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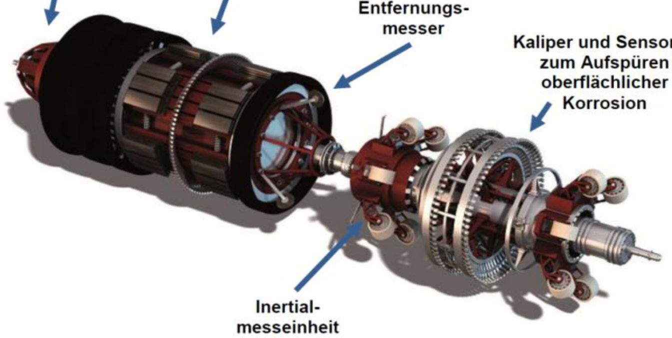

Abb.2. Zoll intelligenter Molch

Die weitere Entwicklung der Pipelineinspektion ist in erster Linie mit der Einführung von neuen Methoden der nicht zerstörenden Kontrolle in die Konstruktion der Fehlersuchgeräte und mit der Vervollkommnung der Software zur Diagnosedatenverarbeitung verbunden. Es wird durch Erhöhung des Auflösungsvermögen von Innenrohrinspektionsgeräte, durch Detaillisierung der Molch-Inspektionsdaten mit Hilfe der Kombination von verschiedenen nicht zerstörenden Kontrolltechnologien erreicht. All das ermöglicht erschöpfende Informationen über den technischen Pipelinezustand zu bekommen, was für den einwandfreien Betrieb notwendig ist.

Literatur

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USE OF THE F-RADIOGRAPHY METHOD IN RESEARCH OF BIOLOGICAL OBJECTS

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Radioactive substances occupy a special place among the polluting agents. Special attention to them was drawn after the Chernobyl accident in 1986 and a number of incidents at other civil and military installations of the nuclear fuel [1].

Monitoring of radiation situation plays an important role in controlling conditions of the environment. For its assessment it is necessary to have a large amount of data on the content of radioactive elements, forms, their location and other parameters in different environmental media.

Methods of elemental analysis, allowing determining the spatial distribution of elements, are called radiography. The term "radiography" literally means "to record the radiation." Recently radiographic methods are used in many branches of science and technology in mineralogy and petrography, in prospecting and exploration of mineral resources, in study of biology localization of micronutrients in plant and animal tissues, etc.

Among the commonly used radiographic methods a special place is occupied by fragmentation radiography method (f- radiography). The French physicist I. Curie was the first who discovered and described the physical nature of this method. The radiography method is based on the reaction of nuclear fission of certain elements (uranium, plutonium, and others.) by thermal neutrons and fission registration of fragments on the detector. The method allows accurately determining the quantitative content of fissile elements, "hot particles" in natural objects [4].

Hot particles are tiny particles of dust with relatively high radioactivity. Radioactive hot particles stay in the atmosphere for a long time and can be transported over long distances, they are registerd near the nuclear fuel cycle (NFC) enterprises [4].

"Hot particles" of alpha-emitting radionuclides (plutonium, transuranic elements) with a diameter of less than 1 micron possess the activity of 2.5 x 106 Bq and are capable of penetrating deep into the lung tissue. It is known that the risk of lung cancer 2-3 times higher when inhaled insoluble compounds of plutonium than that of the soluble, which can be interpreted as the effect of "hot particles" [3]. One of the radioactive elements forming "hot particles" is plutonium.

Plutonium (Pu) is the second artificially derived chemical element. Today, 15 isotopes of Pu are known. Pu is extremely difficult for detection in natural objects. It is used in the manufacture of nuclear weapons as a nuclear fuel and as a compact energy source [3].

Coming into the biosphere, plutonium migrates to the earth's surface, entering the biogeochemical cycles. Its specific activity is 200 000 times higher than that of uranium; furthermore, the release of plutonium from an organism can hardly take place throughout its life. Plutonium is called "nuclear poison", its permissible content in the organism is estimated in nanograms. In human organism, plutonium is deposited in lungs, liver, bones, and other tissues, and excreted from organism very badly. In particular, its half-life in the skeleton is 50-80 years, which is comparable to the duration of a human life [3].

If we exclude the explosion of the atomic devices and emergency situations, the main source of radiation impact on the biosphere is the enterprises of NFC in standard operating conditions.

The most important feature of NFC is that in the process of power production a lot of harmful artificial radionuclides are formed. The main part of radioactive waste from NFC plants is of high specific activity. Some of the radionuclides have significant (from hundreds to millions years or more) half-lives.

Using the f- radiography method in the village Muslumovo (Chelyabinsk region) pollution of biological objects and natural environments with radioactive isotopes, including fissile elements, was established. It was stated that pollution of the River Techa ecosystem was caused by discharges of liquid radioactive wastes from radiochemical plant "Mayak" within the period from 1949 to 1956. This led to a significant radioactive contamination of the river banks.

Radiochemical analyzes were carried out, the concentrations of plutonium in the soil and input of fission elements through the root system in plants were not found. Distribution of fission elements in plants was found in the form of dust particles adhering to the surface of plants and less in the form of scattered penetration into the roots and leaves of plants.

Tomsk region is distinguished by siting the complex of Siberian Chemical Combine (SCC) on its territory, which is a large and widely known plant not only in the country but also abroad.

It became the focus of interest as the result of the accident in April 6, 1993. Survey of the SCC area showed the abnormal concentrations of artificial radionuclides near sanitary protection zone, in the River Chernilschikova, where wastes of co-current reactors were discharged. In the zone of SCC impact, mainly in the northern part, soil contamination with plutonium-239 and plutonium-240 was observed in excess of the background level 4 times more than other radioactive contaminations, rather weak, that are present in Tomsk Oblast in the form of local areas [4].

Research was performed on the distribution of fission elements in the blood of people living in Tomsk Oblast. In total, 4 blood samples from such regions as Seversk, Strezhevoy, Kargosok, Bakchar were studied. Besides, the standard sample was placed together with other samples [4].

In our research we used mica, on which the blood was applied in a thin layer, and then irradiated, and etched by HF and rinsed with water.

View of the detectors was carried out using an optical microscope with different magnification (X10, X20, X40 times). While viewing both separate tracks and their conglomerates ("stars") were recorded

It was found that the distribution of fission particle is different depending on the region. In the blood of people individual tracks were identified in Strezhevoy and Kargasok. The inhabitants of Seversk have hot particles with a distinct form of "stars".

Hot particles in the form of stars found in Tomsk Oblast in Seversk town as well as in the area of enterprise "Mayak" of the Chelyabinsk region (Baranov et al., 2011) are not typical for the blood of inhabitants from other areas. This fact led to the assumption that such hot particles are observed in areas with enterprises of the nuclear fuel cycle.

Owing to the f-radiography the presence of "hot particles" in the blood of inhabitants of NFC enterprise area was found. It indicates the negative effects of NFC enterprise on the adjacent territories, on organisms living in its vicinity. In my opinion, one should inform people about the threat to their health and the consequences of living in vicinity of such objects.

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NUMERICAL MODEL OF HYDROGEOLOGICAL CONDITIONS FOR CALCULATION OF UNDERGROUND FRESHWATER RESERVES OF THE STOLBOVOE OIL FIELD

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The region of research is located in the central part of the West Siberian low plain in the territory of the Stolbovsky deposit in northwest part of the Kargasoksky region (Tomsk Oblast). The penetrated section is of practical