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Radiation Levels at the Possible Bunch Dilution Cavity/Diode Locations

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AGS Studies Report

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Experimenter(s) W. Frey

Reported by W. Frey

Subject Radiation Levels at the Possible Bunch Dilution Cavity/Diode Locations

Purpose

The bunch dilution cavity and PIN diode (De-Qing) assembly will be located in the AGS ring in the G10 straight section (F20 is an alternate location). The PIN diode assembly is composed of several semiconductor switching diodes in parallel. The semiconductor diodes effective life is effected by the total radiation dose received. The literature* indicates that the switching diodes will have stable characteristics up to a dose of 3×10^5 R. Thus, a safe operating limit of 1.5×10^5 R should determine how often the diode assembly must be changed to ensure reliable performance.

Test Method

Dosimeters (TLD-700) were taped to the girder web, as shown in Figure 1, at G10 and F20 straight sections. The dosimeters were installed on January 26, 1987, and removed on March 3, 1987. During this period, the average beam intensity was 10.7×10^{12} with 7.38×10^{18} protons accelerated.

Results

The following radiation levels were recorded at F20 and G10 during this period.

Mid-F20	8.8×10^3 R
Downstream F20	8.1×10^3 R
Mid-G10	2.1×10^3 R
Downstream G10	1.8×10^3 R

*S. Wernikowski, "The Effects of Radiation on Electronic Devices", Isabelle Project Technical Note #71, August 14, 1978.

Conclusions

The downstream half of the 10-foot G10 straight section is a good location for the bunch dilution cavity and diode assembly. The radiation dose rate at this location should result in a minimum service life of 75 weeks (based on the 1.5×10^5 R level).

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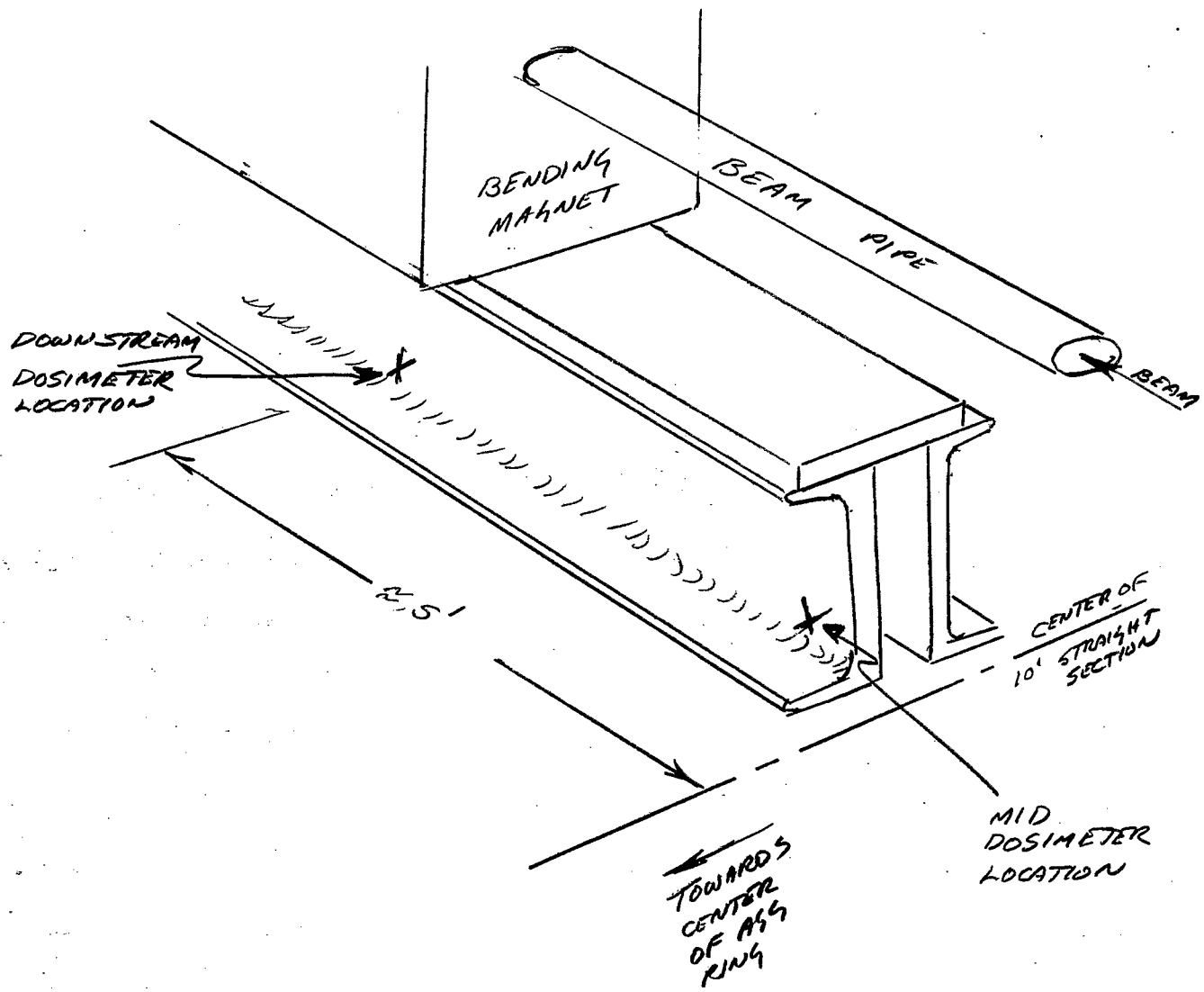

FIGURE 1

DOSIMETER LOCATIONS ON GIRDER