West Midlands Fire Service takes a Tracerco PED+ to Chernobyl

In September 2019 Jim Grove, Watch Commander, HazMats, DIM Advisor and CBRNe Tactical Advisor at West Midlands Fire Service, visited the Chernobyl Nuclear Power Plant in Ukraine to undertake training organised by Technical Resources Group, an American company that specialises in radiation training for first responders.

The purpose of the training was to gain a better understanding of the hazards and risks of radiation incidents and contamination. It included a visit to the power plant and provided unprecedented access to the site, and the contaminated areas within the controlled area of Unit 4 reactor and in the immediate vicinity of the site including the evacuated town of Pripyat.

Case Study

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Achieving a better understanding of the hazards and risks of radiation incidents and contamination

"The internal visit to the control room was to provide a better understanding of how high, medium and low activity waste from the destroyed reactor is handled and stored, the control measures and PPE supplied to help keep plant operators safe. Internal contaminated areas included the Turbine Halls, Main Circulating Pump Rooms, and the defueled Unit 3 Reactor Hall spent fuel pond, and Unit 4 Control Room."

"Outside of the power plant, we made use of the heavily contaminated areas of Pripyat, looking specifically at the current decay rate of material and the overall wide-scale contamination that plagues such a vast area, finding hot spots with detection equipment and taking measurements to practise and learn how responders would move forward in order to carry out rescues or further surveys for clean-up teams."

Jim Grove, West Midlands Fire Service

Using the Tracerco PED+

Southern Scientific assisted Jim by providing a Tracerco PED+ (advanced model, personal electronic dosimeter) for the trip to log his dose accumulation during the visit.

GPS recording and overlay to plot exposure

Jim said: *"The PED+ supported my work throughout the training as the unique GPS feature logged my accumulated dose, tagged all my data collected and overlaid it on a map with easy-to-use computer software."*

"The GPS recording is especially useful for plotting rates and the overlay within the software was superb and very accurate. The colour changes allow higher readings to be identified.

Essential features within a contaminated environment

Jim added: *"Reaction time was important for me as a wearer in a contaminated and irradiated environment, as I wanted to be sure that the instrument would react to changes in the environment quickly – by display or by warning me to the change.*

"On average, the PED+ reacted to environmental changes between 15-30 secs quicker than the current issued EPD. The reaction time was critical, especially in high dose areas where time becomes a significant factor impacting on work activity and this was one area where I felt my current issued EPD let me down. User confidence is hugely important with an instrument like this, as such I left my issued EPD in the control room when entering more heavily contaminated environments such as the area outside the original sarcophagus. The PED+ battery life was also excellent."

Easy to use personal dosimeter

Jim said: *"All information was available on the large easy-to-read PED+ display including both dose, dose rate and stay time based on alarm thresholds. The large display also made reading easy even when wearing PPE and without my glasses, very different to my National issued EPD MkII, which requires my glasses and is almost impossible to read with PPE/RPE on."*

"The menu system is easy to navigate and can be achieved one-handed, which was important when wearing PPE, for example even a gas-tight suit glove.

"Finally the software and USB support made recording data very easy."

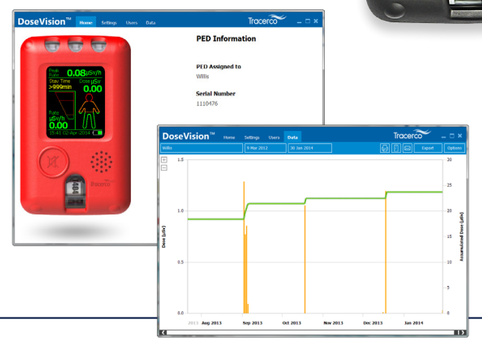
Tracerco PED+ for first responders

PED+ GPS recording for DIM officers

Jim said: *"GPS recording is an important addition for emergency planning, as it could highlight hot spots that require more detailed surveys, in the recovery phase of an incident. Responder data can be overlaid allowing clean up to be targeted. This is one of the unit's major strong points, and also would support the wider work of a DIM officer at an incident involving a dispersal weapon or a release causing contamination."*

Jim continued: *"GPS for environmental overlay is an area where the unit could provide vital and valuable data during or after an event, to target high dose areas, or to estimate dose rates to nearby objects or people. It could also provide clean up or other specific areas of interest to deal with first. As the fire service is likely to be at these scenes long before specialists, the data collected by GPS enabled dosimeters could prove invaluable."*

"The GPS overlay within the software is a fantastic way of targeting clean up or cordon control around areas that can be marked as prohibited, controlled or for other specialists."



Case Study

Findings from the PED+

Cs-137 in various concentrations

The main isotope that Jim found during the visits was Cs-137 due to its long half-life and the time between the Chernobyl disaster and this visit. In some places, the Cs-137 contamination was at much higher concentrations than others, for example at the bottom of a set of steps to a lake, as the water solubility of Cs-137 makes concentration at the bottom of a set of outdoor steps more likely than the top.

Discovering a Plutonium fuel flea

Jim discovered Plutonium in other areas, which following some local scientific guidance, was likely a fuel flea. It was discovered in a storage area for equipment used in the clean up to mitigate the immediate after-effects of the disaster back in 1986. Therefore the background gamma reading was around 3-5 µSv/h (low but far higher than normal).

Variation of dose rates and personal dose

Dose rates varied but were generally nothing to be concerned about based on the time spent in the area. However, Jim found that when hunting for high areas or specific contamination hot spots, personal dose became a problem. The stay time indication on the PED+ enabled Jim to keep at a safe dose level within these high-risk areas.

Conclusion

Jim said: *"The PED+ features proved invaluable throughout the trip including screen size, operating system, GPS, battery life, convenient data download, easily adjustable alarm levels, all data on one screen and the operation of the unit with PPE on.*

"Moving forward, the PED+ features are also invaluable for work carried out by first responders and DIM officers at West Midlands Fire Service."

"The service from Southern Scientific has been fantastic and I have been very impressed with the response time from the team. I contacted Southern Scientific about a loan device and within three days it was delivered and programmed to my exact requirements."

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