

KODAK EC Film

1) Description

KODAK EC Film is a high-contrast film that is coated on both sides with a very fine grain emulsion having low image noise. It is intended for radiation therapy beam localization and verification procedures. This film is designed to be used with KODAK EC-L and EC-V Lightweight Cassettes which "sandwich" the film between a copper front screen, and front and back fluorescent intensifying screens (gadolinium oxysulfide). KODAK EC Film provides images with significantly higher contrast than previously available—approximately four times that of current systems. As a result, the images show clearer definition of body structures, thus providing more anatomical detail and making the images much easier to interpret.

2) Safelight

Use a KODAK GBX-2 Safelight Filter with a frosted 15-watt bulb located at least 1.2 m (4 feet) from the film.

3) Storage and Handling

Handling -

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

Storage -

Store unexposed film at 50 to 75°F (10 to 24°C), 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 as soon as possible after exposure. Processed film should be stored at 60 to 80°F (16 to 27°C), at 30 to 50 percent RH.

4) 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.

5) Process Variations

Changes to speed, contrast, and fog as a result of temperature variation from normal are included in GRAPHS Section.

6) Intermix

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

7) Automated Processing

Processors -

See Service Bulletin 30 for processing recommendations.

8) Emergency Manual Processing

(Not recommended for regular use, but can be used when automated processor fails)

Solution/Step	Temperature	Time	Agitation
KODAK RP X-OMAT Developer working solution plus KODAK RP X-OMAT Developer Starter (3 fl oz/gal)	80°F (26.5°C)	1 min	No agitation. Tap hanger immediately after immersion to remove film surface air bubbles.
KODAK Indicator Stop Bath OR Running Water Rinse	80°F (26.5°C)	20 sec	Continuous, moderate
KODAK RP X-OMAT LO Fixer and replenisher	80°F (26.5°C)	1 min	Vigorous at start
Running water wash ¹ (8 volume changes/hour)	80°F (26.5°C)	5 min	—
Dry	120°F (49°C)	—	—

¹ KODAK PHOTO-FLO Solution may be used after washing to minimize water spots and drying marks.

NOTICE! Observe precautionary information on product labels and on the Material Safety Data Sheets.

9) Emergency Manual Processing-Rack and Tank

Solution/Step	Temp	Time	Agitation
KODAK GBX Developer and Replenisher	72°F (22°C) 80°F (26.5°C)	7 min 4 min	Tap sheet film hangers lightly on side of tank immediately after immersion to dislodge air bubbles.
NOTE: DO NOT agitate films during remainder of development step. Remove film and hanger 5 seconds before end of development. DO NOT allow films to drain excess developer back into the developer tank.			
KODAK Indicator Stop Bath OR Running Water Rinse	60 to 85°F (16 to 30°C)	30 sec	Immerse hanger rapidly; agitate continuously.
KODAK GBX Fixer and Replenisher OR KODAK RP X-OMAT LO Fixer and replenisher	60 to 85°F (16 to 30°C)	2 to 4 min	Intermittent, 5 sec every 30 sec.
Running Water Wash ¹ (about 8 volume changes/hour)	60 to 85°F (16 to 30°C)	5 min	—
Dry in a dust-free area at room temperature or a suitable drying cabinet. Temperature not to exceed 120°F (49°C).			

¹ KODAK PHOTO-FLO Solution may be used after washing to minimize water spots and drying marks.

10) Graphs¹

Characteristic:

A) RP X-OMAT Chemicals (8-96)

Reciprocity:

C) Speed (10-96)

D) Contrast (10-96)

Safelight Sensitivity:

H) (8-96)

Spectral Sensitivity:

I) (3-98)

Data Generated from High Energy Therapy Images:

¹NOTICE: While the data presented are typical of production coatings, they do not represent standards that 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.

Slab Thickness vs Monitor Units

J) (9-96)

Graph J shows the exposure, in monitor units, that would be required to give a film optical density of 1.50, for a range of phantom (acrylic slabs) thicknesses and three different photon energies (6, 10 and 18 mV). These curves establish the response of this new system to typical high energy therapy x-ray beams under one well defined set of conditions.

NOTE: This is not considered a "technique chart" since practical exposure requirements will need to take into consideration various combinations of exposure geometry conditions. Also, data points in this graph show non-integral values of Monitor Units required for $D=1.50$. Since therapy machines can only be set for integral Monitor Unit values, some readers may question how these values were obtained. The non-integral Monitor Unit values were determined by using the nearest possible integral values and then correcting from the densities thus obtained to $D=1.50$ using the H&D curve. In practice, there will of course be situations where a particular density value may not be achievable by simply changing the Monitor Unit setting.

Density vs Cassette Spacing

K) (9-96)

Graph K shows that for a given Monitor Unit setting, large changes in film optical density can occur due to changes on field size and in cassette spacing from the patient. While other Monitor Unit settings and other exposure geometries will result in a different set of curves, this graph serves to emphasize the need for attention to consistent cassette placement.

EC-L cassette/EC-L film system vs 4 conventional films/ L-cassette

L) (9-96)

Graph L shows H&D curves for the EC-L cassette/EC-L film system and for four conventional films in the L-cassette. The data points were obtained from 6 mV exposures. The EC curve was determined using a 26-step, 0.01 Log E increment, 80 kV medical x-ray inverse square law sensitometer with LANEX Fast intensifying screens. The curves for the other films were obtained using a 21-step, 0.15 Log E increment, 320 kV industrial x-ray time scale sensitometer.

EC and XV Films / L- and V- cassettes

M) (9-96)

Graph M shows H&D curves for the EC and XV Films exposed in the L- and V- cassettes. The data points shown were generated using 6 mV exposures, and read on an industrial x-ray sensitometer.

EC Film / EC-L and EC-L "fast" cassettes

N) (9-96)

Graph N shows H&D curves for EC Film used in the EC-L cassette (LANEX Fast front / LANEX Fast back), and EC Film used in the EC-L "fast" cassette (LANEX Fast back / LANEX Fast back)

NOTE: The Kodak materials described in this publication for use with KODAK EC Film are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.

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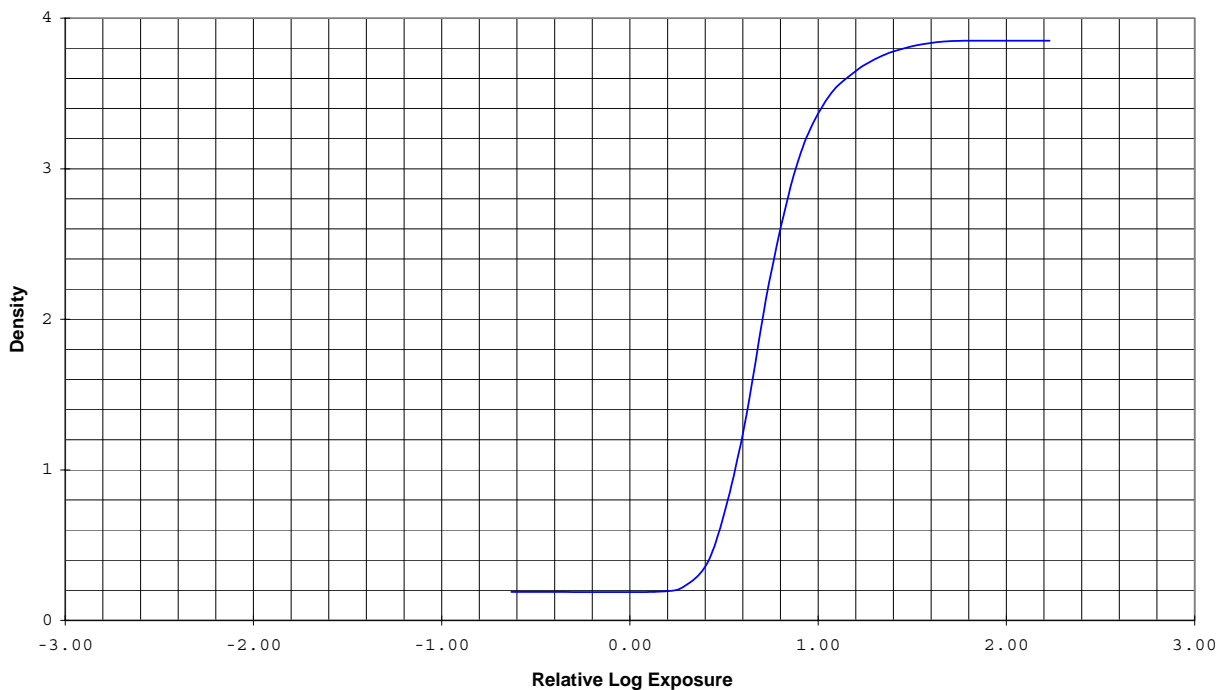
The Kodak trademarks and trade dress are used under license from Kodak.

Carestream Health, Inc. – Rochester, NY 14608

End of Data Sheet

TI2315A 8-96
CHARACTERISTIC, For Publication

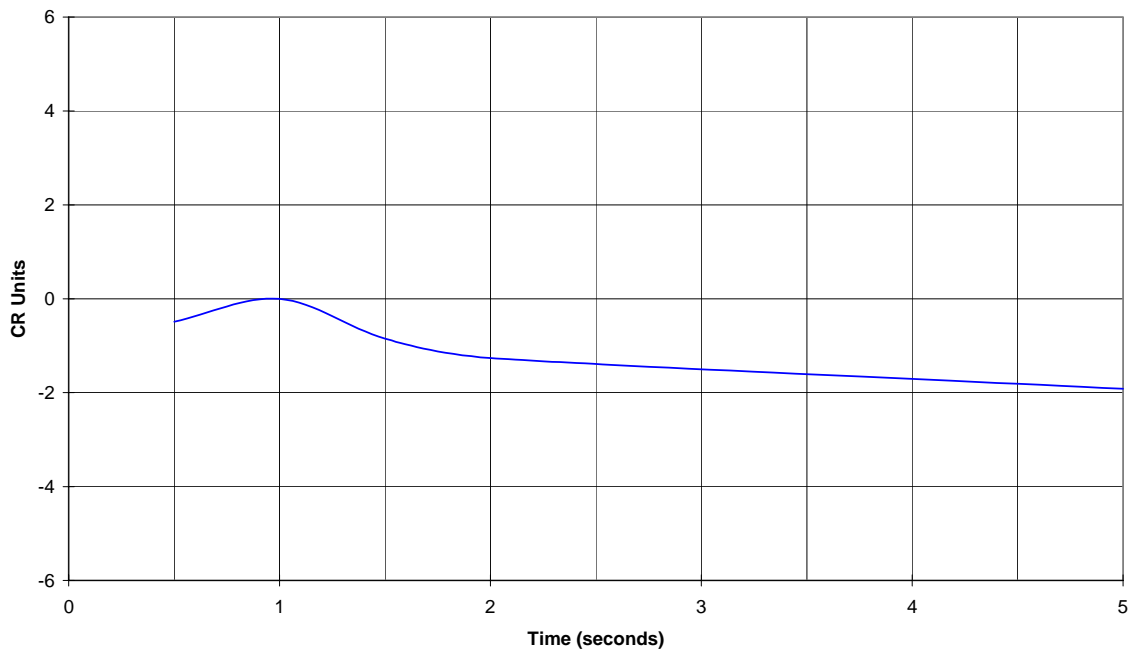
KODAK EC Film
Simulated Green Screen exposure;
KODAK RP X-OMAT Chemicals, 35 C(95 F), KODAK RP X-OMAT Processor;
Diffuse Visual Densitometry



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.

TI2315C 10-96
RECIPROCITY, For Publication

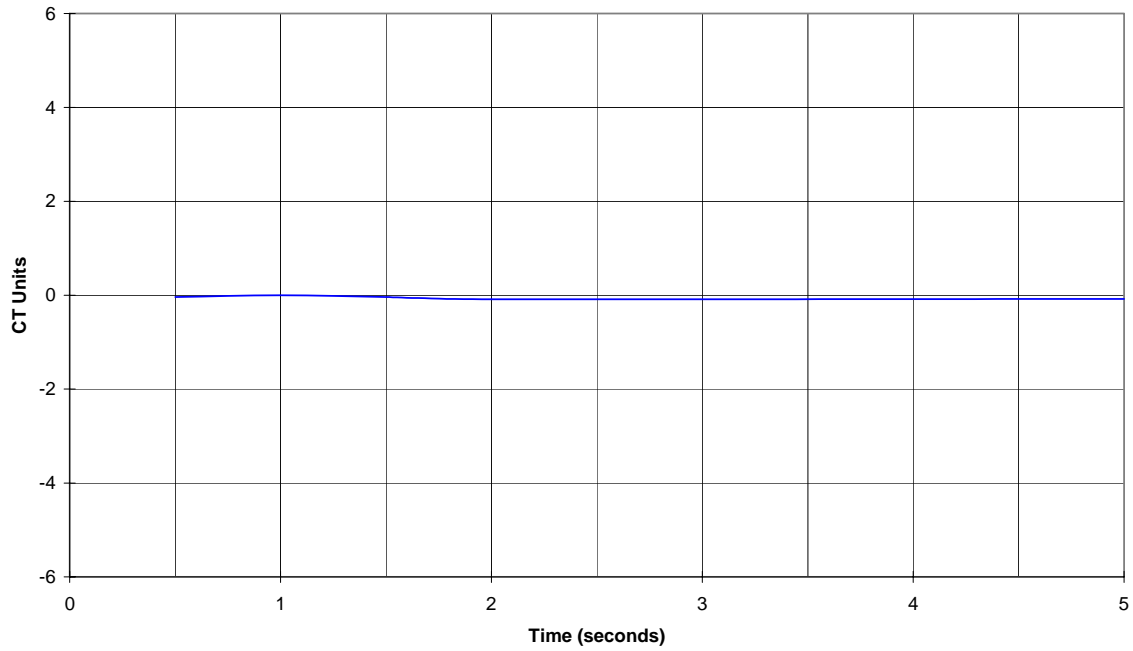
KODAK EC Film
Change in Speed
KODAK RP X-OMAT Chemicals, 35 C(95 F); KODAK RP X-OMAT Processor,
Simulated Green Screen exposure,(Normal = 1 sec)



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TI2315D 10-96
RECIPROCITY, For Publication

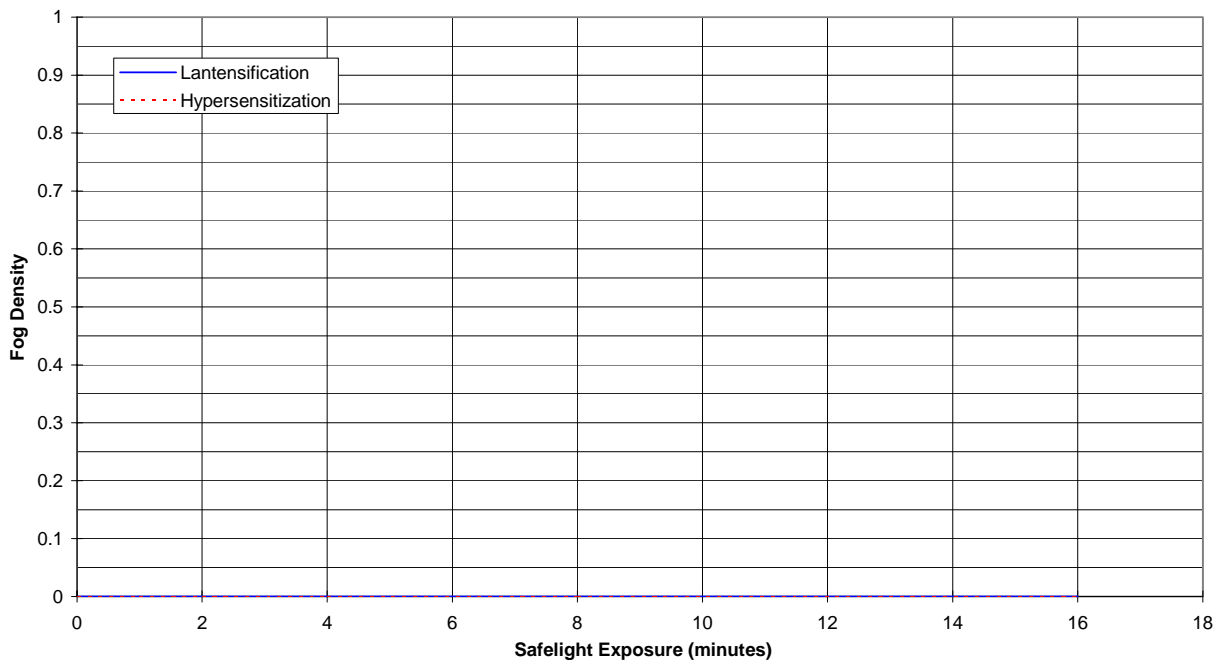
KODAK EC Film
Change in Contrast
KODAK RP X-OMAT Chemicals, 35 C (95 F); KODAK RP X-OMAT Processor,
Simulated Green Screen exposure, (Normal = 1 sec)



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TI2315H 8-96
SAFELIGHT SENSITIVITY, For Publication

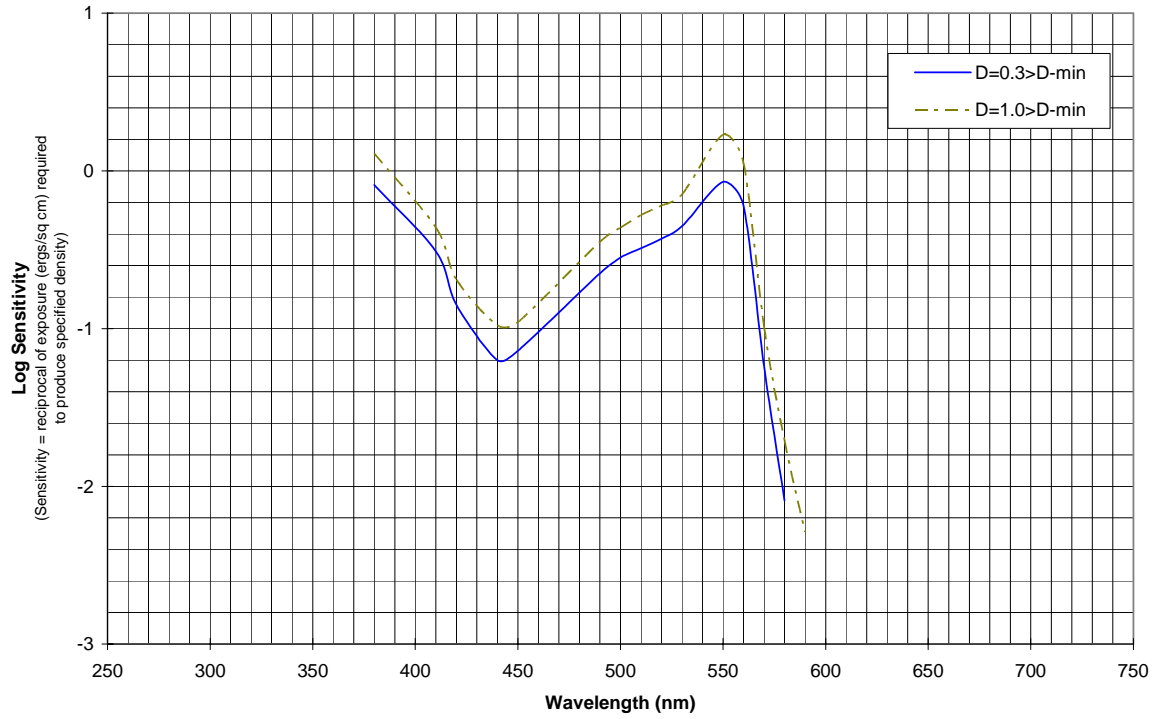
KODAK EC Film
KODAK GBX-2 Safelight Filter, 15 watt lamp, 48 inches
KODAK RP X-OMAT Processor; KODAK X-OMAT Chemicals.
(Fog growth with increasing safelight exposure)



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TI2315I 3-98
SPECTRAL SENSITIVITY, For Publication

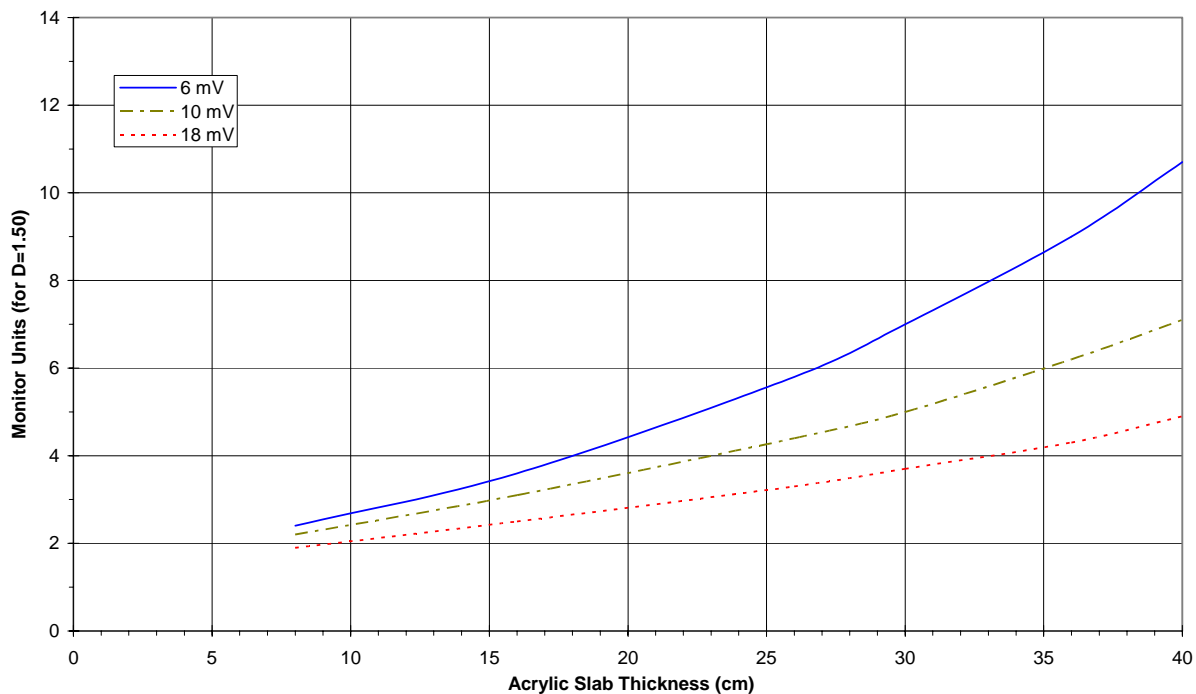
KODAK EC Film
Effective Exp 1.4 sec; Seasoned KODAK RP X-OMAT Chemicals, 35 C (95 F)
KODAK RP X-OMAT Processor; Diffuse Visual



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TI2315J 9-96
PHANTOM THICKNESS and PHOTON ENERGY, For Publication

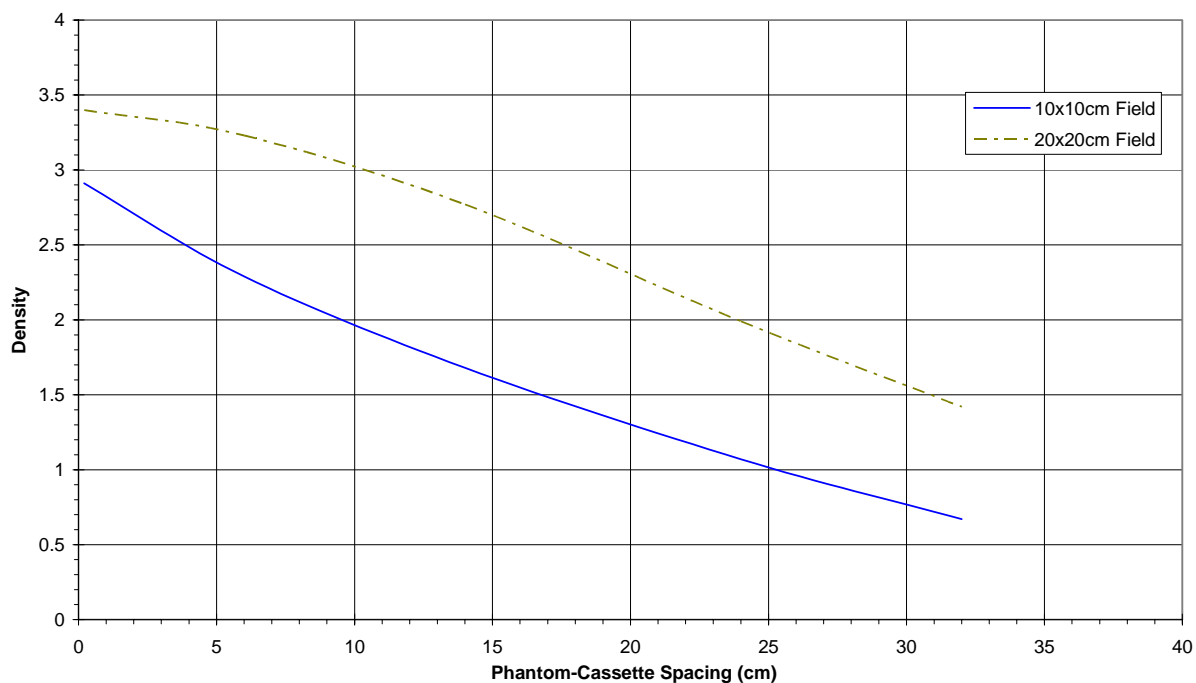
KODAK EC Film
Therapy Machine: Varian Clinac 2100- 6 and 10 mV X-rays and Varian Clinac 1800- 18mV X-rays;
Calibration: 1.0 cGy/1 Monitor Unit (in muscle, SSD = 100 cm, 10 x 10 cm field at D-Max = 1.5, 2.5 and 3.3 cm for 6, 10, 18 mV respectively);
Phantom: Acrylic Slabs; Source-Cassette Distance: 111 cm; Phantom(exit side)-Cassette Spacing: 11 cm;
Field Size: 10 x 10 cm(100 cm from source); Cassette: KODAK X-OMATIC Cassette with EC-L Screens; Film: EC



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TI2315K 9-96
FIELD SIZE and CASSETTE SPACING, For Publication

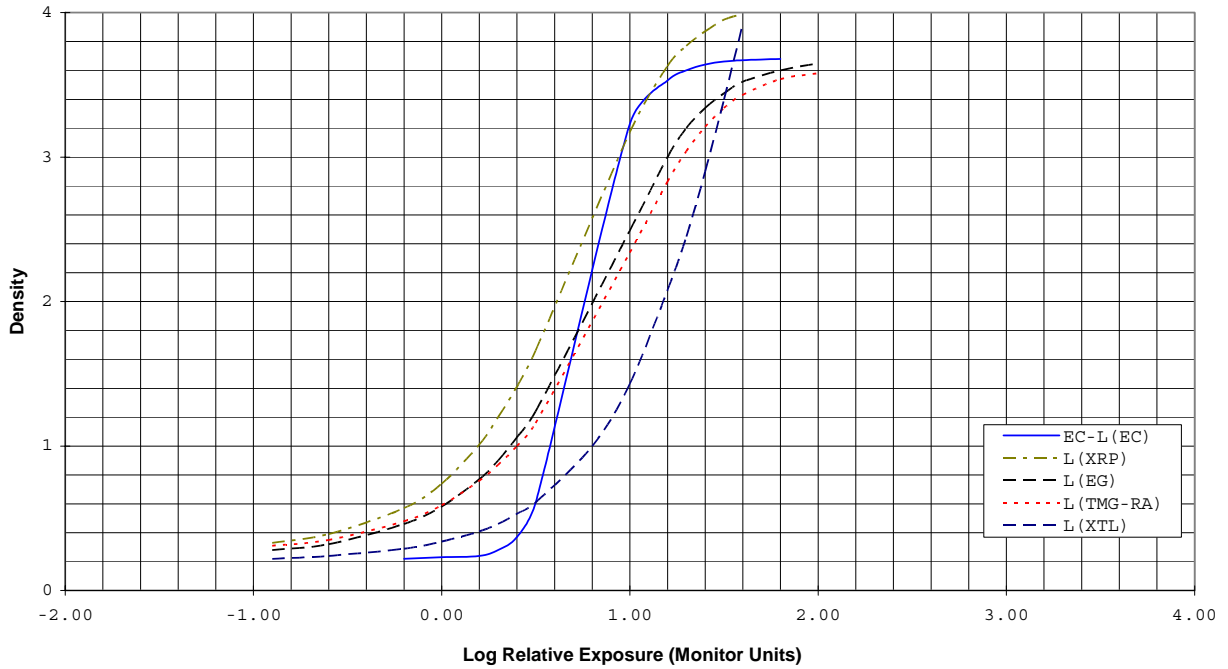
KODAK EC Film
Therapy Machine: Varian Clinac 2100- 6 mV X-rays; Calibration: 1.0 cGy/1 Monitor Unit (in muscle, SSD=100 cm, 10 x 10 cm field, at Dmax=1.5 cm); Phantom: 30 cm thick Acrylic slab; Source-Phantom Exit side: 100 cm; Field Size: 10 x 10 and 20 x 20 cm (100 cm from source); Phantom (exit side)-Cassette Spacing: Varied;
Cassette: KODAK X-OMATIC Cassette with EC-L Screens; Film: EC; Exposure: 8 Monitor Units



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TI2315L 9-96
MONITOR UNITS, For Publication

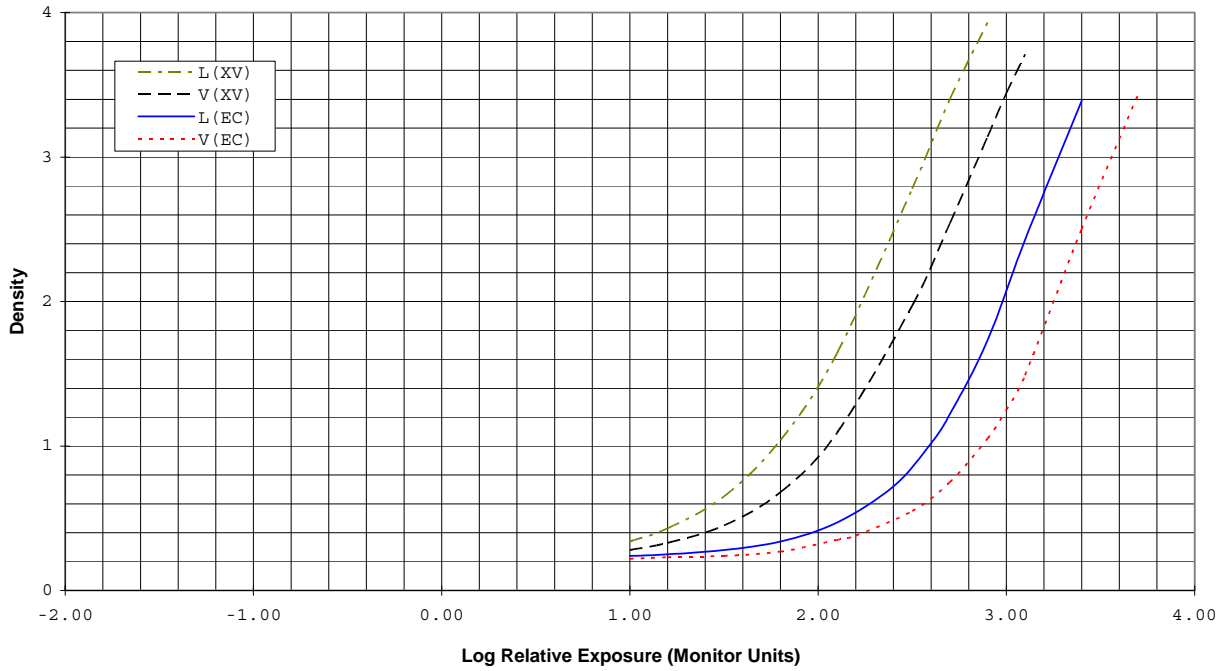
KODAK EC Film
Therapy Machine: Varian Clinac 2100- 6 mV X-rays; Calibration: 1.0 cGy/1 Monitor Unit (in muscle, SSD=100 cm, 10 x 10 cm field,
at Dmax=1.5 cm); Phantom: 30 cm thick Acrylic slab; Source-Cassette Distance: 111 cm;
Field Size: 20 x 20 cm (100 cm from source); Phantom (exit side)-Cassette Spacing: 11 cm;
Key: Cassette(Film)



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TI2315M 9-96
MONITOR UNITS, For Publication

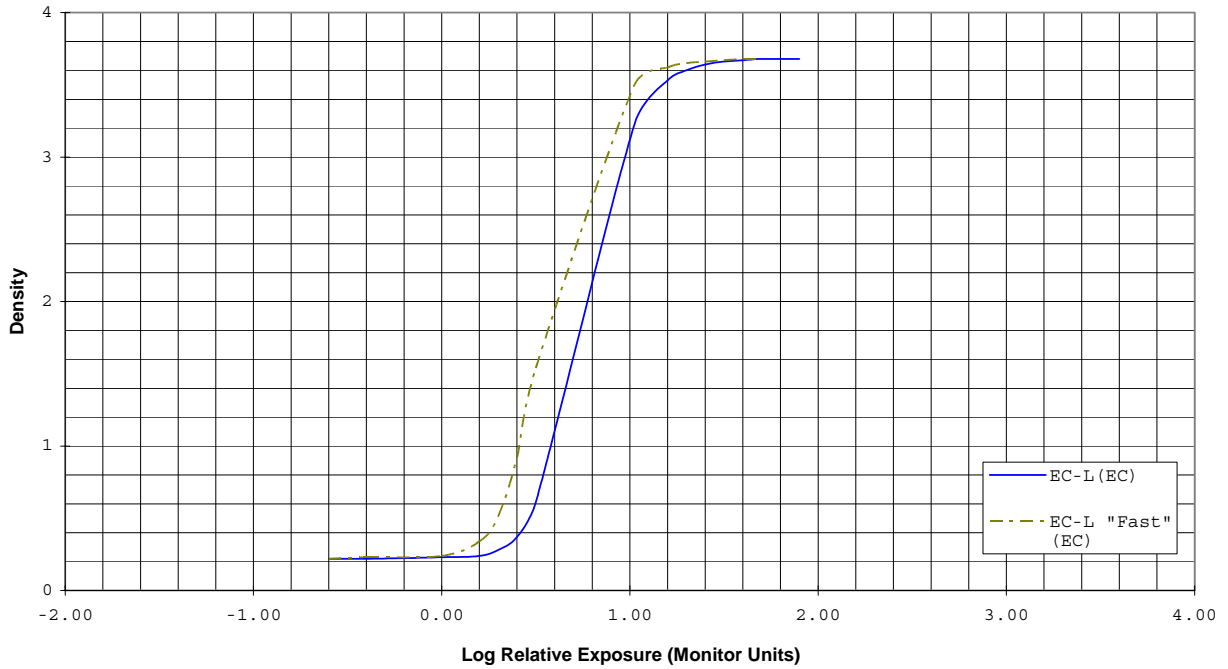
KODAK EC Film
Therapy Machine: Varian Clinac 2100- 6 mV X-rays; Calibration: 1.0 cGy/1 Monitor Unit (in muscle, SSD=100 cm, 10 x 10 cm field,
at Dmax=1.5 cm); Phantom: 30 cm thick Acrylic slab; Source-Cassette Distance: 111 cm;
Field Size: 20 x 20 cm (100 cm from source); Phantom (exit side)-Cassette Spacing: 11 cm;
Key: Cassette(Film)



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TI2315N 9-96
MONITOR UNITS, For Publication

KODAK EC Film
Therapy Machine: Varian Clinac 2100- 6 mV X-rays; Calibration: 1.0 cGy/1 Monitor Unit (in muscle, SSD=100 cm, 10 x 10 cm field,
at Dmax=1.5 cm); Phantom: 30 cm thick Acrylic slab; Source-Cassette Distance: 111 cm;
Field Size: 20 x 20 cm (100 cm from source); Phantom (exit side)-Cassette Spacing: 11 cm;
Key: Cassette(Film)



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