NONDESTRUCTIVE TESTING
NDTMA
MANAGEMENT ASSOCIATION

Advancements in Personal Dosimetry

February 10th, 2022

Need for Improvement

- NDT industry was falling behind Nuclear and Medical Industries
- Inaccuracy of existing equipment
  - Fragile—pen dosimeters can easily go off-scale
- Lack of permanent record
  - Once reset, data is gone
- Lack of “transparent” alarms
  - No audible on Dosimeter, No Dose Rate data on Rate Alarm

September 19, 2017
NRC REGULATORY ISSUE SUMMARY 2017-06

- "The NRC licensees asserted that the use of a combined dosimetry device meets the requirements in 10 CFR 34.47(a) because the combined devices meet or exceed the design quality and measurement accuracy of a single device pocket dosimeter (direct reading dosimeter) and alarm ratemeters. Additionally, these licensees asserted that the additional features of these combined function devices, such as improved visible alarms and exposure data logging and analysis, enhance personnel safety."

- "The NRC staff concluded that combined dosimetry devices, generally known as electronic alarming dosimeters (EADs), have a proven track record at nuclear power plants. Electronic alarming dosimeters have provided adequate protection and have been used routinely and reliably for over 25 years as a secondary dosimeter. The operating environment of a nuclear power reactor is as varied as would be experienced in industrial radiography (e.g., extreme temperatures, humidity, physical labor, high-radiation areas) and EADs have performed adequately under these conditions with no subsequent degradation in personnel safety.

Electronic Dosimeters

- Improved Accuracy
  - Energy compensated GM tube vs electron filament
- Increased Durability
  - Drop Tested, Water Resistance
- Greater Ranges (0 to 10R) and data readings
- More Permanent Record Keeping
- Ability to upload and interpret data
- Redundancy reduction

Thermo Fisher Radeye G

Mirion DMC 3000

S.E. International Sentry

Tracerco PED Blue

RADOS Rad-60

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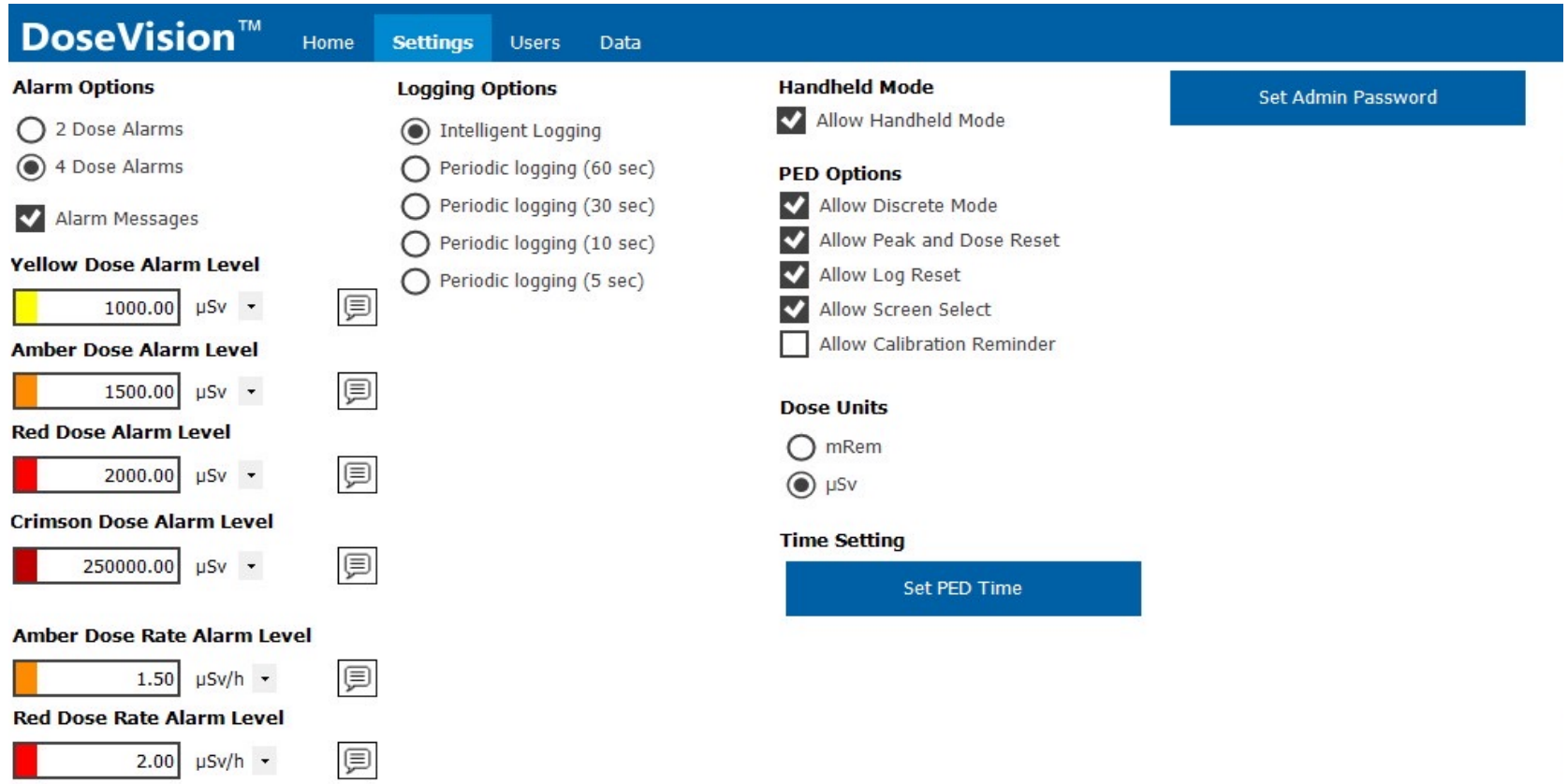
Customizable Features

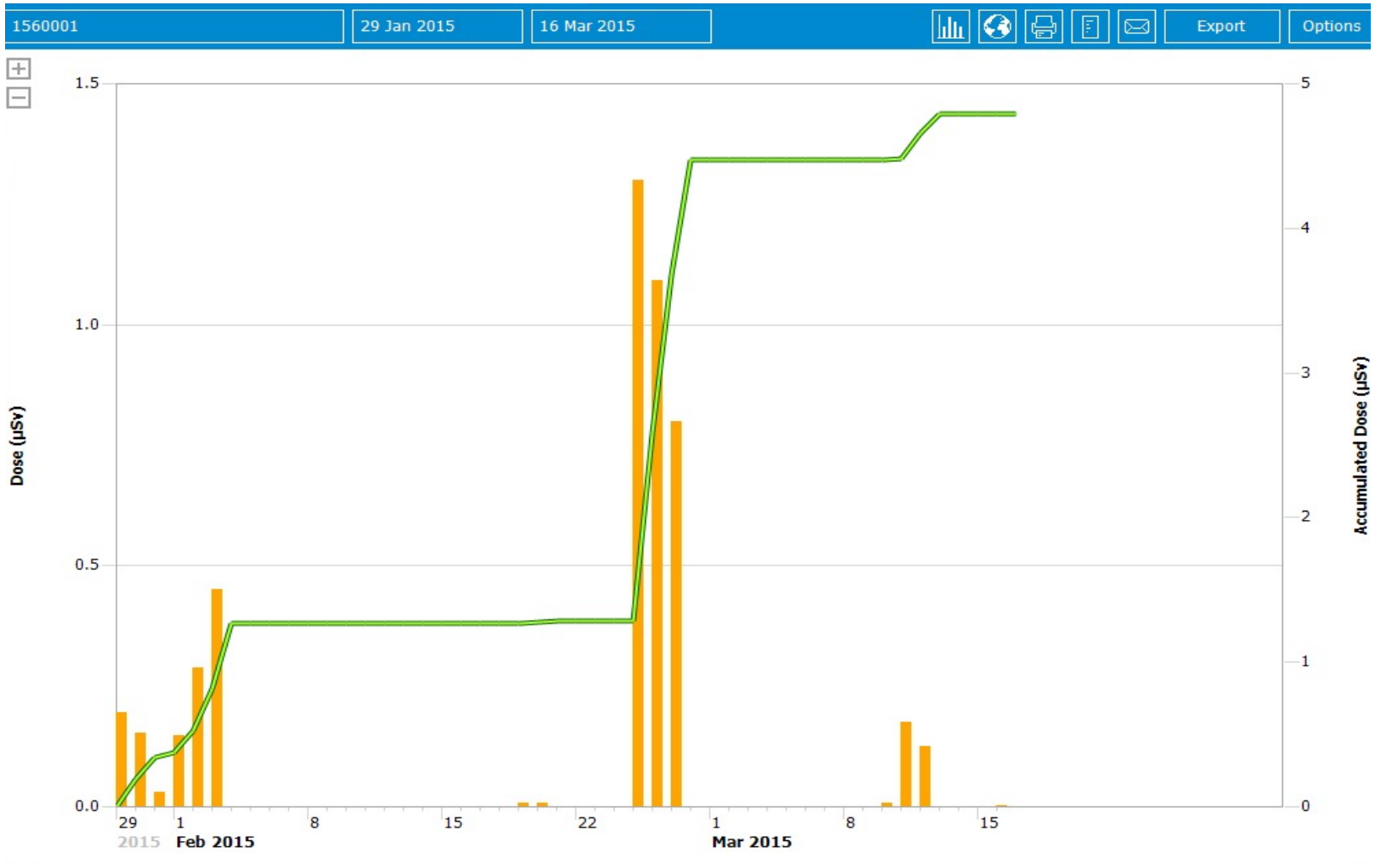
- Customizable Dose Alerts and Rate Alarm Levels
- Ability to be reset while maintaining data
- Password protected by Manager or RSO
- Easily switch between mR or uSv



Tracerco DoseVision Software

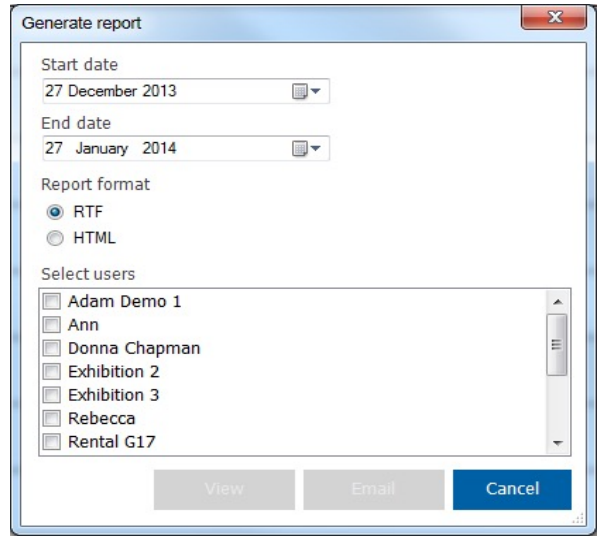
Access to Data for Interpretation

- Ability to graph dose to pinpoint dose accumulation
- Visual representation of Data
- More insight as to when/why an overexposure event may have occurred



Report Generation

- Report generating made easy
- Selectable Time Ranges
  - Can select employees and dates for end of month reporting
- Reduce Error from hand-written logs



PED USER NAME	FULL NAME	ORGANISATION	MONITORING PERIOD			CUMULATIVE DOSE TOTALS mSv		DATE OF BIRTH	EMPLOYEE REFERENCE
			START DATE	END DATE	DOSEHp (10) (mSv)	YEAR TO DATE	LIFETIME RECORD		
ADAM DEMO 1	-	-	27/12/2013	27/01/2014	0.00	0.00	0.02	-	-
ANN	-	-	27/12/2013	27/01/2014	0.00	0.00	0.02	-	-
DONNA CHAPMAN	-	-	27/12/2013	27/01/2014	0.00	0.00	0.00	-	-
EXHIBITION 2	-	-	27/12/2013	27/01/2014	0.00	0.00	0.01	-	-
EXHIBITION 3	-	-	27/12/2013	27/01/2014	0.00	0.00	0.01	-	-
REBECCA	-	-	27/12/2013	27/01/2014	0.04	0.04	0.04	01/01/1900	-
RENTAL G17	-	-	27/12/2013	27/01/2014	0.00	0.00	0.00	-	-

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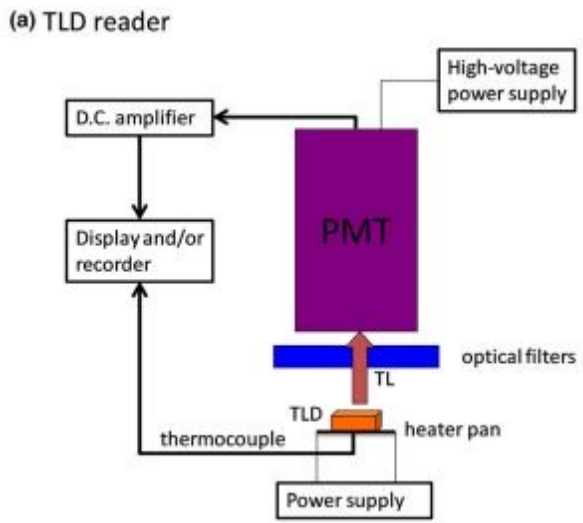
Film Badge Dosimetry Improvements

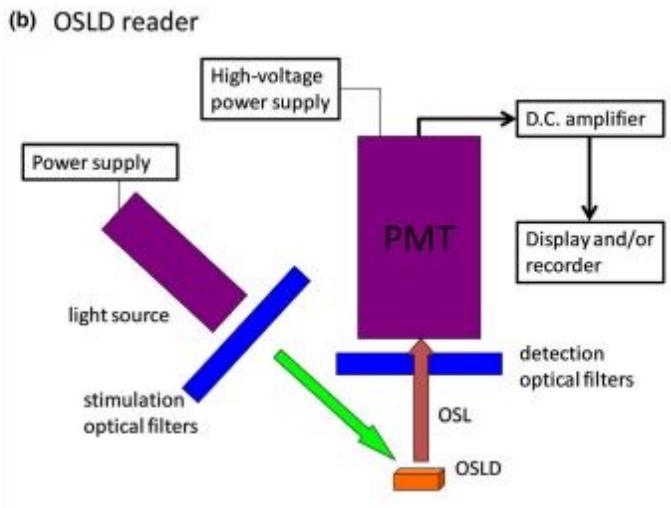
- As with electronic dosimeter improvements, likewise improvements have been made among film badges:

- Film Badge
  - Uses film to function
  - One time use, cannot be reused
  - Least accurate at low dose ranges

- Thermo Luminescent Dosimeter (TLD)
  - Uses LiF Cystal to function
  - One time reading before zeroed out
  - Requires heat to function
  - Can be affected by external environment

- Optically Stimulated Luminescence Dosimeter (OSLD)
  - Uses Aluminum Oxide to function
  - Can be used multiple times
  - Not affected by Environment
  - High degree of sensitivity at low dose rates





Instadose

- Unlimited use using silicon diode
- Immediate Dose Reads
  - Time reduction between notification that an overexposure event may have occurred
  - Wireless transmission of data
- Eliminates badge collection, return, and redistribution process
  - Remote Workers can upload on-site
- Automated email notifications when a dose exceeds a user specified level or when communication is overdue

Mirion Instadose

In Summary…

- Cons:
  - Short-term cost is a factor when choosing to upgrade
  - Enhanced features aren't required by NRC
  - Film Badge/Instadose - Physical Collection vs "Upload Collection"
- Pros:
  - Less equipment to maintain
  - Time Savings
  - Accuracy/Durability/Safety Improvements

THANK YOU

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