^{90}Sr LEVEL IN FRESH AND POWDER MILK IN SOME AREAS OF ALBANIA CAUSED BY THE CHERNOBYL ACCIDENT

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SUMMARY

Chernobyl accident caused a rather high level of territory contamination, especially in the east and north-east areas of Albania. That's why for the radioprotection scope of population in the INP, during and after the accident a great number of environmental samples are measured. An important type of samples were those of the fresh and powder milk. Exept the ^{131}I and ^{137}Cs radioactivity concentration measurements, ^{90}Sr level in milk determination was performed.

The tracing method by stable strontium was used for the chemical separation ratio determination.

The ^{90}Sr activity concentration in milk was evaluated by ^{90}Y in equilibrium activity measurement. The dynamics of the ^{90}Sr in milk for a period of some months, just after the accident and some daily measurements carried-out during the "hot" period are given in this paper.

INTRODUCTION

Parallely with the widening of the nuclear power and radioactive isotopes use, the environmental radioactive contamination measurement are development for radiation protection scope.

As the result of the food chain grass-cow-milk-human the environmental radioactive materials can be transfered in human body. The presence of ^{90}Sr in biosphere is a long-term risk, due to its chemical similarity to calcium and its long biological half-life [1]. Since 1978, some environmental measurement methods for beta and beta-gamma low-level measurement are carried-out. Global beta counting with proportional gas detectors, liquid scintillation counter and low-level gamma spectrometry are some of them [2]. Concerning the ^{90}Sr, taking into account the level and the fact both ^{90}Sr and its daughter ^{90}Y are pure beta

emitters the general measurement procedure are based on chemical separation and low-level beta counting.

METHODS

The following milk samples distruction method is used:

1- The transferation of 1000 ml collected sample in a beaker, adding 4 ml acetic acid (CH_3COOH) and mixing thoroughly.

2- The transferation of the acidic milk in two 500 ml porcelain bowls and evaporation at low temperature to avoid the boiling until to dry up.

3- The ashing of all dried material in a muffel furnace, raising slowly the temperature up to 300°C (3 hours) and after that up to 600°C (15 hours).

4- The dissolution of the ash in 45 ml HNO_3 (65%), sending to 100 ml volume by distilled water and covering with a watch glass.[3].

The separation method used was as follows:

The separation of alkaline-earth elements as phosphate, the nitric acid fuming method to move the Ca ions, and the dregs method to move the Ba ions as chromates is applied. [4].

The tracing by nonradioactive strontium salt of the strontium nitrat waterfree $Sr(NO_3)_2$ was used to determinate the chemical separation ratio.

The chemical separation ratio of calcium (Ca^{2+}) ions was determinated by the X-ray fluoresence measurement method. It was obtained a higher than 0.99% value.

The overall chemical yield of ^{90}Sr was 70-80%, while that of ^{90}Y was 96.8-99.7%.

The ^{90}Sr activity was determined by the ^{90}Y activity in equilibrium measurements, which sources were produced in oxalat form. The measurements were performed mainly in a low-level beta counting system with propotional gas detector and anticoincidence protection. A LSC system, using the Čerenkov radiation measurements was used, too. The lower limit of detection of the first system was 12 mBq/l, while the registration effectivity was 0.41.

The uncertainty of ^{90}Sr activity concentration in milk was estimated about 30%, at 68% confidence level.

RESULTES AND CONCLUSIONS

The ^{90}Sr activity concetration levels of three sampling areas, dislocated in Tirana (centre of Albania), in Shkodra (north of the country) and Tropoja (north-east) are in Tab.1 represented.

Tab.1

^{90}Sr activity concentration on milk

Place	1986						1987											
	May	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tirana* (Bq/1)	4.6	-	.16	.40	.21	.19	.22	.20	.21	.25	.14	05	.045	.04	.13	.05	.07	.06
Shkodra** (Bq/kg)	23	1.87	1.4	-	-	-	-	-	1.5	-	1.0	1.3	.80	.88	.70	1.30	-	.45

* long term average value on fresh milk before Chernobyl was 60 mBq/l

** " " " " on powder milk " " " 450 mBq/l

Some values of the fresh milk from the "hot" period are given in Tab.2

Tab.2

Date of the May 1986	4	6	8	9	13	14	15
Tirana (Bq/l) (cow milk)	1.2	35.5	-	1.4	-	7.6	-
Tropoja (Bq/l) (sheep milk)	-	55.7	7.1	3	10	-	4

The considerable ^{90}Sr contamination of the fresh milk on May 1986, shows a monthly average of about 80 times greater than the long-term value before the Chernobyl accident.

The absolute maximum obtained around the 6 May was about 1000 times greater than the "normal" value.This is in accordance with the maximum level of the air contamination reached the first days of the May 1986.[2],[5],[6]. At the same time, it can be said that the first maximum of 6 May and the second one, that of 13-14 May is in accordance with the maximum of the cantamination of fall-out and that of ^{131}I in milk. [2],[5].[6]. Another conclusion similar with that of the previous publications is that the north-east part of the country was more contaminated than the inner part, confirming again that the contaminated air streams penetrated in Albania through the east and north-east border of the country.