



# Tritium Detector in Water

## *Potential Next Phase*

## *Developments for Sellafield Ltd.*

### Introduction

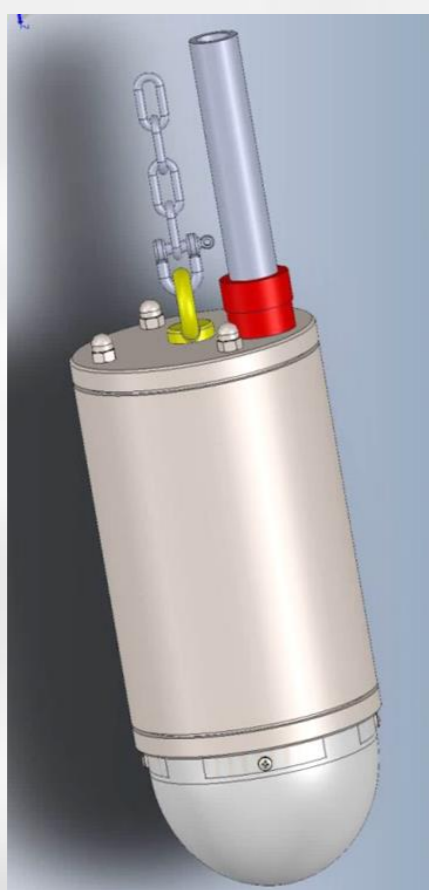
XCAM has successfully undertaken a project to develop a proof of concept prototype of a tritium in groundwater monitor. Utilising XCAM's sensing technology it directly monitors the water using a high performance silicon sensor, avoiding the need to collect samples, pretreat or filter the water under test.

The focus of the project was to show how the concept could be developed for use down groundwater testing boreholes and provide unattended continuous monitoring, however the technology has the potential to be used on other tritium-in-water monitoring applications.

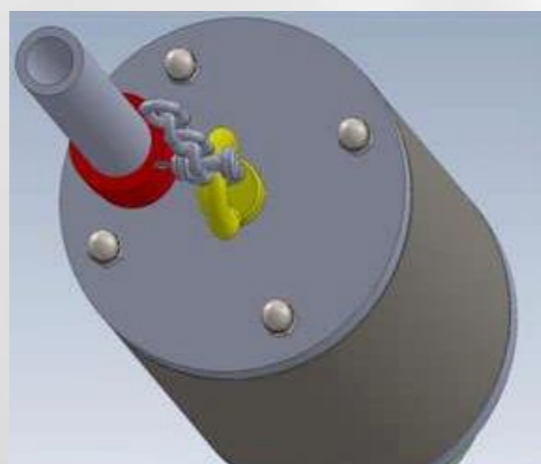
### Potential Benefits

A tritium-in-water monitoring solution would offer potential benefits over current manual sampling processes:

- Continuous monitoring to track trends and link to site activities/processes
- Continuous alarm detection – trigger an alert in the case of an increase in detected levels
- Speed of results – removes delay in laboratory analysis
- Immunity to other radioactive contaminants and water-borne sludge
- Remote communication – to provide reporting to central management systems/secondary alarm systems
- Reduction in personnel exposure by replacing manual sample collection
- Unit can be immersed in water to be monitored - no sample water disposal required



Model of the prototype tritium in groundwater detector



### Other Applications

The prototype demonstrates an enclosure concept for use in boreholes however the detection technology could be used in other water sampling applications including storage ponds, plant vessels, tanks and pipelines.



Proof of concept prototype tritium in groundwater detector

### Next Phase Developments

#### *Production-readiness*

- Down-borehole form factor – re-design electronics and housing to reduce diameter for 50mm borehole compatibility or development of a well-head unit utilising industry standard borehole water pumping
- Qualification of discrimination between Tritium and other contaminants
- Design for manufacture
- Qualification & Certification.
- Local processing and remote communications to provide local data storage, radio communications interface, LAN communications interface
- Central reporting software package
- Interface to Secondary Alarm Systems
- Interface to remote power supplies – battery, solar/wind, fuel cell.
- Development of production cell

#### *Detection – lower limit*

- Investigation and development of improved detection techniques
- Current lower limit of detection is 3000Bq/l (24h) and 1500 Bq/l (7 days).
- Two development strands have been identified which offer the prospect of significant improvements in detection performance

#### *Detection – other applications*

Configuration/packaging for other environments – ponds/vessels, pipework