

TRITIUM AND CARBON 14 IN AIR SAMPLE COLLECTING SYSTEM

A COMPLETELY SELF CONTAINED PASSIVE SAMPLE COLLECTOR FOR AIRBORNE RADIOACTIVE MATERIAL

TRITIUM IN AIR SAMPLE COLLECTING SYSTEM FOR MEASUREMENT TO 10^{-9} Ci/m³ OR LOWER

The TASC is a small self-contained unit, which serves to collect samples from stacks, hoods, room air, the outside environment or other areas.

METHOD OF OPERATION AND USE

The radioactive material is continuously collected and concentrated in small vials. The amount trapped increases linearly with elapsed time. At regular intervals, the contents are assayed using (liquid) scintillation counters.

Knowing the collector flow rate, and the results of the scintillation assay, it is easy to deduce the average sample activity over the period of time over which the sample was collected.

RADIOISOTOPES, TRITIUM, CARBON 14 OR OTHER

Separate HT and HTO collectors are provided for discriminating tritium measurement. The HTO (T_2O) is directly trapped in a double set of vials, while the HT fraction of airborne tritium is trapped in a second set of vials by converting the HT (T_2) into the oxide by means of a small low temperature catalytic oxidizer.

Cascaded triple vials are provided to ensure virtually 100 % collection efficiency.

Other isotopes that can be collected include Carbon 14, where the radioisotope, in the form of $^{14}CO_2$, is collected by using specific chemical reagents.

DESCRIPTION

The self-contained instrument consists of a pump and flow regulator to draw a constant sample (air) stream into a set of vials which collect the radioactive material.

Two sets of vials are used to ensure that whatever may be missed by one vial is virtually certain to be trapped by a second and third.

One set of vials is used to collect tritium oxide, the air stream exiting from this set is passed through a small low temperature catalytic oxidizer and the resultant oxides are then trapped in the second set of vials.

A timer is mounted on the front panel of the instrument, as well as visual indicators to signal failure of sample flow. A rotameter and a low flow switch monitor the sampling flow rate.



FOR NRC, EPA & DOE COMPLIANCE REQUIREMENTS

The TASC uses well proven techniques of passively collecting very low level radioactive samples by continued trapping in vials containing liquid or granular agents. Government regulations impose very strict requirements on minimum detectable activity levels. Passive samplers, although they do not provide real time data, provide a low cost highly effective method of measuring to extremely low levels, thereby ensuring compliance.



TASC TECHNICAL SPECIFICATION

SENSITIVITY	Better than 10^{-9} Ci/m ³ , the detection limit depends on the collection time, for any given sample flow rate
FLOW RATE	Electronic Mass Flow Meter range from 10 to 500 ml/min or Rotameter (0 - 100 ml/min. typical) other ranges are available
PUMP	Oscillating piston high reliability pump
FLOW FAILURE	Δ P sensor, relay and pilot light
SAMPLING VIALS	20 cc vial, or other as requested
OXIDIZER	Heated platinum palladium cartridge
ELAPSED TIME	Electronic timer
ENCLOSURE COOLING	Long life fan
ENVIRONMENTAL	0 - 50° C, 0 - 99 % R.H.