Alpha Radiation Monitor for Water and Effluent Discharge Real-Time Continuous

Model - Nex-Alpha

NEX-ALPHA allows radiation users to be good community members by controlling and measuring their effluent.

Features

- Measures Alphas, U-238, Po-210, RADON
- Available In-Line, Desktop or Portable Systems
- Measures at or Below EPA/DHS PAG Levels
  Protective Action Guideline Levels and Military Drinking Water Limits
- Real Time, In-Line, Continuous
- High Sensitivity to Alphas (Low Sensitivity to Gammas)
- No Reagent Tanks to Fill
- No Waste Stream
- Easy Calibration
- Prevent Acute Health Effects
- Reduce Risk of Chronic Exposure
- World's Only PAG-Level **Alpha Water Monitor**

Application

USERS:

- Hospitals
- Power Plants
- Oil and Gas Extraction
- National Laboratories

USE FOR:

- Internal Testing
- Locate Problems / Leaks
- Develop Compliance Strategies

DETECT:

All Alphas

» Monitor drinking water against **Alpha emitter contaminants**
» Monitor for contamination in ground or surface water
» Monitor liquid-waste-stream from laboratory or plant

CBRN Real - Time Air & Water Specialists

TECHNICAL ASSOCIATES
OVERHOFF TECHNOLOGY

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DIVISIONS OF
US NUCLEAR CORP
OTCQB-UCLE

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Application

Many labs, universities, hospitals, government and pharmaceutical facilities handle some liquid radioactivity.

Some portion of this is collected as radioactive waste and sent for storage or burial. But a significant portion goes down the drain directly or into short term storage tanks. More and more of this is being seen as a hazard by regulators or community members.

The solution is for the various facilities to quantitate these materials to make sure the liquid effluent or waste water is being disposed of into the correct flow path.

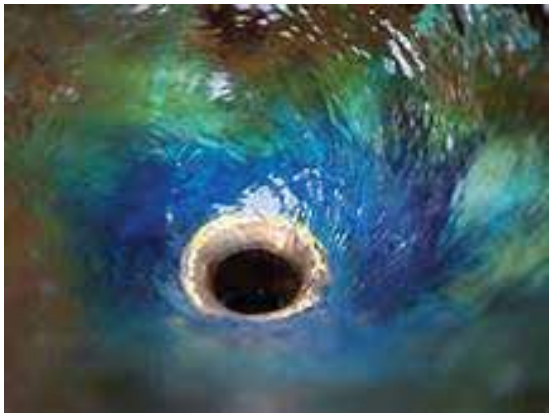
Technical Associates Model **NEX-ALPHA** is designed especially for this purpose of quantitating waste water and liquid effluent.

Problem

Ground water and drinking water sources are vulnerable to contaminants coming from a variety of sources.

These include but are not limited to hospitals, power plants, oil exploration and other industrial uses, accidental or knowing contamination by individuals, groups, and from naturally occurring radioactive materials (NORM).

As yet 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 radiation water monitor** the Model **NEX-ALPHA** solves this problem by continuously monitoring the water using ultra-sensitive, Alpha radiation detector.

The information from this detector is analyzed and displayed in units of picoCuries per liter. The count times are user settable and calculations are automatically updated every 2 minutes, every hour and every day. Measurements of radiation concentration and total discharge are logged 24 hr/day, 7 day/week.

The longer update times correspond with greater precision and increased sensitivity. Sensitivities in the daily updates each meet or exceed the DHS Protective Action Guideline Levels (PAG) for drinking water. Please see attached chart of measurements.

Using TA Tried and True sample collection and measurement technology this detector measures ALPHA emissions from any radioactive liquids.

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Description

Model NEX-ALPHA is an Alpha detector water monitor /controller for measuring of Alpha emitting radio nuclides. The electronics are microprocessor with LED/LCD display with plug in modules facilitating quick change or addition of functions at a later date. Modular design allows for 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. On-site service contracts available in many areas.

The Alpha flow cell is easily changed via quick disconnect fittings. 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. ystem can also be operated using city water pressure in which case no pump is required.

A wide range of pump capacities are available to meet user's specific needs. The system electronics is mounted in a rugged cabinet. It 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.

Alpha Detector Assembly:

- Alpha Detector: Consists of a light-tight detector assembly which interfaces with the sample via quick disconnect coax cables and medical grade tubing. The sample is viewed by a matched pair of 5" diameter photo-multiplier tubes.
- Alpha Scintillation detector has 1,100 cm^2 sensitive area.

The Alpha pulse analysis portion of this system conditions and analyzes the output from the photo-multiplier tubes by pulse height and duration.

In this way the system is able 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.

Detect	PAG Level	Lower Limit of Sensitivity	Top of Range	Sensor Method Used		Maintenance
					Time	Action
ALPHA				Special Alpha Scintillator	3 mos	Replace Particulate Filter Cartridge
U-238	**30 min.** **24 hr**	3,000 pCi/l 500 pCi/l	2 x 10^7 pCi/l			
Po-210	**30 min.** **24 hr**	2,000 pCi/l 500 pCi/l	2 x 10^7 pCi/l			
OPTIONS:		**LOWER LIMIT**	**TOP OF RANGE**			
DETECT						
Radon		100 pCi/liter	2,000 pCi/liter		1-3 mo	Clean or replace vapor trap
PRE- CONDITION						
Expel Radon					1-3 mo	Clean or replace vapor trap

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Specifications

Alarms: Three relay alarms. Each alarm activates a relay.

Sample Temperature Standard: Up to 80° F liquid. (Optional to higher temperatures)

Ambient Temperature: 65 - 100° F (**Optional** wider temperatures ranges)

Optional:

Cooler model Cool-33 for detector and sample is used in case of higher sample or ambient temperatures.

Size and Weight:

Dimensions: One assembly: 14" wide x 29" tall including wheels
Electronics may be separated from detector electronics.

Electronics: 7" wide x 10" tall (23 lbs.)

Shipping Weight: Standard unit: 22Kg - excluding **optional** shielding

Note: Optional thin Lead Sheet for shielding can be shipped with or shipped separately or overseas customers may wish to buy the lead sheet locally.

Data: - Analysis - Display - Archive ~ NEX-ALPHA

The concentration and total activity released and MDA levels are continuously calculated and recorded.
All data can be saved to the hard drive in spreadsheet format.

NEX-ALPHA Electronics
LAM-10-DSC

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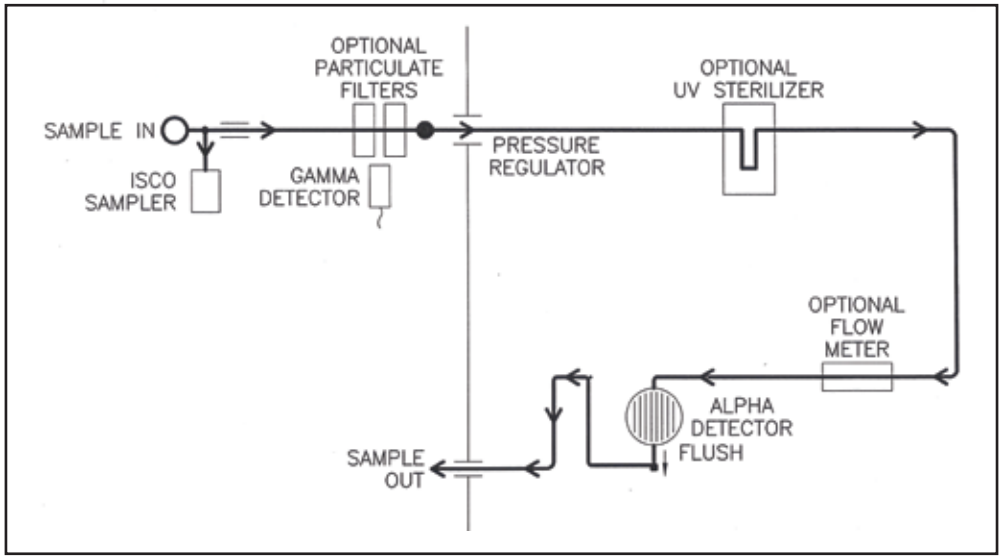

Flow Path

- » Water Inlet port
- » Pressure relief valve
- » Particulate Pre-Filter (with **Optional** Gamma Detector) Ultra Violet Sterilizer **Optional**
- » Mass Flow Meter **Optional**
- » Alpha Detector
- » Sample Out

Discharge water is clean and can go back into drinking water line.
No liquid scintillant or reagents are added
No toxic or radioactive waste of any kind.

	NEX-ALPHA
Read-out Units (Typical)	Bq/m3 OR pCi/l
Measures	Waterborne Concentration
Available options	Electronic Mass Flowmeter USB & Data Retrieval & Archive Software for PC

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Excerpt from Revisions to the Protective Action Guides (PAG) Manual for Radiological Incidents 2009

Table 4-1. Derived Response Levels (DRLs) Associated with a Committed Effective Dose (CED) of 0.5 rem Resulting from 1 Year of Ingestion

DRLs (pCi/L)			DRLs (pCi/L)			DRLs (pCi/L)		
Column 1: Radionuclide	Column 6: Without Radioactive Decay	Column 7: With Radioactive Decay Only	Column 1: Radionuclide	Column 6: Without Radioactive Decay	Column 7: With Radioactive Decay Only	Column 1: Radionuclide	Column 6: Without Radioactive Decay	Column 7: With Radioactive Decay Only
H-3	4.42E+06	4.54E+06	Sn-125	6.01E+04	1.58E+06	Hg-203	9.69E+04	5.29E+05
C-14	3.19E+05	3.19E+05	Sn-126	3.87E+04	3.87E+04	Tl-204	1.56E+05	1.70E+05
Na-22	5.80E+04	6.61E+04	Sb-124	7.29E+04	3.11E+05	Pb-210	2.65E+02	2.70E+02
P-32	7.71E+04	1.37E+06	Sb-126	7.53E+04	1.54E+06	Bi-207	1.46E+05	1.47E+05
P-33	7.53E+05	7.50E+06	Sb-127	1.11E+05	7.28E+06	Bi-210	1.41E+05	7.11E+06
S-35	2.39E+05	7.31E+05	Te-127	1.10E+06	7.12E+08	Po-210	1.53E+02	3.33E+02
Cl-36	1.99E+05	1.99E+05	Te-129	2.94E+06	1.53E+10	Ra-226	6.59E+02	6.59E+02
K-40	3.00E+04	3.00E+04	Te-129m	6.23E+04	4.68E+05	Ac-227	5.76E+02	5.85E+02
Ca-45	2.60E+05	5.13E+05	Te-131m	9.49E+04	1.92E+07	Th-227	2.05E+04	2.77E+05
Sc-46	1.25E+05	3.97E+05	Te/I-132	4.86E+04	3.78E+06	U-235	3.96E+03	3.96E+03
Ti-44	3.19E+04	3.20E+04	I-125	1.20E+04	5.12E+04	U-238	4.15E+03	4.15E+03
V-48	9.34E+04	1.46E+06	I-129	1.75E+03	1.75E+03	Np-237	1.73E+03	1.73E+03
Cr-51	4.79E+06	4.37E+07	I-131	8.49E+03	2.67E+05	Np-239	2.32E+05	2.49E+07
Mn-54	2.57E+05	3.74E+05	Cs-134	9.63E+03	1.13E+04	Pu-236	2.13E+03	2.40E+03
Fe-55	5.57E+05	6.31E+05	Cs-136	6.01E+04	1.16E+06	Pu-238	8.12E+02	8.15E+02
Fe-59	1.03E+05	5.91E+05	Cs/Ba-137	1.36E+04	1.38E+04	Pu-239	7.37E+02	7.37E+02
Co-58	2.47E+05	9.09E+05	Ba-133	1.21E+05	1.25E+05	Pu-240	7.37E+02	7.37E+02
Co-60	5.39E+04	5.76E+04	Ba-140	7.12E+04	1.41E+06	Pu-241	3.89E+04	3.99E+04
Ni-63	1.22E+06	1.22E+06	La-140	9.16E+04	1.38E+07	Pu-242	7.77E+02	7.77E+02
Zn-65	4.69E+04	7.54E+04	Ce-141	2.60E+05	2.03E+06	Am-241	9.07E+02	9.08E+02
Ge-68	1.44E+05	2.16E+05	Ce-143	1.65E+05	3.04E+07	Am-242m	9.69E+02	9.71E+02
Se-75	7.09E+04	1.70E+05	Ce/Pr-144	3.53E+04	5.33E+04	Am-243	9.12E+02	9.12E+02
Rb-86	6.59E+04	8.92E+05	Nd-147	1.71E+05	3.94E+06	Cm-242	1.58E+04	3.12E+04
Sr-89	7.20E+04	3.63E+05	Pm-145	1.60E+06	1.63E+06	Cm-243	1.24E+03	1.26E+03
Sr-90	6.65E+03	6.73E+03	Pm-147	7.09E+05	8.07E+05	Cm-244	1.51E+03	1.53E+03
Y-90	6.88E+04	6.53E+06	Pm-149	1.86E+05	2.13E+07	Cm-245	8.90E+02	8.90E+02
Y-91	7.81E+04	3.41E+05	Pm-151	2.53E+05	5.41E+07	Cm-246	8.94E+02	8.94E+02
Zr-93	1.67E+05	1.67E+05	Sm-151	1.89E+06	1.89E+06	Cf-252	1.95E+03	2.21E+03
Zr-95	1.92E+05	7.73E+05	Eu-152	1.35E+05	1.39E+05			
Nb-94	1.06E+05	1.06E+05	Eu-154	9.07E+04	9.43E+04			
Nb-95	3.14E+05	2.26E+06	Eu-155	5.66E+05	6.07E+05			
Mo-99	3.06E+05	2.81E+07	Gd-153	6.65E+05	1.07E+06			
Tc-99	2.88E+05	2.88E+05	Tb-160	1.15E+05	4.15E+05			
Ru-103	2.52E+05	1.62E+06	Ho-166m	9.34E+04	9.35E+04			
Ru/Rh-106	2.64E+04	3.65E+04	Tm-170	1.40E+05	3.20E+05			
Ag-110m	6.65E+04	1.06E+05	Yb-169	2.60E+05	2.06E+06			
Cd-109	9.26E+04	1.20E+05	Hf-181	1.65E+05	9,84E+05			
Cd-113m In-	8.05E+03	8.26E+03	Ta-182	1.20E+05	2.97E+05			
114m Sn-	4.54E+04	2.33E+05	W-187	2.94E+05	7.47E+07			
113	2.51E+05	6.20E+05	Ir-192	1.35E+05	4.77E+05			
Sn-123	8.82E+04	2.01E+05	Au-198	1.80E+05	1.69E+07			

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