

Title: A320 NEUTRON GENERATOR OPERATION OUTSIDE OF THE BOREHOLE	Date: 09/03/2003	Page 1 of 1
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The model A-320 is a medium output pulsed neutron generator that produces 10^8 neutrons per second.

In a borehole environment, the strata surrounding the tool provides the shielding necessary to reduce personnel exposure. However, it is often necessary to operate the tool on the surface for calibration purposes or for the benefit of extending the neutron tube life which degrades due to helium buildup from the natural occurring tritium decay. This degrading process is more devastating in an idle tool, so periodic operation is required during a non-use period.

This tool is also used for environmental assaying where it is necessary to produce neutrons while the tool is scanning the surface of the soil. A common technique is to cordon off an area to assure a maximum permissible dose of $< 10 \text{ n/cm}^2 / \text{sec}$ (the maximum permissible for a 40 hour week is $10 \text{ n/cm}^2 / \text{sec}$). The following calculations show that a distance of 50 feet from the target would reduce the dose to $3.14 \text{ n/cm}^2 / \text{sec}$ which is less than the $10 \text{ n/cm}^2 / \text{sec}$ allowable:

Inverse square law or

$$\frac{10^8}{4 \pi (1590)^2} = 3.14 \text{ neutrons / cm}^2 / \text{sec}$$

or using the inverse square law in solving for r

$$r = \frac{10^8}{4 \pi (10 \text{ neutrons / cm}^2 / \text{sec})}^{1/2} = 29 \text{ feet}$$

These systems can be operated remotely, via computer control to ensure safe distance beyond the 50 feet cable that is provided.

An external interlock output is provided for powering intrusion alarms that shut the system down when unauthorized entry is attempted.