

used for fast-neutron flux or dose-rate calculations in hydrogenous materials. Buildup factors computed by empirical expressions are used in conjunction with exponential attenuation to compute gamma-ray fluxes and dose and energy absorption rates. Bivariant polynomial functions are used for computation of differential spectra.

5. Restrictions: Enough physical and source-description capability is provided that nuclear analysis of reactor-shield assemblies, which contain sources that can be described in cylindrical- or rectangular-coordinate systems, should involve little uncertainty except that associated with the point kernels.
6. Machine Requirements: 32-K core memory and 2 magnetic-tape units for each.
7. Typical Running Time: Program 14-0, 14-1 and 14-2 computation time depends on the complexity of the source-shield description and the output requested; it varies from short to long. Program 14-3 running time is short.
8. Status: Code packages CCC-1 (14-0 and 14-3), CCC-2 (14-1 to 14-3), and CCC-3 (14-2 and 14-3) are available from Radiation Shielding Information Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
9. References:
  - <sup>1</sup>J. T. Martin, J. P. Yalch and W. E. Edwards, "Shielding Computer Programs 14-0 and 14-1, Reactor Shield Analysis," XDC 59-2-16, (January 1959).
  - <sup>2</sup>J. T. Martin, J. P. Yalch and W. E. Edwards, "Shielding Computer Program 14-2, Reactor Shield Analysis," XDC 50-6-173, (June 1959).
  - <sup>3</sup>M. C. McDonald, "Shielding Computer Program 14-3, Data Check for Shielding Computer Programs 14-0, 14-1 and 14-2," XDC 59-3-52, (December 1958).

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1. Code Name: Gamma Single-Scattering Program 05-0 (NMPO No. 59)  
Neutron Single-Scattering Program 09-0 (NMPO No. 64)
2. Computer and Programming System: IBM 7090 and 7094-FAP
3. Nature of Code: Programs 05-0 and 09-0 calculate the dose rate at any specified, unshielded point detector due to single-scattered gamma rays and fast neutrons, respectively, in an infinite, homogeneous medium from an anisotropic point source. The source energy spectrum may be approximated by ten discrete values of the energy. Exponential attenuation may be considered on either scattering leg as desired. The dose rate is determined by trapezoidal integration for each source energy, and the total dose rate is obtained by summation over all source energies.
4. Machine Requirements: 32-K core memory.
5. Typical Running Time: Less than one minute per receiver point.
6. Status: Production. Code packages CCC-25 (05-0) and CCC-26 (09-0) are available from Radiation Shielding Information Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
7. References:
  - <sup>1</sup>J. J. Loechler, J. E. MacDonald and H. M. Van Valkenburg, "704 Program Report, Aircraft Nuclear Propulsion Shielding Program 05-0," XDC 59-8-218, (July 1959).
  - <sup>2</sup>J. W. Haffner, J. J. Loechler and J. E. MacDonald, "IBM 704 Program Report, Aircraft Nuclear Propulsion Shielding Program 09-0," APEX 533, (December 1958).

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