General Characteristics		
1	**Abstract of Model Capabilities**	The Radiological Safety Analysis Computer Program (RSAC-5) calculates the consequences of the release of radionuclides to the atmosphere. Using a personal computer, a user can generate a fission product inventory from either reactor operating history or nuclear criticalities. RSAC-5 models the effects of high-efficiency particulate absorber (HEPA) air filters or other cleanup systems and calculates decay and ingrowth during transport through processes, facilities, and the environment. Doses are calculated through the inhalation, immersion, ground surface, and ingestion pathways. RSAC+, a menu-driven companion program to RSAC-5, assists users in creating and running RSAC-5 input files. The user's manual contains the mathematical models and operating instructions for RSAC-5 and RSAC+. Instructions, screens, and examples are provided to guide the user through the functions provided by RSAC-5 and RSAC+. These programs are designed for users who are familiar with radiological dose assessment methods.
2	**Sponsor and/or Developing Organization**	Douglas R. Wenzel Lockheed Martin Idaho Technologies P.O. Box 1625 Idaho Falls, ID 83415-5209 (208) 526-3463 (208) 526-3787 **Fax** dxw@inel.gov **sponsoring organization** dxw@inel.gov **developing organization**
3	**Last Custodian/ Point of Contact**	Douglas R. Wenzel Lockheed Martin Idaho Technologies P.O. Box 1625 Idaho Falls, ID 83415-5209 (208) 526-3463 (208) 526-3787 **Fax** dxw@inel.gov **primary individual** dxw@inel.gov **secondary individual**
4	**Life-Cycle**	RSAC was first developed at the Idaho National Engineering and Environmental Laboratory (INEEL) beginning in the 1960's. Ongoing RSAC development has been geared toward responding to the complex programmatic needs of assessing the radiological consequences to individuals from the release of radionuclides to the atmosphere. The fourth and fifth (current) version of RSAC provided model enhancement along with extensive verification and validation. A companion program, RSAC+, was added to assist the user in preparing an input file for RSAC-5.
5	**Model Description Summary**	RSAC-5 calculates fission product inventories. RSAC-5 also calculates complete progeny ingrowth and decay during all accident phases. RSAC-5 has provision for calculating releases from an operating reactor. Provision is also made for users to import fission product, actinide, and activation product inventories using other codes such as ORIGEN2, when desired. Radionuclide inventories can be fractionated and decayed to simulate transport through a process or clean-up system, such as HEPA filters. Inventory fractionations may be done by chemical group, element, or fraction of the entire radionuclide inventory. Complex scenarios of releases to the atmosphere can be modeled with RSAC-5. Releases to the atmosphere can be simulated using either linear or exponential release models. RSAC-5 calculates meteorological dispersion in the atmosphere using Gaussian plume diffusion for Pasquill-Gifford, Hilsmeier-Gifford, and Markee models. A unique capability is the ability to model stability Class F fumigation conditions, the meteorological condition that causes the highest ground level concentrations from an elevated release. Optionally, users may supply s's or χ/Qs to the program as input data. RSAC-5 also includes optional corrections such as plume rise, building wake and ground depletion. Doses may be calculated for various pathways including inhalation, ingestion, ground surface, air immersion, and water immersion pathways. Calculations may be made for either acute or chronic releases. Internal doses (inhalation and ingestion) are calculated using the ICRP-30 model with dose conversion factors from DOE/EH-0071. External doses are calculated using the dose-rate conversion factors from DOE/EH-0070. RSAC-5 provides a finite plume model for making cloud gamma dose calculations for use when the size of the plume is small compared to the mean free path of the gamma rays.
6	**Application Limitation**	RSAC-5 primarily calculates downwind doses using straight line diffusion. However, a companion program has been developed to interact with a real-time meteorological program written by NOAA for use at the Idaho National Engineering and Environmental Laboratory (INEEL). RSAC-5 does not calculate inventories for activation products or actinides. However, provision is made to import source terms from other codes such as ORIGEN2.
7	**Strengths/ Limitations**	**Strengths:** The ability of RSAC-5 to calculate and fractionate fission product inventories is particularly useful in the analysis of accidents where the short-lived radionuclides change rapidly as a function of decay time or accidents with criticality excursions. The ability to model stability Class F fumigation conditions and the finite plume cloud gamma model are definite strengths. A major strength of RSAC-5 is the independent verification and validation (V&V) that has been conducted. RASAC-5 has been

7	**(Continued)**	subjected to extensive independent V&V for use in performing safety-related dose calculations to support safety analysis reports. This V&V was conducted in accordance with the guidelines presented in ANSI/ANS-10.4, "American National Standard Guidelines for the Verification and Validation of Scientific and Engineering Programs for the Nuclear Industry" (ANSI/ANS 1987). The V&V meets the requirements for software imposed by ASME-NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities" (ASME 1989). **Limitations:** RSAC-5 fission product calculations are valid primarily for high-enriched fuels. When fission product inventories are desired for low-enriched fuels, users are encouraged to use another code such as ORIGEN2 to calculate radionuclide inventories and then import the results back into RSAC-5. The current version of RSAC does not model particulate resuspension of activity deposited on the ground downwind from the point of release from a facility.
8	**Model References**	• Clawson, L.L., G. E. Start, N. R. Ricks, 1989, *Climatography of the Idaho National Engineering Laboratory*, DOE/ID-12118, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Research laboratories, Air Resource Laboratory, Field Research Division, Idaho Falls, Idaho, December. • U.S. Department of Energy, 1988, *Internal Dose Conversion Factors for Calculation of Dose to the Public*, DOE/EH-0071, Washington, D.C. • U.S. Department of Energy, 1988, *External Dose-Rate Conversion Factors for Calculation of Dose to the Public*, DOE/EH-0070, Washington, D.C. • U.S. Nuclear Regulatory Commission, 1977, *Calculation of Annual Doses to man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*, Regulator Guide 1.109 Revision 1, Washington, D.C. • Wenzel, D. R., 1994, *The Radiological Safety Analysis Computer Program (RSAC-5) Users Manual*, Westinghouse Idaho Nuclear Company, Inc., Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.
9	**Input Data/Parameter Requirements**	RSAC-5 can be run directly using a user-supplied ASCII input file or companion program RSAC+ can be used to assist in creating and running RSAC-5 input files. RSAC+ will only edit files that have been created using RSAC+. Files created by RSAC+ have .DTT extensions. RSAC-5 can be run directly from RSAC+ without creating an ASCII RSAC-5 input file.
10	**Output Summary**	Each page of RSAC-5 output contains the program version number, the program serial number, and the date and time that the run was made. All input parameters selected for the run are indicated on the output. RSAC-5 also has an option to allow doses from different exposure pathways and multiple RSAC-5 calculations within the same input run to be summarized, added, and reported in summary tables.
11	**Applications**	RSAC development has been geared toward responding to the complex programmatic needs of assessing the radiological consequences to individuals from the release of radionuclides to the atmosphere. The primary application of RSAC-5 is in the calculation of downwind doses from the airborne pathway for safety analyses reports and environmental impact statements.
12	**User-Friendliness**	A user friendly interface, RSAC+, is issued with RSAC-5 to assist users in the preparation of input files for RSAC-5. RSAC+ allows RSAC-5 input files to be developed through the use of menu screens. RSAC+ stores RSAC-5 input data in a database and has provision for users to easily modify previously created files. Instructions to the RSAC-5 program can be inserted, edited, added, copied, moved, or deleted. RSAC+ checks all fields to assure that data is in range for the given variable and that consistency in an input series is maintained. RSAC+ has provision for directly executing RSAC-5, displaying RSAC-5 input and output files. In addition, RSAC+ offers the capability of filing RSAC-5 input and output in user specified sub-directories.
13	**Hardware-Software Interface Constraints/ Requirements**	**Computer operating system:** RSAC-5 and RSAC+ are DOS based programs; however, they can be run under Windows. Instructions are provided to the user on how to create a PIF file when running under Windows 95. **Computer platform:** RSAC-5 runs on an IBM personal computer or compatible, with the following minimum requirements: • Math co-processor • A minimum of a 80386 processor • 450 Kilobytes of available memory • One RSAC-5 installation diskette [DS/HD (1.44 MB)]. **Disk space requirements:** RSAC-5 runs on an IBM personal computer or compatible, with the following minimum requirements: • Math co-processor • A minimum of a 80386 processor • 450K of available memory • One RSAC-5 installation diskette [DS/HD (1.44 MB)]. **Run execution time** (for a typical problem)**:** Execution time is a function of the complexity of the run. Most typical runs made on the current generation of PCS take less than 10 seconds. **Programming language:** RSAC-5 is written in Fortran 77 and the companion program RSAC+ is written in Clarion Professional. **Other computer peripheral information:** No information provided.

14	**Operational Parameters**	**Identify whether the code has any error diagnostic messages to assist the user in troubleshooting operational problems:** Approximately a third of the RSAC-5 program is devoted to error diagnostics. RSAC+ checks all fields to assure that data is in range for the given variable and that consistency in an input series is maintained. **Set up time for:** Setup up times are dependent on the complexity of the run being made. **Typical times are: *first-time user:*** .30-60 minutes ***experienced user:*** 5-10 min
15	**Surety Considerations**	**All quality assurance documentation:** 1) Shonka Research Associates, Inc., 1989, *Software Verification and Validation Report for the WINCO RSAC-4 Code*, Marietta, Georgia. 2) Shonka Research Associates, Inc., 1993, *Software Verification and Validation Report for the WINCO RSAC-5 Code*, Marietta, Georgia. Configuration control is maintained by issuing copies of RSAC-5 with a unique serial number. Only binary copies of RSAC-5 and its libraries are issued to users to prevent user changes to the program that would invalidate the extensive validation and verification. Each page of RSAC-5 output contains the program version number, the program serial number, and the date and time the run was made. **Benchmark runs:** See V&V reports above. **Validation calculations:** See V&V reports above. **Verification with field experiments that has been performed with respect to this code:** See V&V reports above.
16	**Runtime Characteristics**	Execution time is a function of the complexity of the run. Most typical runs made on the current generation of PCs take less than 10 seconds.
		Specific Characteristics
Part A: Source Term Submodel Type		
A1	**Source Term Algorithm?**	_✔_YES __NO RSAC-5 calculates fission product inventories. RSAC-5 also calculates complete progeny ingrowth and decay during all accident phases.
A2	**For Chemical Consequence Assessment Models**	**Liquid spill: _✔_ pool evaporation _✔_ particulate resuspension** RSAC-5 models the release of radioactivity from containment structures using exponential functions. Instantaneous and continuous releases are modeled using a single exponential function. Complex release scenarios can be modeled using a series of up to 10 exponential functions. These functions decay the radionuclide inventory while it is held up by the containment structure before it is released. The inventory can be fractionated by chemical group, element, or entire inventory. Pool evaporation and particulate resuspension within a facility can be simulated by RSAC-5. However, RSAC-5 does not model particulate resuspension of activity deposited on the ground downwind from the point of release from a facility. **Pressurized releases:__ two-phase jets__ flashing__ entrainment__ aerosol formation** **Solid spills: _✔_ resuspension _✔_ sublimation** RSAC-5 models resuspension and sublimation within the limitations noted above.
A3	**For Radiological Consequence Assessment Models**	**Gaseous releases: _✔_ noble gases _✔_ iodines __ other non-reactive gases** **Aerosol releases:** RSAC-5 simulates aerosol releases and provides an option for the user to specify particle sizes of $\geq$0.1 µm activity median aerodynamic diameter (AMAD) for inhalation dose calculations**.** **Particulate releases:** An option is provided to fractionate the radionuclide inventory and to simulate removal of activity by cleanup systems such as HEPA filters. **_✔_ Chemistry __ Isotopic exchange _✔_ Physical properties capability** Radionuclides can be fractionated by physical group or by individual element to account for chemical behavior. In addition, lung clearance classes may be specified for inhalation dose calculations.
A4	**For Weapons Consequence Assessment Models**	**Chemical weapon release characteristics:** RSAC-5 can calculate downwind doses from weapon releases when the user inputs the initial size and height of the plume. **Biological weapon release characteristics:** RSAC-5 can calculate downwind doses from the airborne release of radioactivity**.**
Part B: Dispersion Submodel Type		
B1	**Gaussian**	**_✔_Straight-line plume __Segmented plume __ Statistical plume __ Statistical puff** Atmospheric diffusion parameters can be input directly by the user or calculated by RSAC-5. RSAC-5 calculates plume standard deviations (s) developed for three different conditions. Hilsmeier-Gifford s were developed for desert terrains and releases from a few to 15 minutes. Markee s have also been developed for a desert terrain; however, they were developed for releases from 15 to 60 minutes in duration. Pasquill-Gifford s are presented in the NRC Regulatory Guide 1.145 and by Slade (1968) from the Prairie Grass experiments for effluent releases with durations of 10 to 60 minutes.
B2	**Similarity**	**_✔_ Plume _✔_ Puff** Plume releases are modeled by the direct input of χ/Qs to the program by the user. Puff releases are modeled by requesting the program to calculate s or the user can directly input s.

B3	**Stochastic**	**__ Monte Carlo** **__ Random walk** The output from RSAC-5 can be input into other codes to make stochastic calculations.
B4	**Gradient Transport or K-Theory**	Not available in RSAC-5.
B5	**Particle-In-Cell**	Not available in RSAC-5.
B6	**Box**	Not available in RSAC-5.
B7	**Turbulent Kinetic Energy (TKE)-Driven**	Not available in RSAC-5.
B8	**Particle**	Not available in RSAC-5.
B9	**Multiple Capabilities**	RSAC-5 has the option to simulate the release activity within a single run during different meteorological conditions and wind speeds with the combined calculated downwind doses summarized in a single output table.
Part C: Transport Submodel Type		
C1	**Prognostic**	RSAC-5 can perform prognostic calculations when used in conjunction with companion programs. A companion program RSAC+ER, where ER stands for Emergency Response, is used at the Idaho National Engineering and Environmental Laboratory (INEEL) in conjunction with a real-time meteorological program written by NOAA.
C2	**Deterministic**	Dose calculations in RSAC-5 are primarily deterministic.
C3	**Stochastic**	When stochastic dispersion evaluations are desired, probability distributions are developed external to RSAC-5 and input directly in the form of χ/Q.
C4	**Frame of Reference**	**_✔ Eulerian** **__ Lagrangian** **__ Hybrid** **__ Eulerian-Lagrangian**
Part D: Fire Submodel Type		
D1	**Radiant Energy**	The current version of RSAC does not have a direct model for fires. Fires can be modeled to some extent by using an artificially short stack with a buoyant plume rise model. The downwind dispersion can then be modeled as either a lofted plume or as a well mixed plume between the ground level and the maximum plume rise height.
Part E: Energetic Events Submodel Type		
E1	**Blast Overpressures**	The current version of RSAC does not have direct models for energetic events. RSAC-5 can calculate the downwind dose from these events when the initial dimensions of the plume are provided by the user.
Part F: Health Consequence Submodel Type		
F1	**For Chemical Consequence Assessment Models**	**Health effects: __ fatalities** **__ cancers** **__ latent cancers** **__ symptom onset** RSAC-5 evaluates doses to downwind individuals from the release of airborne radioactivity. No evaluations are made of the hazards from the release of chemicals. **Health criteria** **__ IDLH** **__ STEL** **__ TLV** **__ TWA** **__ ERPG** **__ TEEL** **__ AEGL** **__ WHO** **Zones with flammable limits:** **__ UFL** **__ LFL** **Blast overpressure regions:** **Fire radiant energy zones:** **Risk qualification:** **Concentration:** **__ single value** **__ time-history** **__ integrated dose** **Probits:**
F2	**For Radiological Consequence Assessment Models**	**Cloudshine:** **_✔ finite cloud** **_✔ semi-finite cloud** **_✔ other** One of the strengths of RSAC-5 is its finite plume cloud gamma model. RSAC-5 also provides an air immersion model (using DOE/EH-0070 dose-rate conversion factors) and a semi-infinite model. However, RSAC-5 users are cautioned on using either the air immersion or the semi-infinite model plume unless they know that proper conditions exist for the models to be valid. The semi-infinite model accurately calculates the plume gamma dose when the plume size is large compared to the mean free path of the gamma rays. As with the air immersion model, the semi-infinite plume model can overestimate doses by several decades when the plume size is small compared to the mean free path of the gamma rays. When the plume has not diffused to the ground level, the model can underestimate doses by several orders of magnitude. Before either the RSAC-5 air immersion or semi-infinite plume models are used, users are instructed to perform an evaluation to ensure that the results are reasonably converged to those obtained

<table>
<tr><td>F2</td><td>(Continued)</td><td>using the finite plume cloud gamma model.
Groundshine: ✔ short-term ✔ long-term
Doses from groundshine can be calculated for any desired time period. Doses from groundshine are calculated using the dose-rate conversion factor from DOE/EH-0700.
Inhalation: __ short-term ✔ long-term
✔ Total effective dose equivalent
✔ Uptake of respirable fraction of particle spectra
RSAC-5 calculates inhalation doses using the ICRP 30 model with DOE/EH-0071 dose conversion factors (DCFs). The committed dose equivalent (CDE) is calculated for individual organs and tissues over a 50-year period after inhalation. The CDE for each organ or tissue is multiplied by the appropriate ICRP 26 weighting factor to calculate what is called the weighted committed dose equivalent (WCDE) in RSAC-5. The committed effective dose equivalent (CEDE) is then the sum of the WCDEs for the various organs and tissues. The CEDE from inhalation and ingestion is then added to the external effective dose to give the total effective dose equivalent. RSAC-5 calculates CEDE for the default 1 µm activity median aerodynamic diameter (AMAD). For particle sizes other than the default 1 µm AMAD, DCFs are corrected according deposition in the three regions of the respiratory system; the nasal passage (NP), the trachea and bronchial tree (TB), and the pulmonary parenchyma (P) using the methodology recommended in ICRP 30. Correction is made for the chemical state of each radionuclide according to the ICRP-30 designated clearance classes of D, W and Y.
Resuspension: __ short-term _ long-term __ Anspaugh
The current version of RSAC does not model particulate Resuspension of activity deposited on the ground downwind from the point of release from a facility.
Food/Water Ingestion: __ dynamic ✔ static
Ingestion dose calculations for chronic releases are calculated using the models and equations from Regulatory Guide 1.109. Because of the lack of a consensus model for the calculation of ingestion doses from an acute release, a special model was developed for RSAC-5. The model assumes that consumption of contaminated vegetation from an acute release occurs at a constant rate during the acute release period and during the harvest duration time that follows the acute release period.
Skin dose: ✔ absorption ✔ other
Skin absorption dose calculations for HTO are automatically included when inhalation dose calculations are made. Skin dose calculations are also calculated for the ground surface and air immersion pathways using the dose-rate conversion factors of DOE/EH-0070.
Dose assessment: __ ICRP-60 criteria _ organs __ pathways
RSAC-5 calculates internal doses using ICPR 30 methodology. The ICRP 60 methodology will be added as an option to the next version of the program, RSAC-6, which is currently under development. However, DOE has yet to recognize the ICRP 60 methodology for calculating doses to members of the public.
Health effects: __ early _ latent
RSAC-5 calculated doses to downwind individuals. Any health effects must be evaluated by external means.</td></tr>
<tr><td>F3</td><td>For Weapons Consequence Assessment Models</td><td>Health effects: __ fatalities __ cancers __ latent cancers__ symptom onset
RSAC-5 calculated doses to downwind individuals. Any health effects must be evaluated by external means.
Health criteria
__ IDLH __ STEL __ TLV __ TWA
__ ERPG __ TEEL __ AEGL
Risk quantification: RSAC-5 calculated doses to downwind individuals. Any risk quantification must be evaluated by external means.
Concentration: ✔ single value __ time-history ✔ integrated dose
RSAC-5 provides the airborne concentration at each downwind distance and the calculated integrated dose. Doses are calculated for the inhalation, ingestion, ground surface and air immersion pathways. RSAC-5 also provides a finite plume model for making cloud gamma dose calculations for use when the size of the plume is small compared to the mean free path of the gamma rays.
Probits:</td></tr>
<tr><td colspan="3">Part G: Effects and Countermeasures Submodel Type</td></tr>
<tr><td>G1</td><td>For Chemical Consequence Assessment Models</td><td>Evacuation: RSAC-5 calculates doses to downwind individuals. Any effects and countermeasures must be evaluated by external means.
Sheltering:
Interdiction:
Spray/Foam:
Victim Treatment/Treatment Measures:</td></tr>
<tr><td colspan="3">Part H: Physical Features of Model (No Information Provided.)</td></tr>
<tr><td colspan="3">Part I: Model Input Requirements</td></tr>
</table>

I1	**Radio(chemical) and Weapon Release Parameters**	**Release rate: _✔_ Continuous __ Time dependent _✔_ Instantaneous** **Release container characteristics: __ vapor temperature __ tank diameter __ tank height __ tank temperature __ tank pressure __ nozzle diameter __ pipe length** RSAC-5 models the release of radioactivity from containment structures using exponential functions. Instantaneous and continuous releases are modeled using a single exponential function. Complex release scenarios can be modeled using a series of up to 10 exponential functions. These functions decay the radionuclide inventory while it is held up by the containment structure before it is released. As such, RSAC-5 can model releases from any container size or shape. **Jet release: _✔_ initial size __ shape** **__ concentration profile at end of jet affected zone** RSAC-5 uses the jet plume rise models by Briggs**.** **Release dimensions: _✔_ point _✔_ line _✔_ area** Line and area sources are modeled by the manual input of the appropriate $_y$. **Release elevation: _✔_ ground _✔_ roof _✔_ stack** Releases from a roof are modeled using the building wake model.
I2	**Meteorological Parameters**	**Wind speed and wind direction: _✔_single point __ single tower/multiple point _✔_ multiple towers** RSAC-5 primarily calculates downwind doses using straight-line diffusion which is representative of a single point release. However, a companion program (RSAC+ER) has been developed to interact with real-time meteorological programs (MESODIF and INELVIZ) written by NOAA for use at the Idaho National Engineering and Environmental Laboratory (INEEL). MESODIF evaluates data from approximately 30 meteorological towers. **Temperature: _✔_ single point __ single tower/multiple point _✔_ multiple towers** See above. **Dew point temperature: _✔_ single point __ single tower/multiple point _✔_ multiple towers** See above. The actual measurement is of humidity from which the dew point can be calculated. **Precipitation: __ single point __ single tower/multiple point _✔_ multiple towers** See above. **Turbulence typing parameters: __ temperature difference _✔_ sigma theta __ sigma phi __ Monin-Obukhov length __ roughness length _✔_ cloud cover __ incoming solar radiation __ user-specified** See above. Currently cloud cover is used; however, a conversion to incoming solar radiation will be made in the near future. **Four dimensional meteorological fields from prognostic model:** See above.

Part J: Model Output Capabilities		
J1	**Hazard Zone**	RSAC-5 calculates doses to downwind individuals. Any evaluation of hazard zones must be evaluated by external means.
J2	**Graphic Contours and Resolution**	RSAC-5 does not provide any graphic output. However, a companion program (RSAC+ER) has been developed to interact with a real-time meteorological programs (MESODIF and INELVIZ) written by NOAA for use at the Idaho National Engineering and Environmental Laboratory (INEEL). INELVIZ displays graphic contours.
J3	**Concentration Versus Time Plots**	INELVIZ (see J2 above) has a data base from which concentrations versus time can be obtained; however, time plots must be made by an external plotting program.
J4	**Tabular at Fixed Downwind Locations**	Output from RSAC-5 is primarily tabular for selected downwind distances. However, when used in conjunction with RSAC+ER and INELVIZ (see 2 above), concentrations and doses at any location within the vicinity of the INEEL are available.
J5	**Health Effects**	**__ toxicity indices [e.g., ERPG's, PAG's] __ potential fatalities** **__ cancers __ other adverse effects** RSAC-5 calculates doses to downwind individuals. Any health effects must be evaluated by external means.
J6	**Number of People Affected, Calculated at What Resolution?**	**__ block __ block group __ country** Evaluations of the number of people affected are done external to RSAC-5.
J7	**Graphic Contours of Probability of Exceeding Concentration**	Graphic contours are available for the INEEL from MESODIF.
J8	**F-N Probability Distribution Curves**	Probability distribution curves are available for the INEEL from MESODIF.
J9	**Commerical Off-the-Shelf (COTS) Geographic Informaiton System (GIS) Used**	RSAC-5 does not use GIS.
J11	**Accuracy of Output, Calculated in Terms of Percentages of Population Impacted More Than Predicted at one, two, and three Standard Deviations in Urban and Rural Areas**	Evaluation of population doses and impact are done external to RSAC-5.
Part K: Model Usage Considerations		
K1	**Ease of Model Use**	**Training required to run the model: __ background (years of education)** **__ training time needed on the model to be able to exercise all model capabilities** RSAC-5 is designed for users who are familiar with radiological dose assessment methods. Such a user can exercise all of the model capabilities of RSAC-5 within a week or so. However, the novitiate is not excluded as the user friendly companion program RSAC+ steps a user through all of the input selections required to make a RSAC-5 run. **Training required to continue development of the model:** **__ background (years of education)** Continued development by the user community is not an option provided. Only binary copies of RSAC-5, RSAC+ and their libraries are issued to users to prevent user changes to the program that would invalidate the extensive validation and verification. Users are encouraged to give comments and suggestions to the author for incorporation in future versions of RSAC. **__ training time needed on the model to be able to exercise all model capabilities** See above.

K2	**Time to Process From Notification of Release (including data acquisition) to Production of Product Listed in #K1, Listed for Platforms for Which the Program is Already Compiled**	RSAC-5 is issued to individuals by serial number. This provides a means to promptly notify the user community in the event of a program change or update. RSAC-5 is issued on a single diskette [DS/HD (1.44 MB)] in a compressed format. An installation program is provided on the diskette. The initial installation or updates can be installed on a personal computer within a few minutes. Currently RSAC-5 is being run on only personal computers.
K3	**Ease of Use of Output, Evaluated as the Time Needed to Train a College Graduate in the Use of the Output**	An attempt has been made to format the output so that it can be immediately read and understood by individuals knowledgeable in radiological dose assessment methods.