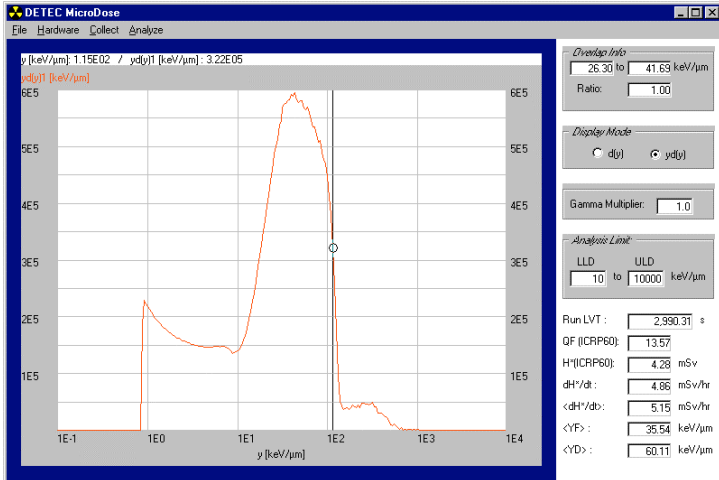


## Introducing MICRODOSE...

... an application for the acquisition and real time analysis of dosimetric data acquired with a tissue equivalent proportional counter (TEPC).



Main window of MicroDose. An event size spectrum for  $^{252}\text{Cf}$  fission neutrons, acquired with a spherical TEPC is shown.

The simultaneous measurement of the dose and the determination of the appropriate radiobiological weighting factor is the function of the TEPC. The gathering of this data and its analysis and display in real time is the job of MICRODOSE.

## MICRODOSE realtime data analysis

MICRODOSE has the look and feel of PC based multichannel analyzer (MCA) applications. It is targeted towards a dual MCA system based on two on-board MCA PC cards of 16k channels each. This provides the sensitivity to a wide dynamic range in pulse heights required by the professional health physics specialist.

The event size display area presents the «event size spectrum», familiar to microdosimetrists, and its

display is updated in real time as new pulse height data is acquired. The vertical scale presents either the number of events or the dose.

The dosimetric results area displays the results of a full analysis, update every 5 seconds. The analysis makes use of important TEPC parameters such as the mean chord length and the mass of gas that it contains. The results include :

Run LVT :	10,974.50 s
Events:	2476253
QF (ICRP60):	13.82
H*(ICRP60):	15.63 mSv
dH*/dt :	4.33 mSv/hr
<dH*/dt>:	5.13 mSv/hr
<YF> :	36.11 keV/μm
<YD> :	59.63 keV/μm

- **Run LVT** : current run live time in seconds
- **QF (ICRP60)** : mean quality factor of the radiation field according to ICRP60 standard
- **H\*(ICRP60)** : dose equivalent at 1 cm depth (H\*(10)) according to ICRP60. Units autorange from μSv to Sv
- **dH\*/dt, <dH\*/dt>** : instantaneous and average dose equivalent rates. Units autorange from μSv/hour to Sv/hour.
- **<YF>, <YD>** : first moments of d(y) and yd(y) plots

The control and diagnostic area contains the framed parameters above the dosimetric results area. It presents various diagnostic and control parameters :

- **Overlap info** : diagnostic information on the quality of the low LET and high LET MCA spectra

- **Display mode** : vertical scale selection ; ‘Events’ d(y), or ‘Events x Energy’ yd(y)
- **Gamma multiplier** : factor for gamma subtraction
- **Analysis limits** : lineal energy analysis limits

Overlap Info

25.12 to 41.69 keV/μm

Ratio: 0.98

Display Mode

d(y)  yd(y)

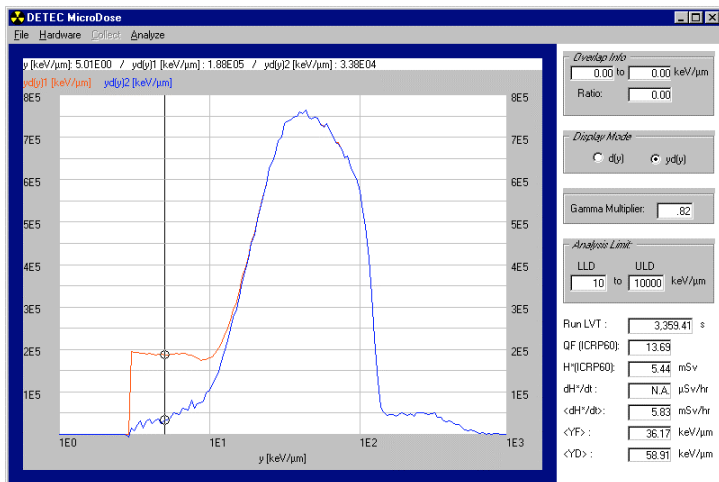
Gamma Multiplier: 1.0

Analysis Limit:

LLD 10 to ULD 10000 keV/μm

### MICRODOSE offline gamma subtraction

Off-line, MICRODOSE offers the possibility of subtracting a previously saved event size spectrum from the current data. When in this mode, the results field is updated to provide the dosimetric information of the net data (blue curve). This allows the quantification of the different components of the radiation field to the total dosimetric quantities.



Total gamma/neutron in red and the neutron « only » response, in blue.

### Applications

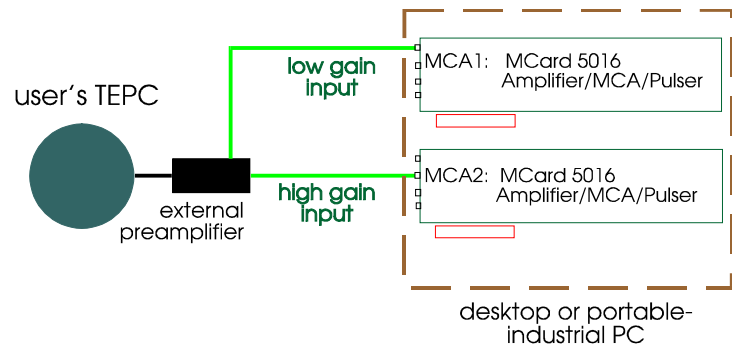
- % laboratory radiation characterization
- % TEPC development
- % high LET dosimetry research (space radiation high altitude cosmic ray dosimetry)
- % high precision portable dosimetry (using portable PC)

MICRODOSE is designed to be used by technician as well as expert level practitioners.

### System requirements and configuration

- Pentium 166 MHz or above, Win 95/98, ME
- two Aptec-NRC MCard 5016<sup>□</sup>

A proposed configuration is shown below. A high electronic gain chain provides sensitivity to « low LET » photon events, while the low gain chain samples « high LET » radiation. Merging of two resulting data set is performed at each data update.



### Developers

MICRODOSE is the result of a collaborative effort between DETEC and Atomic Energy Canada Ltd.

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<sup>□</sup> Currently, only the MCard 5016 by Aptec Inc. is supported. See [www.aptec-inc.com](http://www.aptec-inc.com) for hardware details. MICRODOSE may be adapted to other MCA make and models. Contact us for details.