

**NON-DESTRUCTIVE DECONTAMINATION
OF THE BR2 HOT CELL FACILITY
AT SCK/CEN MOL**

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0 Introduction

The BR2 hot cell building is adjacent to the BR2 reactor, the building is used for :

- the dismantling of active rigs and experiments ;
- the handling of cobalt used for medical applications ;
- the dimensional control of fuel rods ;
- the assembling of rigs and experiments.

1 Description of the facility

- The laboratory is a vertical construction divided in three levels.
- All levels are build to provide biological shielding (β - γ).
Wall thickness : 1,3 m concrete.
- The walls are partially plated with stainless steel.

1.1 Dismantling area (level +7,10m)

This area is equipped with :

- 6 master sleeve manipulators ;
- a dismantling machine (milling, drilling, sawing and welding operations);
- a heavy duty manipulator ;
- shielded windows ;
- a shielded door ;
- a roll crane ;
- two filtration units (on each level) ;
- transport facility to the BR2 storage pool.

1.2 Observation area (level +1,22m)

Equipent :

- 4 master sleeve manipulators ;
- 2 shielded doors ;
- fuel measurement unit ;
- roll crane ;
- loading and unloading of containers ;
- shielded windows.

1.3 Storage area (level -1,98m)

Used for the storage (temporarily) of high level waste or fuel pins.

1.4 Container loading area (level -1,98m)

Used for the handling of the shipping casks and the various waste containers.

1.5 Cell back areas

These provided containment when a cell door was opened for introduction of tools or containers.

1.6 Related rooms

Ventilation rooms.

Maintenance area for master sleeve manipulators.

Mechanical workshop.

Decontamination room.

2 State of the facility after the contamination

A ^{60}Co -source containing small metal grains and powder ruptured inside the hot cell.

Co-particles were dispersed in the building.

The resulting contamination has given rise to radiation levels which are too high to permit human entry.

Background measurement on level

+ 7,10m --> 350 mSv/h

+ 1,22m --> 350 mSv/h

- 1,98m --> 100 mSv/h

3 Decontamination objectives

Objectives

to evaluate the kind of contamination ;

to recover and remove the grains ;

to remove the powder ;

to reduce the radiation levels to permit human entry on each level.

4 Achievements

Achievements

Determination of a decontamination strategy.

Development of inspection and decontamination equipment.

Selection of cleaning products compatible with the cell infrastructure and also accepted by e liquid waste treatment plant.

Description of safety and operation procedures.

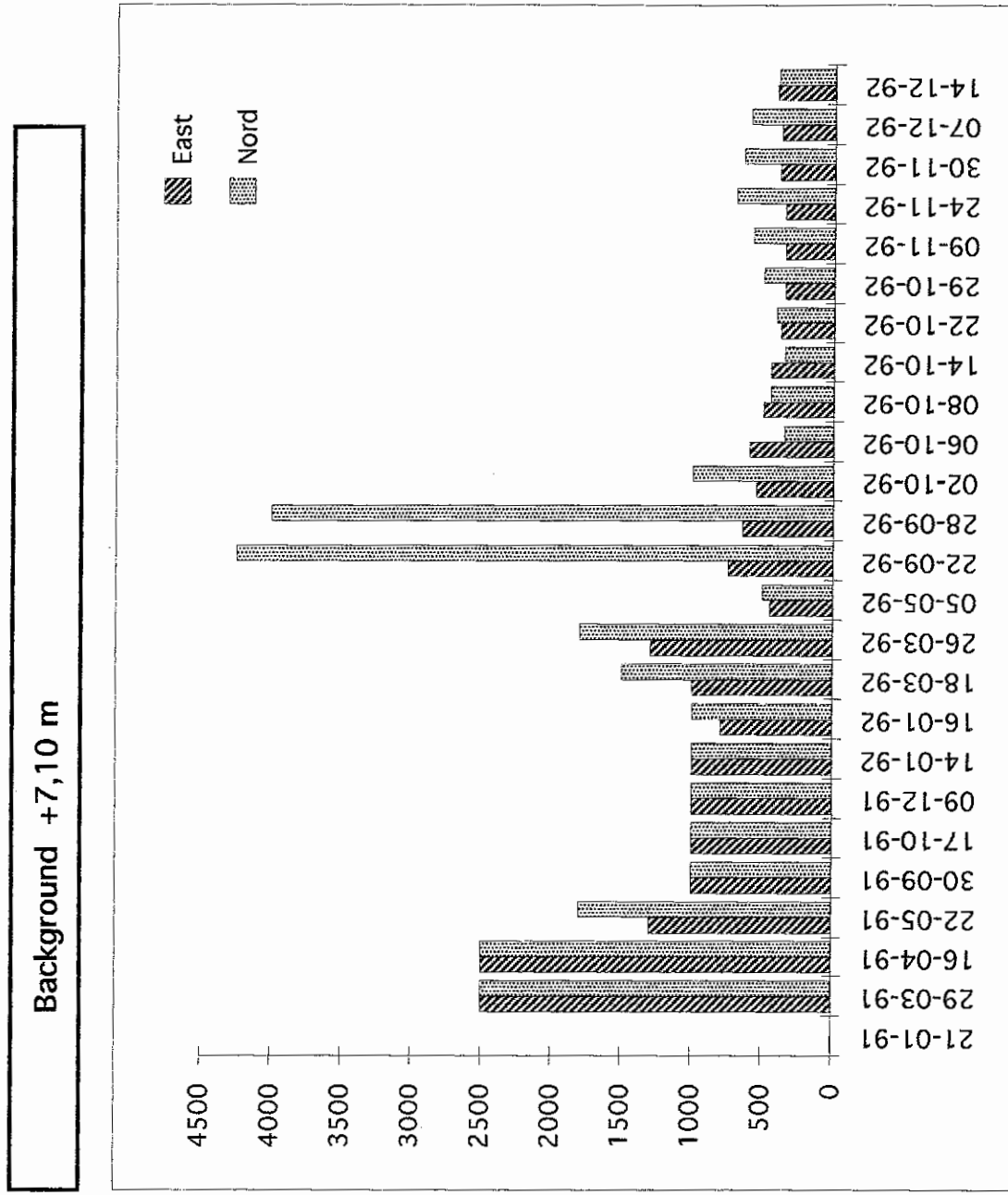
Clearance for entrance for maintenance operations in the building.

Reduction of the background of the highest compartment from 350 mSv.h⁻¹ to 1 mS.h⁻¹.

5 Accumulated dose

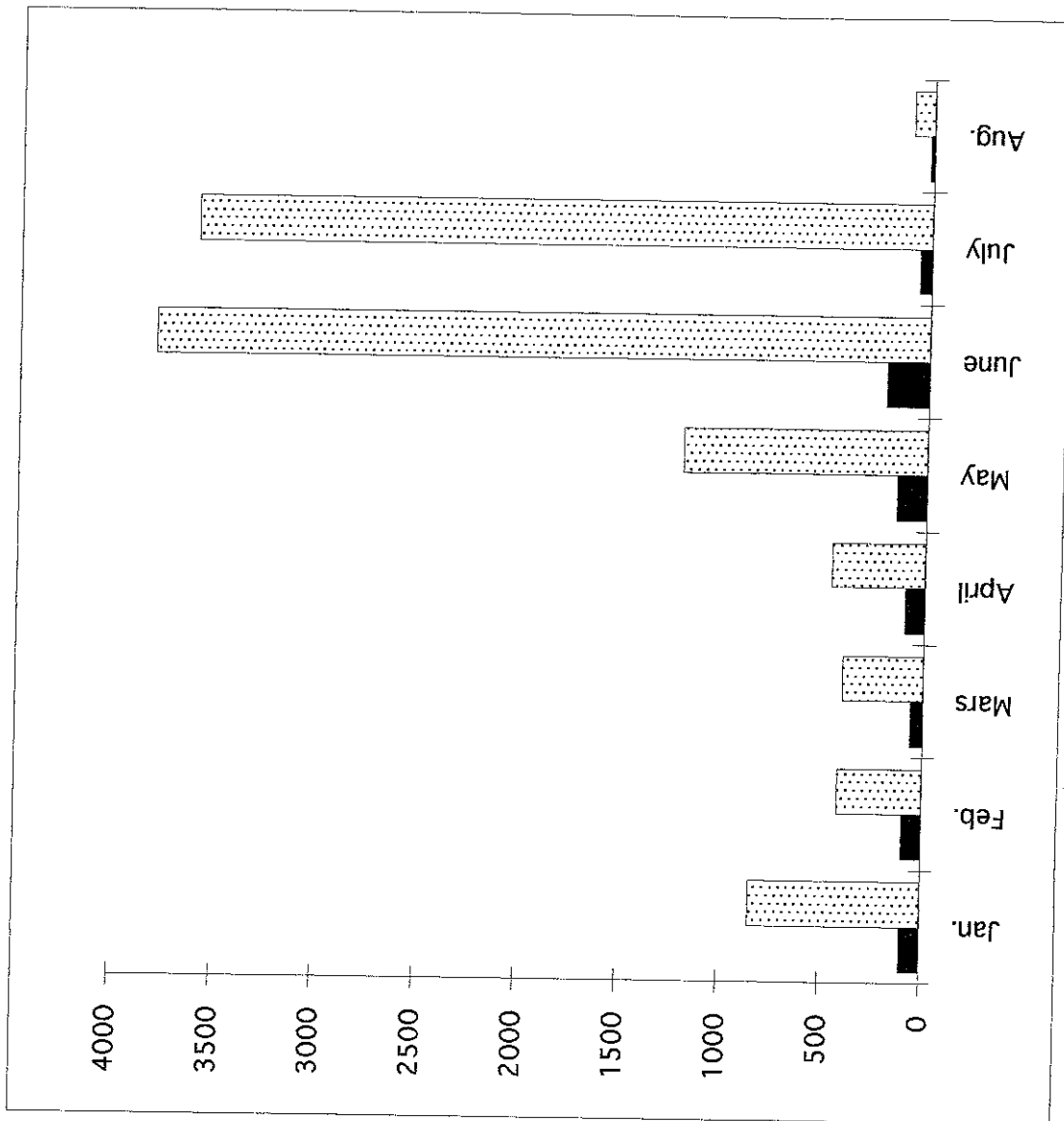
Over a period of three years the eight workmen did not exceed the limit of 10mSv/52weeks.

Date	γ Dose rate		Doorway	
	East mSv/h	Nord mSv/h	in cel mSv/h	outside mSv/h
21-01-91	10	1,3	5	
29-03-91	2500	2500		1000
16-04-91	2500	2500		200
22-05-91	1300	1800		200
30-09-91	1000	1000		
17-10-91	1000	1000		200
09-12-91	1000	1000		
14-01-92	1000	1000		
16-01-92	800	1000		
18-03-92	1000	1500		200
26-03-92	1300	1800		
05-05-92	450	500		
22-09-92	750	4250		
28-09-92	650	4000		
02-10-92	550	1000		
06-10-92	600	350		
08-10-92	500	450		
14-10-92	450	350		
22-10-92	380	410		
29-10-92	350	500		
09-11-92	350	580		
24-11-92	350	700		
30-11-92	390	650		
07-12-92	380	600		
14-12-92	410	400		



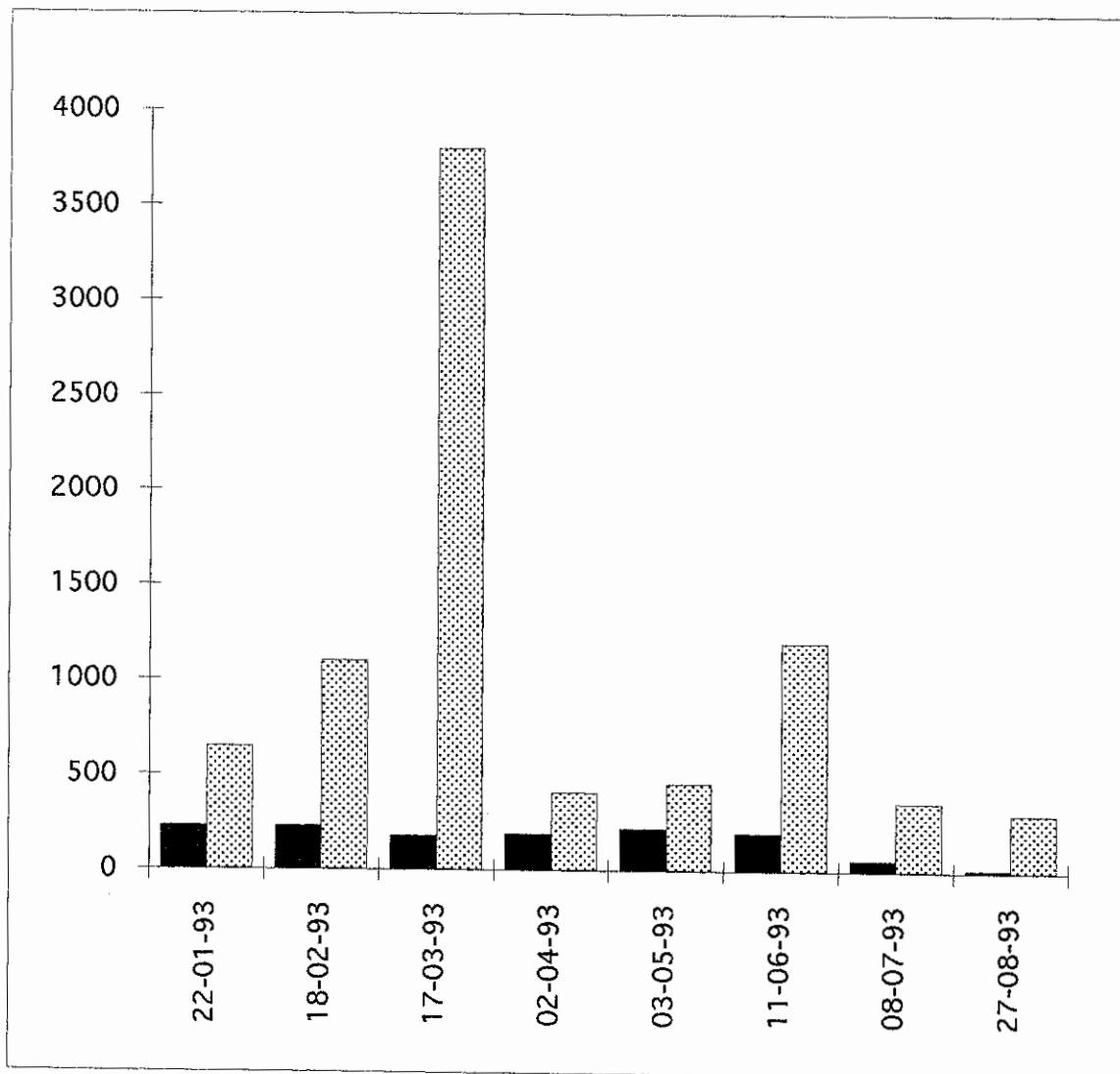
Background +7,10 m Nord

Date Min	γ Dose rate Nord mSv/h	Date Max	γ Dose rate Nord mSv/h
Jan. 26-01-93	100	Jan. 14-01-93	850
Feb. 23-02-93	100	Feb. 26-02-93	420
Mars 18-03-93	65	Mars 03-03-93	400
April 07-04-93	100	April 26-04-93	460
May 11-05-93	150	May 25-05-93	1200
June 02-06-93	210	June 30-06-93	3800
July 09-07-93	60	July 05-07-93	3600
Aug. 27-08-93	19	Aug. 11-08-93	100



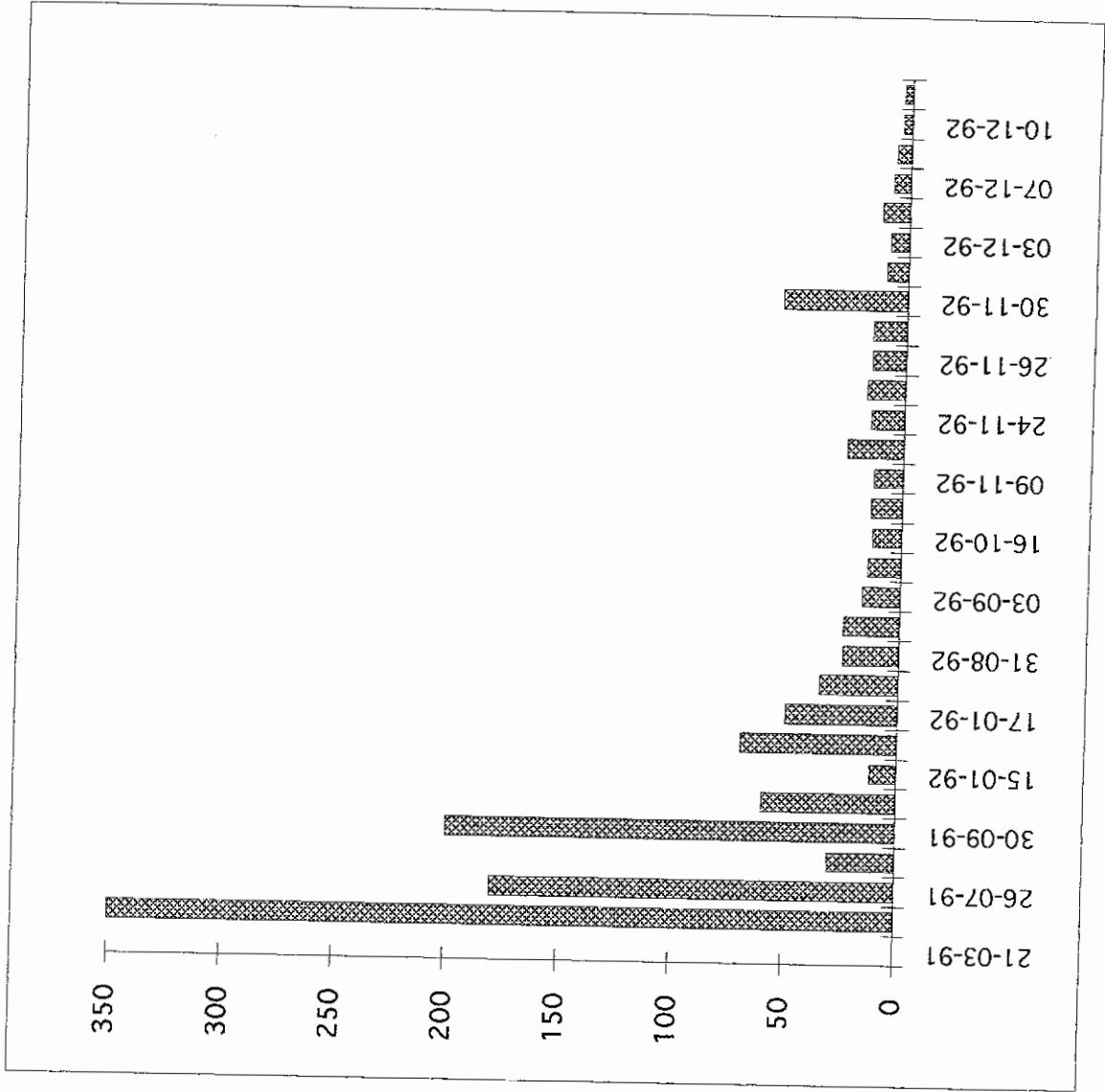
Background +7,10 m east

Date Min	γ Dose rate east mSv/h	Date Max	γ Dose rate east mSv/h
Jan. 22-01-93	230	Jan. 15-01-93	650
Feb. 18-02-93	230	Feb. 26-02-93	1100
Mars 17-03-93	180	Mars 03-03-93	3800
April 02-04-93	190	April 20-04-93	410
May 03-05-93	220	May 24-05-93	460
June 11-06-93	200	June 02-06-93	1200
July 08-07-93	60	July 06-07-93	360
Aug. 27-08-93	16	Aug. 09-08-93	300



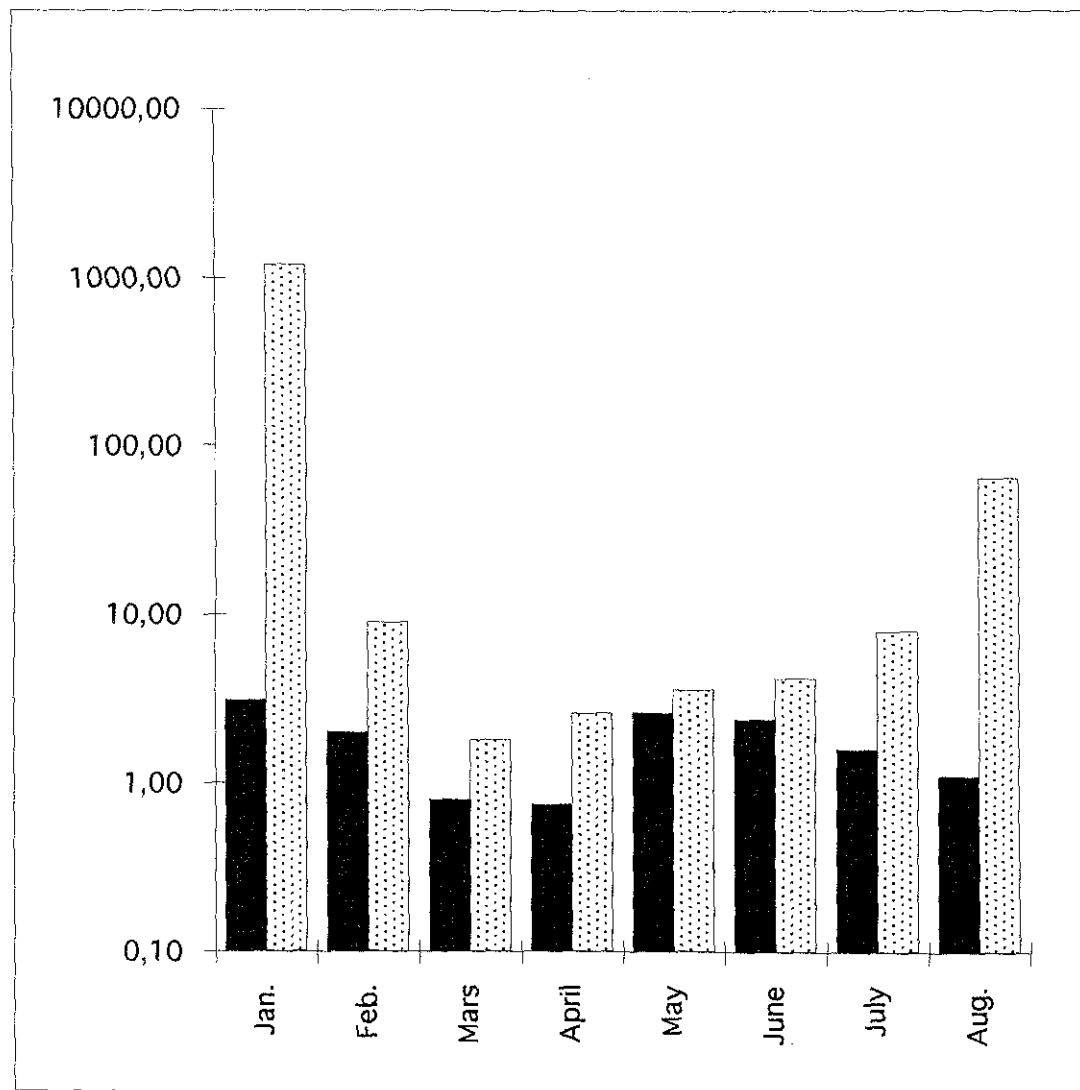
Date	γ dose rate mSv/h
21-03-91	∞
22-05-91	350
26-07-91	180
02-09-91	30
30-09-91	200
13-01-92	60
15-01-92	12
16-01-92	70
17-01-92	50
20-08-92	35
31-08-92	25
01-09-92	25
03-09-92	17
15-10-92	15
16-10-92	13
30-10-92	14
09-11-92	13
18-11-92	25
24-11-92	15
25-11-92	17
26-11-92	15
27-11-92	15
30-11-92	55
02-12-92	9,5
03-12-92	8,2
04-12-92	12
07-12-92	7,5
09-12-92	6
10-12-92	3,5
14-12-92	3,3

Background +1,22m

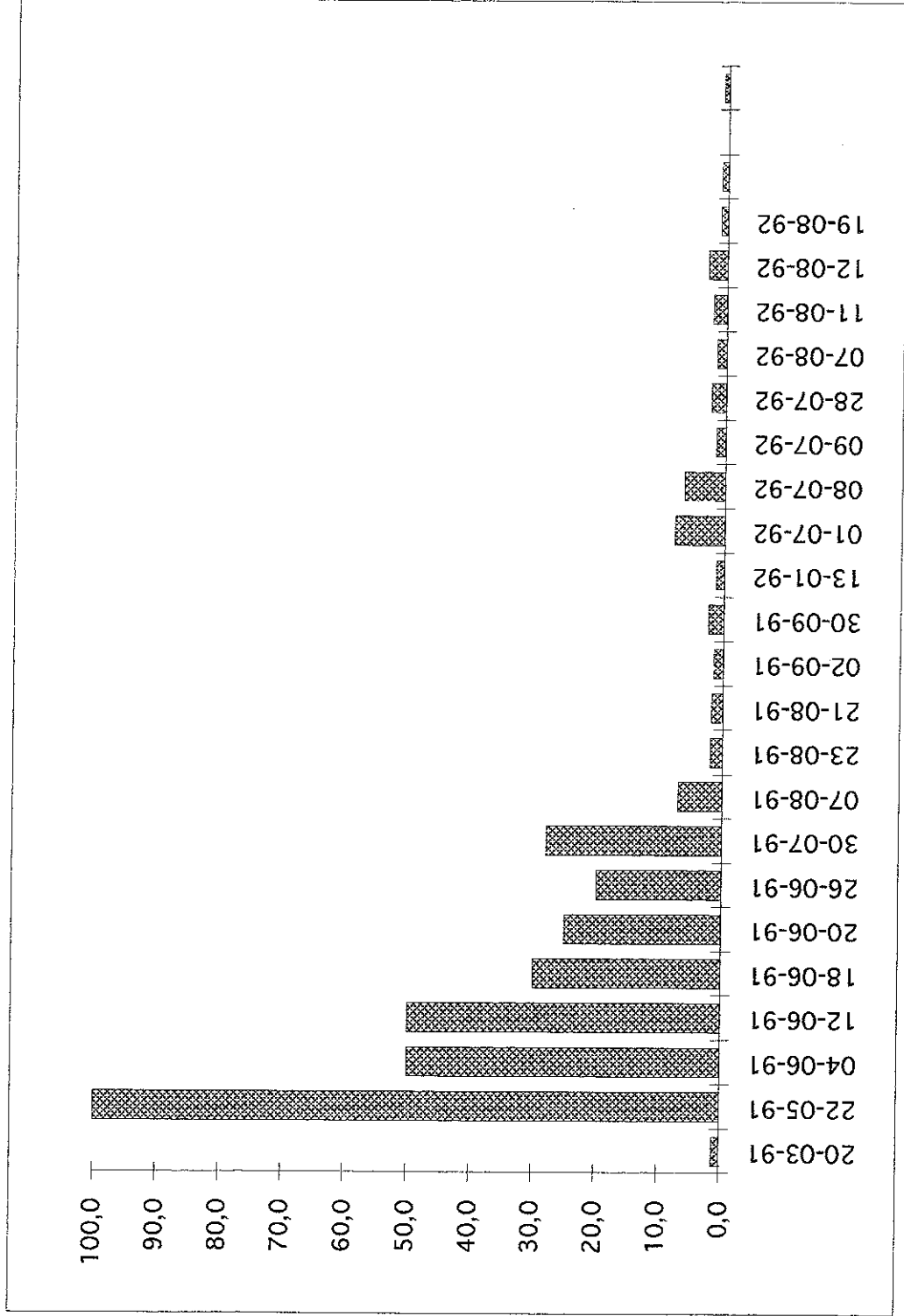


Background min. max. +1,22m

Date Min	γ Dose rate mSv/h	Date Max	γ Dose rate mSv/h
Jan. 28-01-93	3,10	Jan. 18-01-93	1200,00
Feb. 23-02-93	2,00	Feb. 16-02-93	9,00
Mars 18-03-93	0,80	Mars 03-03-93	1,80
April 07-04-93	0,75	April 22-04-93	2,60
May 03-05-93	2,60	May 28-05-93	3,60
June 07-06-93	2,40	June 28-06-93	4,20
July 09-07-93	1,60	July 06-07-93	8,00
Aug. 12-08-93	1,10	Aug. 24-08-93	65,00



Background -1,98 m east



Background -1,98 m east

Date Min	γ Dose rate mSv/h	Date Max	γ Dose rate mSv/h
Jan. 28-01-93	0,36	Jan. 25-01-93	20,00
Feb. 18-02-93	0,30	Feb. 17-02-93	1,40
Mars 11-03-93	0,60	Mars 18-03-93	0,95
April 07-04-93	0,70	April 14-04-93	2,10
May 24-05-93	1,40	May 12-05-93	1,70
June 04-06-93	1,40	June 15-06-93	2,00
July 07-07-93	0,38	July 05-07-93	1,50
Aug.		Aug. 03-08-93	1,30

