Fermi National Accelerator Laboratory

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Analysis of Exposure due to Work on Activated Components*

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In this brief note I summarize analysis of the exposure incurred in various maintenance jobs involving activated accelerator and beam line components at Fermilab. Because of their availability to me, most of these occured in the fixed target areas. The following tabulation was made of these the parameters were associated with each job. After the table I list rather terse descriptions of the various tasks. Thereafter, I present various plots of the various quantities in this table. All exposure rates are mR/hr while all exposures accumulated are mR (milli-Röntgens). The exposure rates were generally measured at the Fermilab "standard" *one ft* distance from the activated component. Accumulated exposures are taken from the self-reading pocket dosimeter records maintained by the radiation control technicians.

Job No.	Max Exposure Rate	No. of workers Exposed	Max Individual Exposure	Ave Individual Exposure	Total Exposure
1	1500	21	196	68	1441
2	200	9	51	26	238
3	600	12	110	35	420
4	600	20	443	120	2385
5	1000	20	307	103	2055
6	1200	11	140	61	679
7	1500	7	55	18	129
8	30	6	34	16	96
9	30	3	42	22	42
10	250	7	50	20	50
11	50	8	100	52	423
12	50	10	50	13	131
13	50	6	25	18	105
14	30	6	40	28	169

Brief Descriptions of the Jobs Listed Above

1. Repair of a water leak in a "target box" cooling loop assembly just downstream of heavily irradiated beam dump

2. Replacement of a failed magnet downstream of a heavily irradiated beam dump

3. Changeover in the sweeping magnets in a target box to allow a different running mode

4. Rework of the MP01 location in the Booster (courtesy of P. Yurista)

5. Repair of the same water leak as No. 1 at a different time

6. Salvage and reclamation operations on a target train

7. Insertion of a pin in a moving target holder on a target train. Finger and hand doses are <u>not</u> included in these totals

8. Replacement of Kautzky valved downstream of a heavily irradiated beam dump

9. Torch-cutting of alignment tracks within a target pile

10. Repair of a target box magnet

11. Removement of target box "drawers" from a storage "cave"

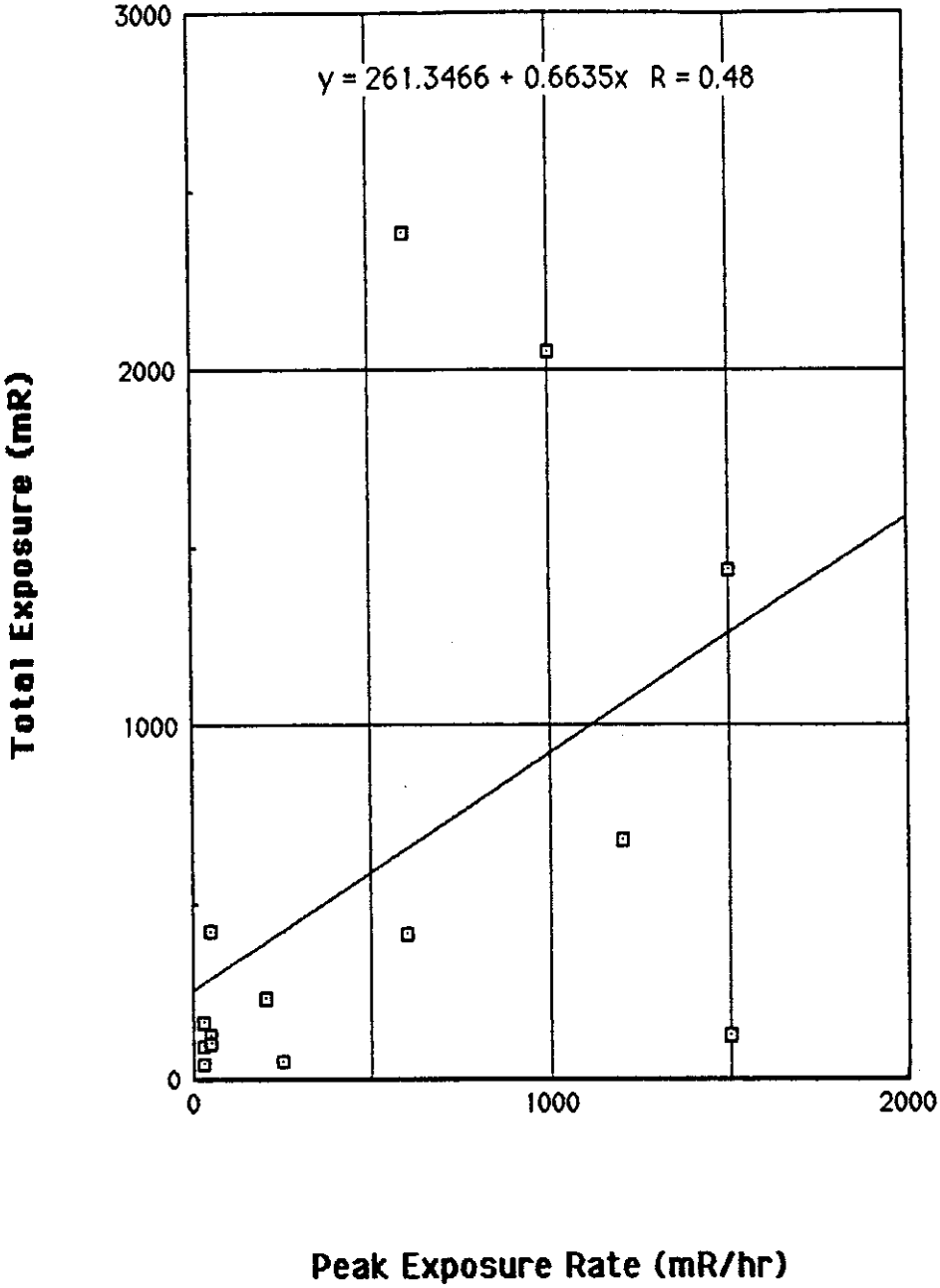
12. Repair of magnet just upstream of a primary proton target

13. Repair of "closed loop" water system

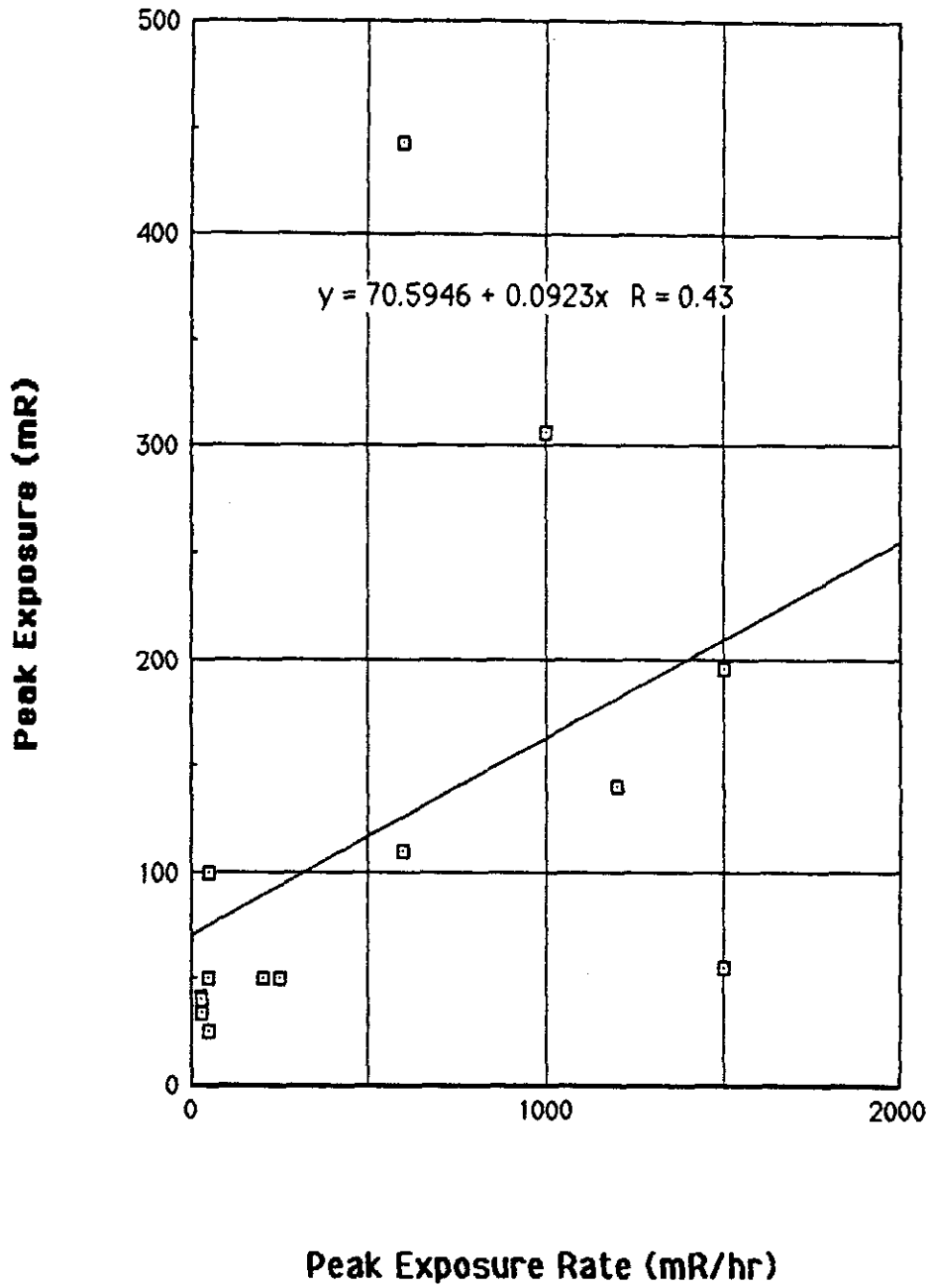
14. Salvaging of bedplate from a target train

From this work it is clear that, from "past experience", it is rather difficult to predict the total exposure or the peak exposure to an individual from the measured peak exposure rate. This is expected due to the myriad of types of possible "hot jobs". On the other hand, average exposure to an individual is rather nicely correlated with peak exposure to an individual and to total exposure. It is hoped that the job descriptions may be helpful in this respect.

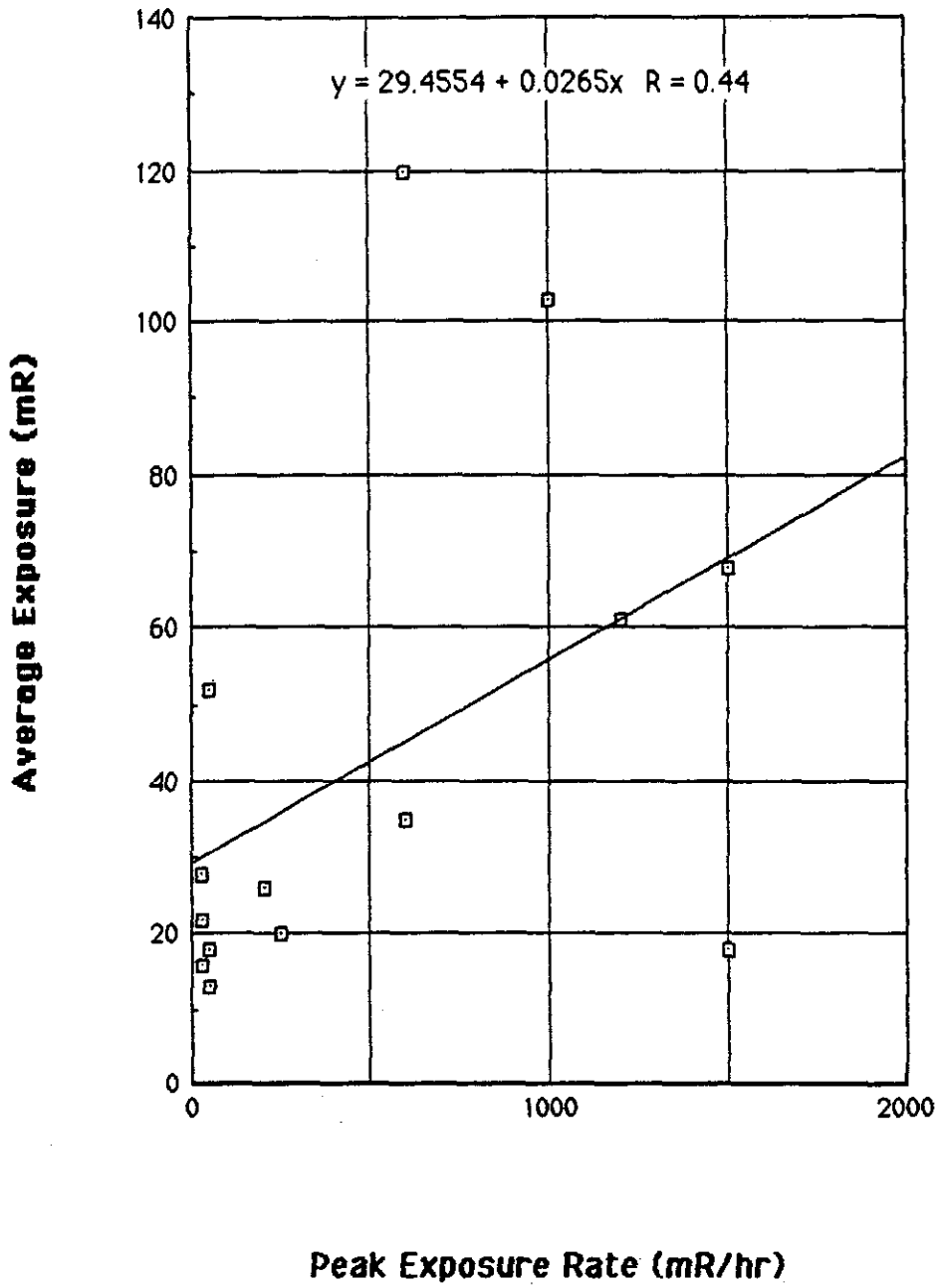
Total Exposure as a Function of Peak Exposure Rate



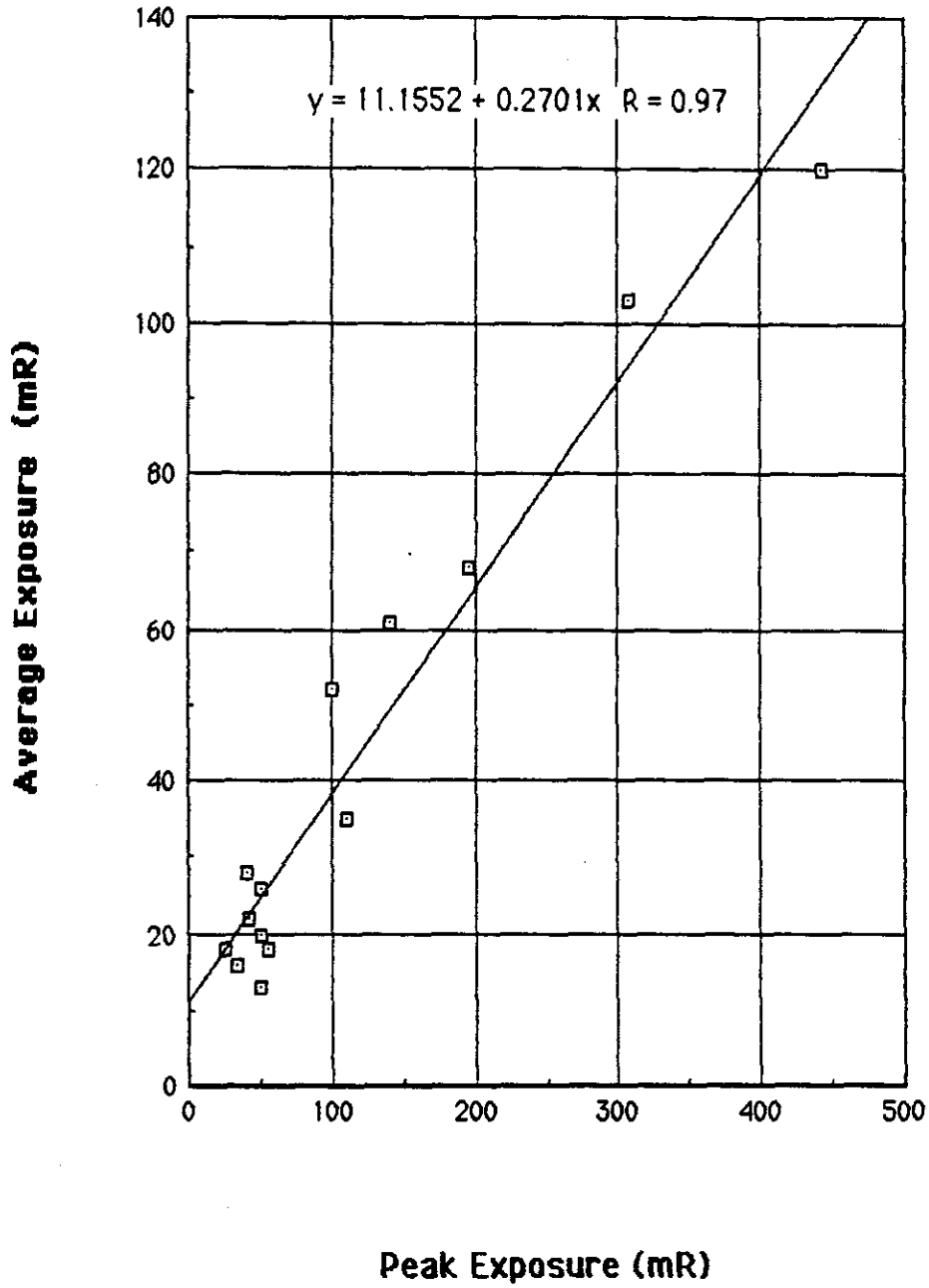
Peak Exposure as a Function of Peak Exposure Rate



Average Exposure as a Function of Peak Exposure Rate



Average Exposure as Function of Peak Exposure



Average Exposure as a Function of Total Exposure