

# Neutron Under Water Coincidence Counter

## Introduction

Underwater detectors are routinely used as inspection tools, for safeguards purposes, and to conduct non-destructive measurements to determine the radiation from reactor pond fuel rod assemblies whilst stored underwater. They are supplied in two different configurations:

- BWR used to measure Boiling Water Reactor fuel rods
- PWR used to measure Pressurised Water Reactor fuel rods

ANTECH N2108 Neutron Underwater Coincidence Counters (UWCC's) are used to measure neutron radiation activity from spent MOX (Mixed Oxide) fuel assemblies. The detector head is designed with the flexibility to measure either PWR or BWR fuel assembly geometries. The detector is supplied with either a PWR or BWR buffer plate, as appropriate, which enables the fuel assemblies to be positioned centrally within the tines of the detector head. Each tine is clad with a cadmium absorber to enclose the He<sup>3</sup> detectors and enhance its capability to detect fast neutrons. The detectors are designed to be portable and easy to assemble to facilitate transportation between sites and quick set-up to conduct measurements.



Detector efficiencies of 2-4% (typical) are attainable dependent on the detector type and geometry.

Each system consists of a detector head with integral electronics, a set of connection pipes with associated interconnect clamps, O-ring seals, interconnect cables, a mechanism for attaching the detector assembly to the pond gantry side rails and an OR Box, which combines two input signals from the four detectors in each tine of the fork of the detector head into a single output signal, that is ultimately fed into counting electronics such as an ANTECH N150 Advanced Multiplicity Shift Register, JSR 12, JSR 14, MicroMesskanal or ANTECH N1003 Time Correlation Analyser.

Each detector is performance tested with nuclear sources and supplied with full documentation and test records including a leak test report, Certificate of Conformance and manufacturers test records for preamplifier and <sup>3</sup>He tubes.

## Features

- High density polyethylene detector head suitable for measuring PWR or BWR fuel assemblies
- All external components manufactured from polished stainless steel and polyethylene
- Rugged cable construction with extra strain relief for connectors
- Water tight detector head and pipe assemblies (IP68)
- Supplied with 12 m of extension pipes, connecting flanges, clamps and 'O' ring seals
- Mounting bracket for securing UWCC to gantry surrounding fuel pond
- Supplied with an 'OR' box to combine the two signal outputs from the preamplifier - one from each fork tine - into a single output
- Reusable shipping containers for the detector body, pipe sections and other components
- An essential spares and maintenance kit

## Benefits

- Designed for ease of decontamination
- Easily assembled and dismantled for transportation between facilities
- Highly reliable detector electronics
- Components leak tested prior to delivery
- Detector head and extension pipes supplied in reusable type transportation containers
- Built to Euratom configuration
- Universal BWR/PWR design with BWR or PWR guide plates supplied to assist with positioning the fuel assembly within the forks

## Specification

<b>Detectors</b>	8 x <sup>3</sup> He detectors with 7.5 atm Helium fill gas pressure and 11" active length
<b>Pre-amplifier</b>	PDT 210A (or equivalent)
<b>Extension pipes</b>	5 x 2 m length; 1 x 1 m length; 2 x 0.5 m length; lifting pipes
<b>Cables</b>	RG174 multicore cable assemblies under a single common cover
<b>Nucleonics</b>	Fully compatible with Advanced Multiplicity Shift Register N150, JSR 12/14, MicroMesskanal and Time Correlation Analyser N1003