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ABNORMAL "CONTAMINATION" LEVELS ON GARDEN APPLIANCES.

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1. Introduction

During routine contamination checks we encountered an abnormal high level of Alpha and Beta emitting radioisotopes on working gloves of employees of the gardening department. It came out that the source was due to "contamination" levels on steering wheels of some gardening machines. In order to ensure that no real contamination of these workers was involved, a series of checks was started to identify the source of the abnormal levels found during monitoring.

2. Measurements

The issue began by detecting abnormal "contamination" levels on gloves of the gardening department workers during routine monitoring. A process of checks was started to identify the problem and find a remedy, if needed :

- The gloves were numbered to facilitate the follow-up and to enable linkage to tests performed on the steering wheels.
- At the beginning and end of each day the gloves and working tools which were used, were monitored for Alpha and Beta emitting radionuclides using "RAM " ⁽¹⁾ monitors.
- The working areas, including storage rooms, offices, etc. were monitored as well as stored tools, fertilizer packages, and other items.
- Gamma spectrometry was performed on gloves, steering wheels and fertilizer samples.

Following is a summary of the results of the various measurements:

- In all rooms and working areas no contamination levels over the limits of detection of the monitoring detectors were found.
- Fertilizer samples contained various concentrations of ^{nat}U, ²³²Th, ⁴⁰K, within the limits of natural occurring concentrations.
- α monitoring of gloves and steering wheels indicated different levels of "contamination" which varied according to the time of the day. No significant levels were detected on other garden appliances.
- Spectrometry results of gloves and steering wheels indicated the presence of Radon daughters. The results varied according to the time of the day.

The monitoring results in the morning and in the afternoon obtained with the α - surface contamination monitor during a follow-up of 5 days are given in table I. It can be seen that all measurements gave background values in the morning hours. The values obtained in the afternoon for the steering wheels and gloves were approximately similar during the check period, with somewhat lower values for the gloves.

(1) - Rotem Industries Ltd. , P.O.B. 9046 , Beer Sheva , Israel

Table 1. α monitoring results of steering wheels and gloves (cpm).

Day	Time	Tractor		Lawn mower 1		Lawn mower 2	
		Steering wheel	Gloves	Steering wheel	Gloves	Steering wheel	Gloves
1	Morning	bkg.	bkg.	bkg.	bkg.	bkg.	bkg.
	Afternoon	800	600	800	400	400	200
2	Morning	bkg.	bkg.	bkg.	bkg.	bkg.	bkg.
	Afternoon	400	400	400	200	-	-
3	Morning	bkg.	bkg.	bkg.	bkg.	bkg.	bkg.
	Afternoon	800	600	400	200	400	400
4	Morning	bkg.	bkg.	bkg.	bkg.	bkg.	bkg.
	Afternoon	800	800	*	-	400	-
5	Morning	bkg.	bkg.	bkg.	bkg.	bkg.	bkg.
	Afternoon	600	400	600	600	-	-

bkg. - background levels

* - the steering wheel was disassembled and sent to γ spectrometry check.

For comparison, a count rate of the α monitor of about 600 cpm corresponds to a Uranium surface contamination of about $10^{-5} \mu\text{Ci}/\text{cm}^2$. This count rate is the same order of magnitude as the upper limit of contamination for personal garments to Uranium.

We suspected that the "contamination" was most probably due to attracted radon daughters on the plastic steering wheels, following static charge accumulation by rubbing the plastic steering wheels by the gloves during the work in the morning. We simulated the process by rubbing different items for several minutes by the same kind of gloves in a separate and controlled experiment. and monitoring the accumulated activity as a function of time. The results are given in fig 1.

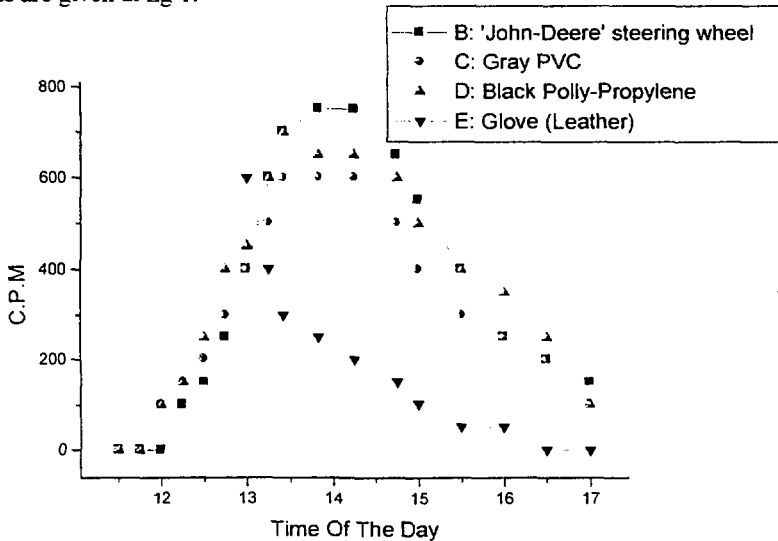


Fig. 1 . Count rate variation during the day hours.

