

## TLD Patient Dose Measurement Service

### General:

The TLD patient dose measurement service provided by K&S uses the Harshaw TLD-100 chips. The chips are supplied in folders with a place to record the exposure information for each packet. The packets may be supplied with sticky tape on the back that may be applied directly to the patient's skin. The user is required to record the date of exposure and such other identifying information in the card as may be needed by the clinic to describe the location. Please note that this information is critical to have a successful measurement using TLDs.

### REQUIRED DATA

<u>ITEM</u>	<u>Purpose</u>
TLD ID number	to establish history of chip
Exposure date	to determine when the chips may be readout (date),
Energy of beam(s)	to establish calibration energy
anatomical location	to identify location of the dose.
Special notation	control, calibration dose and calibration conditions, etc.

One or more chips are sealed in polyethylene as ordered with numeric designations and should not be removed from the packet. The packets are intended to be exposed as is. Do not remove the chips from the packet. If the packet seal should be inadvertently opened or torn, do not touch or otherwise contaminate the chip. Handle only with forceps.

### Measurements with TLDs

Initially and after each use, a group of TLD-100 chips are annealed at 400 degrees C for one hour and 80 degrees C for two hours and then exposed to Cobalt-60 for a 10cm x 10cm field on a phantom at Dmax. The chips are read out in a Harshaw 3500 single chip reader to determine the individual chip sensitivity. The chips are then annealed again, sealed in poly as ordered (tape strips added if needed) and mounted in a card folder for shipment.

### Calibration of the TLD dose measurement

The most accurate TLD measurements occur when the calibration TLDs are exposed using a subset of the TLDs provided for patient dose measurements. For this reason, we recommend that the calibration be performed at the user's facility using the user's beams. The best uncertainty of the reported radiation dose is achieved by calibration to the user's beams since any disagreement between the user's beams and the NIST traceable beams at K&S will be eliminated.

High energy photon and electron beam calibrations should always be done under

calibration conditions (10cm x 10cm field, calibration SSD/SAD) using an appropriate solid phantom with the calibration TLDs placed on the surface of the phantom. A bolus should be used only if a bolus is to be used when the TLDs are exposed on the patient. The TLDs will then be calibrated to predict the dose at Dmax for the required energy.

### **Uncertainty**

The combined expanded uncertainty with a coverage factor of 2 (95% confidence) of the TLD measurement with one chip is 5%. Three chips used to measure the dose at the same point will reduce the uncertainty to approximately 3.5%. Thus for high precision dose measurements, several calibration chips are recommended.

The length of time between the annealing and preparation of the chips and the exposure also influences the overall uncertainty of the measurement. TLDs should be ordered, exposed and used within a one to two week period. We do not recommend using chips for dose measurements after 30 days have expired since preparation. Please order only what you need for a one to two week period. For large quantity orders, release for shipment only a one to two week supply at a time. TLDs that have not been used within 30 days should be returned for a partial credit.

### **Usual turn-around time**

Typical turn-around time for the readout of the TLDs and report generation is 24 to 48 hours after the exposure of the TLDs. Current policy requires that readout should not be attempted until at least 24 hours has elapsed after exposure. Usually the TLDs are read out the same day as received or the next day. A preliminary report is usually prepared and faxed to the institution on the day of report preparation. The formal report usually follows several days later to allow time for all reviewers to complete their work.

### **Control chips**

Each shipment of TLDs are provided with a control chip at no additional charge. These control chips should not be exposed. Their purpose is to monitor radiation exposure during shipment. If the return of the chips occurs in more than one shipment, an unexposed chip should be included in the return shipment for monitoring during shipment.

### **Reports**

TLD orders include one report indicating the information provided on each exposure when the card is returned. Additional charges may be apply for the preparation and quality review of multiple reports

### **Charge for lost or unreturned TLDs**

Lost or unreturned TLDs are billed at the rate of \$10 per chip.

**Quantity orders**

Quality discounts are available for large orders. Please call for a quotation.

If a large quantity is needed but will not be used immediately (within 30 days), the user should release for delivery only those chips that will be used within a one to two week period.

**Mechanical stress**

It is important to minimize the mechanical stress on the TLD chips.

**Storage for long periods**

If the TLDs are to be stored for a period of time before use, it is best to store them in a dark cool environment. We do not recommend holding the chips longer than 30 days at a time.