

# SENSITIVE DRINKING WATER RAD-SAFETY MONITOR Model # SSS-33-5FT-LLD

## FEATURES:

- MEASURES AT OR BELOW EPA LEVELS
- REAL TIME, IN-LINE, CONTINUOUS
- TRUE FAIL SAFE DESIGN
- DETECTS ALPHAS, BETAS AND GAMMAS
- NO LIQUID SCINTILLANT
- EASY CALIBRATION
- MEASURES TRITIUM TO 20,000 picoCurie/ml

## APPLICATION:

- Monitor drinking water against any & all Radioactive contaminants
- Monitor for leaks in Candu / heavy water reactors
  - Monitor for contamination in ground or surface water
  - Monitor liquid-waste-stream from laboratory or plant

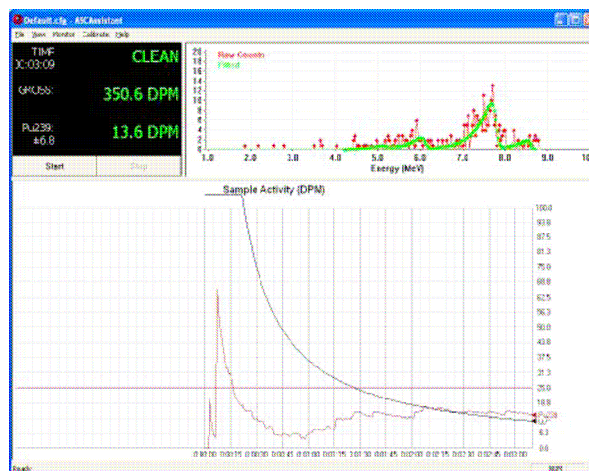


**PROBLEM:** Drinking water sources are vulnerable to accidental or knowing contamination by individuals, groups, industry, medical labs, terrorists and from naturally occurring radioactive materials (NORM). Very few water districts have real-time radiation monitors in place to protect the water and the public.

**SOLUTION:** For the first time in a Continuous Real Time monitor the Model SSS-33-LLD solves this problem by continuously monitoring the water using alpha, beta and gamma detectors. The information from these detectors is analyzed and displayed in units of microCuries, nanoCuries or picoCuries per liter. The calculations are updated every 2 minutes, every hour and every day. The longer update times correspond with greater precision and increased sensitivity. Sensitivities in the daily updates each meet or exceed the EPA clean drinking water requirement for that measurement. Please see attached chart of measurements.

These detectors measure alpha, beta and gamma from any radioactive liquids. Measurements of radiation concentration and total discharge are logged 24 hr/day, 7 day/week.

## ON-SCREEN ANALYZER AND STRIP CHART RECORDER



**TA** TECHNICAL ASSOCIATES

7051 ETON AVENUE, CANOGA PARK, CA 91303  
TELEPHONE (818) 883-7043 • FAX (818) 883-6103  
e-mail: tagold@nwc.net • www.tech-associates.com

**DESCRIPTION:** Model SSS-33-LLD is a multi detector water monitor /controller for simultaneous measuring of alpha, beta and gamma-emitting radio nuclides. The electronics are microprocessor with color LCD display. The pre-amps are plug in modules allowing change or addition of functions at a later date, and allow rapid repair by module replacement in the field. The modular system is covered by TA's unique exchange warranty system in addition to the full one year warranty.

Shields are void free lead encased in welded housing for long useful life and easy decontamination. The silicon and anthracene alpha, beta flow cells are easily changed via disconnect fittings. Gamma Spec shield can be opened for cleaning with minimum effort. All connections are sealed against leaks. The standard water moving system is based on a high precision pump. It has a 10 liter per minute capacity.

A wide range of pump capacities are available to meet users specific needs. The entire system is mounted in a wheeled, self-contained rugged cabinet. The SSS-33-LLD comes complete with all cabling tubing and connectors in place and is ready to operate. 115 Volt 60Hz is standard; 220 Volt 50/60 Hz is optional.

**There are two types of alpha, beta detectors** in this system.

1. Silicon detectors with 2,000mm<sup>2</sup> sensitive area.
2. Anthracene scintillator that consists of a light-tight detector assembly which interfaces with the sample via quick disconnect coax cables and medical grade hoses (stainless steel tubing is optional). The sample is passed through a deionizer, filter and then goes to the detector assembly where it is viewed by a matched pair of 1.5" diameter photo-multiplier tubes.

**The alpha, beta pulse analysis portion** of this system conditions and analyzes the output from the photo-multiplier tubes by pulse height, duration and coincidence. Thereby permitting the system to eliminate counting most background and noise counts. Sensitivity is enhanced by the use of stochastic resonance plus high gain, low noise PM tubes and pre-amps.

**The water is measured for Gamma-emitter content**, typically in three areas of interest. These are user settable. For example they can be set for Na-22 (greater than 550 KeV), Be-7 (450 to 550 KeV) and low energy (below 450 KeV). To correct for overlap and multiple peaks (e.g. Na-22) percentages of the high energy peak can be subtracted from the mid and low energy peaks. Then a percentage of the net mid-energy peak is also subtracted from the low energy peak.

#### **Data:-Analysis-Display-Hard-Copy-DVD-ROM Archive**

In each data collection channel, the net counts are automatically converted to concentration units, such as uCi/liter Bq/l or etc. (using the detector efficiencies automatically measured and stored previously by SSS-33-LLD semi-automatic self-calibration procedure).

The concentration and total activity released and MDA levels are continuously calculated and recorded. This real time information will trigger the alarms. Also, all data is saved to the hard drive in spreadsheet format.

Historical data is easily displayed on-screen (and/or printed out on the included graphics printer) in tabular or graphical format, showing quantitative information as well as trends. Data is recorded frequently so time-resolution is excellent.

DVD drive, Ethernet card (with security) and USB ports make it easy to archive and further analyze data.

An optional alarm voting system is available so that alarms will come on only if all the data is consistently conclusive.

Each alarm activates fail-safe relays. Relay contacts are available to user.

**Triggered Aliquot:** This feature automatically collects and stores a small water sample for independent analysis whenever an alarm occurs.

**UV Lamp:** Used on inlet as algae-cide.

### 3 GHz COMPUTER INCLUDES:

3 GHz Processor, 600 Gig Hard Drive, 2 gig Ram

15" LCD Monitor, Keyboard, Mouse

DVD Drive creates DVD's for Data Archive

10 Channel Data Acquisition Board, All Cables

Full Graphics Printer, color + B/W

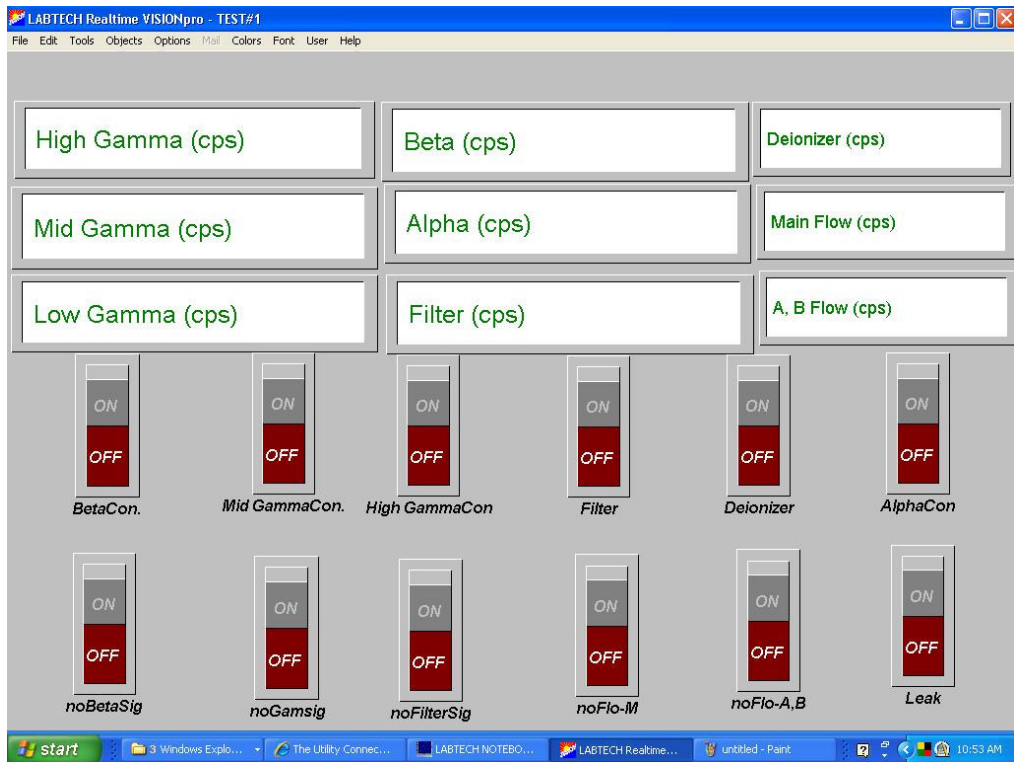
Ethernet for hook up to your LAN

Win XP/Vista, Specific Software for AlphaBeta and Gamma Counting.

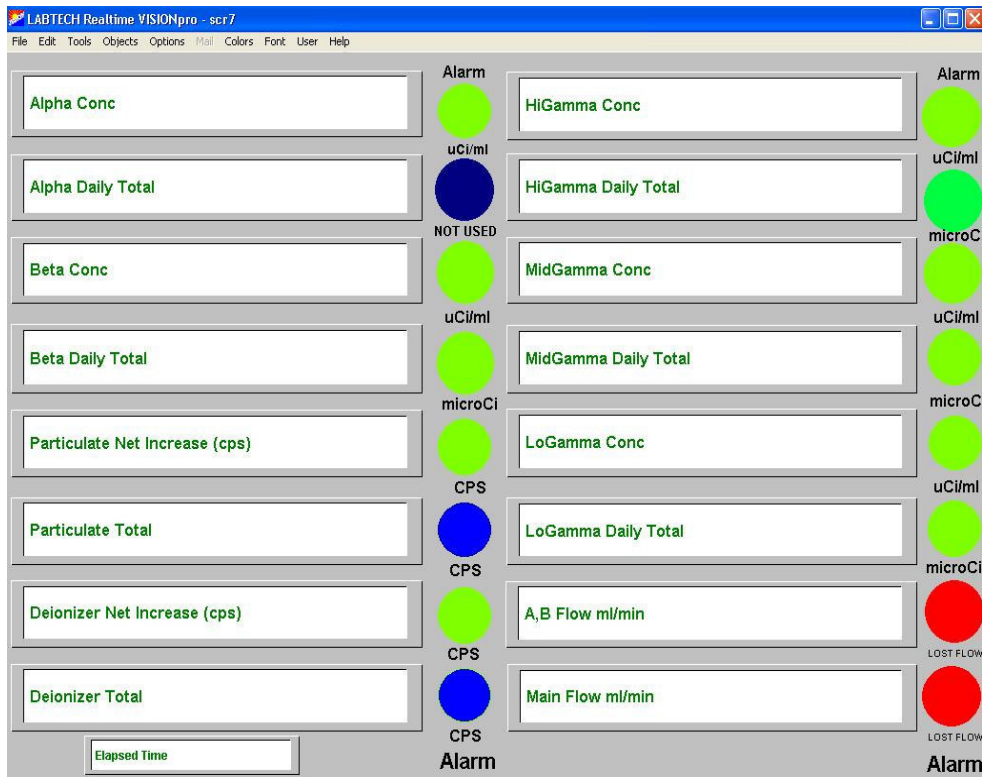
Software is easily customized by user for special needs.



## STEP #1 – SET ALARMS



## STEP #2 TESTS DETECTORS AND ALARMS



## STEP #3 – MAIN OPERATION SCREEN

**DRINKING WATER RAD-SAFETY MONITOR  
Model # SSS-33-LLD**

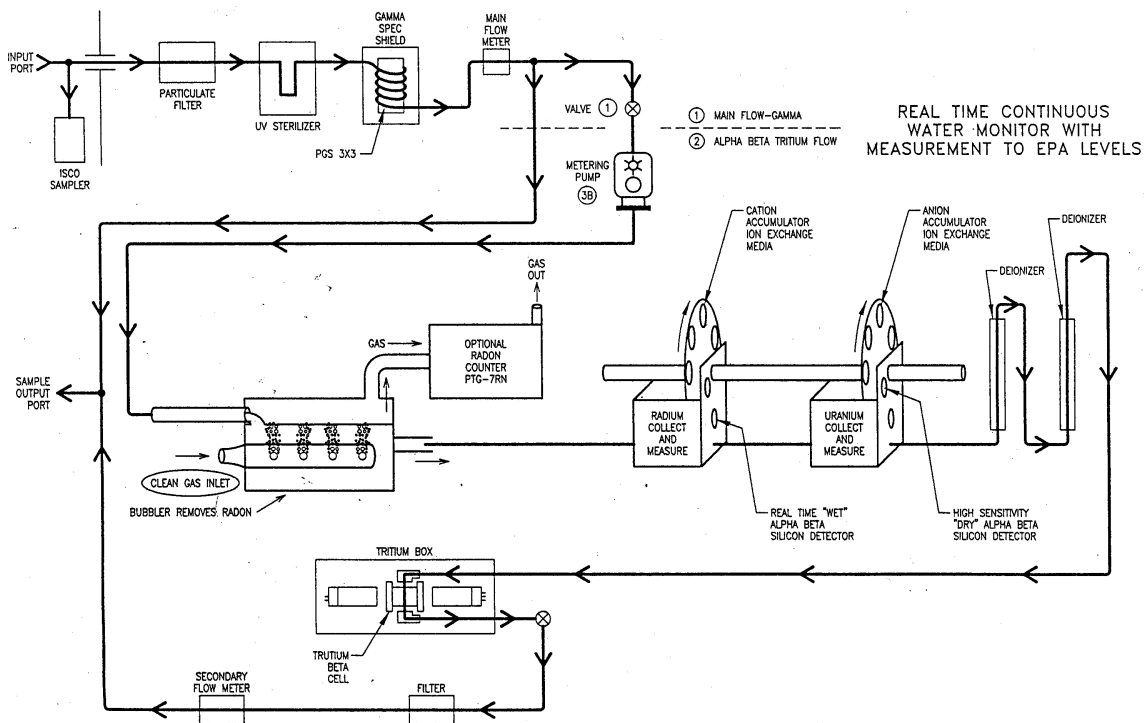
**Radiological- ANALYTICAL, WATER-PURITY Model SSS-33-LLD**

MEASUREMENT	SENSITIVITY RANGE	TOP OF RANGE	SENSOR/METHOD USED	MAINTENANCE TIME - ACTION	EPA MAX LEVELS FOR DRINKING WATER
<b>Gross Alpha</b>	15pCi/liter	10,000pCi/liter	Crushed Scintillation Bed of Crystals preceded by Radon and Uranium Traps	3-6 Months for Finished Water. Replace De-ionizer Cartridges	15pCi/liter
<b>Beta</b>	50pCi/l	50uCi/liter	Crushed Scintillation Bed of Crystals	3-6 Months for Finished Water. Replace De-ionizer Cartridges	50pCi/l
<b>Gamma</b>	4mRem/yr	50uCi/liter	Nal Gamma Spec Scintillation Crystal	3-6 Months for Finished Water. Replace Particulate Filter Cartridge	4mR/yr
<b>Uranium</b>	20pCi/liter	2000pCi/liter	An-Ion Concentrator & Scintillation Crystal	Weekly Replace An-Ion Beads Media	20pCi/liter
<b>Combined Ra-226 and Ra-228</b>	5pCi/liter Combined	1,000pCi/liter	Cat-Ion Concentrator & Scintillation Crystal	Weekly Replace Cat-Ion Media	5pCi/liter Combined

**OPTIONAL:**

MEASUREMENT	SENSITIVITY RANGE	TOP OF RANGE	SENSOR/METHOD USED	MAINTENANCE TIME - ACTION	EPA MAX LEVELS FOR DRINKING WATER
<b>Tritium</b>	20,000pCi/liter	1uCi/liter	Crushed Scintillation Bed of Crystals	6 Months for Finished Water. Replace De-ionizer Cartridges	20,000pCi/liter
<b>Radon</b>	100pCi/liter	2000pCi/liter	Ion Chamber with Water Bubbler--Agitator	3 Months Clean Vapor Trap	Unregulated

## FLOW CHART DIAGRAM



REAL TIME CONTINUOUS  
WATER MONITOR WITH  
MEASUREMENT TO EPA LEVELS

### Flow Path

Water Inlet port  
 Pressure relief valve  
 ISCO Sampler  
 Particulate Filter (with Gamma Scintillation Detector)  
 Ultra Violet Sterilizer  
 Gamma spec shield  
 Gamma Detector  
 Mass Flow Meter  
 Metering pump for Alpha Beta Tritium detector loop

Radon gas separator  
 Radon counter  
 Cation accumulator  
 Silicon Radium Detector  
 Anion accumulator  
 Silicon uranium detector  
 Deionizer with gamma detector  
 Tritium-Beta flow cell  
 Anthracene detector  
 Alpha Beta flow meter  
 Water discharge



## SEVEN DAY RADIUM SAMPLE CHANGER

- System flow rate**

- Standard: 100 to 1,000 ml/minute

- Optional: very wide range of flow rates is available

- Sample temperature standard:** up to 80° F liquid. (optional to 115° F)

- Ambient temperature** 65 - 100 ° F

- Optional:** Cooler model Cool-33 for detector & sample is used in case of higher sample or ambient temperatures.

- SIZE AND WEIGHT:**

- Dimensions:** One or two cabinets each; one is 34" WIDE X 31" deep X 46" high including wheels

- Wheels:** 5" dia, high capacity, rugged wheels with lock & rubber tires.

- Shipping weight:** standard unit: 300kg

**Discharge rate maximums:**

- H-3** up to, but not exceeding 20,000 pico Ci/l (legal max for clean drinking water).

- Alpha Beta Gamma** per regulations

	SSS-33-5FT	SSS-33-LLD
FLOW PATH ADDITIONAL DETECTORS RADIUM:		
GAMMA	GAMMA SPEC NoI Scintillator	GAMMA SPEC NoI Scintillator
TRITIUM	Scintillation	Anthracene Flow Cell Scintillation
PARTICULANTS		
IONS		
DETECTOR MEDIUM  DETECTOR TYPE	Anthracene Flow Cell  Anthracene Scintillation	Cal-Ions concentration wheel with 7 samples Solid State Silicon Action area 2000 mm <sup>2</sup>
URANIUM	Anthracene Flow Cell  Scintillation	Anion concentration 2000 mm <sup>2</sup> Select alpha-beta detectors
CONDUCTIVITY- optional existing detectors		
HARDWARE DATA ANALYSIS Pre-filters "need service" monitors		Use multichannel analysis (MCA) for Channels 1, 5, and 6
SOFTWARE ADDITIONS		Spectrum analysis, Isotope peak- setting algorithm capable of quantifying alpha activity against Radiological of Radon interference
FAST-SLOW DISPLAY SHOWS		Shows Real-time concentrations (2 minutes update time) as well as more specific hourly raxzxxx throughout the day
EPA Standard levels		Are derived from the Silicon detectors and there display on a 24 hr cycle