

FACILITY
Drinking Water Safety Monitor
Model # NEX-BETA-ABG

PROTECT VULNERABLE – HOSPITALS – SCHOOLS – GOVERNMENT FACILITIES

FEATURES:

- DETECTS ALPHA, BETA AND GAMMA RADIATION
- AVAILABLE IN PORTABLE OR INSTALLED VERSION
- MEASURES AT OR BELOW EPA/DHS PAG LEVELS
Protective Action Guideline Levels and Military Drinking Water Limits
- REAL TIME, IN-LINE, CONTINUOUS
- MONITORS WATER CONTINUOUSLY FOR RADIATION
- HIGH SENSITIVITY
- NO REAGENT TANKS TO FILL
- NO WASTE STREAM
- EASY CALIBRATION
- PREVENT ACUTE HEALTH EFFECTS
- REDUCE RISK OF CHRONIC EXPOSURE
- TA MAKES THE WORLD'S ONLY PAG-LEVEL WATER MONITORS
- ALSO DETECTS SOME ISOTOPES DOWN TO LOWEST EPA LEVELS



APPLICATION:

- Install **NEX-BETA-ABG** on your water inlet pipe. It automatically and continuously monitors drinking water 24/7 to your entire facility for any radioactive contamination. Facilities with multiple water inlets may wish to install multiple **NEX-BETA-ABG's**
- Very few cities or water wholesalers monitor water continuously for radiation.
- Specifically designed to protect your people who are vulnerable to contaminants.
- Monitor drinking water against most Radioactive contaminants except H-3, C-14, S-35, Fe-55.

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-ABG** solves this problem by continuously monitoring the water using ultra-sensitive, radiation detectors. The information from these detectors are analyzed and displayed in units of picoCuries per liter. The count times are user settable in NexBeta-ABG-7 and calculations are automatically updated every 2 minutes, every hour and every day in NexBeta-ABG-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 & measurement technology this detector measures emissions from any radioactive contaminants. Measurements of radiation concentration are logged 24 hr/day, 7 day/week in NexBeta-ABG 9.

DESCRIPTION: Model **NEX-BETA-ABG-7 and 9** are radiation detecting water monitor /controllers for measuring of alpha, beta and gamma emitting radio nuclides. The electronics are microprocessor with LED/LCD display. The system is covered by TA's full one year warranty. On-site service contracts available in many areas.

The alpha, beta flow cell and gamma detector are 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 detectors and electronics are ruggedly built. 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 or battery operation are optional.

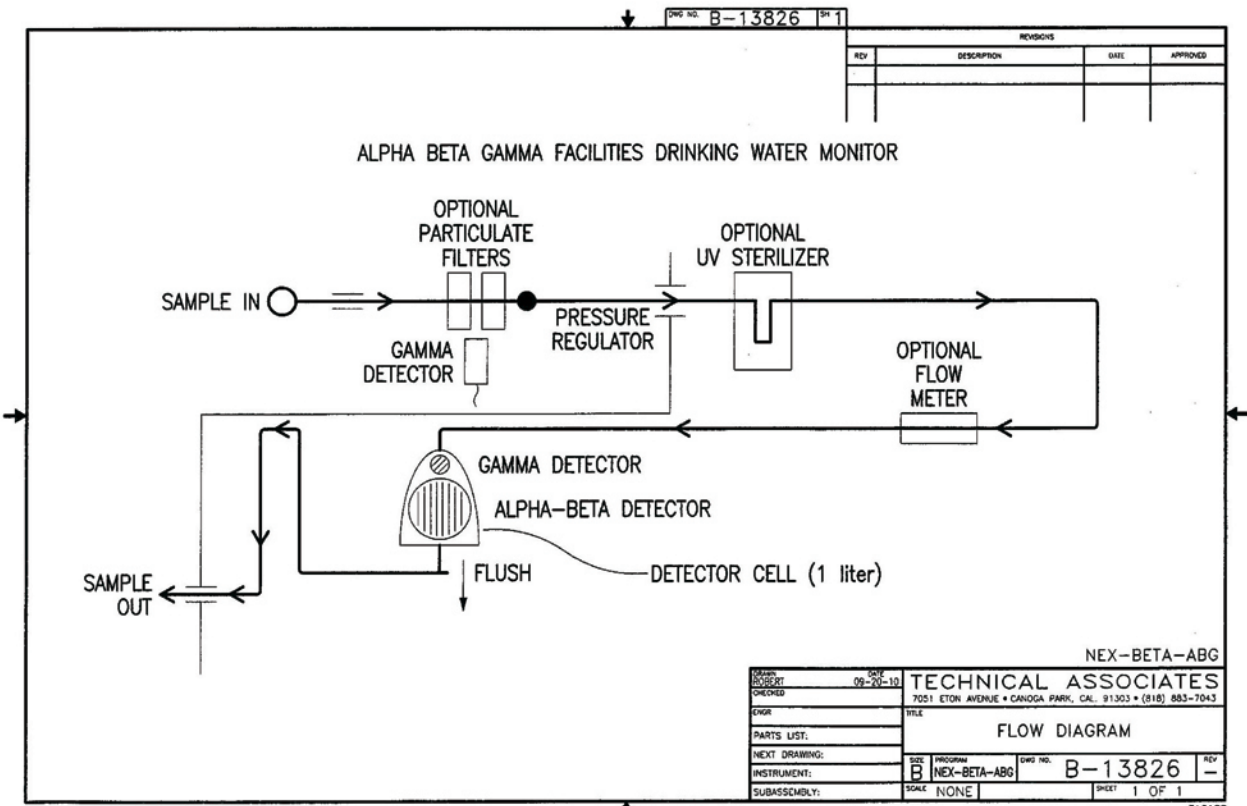
Detectors in this system;

1. Alpha-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. Gamma Scintillation detector has a sensitive 2" diameter crystal.

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 exclude 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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FLOW CHART



Flow Path

- Water Inlet port
- Pressure relief valve
- Particulate Pre-Filter (with optional additional Gamma Detector)
- Ultra Violet Sterilizer (Optional)
- Mass Flow Meter (Optional)
- Flow chamber with alpha-beta and gamma detectors
- Tested water is clean and returns to the drinking water line.
- No liquid scintillant or reagents are added
- No toxic or radioactive waste of any kind.

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

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

SPECIFICATIONS:

- Alarms:** Each alarm activates a relay. Relay alarms are available to the user.
- Sample temperature:** measurements are most accurate in range 40° to 85°F. Instrument is still operational up to higher temperatures
- 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"

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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DETECT	PAG LEVEL	LOWER LIMIT of SENSITIVITY	TOP OF RANGE	SENSOR / METHOD USED		MAINTENANCE for finished water
					TIME	ACTION
Alpha	U-238 3,000 pCi/l			5" dia. Dual PM Tube Scintillation plates	3-6 mo	Replace particulate filter cartridge
30 min 24 hr		25,000 pCi/l 3,000 pCi/l	2 x 10 ⁷ pCi/l			
Beta	K-40 30,000 pCi/l			5" dia. Dual PM Tube 1000ml chamber	3-6 mo	Replace particulate filter cartridge
30 min 24 hr		30,000 pCi/l 10,000 pCi/l	2 x 10 ⁷ pCi/l	1100cm ² Beta Scintillator		
Gamma	Co-58 30,000 pCi/l			Standard; Single Channel Energy Analyzer Optional; Multi-Channel Analyzer	3--6 mo	Simple check
30 min 24 hr		20,000 pCi/l 5,000 pCi/l	2 x 10 ⁷ pCi/l	75x75mm NaI(Tl) Crystal		
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/lit er		1-3 mo	Clean or replace vapor trap
PRE- CONDITION						
Expel Radon						Clean or replace vapor trap

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FEATURES	NEX-BETA-ABG-7	NEX-BETA-ABG-7 USER'S PC	NEX-BETA-ABG-9
Read-out Units (Typical)	Bq/m3 pCi/l Factory selectable	Bq/m3 pCi/l User selectable	Bq/m3 pCi/l User selectable
Measures	Waterborne Concentration	Waterborne Concentration	Waterborne Concentration
Upgraded Hardware	Standard NEX-BETA-ABG-7	User PC switches units, subtracts background data- logging, electronic data transmissions	Calculations by Imbedded Processor in NEX-BETA- ABG-9
<u>Software Functions</u>			
Data Logger	N/A	Optional WIN-W Data Logger Software	On board Data Logger
Assisted calibration	N/A	Optional	Included
Report generator	N/A	Optional	Included
Advanced Data Analysis (for low radiation levels and long measurements)	N/A	Optional	Included
Available Options		Optional WIN-W Data Logger Software	Optional overview networking software
Probable version	NEX-BETA-ABG-7P		NEX-BETA-ABG-9P
Installed version	NEX-BETA-ABG-7		NEX-BETA-ABG-9

Alternative Uses:

- If **water source is reservoir or river** the particulate pre-filter with its own RAD Detector is recommended
- Monitor **Liquid-waste-stream** from plant or laboratory **to maintain regulatory compliance.**

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			