TRG-RS(N)

1. Code name: TRG-RS(N)
2. Computer: IBM 704—Fortran coded
3. Nature of code: Monte Carlo calculation of neutron flux in a cylindrical detector. The neutrons originate uniformly on the surface of a disk and pass through a complex shield configuration, the entire system being axially symmetric. The source neutrons can be monoenergetic or form a fission spectrum. The source direction may be distributed according to a power of the cosine of the axial angle or at a fixed axial angle. At any point on the source the azimuthal distribution is assumed to be uniform. The energy and radial dependence of the flux at the detector is computed. A multicase feature allows the simultaneous calculation of flux from various source energies through various shield configurations.
4. Restrictions:
   10 spectral energy divisions
   6 shield materials
   16 axial shield divisions
   8 radial shield divisions per axial division
   8 radial detector divisions
   Machine requirements: 32K memory, 5 tape units, floating point trap
5. Typical running time: For deviations in the total flux less than 5% for hydrogenous or 10% for nonhydrogenous material, 10 min.
6. Unusual features: Importance sampling and generalized quota sampling used to reduce variance of results. Statistical estimation made before scattering to obtain data at every collision.
7. Present status: Advanced development. Deck available on request from H. Steinberg, TRG, Inc.
8. *Reference:* R. Aronson, K. Held, C. Klahr, and H. Steinberg, TRG-136-FR.

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SHADOW

1. Code name: SHADOW
2. Computer: IBM 7090—Fortran coded
3. Nature of code: Monte Carlo calculation of gamma ray current escaping from an axially symmetric spherical system. The source is assumed to be uniformly distributed over a spherical volume centered at the center of the system, monoenergetic, and isotropic. A shadow shield is located on the axis, inside the outer sphere. The outer sphere and the source are considered (for scattering purposes) to be Compton scatterer, while the shadow is lead. The emergent current can be accumulated in either of two ways, as a function of angle with the axis of the emergent direction or as a function of surface position. The current is also obtained as a function of energy. Multicase features are present allowing a number of problems to be run simultaneously with variations in material density and source energy.
4. Restrictions:
   10 spectral energy divisions
   12 angle divisions
   Machine requirements: 32K memory, 4 tape units
5. Typical running time: To obtain deviations less than 2% in total flux, 1 min, longer time to get low deviations in angular distribution.
6. Unusual features: Importance sampling and generalized quota sampling used to reduce variance of results.
7. Present status: Production: available on request from E. P. Blizard, Neutron Physics Division, ORNL.
8. *Reference:* H. Steinberg, M. J. Kelly, and R. Aronson, TRG-215-FR.

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TRIGR-S

1. Code name: TRIGR-S
2. Computer: IBM 704—SAP coded
3. Nature of code: Monte Carlo calculation of gamma ray emission and heating (optional) of multilayer spherical body. Each layer consists of a mixture of several elements. The source is monoenergetic and uniformly distributed over a spherical surface in the interior, at a given angle with the radial direction. Data obtained consist of energy flux and spectrum, energy current and spectrum, and optionally, a distribution of energy loss due to absorption and scattering within the shield.
4. Restrictions:
   15 shells
   40 spectral energy divisions
   15 materials
   8 similarity ratios
   Machine requirements: 8K memory, drums, 1 tape unit
5. Typical running time: To obtain deviations less than 5%, 3 to 5 min for all cases studied.
6. Unusual features: Importance sampling extensively used to reduce variance of results.
7. Present status: Production: available on request from L. Bowman, ARL, WADD.
8. *Reference:* H. Steinberg and R. Aronson: WADD TR58-771.

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TRIGR-P

1. Code name: TRIGR-P
2. Computer: IBM 704—SAP coded
3. Nature of code: Monte Carlo calculation of gamma ray transmission through multislab infinite plane shield. The source monoenergetic and monodirectional, making a fixed angle with the slab normal. Similarity transform is used to obtain data for several similar slabs. Data obtained consist of energy flux and flux spectrum, energy current and current spectrum, and dose.
4. Restrictions:
   30 spectral energy divisions
   7 slabs
   Machine requirements: 8K memory, drums, 1 tape unit
5. Typical running time: To obtain deviations less than 5%, 3 min for normal incidence, 10 mins for angles around 45°, at source energies around 3 Mev, shield 15 mean free paths thick along source direction.
6. Unusual features: Importance sampling extensively used to reduce variance of results.

7. Present status: Production: available on request from L. Bowman, ARL, WADD.
8. *Reference:* H. Steinberg and R. Aronson, WADD TR-58-771.

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ABCD

1. Code name: ABCD
2. Computer: IBM 704—SAP coded
3. Nature of code: Monte Carlo calculation of neutron dose inside a shielded cylindrical crew compartment. The source may take on one of three forms: (1) monoenergetic and constant in direction, (2) monoenergetic with constant angle to the axis, or (3) given by the output of Convair's D-54 code, i.e., the angle and energy distribution at a distance resulting from air-scattering of a neutron gun source. The data obtained consists of a radial dose distribution (based on distance from the axis) as well as total dose. The similarity transform is used to obtain doses simultaneously for many geometrically similar cases.
4. Restrictions: The walls of the container consist of hydrogen and/or one nonhydrogen element.
   8 radial cavity divisions
   20 similarity ratios
   Machine requirements: 8K memory, drums, 4 tape units.
5. Typical running time: To obtain deviations less than 5%, 5–10 min for all cases studied.
6. Unusual features: Importance sampling extensively used to reduce variance of results. Random numbers generated by Richtmeyer procedure to reduce variance.
7. Present status: Production: available on request from E. P. Blizard, Neutron Physics Division, ORNL.
8. *Reference:* H. Steinberg, TRG-211-3-FR.

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