

PRODUCTS AND MATERIALS

A NUCLEONICS Special Survey:

Commercial Film-Badge Services

TO PROVIDE ITS READERS with comprehensive information about film-badge services NUCLEONICS queried all known suppliers and assembled the data presented in this table. AEC-operated film-badge service is available only to contractors and thus is not included. In following months other products and

Firm name and address	Cost of service (per badge)	Minimum		How often are badges supplied	Control badge provided	Time to report exposures	Interval badge is kept on file	Finger or hand badges	Related services
		No. of badges	Subscript. period						
Atomic Research Lab., 2633 Santa Monica Blvd., Santa Monica, Cal.	\$1-1, 80¢-2, 65¢-3-10, 60¢-11-25	None	None	Weekly, bi-weekly, or monthly	Yes	7 days	Permanently	\$1.50 apiece, then film prices	Consulting, monitoring, surveys
Isotopes Specialties Co., 3816 San Fernando Rd., Glendale, Calif.	50¢ apiece (quantity discounts allowed)	13	None	Weekly	Yes	Within 7 days	6 years	Wrist bracelet sold, then 50¢ per film	None
R. S. Landauer, Jr. and Co., P. O. Box 102, Park Forest, Ill.	\$1.20-1, 50¢ each add. Over 50-quantity prices	None	13 weeks (shorter at higher price)	Weekly, bi-weekly, or special arrangement	Yes	About 2 days*	Permanently	Same price as badges	Area monitoring badges 5-\$12, \$1.25-add. Consulting
Nuclear Consultants, Inc., 33-61 Crescent St., Long Island City 6, N. Y.	\$1-1, 60¢-2-9, 50¢-10 and over	1	3 months	Twice a month	No	7 days	2 years	None	None
Nuclear Inst. and Chemical Corp., 223 W. Erie St., Chicago 10, Ill.	65¢-3-24, 60¢-25-49, 55¢-50-99, 50¢->100†	None	None	Weekly, bi-weekly, or monthly	Yes (3 or more badges)	4 days*	Permanently	None	ORNL packets-55¢-40¢ ea., consulting
Radiation Detection Co., 576 College Ave., Palo Alto, Calif.	50¢ (weekly) 60¢ (bi-wk.) \$10 per yr (monthly)	None	26 wk if 1-2, 13 wk if >3	Weekly, bi-weekly, or monthly	Yes	Within 2 days*	Permanently	70¢ apiece	Badge storage racks, consulting
R-C Scientific Inst. Co., 307 Culver Blvd., Playa del Rey, Calif.	60¢ apiece \$2.50 min. quantity discounts	None	13 periods	Weekly or longer scheduled period	Yes	Within 7 days	Indefinite	Finger ring-75¢ (\$3 min.)	Survey pack of 10-\$10
St. John X-Ray Lab., Califon, New Jersey	50¢ per badge \$75/yr min.	None	1 year	As desired or user holds supply	Yes	Within a few days	Badge is returned to user	None	Environment monitoring
Technical Associates, 140 W. Providencia Ave., Burbank, Calif.	60¢; less on quant. or yr contracts	3	13 periods	Weekly, bi-weekly, or special arrangement	Yes	Within 7 days	Indefinitely	Wrist bands-\$1, then 60¢ per film	Consultation
Technical Operations, Inc., 6 Schouler Ct., Arlington, Mass.	75¢ each (discounts on contracts)	None	None	As ordered (3 mo. max. storage)	Yes (sold)	3 days	Indefinite	None	None
Tracerlab, Inc., 130 High St., Boston 10, Mass.†	60¢ apiece, over 25-quantity discounts	3	13 weeks	Weekly or any regular schedule	Yes	Within 5 days*	Permanently	Wrist band-\$1.50, then film prices	Consulting; body survey packet

* Will notify of any overexposures by collect telegram, if requested. † Deduct 5% for yearly contract on weekly basis. Price Richmond 2, Calif.

materials of particular use in atomic-energy work will be reported.

Film-badge dosimetry is complicated by the energy spectrum encountered, and by whether mixed β and γ is present, plus the variables of film sensitivity, processing conditions, and radiation discrimination method. Because of this, the accuracy tabulated is a typical figure and does not represent either the best obtainable or a guaranteed performance. If radiation energy

is known, better accuracy is possible. Tabulated data do not include neutron badges or film-badge holders for sale. These data follow.

Neutron Badges

Radiation Detection Co. and Tracerlab, Inc. supply neutron badges at \$1.25 each. Both firms use Po-Be sources for calibration. Tracerlab claims recordable energy range of up to 20 Mev; an uncertain film dose

range, as γ background affects range; and an accuracy in line with that obtained by the AEC. Radiation Detection claims thermal and high-energy neutrons are recordable; a dose range of 20% of tolerance to an indefinite upper limit; and an accuracy for tolerance flux no better than 100%, but better accuracy as exposure increases. R. S. Landauer reports it is inaugurating neutron-badge service in February, at about \$1.20. Atomic

Method of distinguishing X-, γ , and β rays	How often calib. film processed	Gamma rays				Beta rays			
		Calibration source	Accuracy (%)	Energy range recordable	Film dose range	Calibration source	Accuracy (%)	Energy range recordable	Film dose range
Copper step wedge	Monthly	Radium, X-ray (Co ⁶⁰ optional)	10	50 kv-250 kv X-ray (min.)	10 mr-10 r	Sr ⁹⁰	25	100 kev-3 Mev	10 mr-10 r
Step wedge	With each batch	Co ⁶⁰	10% or 15 mr high energy gammas	30 kev->5 Mev	10 mr-500 r	Sr ⁹⁰ -Y ⁹⁰ 1-mil. s. s., 50-cm air filtering	50	10 kev->3 Mev	10 mr->500 r
Open window; 4 different absorbers	With each customer batch	Film exposed at energy found from darkening ratios	20	30 kev-about 5 Mev (at stated accuracy)	30 mr-600 r ($\times 0.1$ for low energy γ)	Use β emitter specified by customer	About 20	400 kev-higher	60 mrep-1200 rep (higher for lower energy)
Open window; 0.5-mm Cu, 1-mm Cd filters	With each batch	X-ray, Co ⁶⁰	20 (>140 kv)	40 kv and up	50 mr-20 r	Not calibrated for beta.			
Open window; 10-mil Cu, 40-mil Cd, 40-mil Al	With each batch	X-ray, Co ⁶⁰	20	25 kev-10 Mev	50 mr-500 r	Subtract background from open window reading to get equivalent exposure caused by β rays. Possible factor of 2.5 unless β energy known.			
Open window; Al, Cd, 27-mil Pb filters	With each batch	30 kev X-rays, Co ⁶⁰	20	25 kev-3 Mev, special calib. for others	30 mr-400 r (-50 r low energy γ)	Film sensitivity calibrated	25% if energy known, no low γ	1 Mev-higher	50 mrep-400 rep
Open window; 20-mil Ag, 21-mil Pb filters	With each batch	X-ray, Co ⁶⁰ ; special sources on request	20	30 kv and up	10 mr-750 r (3 films)	U ²³⁸ or other on request	20	1 Mev and up	10 mrem->1,000 rem
γ given, factors to convert to X-ray	With each batch	Co ⁶⁰	20	Dupont 552 film figures		Do not monitor, but for rough estimate of β , multiply our figure by 3.			
2 Cu, 2 Al, 1 Cd filter	With each batch	45-, 100-, 200-kvp X-rays, Co ⁶⁰	25	45 kvp-1.3 Mev	25 mr-100 r	U ²³⁸ , and emitter specification	Dosage estimate based on U β curve	400 kev-higher	100 mr-50 r
Filters	With each customer batch	50-250-kv X-rays, Co ⁶⁰	10-25%	50 kv-2,000 kv	25 mr-20 r	Not calibrated for beta.			
Cu step wedge; or Cd filter, open window	With each batch	X-ray, Co ⁶⁰	Dependent upon status of source knowledge	10 kev and up	20 mr-50 r (-2,000 r on request)	U ²³⁸ , and emitter specification	In line with AEC install. performance	150 kev-higher	30 mrep-80 rep

for 1 badge-\$1, for 2-87.5¢. † For the 17 western states; Tracerlab, Inc., Western Division Film Badge Service, 759 23rd St.,