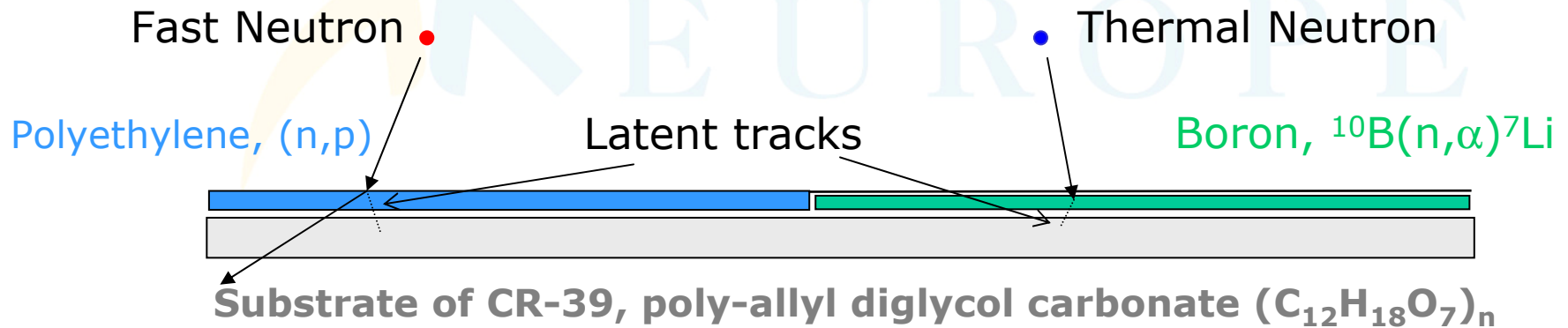
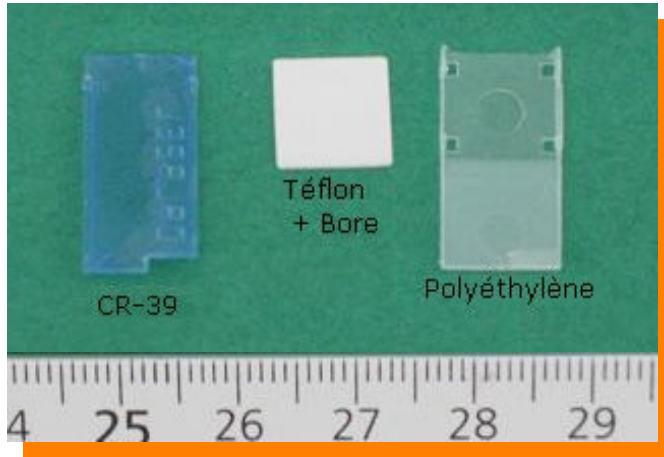


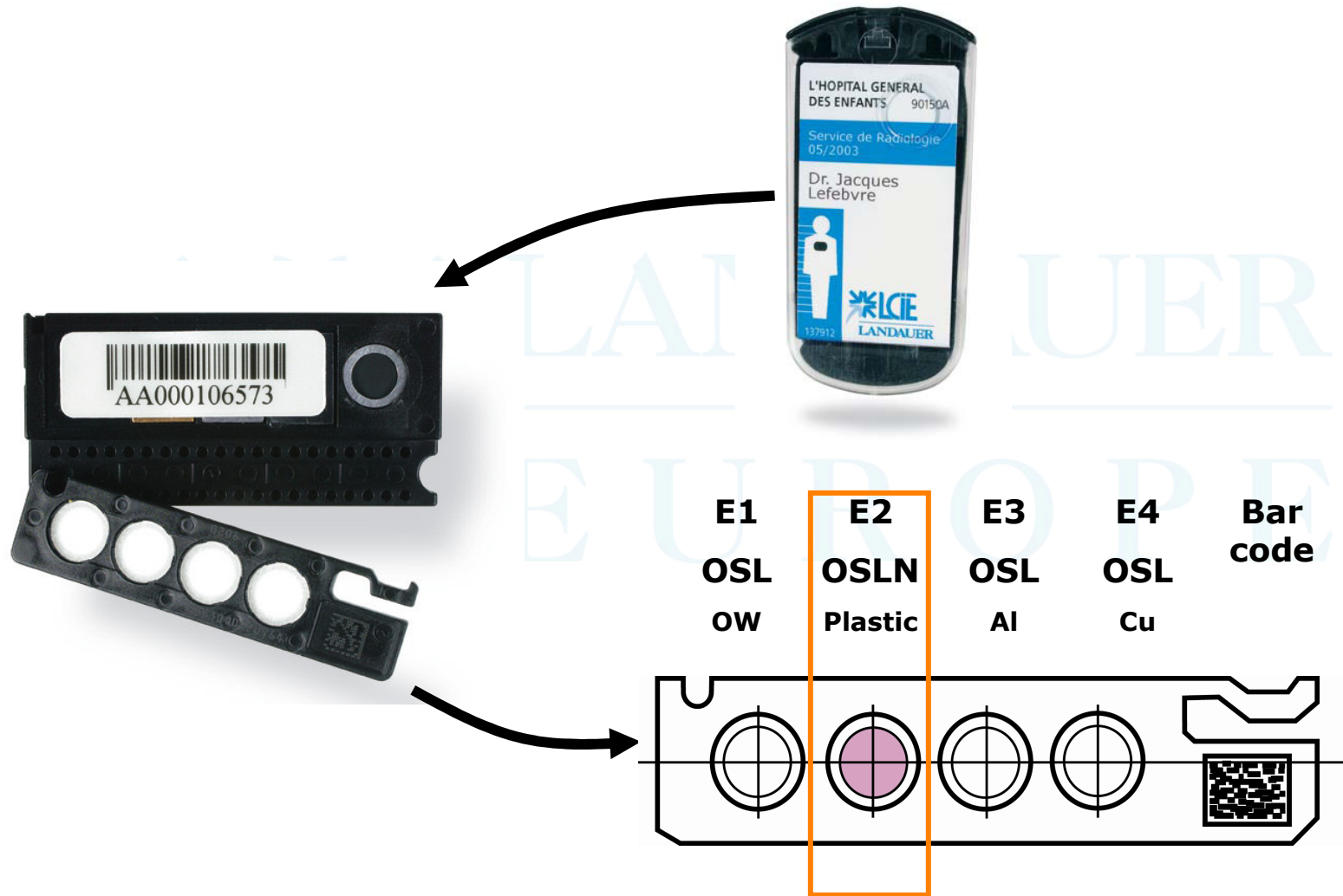
A new OSL albedo dosemeter

Dr. Chris PERKS
Technology Manager
LANDAUER EUROPE

Current system – CR-39

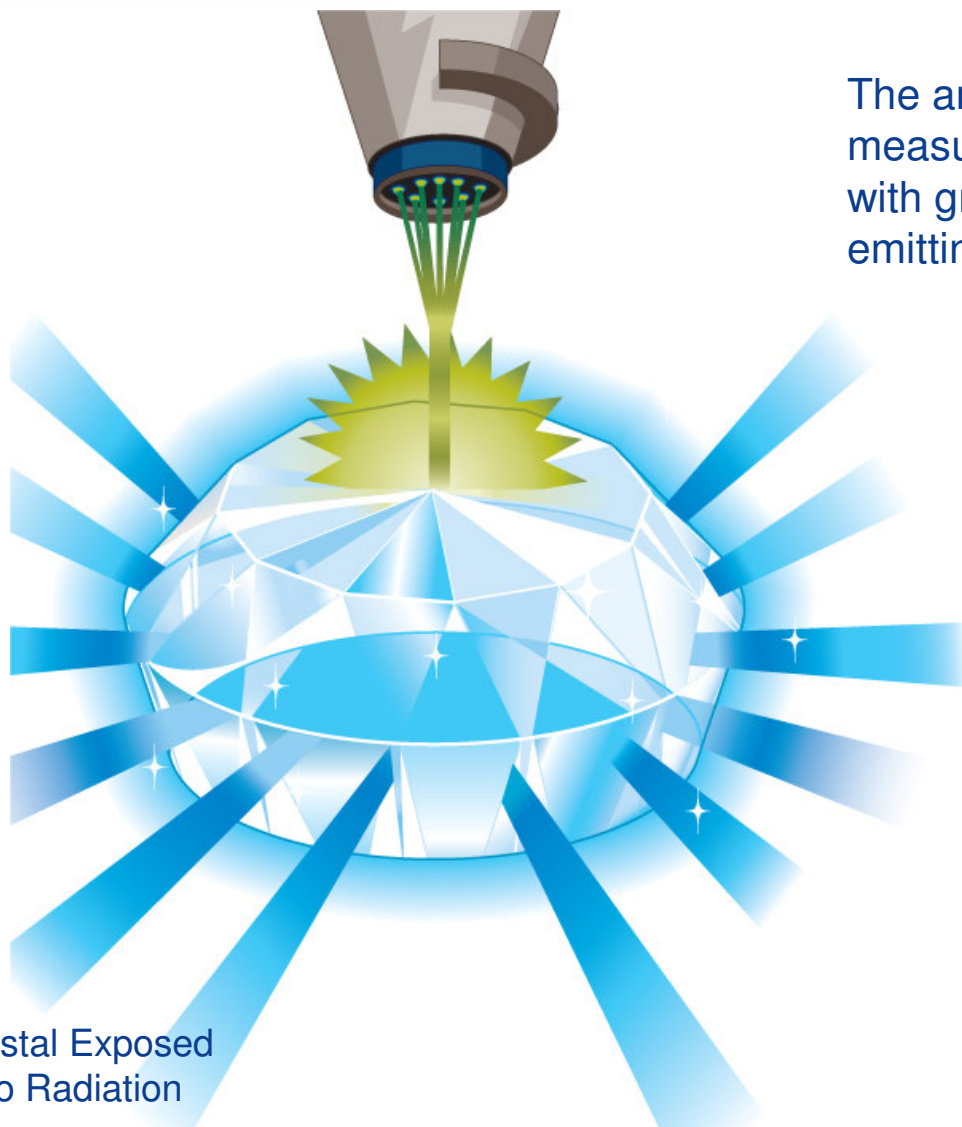


A new albedo dosimeter



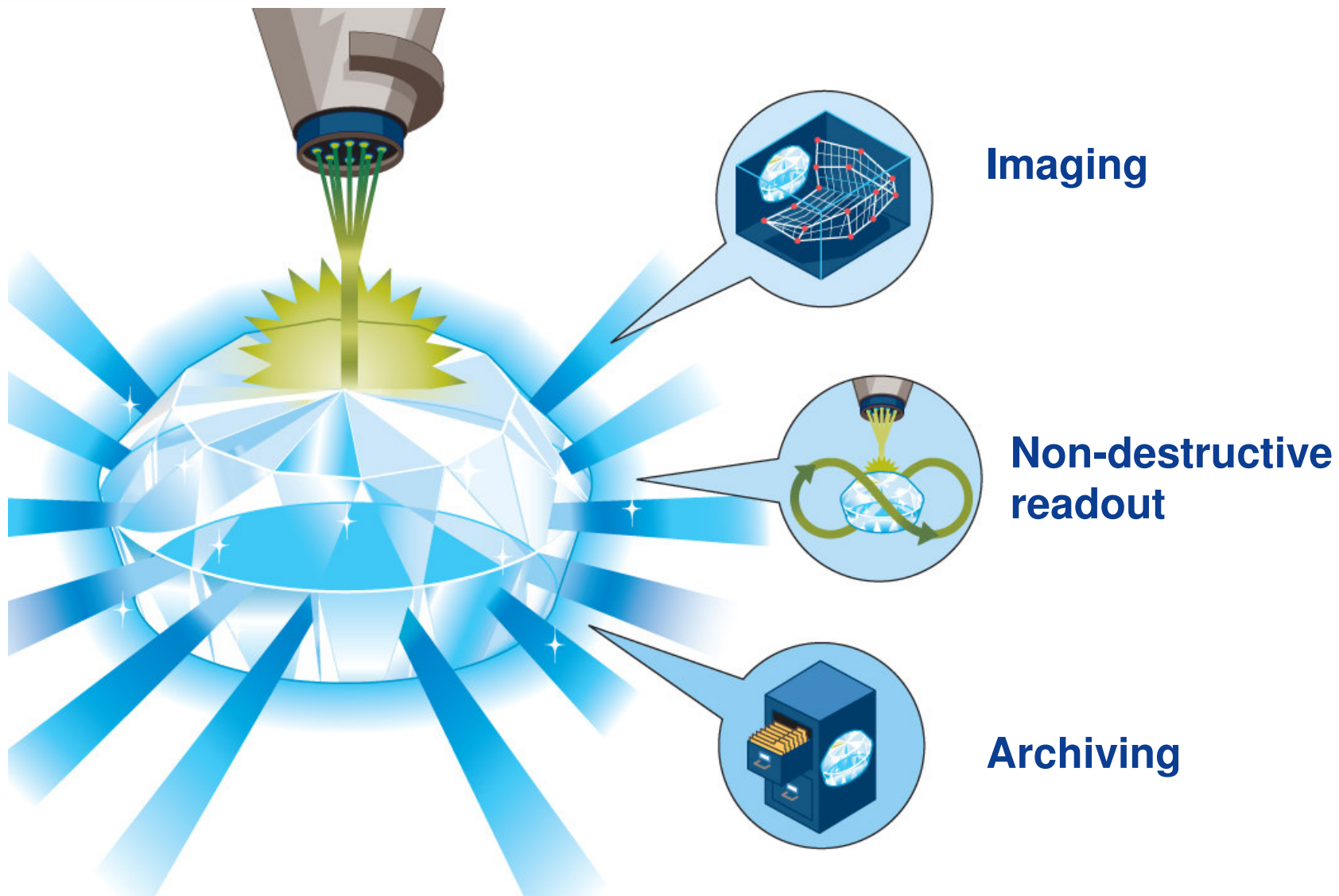
OSL – principals

The amount of radiation exposure is measured by stimulating the Al_2O_3 material with green light from either a laser or light emitting diode source.



The resulting blue light emitted after stimulation indicates the level of radiation exposure. This can be done repeatedly to verify a radiation exposure or to accumulate a total dose over time.

OSL - benefits



How it works

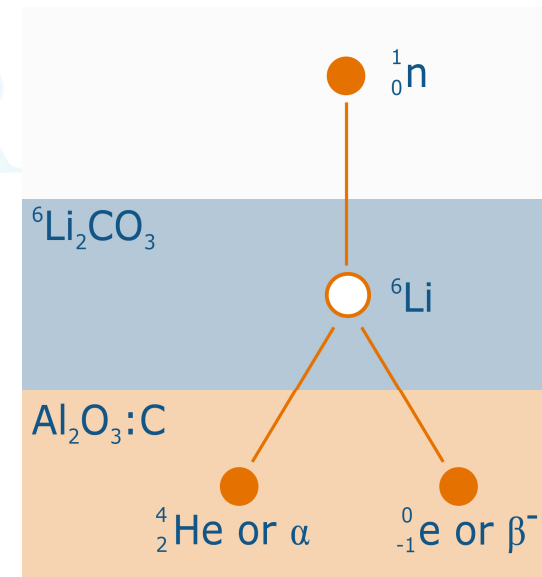
→ $\text{Al}_2\text{O}_3:\text{C}$ coated with ${}^6\text{LiCO}_3$

→ Neutron response

- ▶ Is induced in the $\text{Al}_2\text{O}_3:\text{C}$ when ${}^6\text{Li}$ absorbs a neutron (${}^1_0\text{n}$)
- ▶ Produces both tritium (${}^3\text{H}$) and alpha (${}^4\text{He}$) particles

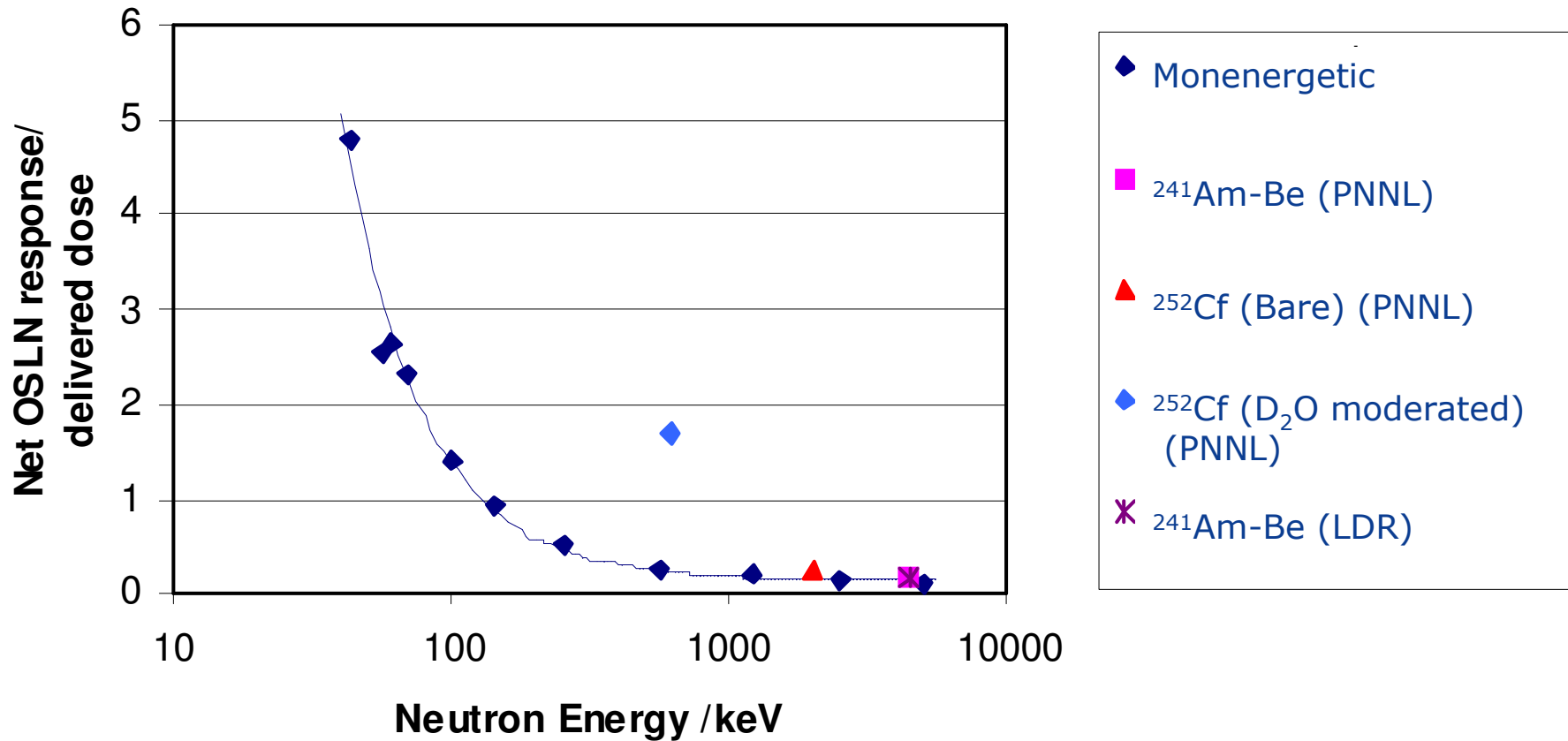


→ Alpha and beta particles deposit their energy in detector via coulomb interactions.



- Photon response
- Neutron response
- Linearity
- Fade
- Energy response
- Depletion
- Optical annealing

Energy response



Field testing

Description	Phantom	NCF
Highest level in containment- direct line of sight to top of Steam Generator	1	1.568
Highest level in containment- direct line of sight to top of Steam Generator	2	1.580
Highest level in containment- direct line of sight to top of Steam Generator	3	1.580
Operating floor, mostly open grating above, some obstruction	4	1.595
Operating floor, mostly open grating above, some obstruction	5	1.581
Operating floor, mostly open grating above, some obstruction	6	1.573
Below grade, 12" of concrete above	7	1.482
Basement level	10	1.608
Basement level	11	1.572
Average		1.571
STD		0.036
CV		0.023

Comparison with other neutron dosimeters

PNNL Neutron Field	OSLN Al ₂ O ₃ :C material coated with ⁶ LiCO ₃	LDR Neutrak CR-39	Panasonic UD-802* ⁶ Li ₂ B ₄ O ₇	Thermo Electron TLD-600 - TLD700 ⁶ LiF - ⁷ LiF
	Response/mSv	Response/mSv	Response/mSv	Response/mSv
Moderated ²⁵² Cf with D ₂ O Sphere	1.69	1.54	1.66	3.02
Bare ²⁵² Cf	0.22	1.54	0.21	0.31

* Stanford, Stanford Dosimetry, *Three Whole Body Algorithms for the PantexPlant Panasonic 802 TLD*, February 1992

- OSLN and UD-802 same response/mSv characteristic
- Significant variations noted with all albedo neutron dosimeters for response/dose
- CR-39 response/dose the same for the 2 radiation fields

Advantages of OSL albedo dosemeter

- Compatible with existing InLight system
- Re-readable
- Quick annealing



Automatic
reader

Annealer



microStar



→ This work was undertaken by Landauer principally by:

- ▶ Chris Passmore,
- ▶ Mark Salasky and
- ▶ Mirela Kirr