General Characteristics		
1	**Abstract of Model Capabilities**	AXAOTHER XL is a dose assessment model used for acute atmospheric releases during high-velocity straight-line winds or tornado conditions at the Savannah River Site. Doses from inhalation and plume shine pathways may be considered. Dose to the maximally exposed offsite individual is calculated as well as 50-mile population doses. The radionuclide library contains nearly 500 isotopes. For high-velocity straight-line winds the air concentration is calculated, but the user must enter the concentration for tornado conditions (Look-up graph in user's manual.)
2	**Sponsor and/or Developing Organization**	Ali A. Simpkins Westinghouse Savannah River Company 773-A rm A1001 Aiken, SC 29808 (803)725-9643 (803)725-4233 **Fax** ali.simpkins@srs.gov **sponsoring organization** ali.simpkins@srs.gov **developing organization**
3	**Last Custodian/ Point of Contact**	Ali A. Simpkins Westinghouse Savannah River Company 773-A rm A1001 Aiken, SC 29808 (803)725-9643 (803)725-4233 **Fax** ali.simpkins@srs.gov **sponsoring organization** ali.simpkins@srs.gov **developing organization**
4	**Life-Cycle**	AXAOTHER XL originated as AXAOTHER in the early 80s. AXAOTHER has resided on the SRS IBM Mainframe since that time. In 1996 the computer program was moved to an Excel spreadsheet where it is currently maintained.
5	**Model Description Summary**	**!** AXAOTHER XL calculates individual and population doses for high-velocity straight-winds, dispersion factors are estimated using Gaussian plume dispersion. The user may enter the relative air concentration or have the code calculate it. **!** For tornado conditions, an extensive study was performed at SRS and a set of curves was developed which represents dispersion during tornadoes with difference translational speeds. This information is contained within the user's manual. **!** Doses are calculated for inhalation and plume shine pathways using DOE Dose Conversion Factors.
6	**Application Limitation**	AXAOTHER XL only contains inhalation and plume shine pathways and daughter ingrowth is not considered.
7	**Strengths/ Limitations**	**Strengths:** AXAOTHER XL has unique features to analyze adverse weather such as high-velocity straight-line winds and tornadoes. **Limitations:** AXAOTHER XL does not considered daughter ingrowth and only plume shine and inhalation dose pathways are considered.
8	**Model References**	Simpkins, A.A. 1996, AXAOTHER XL - A Spreadsheet for Determining Doses for Incidents caused by Tornadoes or High-Velocity Straight Winds (U), WSRC-RP-96-504, Westinghouse Savannah River Company, Aiken, SC.
9	**Input Data/Parameter Requirements**	The following items are needed for input: average wind speed, downwind distance, chi/Q, population percentage, number of people (if population calculation) radionuclides, amount released.
10	**Output Summary**	AXAOTHER XL includes individual and population doses by pathway and radionuclide and totals are also shown.
11	**Applications**	AXAOTHER has been used for Safety Analysis Reports at the Savannah River Site.
12	**User-Friendliness**	The input template for AXAOTHER XL is extremely easy to use as the user is just required to fill in the blanks with the appropriate response. A variety of checks have been added to the program to prevent the user from entering incorrect input.
13	**Hardware-Software Interface Constraints/ Requirements**	**Computer operating system:** AXAOTHER XL operates on any computer that will support Microsoft Excel 4.0 or higher. **Computer platform:** IBM or Macintosh **Disk space requirements:** AXAOTHER XL takes less than 1000 kilobytes of disk space **Run execution time** (for a typical problem)**:** Less than a minute depending on computer speed. **Programming language:** Macros **Other computer peripheral information:**

14	**Operational Parameters**	**Identify whether the code has any error diagnostic messages to assist the user in troubleshooting operational problems:** Input checks have been included so the spreadsheet will not execute unless the proper input is provided. **Set up time for: Typical times are: *first-time user:* <1 hour** ***experienced user:*** minutes
15	**Surety Considerations**	**All quality assurance documentation:** Verification Report listed above Simpkins, A.A. Software Quality Assurance Plan for Environmental Dosimetry, Westinghouse Savannah River Company Report, WSRC-RP-95-1159, Aiken, SC, November, 1994. **Benchmark runs:** Runs are maintained by the Environmental Dosimetry Group at SRS and any time changes to code are made, test cases are performed. **Validation calculations:** Reports cited above. **Verification with field experiments that have been performed with respect to this code:** None to date.
16	**Runtime Characteristics**	Less than one minute depending on the speed of the machine.

Specific Characteristics

Part A: Source Term Submodel Type

A1	**Source Term Algorithm?**	_YES ✔ NO

Part B: Dispersion Submodel Type

B1	**Gaussian**	**✔ Straight-line plume __Segmented plume __ Statistical plume __ Statistical puff**

Part C: Transport Submodel Type

C1	**Prognostic**	No prognostic capabilities.
C4	**Frame of Reference**	**✔ Eulerian __ Lagrangian __ Hybrid __ Eulerian-Lagrangian**

Part D: Fire Submodel Type (Not Applicable)

Part E: Energetic Events Submodel Type (Not Applicable)

Part F: Health Consequence Submodel Type

F1	**For Chemical Consequence Assessment Models**	**Health effects: __ fatalities __ cancers __ latent cancers __ symptom onset** **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** **Groundshine: __ short-term __ long-term** **Inhalation: ✔ short-term __ long-term** **✔ Total effective dose equivalent** **_ Uptake of respirable fraction of particle spectra** **Resuspension: __ short-term __ long-term __ Anspaugh** **Food/Water Ingestion: __ dynamic ___ static** **Skin dose: ✔ absorption _ other** **Dose assessment: __ ICRP-60 criteria ✔ organs ✔ pathways** **Health effects: __ early __ latent**
F3	**For Weapons Consequence Assessment Models**	**Health effects: ___ fatalities __ cancers __ latent cancers__ symptom onset** **Health criteria** **__ IDLH __ STEL __ TLV __ TWA** **__ ERPG __ TEEL __ AEGL** **Risk quantification:** **Concentration: ✔ single value __ time-history __ integrated dose** **Probits:**

Part G: Effects and Countermeasures Submodel Type (Not Applicable)		
Part H: Physical Features of Model		
H1	**Stability Classification Turbulence Typing**	**Pasquill-Gilfford-Turner:** User selects either Pasquill-Gifford Turner or Pasquill Briggs **STAR:** **Irwin:** **Sigma theta:** **Richardson number:** **Monin-Obukhov length:** **TKE-driven:** **Split sigma:**
H2	**Release Elevation**	**___ ground ✔ roof**
H6	**Mixing Layer**	**__ trapping __ lofting ✔ reflection __ penetration** **__ inversion breakup fumigation __ temporal variability**
H11	**Resuspension**	None
H12	**Radionuclide Ingrowth and Decay**	Yes
H13	**Temporally and Spatially Variant Mesoscale Processes**	**Urban heat island:** **Canopies:** **Complex terrain (land) effects: __ mountain-valley wind reversals** **__ anabatic winds __ katabaic winds** **Complex terrain (land-water) effects: __ seabreeze airflow trajectory reversals** **__ Thermally Induced Boundary Layer definition __ seabreeze fumigation** **__ landbreeze fumigation** **Thunderstorm outflow:** **Temporally variant winds:** **High velocity wind phenomena: ✔ tornado ✔ hurricane__ supercane __ microburst** Hurricane can be simulated by assumed straight winds.
Part I: Model Input Requirements		
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** **Jet release: __ initial size __ shape** **__ concentration profile at end of jet affected zone** **Release dimensions: ✔ point __ line __ area** **Release elevation: __ ground __ roof ✔ stack**
Part J: Model Output Capabilities		
J4	**Tabular at Fixed Downwind Locations**	Doses are reported at user selected downwind distances.
Part K: Model Usage Considerations		
K1	**Ease of Model Use**	**Training required to run the model: 1-2 background (years of education)** <1 **training time needed on the model to be able to exercise all model capabilities** **Training required to continue development of the model:** 4 **background (years of education)** 2 months **training time needed on the model to be able to exercise all model capabilities**

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**	Less than 5 minutes from problem to output display.
K3	**Ease of Use of Output, Evaluated as the Time Needed to Train a College Graduate in the Use of the Output**	One hour would be sufficient for explanation of output. In-depth understanding of results and why they would take longer.