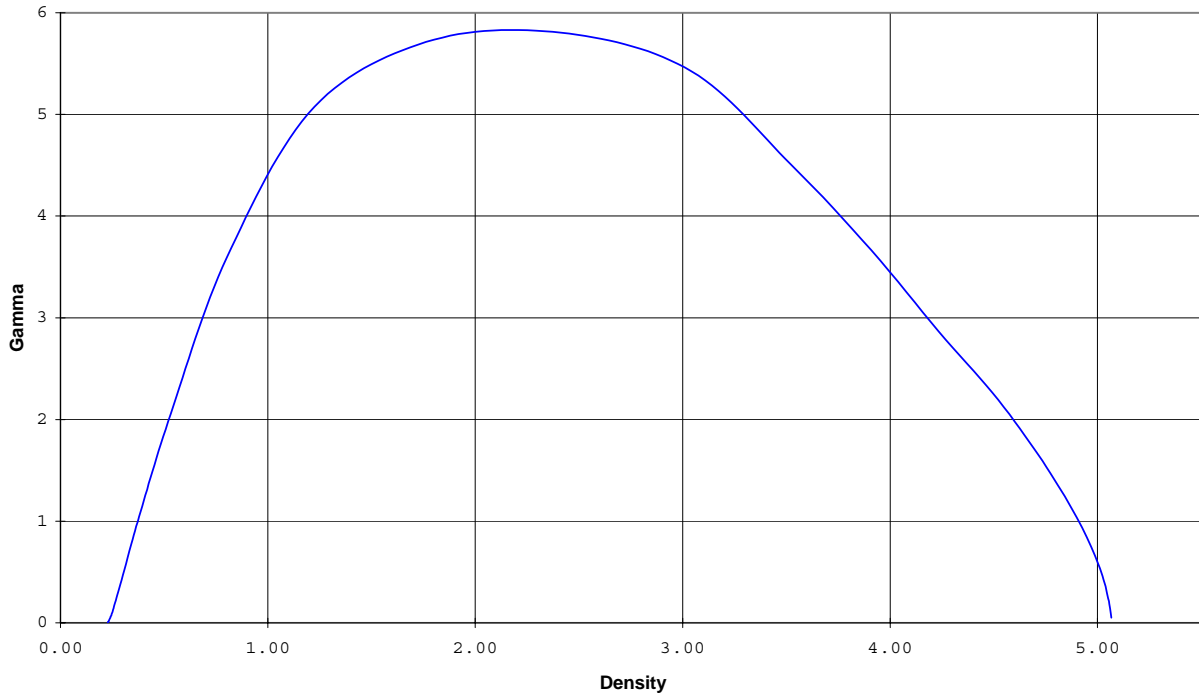
TI5015L 7-03
INVERSE/SQUARED SENSITOMETRY, For Publication
Log Exposure vs. Gamma

KODAK MIN-R EV Film / 4354
Fresh flooded KODAK RP X-OMAT Chemicals, 35C (95F);
KODAK X-OMAT 480 RA Processor



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.

TI5015M 7-03
INVERSE/SQUARED SENSITOMETRY, For Publication
Density vs. Gamma
KODAK MIN-R EV Film / 4354
Fresh flooded KODAK RP X-OMAT Chemicals, 35C (95F);
KODAK X-OMAT 480 RA Processor



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Carestream Health, Inc. Varying storage, exposure, and processing conditions will affect results. The company reserves the right to change and improve the product characteristics at any time.