MONITORING AND DISPOSAL SYSTEM FOR RADIOACTIVE WASTEWATERS

WDMS NT-VK

MAIN FEATURES

- Automatic system managed by remote PC
- Imhoff purification tanks
- Decay tanks
- Washing and sampling circuit
- Detector: 2”x2” NaI(Tl), multichannel electronics
- Measurement geometry: Marinelli beaker in a lead shielding well
- Release pumps
- Safety devices against flooding
- Safety flooding well
- Power supply switchboard with PLC and local emergency push-button
- Remote management software with virtual emergency button

DESCRIPTION

The diagnostic and therapeutic procedures involving radioactive substances, and their partial elimination through the patient's metabolism, require the mandatory use of controlled toilets (said “hot”) before the patients are dismissed or during their hospitalization. This is necessary to hold the radioactive wastewaters in proper tanks for the required time before releasing them in the public sewers.

The WDMS NT-VK system is designed to collect and monitor radioactive wastewaters, which can obtain the free release only after their radioactivity drops under the values allowed by the laws in force.

The monitoring system’s main components are described in the following:

- Purification group: Imhoff tanks designed to collect the wastewaters coming from the wards and to separate liquid wastes from solid
- Sorting group: pumps and conduits system designed to pour the wastewaters in the decay tanks
- Decay group: tanks array to hold and stock the wastewaters until their radioactive levels reach allowed values for the free release
- Sampling system: valves and pumps system that performs the washing procedures of the sampling circuit and the stocked wastewaters sampling itself, allowing the measurement in Marinelli geometry
- Release group: depending on the monitoring results, the wastewaters contained in the sampled tank can be released in the sewers
- Safety groups and devices: they mainly consist in guard levels - installed in all the system’s critical stages - which stop the wastewaters flow in case of detected anomaly, and a safety flooding well which can eventually collect and stock wastewaters overflowing from any on the system’s group

The entire system is locally managed by a PLC, the action of which are commanded by a remote management software installed on a PC.

Through the interactive synoptic interface of the software the operator can activate the system automatic cycles, set the measurement parameters, visualize the alarms and release archives, and monitor the system’s status (filling levels, pumps stages, measurements, alarms). Depending on the measurement results, and as defined by the procedures in force, the operator can also activate the monitored wastewaters release in the public sewers.

An emergency virtual button is located on the main panel of the software, as well as the PLC switchboard.
TECHNICAL SPECIFICATIONS

System’s layout:
Some components of the system, mainly the number and the type of the decay tanks, can change according to specific installation requirements; however, the groups of the systems, as described in this document, as well as the functioning logic, are essentially the same.

Radioclogical monitoring specification:
- Detector SCIONIX mod. 51 B 51 / 2-X
  - 2”x2” NaI(Tl)
- Multichannel PMT base
  - Signal digital processing ADC
  - Built-in memory, pre-amplification and HV
  - PC connection through Ethernet port
  - Maestro 32 software
  - Spectrum stabilization
- 1 liter Marinelli beaker complete of connections to the system
- Lead well 50mm thickness Mod. POZ 50.50
  - Upper hinged hatch for Marinelli beaker positioning
  - Support framework with adjustable base and nylon collar for the detector

SAFETY DEVICES

Redundant critical elements:
The elements of the hydraulic system that manage the flow of the wastewaters (pumps, purification tanks, etc.) are designed to minimize the risks of overflowing due to any malfunctioning, and to guarantee the operational functioning of the system also during maintenance procedures.
In particular, the critical elements are installed in couples: this way, if for example the first Imhoff tank gets clogged, or if it needs maintenance, the second Imhoff tank allows to continue the normal operations without risks or interruptions. This redundancy is applied also to the sorting pumps, which by the way works alternatively even in normal functioning, to minimize their wear.

Containment group:
It consists in a perimetral waterproof containment barrier built on the floor, able to contain eventual wastewaters flooding from any system’s stage and to convoy them to a safety flooding well; from here, under the operator’s command, the wastewaters can be poured back in the sorting group through a dedicated pump.

Level signal systems:
These devices indicate to the operator the progressive filling of the decay tanks, the sorting group and the safety flooding well; if a first “maximum” level should be exceeded and if the system doesn’t respond accordingly, the safety device alert the operator when a second “too full” threshold is reached.

Emergency “Stop” switches:
Push-button on the PLC switchboard and virtual buttons on the software’s panels. The activation of one of these switches stops any ongoing action of the system. When the emergency status is switched off, the systems waits an operator’s explicit command before resuming its functioning.

OPTIONS
- Single-channel acquisition electronics, as an alternative to the multichannel module

ACCESSORIES AVAILABLE UPON REQUEST
1. Warranty extension from 12 months to 24 months