

NEXT GENERATION DRINKING WATER RADIATION SAFETY MONITOR

下一代饮用水辐射安全监测器

Model ~ NEXGEN-SSS

FEATURES: 特点

- WORLD'S ONLY PAG-LEVEL $\alpha\beta\gamma$ WATER MONITOR
MEASURES AT OR BELOW EPA/DHS PAG LEVELS
世界上唯一符合“保护行动纲领限值” $\alpha\beta\gamma$ 水监测器，测量满足或低于EPA/DHS PAG限值

Protective Action Guideline Levels and Military Drinking Water Limits

- REAL TIME, IN-LINE, CONTINUOUS
实时，在线，连续
- DETECTS ALPHAS, BETAS AND GAMMAS
监测 $\alpha\beta\gamma$
- ISOTOPE IDENTIFICATION
核素识别
- NO REAGENT TANKS TO FILL
无需添加试剂
- NO WASTE STREAM
无废水流产生
- EASY CALIBRATION 容易标定
- PREVENT ACUTE HEALTH EFFECTS;
REDUCE RISK OF CHRONIC EXPOSURE
防止急性健康影响，减少慢性辐射风险
- FULL SCADA OR MODBUS COMPATIBILITY
SCADA全兼容
- EASY INTEGRATION INTO CENTRAL CONTROL SYSTEM
容易与总控制系统整合
- **OPTIONAL: TRITIUM DETECTOR** 可选氚探头
- **OPTIONAL: RADON DETECTOR** 可选氡探头
- **OPTIONAL: RAWA-GP CHANNEL** 可选RAWA-GP前装置
- **IP42**



APPLICATION: 应用

- Monitor drinking water against any & all Radioactive contaminants
监测水中任何任何辐射污染物
- Monitor for contamination in ground or surface water
地表水监测
- Monitor liquid-waste-stream from laboratory or plant
实验室或核电站废水监测



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PROBLEM: 问题

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.

饮用水源很容易遭到来自个人、团体、工业、医疗实验室、恐怖分子、自然发生的放射性物质的意外或已知污染，然而就地安装的实时辐射监测设备却很少，无法通知企业或公众海水辐射污染情况。

FAQ

SOLUTION:

For the first time in a **Continuous Real-Time Water Monitor** the Model **NEXGEN-SSS** solves this problem; continuously monitoring water using alpha, beta and gamma detectors. Detector data is analyzed and displayed in units of picoCuries per liter. 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 DHS protective Action Guideline Levels for drinking water. Please see attached chart of measurements.

Using TA Tried and True sample collection & measurement technology 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.

实时连续水监测器NEXGEN-SSS首次解决了此问题。它使用 $\alpha\beta\gamma$ 探头，持续监测水。探测数据被分析并显示，单位pCi/L。每两分钟，每小时，每天计算更新，更新时段越长，灵敏度越高越精确，日更新的灵敏度达到或超过国土安全局饮用水保护行动准则标准。请参照附件测量表

使用TA Tried and True样品收集&测量技术，来测量任何辐射液体中的 $\alpha\beta\gamma$ 。辐射浓度测量结果和总排放量每周7天，每天24小时不间断记录。

GAMMA-MCA ISOTOPE IDENTIFIER



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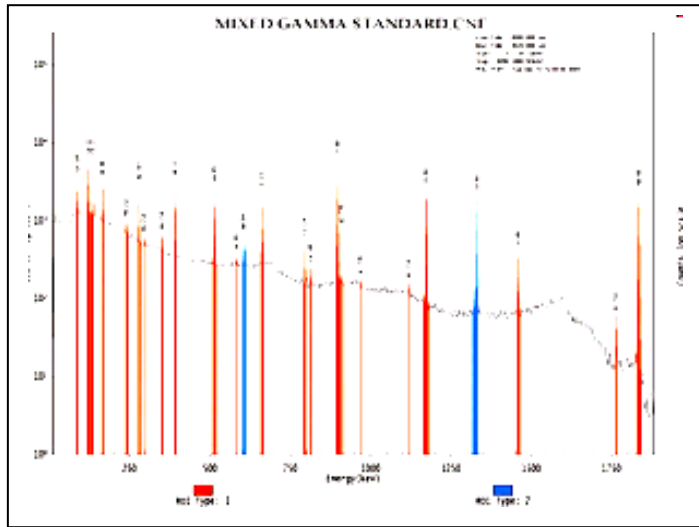
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**MULTI-SOURCE
GAMMA
SPECTRUM**

DESCRIPTION:

Model **NEXGEN-SSS** 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. On-site warrantees available in many areas.

NEXGEN-SSS系多探头水探测器/控制器，同时测量 α β γ 放射核素。电子学系微处理器，带LCD彩屏。前置放大器连接在模块上，以便后期改动或使用附加功能，还可以通过更换模块进行快速维修。除了一年保修期外，此模块系统还享有TA公司包换服务，许多地区可提供现场服务。

Detector shields are made of lead encased in welded housing for long useful life and easy decontamination. The alpha and 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. 伽马探测器铅屏装入焊接壳内，寿命长且易于去污。通过断开装置很容易更换 α β 流室。伽马专用屏蔽容易打开清理。所有连接均密封以防泄露。标准水动系统基于高精泵，每分钟10升容量

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 **NEXGEN-SSS** 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.

宽量程泵容量可满足用户具体需求。整个系统安装在单独的带轮的坚固柜子中，NEXGEN-SSS自带全部线路管套，连接器以备操作。标准115伏，60赫兹；可选购220伏，50/60赫兹。

Three principal detectors make up the **NEXGEN-SSS** system.

此系统带三个主要探测器

1. Alpha Detectors:



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A special plastic Alpha scintillator that consists of a light-tight detector assembly interfaces with the sample via quick disconnect coax cables and medical grade hoses. A matched pair of 5" diameter photo-multiplier tubes display the sample.

α 探测器：专用 α 塑料闪烁体探头，不透光探头组件通过快速断开的同轴缆线和医疗级软管与样品连接，由一对光电倍增管观察着水样。

2. Beta Scintillation Detectors:

Sensitive area: 1,100cm².

β 闪烁探头敏感面积达1,100cm²

3. Gamma Detectors:

Choice of NaI (TI) Scintillation or HPGe Solid State:

γ 探头，碘化钠晶体或高纯锗

Description of Alpha, Beta Pulse Analysis:

α β 脉冲分析

This system conditions and analyzes the output from the photo-multiplier tubes by pulse height, duration and coincidence. In this way the system eliminates 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.

此系统通过脉冲高度，持续时间和耦合事件分析光电倍增管输出，以便系统清除大多数本底计数和噪音计数。随机共振，加上高增益，低噪音PM管和前置放大器提高了灵敏度。

Isotope Identification System 同位素识别系统

Peak Detection and Isotope Identification

峰值检测与同位素识别

TA SMART-PEAK™ Software detects radiation peaks even at very low gamma concentration, In the event of high activity and during system calibration; the isotope identifier function takes over and displays the exact radioactive nuclides in water.

TA SMART-PEAK™ 软件甚至在非常低伽马浓度情况下检测辐射峰值；在高辐射和仪器标定情况下，同位素识别功能开始工作，显示水中确切的辐射核素。

Gamma Detector: **Water is measured for Gamma-emitter content**, using a MCA analyzer with greater than 1,000 channels and a user setter energy range. For example the MCA can be set for Gamma energy of 10 KeV to 3 MeV.

伽马探头：**测量水中 γ 发射物**，1000道多道能量分析仪，用户设定能量范围，例如可设定伽马能量范围10 KeV - 3 MeV.

DATA: Analysis – Display - Hard-Copy-Archive

数据：分析-显示-硬拷贝存档

In each peak or area of interest, the net counts are automatically converted to concentration units, of picoCuries/liter (using the detector efficiencies automatically measured and stored previously by



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NEXGEN-SSS semi-automatic self- calibration procedure).

在每个峰值或兴趣区，净计数自动转换成浓度单位pCi/L（自动使用由NEXGEN-SSS半自动自校准程序预先测量并存储的探测效率）

The concentration and total activity released and MDA levels are continuously calculated and recorded. This real time information will alert the notification system. 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 optional printer) in tabular or graphical format, showing quantitative information as well as trends. Data is recorded frequently so time-resolution is excellent.

浓度和释放总活度及最低探测活度水平持续计算并记录，这些实时信息将警告通报系统。所有数据被储存在电子表格格式的硬盘中。历史数据很容易以表格或图形格式显示在屏幕上（同时/或选择图形打印机打印出来），显示定量信息和走势。数据频繁被记录因此时间分辨率特别出色。

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

以太网和USB端口（加锁）容易存档并进一步数据分析。

Continuous, Reliable Data – **YES**, False Alarms – **NO**

持续、可靠—是，虚报警—无

Our newest systems have multiple layers of protections and redundancy in both the software and the physical act of reporting an alarm, that prevent false alarms. This includes an alarm voting system so that alarms will come on only if all the data is consistent and conclusive The data is continuously recorded to allow human interpretation.

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

我们最新系统无论在软件方面还是在实际应用中有多层保护和多余度，防止虚假报警。这包含一个报警表决系统，只有所有数据一致和确定情况下才报警。持续数据录入以便人们解读，每一次报警激活故障安全继电器，用户可通过继电器触点操作外置设备。

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

触发式等分测量: 在报警或兴趣区事件发生时，此功能自动收集并储存少量水样进行独立析测量

UV Lamp: Used on inlet as algae-cide.

UV灯: 用于入口作为除藻剂

OPTIONAL: Ozone System

可选: 臭氧系统

3 GHz COMPUTER INCLUDES:

3 GHz 计算机包括:

3 GHz Processor, 600 Gig Hard Drive, 4 GIG Ram 15" LCD Monitor, Keyboard, Mouse



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3 GHz处理器, 600G硬盘, 4G存储器

15" LCD显示器, 键盘、鼠标

USB Ports USB接口

10 Channel Data Acquisition Board, All Cables
10道数据采集卡, 全缆线

OPTIONAL: Full Graphics Printer, color + B/W
Ethernet for hook up to your LAN

选项: 全图形打印机, 彩色+ B/W 以太网本地连接

Windows Specific Software for Alpha, Beta, Gamma Counting.

Software is easily customized by user for special needs.

Data from the 1024 channel MCA- multi-channel analyzer

Windows操作系统, 专用软件计数 α β γ

软件根据用户特别要求容易定制

从1024道 MCA分析仪输出的数据可通过USB或以太网获取

Port: Full SCADA compatibility

接口: 全SCADA兼容

OPTIONAL: MODBUS or DNP3 or other protocols.

选项: MODBUS , DNP3或其它协议



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Detect 探测	PAG Level 饮用水标准	Lower Limit of Sensitivity 灵敏度下限	Top of Range 上限	Sensor Method Used 探测方法		Maintenance 维护
					Time 时间	Action 方式
ALPHA	U-238 3,000 pCi/l			Special Alpha Scintillator	3 mos	Replace Particulate Filter Cartridge
U-238	30 min. 24 hr	2,000 pCi/l 500 pCi/l	2×10^7 pCi/l			
Po-210	30 min. 24 hr	2,000 pCi/l 500 pCi/l	2×10^7 pCi/l			
BETA	K-40 30,000 pCi/l			5" dia. Dual PM Tube 1,000 ml Chamber	3-6 mos	Replace Particulate Filter Cartridge
Cs-137	30 min. 24 hr	1,200 pCi/l 200 pCi/l	2×10^7 pCi/l	1100 cm ² Beta Scintillator		
K-40	30 min. 24 hr	30,000 pCi/l 100 pCi/l				
Sr-90	30 min. 24 hr	200 pCi/l 15 pCi/l				
GAMMA	Co-58 30,000 pCi/l			MultiChannel Analyzer, Smart-Peak Detection Software	3-6 mos	Simple MCA Check
Co-58	30 min. 24 hr	1,000 pCi/l 250 pCi/l	2×10^7 pCi/l	75 75 mm NaI(Tl) Crystal		
Co-60	30 min. 24 hr	400 pCi/l 100 pCi/l				
I-131	30 min. 24 hr	600 pCi/l 150 pCi/l				
OPTIONS:						
TRITIUM		20,000 pCi/l	1×10^6 pCi/l	Bed of Crushed Scintillation Crystals	1-3 mos	Replace Filter Cartridge
RADON		100 pCi/l	2,000 pCi/l		1-3 mos	Clean or Replace Vapor Trap
Pre-Condition						
Expel Radon						Clean or Replace Vapor Trap



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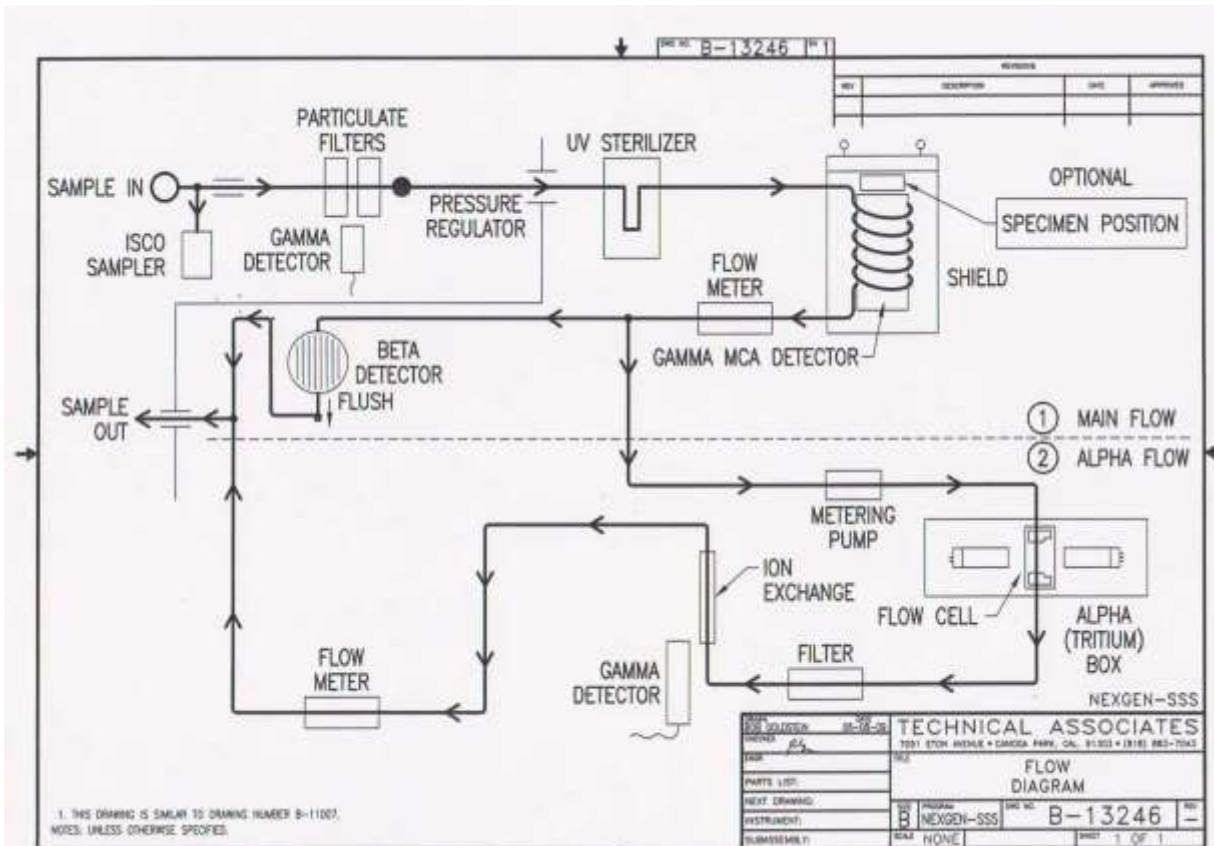
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MAIN SYSTEM FLOW CHART
主系统流路

- Discharge water is clean and can go back into the source.
干净水样可返回水源
- No liquid scintillate or reagents are added.
无添加液闪或试剂
- No toxic or radioactive waste of any kind.
无任何有毒或放射性废物产生



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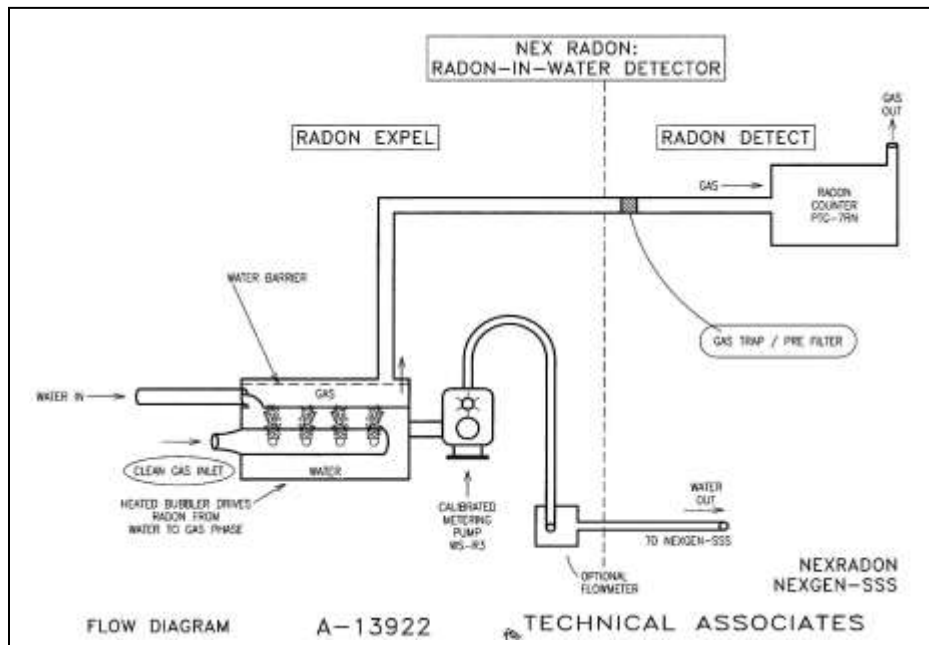
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FLOW PATH: 流路

- Water Inlet Port 进水
- 15 – 90 PSIG (Typical) 水压 (通常)
- ISCO Sampler 采样器
- Particulate Filter
(with Gamma Detector) 泥沙过滤器 (带伽马探测)
- Ultra Violet Sterilizer 紫外线消毒
- Gamma Spec Shield 伽马屏蔽
- Main Gamma Detector with MCA 主伽马探头带多道分析仪
- Mass Flow Meter 流量计
- Metering Pump for Alpha Detector Loop α 探头回路计量泵
- Alpha Detector Flow Cell α 探头流室
- Alpha Loop Flow Meter α 回路流量计
- Ion Exchange with Gamma Detector 带伽马探头离子交换器



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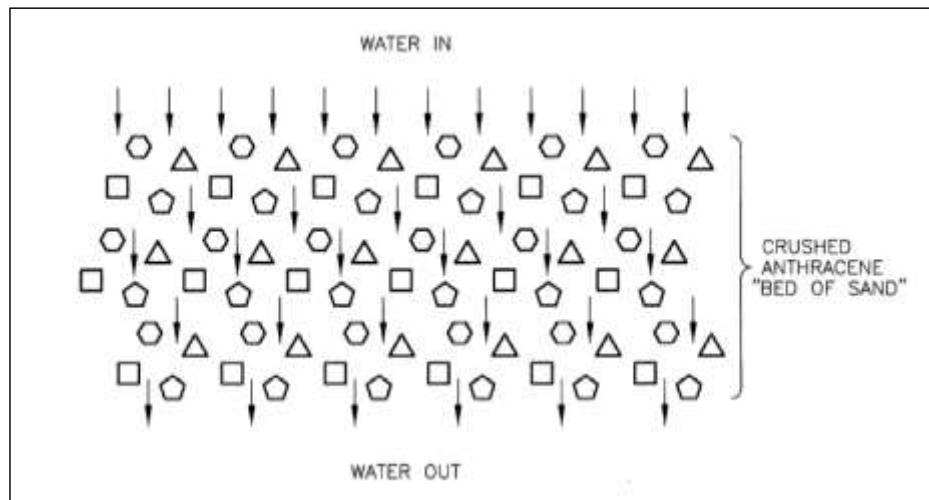
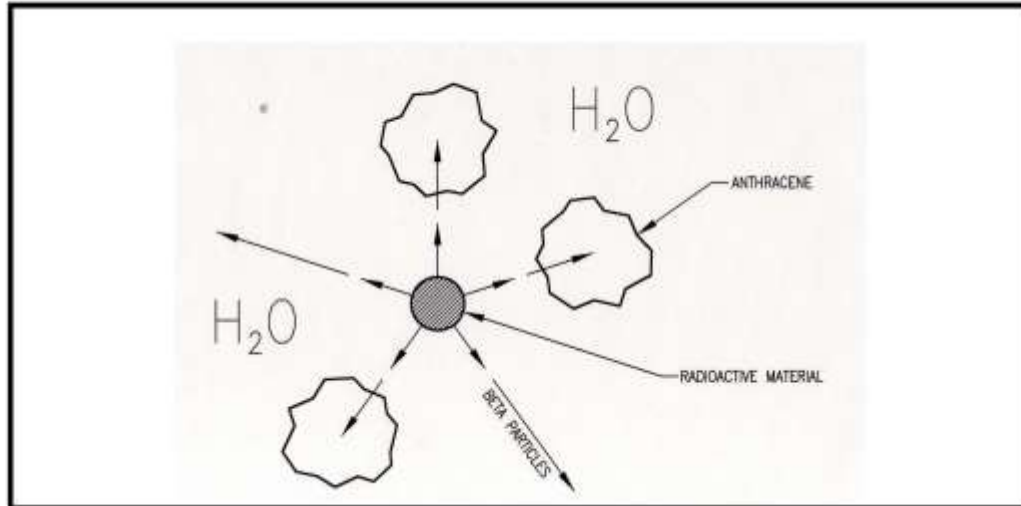
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OPTIONAL TRITIUM DETECTION PROCESS

可选项氚探测



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SYSTEM FLOW RATE:

系统流量:

Standard Main Flow: 10 l/minute
标准主流量: 10升/分钟

Alpha - Tritium Flow: 100 ml/minute
α - 氚流量: 100 ml/分钟

OPTIONAL:

选项: Very wide range of flow rates is available
可提供不同流量

Sample temperature standard: Up to 80° F liquid. (OPTIONAL to higher temperatures)
样品温度标准: 80° F 液体 (可选更高温度)

Ambient temperature: 65 - 100° F (wider temperatures ranges OPTIONAL)
环境温度: 65 - 100° F (可选更宽温度范围)

OPTIONAL:

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

可选:

Cool-33

在更高样品和环境温度情况下可选购Model

SIZE AND WEIGHT:

尺寸与重量

Dimensions: One cabinet: 34" wide X 31" deep X 72" high including wheels
尺寸: 单柜: 34" 宽 X 31" 深 X 72"高, 包括轮子

Wheels: 5" dia, high capacity, rugged wheels with lock & rubber tires.
轮子: 直径5", 带锁和橡胶轮胎, 耐用型

Shipping Weight: Standard unit: 380kg - excluding shielding

装运重量: 标准箱: 380kg-不含屏蔽

NOTE: Lead Shot for shielding can be shipped with or stripped separately or overseas customers may wish to buy lead shot locally.

注: 铅粒可随机邮寄, 或分开装运, 或海外客户可以当地购买。



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FILTER DETECTORS

SPECIFICATIONS	PARTICULATE DETECTOR	ION EXCHANGE DETECTOR
Detector	Pre-filter	De-ionizer
Radiation detected	GAMMA	GAMMA
Materials monitored	Particulates	Dissolved metals and salts
Scintillator shape	2" x 2" dia	2" x 2" dia
Scintillating crystal	Nal TI Spectroscopic grade	Nal TI Spectroscopic grade
Shielding	None	None
More Shielding (Optional)	1/2" 2pi	1/2" 2pi



WATER TREATMENT PLANT
水处理厂



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MODEL	NexGen-SSS
MAJOR USE 主要用途 PROTECTIVE-ACTION GUIDELINE 保护行动指南	NEXT GENERATION WATER MONITOR 下一代水监测器
Serve as Accident/Attack Alarm 事故/袭击报警	
Serve as Alarm in case of major pollution event 污染报警	
MEASURES AT OR BELOW 测量达到或低于	
Acute Health Effects Rad Level 急性健康影响标准	Reads at Full Scale
Chronic RAD levels leading to severe health risk 慢性辐射导致严重健康危害	Yes
Military Limits for Drinking Water 军队饮用水限值	Yes
DHS Protective Action Guideline Levels 国土安全局保护行动标准	Yes
Public Drinking Water Limits 公共饮用水标准	Send sample for lab analysis 送水样到实验室分析
DETECTS 检测	
Detects Alpha and Beta as well as Gamma α β γ 和氡 (选项) OPTIONAL: Tritium Detection	Has never been done before in real time, in liquids 前所未有的实时对液体监测
False Alarm Protection 虚报保护	Yes
Action 方法	Saves water sample for independent analysis 保存水样独立分析
Local and remote Alarms 本地& 远程报警	Yes
Local and remote data availability and data archive 本地和远程数据获取与存储	Yes
Response Time 响应时间	Prompt response – 2 min & 1 hr warn or alarms 快速响应-2分钟&1小时报警
Efficient 效率	Continuous, automatic, unattended operation 连续自动
Maintenance interval 维护周期	30 days or longer see "Maintenance Schedule"
Serviceable 可维修	Easy Maintenance, low cost 易维护, 费用低
Durability 耐久性	Rugged, dependable 结实可靠
Customer Support 客户支持	Annual upgrades are available on request 应客户要求可年升级
Software upgrades 软件升级	No Charge 免费
Hardware upgrades 硬件升级	At Cost 产生费用



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NEXT GENERATION DRINKING WATER RADIATION SAFETY MONITOR

下一代饮用水辐射安全监测器

Model ~ NEXGEN-SSS

2009 Revisions to the Protective Action Guides Manual for Radiological Incidents

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 5: 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	2.80E+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			



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