

**NEXT GENERATION
BETA ONLY- Water Monitor
Model # NEX-BETA**

FEATURES:

- AVAILABLE IN 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 BETAS (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 **β water monitor**



APPLICATION:

- Monitor drinking water against **any & all Beta Emitter Contaminants** except H-3, C-14, S-35
- 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). As yet very few water districts have real-time radiation monitors in place to protect the water and the public.

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SOLUTION: For the first time in a **Continuous Real Time** monitor the Model **NEX-BETA** solves this problem by continuously monitoring the water using ultra-sensitive, beta detector. The information from this detector is analyzed and displayed in units of picoCuries per liter. The count times are user settable in NexBeta-7 and calculations are automatically updated every 2 minutes, every hour and every day in NexBeta-9. 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 for drinking water. Please see attached chart of measurements. Using TA Tried and True sample collection & measurement technology this detector measures beta emissions from any radioactive liquids. Measurements of radiation concentration and total discharge are logged 24 hr/day, 7 day/week in NexBeta-9.

DESCRIPTION: Model **NEX-BETA-7 and 9** are is a beta detector water monitor /controller for measuring of beta emitting radio nuclides. The electronics are microprocessor with LED/LCD display. The electronics 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. On-site service contracts available in many areas.

The beta flow cell is easily changed via 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. System 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 users 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.

Beta Detector in this system;

1. Beta Detector: Consists of a light-tight detector assembly which interfaces with the sample via quick disconnect coax cables and medical grade hoses. The sample is viewed by a matched pair of 5" diameter photo-multiplier tubes.
2. Beta Scintillation detector has 1,100cm² sensitive area.

The 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.

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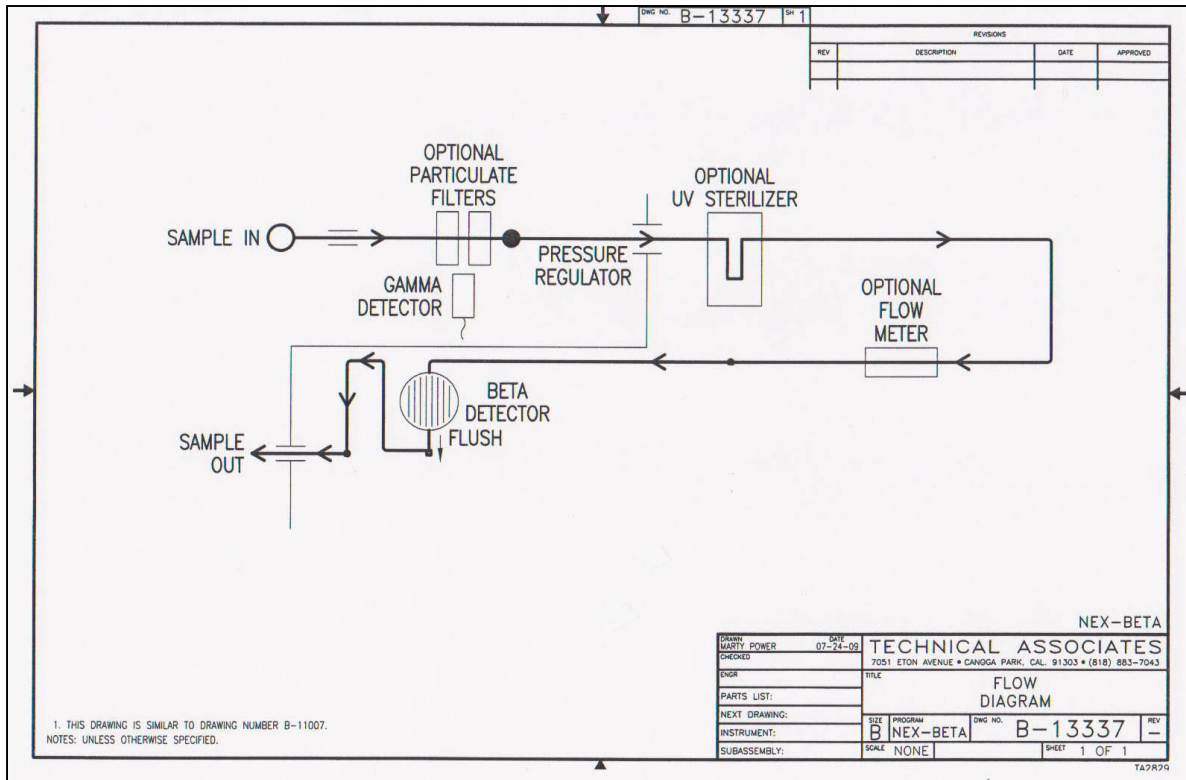
DETECT	PAG LEVEL	LOWER LIMIT of SENSITIVITY	TOP OF RANGE	SENSOR / METHOD USED		MAINTENANCE for finished water
		True for both models			TIME	ACTION
Beta	K-40 30,000 pCi/l			5" dia. Dual PM Tube 1000ml chamber	3--6 mo	Replace particulate pre-filter cartridge
30 min 24 hr		30,000 pCi/l 10,000 pCi/l	2 x 10 ⁷ pCi/l	1100cm ² Beta Scintillator		
OPTIONS:		LOWER LIMIT	TOP OF RANGE			
DETECT						
Tritium		20,000pCi/l	1 x 10 ⁶ pCi/l	crushed scintillation bed of crystals		Replace ion exchange cartridge
Radon		100pCi/liter	2000pCi/liter		1-3 mo	Clean or replace vapor trap
PRE-CONDITION						
Expel Radon					1-3 mo	Clean or replace vapor trap

Data:-Analysis-Display-Hard-Copy-DVD-ROM Archive (NexBeta-9)

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

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FLOW CHART



Flow Path

- Water Inlet port
- Pressure relief valve
- Particulate Pre-Filter (with optional Gamma Detector)
- Ultra Violet Sterilizer (Optional)
- Mass Flow Meter (Optional)

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.

SPECIFICATIONS:

- Alarms:** Each alarm activates a relay. Relay alarms are available to the user.
- Sample temperature standard:** up to 80° F liquid. (optional to higher temperatures)
- Ambient temperature** 65 - 100 ° F (wider temperatures ranges optional)
- Optional:** Cooler model Cool-33 for detector & 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 is 7" wide x 10" tall (23lbs)
- 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.

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DESIGN CRITERIA

MODEL	Nexm Beta 7 or 9
MAJOR USE	NEXT GENERATION WATER MONITOR
PROTECTIVE-ACTION GUIDELINE	
Serve as Accident/Attack Alarm	
Serve as Alarm in case of major pollution event	
MEASURES AT OR BELOW	
Acute Health Effects Rad Level	Reads at Full Scale
Chronic RAD levels leading to severe health risk	Yes
Military Limits for Drinking Water	Yes
DHS Protective Action Guideline Levels	Yes
Public Drinking Water Limits	Must send sample for lab analysis
DETECTS	
Detect beta	Has never been done before in real time, in liquids
False Alarm Protection	---
Local alarm	Yes
Local and remote Alarms	Optional
Local and remote data availability and data archive	Optional
Response Time	Prompt response – 2 min & 1 hr warn or alarms
Efficient	Continuous, automatic, unattended operation
Maintenance interval	30 days or longer see “Maintenance Schedule”
Serviceable	Easy Maintenance, low cost
Durability	Rugged, dependable
Customer Support	

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	NEX-BETA-7	NEX-BETA-7 USER'S PC	NEX-BETA-9
Read-out Units (Typical)	Counts/sec nCuries	Bq/m3 pCi/l	Bq/m3 pCi/l
Measures	Total activity in flow cell	Waterborne Concentration	Waterborne Concentration
Upgraded Hardware	Standard NEX-BETA-7	User PC calculates concentration from increased filter activity	Calculations by Imbedded Processor in NEX-BETA-9
Available options		Optional WIN-W Data Logger Software	Optional Electronic mass flowmeter



Excerpted From

Revisions to the Protective Action Guides 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	8.05E+03	8.26E+03	Ta-182	1.20E+05	2.97E+05			
In-114m	4.54E+04	2.33E+05	W-187	2.94E+05	7.47E+07			
Sn-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			