

# Leaps in Hybrid Dosimetry

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Mirion Connect 2025



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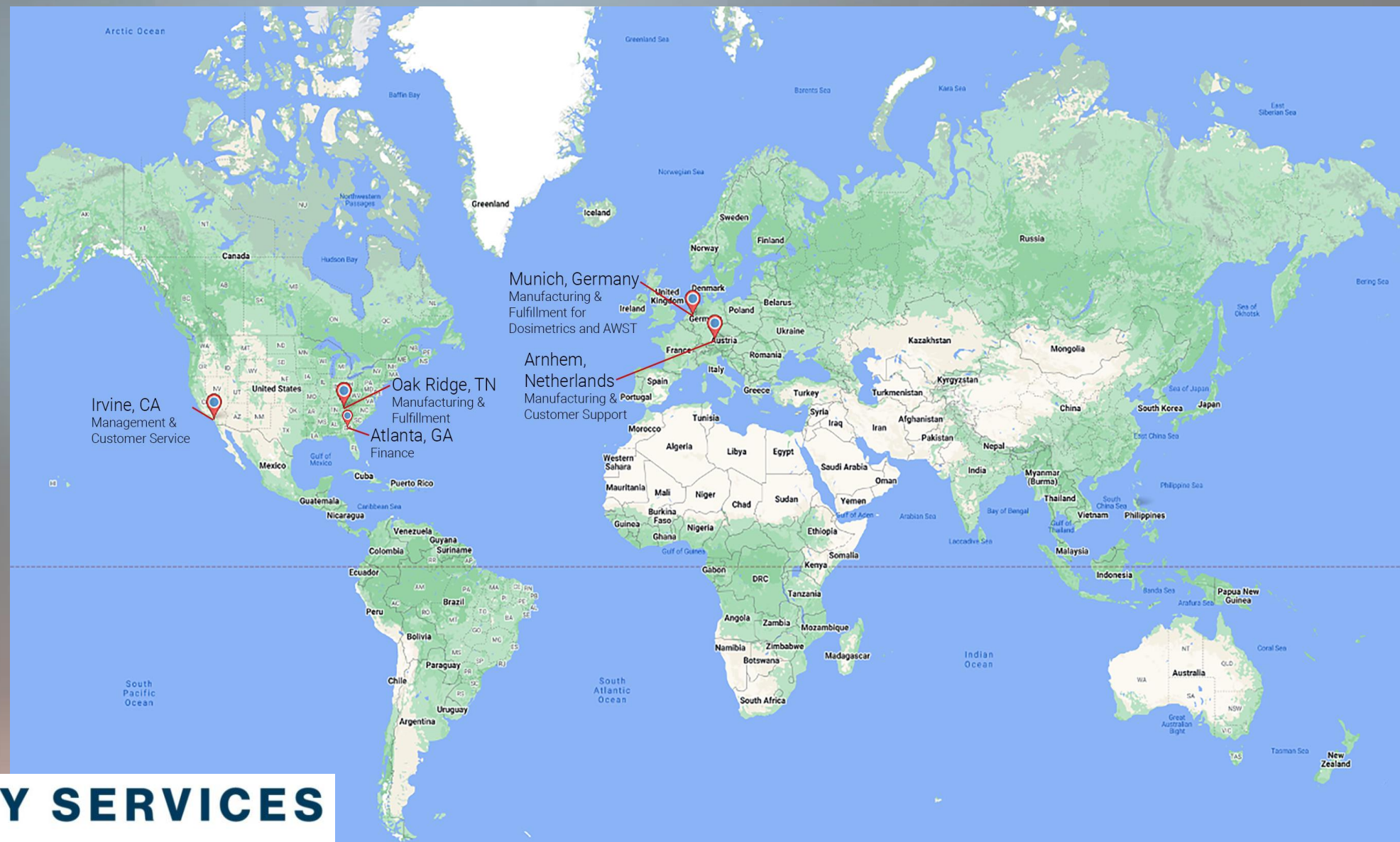
# Dosimetry Services Overview

2<sup>nd</sup> Largest Dosimetry Services Provider

5 Locations (3 US / 2 Intl)

1.3M Monitored Individuals (50K customers)

25% Using Instadose<sup>®</sup> Dosimeters



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# Why STP chose Instadose Vue Dosimetry



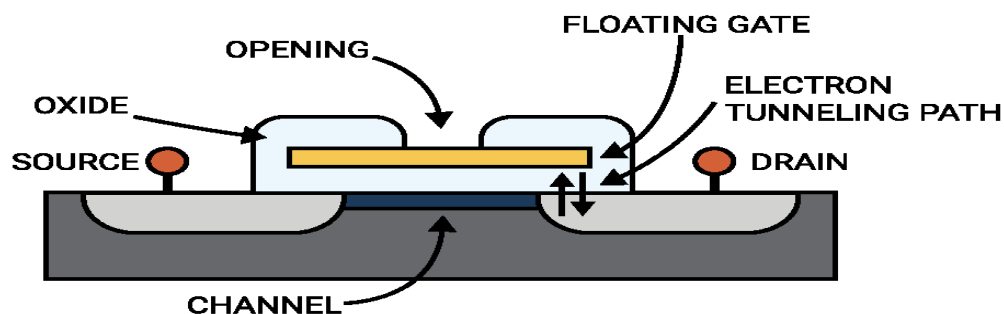
- The ease of dosimeter “processed” or read by Bluetooth while on site and still issued to a person to acquire “record” dose
- Cost Savings by reassigning badges without extra charges.
- Instant knowledge of dose discrepancies between active and passive dosimetry
- Dose is time stamped when received
- Electronic labels



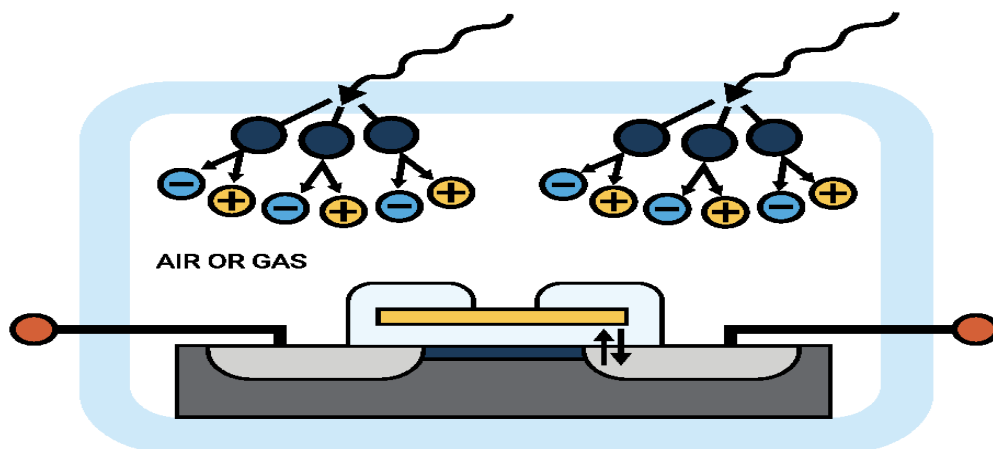
# Direct Ion Storage (DIS) Technology

## **DIRECT** Ion Storage (DIS)

Self-reading for immediate determination of exposure.



- Surface of the floating gate is exposed to surrounding space.
- Ions in the form of electric charge are gathered within the floating gate.
- Source anode has a non-volatile memory cell element.



- Memory cell is surrounded by ion chamber filled with gas.
- Secondary electrons generated by initial interactions within chamber wall ionize the gas inside.
- Ions are separated between the electrode and wall then stored in the memory element cell.



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# Why Instadose Vue for Passive Dosimetry

**National Voluntary  
Laboratory Accreditation Program**



## **IONIZING RADIATION DOSIMETRY**

**NVLAP LAB CODE 100555-0**

100555-B6, APex (Badge Type 30) – OSL-BeO<sub>2</sub>-Bx for ANSI N13.11-2009 categories IA, IIA, IIIB, and IVAB.

100555-B7, Instadose ID-1+ - ID-1+ for ANSI N13.11-2009 categories IA and IIA.

100555-B8, Instadose 2 - ID-2 for ANSI N13.11-2009 categories IA, IIA, IIIB, and IVAB.

100555-B9, Genesis Ultra (Badge Type 36) - TLD-MCP-BP for ANSI N13.11-2009 categories IA, IIA, IIIA, IVAA and VCA.

100555-C2, Instadose Vue - for ANSI N13.11-2009 categories IA and IIA.

100555-C4, Instadose ID Vue-Beta - for ANSI N13.11-2009 categories IA, IIA, IIIA and IVAA.

100555-C5, Instadose ID Vue-Neutron - for ANSI N13.11-2009 categories IA, IIA, IVAA and



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# Dosimetry Inventory at STP

Instadose Vue NVLAP  
accredited dosimeters

- Photon
- Photon/beta
- Photon/beta/neutron

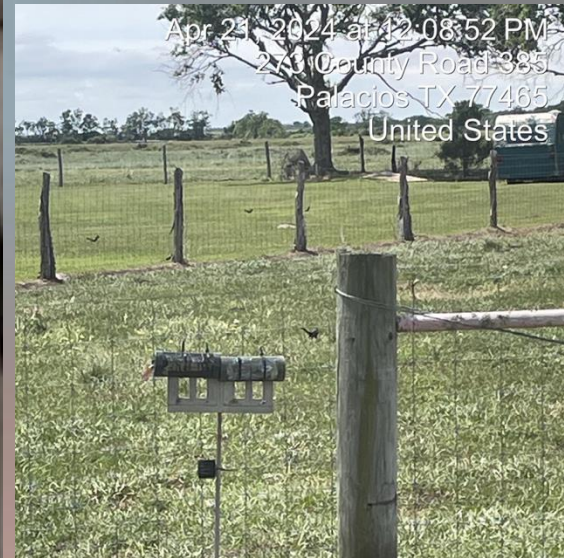
Badge Inventory at STP:

1200 inhouse workers

900-1500 outage and  
multibadges

950 emergency Plan  
badges

250 environmental  
badges

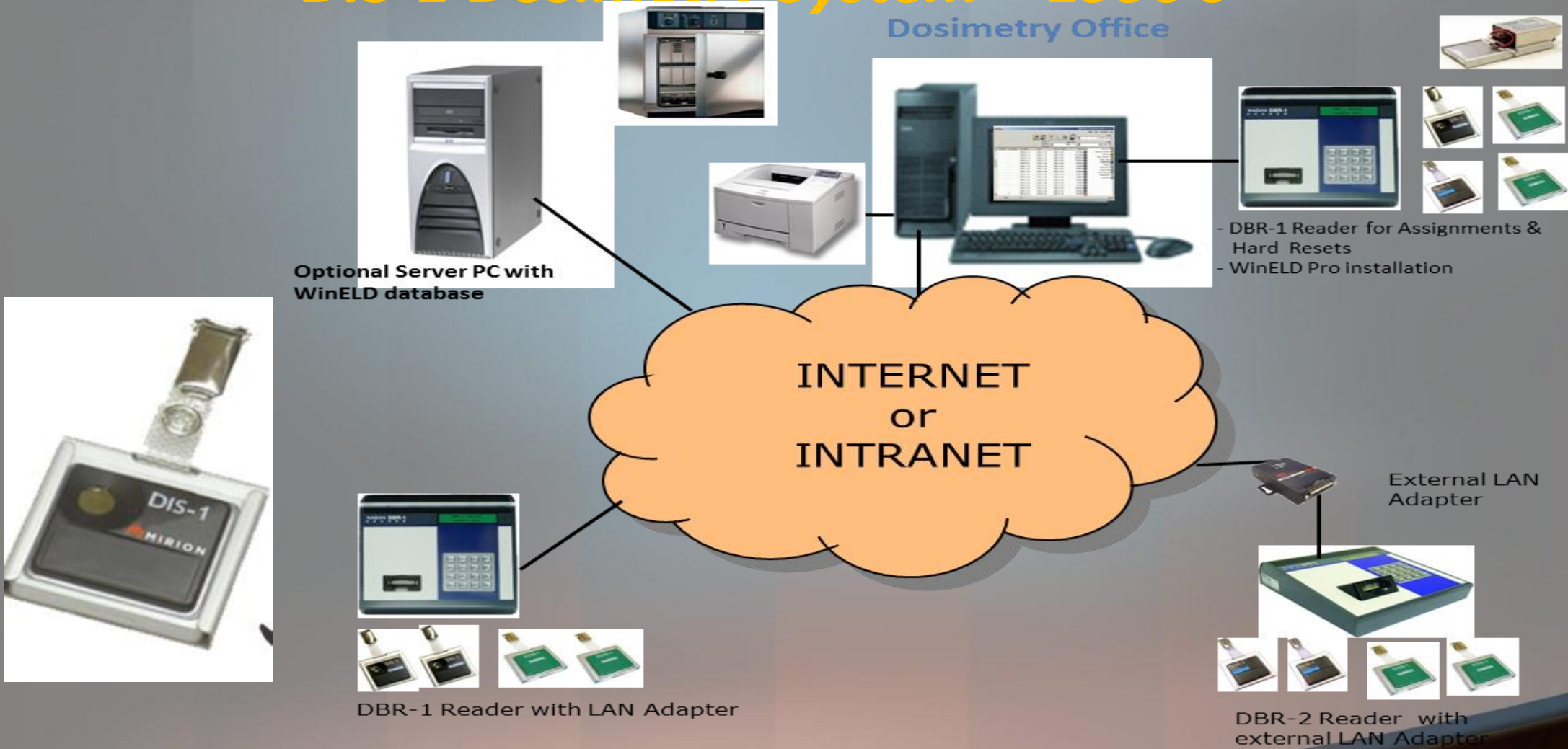


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# The Future of Dosimetry Monitoring is Mirion

## *DIS-1 Dosimetry System – 1990's*



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# ***DIS-1 Dosimetry System***



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# Instadose 1 – late 2000's



USB-  
Compatible  
Dosimeter

Energy Response:

Photon 5 keV - 6 MeV

Min Rep Dose: 3 mrem - 500 rem (0.03 mSv - 5 Sv)

\*1 mrem (0.01 mSv) upon request

1



2



3



"Plug-in &  
Read"



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# Instadose<sup>®</sup>+ - 2010's

Energy Response:  
Min Rep Dose:

Photon 5 keV - 6 MeV  
5 mrem - 500 rem (0.05 mSv - 5 Sv)



“PUSH” to Perform  
Manual Read

Detector

Detector Battery  
(10 year life)

Communication  
Battery  
(5 year life)  
\*weekly read cycle



- ✓ Dose data stored until communicated/transmitted.
- ✓ Wireless transmission (via InstaLink hotspot, Instadose mobile app, PC with instaLink-USB).



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# Instadose<sup>®</sup>2 – late 2010's

Energy Response: Photon 5 keV - 6 MeV

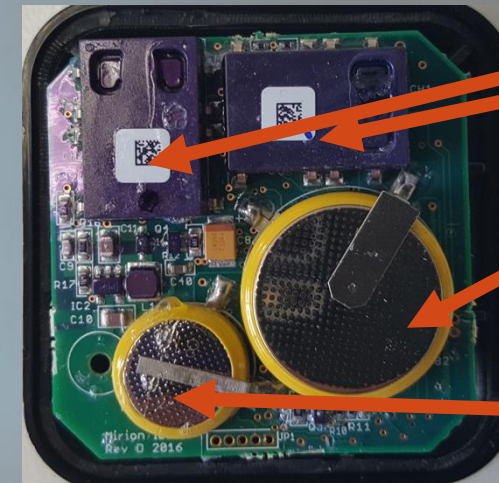
Beta  $\geq 0.8$  MeV

Min Rep Dose: 10 mrem - 500 rem (0.1 mSv - 5 Sv)



**“PUSH” to Perform  
Manual Read**

- ✓ Dual-detector for independent deep [Hp(10)] & shallow [Hp(0.07)] measurements of photon & high-energy beta radiation.
- ✓ Wireless transmission (via InstaLink hotspot, Instadose mobile app, PC with instaLink-USB).



**Detectors**

**Communication  
Battery  
(5 year life)  
\*weekly read cycle**



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# What's NEW with the Instadose® VUE – launched January 2024

## Improved Technology

- Utilizes the most advanced wireless, processing & communication technologies available
- More robust, stable connectivity & communications
- Increased battery life & performance

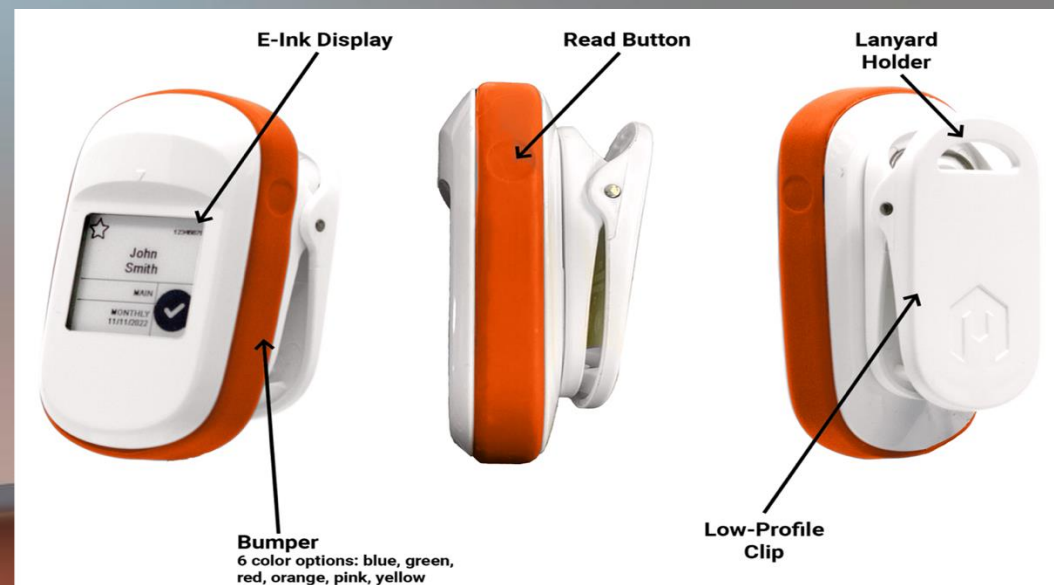
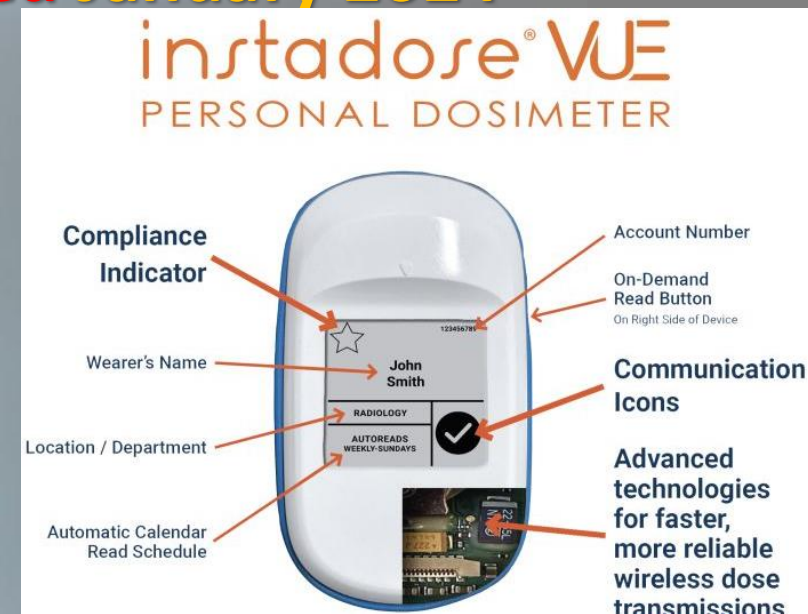
## Electronic Display Screen\*

- Displays dynamic wearer & operational information  
\*no dose is displayed on dosimeter screen

## All 3 Measurements (launched in phases)

- Photon (Available now)
- Beta (Available in late 2025)
- Neutron (Available in early 2026)

**The new InstadoseVUE**  
Advanced technology for increased safety



**DOSIMETRY SERVICES**

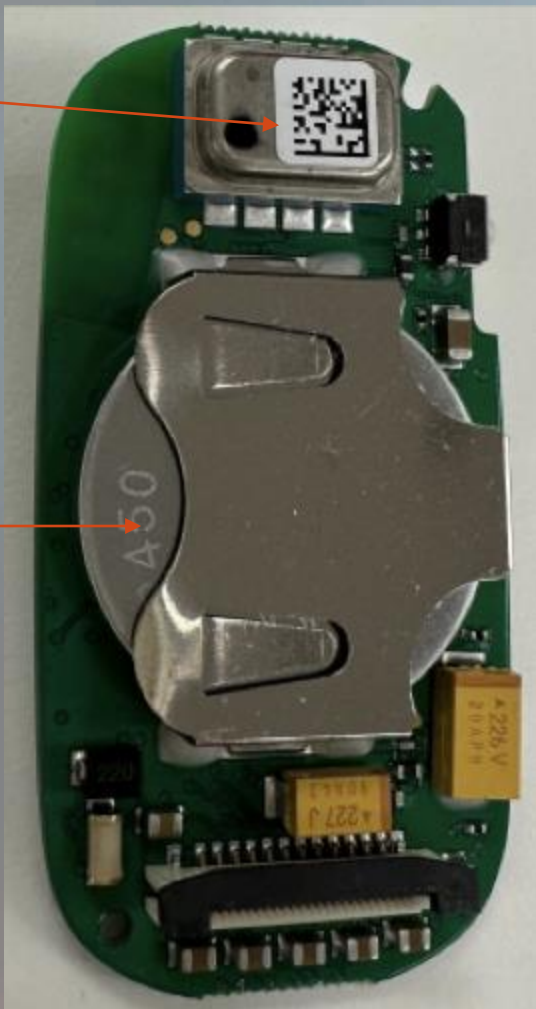
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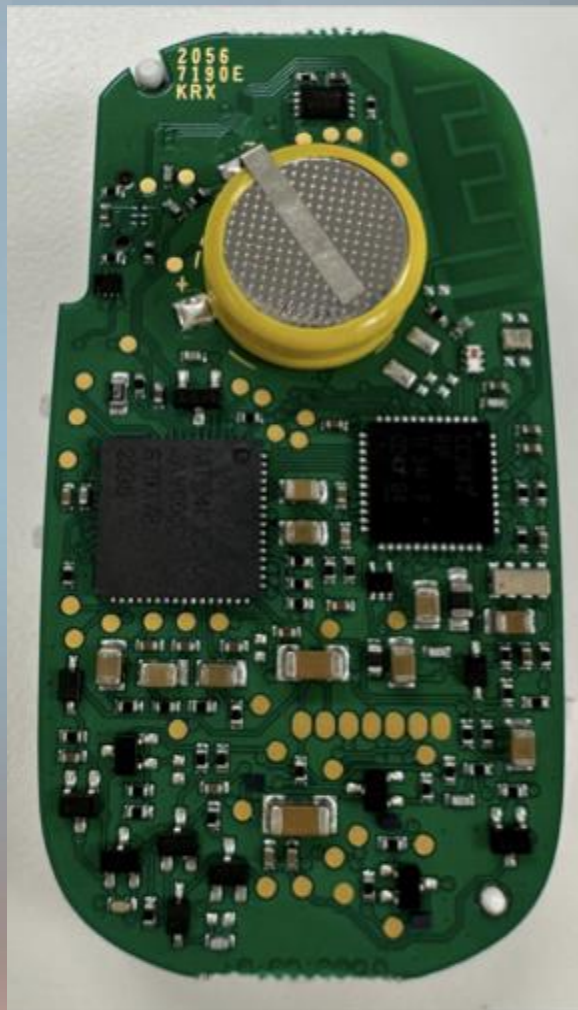
## Internal Detector in Instadose Vue

DIS  
Detector

Communication  
Battery



Note –  
Display not  
shown



Broken screen in  
Instadose Vue, was  
sent to Mirion and  
“processed”



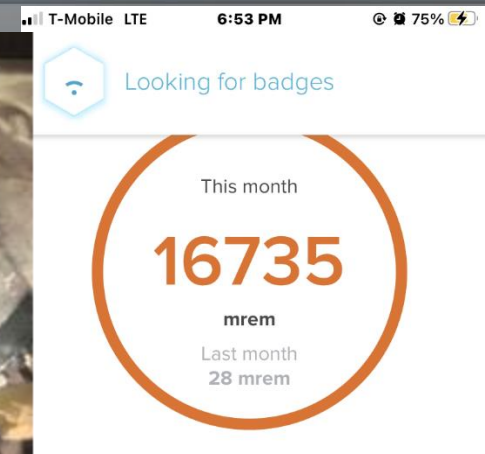
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# Jobs at STP that used Instadose Vue

1. Vistors (working vistors, NRC, ANI, oversight, radiography)
2. Westinghouse (refuel workers that arrive after RX shutdown, S/G crew, management)
3. S/G Jumpers packs
4. Short term workers i.e. Freeze tech, engineering vendor walkdowns



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**RADIOGRAPHY  
TODAY**

**UNIT 1 - RCB Pressurizer**  
**BE AWARE OF RADIATION**  
**BOUNDARY SIGNS AND POSTINGS**

POINT OF CONTACT  
RP OCC Rep - ext 4214



# MRD values for ID and NVAP categories

Instadose®VUE | **Wireless Dosimeter** Photon + Beta + Neutron

Specifications	 <b>Instadose®VUE Photon</b>	 <b>Instadose®VUE Beta</b>	 <b>Instadose®VUE Neutron</b>
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Minimum Reportable Dose	Photon: 5 mrem (0.05 mSv)	Photon: 5 mrem (0.05 mSv) Beta: 7 mrem (0.07 mSv)	Photon: 5 mrem (0.05 mSv) Beta: 7.5 mrem (0.075 mSv) <i>3 mrem available upon request</i> Neutron: 20 mrem (0.2 mSv)
Useful Dose Range	5 mrem – 500 rem* (0.05 mSv – 5 Sv)	5 mrem - 500 rem* (0.05 mSv - 5 Sv)	5 mrem - 500 rem* (0.05 mSv - 5 Sv)
Energy Response	Photon 20 keV - 7 MeV	Photon: 20 keV to 7 MeV Beta: 70 keV to 0.935 keV	Photon: 20 keV to 7 MeV Beta: 70 keV to 0.935 keV Neutron ( <i>configurable</i> ): 2.5 E-8 MeV to 14 MeV



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# Lessons Learned for Implementing the Instadose Vue for Passive Dosimetry at STP

- Fall 2024 STP outage workers used around 355 Instadose (ID) Vue photon
  - Westinghouse Refuel -fast turnaround results but had to do some training on FME.
  - Westinghouse Steam Generator (S/G) work primary and secondary side
    - Multi-badging of (S/G) jumpers into the S/G tubes. Had three dosimeters on each location, extra work and cost.
  - Instrument and Control (I&C) technicians on Reactor (Rx) head instrumentation. Two dose extensions performed.
  - Radiation Protection technicians providing job coverage. Had manual work w/o API
  - Mechanical Maintenance group performing welding valve work. Had one broken ID
  - Visitors needed to manually upload API data
  - Area Monitors. Still need to integrate with GEDDS





# Implementing the Instadose Vue for Passive Dosimetry at STP

TLD Number	TLD (mrem)	DMC 3000 (mrem)	Instadose Vue (mrem)	Calculated difference DMC vs TLD	body location
3623148614	57	50.3	54	6.85%	left upper arm
3623148181	71	63.5	65	2.31%	head
3623148195	102	98.6	102	3.33%	left upper arm
3623149116	73	95.4	96	0.62%	back
3623149112	106	106.3	104	-2.21%	head
3623148905	101	91.9	100	8.10%	left thigh
3623148891	103	95.6	98	2.45%	right thigh
3623148794	87	87	93	6.45%	gonads
3623148251	105	91.8	96	4.38%	chest
3623148198	102	100.4	107	6.17%	right upper arm
3623148273	66	70.7	64	-10.47%	chest
3623148360	76	80	86	6.98%	right thigh
3623148403	58	55	56	1.79%	back
3623148425	76	73.2	77	4.94%	head
3623148697	64	66.4	69	3.77%	gonads
3623148701	75	73.1	75	2.53%	left thigh
3623149031	68	63.2	69	8.41%	left upper arm
3623149073	87	70.8	75	5.60%	right upper arm
dose for 12 S/G jumpers	3459	3312.9	3410	3.48%	
	mrem	mrem	mrem		



# Making Dose Reads Quick & Easy

## On-Demand Dose Reads in Seconds

Read  
Button  
Location

The hourglass icon indicates that the device is searching for a connection.

The cloud icon confirms that the data is being uploaded.



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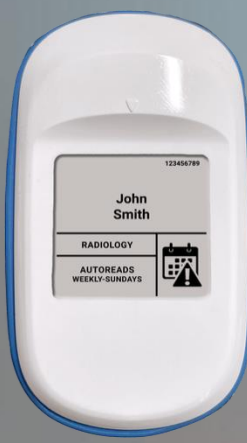


# Enhancing Engagement with Visual Feedback

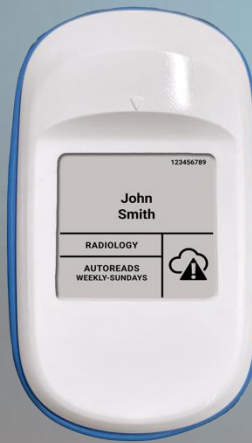
## Other Status Communication Icons



47 Days  
Since Dose Data  
Transmitted



Calendar  
Communication  
Unsuccessful



On-Demand  
Communication  
Unsuccessful



Call  
Customer  
Support



Low  
Temperature  
Error



High  
Temperature  
Error



Fatal  
Temperature  
Error

Dose Read Warning Icons

Call Support Icon



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**Confirming  
Compliance**

Instadose® VUE Dosimeter's  
Motion-Sensing Technology

[READ MORE >](#)



# Log in Process for RCA

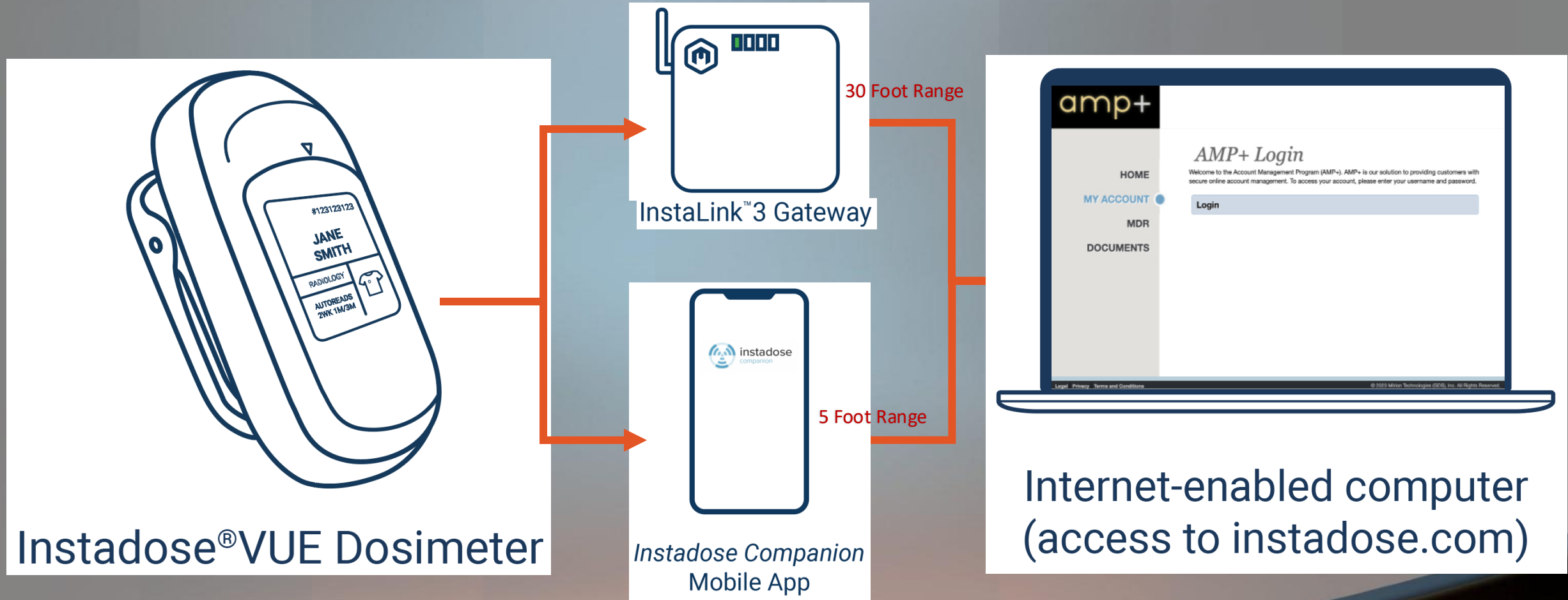
Foreign Material Exclusion (FME) was set up with loop design. Racks are used for storing Instadose Vue on site





# How Instadose®VUE Works?

## Understanding the Instadose Ecosystem



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# Instadose® Communication

- **Bluetooth® Range:** dosimeters transmitting doses must be within 50 feet of the hotspot).
- **Transmission Capacity:** 10 dosimeters/badges per minute.
- Ideal when there is a **high concentration of badges (>10) stored together when not worn** (e.g. badge board, locker room, etc.)



InstaLink™3 Gateway Status	LED 1	LED 2	LED 3	LED 4
Uploading/Transmitting Dose Data	Green	Green	Blinking Green	Off
No Power To Unit	Off	Off	Off	Off
NTP Failed	Green	Yellow	Off	Red
No Internet Access	Green	Blinking Yellow	Off	Red

**InstaLink hotspot will listen & communicate with Instadose wireless dosimeters (within range) to transmit dose data to Mirion secure servers where it is saved in the wearer's dose record.**



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# Instadose® Communication

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InstaLink hotspot will listen & communicate with Instadose wireless dosimeters (within range) to transmit dose data to Mirion secure servers where it is saved in the wearer's dose record.

# Mitigate Risks & Liability

## Comprehensive Dose Insights with Unparalleled Access

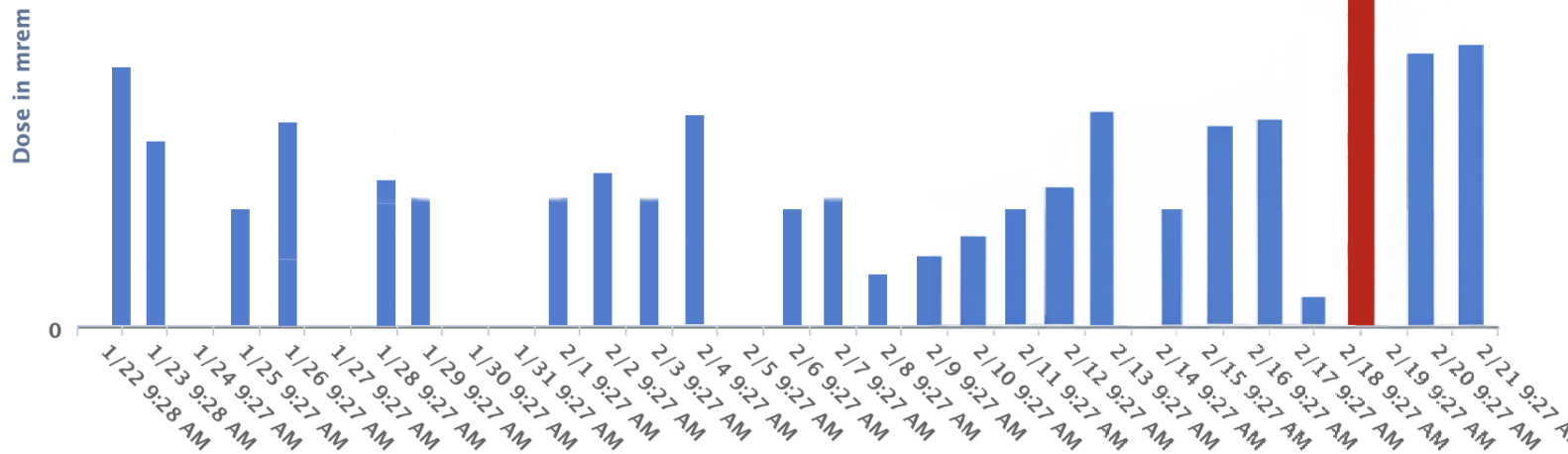
### Instadose **DAILY READS**

Serial #: 23029913: JOHN SMITH

Wearer: JOHN SMITH: 3/8/2023 to present

Period: 01/22/2024 to 02/22/2024 [Show](#)

DAILY INSTADOSE READS FOR BADGE #: 23029913  
Period: 1/22/24 to 2/22/24



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T-Mobile Wi-Fi 11:46 AM 64%

[Back](#) Read History

2025-04-04 11:45 AM	deep	FHB PHANTOM EPRI TEST 1 75 mrem	<a href="#">&gt;</a>
- Area			
2025-04-04 11:45 AM	deep	FHB PHANTOM EPRI TEST 1 80 mrem	<a href="#">&gt;</a>
- Area			
2025-04-04 11:44 AM	deep	FHB PHANTOM EPRI TEST 1 85 mrem	<a href="#">&gt;</a>
- Area			
2025-04-04 11:44 AM	deep	FHB PHANTOM EPRI TEST 1 77 mrem	<a href="#">&gt;</a>
- Area			
2025-04-04 11:44 AM	deep	JOHANN GARCIA ACEVEDO * mrem	<a href="#">&gt;</a>
- Torso			
2025-04-04 11:43 AM	deep	JOHANN GARCIA ACEVEDO * mrem	<a href="#">&gt;</a>
-			

[Overview](#) [Badges](#) [B:](#)





# Mitigate Risks & Liability

## Comprehensive Dose Insights with Unparalleled Access

Badge Serial #: 30065645

Account	Baseline	Reads	Graphs	Technical Notes	Review	Exceptions	Motions											
30065645	07/09/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
30065645	07/08/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
30065645	07/07/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
30065645	07/06/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30065645	07/05/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30065645	07/04/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30065645	07/03/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
30065645	07/02/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30065645	07/01/2025	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30065645	06/30/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
30065645	06/29/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
30065645	06/28/2025	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1
30065645	06/27/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
30065645	06/26/2025	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
30065645	06/25/2025	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
30065645	06/24/2025	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
30065645	06/23/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30065645	06/22/2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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# Account Management Program (AMP+)

**amp+**

My Account

You are logged in as Istoisescu  
Need help? Check out our [User Guide](#).

Welcome **LAURA STOICESCU**

Quick Look

ACCOUNT: 107570 : STP NUCLEAR OPERATING COMPANY (Active)

MY ROLE: RSO

Refresh Close Last updated at 23:19:19 PM

ACTIVE WEARERS: 4026

ACTIVE BADGES: 30 - Apex BeOSL: 1500  
36 - MCP TLD: 2068  
45 - Instadose VUE: 331

Manage

Account Profile: Update the pertinent information on your account.

Locations: Add and modify locations.

Wearers : Add and modify wearers and their badges.

Badges: View instadose badges in your account and assign them to wearers.

Calendars: Manage instadose+ reading calendars.

BadgeTrak Online: Track and monitor your badges.

Online Users: Add and modify online user access.

Instadose

Download Software: Download instadose reader software to perform reads from your computer.

Instadose Reports

Badges Not Communicated: Generate a report of wearers that have not read their instadose+ badges within a specified period.

Instadose Reading History: View instadose reads in your account.

Instadose Daily Dose: View daily dose readings from instadose+ badges.

Calendar Status Read: View device read analysis by calendar

Reports

ON DEMAND

REPORTS INBOX

ALARA: Generate an ALARA report for a year.

Form 5: Generate a radiation worker's Form 5 report.

History Detail: Generate a detailed report of the readings each wearer has made.

Occupational Exposure Summary: Generate an occupational radiation summary report by month or quarterly.

Termination: Generate a termination report for each wearer for a selected period.

ALARA Limit Exceeded: View wearers that have exceed ALARA limits for a dose type per quarter in a specified year, *does not include instadose badges*.

Audit Trail: View audit transactions.

Dose Review: View dosage for each wearer, *does not include instadose badges*.

Non-Returned Badges: View all badges not returned for each wearer for a selected period, *does not include instadose badges*.

My Account > Manage Wearers

You are logged in as Istoisescu  
Need help? Check out our [User Guide](#).

Manage **WEARERS**

Account: 107570 : STP NUCLEAR OPERATING COMPANY (Active)

Show: ☒ Active ☐ Canceled ☐ All

Location: All locations

Show: ☐ Active ☐ Canceled ☒ All

Search: Last Name ▼ stoicescu Search

Last Name

☐ STOICESCU  
☐ STOICESCU  
☐ STOICESCU  
☐ STOICESCU  
☐ STOICESCU

Edit Wearer # 1

Account\*: 107570 : STP NUCLEAR OPERATING COMPANY (Active)

Location\*: 00045VUE (Q1 Active)

Wearer #: 1

First Name: - ▼ LAURA

Last Name\*: STOICESCU

Gender: ☒ N/A ☐ Male ☐ Female

ID Number: Other ▼ T044940

Date of Birth: M/D/YYYY

Dose Weighting: No Calculation ▼

Start Date: 7/24/2024

TRANSFER HISTORY

START	END	ACCOUNT	LOCATION	WEARER #
10/1/2024	7/1/2024	107570	00000IDV	1
7/24/2024	10/1/2024	107920	00000NUC	1

\* Indicates a required field.

Last Modified on 10/1/2024

Actions: Add Wearer Edit

Close Window View Badges Transfer Wearer Cancel Wearer Save

Powered by **MIRION** TECHNOLOGIES



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# Future work of Dosimetry and Application Programming Interface (API)

- We need to transfer data automatically to database for issue and collection of dosimeters.
- Facilitate data communication between dosimetry vendor and client of processed dose data

Rad Worker Management v.1.12.00.20230314 - STOICEL @ prsen9 / NPFO76/NPFO80

File View Options Help

Selected Worker: T044940 Name: STOICESCU, LAURA

Search: Employee ID

Active Inactive Terminated

Type in the keyword to find:

Employee ID	Last Name	First Name	Middle Initial
T044940	STOICESCU	LAURA	

Individual Qualifications TLD Data Dose Data

Single Multipack / Extensity TLDs Monitoring Year: 2024

TLD	Batch ID	Assign...	Return Date	Posting Date	TLD Type	TLD Status	Been Used	Been Lost	Neutron Set ID	Resolution Date	Error Code	Error Status	Plant Code
3622209556	2023008	11/1/2022	1/7/2025	4/14/2022	GAMMA BETA NEU	POSTED	Yes	No		4/14/2025 1...			Missing Co
0040525740	2023008	10/30/2024	11/1/2024		GAMMA BETA NEUTRON	DEASSIGNED	No	No					STP
00410527011	2023002	10/29/2024	10/29/2024		GAMMA BETA NEUTRON	TERMINATED	No	No					STP
3623149115	2023009	7/1/2024	11/6/2024	1/7/2025 1...	GAMMA BETA NEUTRON	POSTED	Yes	No		1/7/2025 12.3...			
004541931008	2023007	1/1/2024	7/11/2024	11/1/2024	GAMMA BETA NEUTRON	POSTED	Yes	No		11/1/2024 2.0...			

TLD No: 3623253656 Batch ID: 20230011

Exposure Begin Date: 11/1/2024 2:00:22 PM Result Filename: april 2025 change2\_Corrected.csv

Exposure End Date: 12/31/2024 11:59:59 PM Error Code: Error Status:

Comment:

Doses: Deep: 25.0 Lens: 25.0 Shallow: 25.0 Neutron: 25.0

Calculated Doses: Deep: Lens: Shallow: Neutron:

Total TLD Estimate: Gamma: 2.3 Neutron: 8.7

Employee HP Access Training Medical BioAssay TLD Data

Single TLD Processing

Employee ID: T086632

TLD Number: Find

TLD	Batch ID	Begin Date	End Date	Mu...	Employee...	Name	Error Message
30009273	20230018	1/17/2025 2:1...	6/30/2025 11:...	0	T086632	ARMAS, MELISSA	
3623481944	20230016	1/1/2025	6/30/2025 11:...	0	T086632	ARMAS, MELISSA	
3623808081	20230024	7/1/2025	12/31/2025 11:...	0	T086632	ARMAS, MELISSA	Error Code: 40005 DLR ASS

TLD Number: Batch ID: Estimate Dose: mrem

Multipack ID: Body Location:

TLD Information in mrem unit:

Begin Date: 1/1/2025 12:00:00 AM End Date: 1/1/2025 12:00:00 AM

Deep Dose: Lens Dose:

Shallow Dose: Neutron Dose:



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# API, Power BI, and AMP+ Automatically Transfer Data

- Imagine getting processing results upon the completion of a job
- No shipping back dosimeters, inventory is late because it's on site
- No more change out periods, just a continuous similar to DMC 3000
- Reduced inventory to accommodate quick turnarounds
- Track and trend dose on a daily basis for passive and active
- Dose investigations can be reduced

Dosimetry Power BI version 3 - Power BI Desktop

File Home Insert Modeling View Optimize Help Format Data / Drill

Get data Excel OneLake data SQL Enter Dataverse Recent sources Transform Refresh data New visual Text box More visuals New measure Quick measure Sensitivity Publish

Auto recovery contains some recovered files that haven't been opened. View recovered files

**Nuclear Operating Company** **NEUTRON** **OVERVIEW** **SRD** **MULTI PK**

Year, Month, Day

2024

January

February

March

April

NAME

stoicescu

☐ LAURA STOICESCU

**RCA ENTRY**

NAME	EXP_BEG_DATE	EXP_END_DATE	DEEP	ESTIMATE_NEUTRON	NEUTRON_DOSE	CALC_NEUTRON_DOSE
LAN NEMEC	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	336.00	30.06	0.00	
YSON HUITT	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	288.00	28.25	0.00	
ATHAN BRAUNER	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	84.00	24.77	0.00	
YLOR LOVE	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	14.00	18.62	0.00	
ERLING LOWRY	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	0.00	18.52	0.00	
AN STUKEY	8/20/2024 8:07:00 AM	11/4/2024 5:37:45 AM		13.28		
CHARD MCKAY	2/26/2024 2:54:01 PM	6/30/2024 11:59:59 PM	107.00	12.59	0.00	
SLIE JOHNSON	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	30.00	10.40	0.00	
UL OCHOA	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	36.00	10.39	0.00	
MES SMITH	8/20/2024 8:37:47 AM	12/31/2024 11:59:59 PM		10.29		
EL JOHNSON JR	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	182.00	9.84	0.00	
SH KORENEK	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	175.00	9.74	0.00	
MERON LEDWIG	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	14.00	9.21	0.00	
OTT PRAUSE	7/1/2024 12:00:00 AM	12/31/2024 11:59:59 PM		8.58		
HN GONZALES	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	315.00	8.44	0.00	
CHARD MCKAY	7/1/2024 12:00:00 AM	12/31/2024 11:59:59 PM		8.43		
NNY DEVINE	7/1/2024 12:00:00 AM	12/31/2024 11:59:59 PM		8.14		
ANKIE BAROS	7/1/2024 12:00:00 AM	12/31/2024 11:59:59 PM		7.72		
AN LULE	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	337.00	7.68	0.00	
AVIS TAYLOR	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	57.00	7.67	0.00	
MERO ZEPEDA JR	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	66.00	7.66	0.00	
ATTHEW ESTLINBAUM	1/1/2024 12:00:00 AM	6/30/2024 11:59:59 PM	0.00	7.25	0.00	
			44,866.00	908.91	5.00	2.30



# Can Instadose be Cheaper than Traditional Dosimetry?

- ALARA dose reporting as dose of record vs DMC 3000
- Reuse of dosimeters over the year to reduce dosimeter number from 5,000/ year to 1,500/year
- Reduction of dose investigations over 6-month period
- Background issues reduced/ eliminated
- Shipping x-ray discrepancies
- Neutron Correction Factors can be dosimeter dependent
- Quicker response to correct issues





# Blind Test Comparison and Industrial Humidity testing



STP blind testing to 100 mrem to Cs-137 irradiator 10/28/24		100 mrem Blind	Units
ID dosimeter	dose (mrem)		
30005513	97	mrem	
30006269	97	mrem	
30007387	98	mrem	
30007071	101	mrem	
30006605	97	mrem	
30043996	98	mrem	
30007077	98	mrem	
30007731	97	mrem	
30006959	99	mrem	
30007500	100	mrem	
30064257	98	mrem	
30037996	100	mrem	
30005532	97	mrem	
30006264	100	mrem	
30061574	98	mrem	
30006172	98	mrem	
	98.3125	mrem	





# Neutron Correction Factor development Reactor Containment Building, Fuel Handling Building, ISFSI pad

RCB Neutron Correction Factor  
developed as multiplicative of \*0.19



Cask Connecting Channel Neutron  
Correction Factor as multiplicative of \*0.4





# Dosimetry Comparison Tests during outage/non-outage Industrial Work





# Instadose Vue Beta and Neutron



ID Vue Beta  
Passed NVLAP  
categories:  
IA, IIA, IIIA, IVAA

Passed testing to IEC  
62387 type test  
standard



ID Vue  
Neutron  
Passed NVLAP  
categories:  
IA, IIA, IIIA,  
IVAA, VCA

IEC 62387 type  
testing in  
process

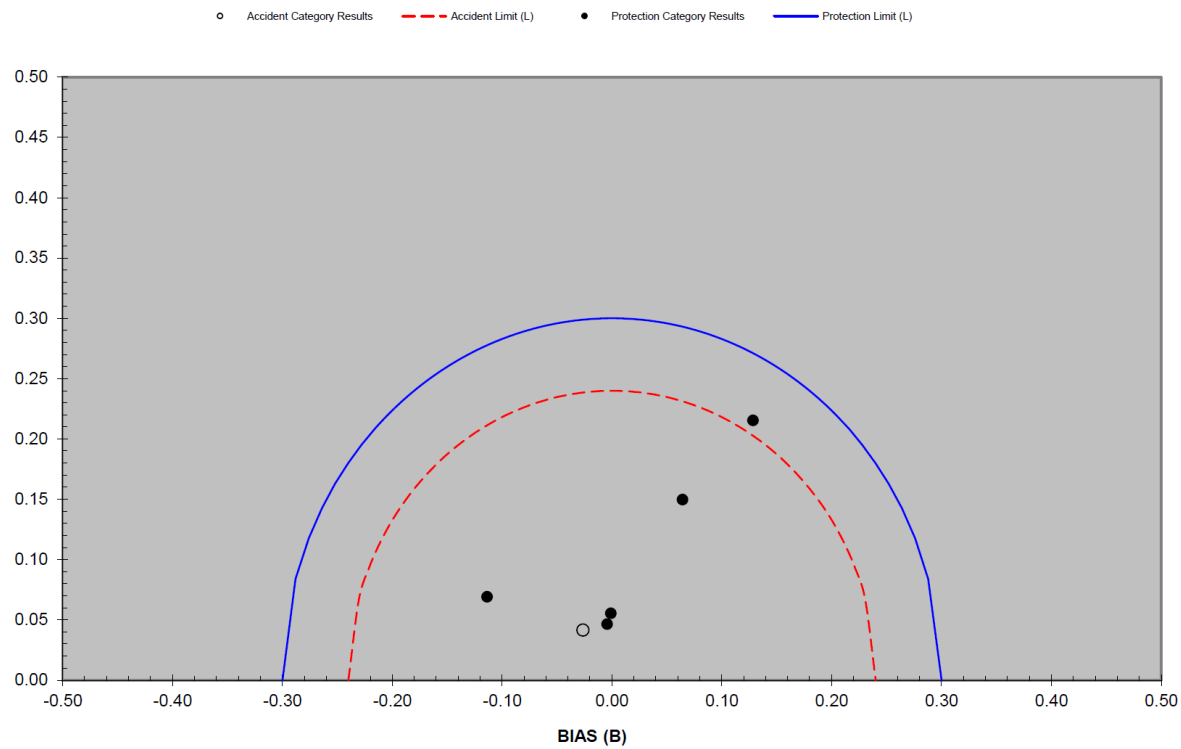


**DOSIMETRY SERVICES**

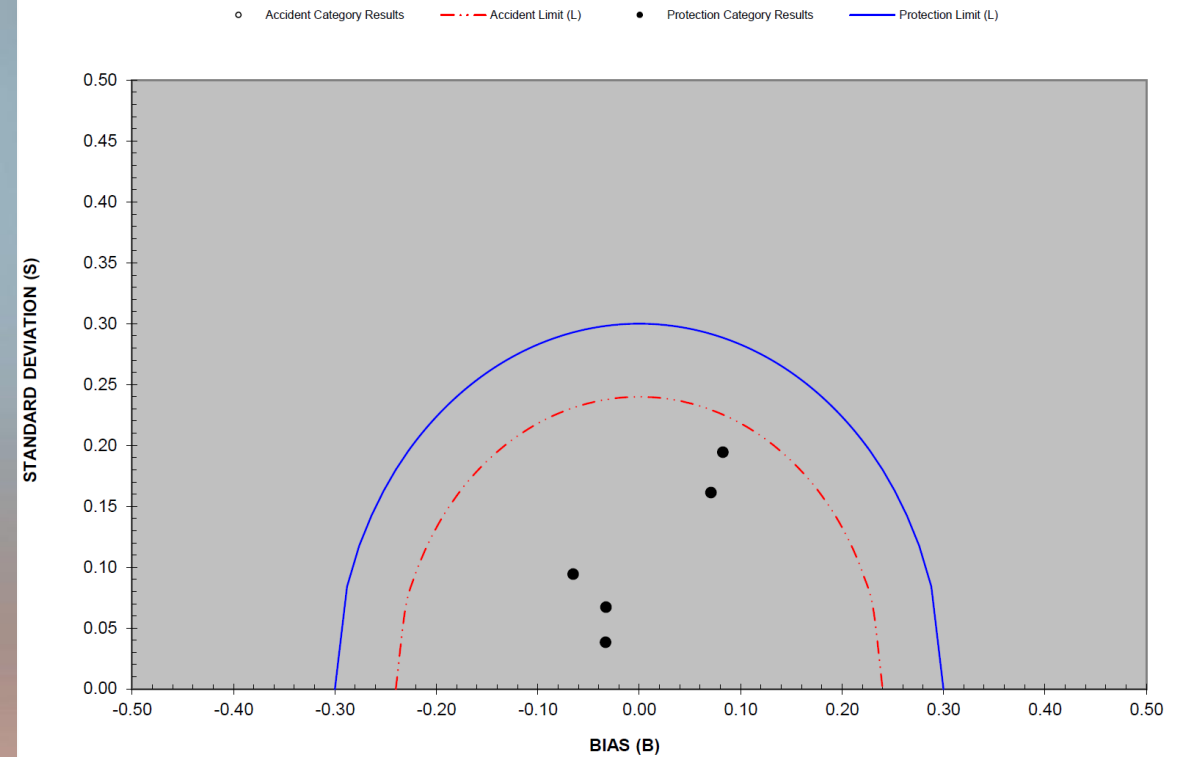
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# Instadose Vue Neutron and Beta

100555-0-C4 -- WHOLE BODY DOSIMETER RESULTS -- 2023 - 04

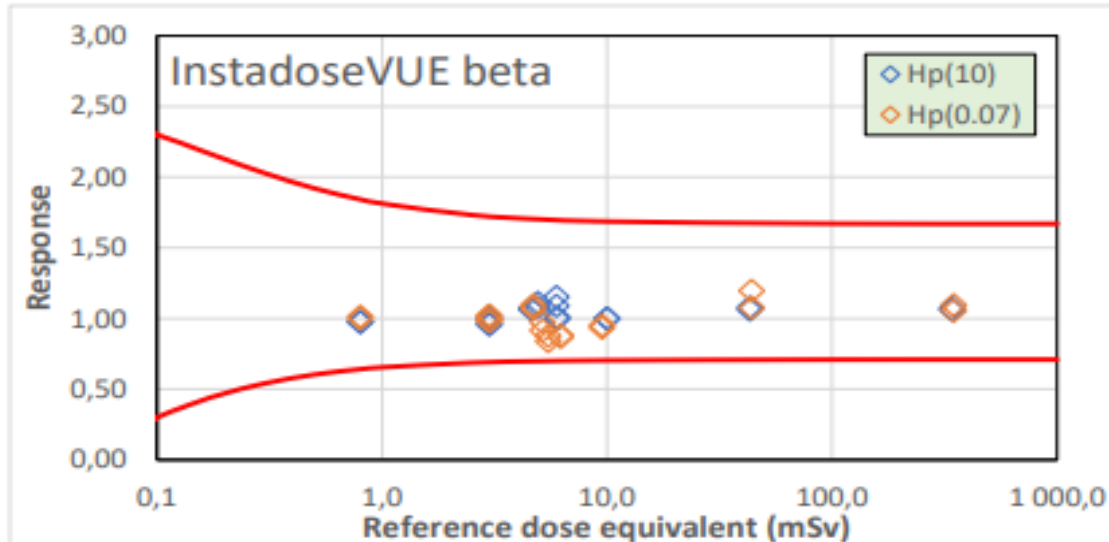


100555-0-C5 -- WHOLE BODY DOSIMETER RESULTS -- 2024 - 03

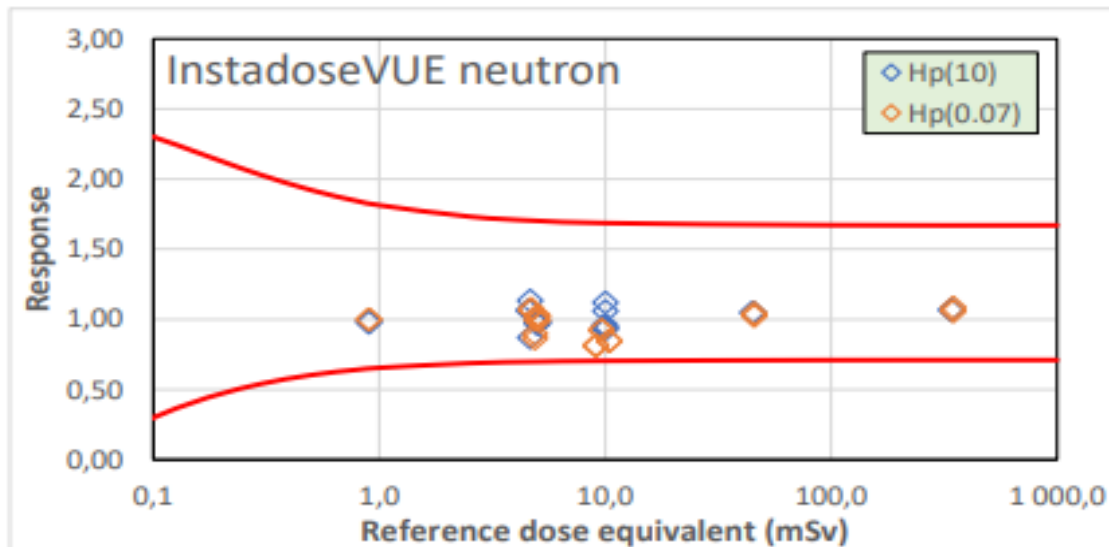




# Instadose Vue Neutron and Beta – Eurados 2024 results



**Figure 3B:**  
Response as a function of reference dose equivalent (InstadoseVUE beta). The solid lines show the uncertainty limits according to the ISO 14146 standard [3].



**Figure 3C:**  
Response as a function of reference dose equivalent (InstadoseVUE neutron). The solid lines show the uncertainty limits according to the ISO 14146 standard [3].



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# EPRI Dosimetry Study and MCNP Comparisons



- EPRI conducted a Dosimetry Twin study onsite at STP as the pilot plant on March 30-April 4, 2025
- NCF development for Instadose
- MCNP calculations for photon/neutron
- Camera set on workers to develop continuous





# Independent Spent Fuel Storage Installation (ISFSI) Project with ID Vue

Comparison between three dosimetry



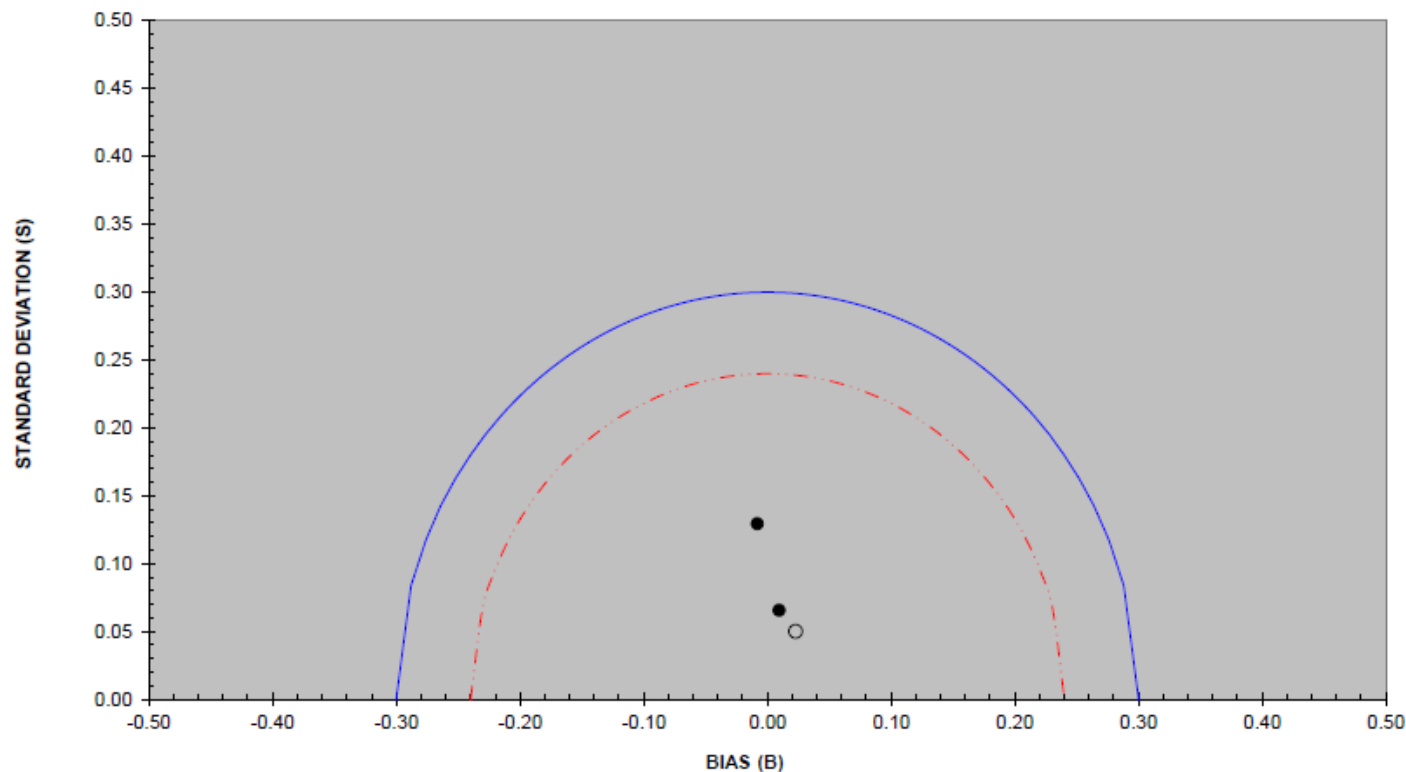
ISFSI neutron correction factor highest



# Initial NVLAP Results – Instadose®VUE photon

100555-0-C2 -- WHOLE BODY DOSIMETER RESULTS -- 2025 - 01

○ Accident Category Results    - - - Accident Limit (L)    ● Protection Category Results    — Protection Limit (L)



C2 – Whole Body

Pass/Fail	Category	Category Description
Pass	IA	Accidents Photons, General
Pass	IIA	Photons/Photon Mixtures, General ( $E \geq 20$ keV; $\pm$ if $\leq 70$ keV)

Categories tested: 1A and 2A



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# Eurados 2024 Results – Instadose<sup>®</sup>VUE

Passed testing to IEC 62387 type test standard

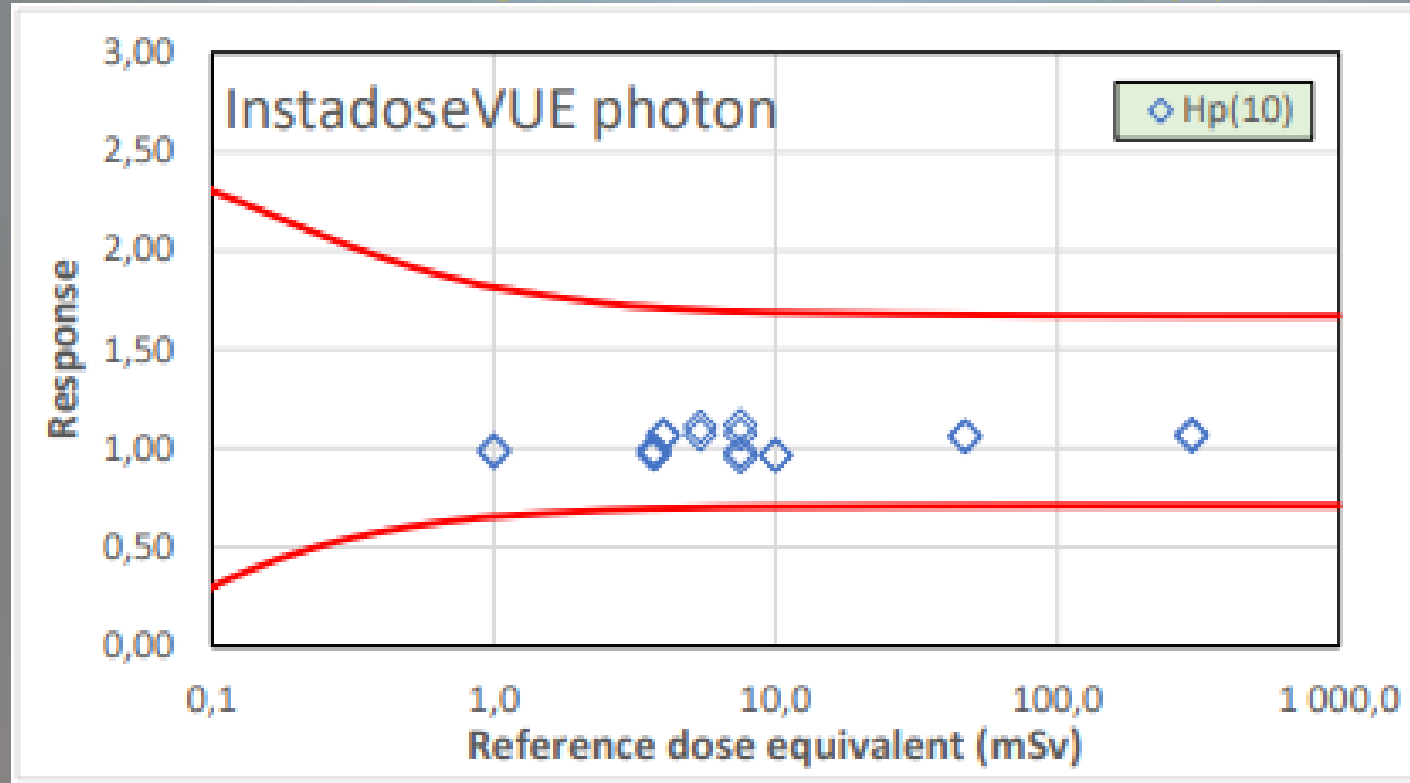


Figure 3A:

Response as a function of reference dose equivalent (InstadoseVUE photon). The solid lines show the uncertainty limits according to the ISO 14146 standard [3].

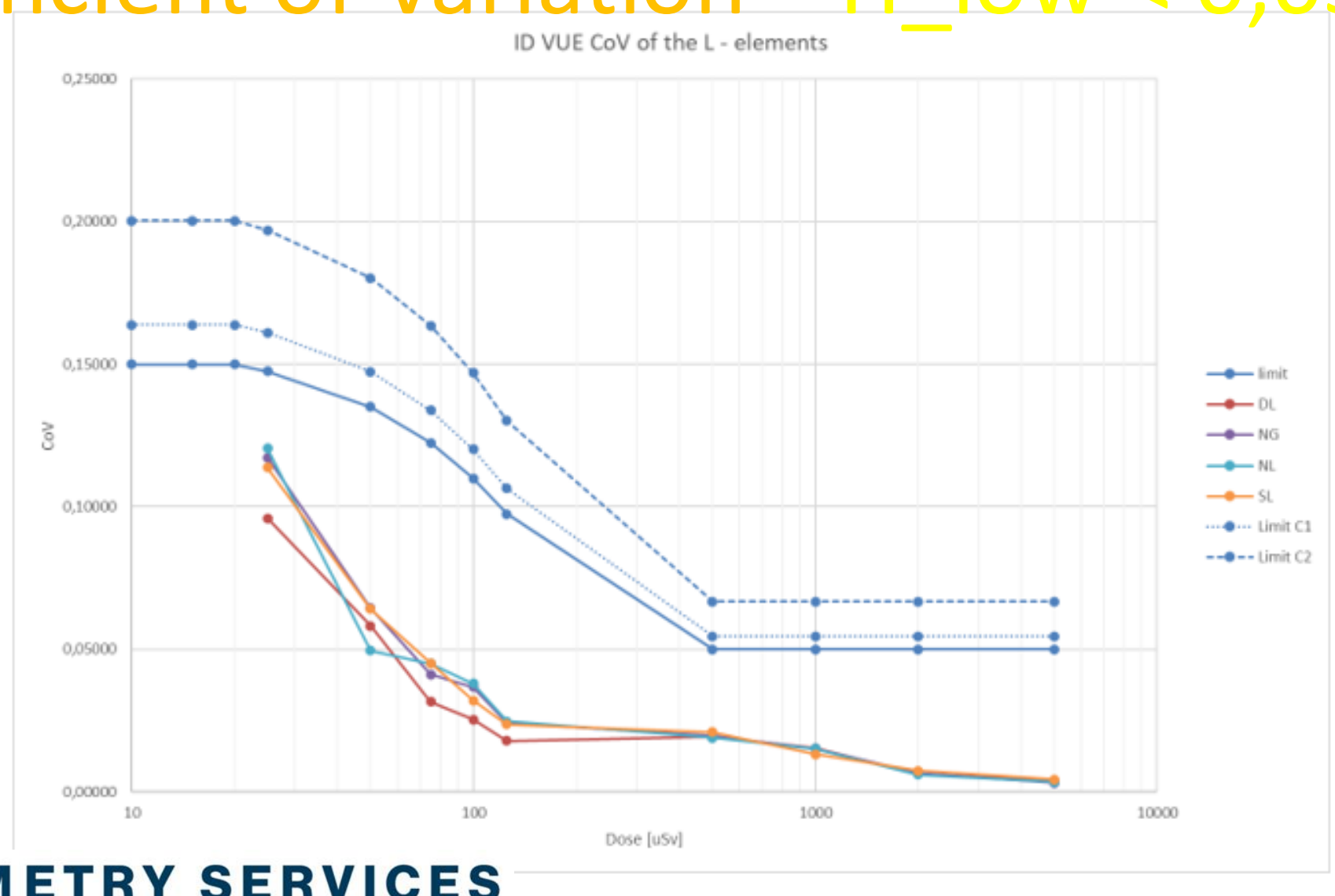


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# Type test results Instadose VUE photon

## Coefficient of Variation $H_{low} < 0,05 \text{ mSv}$



**DOSIMETRY SERVICES**

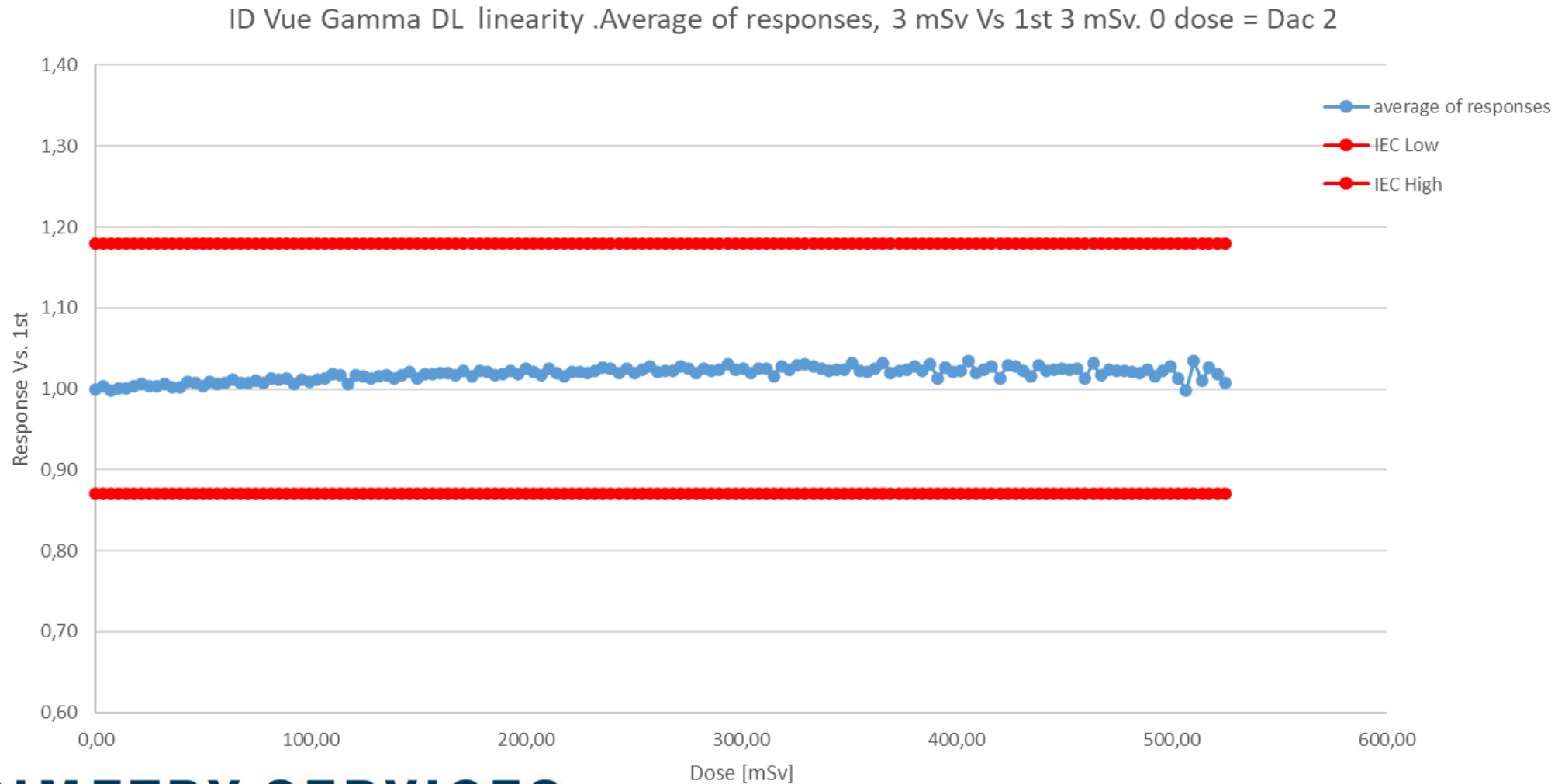
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# Type test results Instadose VUE photon

## Linearity: LowDose channel

Extended range  
LowDose channel



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# Type test results Instadose VUE photon

## Linearity: high dose channel

Extended range  
HighDose channel

ID Vue Gamma linearity DH .Average of responses, 10 mSv Vs 1st 10 mSv. 0 dose = Dac 1



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# Type test results Instadose VUE photon

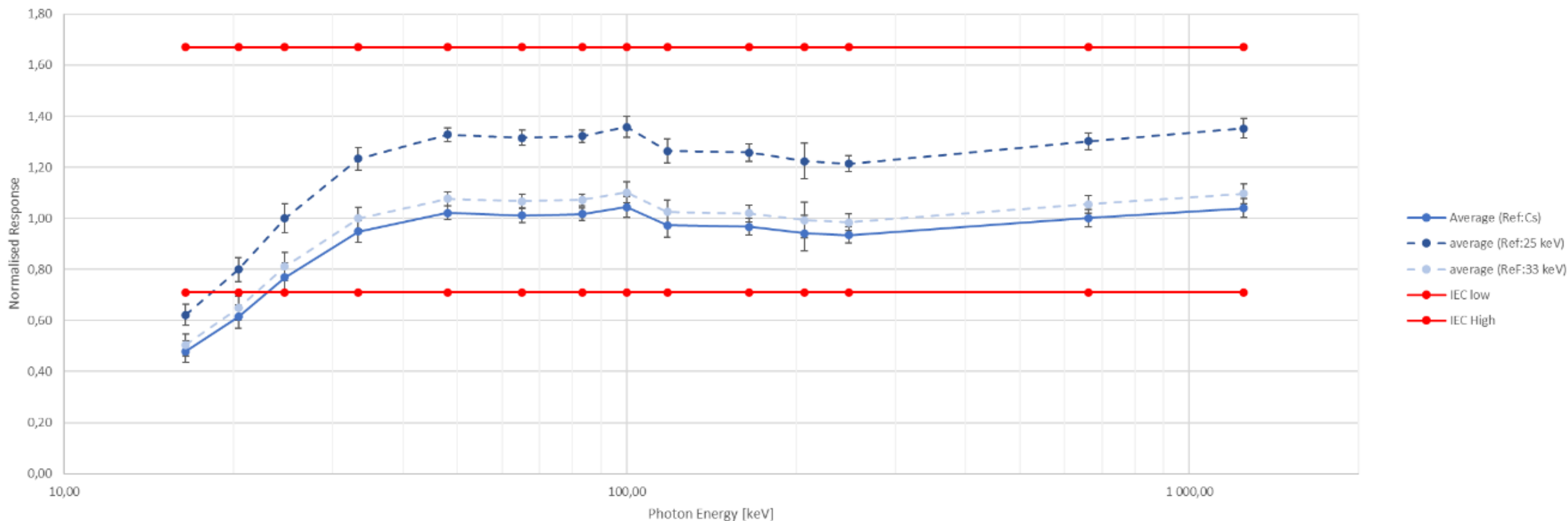
## Energy response

Much better energy response

IEC met from 25 keV and up (+/- 60o angles)

NVLAP met 20 keV and higher

ID VUE Gamma certification Energy Response reference direction, 3\*STDEV Error bars



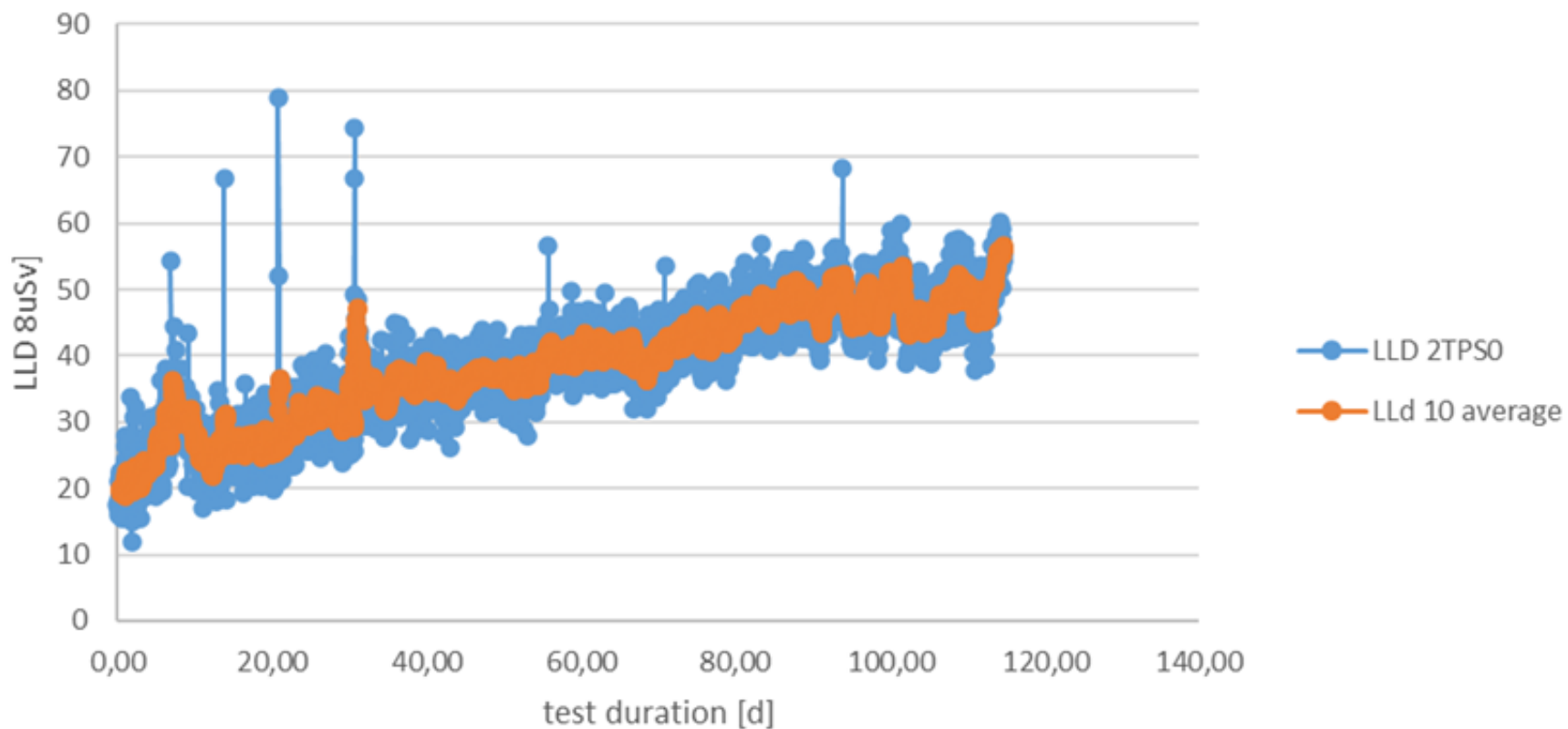
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# Type test results Instadose VUE photon

## Dose build-up, fading and self-irradiation ( LLD)

ID VUE Gamma LLD



ANSI method for LLD:  
 $LLD@90d = 44 \mu Sv$

More data analysis to  
be made to test for  
 $IEC H_{low} = 0,05 mSv$

Established MRD of  
 $0.05 mSv$  while more  
testing is being  
conducted



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# Mirion and BeOSL using OSL technology

*first* and *most advanced*

dosimetry system based on *BeO*

made in *Germany*

BE SMART. BE SAFE. **BeOSL**

DOSImetrics



**MIRION**  
TECHNOLOGIES



MADE IN GERMANY



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# BeOSL Dosimeter (2 and 4 Elements available)

- 2 - 4 identical BeO detectors  
Size: 58 mm × 23 mm × 8,7 mm
- Individually calibrated
- Dosimeter ID: unique, via barcode and human readable number
- $H_p(10)$  and  $H_p(0.07)$
- “No” algorithm (linear combination only)
- Symmetric
- 100% sealed against
- Customized imprint



## Tissue-Equivalency

Human (soft) tissue:  $Z_{EFF} \sim 7,6$

BeO:  $Z_{EFF} = 7,2$

LiF, e.g. TLD-100:  $Z_{EFF} = 8,2$

$Al_2O_3$ :  $Z_{EFF} = 11,7$

“The effective atomic number of  $Al_2O_3$  :C causes the material to over-respond to low energy X-rays by a factor of up to ~3,5” (Bos, 2001)



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# Emergency Plan Kits Personnel Badges ID or Environmental BeOSL



- Photon and Beta BeOSL
- OSL technology-reread 3X
- NVLAP accredited
- Most near tissue equivalent OSL
- 10 mrem – 1000 rad range
- 12 keV – 6 MeV photon
- 0.565 MeV – 5 MeV Beta
- NO FADE over 12 months

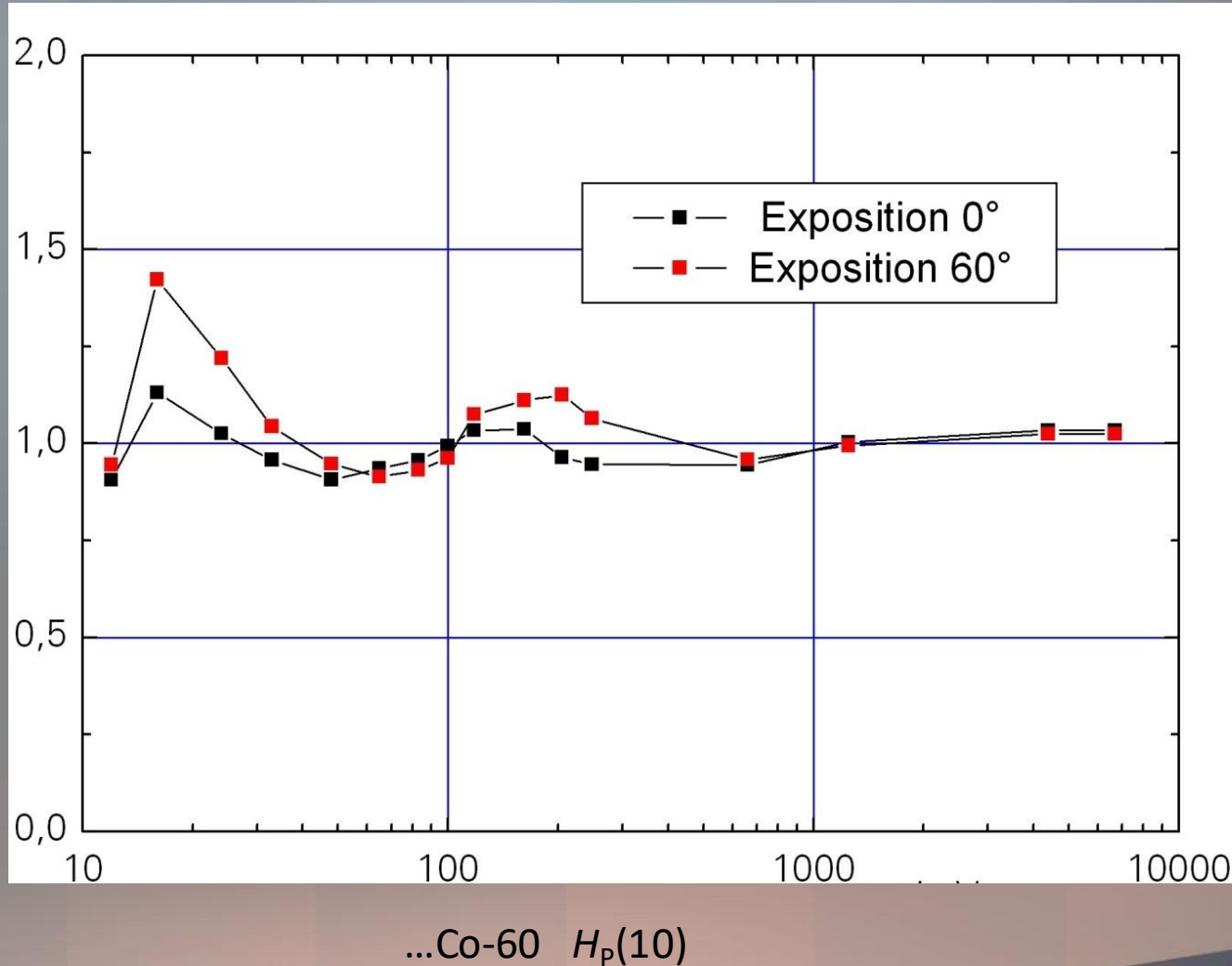


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# BeOSL 4-Element Dosimeter

Response relative to...



BeOSL dosimeters have obtained accreditations worldwide:

- NVLAP (US),
- HSE (UK),
- PTB (Germany),
- and others



**DOSIMETRY SERVICES**

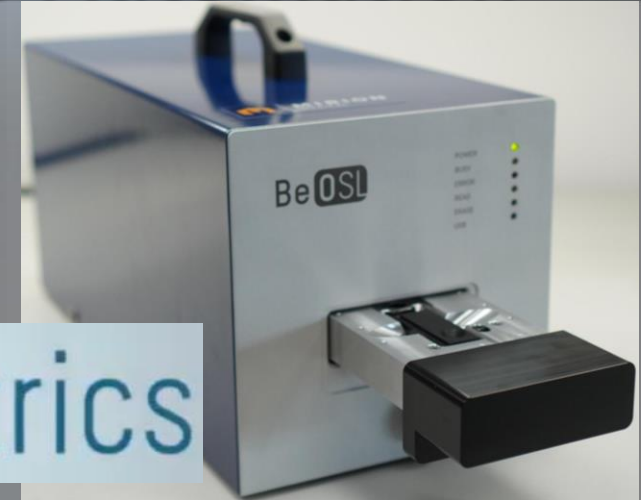
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# Reader/Eraser Combination – from Manual to Automation



DOSImetrics



BE SMART. BE SAFE. BeOSL



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# ANSI N14.37 Environmental BeOSL



Meeting the standard is the best that can be done to have exceptional ENV dosimeters.

Highlights from the standard are:

## Section 5

Uniformity and Reproducibility

Photon Energy Dependence

Linearity and Precision

Laboratory-Based Minimum Quantifiable Dose

Dosimeter Orientation in Radiation Field

Neutron Radiation Influence

Beta Radiation Influence

## Section 6

Light Test

Condensing Moisture Test

Low-Temperature Test

High-Temperature Test



# South Texas Project Panasonic vs BeOSL Environmental data

Station ID	Distance	2022	2023	Bq + MDDq	2023 Normalized Net Dose Mq (mrem per Std Qtr)				2023 Quarterly Facility Dose, Fq (mrem)				2023	2023	2023
		Quarterly Baseline	Quarterly Baseline*		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Ba (mrem)	Ba + MDDa	Normalized Annual Dose
		(mrem)	(mrem)												
1	1 mile N	12.5	14.0	19.0	14.0	14.0	14.0	15.0	ND	ND	ND	ND	56.2	66.2	57.0
2	1 mile NNE	12.9	14.4	19.4	13.0	15.0	16.0		ND	ND	ND	ND	57.6	67.6	58.7
3	1 mile NE	13.5	15.0	20.0	14.0	14.0	16.0	14.0	ND	ND	ND	ND	59.8	69.8	58.0
4	1 mile ENE	13.1	14.6	19.6	15.0	15.0	15.0	15.0	ND	ND	ND	ND	58.4	68.4	60.0
5	1 mile E	13.4	14.9	19.9	15.0	14.0	15.0	14.0	ND	ND	ND	ND	59.5	69.5	58.0
6	3.5 miles ESE	14.1	15.6	20.6	15.0	15.0	16.0	15.0	ND	ND	ND	ND	62.5	72.5	61.0
7	3.5 miles SE	11.3	12.8	17.8	13.0	13.0	13.0	12.0	ND	ND	ND	ND	51.2	61.2	51.0
8	0.25 mile SSE	10.5	12.0	17.0	12.0	12.0	12.0	11.0	ND	ND	ND	ND	48.2	58.2	47.0
9	0.25 mile S	13.6	15.1	20.1	14.0	16.0	13.0	14.0	ND	ND	ND	ND	60.5	70.5	57.0
10	0.25 mile SSW	10.7	12.2	17.2	12.0	11.0	13.0	11.0	ND	ND	ND	ND	48.8	58.8	47.0
11	0.5 mile SW	11.1	12.6	17.6	11.0	11.0	12.0	12.0	ND	ND	ND	ND	50.4	60.4	46.0
12	1.5 mile WSW	12.6	14.1	19.1	14.0	14.0	13.0	15.0	ND	ND	ND	ND	56.4	66.4	56.0
13	1.5 mile W	15.9	17.4	22.4	16.0	18.0	18.0	16.0	ND	ND	ND	ND	69.6	79.6	68.0
14	1.5 mile WNW	14.9	16.4	21.4	15.0	18.0	19.0	15.0	ND	ND	ND	ND	65.6	75.6	67.0
15	1 mile NW	13.0	14.5	19.5	14.0	15.0	13.0	14.0	ND	ND	ND	ND	58.0	68.0	56.0
16	1 mile NNW	13.0	14.5	19.5	14.0	15.0	15.0	14.0	ND	ND	ND	ND	58.0	68.0	58.0
17	6.5 miles N	13.1	14.6	19.6	13.0	16.0	15.0	13.0	ND	ND	ND	ND	58.5	68.5	57.0
18	5.5 miles NNE	13.0	14.5	19.5	14.0	13.0	15.0	14.0	ND	ND	ND	ND	58.0	68.0	56.0
19	5.5 miles NE	12.9	14.4	19.4	14.0	14.0	16.0	13.0	ND	ND	ND	ND	57.6	67.6	57.0
20	5 miles ENE	14.6	16.1	21.1	17.0	16.0	16.0	15.0	ND	ND	ND	ND	64.5	74.5	64.0
21	5 miles E	13.2	14.7	19.7	14.0	14.0	15.0	14.0	ND	ND	ND	ND	58.6	68.6	57.0
22	7 miles E	12.6	14.1	19.1	13.0	15.0	15.0	13.0	ND	ND	ND	ND	56.5	66.5	56.0
23	16 miles ENE	14.7	16.2	21.2	17.0	16.0	18.0	16.0	ND	ND	ND	ND	64.8	74.8	67.0
24	4 miles SSE	11.0	12.5	17.5	12.0	11.0	12.0	12.0	ND	ND	ND	ND	49.9	59.9	47.0
25	4 miles S	11.5	13.0	18.0	13.0	12.0	13.0	12.0	ND	ND	ND	ND	52.2	62.2	50.0
26	4 miles SSW	11.3	12.8	17.8	12.0	12.0	12.0	14.0	ND	ND	ND	ND	51.0	61.0	50.0
27	2.5 miles SW	11.8	13.3	18.3	13.0	13.0	12.0	13.0	ND	ND	ND	ND	53.1	63.1	51.0
28	5 miles WSW	13.1	14.6	19.6	15.0	16.0	15.0	15.0	ND	ND	ND	ND	58.4	68.4	61.0
29	4.5 miles W	14.7	16.2	21.2	18.0	18.0	18.0	16.0	ND	ND	ND	ND	64.8	74.8	70.0
30	6 miles WNW	12.1	13.6	18.6	12.0	15.0	13.0	13.0	ND	ND	ND	ND	54.5	64.5	53.0
31	5.5 miles NW	12.2	13.7	18.7	14.0	14.0	12.0	13.0	ND	ND	ND	ND	54.9	64.9	53.0
32	3.5 miles NNW	12.4	13.9	18.9	13.0	14.0	13.0	13.0	ND	ND	ND	ND	55.7	65.7	53.0
33	14 miles NNE	13.1	14.6	19.6	16.0	14.0	13.0	13.0	ND	ND	ND	ND	58.3	68.3	56.0
34	7.5 miles ENE	12.3	13.8	18.8	13.0	15.0	14.0	13.0	ND	ND	ND	ND	55.2	65.2	55.0
35	8.5 miles SSE	12.3	13.8	18.8	14.0	14.0	14.0	14.0	ND	ND	ND	ND	55.0	65.0	56.0
36	9 miles WSW	12.3	13.8	18.8	13.0	14.0	13.0	14.0	ND	ND	ND	ND	55.3	65.3	54.0
37	10 miles WSW	12.4	13.9	18.9	13.0	14.0	13.0	13.0	ND	ND	ND	ND	55.7	65.7	53.0
38	10.5 miles NW	11.2	12.7	17.7	11.0	12.0	12.0	13.0	ND	ND	ND	ND	50.8	60.8	48.0
39	9 miles NW	14.3	15.8	20.8	18.0	17.0	15.0	17.0	ND	ND	ND	ND	63.2	73.2	67.0
40	4.5 miles SW	12.6	14.1	19.1	15.0	15.0	14.0	15.0	ND	ND	ND	ND	56.3	66.3	59.0
41	2.0 miles ESE	11.5	13.0	18.0	13.0	13.0	13.0	13.0	ND	ND	ND	ND	51.9	61.9	52.0
43	4.5 miles SE	13.3	14.8	19.8	14.0	16.0	15.0	13.0	ND	ND	ND	ND	59.0	69.0	58.0

MDDq at 5 mrem, MDDa at 10 mrem

ND - Not Detected



es because of new dosimeter use In 2023 (overall average was across

es because of new dosimeter use In 2023 (overall average was across

es because of new dosimeter use In 2023 (overall average was across

es because of new dosimeter use In 2023 (overall average was across

es because of new dosimeter use In 2023 (overall average was across



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# Challenges and Future Task Force Work

- Development of Neutron Correction Factors
- Foreign Material Exclusion Clips
- API finalization for Instadose and Legacy
- Change Management process for training and procedures
- Determination of integration and inventory of Instadose and Legacy
- Placement of Instalinks at site and coordination with IT resources
- Badge racks
- Continued work with American Nuclear Insurers (ANI) and Nuclear Regulatory commission (US NRC) with help from Nuclear Energy Institute (NEI)
- If you are interested in testing out Instadose to see how it will work for you, start with a Kit of 5 dosimeters and a Instalink base



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**Thank you for your time!**

**Kip Bennett & Laura Stoicescu, CHP**

**mirion.com**

**Kbennett@mirion.com**

**Lstoicescu@stpegs.com**

**Dosimetrix Production - Robotic Table**



Instadose Corrective  
Action at STP



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