

Ultra-Sensitive dosimeter for Artemis: Enabling Lower Detection Limits in Space Radiation Measurement.

Marianthi Fragkopoulou
CEO of HERADO Group

ALMAR history

2016
Prototype



2017
Ver.1



2017
Ver. 2



2018
Ver. 3



2018
Ver. 4



2019
Ver. 5



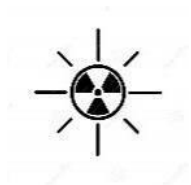
2020
Ver. 6



2023
Ver. 7



Why to use ALMAR in space



High Stability



Lower detectable limit 0,6 μ Sv



Linearity up to 10 Sv



Measure the different types of radiation.



Fully calibrated (Los Alamos, HIMAC,)



Dose rate and angular dependence < 5%



No Electromagnetic interference



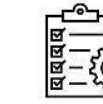
Very low power consumption/ Long battery lifetime/rechargeable



Compact Size and weight



Selection of the alarm levels



software/ telemetry system





User friendly

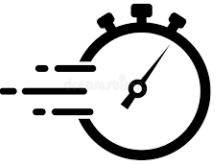
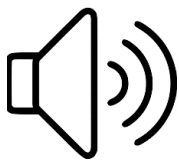



CE

Solution | A Real-Time Radiation Data

EN 61526:2013

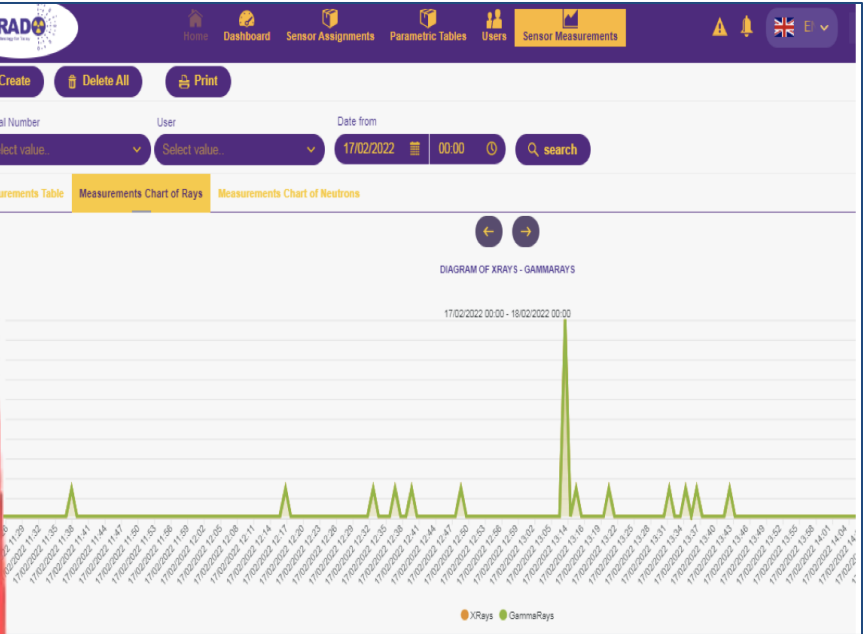






25 gr

Wide Range
X-rays, Gamma
Neutrons, Electrons
Heavy Ions
IP 68



HERADO Platform

Analysis Platform
Real Time Dose Breakdown
Cumulative Dose
Metadata per
device/user/procedure

ALMAR characteristics

Power consumption

Active mode typical current: 5mA

Stand-by mode typical current: below of 0.5 μ A

Measurement of protons and neutrons

The battery may last for more than 4 months

Dimensions

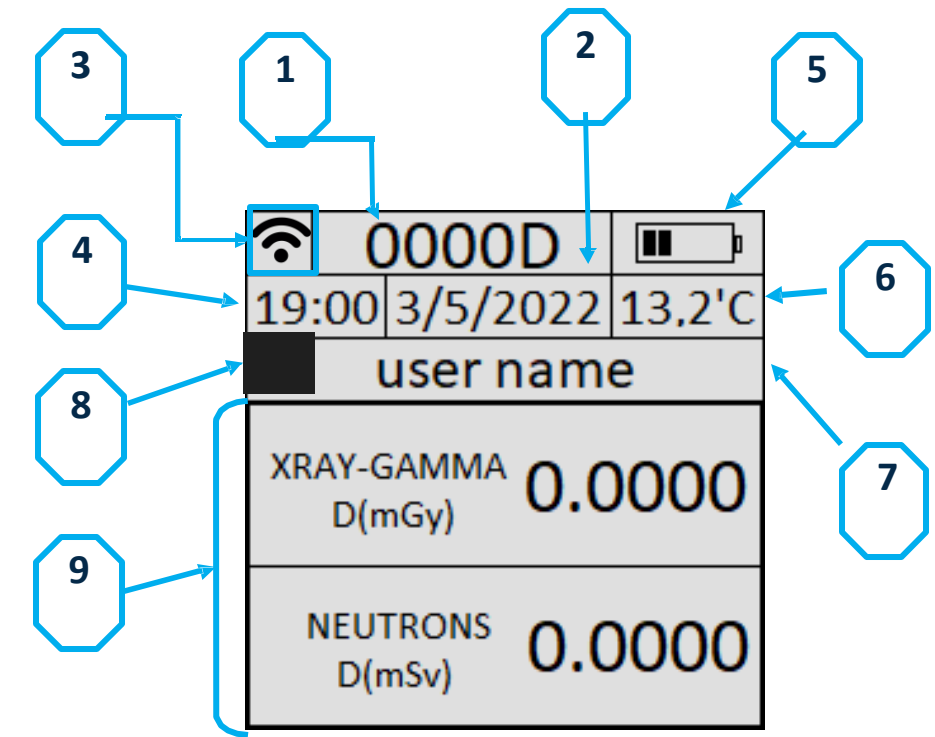
Compact size & weight Weight: 25 gr

Length: 79 mm

Width: 10 mm

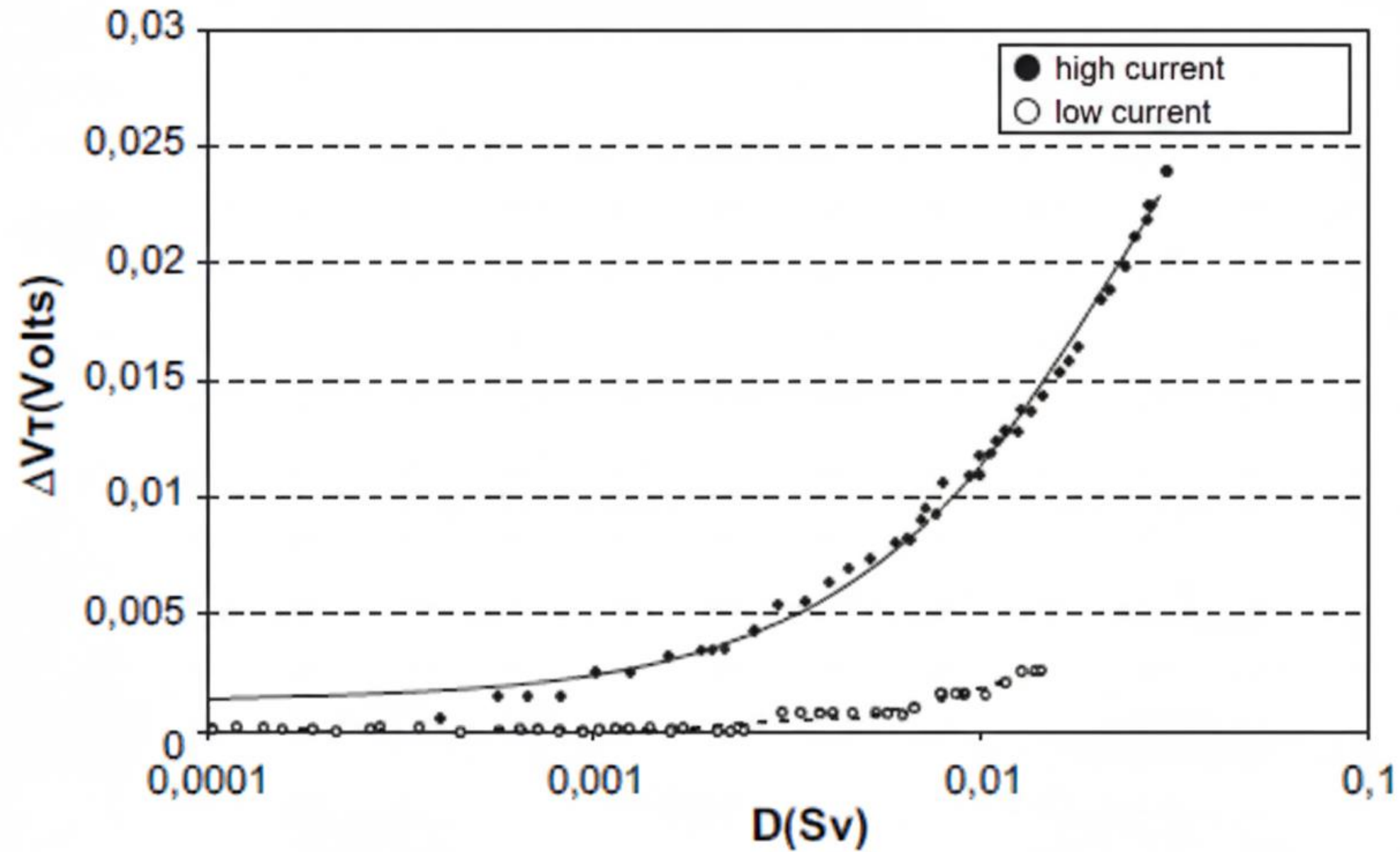
Height: 48 mm

WiFi and USB connectivity



1. .Unique Device ID
2. .Date
3. .WiFi ON indicator
4. .Time
5. .Battery level indicator
6. .Temperature
7. .User name
8. .Mode H
9. .Measurement Area

Linear Test of ALMAR



Response in Gamma radiation

ALMAR test and measurements reports

ALMAR is fully licensed CE (EN 61526) and accredited, meets ICRU 95 recommendations.



Conforms with the following Harmonized standards:



Photo 8.1: Setup for radiated emissions test (30MHz-1GHz)

Safety:	EN 61010-1:2010 + A1:2019 + AC:2019
EMC:	ELOT EN 61326-1 E3:2021 / ELOT EN 61326-1 E2:2013 ELOT EN 60601-1-2 E4:2015 + A1:2021 IEC 60533:2015 IEC 60092-504:2016 ELOT EN 60945 E3:2003 ELOT EN IEC 61000-6-2 E3:2019 / ELOT EN 61000-6-2 E2:2005 ELOT EN IEC 61000-6-3 E3:2021 / ELOT EN 61000-6-3 E2:2007 + A1:2011 ETSI EN 301 489-1 v2.2.3 (2019-11) / ETSI EN 301 489-1 v1.9.2 (2011-09) ETSI EN 301 489-17 v3.2.4 (2020-09)
RED:	ETSI EN 300 328 V2.2.2 (2019-07)
RoHS:	EN IEC 63000:2018
Human Exposure:	EN 62311:2008
Radiation Protection:	EN 61526:2013

ALMAR test and measurements reports

ALMAR is **fully licensed CE** (EN 61526) and **accredited**, meets **ICRU 95 recommendations**.

Conforms with the following Harmonized standards:



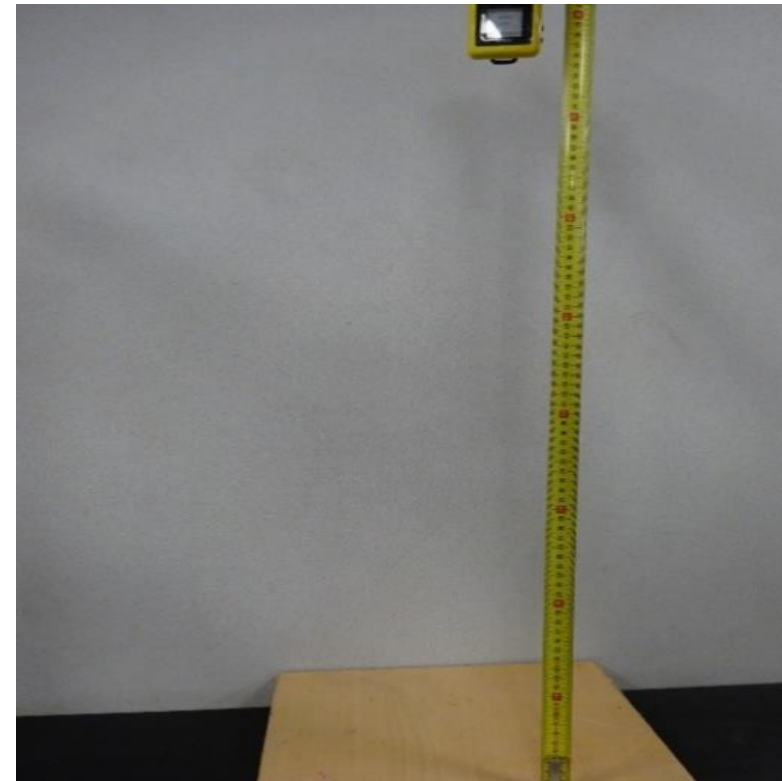
Test Parameters	Version 7	New Version
80MHz-1GHz (80% 1kHz AM modulation)	Improved Performance: First deviation at 55V/m within 920-1000MHz.	Test was already passed
800-960MHz (28V/m Pulse Modulation 50% 18Hz) - Medical Equipment	Success: No measurement deviation.	Test was already passed
1GHz-6GHz (80% 1kHz AM modulation)	Success: No measurement deviation at 17-27V/m.	Test was already passed
2.400GHz-2.570GHz (28V/m Pulse Modulation 50% 217Hz) - Medical Equipment	Failure: Test failure at >20V/m within 2.480GHz - 2.560GHz.	Success: Passed the test after the update.

ALMAR mechanical test

ALMAR Static test



ALMAR Drop test



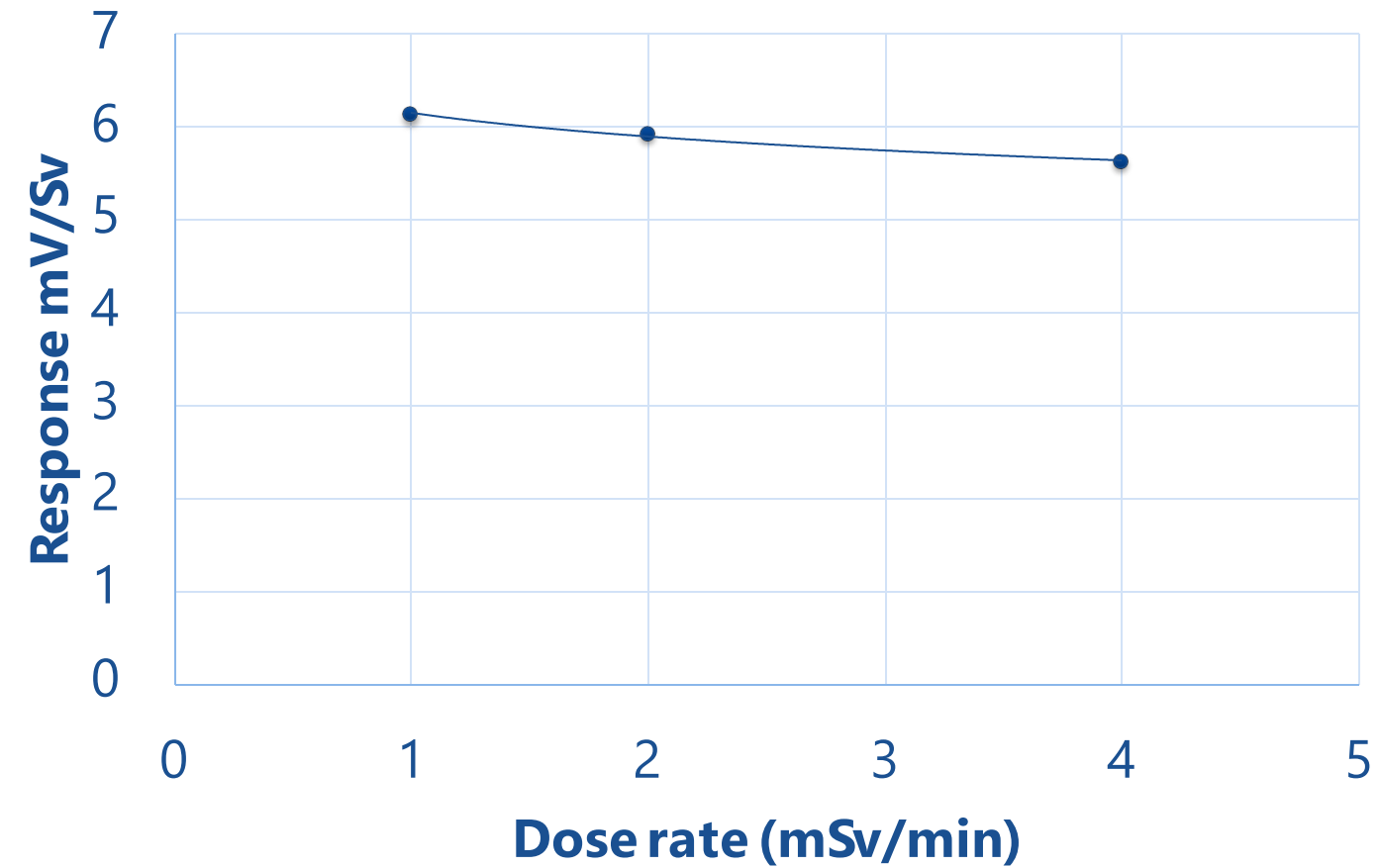
ALMAR Impact test



Conforms with the EN 61010-1 E3: 2010 + A1:2019 + AC1:2019. Harmonized standards:

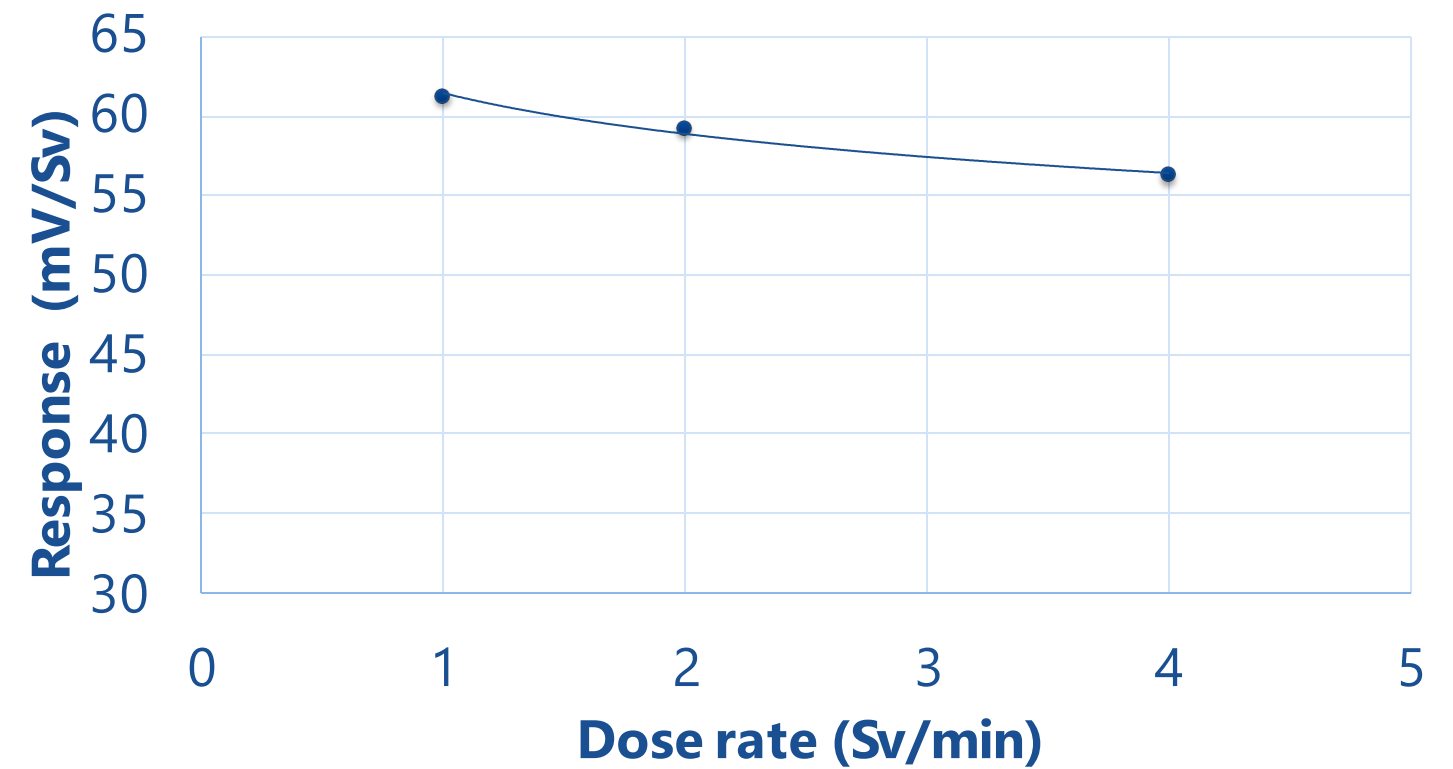
A compact, smooth steel sphere with a diameter of $50 \text{ mm} \pm 1 \text{ mm}$ and a mass of $500 \text{ g} \pm 25 \text{ g}$ was used for the tests.

Dose Rate Test



Low Dose

Response dose rate dependence



High Dose mode

HERADO: Test Inside the Water



HERADO: Integrated Dosimetry for Unmanned Vehicles

Seamless Integration

Real-time Situational Awareness

Mission Versatility

Robust & Reliable



On a wide range of UGVs, UAVs vehicles

Immediate, accurate low level radiation dose measurements

Crucial for sensitive geopolitical zones

Essential WMD threat detection

Enhance Unmanned Vehicle Operations with Integrated Radiation Monitoring.

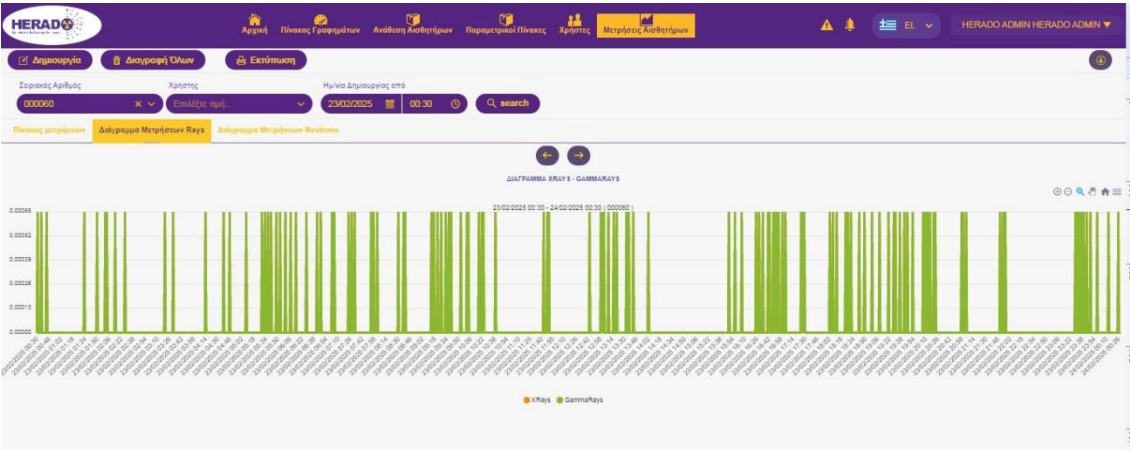
HERADO: Homeland Security Drone Fly



HERADO: Measurements

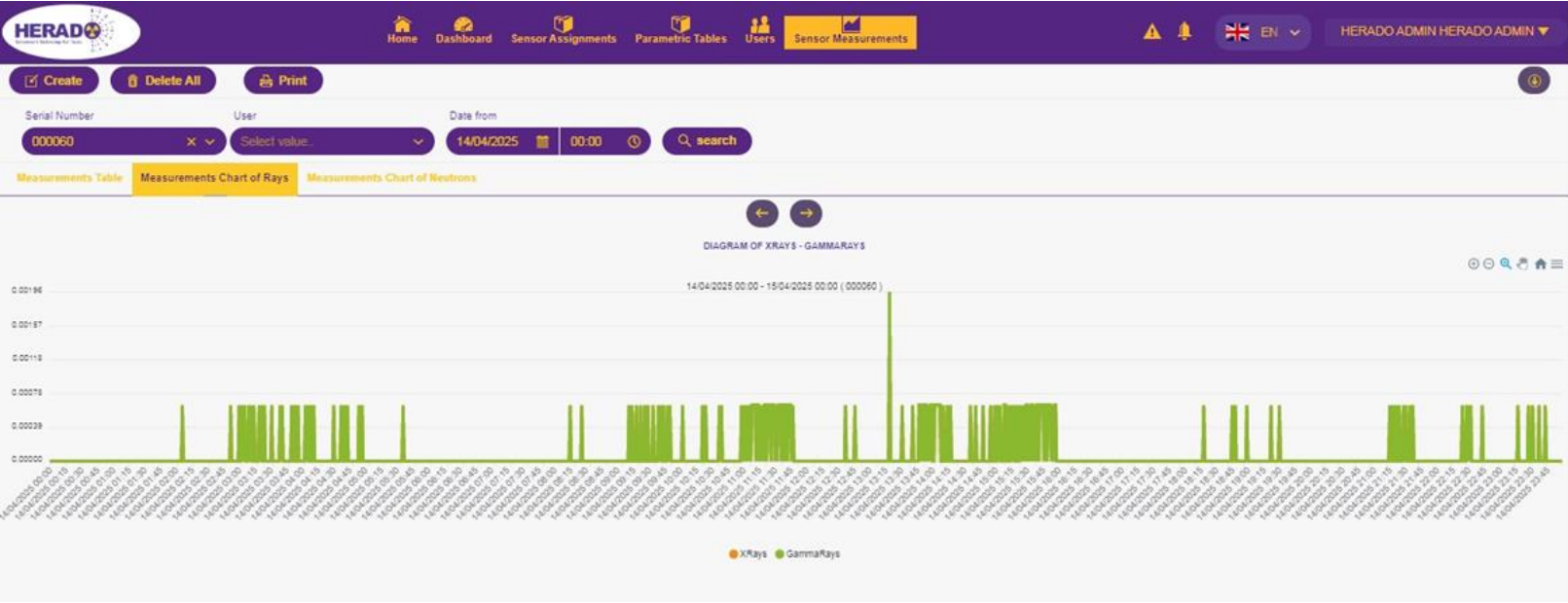
Normal Daily Background

May 14, 2025

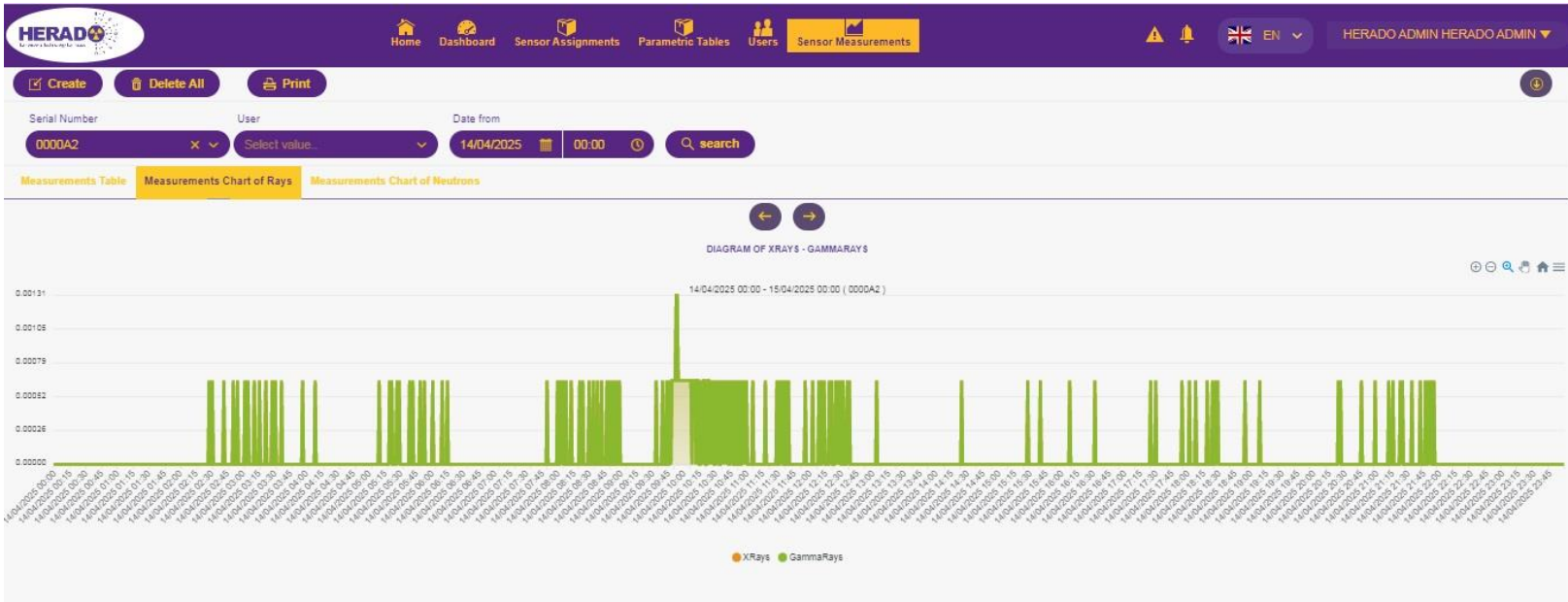


HERADO: Measurements

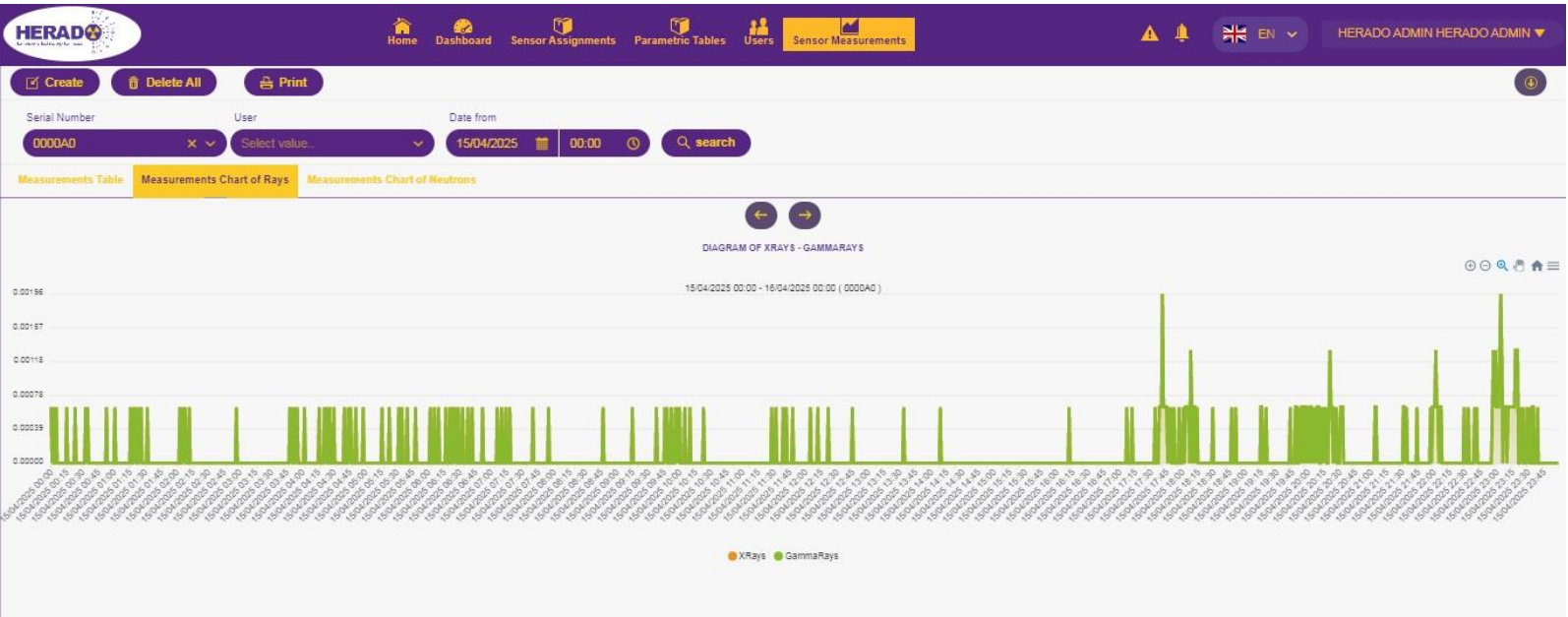
Almar Station 000060 **April 14, 2025**



Almar Station 0000A2 **April 14, 2025**

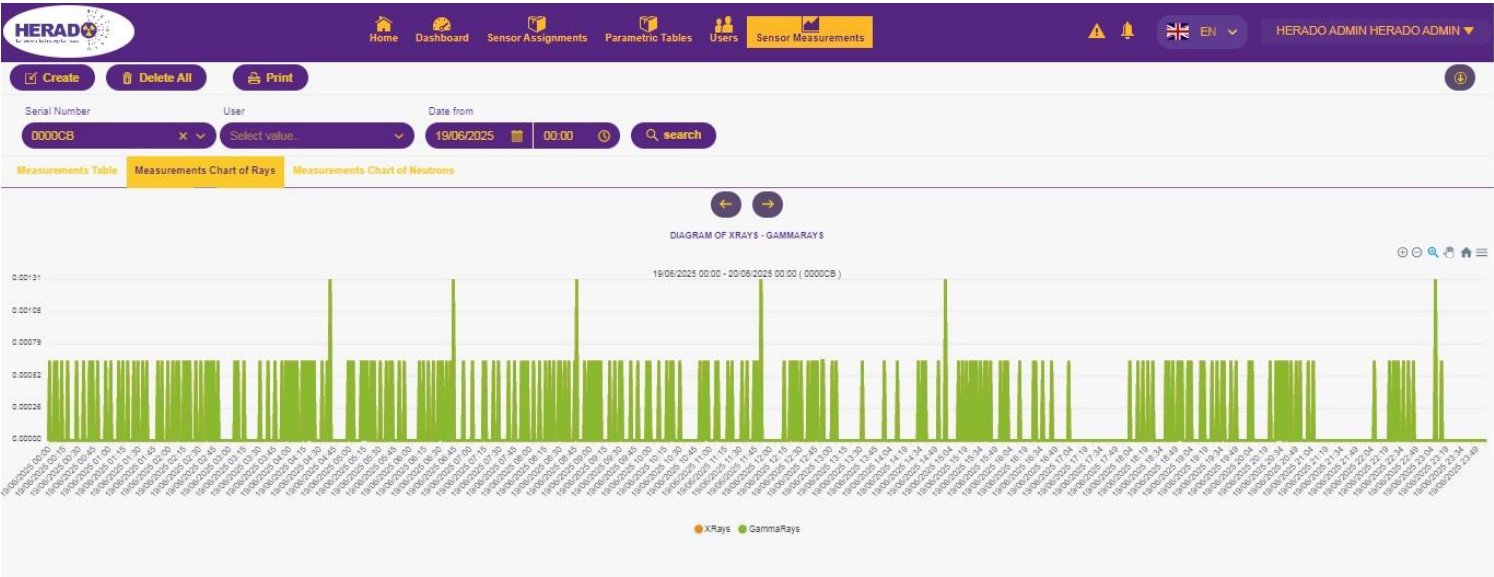


Almar Station 0000A0 **April 15, 2025**

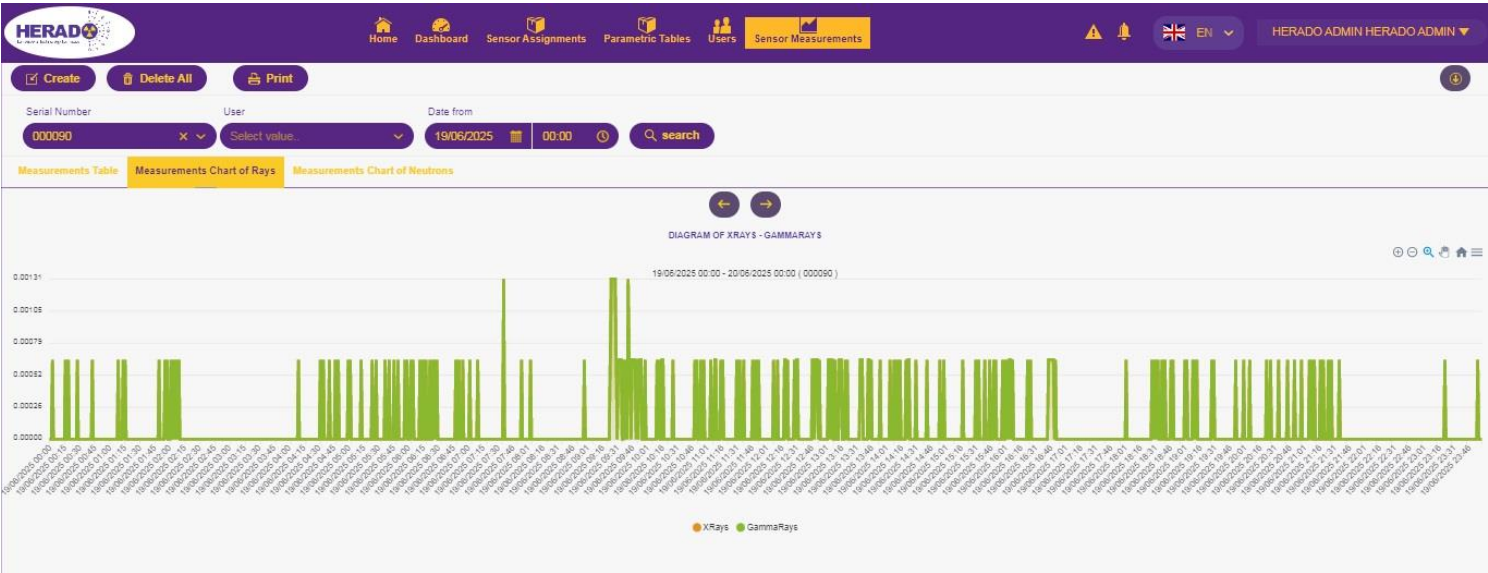


HERADO: Measurements

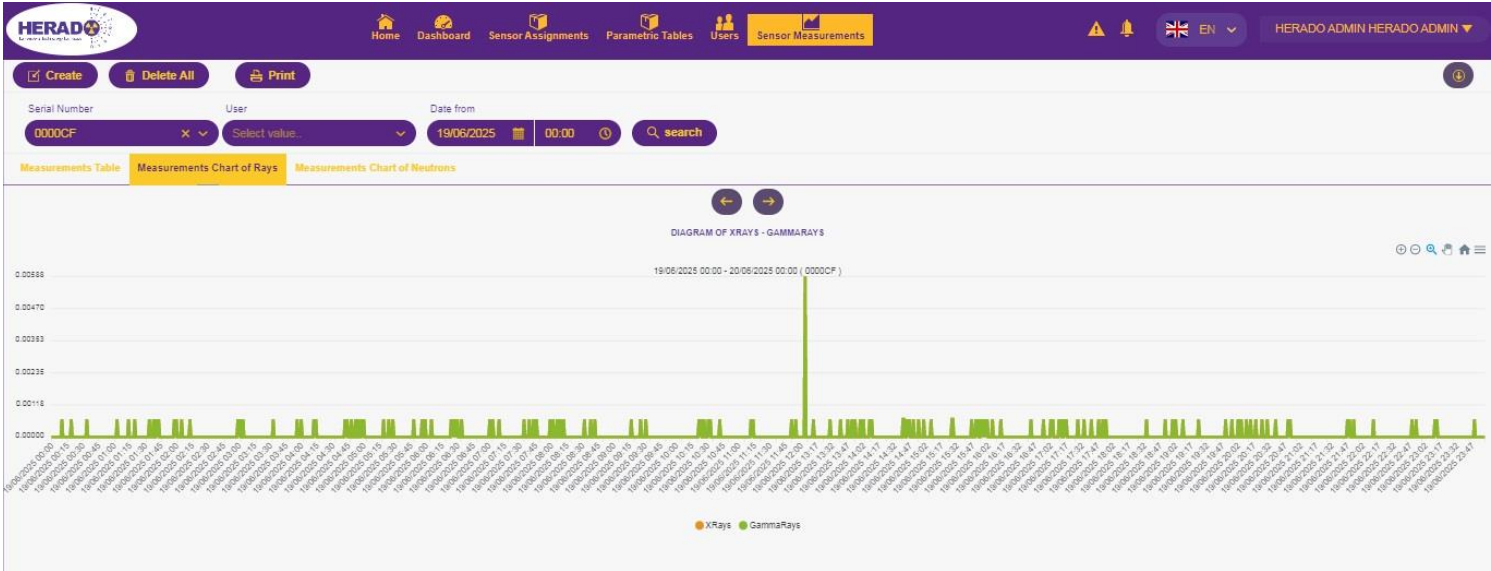
Almar Station 0000CB **June 19, 2025**



Almar Station 000090 **June 19, 2025**



Almar Station 0000CF **June 19, 2025**



Contact and Disclaimer

HERADO Group SA.

70 Amiklon str. 11142

Athens Greece

+30 2102582904

info@herado.eu

www.herado.eu



Continued focus on ESG

Lower power consumption, rechargeable batteries



Portfolio evolution

towards higher-growth end markets,
mitigating business risks



Enhance returns to shareholders

Continuous investment in organic and inorganic growth



Accelerated growth in line with global megatrends

IoT clever device, Digital AI healthcare protocol

DISCLAIMER | The data and conclusions contained in this presentation do not purport to contain or incorporate all the information that may be required to evaluate the proposed business decision; accordingly, any potential business partner should conduct more detailed analyses for purposes of its review of a possible partnership or business.

This presentation is supplied on the understanding that it is solely for the use of serious and potential business partners. If copies of this presentation may be made available to the advisers or partners of the business partner or other persons, it is clearly understood by such recipients that we accept no responsibility to them in respect thereof and that the presentation is to be used only for the purpose stated. In preparing this presentation we used and relied primarily on empirical data, indicative internal information and publicly available information.

We have not independently verified any publicly available information and we assume no responsibility for nor give any representations with respect to the accuracy or completeness of any such internal or publicly available information.

We emphasize that statements of expectation, forecasts and projects relate to future events and are based on assumptions which may not remain valid for the whole of the relevant period. Consequently, they cannot be relied upon to the same extent as information derived from current statistical reports. For these reasons, we express no opinion as to how closely the actual results achieved will correspond to any statements of expectation, forecasts or projections.

The data and conclusions contained in this presentation are based on various tests and assumptions which may or may not be correct, being based upon factors and events subject to uncertainty. Future results or values could be materially different from any forecast or estimates contained in the analyses, and the range of values resulting from the analyses should not be taken to be a recommendation with respect to price.

The data contained herein were undertaken HERADO as of the dates noted herein. HERADO undertakes no obligation to update any such data.