Instruction & Information Manual for Stockpileable RADTriage-FIT™

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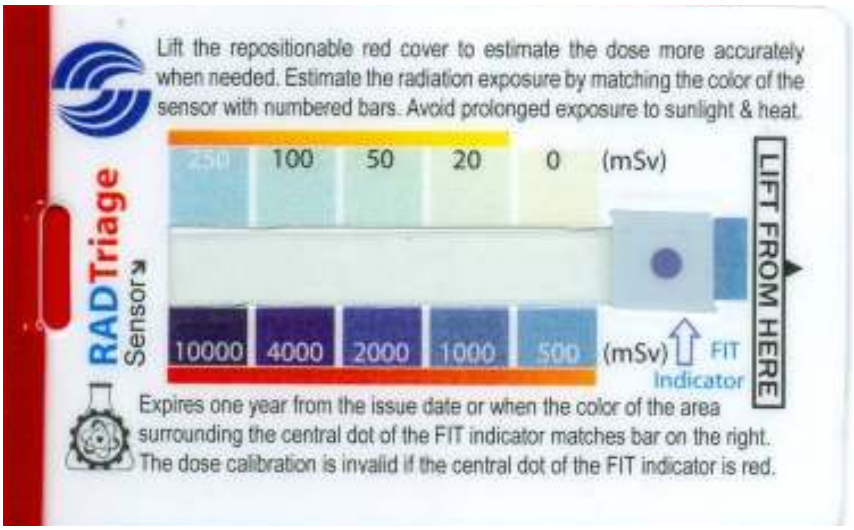

RADTriage-FIT™: RADTriage-FIT, a stockpileable personal dosimeter provides wearers, medical personnel and law enforcement personnel timely personal radiation exposure information in an event of a terrorist radiological incident or industrial accident. RADTriage-FIT with the liftable red filter provides significantly longer life of days under direct sunlight. The red film is repositionable/ liftable for more accurate reading of the dose from 0-10,000 mSv. **RADTriage-FIT**, part of the **SIRAD®** (**S**elf-**I**ndicating **R**adiation **A**lert **D**osimeter) family of SMART dosimeters, is uniquely designed to prevent erroneous readings. It has a sensor (a rectangle strip between the color bars) with 0, 20, 50, 100 & 250 mSv bars on its top and 500, 1,000, 2,000, 4,000 & 10,000 mSv bars on its bottom for triaging information in emergencies. If during or after the incident, the color of sensor has not changed, the wearer has not received radiation exposure large enough to cause acute medical effects and therefore has ***peace of mind***. If the sensor turns light blue in color, a low radiation exposure is indicated. In this case, further exposure

should be avoided. If the sensor has developed a darker blue color e.g., above 250 or 500 mSv, the user should seek a medical evaluation. A person exposed to dose higher than 500 mSv should immediately contact an emergency room of a nearest hospital.

GENERAL INSTRUCTIONS: **1.** Write your name and date received on the back of the badge and note the color of the area of the FIT indicator. The area must be much lighter than its color reference bar on its right. **2.** Carry RADTriage-FIT in your wallet, purse or pocket. You may also hang it from your neck or belt as you would carry an ID badge. **3.** RADTriage-FIT is a warning and casualty radiation dosimeter. It supplements, but does not replace, other dosimeters or detectors that you may require to use. RADTriage-FIT may be the only dosimeter worn by people who do not routinely work with radioactive materials & radiation sources. **4. Keep the red protective cover in place at all times except when you need to read the dosimeter more accurately.** This will protect the radiation sensor from prolonged exposure to ultraviolet (UV) and near UV light from sunlight or fluorescent lights. Colors referred herein this manual are without the red filter, except when stated. **5.** Do not deliberately expose RADTriage-FIT to UV/sunlight or ionizing radiation. Protect RADTriage-FIT from high temperatures (above $140^{o}F/60^{o}C$) and UV/sunlight for a prolonged period. This ensures the maximum usable life of the sensor. **6.** When issued, (a) the color of the sensor MUST closely match with the zero bars of the color reference charts and (b) the central dot (if printed) of the FIT indicator (located on the right hand end of the sensor) should be blue while the surrounding area should be light blue. Return the dosimeter to the issuing authority/organization or JP Labs for a replacement if they are not so or if RADTriage-FIT is damaged or defective. **7. The service life of this stockpileable RADTriage-FIT can be extended by keeping it in a freezer when not in use.**

INTRODUCTION: RADTriage-FIT (USP# 7,227,158 and others) is always active and ready to use. **It is a smart dosimeter with a capability of monitoring service life, false positives/negatives and tampering.** When exposed to radiation, e.g., from a "dirty bomb", the sensor of RADTriage-FIT develops color instantly. The color changes are permanent, cumulative and proportional to dose thereby providing the wearer and medical personnel instantaneous, easy to read information on a radiation exposure of the victim to assess the health risks and guide treatment.

TYPES OF RADIATION: The RADTriage-FIT sensor responds to gamma/X-ray (energy higher than 30 KeV) and high energy (e.g., above 1 MeV) electrons/beta particles. Color development of the sensor is essentially independent of dose rate. However, protective films attenuate low energy (below 200 KeV) X-ray. RADTriage-FIT will not be affected by a normal exposure to diagnostic X-ray (e.g., chest or dental) or security X-ray machines. Multiple (more than five) exposures to medical or airport luggage CAT scans will result in sufficient exposure to produce a detectable color change in the sensor.

HOW TO READ DOSE WITH RADTriage-FIT: Estimate the exposure dose by comparing the color of the sensor with the color reference bars. For higher accuracy lift the red filter and find a bar which closely matches the color of the sensor and read the dose in rad/mSv which is printed adjacent to those bars. If the sensor develops a color in-between any two adjacent bars, this indicates an in-between dose. For a nearly tissue equivalent dosimeter, such as RADTriage-FIT, 1 rad = 1 rem = 10 mSv. It can be viewed in any light. However, we recommend reading the dose under fluorescent lights for a better accuracy. **Color matching under other lights may not be as accurate**. Dose can be estimated with an uncertainty of about 20% with a color-matching reference chart. Where additional accuracy is needed, a spectrophotometer or an optical densitometer can be used to determine the dose to within 10%.

EFFECTS OF HEAT & UV LIGHT: RADTriage-FIT provides sufficient protection from sunlight and can be read more accurately by lifting the red filter. The unprotected sensor of RADTriage-FIT will develop colors faster if exposed to UV/sunlight for a prolonged period. Keep RADTriage-FIT at or below normal body temperature. Repeated, e.g.,

hundreds, of readings where the sensor gets exposed for less than a minute per reading (even under direct sunlight) will cause little or no color development in the sensor.

LAUNDRY CYCLE: A normal residential laundry cycle of washing and drying (below 175^{o}F/80^{o}C) has a negligible effect on RADTriage-FIT. However, repeated laundry cycles or exposure to temperatures higher than 80^{o}C will damage the sensors and hence must be avoided. Replace RADTriage-FIT if it is subjected to boiling water or more than one laundry cycle.

FALSE POSITIVE & TAMPER INDICATORS: If used as per instructions, it is least likely RADTriage-FIT will provide false positives or negatives. False signals can create unnecessary problems for users and issuing organizations. Your RADTriage-FIT is a SMART personal dosimeter, equipped with a simple-to-use revolutionary indicator for monitoring the deliberate or inadvertent exposure to high temperatures or ultraviolet light. We call it **FIT**^{TM} (acronym for **F**alse-positive, **I**nactivation and **T**amper) indicator and it is located on the right hand end of the sensor. FIT simultaneously monitors false positives & negatives, overexposure to heat & UV/ sunlight, service-life, inactivation and/or altered sensitivity.

Inactivation & False Negative Indicator: If the central dot (if printed) of the FIT indicator or the FIT indicator itself is blue, the sensor is active, it is monitoring radiation and the calibration is valid. However, if it has changed to purple or red, your RADTriage-FIT has been heated near or above 90^{o}C which has made the sensor inactive to radiation or has altered the sensitivity to radiation. **DO NOT USE the dosimeter if the central dot of FIT or FIT indicator is purple or red.** Turn the dosimeter in to the issuing organization with a description of the circumstances.

False Positive Indicator: The service life (expiration date) of the dosimeter is based on storage of RADTriage-FIT at room temperature (71^{o}F/22^{o}C) or below and continuous protection from ultraviolet/sunlight exposures. Service life will be reduced if it is stored at higher temperatures and/or exposed to UV/sunlight for a prolonged period (e.g., more than a few hours of direct sunlight). **The service life will reduced to half (six months) and quarter (3 months) if the dosimeter is stored at 32^{o}C and 42^{o}C respectively.** In order to expend the service life, keep the dosimeter in a refrigerator when not in use. The FIT indicator should be light blue when issued/purchased. If it has developed a color matching or darker than its color reference bar on its right, the service life of the RADTriage-FIT has expired; it was overexposed to UV light, and/or exposed to higher temperatures for a prolonged period. The sensitivity of the FIT indicator to X-ray is hundreds of times lower than that of the sensor. It will also develop a very faint blue color at 5,000 mSv.

Service life: The sensor of RADTriage-FIT will develop color equivalent to about 10-20 mSv in about one year if stored at 22^{o}C. The service life of RADTriage-FIT can be extended to about five years if kept in a freezer. The service life of RADTriage-FIT expires one year from the issue date and definitely when the color of the FIT indicator matches or is darker than the color reference bar on the right hand side. **The service life will reduced to half (six months) and quarter (3 months) if the dosimeter is stored at 32^{o}C and 42^{o}C respectively.**

UV/TAMPER DETECTOR: A small portion of the sensor is covered with the FIT indicator. The substrate of the FIT indicator is 100% opaque to visible and UV light but transparent to X-rays and gamma-rays. If the color development of the sensors is due to exposure to high energy ionizing radiation, the whole sensor will be uniformly colored. If the color development of the sensors is due to exposure to UV light, the color of the sensor under the FIT indicator will be significantly lighter. If you suspect the color development of the sensor exposure to high energy ionizing radiation, return the RADTriage-FIT to JP Labs or authorized distributor. For a fee, we will remove the sensor for determination of genuine exposure or false positive.

REPORTING EXPOSURE: If the sensor of RADTriage-FIT develops darker color and the color development is not due to prolonged exposure to high temperatures, UV/sunlight, and/or expiration of service life, estimate the dose and immediately report it to the department/agency/organization issuing the dosimeter. Seek advice and medical help immediately from your agency/company medical office, your personal health care provider or county public health office, especially if the dose is higher than 250 mSv. For a dose higher than 1,000 mSv, report to the nearest Emergency Room.

ADDITIONAL INFORMATION: Only limited information can be provided on this one page manual. For additional useful information, visit *www.jplabs.com*.

LIMITED LIABILITY: Reasonable efforts have been made to make this product free from defects. It is expected to perform as specified if used as recommended and instructions are followed. In the event that the product does not perform as specified, JP Labs will replace the product. JP Labs specifically disclaims all other warranties and liabilities expressed or implied. All warranties are null and void if at least any of the following occur: (1) the central dot of FIT indicator or the FIT indicator itself is red is matching or darker than that of its color reference bar and (2) RADTriage-FIT is tampered with in any way.