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Pit Disassembly and Conversion Facility

Emergency Preparedness Hazards Assessment, Rev C
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PIT DISASSEMBLY AND CONVERSION FACILITY

Emergency Preparedness Hazards Assessment

APPROVALS

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S-EHA-F-00005
Rev. C

Emergency Preparedness Hazards Assessment for the Pit Disassembly and Conversion Facility

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LIST OF ACRONYMS

AGV	Automated Guided Vehicle
ALOHA	Areal Locations of Hazardous Atmospheres
ARF	Airborne Release Fraction
CEDE	Committed Effective Dose Equivalent
CTF	Central Training Facility
DBA	Design Basis Accident
DMO	Direct Metal Oxidation
DOE	U.S. Department of Energy
DR	Damage Ratio
DSA	Documented Safety Analysis
EAL	Emergency Action Level
EG	Evaluation Guideline
EMG	Emergency Management Guide
EMPP	Emergency Management Program Procedure
EPHA	Emergency Preparedness Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERPG	Emergency Response Planning Guideline
FB	Facility Boundary
GE	General Emergency
HEPA	High Efficiency Particulate Air
HEU	Highly Enriched Uranium
HTV	Hydride Transport Vessel
HVAC	Heating, Ventilation, and Air Conditioning
ITS	Internal Transport System
LOI	Loss-on-Ignition
LPF	Leak Path Factor
M&SEB	Mechanical and Support Equipment Building
MAR	Material-at-Risk
NDA	Non-Destructive Assay
PAC	Protective Action Criteria
PC	Performance Category
PDCF	Pit Disassembly and Conversion Facility
PDSA	Preliminary Documented Safety Analysis
PHA	Preliminary Hazards Analysis
PIDAS	Perimeter Intrusion Detection and Assessment System
RD	Release Designation
RF	Respirable Fraction
RRF	Respirable Release Fraction
RTSA	Radiological/Toxicological Sabotage Analysis
SAE	Site Area Emergency
SB	Site Boundary

SI	Système International d'Unités
SNM	Special Nuclear Material
SRL	Special Recovery Line
SRS	Savannah River Site
SST	Safe Secure Trailer
TEDE	Total Effective Dose Equivalent
TEEL	Temporary Emergency Exposure Limit
TEL	Threshold for Early Lethality
UPS	Uninterruptible Power Supply
VA	Vulnerability Analysis
WMA	Wildlife Management Area
WSRC	Westinghouse Savannah River Company

ABBREVIATIONS

cm/s	centimeters per second
Ci	Curie
ft	foot
ft^2	square foot
g	gram
gal	gallon
HT	tritium-elemental
HTO	tritiated water or tritium oxide
kg	kilogram
kg/s	kilograms per second
km	kilometer
L	liter
lb	pound
m	meter
m/s	meters per second
MOX	mixed oxide
ppm	parts per million
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PuO_2	plutonium oxide
U_3O_8	uranium oxide

1.0 INTRODUCTION

1.1 Purpose

This report documents the Emergency Preparedness Hazards Assessment (EPHA) for the Pit Disassembly and Conversion Facility (PDCF) to be located at the U.S. Department of Energy (DOE) Savannah River Site (SRS) (Appendix A, Figures 1 through 3). The hazards assessment is intended to identify and analyze those hazards that are significant enough to warrant consideration in the PDCF operational emergency management program. The EPHA was conducted in accordance with Emergency Management Program Procedure (EMPP) 6Q-001 (Ref. 1), *Standards for the Development and Maintenance of an Emergency Preparedness Hazards Assessment*. This EPHA provides the technical basis for the PDCF emergency planning efforts.

1.2 Scope

The scope of this EPHA is limited to facilities within the PDCF and the transport of hazardous material within the PDCF area.

1.3 Background

EPHA methodology specified in EMPP 6Q-001 (Ref. 1) differs from that used in other safety basis documentation (e.g., documented safety analysis [DSA]). The EPHA uses barrier analysis as opposed to risk or probabilistic analysis. This method involves compiling and screening facility radiological and chemical inventories. For materials that potentially result in operational emergencies if released, hazards are characterized and barriers identified. Then, event scenarios ranging from minor to severe (e.g., beyond design basis) are postulated. Scenarios specify release mechanism, duration of release, and respirable source term. From these scenarios, consequences are assessed to determine downwind dose/concentration at defined receptor locations.

A preliminary documented safety analysis (PDSA) provides analyses and consequences for the representative and bounding accidents (design basis accidents [DBAs]). These analyses are used to determine design and performance specifications of safety features. DBAs and their associated assumptions can be used as a starting point for emergency response planning; however, their use may be limited because they may contain many assumptions that are overly conservative for emergency planning. Unlike a PDSA, an EPHA is not required to use “bounding” analysis; rather, EPHA analysis must meet the standard of “conservative”. For example, maximum tank inventory may be based on operating history rather than physical capacity.

The PDSA sets a safety envelope that essentially covers accidents over the design basis spectrum. The Evaluation Guideline (EG) (25 rem) is used to designate the need for safety class structures, systems, and components. The goal is to have controls in place (e.g., technical safety requirements, qualified structures, etc.) to show either that a specific event will not occur or, if it

does occur, that the risk (not dose) to workers and the public is acceptable. The EPHA quantitatively documents consequences for all events based on a barrier challenge/failure analysis. The EPHA protective action criteria (PAC) are uniform (1 rem) over the entire spectrum of events.

In a PDSA, an unmitigated release might be postulated to determine if the EG can be exceeded. Accident analysis would then credit mitigation that would then be justified and protected (e.g., via TSRs) to reduce risk (not dose) to an acceptable level. No such credit requirement exists for the EPHA. EPHA accident analysis is not unmitigated. It may credit operator intervention using a criterion of "reasonable" response. This is why an EPHA typically assumes a spill response time of 10 minutes versus the 30 minutes (or longer) used in a PDSA. The EPHA may eliminate accidents from consideration if the initiator lasts for a sufficiently long period of time that operator intervention might reasonably occur. For example, the EPHA might assume that workers will terminate a transfer before waste tanks fill and begin to overflow since it takes many hours for this accident to occur.

The EPHA is required to address malevolent acts within the accident analysis. The DOE *Emergency Management Guide Vol. II: Hazards Surveys and Hazards Assessments* (EMG) (Ref. 2) assumes two types of malevolent acts: moderate and extreme. Moderate events are those that could be initiated by a single individual using materials or tools readily available in the facility, or small quantities of flammables. Extreme events are those analyzed in Vulnerability Analyses (VAs) and/or Radiological/Toxicological Sabotage Analyses (RTSAs) based on DOE Design Basis Threat guidance. The use of the VA and/or RTSA will provide an upper bound on the severity of potential consequences for malevolent acts. Currently, sabotage analyses have not been completed for the PCDF Project. In most cases, malevolent act events will produce releases and consequences similar to those that could be caused by accidental or other external initiators. For example, the catastrophic failure of a chemical storage tank might be postulated due to a seismic or tornado event. However, if approximately the same level of damage and source term might also be caused by an act of sabotage, such as running a motor vehicle into the tank, the malevolent act would simply be considered another initiator for the failure of the storage tank.

Emergency action levels (EALs) and the facility emergency planning zone (EPZ) are determined from EPHA results. Events capable of exceeding defined PAC at the receptor locations are assigned an emergency classification. Based on the consequence assessment, a facility emergency plan implementing procedure (EPIP) will be written/revised for use by facility personnel to accurately classify events in a timely manner.

1.4 Revision Summary

Initial issue.

2.0 SUMMARY

An EPHA was conducted for the PDCF in accordance with EMPP 6Q-001 (Ref. 1). The analysis included the following:

- A compilation, screening, and hazard characterization of both chemical and radioactive materials
- Barrier identification segmentation
- Accident scenario development for potential releases of identified hazardous materials
- Consequence assessment of the identified scenarios
- Emergency classification development
- Determination of the facility EPZ

Based upon this EPHA, the PDCF requires an emergency plan and implementation procedures.

Hazardous materials in the PDCF that required a consequence assessment are:

- Chemicals: hydrochloric acid (evaluated for toxic releases)
- Radionuclides: plutonium-238 (Pu-238), Pu-239, Pu-240, Pu-242, americium-241 (Am-241), tritium (H-3), uranium-234 (U-234), U-235, U-236, and U-238

Hazardous materials in the PDCF that can trigger a classifiable Operational Emergency are:

- Radionuclides (isotopes that contribute more than 95 percent of the dose): Pu-238, Pu-239, Pu-240, Pu-242, Am-241, H-3, U-234, U-235, U-236, and U-238

For the materials identified above, accident scenarios were identified and assessed. Those scenarios that could exceed the specified PAC at downwind receptor points of interest were identified. For each scenario identified as having the potential to result in a classifiable emergency, a corresponding EAL determination was made. The results show the potential for the following:

	Radiological	Chemical
• General Emergencies (GEs):	0	0
• Site Area Emergencies (SAEs):	9	0
• Alerts:	0	1

The PDCF EPZ should extend 7.6 kilometers (km) from the PDCF, based on the methodology and analysis in Section 8.0.

3.0 FACILITY DESCRIPTION

The primary mission of the PDCF is to (1) receive surplus weapons plutonium in the form of pits and other plutonium metals, (2) convert the plutonium metal to plutonium oxide, and (3) remove residual classified attributes from (i.e., sanitize) the converted plutonium oxide. Once the plutonium oxide is sanitized, it may be made available for mixed oxide (MOX) fuel, which can be used in existing commercial nuclear power reactors. The PDCF will also declassify non-plutonium components and remove plutonium contamination from other components.

This description of the PDCF is based on the *Savannah River Site Pit Disassembly and Conversion Facility Preliminary Documented Safety Analysis* (Ref. 3). For a more detailed description of the individual modules, see the PDCF PDSA Chapter 2, Facility Description (Ref. 3).

3.1 EPHA Segmentation

Based on location and function, the facility was divided into one independent segment (Table 3.1-1) for EPHA evaluation purposes:

Table 3.1-1. Segmentation

Segment	Segment	Buildings/Facilities Included
1	Plutonium Processing Building (236000F)	Mechanical and Support Equipment Building (M&SEB) (236001F), Utility Building (237000F), Fan House (292006F), Sand Filter Structure (292005F)

Also located in F-Area are the F-Canyon, A-Line, and FB-Line, Outside Facilities, and Site Utilities Department chemical storage facilities. These facilities are not evaluated in this EPHA or discussed in this section.

3.2 Plutonium Processing Building (236000F)

The Plutonium Processing Building is designed as a hardened structure for handling of plutonium. All of the systems required to convert plutonium pits into plutonium oxide or other non-weapon shapes and to package the material for disposition are contained within the Plutonium Processing Building. The building contains the following systems: pit receiving, storage, and preparation; pit disassembly; special recovery line (SRL); plutonium separation; plutonium conversion; oxide blending and sampling; product canning; non-destructive assay (NDA); product storage, inspection, and sampling; product shipping; non-special nuclear material (SNM) parts declassification; highly enriched uranium (HEU) decontamination, packaging, storage, and shipping; by-product packaging, storage, and shipping; tritium contamination capture, packaging, and storage (SRL design); and material transport systems. HEU operations include uranium processing for main HEU, which is to be sent to Y-12, and auxiliary HEU, which is to be disposed of as waste.

The Plutonium Processing Building is a 409-foot (ft) by 265-ft berm-covered hardened plutonium processing space, plus an additional 91 ft by 91 ft of sallyport and truck bay access area and an enclosed safe secure trailer (SST) truck bay of 113 ft by 40 ft, for a total building area of approximately 121,180 square feet (ft^2) (not including safe havens). The process area is located on a single floor level with a wall and portals separating controlled and uncontrolled areas. Facility support areas are located on the same floor of the Plutonium Processing Building or in several single-story buildings. The Plutonium Processing Building will be constructed to meet Performance Category (PC) 3 (PC-3) criteria in accordance with DOE guidance (Ref. 4).

The Plutonium Processing Building is located within the Perimeter Intrusion Detection and Assessment System (PIDAS) fence line. Most support facilities are located outside the PIDAS boundary adjacent to the Plutonium Processing Building to reduce the level of activity within the PIDAS perimeter fence line.

3.2.1 Mechanical and Support Equipment Building (236001F)

The Mechanical and Support Equipment Building (M&SEB) is inside the PIDAS perimeter fence line and is approximately 46,000 ft^2. The building is a combination of a reinforced concrete structure and a steel structure. The steel structure consists of metal wall panels and insulation on structural steel members. The M&SEB houses service functions to support the operations in the Plutonium Processing Building. Heating, ventilation, and air conditioning (HVAC) air supply equipment, control and communications equipment, and emergency generators are housed in the concrete-reinforced segment of the building. Mechanical equipment, lockers, a break room, and offices are located in the steel segment of the building. The exterior of the concrete-reinforced structure is designated as safety class and is designed to PC-3 requirements to support the normal air supply tornado dampers and to protect the emergency generators, supporting components, and associated electrical distribution. Internal walls separate and segregate the emergency generators and associated equipment; these walls are designated as safety class and are designed in accordance with PC-3 seismic, 2-hour fire-rated construction. The Plutonium Processing Building entry portal and the Plutonium Processing Building HVAC supply components are also housed in a PC-3 structure. Exit corridors are 1-hour and 2-hour fire-resistive-rated. Two-hour fire-resistive walls separate offices and locker rooms from the mechanical equipment areas. Fire sprinklers are provided for all areas of this building.

3.2.2 Utility Building (237000F)

The Utility Building is an aboveground building located on the southeastern side of the PDCF site, outside the PIDAS but inside a limited area perimeter fence line. It is a one-story structure with slab-on-grade foundation, steel framing with exterior walls of metal wall panels, insulation and interior liner panels, and various interior fire-resistive-rated wall assemblies due to electrical equipment. This building is approximately 14,500 ft^2 and houses the utility support equipment, standby generators, an uninterruptible power supply (UPS) battery bank, and computer-controlled stations to monitor the utility systems. This building is designated safety significant because it houses the safety significant standby generators and standby UPS. All

structural components, including exterior walls and foundation, interior structural walls, and interior firewalls for safety significant standby power components, are designed to PC-2 criteria. The building is provided with an automatic sprinkler system.

3.2.3 Fan House (292006F)

The Fan House structure is designated as safety class and is designed to pull air from the Plutonium Processing Building through the Sand Filter Structure to be exhausted as filtered air through the stack. The structure supports the Plutonium Processing Building HVAC Confinement System function of filtering releases. The building is approximately 8,100 ft^2 and houses the air fans, required ductwork, electrical room, storage spaces, and a control room. The Fan House consists of two separate fan areas that can be controlled independently. A control room monitors the fan system to ensure that the directed airflow to the exhaust stack will meet environmental safety requirements. Fan House structures that support the HVAC confinement function are rated for PC-3 natural phenomena events. The facility is equipped with an automatic sprinkler system. The Fan House, the inlet and outlet ducts, and the exhaust stack are constructed of reinforced cast-in-place concrete. Nonstructural interior walls are constructed of gypsum board on structural steel studs.

3.2.4 Sand Filter Structure (292005F)

The Sand Filter Structure and connecting supply and exhaust tunnels are designated as safety class and support the Plutonium Processing Building HVAC Confinement System. The Sand Filter Structure is inside the limited area fence line but outside the PIDAS perimeter fence line, close to the Fan House. This structure is designed to filter contaminated air that is received as by-product from the process operations within the Plutonium Processing Building or that results from postulated accidents. Concrete ducts connect the Sand Filter Structure to the M&SEB for power cabling and to the Fan House for ventilation. The Sand Filter Structure has eight levels of filter material consisting of clay, gravel, and sand; the structure includes connecting inlet and outlet tunnels that run along the east and west sides of the facility. The building is approximately 43,000 ft^2. The inlet and outlet tunnels are 17 ft wide. The walls, floor, roof, and inlet and outlet tunnels are made of reinforced concrete.

Air enters the sand filter through 3-ft by 3.5-ft openings into distribution troughs spaced along the length of the sand filter. The air flows through troughs and through a stainless steel grate into vitreous clay blocks that distribute the air through the graded gravel and sand bed. The filtered air is drawn into an open space on top, just under the roof slab, and exits through the exhaust tunnel leading to the Fan House. Because the structure is unoccupied, an automatic sprinkler system is not required.

3.3 PDCF Boundary Descriptions

3.3.1 Site Boundary

The site boundary (SB) is defined as the perimeter of the DOE-owned and -controlled land at SRS. The distance to the closest SB from the PDCF is 9400 meters (m) (Ref. 3).

3.3.2 Facility Boundary

Rather than calculate the distance from the release to the nearest facility boundary (FB) for each scenario, a common distance to FB may be determined. The nearest distance from the primary release point (Ref. 5) to the facility fence is approximately 150 m; therefore, 150 m is used as the distance to the FB.

3.3.3 Other Onsite Receptor Locations of Interest

Other receptor locations for nearby facilities with significant personnel occupancy are also identified:

- Central Training Facility (CTF) (Building 766-H), approximately 5 km southeast of the PDCF (approximately 1600 personnel)
- Crackerneck Wildlife Management Area (WMA), approximately 12 km southwest of the PDCF

4.0 IDENTIFICATION, SCREENING, AND CHARACTERIZATION OF HAZARDS

The planned PDCF radiological inventories were established from the preliminary hazards analyses (PHAs) (Ref. 6). Hazards associated with transportation to, from, or through the PDCF boundaries that could impact the health and safety of personnel were also considered in this EPHA. However, hazards that are already evaluated and their consequences calculated in other SRS facility EPHAs and in the SRS transportation EPHA are not calculated separately in this EPHA. This EPHA evaluates the hazards internal to the PDCF from the shipping/receiving dock, to the process rooms, and back to the dock. Once facility inventories are established, hazard screening and characterization are completed, eliminating from further analysis materials that do not present an airborne hazard. DOE G 151.1-1 states that materials that are monolithic solids under normal conditions and thus do not present an airborne hazard may be eliminated from consideration in the hazards assessment (Ref. 2).

4.1 Nonradioactive Materials

The screening of a chemical from further analysis does not necessarily mean that that chemical is not hazardous to human health. Relevant portions of Occupational, Safety, and Health Administration, Resource Conservative Recovery Act, and Comprehensive Environmental Response and Liability Act (CERCLA) regulations still apply to these materials.

Nonradioactive materials at the PDCF are separated by categories in order to facilitate the inventory and categorization process. The initial inventory of chemicals available for evaluation is derived primarily from the *PDCF Waste Management Plan* (Ref. 7) and the *System Design Description for the Chemical Storage and Distribution System* (Ref. 8). Chemicals considered are those species present in nonradiological liquid streams and storage areas. These streams include inventories in the Chemical Storage and Distribution System, the HVAC Chilled Water System, and the Analytical Laboratory. Excluded are materials in process equipment. Chemicals in process equipment are excluded from analysis in this document because they are connected to the storage tanks and contain a small quantity when compared to the storage tank volumes for those chemicals that remained after screening.

The chemical inventories were separated by the following categories: purchased chemicals, process chemicals, and reactive chemicals. PDCF chemicals are screened and evaluated in Appendix B, Section B.4.

4.1.1 PDCF Purchased Chemicals

Purchased chemicals (Table 4.1-1) are defined as those chemicals purchased in end-user quantities and brought into the facility for utilization and those chemicals purchased in bulk to support process operations. Table 4.1-1 also lists the amounts that would be provided in a single delivery.

Table 4.1-1. PDCF Hazardous Chemicals

Chemical	Delivery Quantity
Acetone	16 L
Aluminum nitrate	1 kg
Ascorbic acid	1 kg
Barium chloride	1 kg
Bleach	55 gal
Ethanol	16 L
Ferrous sulfamate	5 kg
Ferrous sulfate	1 kg
Hydrochloric acid	16 L
Hydrofluoric acid	16 L
Hydrogen peroxide	16 L
Isopropanol	16 L
Magnesium perchlorate	1 kg
Methanol	16 L
Nitric acid	16 L
Oxalic acid	1 kg
Potassium chloride	16 L
Potassium dichromate	1 kg
Poatssium oxalite	1 kg
Scintillation cocktail	1 L
Sodium carbonate	1 kg
Sodium hydroxide	55 gal
Sodium nitrite	1 kg
Sodium pyrophosphate	1 kg
Sodium sulfate	150 lbs
Sulfuric acid	55 gal
Tolyltriazole solid	50 lbs

Note: L = liter; kg = kilogram; gal = gallon; lb = pound

4.1.2 PDCF Process Chemicals

Process chemicals are normally defined as chemical species created by the processes with the PDCF. These intermediate chemical compounds would be created in small (milliliter) quantities, so will not contribute significantly to the chemical hazard when compared to the PDCF purchased chemicals.

4.1.3 Reactive Chemicals

Reactive chemicals are normally defined as those resulting from the violent reactions of two or more chemicals. No reactive chemicals were identified.

4.1.4 Chemical Screening

The inventory of chemicals is screened from further analysis based on calculations, using the EPA's *Areal Locations of Hazardous Atmospheres* (ALOHA) computer modeling program, of the minimum quantity of material that, if released, could result in an operational emergency

requiring further classification, i.e., could exceed a TEEL-2 or Emergency Response Planning Guideline-2 (ERPG-2) value at 30 m from the PDCF. This screening analysis is documented in Appendix B, Section B.4.

4.2 Radioactive Materials

Radionuclides are screened using the screening quantities listed in 10 CFR 30.72 (Ref. 9) and employing the methodology identified in DOE-STD-1027 (Ref. 10). If the sum of all the ratios of the inventory of each nuclide to that nuclide's screening quantity is greater than or equal to one, then none of the nuclides can be screened.

$$\sum_{i=1}^{n} \frac{r_i}{SQ_i} < 1.0$$

where:

r = Ci of individual radionuclide,
SQ = screening quantity for individual nuclide (Ci),
n = number of nuclides.

4.2.1 Radioactive Materials Screening Results

The screening quantity in 10 CFR 30.72 for plutonium, uranium, and Am-241 is 2 Ci. Segment 1, the PDCF Plutonium Processing Building, will have in excess of 750 kilograms (kg) of plutonium and uranium (Ref. 6). This plutonium and uranium contain about 86,000 Ci of radioactive material, mostly Pu-239, Pu-240, and Am-241. This far exceeds the screening quantity in 10 CFR 30.72.

The screening quantity in 10 CFR 30.72 for tritium is 10,000 Ci. Segment 1, the PDCF Plutonium Processing Building, could contain in excess of 54 g of tritium or 520,000 Ci of tritium. This exceeds the screening quantity in 10 CFR 30.72.

The isotopic distribution of the plutonium and uranium are given in Table 4.2-1, obtained from the PDSA (Ref. 3). Generally, the plutonium was in the form of plutonium oxide.

The dominant oxide product for uranium oxidation is uranium oxide (U_3O_8), according to the Uranium Operations PHA module. The chemical toxicity and radiological hazards of uranium are driven by the fact that the uranium oxide produced in the PDCF is generally insoluble (principally uranium oxide) and is therefore not a chemically toxic form (insoluble forms stay in the lungs rather than being transported to other body tissues) (Ref. 6).

Appendix E details the inventory evaluated in this EPHA. These inventories were extracted from the PDCF PDSA (Ref. 3) and are further explained in that document.

Table 4.2-1. Plutonium and Uranium Isotopic Distribution

Plutonium Isotopic Distribution		Uranium Isotopic Distribution	
Radionuclide	Weight Percent	Radionuclide	Weight Percent
Pu-238	0.05	U-234	1.0
Pu-239	92.35	U-235	93.1
Pu-240	6.50	U-236	0.50
Pu-241*	0.00	U-238	5.4
Pu-242	0.10		
Am-241	1.00		

*Pu-241 assumed decayed to Am-241, giving maximum consequence

4.3 Reactive Chemicals

No reactive chemicals were identified at the PDCF.

4.4 Hazardous Materials Remaining for Analysis

The above-mentioned methodologies were applied to the chemical inventory at the PDCF. Table 4.4-1 shows those chemicals requiring further analysis.

Table 4.4-1. Hazards Requiring Further Analysis

Chemicals	Radionuclides
Hydrochloric acid	Pu-238, Pu-239, Pu-240, Pu-242, Am-241, U-234, U-235, U-236, U-238, H-3

4.5 Protective Action Criteria for Remaining Hazards

Two radiological PACs are used for Emergency Planning. The first PAC, 1.0 rem TEDE, is used as the threshold, at specific receptors, for triggering an operational emergency. The second PAC, 100 rem, is the threshold for early lethality (TEL) and is one input into the facility EPZ determination.

Two chemical PACs are used for emergency planning. The first PAC, ERPG-2, is used as the threshold at specific receptors for triggering an operational emergency. The second PAC, ERPG-3, is the TEL and is one input into the facility EPZ. ERPG values are chemical-specific. The ERPG-2 and 3 values for hydrochloric acid are 20 and 150 parts per million (ppm), respectively.

5.0 ACCIDENT ANALYSIS

Barriers that maintain control over the hazardous materials that failed initial screening/hazard characterization have been analyzed and possible failure modes considered. Results of barrier analysis and resulting release designations are described in this section. Source terms are developed for each accident analyzed as part of the process.

In this section, potential events that would challenge a barrier are not normally described in detail, as the list can become quite long. A list of potential accident initiators will be identified for each barrier failure but is not intended to be an exhaustive listing.

The accident initiator is not an essential factor in the development of EALs, the end product of an EPHA. Many accident initiators will often produce the same barrier failure and consequence. How an accident originated may not be decisive in the recognition and categorization of an event. In those cases where the accident initiator has a direct bearing on the source term and the consequences, the initiator is identified and described. If events are identified where the only initiator to a release is a malevolent act, it is explicitly stated in the EPHA.

The PDCF PDSA was used as the primary basis to document hazardous materials involved in accident scenarios (Ref. 3). The PDSA evaluated two unmitigated accident scenarios that were not carried into the EPHA: (1) Steam Explosion in the Sanitization Furnace (SF-11) and (2) Earthquake-Induced Criticality within the Main Vault (FW-110). The sanitization furnace design has evolved from an induction to a resistance heater design that utilizes cooling coils outside the furnace cavity. This mitigated design precludes the postulated metal/steam explosion event. The mitigated design for the main vault storage racks (safety class PC-3 seismic-qualified racks) provides a robust passive control that prevents the postulated earthquake-induced criticality event. Consequently, neither mitigated event is evaluated in the EPHA. Additionally, the PDSA accident scenarios were supplemented with other events to evaluate a complete spectrum of accidents involving hazardous materials for emergency preparedness purposes. The analyses identify credible human actions, equipment failures, and/or events likely to interact with the hazardous materials inventory and potentially lead to an accident. Accident scenarios include single-room and multiple-room accidents, external events, natural phenomena, and facility/system integration functions. For each accident, the failure of the primary barrier was identified, other barriers and mitigative features were identified, and a range of possible releases was estimated.

5.1 Chemical Releases

A chemical screening analysis was performed for chemicals present at the PDCF (Appendix B, Section B.4; Ref. 11). The screening analysis showed that all chemicals except hydrochloric acid (36 weight percent) were below the screening thresholds used in the analysis (ERPG-2 and Temporary Emergency Exposure Limit [TEEL]-2 values).

5.1.1 Spill of 5 Liters of Hydrochloric Acid

Failure of Primary Barriers: Due to a forklift puncture or operator error two 2.5-liter (L) bottles of 36 weight percent hydrochloric acid break, resulting in an unconfined spill. An earthquake or other natural phenomenon could also cause this accident.

Effects of Other Barriers/Mitigative Features: This accident is assumed to occur at the PDCF loading dock, so the release is unaffected by building filtration.

Range of Possible Releases: The releases from this accident were estimated using the ALOHA Evaporation Calculator for 36 weight percent hydrochloric acid. For average meteorological conditions (2.5 meters per second [m/s] wind speed, 25 ºC temperature), a spill diameter of 0.798 m, and a spill depth of 1 cm, the release was estimated to be 0.00213 kilograms per second (kg/s) of hydrogen chloride. For adverse meteorological conditions (1.7 m/s, 29 ºC temperature), a spill diameter of 0.798 m, and a spill depth of 1 cm, the release was estimated to 0.00202 kg/s of hydrogen chloride. **The release designation is RD-C-01.**

5.1.2 Spill of 16 Liters of Hydrochloric Acid

Failure of Primary Barriers: Due to a forklift puncture or operator error, four 4-L bottles of 36 weight percent hydrochloric acid break, resulting in an unconfined spill. An earthquake or other natural phenomenon could also cause this accident.

Effects of Other Barriers/Mitigative Features: This accident is assumed to occur at the PDCF loading dock, so the release is unaffected by building filtration.

Range of Possible Releases: The releases from this accident were estimated using the ALOHA Evaporation Calculator for 36 weight percent hydrochloric acid. For average meteorological conditions (2.5 m/s wind speed, 25 ºC temperature), a spill diameter of 1.43 m, and a spill depth of 1 cm, the release was estimated to be 0.00641 kg/s of hydrogen chloride. For adverse meteorological conditions (1.7 m/s, 29 ºC temperature), a spill diameter of 1.43 m, and a spill depth of 1 cm, the release was estimated to 0.00608 kg/s of hydrogen chloride. **The release designation is RD-C-02.**

5.2 Radiological Releases

Radioactive materials are present throughout the PDCF Plutonium Processing Building. These radioactive materials consist of plutonium metal, plutonium oxide (PuO_2), uranium metal, uranium oxide, and tritium (tritium-elemental [HT] and tritiated water or tritium oxide [HTO]). The isotopic distribution of plutonium and uranium are given in Table 4.2-1. Table 5.2-1 lists the conversion factors for various forms of plutonium and uranium to Pu-238eq curie (Ci). Details of these calculations are provided in Appendix B, Section B.3.

Table 5.2-1. Plutonium, Uranium, and Tritium Conversion Factors

Conversion	Conversion Factor
Grams Pu (Class Y) to Pu-238eq Ci	0.1019
Grams Pu (Class W) to Pu-238eq Ci	0.1260
Grams PuO_2 (Class Y) to Pu-238eq Ci	0.08990
Grams Pu-238 oxide (Class Y) to Pu-238eq Ci	11.08
Grams U_3O_8 (Class Y) to Pu-238eq Ci	1.845E-5
Grams U (Class Y) to Pu-238eq Ci	2.181E-5
Grams H-3 to Ci H-3	9.69E+3

5.2.1 Room Fire Propagates to the Product NDA Module

Failure of the Primary Barriers: This accident is based on event NA-45 in the PDSA (Section 3.4.4.1.1, Ref. 3). A fire occurs within the Product NDA room due to an electrical short, equipment failure, or human error. The fire spreads throughout the room, placing plutonium contained in 3013 cans at risk. In the PDSA, NA-45 had a bounding material-at-risk (MAR) of 180 kg of plutonium oxide in thirty-six 3013 cans and 32 grams (g) of Pu-238 oxide calibration standards. For the EPHA, a more realistic, yet conservative, estimate of the MAR for the fire is 50 kg of plutonium oxide contained in ten 3013 cans and 32 g of Pu-238 oxide calibration standards. This MAR is based on combustible controls for the facility and Product NDA room, as well as the configuration of the NDA equipment, which limits fire involvement either at the front end of the module where the NDA equipment is located or the back end of the NDA process at the pallet station.

Effects of Other Barriers/Mitigative Features: The low combustible design, control of transient combustibles, and the fire suppression system in the Product NDA room will reduce the duration and intensity of the fire.

The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The ventilation exhaust from the Product NDA room does not pass through glovebox or main plenum high efficiency particulate air (HEPA) filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. Pressurization of the building also occurs as a result of the fire, resulting in a small fraction of the contaminated air being exhausted from the building without going through the sand filters.

Range of Possible Releases: Because the 3013 cans have not been through loss-on-ignition (LOI) verification and could contain out-of-specification product, it is possible that the 3013 cans could fail in the fire. However, there would be a very low incidence of 3013 cans with out-of-specification product, and while the 3013 can may contain out-of-specification product (> 0.5 weight percent moisture), process knowledge indicates that it would be unlikely that out-of-specification product would have greater than 1.0 to 1.2 weight percent moisture. In addition, the low combustible design, control of transient combustibles, and the fire suppression system in the Product NDA room will reduce the duration and the intensity of the fire. For these reasons, a damage ratio (DR) of 0.5 was assumed for the 3013 cans and calibration sources.

The airborne release fraction (ARF) for the high-pressure (> 500 pounds per square inch gauge [psig]) venting of the 3013 can in a fire is estimated to be 0.31 (Appendix E.2). The ARF for the Pu-238 oxide calibration sources is estimated to be 0.1 (Appendix E.2). The respirable fraction (RF) for the high-pressure venting of the 3013 can in a fire and the Pu-238 oxide calibration sources is estimated to be 0.7 (Appendix E.2), and is based on venting pressurized gas through a powder.

The plutonium is assumed to be in oxide form. Because the fire causes the building to pressurize, about 99.7 percent of the release will go through the sand filters and will be released from the 100-ft PDCF main stack. About 0.3 percent of the release will be released from ground

level without being filtered by sand filters or HEPAs. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3) and therefore the sand filter leak path factor (LPF) is 0.0049. A uniform release over 15 minutes is assumed, based on the failure of one 3013 can every 90 seconds.

The total elevated release is 2.4 Pu-238eq Ci, and the total ground level release is 1.5 Pu-238eq Ci. **The release designation is RD-01.**

RD-01 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-01 Elevated	50,000 (PuO_2)	4500 Ci	0.5	0.31	0.7	(1-0.003) × 0.0049	2.4
RD-01 Elevated	32 g Pu-238 oxide	350 Ci	0.5	0.1	0.7	(1-0.003) × 0.0049	0.061
Elevated Total							2.4
RD-01 Ground	50,000 (PuO_2)	4500 Ci	0.5	0.31	0.7	0.003	1.5
RD-01 Ground	32 g Pu-238 oxide	350 Ci	0.5	0.1	0.7	0.003	0.037
Ground Total							1.5

Note: Release time = 15 minutes
ST = source term

5.2.2 Fire in the SST Truck Bay

Failure of Primary Barriers: This accident is based on event PS-58 in the PDSA (Section 3.4.4.1.2, Ref. 3). A fire occurs in the SST truck bay. The fire could be caused by an electrical short, equipment failure, or human error. The MAR for this accident is 120 kg of plutonium oxide contained in 24 Type B shipping containers.

As discussed in Section 3.4.4.1.2 of the PDSA (Ref. 3), the maximum temperature of the truck bay during the fire was estimated to be 1585 ºF and the temperature exceeded 1475 ºF for 20 to 45 minutes. When the SST truck bay louvers and heat transfer to the walls, floors, and ceiling were included in the analysis, the maximum temperature in the truck bay was 1533 ºF and the temperature exceeded 1475 ºF for less than 10 minutes. The fire duration and intensity will be further reduced considering the truck bay trench drain (diesel fuel drains away from the Type B shipping containers) and the fire suppression system. This will reduce the maximum temperature of the truck bay to a value below the 1475 ºF hypothetical accident conditions for Type B shipping containers.

Based on the above discussion, the Type B shipping containers are not predicted to fail in the fire (DR = 0.0).

Effects of Other Barriers/Mitigative Features: The 3013 can contained inside the Type B shipping container has undergone limited fire testing. These tests indicate that the 3013 can will not fail during a fire. In addition, the fire suppression system in the truck bay will reduce the duration and intensity of the fire. Because the accident occurs in the SST truck bay, other barriers and mitigative features, such as the ventilation system, do not provide mitigation for this accident.

Range of Possible Releases: Because the Type B shipping container would not fail in the SST truck bay, the total source term is 0.0 Pu-238eq Ci. **The release designation is RD-02.**

5.2.3 Automated Guided Vehicle Fire in the Main Vault

Failure of Primary Barriers: This accident is based on events VM-13/VP-13/VV-13 in the PDSA (Section 3.4.4.1.3, Ref. 3). A fire starts within the automated guided vehicle (AGV) inside the vault due to an electrical short or equipment failure/malfunction during product oxide transport activities. Due to limited combustibles, the fire does not propagate beyond the AGV. The fire would involve the four 3013 cans of plutonium oxide (20 kg total) transported by the AGV. Alternatively, the four 3013 cans could contain 20 kg of uranium oxide.

These 3013 cans would have been through LOI verification. In addition, the 3013 cans have undergone limited fire testing without failing. For these reasons, it is unlikely that the 3013 cans would fail during a fire. Therefore, a DR of 0.1 was used for this accident.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The ventilation exhaust from the Main Vault does not pass through glovebox or main plenum HEPA filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building would occur during this accident.

Range of Possible Releases: Because the 3013 cans have been through LOI verification and have undergone limited fire testing without failing, a DR of 0.1 was used for this accident.

The ARF for the high-pressure (> 500 psig) venting of the 3013 can in a fire is estimated to be 0.31 (Appendix E.2). The RF for the high-pressure venting of the 3013 can in a fire is estimated to be 0.7 (Appendix E.2) and is based on venting pressurized gas through a powder.

The plutonium or uranium is assumed to be in oxide form. The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. The release duration was 3 minutes (Ref. 3).

The release for this accident when plutonium oxide is involved is 0.19 Ci Pu-238eq and the **release designation is RD-03-1**. The release for this accident when uranium oxide is involved is 3.9E-5 Ci Pu-238eq and the **release designation is RD-03-2**.

RD-03 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-03-1 Elevated	20,000 (PuO_2)	1800 Ci	0.1	0.31	0.7	0.0049	0.19
RD-03-2 Elevated	20,000 (U_3O_8)	0.369 Ci	0.1	0.31	0.7	0.0049	3.9E-5

Note: Release time = 3 minutes.

5.2.4 Deflagration/Explosion Occurs in the Inner Canning Module

Failure of Primary Barriers: This accident is based on event PC-122 in the PDSA (Section 3.4.4.2.1, Ref. 3). During surface decontamination of inner cans, hydrogen is generated and managed in the fluids glovebox. The hydrogen accumulates in the electrolyte feed tank and the accumulated hydrogen ignites. The resulting deflagration damages the fluids glovebox and the nearby Inner Canning glovebox, which contains 125 kg of plutonium oxide in convenience cans and inner cans.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. Because the Inner Canning glovebox was damaged in the deflagration, the ventilation exhaust would not pass through glovebox or main plenum HEPA filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: A DR of 0.1 was assigned to the plutonium oxide contained in inner cans and convenience cans (Ref. 3). The ARF is estimated to be 0.005, representative of shielded blast effects (Appendix E.2). The RF is estimated to be 0.3, also representative of shielded blast effects (Appendix E.2).

The plutonium is assumed to be in oxide form. The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. The release duration is 3 minutes (Ref. 3).

The release for this accident is 0.0083 Pu-238eq Ci. **The release designation is RD-04.**

RD-04 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-04 Elevated	125,000 (PuO_2)	11,200	0.1	0.005	0.3	0.0049	8.3E-03

Note: Release time = 3 minutes.

5.2.5 Loss of Ventilation/Cooling in the Main Vault

Failure of Primary Barriers: This accident is based on events VM-18/VV-18 in the PDSA (Section 3.4.4.3.1, Ref. 3). The ventilation for the Main Vault is lost due to equipment failure or human error. Loss of ventilation/cooling will result in elevated temperatures within the Main Vault, which is assumed to contain 24,280 kg of plutonium oxide in 3013 cans. These 3013 cans would have been through LOI verification, so they would not contain out-of-specification product.

The 3013 can design pressure is 699 pounds per square inch absolute (psia), which corresponds to a temperature of approximately 530 ºF. Temperatures previously calculated by SRS indicate that the material contained inside 3013 cans will not exceed 3013 design (rupture) conditions (Ref. 3). In addition, the 3013 cans have undergone limited fire testing without failing.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The safety class design provides redundant ventilation capability along with emergency power backup in the event of a loss of normal power.

The ventilation exhaust from the Main Vault does not pass through glovebox or main plenum HEPA filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: Because the 3013 cans would not fail during the accident, a DR of 0.0 was estimated. The total source term is 0.0 Pu-238eq Ci. **The release designation is RD-05.**

5.2.6 Loss of Vault Cooling Results in Milk Bottle Overpressurization

Failure of Primary Barriers: This accident is based on event VL-16 in the PDSA (Section 3.4.4.3.2, Ref. 3). Ventilation cooling for the vaults and the Interim Storage area is lost due to equipment failure or human error. Loss of ventilation cooling will result in elevated temperatures within the vaults and the Interim Storage area, which is assumed to contain 750 kg of plutonium oxide in 150 milk bottles.

Preliminary calculations indicate that the maximum temperature of the milk bottle contents in the Interim Storage area under loss-of-ventilation conditions would be approximately 160 ºF. In the PDSA, absent LOI verification at this stage of the process, this elevated temperature could result in the failure of the milk bottle due to overpressurization.

In this analysis, the milk bottle was assumed to be redesigned and to contain a HEPA filter which prevents the buildup of pressure in the milk bottle. This filter was assumed to be similar to a NucFil filter and have an efficiency of 99.97 percent for particles.

Effects of Other Barriers/Mitigative Features: The filter installed in the milk bottle will prevent the buildup of pressure and will mitigate a release of radioactive material from the milk bottle. The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will also mitigate a release of radioactive material. The safety class design provides redundant ventilation capability along with emergency power backup in the event of a loss of normal power.

The ventilation exhaust from the Interim Storage area does not pass through glovebox or main plenum HEPA filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: For this accident, all the material in the 150 milk bottles was assumed to be at risk. Therefore a DR of 1.0 was used (Ref. 3). From DOE-HDBK-3010-94 (Table 4-10, Ref. 12), an ARF of 5.3E-6 is estimated for thermal stress of plutonium oxide powder in low air flow conditions (0.1 m/s) at elevated temperatures (800 to 900 ºC). An RF of 0.01 is estimated for these same conditions (Section 4.4.1.1, Ref. 12).

The efficiency for a NucFil HEPA filter is 99.97 percent, and the resulting LPF is 0.0003.

The efficiency of the sand filters is 99.51 percent. However, the sand filters are downstream of the NucFil HEPA filter, so the efficiency would be lower than 99.51 percent. Therefore, in order to bound potential releases, an LPF of 1.0 was used for the sand filters. The release duration is 30 minutes (Ref. 3).

The release for the accident is 1.1E-6 Pu-238eq Ci. **The release designation is RD-06.**

RD-06 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-06 Elevated	750,000 (PuO_2)	67,400	1.0	5.3E-6	0.01	0.0003	1.1E-6

Note: Release time = 30 minutes.

5.2.7 Overpressurization of a 3013 Can in the Oxide Handling Module

Failure of Primary Barriers: This accident is based on event OH-50 in the PDSA (Section 3.4.4.3.3, Ref. 3). During post-blending activities or while in storage, a 3013 can ruptures due to out-of-specification conditions associated with the product oxide, such as excessive moisture, which causes the 3013 to overpressurize. It was assumed that a blender batch of eight 3013 cans containing 40 kg of plutonium oxide contained out-of-specification product. Alternatively, the eight 3013 cans could contain 40 kg of uranium oxide. The accident was assumed to occur before LOI verification. Because LOI verification would detect the out-of-specification product, the accident could not occur after LOI verification.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The accident occurs outside of a glovebox, so the ventilation exhaust does not pass through glovebox or main plenum HEPA filtration; therefore, HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: The out-of-specification product was assumed to affect all eight 3013 cans in a blender batch (DR = 1.0, Ref. 3).

The ARF for the high-pressure (> 500 psig) venting of the 3013 can is estimated to be 0.31 (Appendix E.2). The RF for the high-pressure venting of the 3013 can is estimated to be 0.7 (Appendix E.2) and is based on venting pressurized gas through a powder.

The plutonium or uranium is assumed to be in oxide form. The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. The release duration was 3 minutes (Ref. 3).

The release for this accident when plutonium oxide is involved is 3.8 Ci Pu-238eq and the **release designation is RD-07-1**. The release for this accident when uranium oxide is involved is 7.8E-4 Ci Pu-238eq and the **release designation is RD-07-2**.

RD-07 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-07-1 Elevated	40,000 (PuO_2)	3600 Ci	1.0	0.31	0.7	0.0049	3.8
RD-07-2 Elevated	40,000 (U_3O_8)	0.738 Ci	1.0	0.31	0.7	0.0049	7.8E-4

Note: Release time = 3 minutes.

5.2.8 Overpressurization of a Milk Bottle

Failure of Primary Barriers: This accident is based on event OH-3 in the PDSA (Section 3.4.4.3.4, Ref. 3). A milk bottle containing 5 kg of plutonium oxide is introduced into the Oxide Handling Module and becomes overpressurized due to excessive heat generation or other off-normal conditions.

In the PDSA, this overpressurization was assumed to result in the failure of the milk bottle. In this analysis, the milk bottle was assumed to be redesigned and to contain a HEPA filter, which prevents the buildup of pressure in the milk bottle. This filter was assumed to be similar to a NucFil filter and have an efficiency of 99.97 percent for particles.

Effects of Other Barriers/Mitigative Features: The filter installed in the milk bottle will prevent the buildup of pressure and will mitigate a release of radioactive material from the milk bottle. The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will also mitigate a release of radioactive material.

The accident takes place in a glovebox, so the contaminated air would be exhausted through the glovebox HEPA filters, the main plenum HEPA filters, the sand filters, and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: For this accident, all the material in a milk bottle was assumed to be at risk. Therefore a DR of 1.0 was used (Ref. 3). From DOE-HDBK-3010-94 (Table 4-10, Ref. 12), an ARF of 5.3E-6 is estimated for thermal stress of plutonium oxide powder in low air flow conditions (0.1 m/s) at elevated temperatures (800 to 900 ºC). An RF of 0.01 is estimated for these same conditions (Section 4.4.1.1, Ref. 12).

The efficiency for a NucFil HEPA filter is 99.97 percent, and the resulting LPF is 0.0003.

The efficiency of the glovebox and main plenum HEPA filters is normally 99.97 percent. The efficiency of the sand filters is 99.51 percent. However, the HEPA filters and sand filters are downstream of the NucFil HEPA filter, so the efficiency would be lower than 99.97 and 99.51 percent. Therefore, in order to bound potential releases, an LPF of 1.0 was used for the glovebox and main plenum HEPA filters, and the sand filters. The release duration is 3 minutes (Ref. 3).

The release for the accident is 7.1E-9 Pu-238eq Ci. **The release designation is RD-08.**

RD-08 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-08 Elevated	5000 (PuO_2)	450	1.0	5.3E-6	0.01	0.0003	7.1E-9

Note: Release time = 3 minutes.

5.2.9 Criticality in the Product NDA Module

Failure of Primary Barriers: This accident is based on event NA-509 in the PDSA (Section 3.4.4.4.1, Ref. 3). This accident postulates an inadvertent criticality in the Product NDA module, where plutonium and uranium oxide materials are non-destructively assayed for accountability purposes. A criticality event occurs due to double-batched or misplaced containers that result in a loss of mass, geometry, or interaction controls. The criticality is postulated to involve two stacked pallets. Each pallet contains four 3013 cans, so the criticality involves eight 3013 cans containing 40 kg of plutonium oxide (Ref. 3). The number of fissions associated with the criticality was estimated to be 1E+18 (Ref. 3).

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The accident occurs outside of a glovebox, so the ventilation exhaust does not pass through glovebox or main plenum HEPA filtration; therefore, HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: Plutonium oxide, noble gases, and volatile radionuclides (i.e., iodine) would be released during the accident.

The amount of radioactivity generated during the criticality is listed below. This inventory is based on a plutonium solution criticality with a fission yield of 1E+19 (Table 3.4-29, Ref. 3) scaled to 1E+18 fissions. A solution criticality would bound a powder criticality, which would have a yield of 1E+17 fissions (Section 6.2.3.3, Ref. 12).

RD-09 Parameter Summary for 1E+18 Criticality Release

Release Designation	MAR (Ci)	DR	ARF	RF	LPF	ST (Ci)
RD-09 Elevated	Kr-83m: 11 Ci	1.0	1.0	1.0	1.0	Kr-83m: 11 Ci
	Kr-85m: 7.1 Ci	1.0	1.0	1.0	1.0	Kr-85m: 7.1 Ci
	Kr-85: 0.00081 Ci	1.0	1.0	1.0	1.0	Kr-85: 0.00081 Ci
	Kr-87: 43 Ci	1.0	1.0	1.0	1.0	Kr-87: 43 Ci
	Kr-88: 23 Ci	1.0	1.0	1.0	1.0	Kr-88: 23 Ci
	Kr-89: 1300 Ci	1.0	1.0	1.0	1.0	Kr-89: 1300 Ci
	Xe-131m: 0.010 Ci	1.0	1.0	1.0	1.0	Xe-131m: 0.010 Ci
	Xe-133m: 0.22 Ci	1.0	1.0	1.0	1.0	Xe-133m: 0.22 Ci
	Xe-133: 2.7 Ci	1.0	1.0	1.0	1.0	Xe-133: 2.7 Ci
	Xe-135m: 330 Ci	1.0	1.0	1.0	1.0	Xe-135m: 330 Ci
	Xe-135: 41 Ci	1.0	1.0	1.0	1.0	Xe-135: 41 Ci
	Xe-137: 4900 Ci	1.0	1.0	1.0	1.0	Xe-137: 4900 Ci
	Xe-138: 1100 Ci	1.0	1.0	1.0	1.0	Xe-138: 1100 Ci
	I-131: 1.1 Ci	1.0	1.0	1.0	1.0	I-131: 1.1 Ci
	I-132: 120 Ci	1.0	1.0	1.0	1.0	I-132: 120 Ci
	I-133: 16 Ci	1.0	1.0	1.0	1.0	I-133: 16 Ci
	I-134: 430 Ci	1.0	1.0	1.0	1.0	I-134: 430 Ci
	I-135: 45 Ci	1.0	1.0	1.0	1.0	I-135: 45 Ci

Note: Release time = 3 minutes.

For plutonium oxide, noble gases, and iodine, the DR was assumed to be 1.0 (Ref. 3).

For plutonium oxide, the ARF for the high-pressure (> 500 psig) venting of the 3013 can is estimated to be 0.31 (Appendix E.2). The RF for the high-pressure venting of the 3013 can is estimated to be 0.7 (Appendix E.2) and is based on venting pressurized gas through a powder.

For noble gases and iodine, the ARF and RF were assumed to 1.0 (Ref. 3).

The release will be through the sand filters and will be released from the 100-ft PDCF main stack. For plutonium oxide, the filtration efficiency of the sand filters is 99.51 percent (Ref. 3), and the resulting LPF is 0.0049. Because no iodine removal devices are present in the Plutonium Processing Building HVAC Confinement System, the LPF for iodine was assumed to be 1.0. For noble gases, the LPF was also assumed to be 1.0. The release duration was 3 minutes (Ref. 3).

For plutonium oxide, the release for this accident is 3.8 Ci Pu-238eq. **The release designation is RD-09**.

RD-09 Parameter Summary for Plutonium Release

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-09 Elevated	40,000 (PuO_2)	3600	1.0	0.31	0.7	0.0049	3.8

Note: Release time = 3 minutes.

5.2.10 Criticality in the Pit Disassembly Glovebox Module

Failure of Primary Barriers: This accident is based on event PD-502 in the PDSA (Section 3.4.4.4.2, Ref. 3). This accident postulates a metal criticality in the Pit Disassembly Module due to handling errors, spurious automated manipulator movements, or failed equipment functions (loss of vacuum chuck holding metal piece) that result in a loss of mass, geometry, or interaction controls. The number of fissions for the postulated criticality event is estimated at 1.0E+19. Due to the heat generated from the event, it is possible that some of the plutonium metal would melt/soften and allow for the release of noncondensible gases and volatile radionuclides in the fraction of material that softens. All of the metal is postulated to soften, resulting in a 100-percent release of fission products. The criticality would have a single brief pulse, as it would quickly disperse the metal pieces. A release of respirable plutonium metal fragments is not expected to occur.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The accident occurs outside of a glovebox, so the ventilation exhaust does not pass through glovebox or main plenum HEPA filtration; therefore, HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: The amount of radioactivity generated during the criticality is listed in the following RD-10 Parameter Summary (see also Table 3.4-29, Ref. 3). This inventory is based on a plutonium solution criticality with a fission yield of 1E+19 because a solution criticality would bound a metal criticality, which would have a yield of 1E+17 fissions (Section 6.2.3.3, Ref. 12).

Noble gases and volatile radionuclides (i.e., iodine) would be released during the accident. The DR for this release was assumed to be 1.0 (Ref. 3). For noble gases and iodine, the ARF and RF were assumed to 1.0 (Ref. 3).

The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The filtration efficiency of the sand filters for particles is 99.51 percent (Ref. 3). Because no iodine removal devices are present in the Plutonium Processing Building HVAC Confinement System, the LPF for iodine was assumed to be 1.0. For noble gases, the LPF was also assumed to be 1.0. The release duration was 3 minutes (Ref. 3).

The releases for noble gases and iodine are listed in the following RD-10 Parameter Summary. **The release designation is RD-10**.

RD-10 Parameter Summary for 1E+19 Criticality Release

Release Designation	MAR (Ci)	DR	ARF	RF	LPF	ST (Ci)
RD-10 Elevated	Kr-83m: 110 Ci	1.0	1.0	1.0	1.0	Kr-83m: 110 Ci
	Kr-85m: 71 Ci	1.0	1.0	1.0	1.0	Kr-85m: 71 Ci
	Kr-85: 0.0081 Ci	1.0	1.0	1.0	1.0	Kr-85: 0.0081 Ci
	Kr-87: 430 Ci	1.0	1.0	1.0	1.0	Kr-87: 430 Ci
	Kr-88: 230 Ci	1.0	1.0	1.0	1.0	Kr-88: 230 Ci
	Kr-89: 13,000 Ci	1.0	1.0	1.0	1.0	Kr-89: 13,000 Ci
	Xe-131m: 0.10 Ci	1.0	1.0	1.0	1.0	Xe-131m: 0.10 Ci
	Xe-133m: 2.2 Ci	1.0	1.0	1.0	1.0	Xe-133m: 2.2 Ci
	Xe-133: 27 Ci	1.0	1.0	1.0	1.0	Xe-133: 27 Ci
	Xe-135m: 3300 Ci	1.0	1.0	1.0	1.0	Xe-135m: 3300 Ci
	Xe-135: 410 Ci	1.0	1.0	1.0	1.0	Xe-135: 410 Ci
	Xe-137: 49,000 Ci	1.0	1.0	1.0	1.0	Xe-137: 49,000 Ci
	Xe-138: 11,000 Ci	1.0	1.0	1.0	1.0	Xe-138: 11,000 Ci
	I-131: 11 Ci	1.0	1.0	1.0	1.0	I-131: 11 Ci
	I-132: 1200 Ci	1.0	1.0	1.0	1.0	I-132: 1200 Ci
	I-133: 160 Ci	1.0	1.0	1.0	1.0	I-133: 160 Ci
	I-134: 4300 Ci	1.0	1.0	1.0	1.0	I-134: 4300 Ci
	I-135: 450 Ci	1.0	1.0	1.0	1.0	I-135: 450 Ci

Note: Release time = 3 minutes.

5.2.11 Loss of Offsite Power

Failure of Primary Barriers: This accident is based on event FW-92 in the PDSA (Section 3.4.4.5.1, Ref. 3). In this accident, a loss of normal power to the Plutonium Processing Building is postulated to occur, which results in multiple process and support system upset conditions as well as loss of primary ventilation and cooling for the Interim Storage area. Loss of power to the facility may result from a disruption of the onsite power distribution system or a loss of offsite power. Depending on the nature of the event, normal power may be lost for multiple days. If the event involves the Utility Building, it would be possible to lose both normal and standby power.

For the postulated event, the facility process rooms and the Interim Storage area will experience elevated temperatures, which could cause containers to fail because of overpressurization. Based on the performance of the Type B shipping containers and 3013 cans, material in these containers would not be at risk.

In the PDSA, overpressurization of a milk bottle was assumed to result in failure of the milk bottle. In this analysis, the milk bottle was assumed to be redesigned and to contain a HEPA filter, which prevents the buildup of pressure in the milk bottle. This filter was assumed to be similar to a NucFil filter and have an efficiency of 99.97 percent for particles. The Interim Storage area was assumed to contain 150 milk bottles, each containing 5 kg of plutonium oxide, for a total of 750 kg of plutonium oxide.

Material in process rooms could also be at risk due to drop accidents related to loss of normal power. Primary plutonium process activities potentially affected by a loss of normal power due to manipulator/hoist drop hazards include Pit Disassembly can opening activities, Internal Transport System (ITS)/glovebox drop box interfaces, Hydrogen Processing, Direct Metal Oxidation (DMO) operations, Plutonium Oxide Handling, Auxiliary Uranium Oxidation, Interim Storage, Inner/Outer Canning, ITS, Product NDA and transfer hoist activities, and Product Shipping.

Effects of Other Barriers/Mitigative Features: The filter installed in the milk bottle will prevent the buildup of pressure and will mitigate a release of radioactive material from the milk bottle. The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will also mitigate a release of radioactive material.

In cases where a drop accident occurs in a glovebox, glovebox and main plenum HEPA filtration and the sand filters would mitigate the release of radioactive material. In cases where the drop accident occurs outside of the glovebox, the sand filters would mitigate the release of radioactive material. In either case, the release would be from the 100-ft PDCF main stack. No pressurization of the building occurs because of this accident.

Range of Possible Releases: The MAR for this event is as follows:

RD-11 MAR

Area	Container	Inside Glovebox	MAR (g)
Interim Storage	Milk bottles	No	750,000 (PuO_2)
Pit Disassembly	3013 can	Yes	5000 (PuO_2)
SRL	None	No	6500 (Pu)
Plutonium Conversion	Milk bottles	Yes	20,000 (PuO_2)
Plutonium Separation	Convenience cans	Yes	10,000 (PuO_2)
Oxide Product Handling	Milk bottle	Yes	5000 (PuO_2)
Auxiliary Uranium	Milk bottles	Yes	10,000 (PuO_2)
Interim Storage	Milk bottle	Yes	5000 (PuO_2)
Inner/Outer Canning	Convenience cans	Yes	10,000 (PuO_2)
Inner/Outer Canning	3013 can	Yes	10,000 (PuO_2)
Inner/Outer Canning	3013 can	No	5000 (PuO_2)
ITS	Milk bottles	Yes	15,000 (PuO_2)
ITS	Convenience can	Yes	5000 (PuO_2)
Product NDA	3013 cans	No	10,000 (PuO_2)
Product Shipping	9975 shipping container	No	5000 (PuO_2)

Overpressurization of the Milk Bottles

For this accident, all the material in a milk bottle was assumed to be at risk. Therefore, a DR of 1.0 was used (Ref. 3). From DOE-HDBK-3010-94 (Table 4-10, Ref. 12), an ARF of 5.3E-6 is estimated for thermal stress of plutonium oxide powder in low air flow conditions (0.1 m/s) at elevated temperatures (800 to 900 ºC). An RF of 0.01 is estimated for these same conditions (Section 4.4.1.1, Ref. 12).

The efficiency for a NucFil HEPA filter is 99.97 percent, and the resulting LPF is 0.0003.

The efficiency of the sand filters is 99.51 percent. However, the sand filters are downstream of the NucFil HEPA filter, so the efficiency would be lower than 99.51 percent. Therefore, in order to bound potential releases, an LPF of 1.0 was used for the sand filters. The release duration is 30 minutes (Ref. 3).

Drop Accidents

For containers with robust drop specifications (i.e., 30 ft), a DR of 0.0 was assumed. For example, for Type B shipping containers, the DR was assumed to be 0.0. In Pit Disassembly and Product NDA, the 3013 cans were assumed to be compliant and the DR was also estimated to be 0.0.

Other containers were estimated to have a DR of 1.0. For example, milk bottles and convenience cans were assigned a DR of 1.0. For drop events in Inner and Outer Canning, the canning process may not be completed and a DR of 1.0 was assumed for 3013 cans. In addition, drops of plutonium metal were also estimated to have a DR of 1.0.

Impact/crush release mechanisms would apply to containers that may drop from a crane or hoist. An ARF of 0.005 and an RF of 0.4 are estimated (Appendix E.2).

For plutonium metal, an ARF of 5.0E-7 and an RF of 1.0 were estimated for impact events (Appendix E.2).

The table listing RD-11 MAR (see above) also lists which drop events occur inside gloveboxes. If a drop occurred inside a glovebox, HEPA filtration with an efficiency of 99.97 percent (LPF = 0.0003) mitigated the release. The sand filters would be downstream of the HEPA filters. Because the efficiency of the sand filters would be reduced, to bound potential releases, an LPF of 1.0 was assumed for the downstream sand filters.

If a drop did not occur inside a glovebox, the sand filters mitigated the release. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3), and the resulting LPF is 0.0049.

For drops accidents, the release duration is 30 minutes (Ref. 3).

The total release for the accident is 0.0093 Pu-238eq Ci. **The release designation is RD-11.**

RD-11 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-11 Overpressurization							
Milk bottles	750,000 (PuO_2)	6.74E+04	1	5.3E-6	0.01	0.0003	1.1E-06
RD-11 Drops							
3013 can	5000 (PuO_2)	4.50E+02	0	0.005	0.4	0.0003	0.0E+00
Metal	6500 (Pu)	6.62E+02	1	5E-7	1.0	0.0049	1.6E-06
Milk bottles	20,000 (PuO_2)	1.80E+03	1	0.005	0.4	0.0003	1.1E-03
Convenience cans	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0003	5.4E-04
Milk bottle	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0003	2.7E-04
Milk bottles	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0003	5.4E-04
Milk bottle	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0003	2.7E-04
Convenience cans	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0003	5.4E-04
3013 cans	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0003	5.4E-04
3013 can	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0049	4.4E-03
Milk bottles	15,000 (PuO_2)	1.35E+03	1	0.005	0.4	0.0003	8.1E-04
Convenience can	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0003	2.7E-04
3013 cans	10,000 (PuO_2)	8.99E+02	0	0.005	0.4	0.0049	0.0E+00
9975 shipping container	5000 (PuO_2)	4.50E+02	0	0.005	0.4	0.0049	0.0E+00
Total							9.3E-03

Note: Release time = 30 minutes.

5.2.12 Earthquake-Induced Multiple-Room Fire

Failure of Primary Barriers: This accident is based on event FW-111a in the PDSA (Section 3.4.4.6.4, Ref. 3). This accident is a multiple-room fire initiated by a seismic event that exceeds PC-2 criteria but is within PC-3 design criteria. The fire was assumed to occur in Plutonium Conversion/Separation and Inner/Outer Canning. The accident includes failure of the PDCF fire suppression systems. The fire is postulated to be of long enough duration and high enough energy so that all plutonium material within the rooms is at risk. All the containers are assumed to fail by thermal-induced vent/burst release mechanisms, and metal forms of material were assumed to ignite or involve molten spills from the process furnaces.

In the PDSA, 80 kg of plutonium oxide were present in inner cans in Inner/Outer Canning and 20 kg of plutonium oxide were present in 3013 cans in Inner/Outer Canning. In this analysis, this inventory was reduced to 10 kg and 5 kg, respectively, to reflect more realistic estimates of facility inventory.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The ventilation exhaust would not pass through HEPA filtration, so HEPA filtration would not mitigate releases. However, contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. Pressurization of the building also occurs as a result of the fire, resulting in a small fraction of the contaminated air being exhausted from the building without going through the sand filters.

Range of Possible Releases: For all material involved in the fire, the DR was assumed to be 1.0 (Ref. 3).

The 3013 cans were assumed to have not gone through LOI verification and were assumed to fail through high-pressure venting. The ARF for the high-pressure (> 500 psig) venting of the 3013 can in a fire is estimated to be 0.31 (Appendix E.2). The RF for the high-pressure venting of the 3013 can in a fire is estimated to be 0.7 (Appendix E.2) and is based on venting pressurized gas through a powder.

The milk bottles and 3013 inner cans were assumed to fail through moderate pressure venting. The ARF for the moderate-pressure venting (25 to 500 psig) of a milk bottle or 3013 inner can in a fire is estimated to be 0.1 (Appendix E.2). The RF for the moderate-pressure venting of a milk bottle or 3013 inner can in a fire is estimated to be 0.7 (Appendix E.2).

The convenience cans were assumed to fail through low-pressure venting. The ARF for the low-pressure venting (< 25 psig) convenience can in a fire is estimated to be 0.005 (Appendix E.2). The RF for the low-pressure venting of a convenience can in a fire is estimated to be 0.4 (Appendix E.2). For equipment containing plutonium oxide, these ARFs and RFs were also used.

For molten metal, an ARF of 0.01 and an RF of 1.0 were used (Appendix E.2). For the thermal ignition of metal pieces, an ARF of 0.0005 and an RF of 0.5 were used (Appendix E.2).

The plutonium is assumed to be in oxide form. Because the fire causes the building to pressurize, about 99.7 percent of the release will go through the sand filters and will be released from the 100-ft PDCF main stack. About 0.3 percent of the release will be released from ground level without being filtered by sand filters or HEPAs. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. A uniform release over 30 minutes is assumed (Ref. 3).

The total elevated release is 1.5 Pu-238eq Ci, and the total ground level release is 0.93 Pu-238eq Ci. **The release designation is RD-12.**

RD-12 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-12 Elevated Release							
Convenience cans	40,000 (PuO_2)	3.60E+03	1	0.005	0.4	(1-0.003) × 0.0049	3.5E-02
Milk bottles	20,000 (PuO_2)	1.80E+03	1	0.1	0.7	(1-0.003) × 0.0049	6.1E-01
Equipment (oxide)	20,000 (Pu)	1.80E+03	1	0.005	0.4	(1-0.003) × 0.0049	1.8E-02
Equipment (molten)	8000 (Pu)	8.15E+02	1	0.01	1	(1-0.003) × 0.0049	4.0E-02
Metal pieces	24,000 (Pu)	2.45E+03	1	0.0005	0.5	(1-0.003) × 0.0049	3.0E-03
Convenience cans	25,000 (PuO_2)	2.25E+03	1	0.005	0.4	(1-0.003) × 0.0049	2.2E-02
Inner can	10,000 (PuO_2)	8.99E+02	1	0.1	0.7	(1-0.003) × 0.0049	3.1E-01
3013 cans	5000 (PuO_2)	4.50E+02	1	0.31	0.7	(1-0.003) × 0.0049	4.8E-01
Total							1.5
RD-12 Ground Level Release							
Convenience cans	40,000 (PuO_2)	3.60E+03	1	0.005	0.4	0.003	2.2E-02
Milk bottles	20,000 (PuO_2)	1.80E+03	1	0.1	0.7	0.003	3.8E-01
Equipment (oxide)	20,000 (Pu)	1.80E+03	1	0.005	0.4	0.003	1.1E-02
Equipment (molten)	8000 (Pu)	8.15E+02	1	0.01	1	0.003	2.4E-02
Metal pieces	24,000 (Pu)	2.45E+03	1	0.0005	0.5	0.003	1.8E-03
Convenience cans	25,000 (PuO_2)	2.25E+03	1	0.005	0.4	0.003	1.3E-02
Inner can	10,000 (PuO_2)	8.99E+02	1	0.1	0.7	0.003	1.9E-01
3013 cans	5000 (PuO_2)	4.50E+02	1	0.31	0.7	0.003	2.9E-01
Total							9.3E-01

Note: Release time = 30 minutes.

5.2.13 Earthquake-Induced Criticality within the Main Vault

Failure of Primary Barriers: This accident is based on event FW-110 in the PDSA (Section 3.4.4.6.2, Ref. 3). This criticality results from an earthquake-induced failure of the vault storage racks in the Main Vault. The criticality occurs as the vault racks fail and a number of the 3013 cans collect together on the vault floor. The single parameter criticality limit for half-density plutonium oxide is 30 kg. Because each 3013 can could contain up to 5 kg of plutonium oxide, at least six cans are required for a criticality event to occur. The 3013 cans are stored in the vault in pallets containing four 3013 cans. Consequently, the minimum MAR for the postulated accident would be 40 kg of plutonium oxide (eight cans on two pallets). The number of fissions is estimated at 3E+20 based on multiple criticality bursts.

For this event, the Main and Product Vault rack/pallet designs are credited as a safety class control that prevents the loss of configuration control in the vaults that leads to the criticality. Similarly, the Interim Storage area array design is a safety class structure that prevents the loss of configuration control that leads to the criticality. Therefore, a criticality due to a seismic event will be prevented, and the DR for this event is 0.0.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material.

Range of Possible Releases: Because the rack/pallet designs and the Interim Storage area array designs will prevent the criticality, the release is 0.0 Pu-238eq Ci. **The release designation is RD-13.**

RD-13 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-13 Elevated	40,000 (PuO_2)	3,600	0.0	0.31	0.7	0.0049	0.0

Note: Release time = 3 minutes (Ref. 3).

5.2.14 Earthquake-Induced Collapse of Interior Walls

Failure of Primary Barriers: This accident is based on event FW-109 in the PDSA (Section 3.4.4.6.1, Ref. 3). The accident postulates a design-basis seismic event, with seismically induced failure of interior (non-structural) walls and process gloveboxes and modules. The collapsed walls cause a loss of confinement (glovebox failure) and a release of materials in multiple areas in the facility. The collapsed walls could also rupture containers.

The following table lists the MAR for this accident. This MAR assumes that all material outside of vaults and vault-like structures are at risk.

RD-14 MAR

Area	Container	MAR (g)
Shipping/Receiving NDA	9975 Type B container	260,000 (PuO_2)
Plutonium Separation	Molten metal	8000 (Pu)
Pit Disassembly	Convenience cans	5000 (PuO_2)
DMO	Convenience cans	40,000 (PuO_2)
DMO	Milk bottles	20,000 (PuO_2)
DMO	Free-form powder	20,000 (PuO_2)
Oxide Handling	Convenience cans	40,000 (PuO_2)
Oxide Handling	Milk bottles	10,000 (PuO_2)
Oxide Handling	Free-form powder	30,000 (PuO_2)
Auxiliary Uranium	Convenience cans	40,000 (PuO_2)
Auxiliary Uranium	Milk bottles	15,000 (PuO_2)
Auxiliary Uranium	Free-form powder/Furnace	35,000 (PuO_2)
Plutonium Canning	Inner cans	10,000 (PuO_2)
Plutonium Canning	3013 cans	5000 (PuO_2)
Product NDA	3013 cans	180,000 (PuO_2)
Plutonium Packaging	3013 cans	20,000 (PuO_2)
Sanitization	Contamination	200 (PuO_2)
Sanitization	Three waste drums	740 (PuO_2)
Waste Management	Waste drums	19,700 (PuO_2)

In the PDSA, 80 kg of plutonium oxide was present in inner cans in Plutonium Canning and 20 kg of plutonium oxide was present in 3013 cans in Plutonium Canning. In this analysis, this inventory was reduced to 10 kg and 5 kg, respectively, to reflect more realistic estimates of facility inventory.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. The ventilation exhaust would not pass through HEPA filtration, so HEPA filtration would not mitigate releases. However, the contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. No pressurization of the building would occur during this accident.

Range of Possible Releases: A DR of 1.0 is assigned for the impact/crush of material (Ref. 3).

Plutonium will be present as an oxide powder in the containers or in free form as powder. Impact/crush release mechanisms will apply to the release of plutonium oxide from failed

containers. For free-form powder, spill/impact release mechanisms will apply. The ARF for impact/crush of convenience cans, milk bottles, inner cans, 3013 cans, and waste drums is estimated to be 0.005 (Appendix E.2). The ARF for the impact/crush of Type B shipping containers is estimated to be 0.0005 (Appendix E.2). For free-form powder, the ARF is estimated to be 0.002 (Appendix E.2). For molten metal, the ARF is estimated to be 0.01 (Appendix E.2).

The RF for impact/crush of convenience cans, milk bottles, inner cans, 3013 cans, and waste drums is estimated to be 0.4 (Appendix E.2). The RF for the impact/crush of Type B shipping containers is estimated to be 0.4 (Appendix E.2). For free-form powder, the ARF is estimated to be 0.3 (Appendix E.2). For molten metal, the RF is estimated to be 1.0 (Appendix E.2).

The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. The release duration is 3 minutes (Ref. 3).

The release for this accident is 0.44 Pu-238eq Ci. **The release designation is RD-14.**

RD-14 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-14 Elevated Release							
9975 Type B container	260,000 (PuO_2)	2.34E+04	1	0.0005	0.4	0.0049	2.3E-02
Molten metal	8000 (Pu)	8.15E+02	1	0.01	1	0.0049	4.0E-02
Convenience cans	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0049	4.4E-03
Convenience cans	40,000 (PuO_2)	3.60E+03	1	0.005	0.4	0.0049	3.5E-02
Milk bottles	20,000 (PuO_2)	1.80E+03	1	0.005	0.4	0.0049	1.8E-02
Free-form powder	20,000 (PuO_2)	1.80E+03	1	0.002	0.3	0.0049	5.3E-03
Convenience cans	40,000 (PuO_2)	3.60E+03	1	0.005	0.4	0.0049	3.5E-02
Milk bottles	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0049	8.8E-03
Free-form powder	30,000 (PuO_2)	2.70E+03	1	0.002	0.3	0.0049	7.9E-03
Convenience cans	40,000 (PuO_2)	3.60E+03	1	0.005	0.4	0.0049	3.5E-02
Milk bottles	15,000 (PuO_2)	1.35E+03	1	0.005	0.4	0.0049	1.3E-02
Free-form powder/furnace	35,000 (PuO_2)	3.15E+03	1	0.002	0.3	0.0049	9.3E-03
Inner cans	10,000 (PuO_2)	8.99E+02	1	0.005	0.4	0.0049	8.8E-03
3013 cans	5000 (PuO_2)	4.50E+02	1	0.005	0.4	0.0049	4.4E-03
3013 cans	180,000 (PuO_2)	1.62E+04	1	0.005	0.4	0.0049	1.6E-01
3013 cans	20,000 (PuO_2)	1.80E+03	1	0.005	0.4	0.0049	1.8E-02
Contamination	200 (PuO_2)	1.80E+01	1	0.005	0.4	0.0049	1.8E-04
Three waste drums	740 (PuO_2)	6.65E+01	1	0.005	0.4	0.0049	6.5E-04
Waste drums	19,700 (PuO_2)	1.77E+03	1	0.005	0.4	0.0049	1.7E-02
Total							4.4E-01

Note: Release time = 3 minutes.

5.2.15 A Tornado or Tornado-Generated Missile Impacts the SST Truck Bay

Failure of Primary Barriers: This accident is based on event FW-116 in the PDSA (Section 3.4.4.6.3, Ref. 3). The accident scenario evaluates a tornado or tornado-generated missile impacting the SST truck bay. This event is assumed to include all of the MAR in the truck bay area, which is estimated to be 24 Type B shipping containers totaling 120 kg of plutonium oxide. The Type B shipping containers are shipped in arrays of four containers. It was assumed that two of the 24 Type B shipping containers could be impacted by a single tornado-generated missile.

Effects of Other Barriers/Mitigative Features: Because the accident occurs in the SST truck bay, other barriers and mitigative features, such as the ventilation system, do not provide mitigation for this accident. A 3013 can is present inside the Type B shipping container.

Range of Possible Releases: A tornado-generated missile was assumed to affect two Type B shipping containers. Therefore, the DR was estimated to be 0.083 (2 ÷ 24).

Plutonium will be present as an oxide powder in 3013 cans that are shipped in Type B shipping containers. Impact/crush mechanisms will apply for the release of plutonium oxide from the failed containers. Type B shipping container performance characteristics have been evaluated in several documents, including NUREG-0170 (Ref. 13) and NUREG/CR-4289 (Ref. 14). Testing has demonstrated that Type B shipping container failures do not result in catastrophic loss of containment. Therefore, the ARF for impact/crush events was estimated to be 0.0005 (Appendix E.2). The RF for the impact/crush of Type B shipping containers is estimated to be 0.5 (Appendix E.2).

An LPF of 0.1 was assumed based on the performance characteristics of Type B shipping containers and analyses presented in NUREG-0170. The release duration was 3 minutes (Ref. 3).

The release for this accident is estimated to be 0.022 Pu-238eq Ci. **The release designation is RD-15.**

RD-15 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-15 Ground	120,000 (PuO_2)	10,800	0.083	0.0005	0.5	0.1	2.2E-02

Note: Release time = 3 minutes.

5.2.16 Aircraft Crash

Failure of Primary Barriers: The multi-room fire (FW-90) evaluated in Section 3.4.4.1.4 of the PDSA (Ref. 3) was used as an accident representative of external initiators such as aircraft crashes, loss of offsite power, etc. This accident is a three-room fire starting in one process room and propagating to two adjacent process rooms. The process rooms for this scenario were selected based upon the MAR present and are expected to provide the maximum consequences for a fire involving three adjoining process rooms in the Plutonium Processing Building. The rooms selected were Inner/Outer Canning, Plutonium Oxide Handling, and Auxiliary Uranium.

In the PDSA, 80 kg of plutonium oxide were present in inner cans in Inner/Outer Canning and 20 kg of plutonium oxide were present in 3013 cans in Inner/Outer Canning. In this analysis, this inventory was reduced to 10 kg and 5 kg, respectively, to reflect more realistic estimates of facility inventory. The following table lists the MAR for this accident.

RD-16 MAR

Area	Container	MAR (g)
Auxiliary Uranium and Oxide Handling	Convenience can	80,000 (PuO_2)
Auxiliary Uranium and Oxide Handling	Milk bottle	25,000 (PuO_2)
Auxiliary Uranium and Oxide Handling	Equipment	65,000 (PuO_2)
Auxiliary Uranium and Oxide Handling	Metal	8000 (Pu)
Inner and Outer Canning	Inner can	10,000 (PuO_2)
Inner and Outer Canning	3013 can	5000 (PuO_2)

Effects of Other Barriers/Mitigative Features: The low combustible design, control of transient combustibles, fire/area zone structures, and the fire suppression system will reduce the duration and intensity of the fire.

The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. Contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack. Pressurization of the building also occurs as a result of the fire, resulting in a small fraction of the contaminated air being exhausted from the building without going through the sand filters.

Range of Possible Releases: For convenience cans, milk bottles, plutonium contained in process equipment, inner cans, and 3013 cans, the DR was estimated to be 0.5, based on the ability of the low combustible design, control of transient combustibles, fire/area zone structures, and the fire suppression system to reduce the duration and intensity of the fire. For plutonium metal, the DR was estimated to be 1.0 (Ref. 3).

Release mechanisms for this accident include overpressurization of containers and ignition of material in metal form. The 3013 cans were assumed to have not gone through LOI verification and were assumed to fail through high-pressure venting. The ARF for the high-pressure (> 500 psig) venting of the 3013 can in a fire is estimated to be 0.31 (Appendix E.2). The RF for the high-pressure venting of the 3013 can in a fire is estimated to be 0.7 (Appendix E.2) and is based on venting pressurized gas through a powder.

The milk bottles and 3013 inner cans were assumed to fail through moderate pressure venting. The ARF for the moderate-pressure venting (25 to 500 psig) of a milk bottle or 3013 inner can in a fire is estimated to be 0.1 (Appendix E.2). The RF for the moderate-pressure venting of a milk bottle or 3013 inner can in a fire is estimated to be 0.7 (Appendix E.2).

The convenience cans were assumed to fail through low-pressure venting. The ARF for the low-pressure venting (< 25 psig) convenience can in a fire is estimated to be 0.005 (Appendix E.2). The RF for the low-pressure venting of a convenience can in a fire is estimated to be 0.4 (Appendix E.2). For process equipment containing plutonium oxide, these ARFs and RFs were also used.

For molten metal, an ARF of 0.01 and an RF of 1.0 were used (Appendix E.2). For the thermal ignition of metal pieces, an ARF of 0.0005 and an RF of 0.5 were used (Appendix E.2).

The plutonium is assumed to be in oxide form. Because the fire causes the building to pressurize, about 99.64 percent of the release will go through the sand filters and will be released from the 100-ft PDCF main stack. About 0.36 percent of the release will be released from ground level without being filtered by sand filters or HEPAs. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. A uniform release over 30 minutes is assumed (Ref. 3).

The total elevated release is 0.84 Pu-238eq Ci, and the total ground level release is 0.62 Pu-238eq Ci. **The release designation is RD-16.**

RD-16 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-16 Elevated Release							
Convenience can	80,000 (PuO_2)	7.19E+03	0.5	0.005	0.4	(1-0.0036) × 0.0049	3.5E-02
Milk bottle	25,000 (PuO_2)	2.25E+03	0.5	0.1	0.7	(1-0.0036) × 0.0049	3.8E-01
Equipment	65,000 (PuO_2)	5.84E+03	0.5	0.005	0.4	(1-0.0036) × 0.0049	2.9E-02
Metal	8000 (Pu)	8.15E+02	1	0.0005	0.5	(1-0.0036) × 0.0049	1.0E-03
Inner can	10,000 (PuO_2)	8.99E+02	0.5	0.1	0.7	(1-0.0036) × 0.0049	1.5E-01
3013 can	5000 (PuO_2)	4.50E+02	0.5	0.31	0.7	(1-0.0036) × 0.0049	2.4E-01
Total							0.84
RD-16 Ground Level Release							
Convenience can	80,000 (PuO_2)	7.19E+03	0.5	0.005	0.4	0.0036	2.6E-02
Milk bottle	25,000 (PuO_2)	2.25E+03	0.5	0.1	0.7	0.0036	2.8E-01
Equipment	65,000 (PuO_2)	5.84E+03	0.5	0.005	0.4	0.0036	2.1E-02
Metal	8000 (Pu)	8.15E+02	1	0.0005	0.5	0.0036	7.3E-04
Inner can	10,000 (PuO_2)	8.99E+02	0.5	0.1	0.7	0.0036	1.1E-01
3013 can	5000 (PuO_2)	4.50E+02	0.5	0.31	0.7	0.0036	1.8E-01
Total							0.62

Note: Release time = 30 minutes.

5.2.17 Tritium Releases

Failure of Primary Barriers: Tritium releases were evaluated for the PDCF SRL Module. The PHA was used as the reference for MAR (Ref. 6). The hydride transport vessel (HTV) used to collect tritium gas has a capacity of no more than 18 g of tritium. No more than the equivalent three full HTVs are in the SRL room at any given time. The maximum total inventory of tritium in the SRL room is less than 54 g.

The tritium could be released during an event in which the HTVs were heated to above 250 ºC. Such an event could be the result of a fire or explosion. Two events were evaluated. One event evaluated the release of 54 g of tritium from three full HTVs involved in a fire or explosion. All tritium released to the environment in a fire or explosion is assumed to convert to HTO.

The second event evaluated the release (spill of tritium) of the contents of one HTV due to a break in the line, filling the HTV, or a rupture of the HTV. The amount of tritium released in the second event was 18 g. The tritium was assumed to be released as 99 percent HT and 1 percent HTO.

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will mitigate a release of radioactive material. However, the tritium is assumed to be a gas (HTO or HT). Therefore, the HEPA filtration or sand filters will not reduce the release, and the LPF is estimated to be 1.0. Contaminated air will be exhausted through the 100-ft PDCF main stack.

Range of Possible Releases: The tritium was assumed to be a gas, either HTO or HT. Therefore, the DR, ARF, and RF were assumed to be 1.0. The tritium was released through the sand filters. However, since the tritium was assumed to be a gas, an LPF of 1.0 was used. The release duration was assumed to be 3 minutes.

For the first accident involving the release of 54 g of HTO, the release is 520,000 Ci of H-3. **The release designation for this accident is RD-17-1.** For the second accident involving the release of 18 g of H-3 (99 percent HT and 1 percent HTO), the release is 170,000 Ci of H-3. **The release designation for this accident is RD-17-2.**

RD-17 Parameter Summary

Release Designation	MAR (g H-3)	MAR (Ci H-3)	DR	ARF	RF	LPF	ST (Ci H-3)
RD-17-1 Elevated	54	520,000	1	1	1	1	520,000 (100% HTO)
RD-17-2 Elevated	18	170,000	1	1	1	1	170,000 (1% HTO)

Note: Release time = 3 minutes.

5.2.18 High-Activity Waste Tank Rupture

Failure of the Primary Barriers: Two 1000-gallon (gal) high-activity waste tanks are contained in the basement of the Plutonium Processing Building. One of the 1000-gal tanks was assumed to be full. During a seismic event, the tank was assumed to rupture, resulting in a spill of liquid high-activity waste.

The plutonium inventory in the tank is estimated to be 0.382 g, and the uranium inventory is estimated to be 0.245 g.

High Activity Waste Tank Inventory

Constituent	Annual Inventory (g)	Annual Volume (gal)	Concentration (g/gal)	Tank Inventory (g)
Pu	3.9	10,200	3.82E-4	0.382
U	2.5	10,200	2.45E-4	0.245

Source: *PDCF Waste Management Plan* (Ref. 7)

Effects of Other Barriers/Mitigative Features: The Plutonium Processing Building HVAC Confinement System and the Plutonium Processing Building Confinement Structure will also mitigate a release of radioactive material. The flow of contaminated air is not through the glovebox or main plenum HEPA filters. Contaminated air is exhausted through the sand filters and the 100-ft PDCF main stack.

Range of Possible Releases: The 1000-gal tank was assumed to fail (DR = 1.0), resulting in a spill of liquid high activity waste. The bounding ARF and RF for a free-fall spill (< 3 m) of an aqueous radionuclide solution are 0.0002 and 0.5, respectively (Ref. 12).

The release will be through the sand filters and will be released from the 100-ft PDCF main stack. The filtration efficiency of the sand filters is 99.51 percent (Ref. 3); therefore, the sand filter LPF is 0.0049. The release time was assumed to be 3 minutes.

The plutonium and uranium are assumed to be in a soluble form. In order to provide a bounding assessment of this accident, the inhalation class with the largest dose conversion factor was used to convert the plutonium and uranium inventories to Pu-238eq Ci.

The release for this accident is 2.4E-8 Pu-238eq Ci. **The release designation is RD-18.**

RD-18 Parameter Summary

Release Designation	MAR (g)	MAR Pu-238eq (Ci)	DR	ARF	RF	LPF	ST Pu-238eq (Ci)
RD-18 Elevated	0.382 (Pu)	0.0481	1.0	2.0E-4	0.5	0.0049	2.4E-8
RD-18 Elevated	0.245 (U)	5.3E-6	1.0	2.0E-4	0.5	0.0049	2.6E-12
Total							2.4E-8

Note: Release time = 3 minutes.

5.2.19 Steam Explosion in the Sanitization Furnace

In Section 3.4.4.2.2 of the PDSA (Ref. 3), a steam explosion in the sanitization furnace was analyzed. This accident was based on using an induction furnace for the sanitization process. The induction furnace would have induction cooling coils within the interior of the furnace. These water-filled coils could fail, resulting in a steam explosion, which would disperse plutonium and beryllium.

The PDCF design has been revised so that a resistance furnace is now used in the sanitization process. This furnace does not require water-filled cooling coils within the interior of the furnace, and the resulting steam explosion is no longer credible.

5.3 Malevolent Acts

This section is provided as a placeholder since the PDCF VA (Ref. 15) is in a conceptual stage and no details are available to conduct an analysis. The Westinghouse Savannah River Company (WSRC) Safeguards & Security Vulnerability Analysis Group will conduct this assessment following Title II design.

The evaluation of malevolent acts is directed in EMPP 6Q-001 (Ref. 1) and the EMG (Ref. 2). The EMPP 6Q-001 states:

> *"Malevolent acts (theft, sabotage, terrorism) including the use of explosives or flammable material are possible release initiators within the scope of emergency planning. It is not intended that all inventories be evaluated with malevolent event initiators. Both moderate and extreme scenarios should be developed and analyzed to establish EALs for events resulting from malevolent acts."*

In most cases, malevolent act events will produce releases and consequences similar to those that could be caused by accidental or other external initiators. For example, the catastrophic failure of a shipping container might be postulated due to a seismic or tornado event. The same failure of the shipping container caused by a malevolent act would result in the same consequences; therefore, the malevolent act is considered another initiator for the failure of the container.

5.3.1 Moderate Events

5.3.1.1 Toxicological

The PDCF has no significant inventories of hazardous chemicals. No moderate event could result in a classifiable emergency.

5.3.1.2 Radiological

As the moderate events are based on those incidents that could be initiated by a single individual using materials or tools readily available in the facility, or small quantities of flammables, the

barrier analysis approach used in developing accident scenarios and source terms in Section 5.2 addresses possible moderate events caused by malevolent acts.

5.3.2 Extreme Events

5.3.2.1 Toxicological

As addressed previously, the PDCF has no significant inventories of hazardous chemicals. No extreme event could result in a classifiable emergency.

5.3.2.2 Radiological

The evaluations to be conducted by the WSRC Safeguards & Security Vulnerability Analysis Group for the PDCF will be used to determine the maximum impact.

6.0 CONSEQUENCE ASSESSMENT

This section provides an overview of the methodology and presents results of the analysis used to transform accident scenarios identified in Section 5.0 into projected ground-level doses at the previously identified receptor locations.

6.1 Description of Methodology

6.1.1 Radionuclide Dispersion Modeling

The HOTSPOT computer code (Ref. 16) was used for dispersion modeling of all radionuclide releases. The HOTSPOT health physics codes were created to provide health physics personnel with a fast, field-portable calculational tool for evaluating accidents involving radioactive materials. HOTSPOT codes are a first-order approximation of the radiation effects associated with the atmospheric release of radioactive materials. HOTSPOT programs are reasonably accurate for a timely initial assessment. More importantly, HOTSPOT codes produce a consistent output for the same input assumptions and minimize the probability of errors associated with reading a graph incorrectly or scaling a universal nomogram during an emergency.

HOTSPOT uses the well-established Gaussian plume model, which is widely used for initial emergency assessment or safety analysis planning of a radionuclide release. A detailed description of the HOTSPOT Gaussian model equations can be found in the HOTSPOT documentation (Ref. 16). Individual doses (unweighted) are produced, along with the 50-year committed effective dose equivalent (CEDE). HOTSPOT supports both classic units such as rem, rad, Ci, and Système International d'Unités (SI units). The Gaussian model is the basic workhorse for atmospheric dispersion calculations and is found in many governmental guidebooks. The Gaussian model has also been used and accepted by the U.S. Environmental Protection Agency. The adequacy of this model for making initial dispersion estimates has been tested and verified for many years.

HOTSPOT strictly follows a shed implementation of the Gaussian model and uses a no "black-box" technique. All algorithms are presented and fully referenced in the HOTSPOT documentation. Model output is presented in Appendix B, Section B.2.

6.1.2 Chemical Dispersion Modeling

Releases of hazardous chemicals are modeled using ALOHA (Ref. 17). ALOHA utilizes both a straight-line Gaussian model and a heavy-gas computation model.

ALOHA is an emergency response model, intended for rapid deployment by responders and for emergency planning. It incorporates source strength as well as Gaussian and heavy-gas dispersion models and an extensive chemical property library. Model output is in both text and graphic form, and includes a "footprint" plot of the area downwind of a release where

concentrations may exceed a user-set threshold level. ALOHA can accept weather data transmitted from portable monitoring stations and can plot footprints on electronic maps.

The emergency responder is the primary target audience of ALOHA; hence, the model does not address air quality issues. ALOHA is not designed to model chronic, low-level (fugitive) emissions. The maximum duration of a release in ALOHA is 1 hour. Due to release duration limitations in ALOHA, 6.12 km is the initial receptor for analyzing a GE under adverse meteorological conditions. If a scenario exceeds PAC at this distance, it is analyzed further to determine if PAC is exceeded at the SB (9.4 km).

All algorithms are presented and fully referenced in the ALOHA documentation. ALOHA does not account for:

- Building wake effects
- Jet effects
- Chemical reactivity within a dispersing cloud
- Cloud lift-off
- Concentration fluctuations

ALOHA's distance limits for footprint plotting are:

- Minimum distance: 10 m
- Maximum distance: 10 km

Model output is presented in Appendix B.

DOE guidance suggests a Protective Action Guide value as a projected dose equivalent of ERPG-2. This value (ERPG-2) is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

The key issue in using ERPG-2 is that exposure to some materials at a concentration exceeding the ERPG-2 value for a short period may be enough to produce health detriment. Therefore, it is recommended that these concentration criteria be compared to a calculated maximum 15-minute average concentration for purposes of deciding on protective actions. The EMG (Ref. 2) states that "*[a] 15-minute TWA concentration of the substance in air that equals or exceeds the published ERPG-2 value, or its alternative value, for that substance (shall be used as the) appropriate ERPG exposure levels*."

6.1.3 Uranium Radiological and Chemical Toxicity Evaluation

Although uranium is typically considered a radiological hazard, the uranium presents a chemical toxicity hazard that must be assessed. In the accident assessment for the PDCF, source terms were developed for the both the radiological hazards and chemical hazards of the uranium. The radiological source term is modeled in accordance with Section 6.1.1, "Radionuclide Dispersion Modeling." HOTSPOT is not able to model the chemical hazards associated with uranium. Therefore, ALOHA was used to model the chemical hazards associated with uranium using the same procedures as outlined in Section 6.1.2, "Chemical Dispersion Modeling." Use of ALOHA to model the chemical hazards of uranium is conservative since ALOHA is not able to take into account the deposition velocity of particulates.

6.1.4 Dispersion Modeling Parameters

General plume dispersion modeling parameters are as follows (Ref. 1):

- Reference wind speed height is 10 m for elevated releases and 2 m for ground releases.
- Ground-level release height is at 0 m.
- Elevated release height is 30.48 m (100 ft), the height of the PDCF stack.
- For ground-level releases, complex source geometry is used with 3-m by 3-m source term geometry.
- Dry deposition and city options are used.
- Since the source term already has a release fraction applied, a value of 1.0 is input for modeling. (HOTSPOT)
- Filter percentage is normally zero unless otherwise specified in the scenario. (HOTSPOT)
- Sample time is the duration of the release (scenario dependent).
- Deposition velocity of 1 centimeter per second (cm/s) is used for unfiltered particulates released from ground level. (HOTSPOT)
- Deposition velocity of 0.1 cm/s is used for filtered particulates released from the PDCF stack. (HOTSPOT)
- Receptor height of zero is used.

The stability classes and corresponding wind speeds used for the appropriate release heights and meteorological conditions (95 percent adverse or 50 percent average) are scenario-dependent and are determined in accordance with the guidance in EMPP 6Q-001 (Ref. 1). Meteorological input parameters are listed in Table 6.1-1.

Table 6.1-1 Meteorological Input Parameters

Release Height (m)	Meteorological Conditions	Stability Class	Wind Speed (m/s)	Temperature (ºC)	Inversion Layer (m)	Cloud Cover	Humidity
# 10	Average	C	2.5	25	500	80%	50%
# 10	Adverse	E	1.7	29	300	10%	50%
> 10	Average	C	2.5	25	500	80%	50%
> 10	Adverse	A	1.7	29	None	10%	50%
> 10	Adverse	B	2.6	29	500	10%	50%
> 10	Adverse	E	1.7	29	300	10%	50%

Note: m/s = meters per second.

6.1.5 Distances to Receptor Locations

- 30 m from the release point
- FB, 150 m from release point
- CTF, approximately 5000 m distant
- SB, 9400 m from release point
- Crackerneck WMA, 12,000 m from F-Area
- Maximum distance to PAC
- Maximum distance to TEL

6.2 Event Classification Determination

Consequence assessment results are evaluated against the following criteria to determine the appropriate emergency class for the event scenario (Ref. 1):

1. Thirty meters from the release (or edge of spill). Dose/concentration at this receptor location provides the demarcation between an accident that would require emergency response organization involvement (e.g., Alert) and one that would not.

2. Distance from the release to the nearest FB. The FB is the demarcation between the facility and its immediate vicinity and the remainder of the site. Dose/concentration at this receptor location provides the demarcation between an Alert and SAE. The closest FB for the PDCF is 150 m.

3. Distance from the release to the closest SB. Dose/concentration at this receptor location is the demarcation for a GE declaration. The closest SB for the PDCF is 9400 m.

4. Operational Emergency – An event or condition that poses a significant hazard to safety, health, and/or the environment and requires time-urgent response from outside the facility. An Operational Emergency involving the release of significant quantities of hazardous materials may require further classification as an Alert, SAE or GE. The Emergency Duty

Officer (EDO) in the SRS Operations Center is the site categorization and reporting authority for Operational Emergencies that do not require further classification.

5. Courtesy Notification Event – An event or condition that does not fall within the Operational Emergency categorization and classification system but has the potential for significant public or media interest.

In each zone, releases are evaluated to determine if a PAC has been exceeded. The last zone where a PAC is exceeded determines event classification. The PAC is a personnel radiation exposure level (1 rem total effective dose equivalent [TEDE]) or toxic chemical concentration (peak 15-minute average) equal to ERPG-2.

Although the radiological PAC is defined in terms of TEDE (external dose plus internal dose), for non-reactor type accidents, as in H-Separations, the CEDE is by far the major portion of the TEDE and can be considered equivalent to the TEDE for purposes of the EPHA (Appendix B, Section B.1, "CEDE versus TEDE"). The CEDE incorporates the 50-year committed dose from inhalation of radionuclides as well as the dose due to air submersion. The CEDE does not incorporate the 4-day ground shine component from release of materials in which gamma emitters dominate dose contribution. When enabled, HOTSPOT calculates the dose from ground shine assuming an individual is present for 4 days. The ground shine dose being added to the plume dose is not a reasonable basis for onsite emergency planning. Onsite personnel are not going to remain in a contaminated area continuously for 4 days. The more appropriate onsite planning basis is to use the CEDE-based dose.

In addition to the above receptor locations, other receptors of interest in regards to the PDCF are as follows:

- CTF (Building 766-H), approximately 5 km southeast of the PDCF (approximately 1600 personnel)
- Crackerneck WMA, approximately 12 km southwest of the PDCF

6.3 Accidents with Multiple Release Mechanisms

Some accident events involve multiple release mechanisms; i.e., instantaneous release(s) followed by longer-term release(s). In these cases, the following assumption is used (Ref. 1): the dominating release mechanism (e.g., detonation) for the release duration is used, with other contributing mechanisms (e.g., spill, resuspension) added together to form one release amount.

When an elevated release and a ground release occur at the same time, the results will be combined at key receptor locators. The farthest distance for PAC or TEL will be used.

For elevated releases, the A stability class results will be used until the touchdown point for the E stability class is reached.

6.4 Consequence Assessment Results

Tables 6.2-1 through 6.2-4 contain the results of the consequence assessments for the releases described in Section 5.0 under both 95 percent adverse and 50 percent average meteorological conditions. The HOTSPOT and ALOHA outputs used to complete Tables 6.2-1 through 6.2-4 are contained in Appendix B, Sections B.2 and B.5, respectively.

Table 6.2-1. 95 Percent Adverse Consequence Assessment Results for Radiological Releases

Release Designation	Dose @ 30 m (rem)	Dose @ FB 150 m (rem)	Dose @ CTF 5000 m (rem)	Dose @ SB 9400 m (rem)	Dose @ WMA 12,000 m (rem)	Maximum Distance to PAC (m)	Maximum Distance to TEL (m)	Probable Event Class
RD-01	2.10E+03	1.44E+02	1.29E+00	6.10E-01	4.60E-01	5500	180	**SAE**
RD-02	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-03-1	1.10E-02	1.80E+00	8.20E-02	3.90E-02	3.00E-02	720	Not Exceeded	**SAE**
RD-03-2	2.20E-06	3.70E-04	1.70E-05	8.10E-06	6.10E-06	Not Exceeded	Not Exceeded	< Alert
RD-04	4.60E-04	1.80E-02	3.60E-03	1.70E-03	1.30E-03	Not Exceeded	Not Exceeded	< Alert
RD-05	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-06	3.80E-08	6.50E-06	3.00E-07	1.40E-07	1.10E-07	Not Exceeded	Not Exceeded	< Alert
RD-07-1	2.10E-01	3.60E+01	1.60E+00	7.90E-01	5.90E-01	7550	Not Exceeded	**SAE**
RD-07-2	4.30E-05	7.30E-03	3.40E-04	1.60E-04	1.20E-04	Not Exceeded	Not Exceeded	< Alert
RD-08	3.90E-10	6.70E-08	3.10E-09	1.50E-09	1.10E-09	Not Exceeded	Not Exceeded	< Alert
RD-09	2.10E-01	3.60E+01	1.60E+00	7.90E-01	5.90E-01	7550	Not Exceeded	**SAE**
RD-10	1.20E-03	1.90E-01	2.50E-03	4.70E-04	2.40E-04	Not Exceeded	Not Exceeded	< Alert
RD-11	3.2E-04	1.30E-02	2.50E-03	1.20E-03	9.10E-04	Not Exceeded	Not Exceeded	< Alert
RD-12	1.10E+03	7.91E+01	7.00E-01	3.40E-01	2.50E-01	2450	130	**SAE**
RD-13	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-14	2.40E-02	9.70E-01	1.90E-01	9.10E-02	6.90E-02	1380	Not Exceeded	**SAE**
RD-15	4.30E+01	2.90E+00	1.10E-02	5.10E-03	3.80E-03	270	16	**SAE**
RD-16	2.90E-02	1.20E+00	2.30E-01	1.10E-01	8.30E-02	1580	Not Exceeded	**SAE**
RD-17-1	7.10E-03	1.20E+00	5.70E-02	2.70E-02	2.10E-02	500	Not Exceeded	**SAE**
RD-17-2	2.30E-05	3.90E-03	1.90E-04	9.00E-05	6.80E-05	Not Exceeded	Not Exceeded	< Alert
RD-18	7.60E-10	1.30E-07	6.00E-09	2.80E-09	2.10E-09	Not Exceeded	Not Exceeded	< Alert

Note: For accidents where the release was from both ground level and elevated, the farthest distance to the PAC or TEL was used.

Table 6.2-2. 95 Percent Adverse Consequence Assessment Results for Chemical Releases

Release Designation	Conc. @ 30 m (ppm)	Conc. @ FB 150 m (ppm)	Conc. @ CTF 5000 m (ppm)	Conc. @ SB 9400 m (ppm)	Maximum Distance to PAC (ERPG-2) (m)	Maximum Distance to TEL (ERPG-3) (m)	Probable Event Class
RD-C-01	117	5.5	0.00744	0.0	75	25	**Alert**
RD-C-02	318	16.3	0.0224	0.0	134	46	**Alert**

Note: Concentrations not calculated at the Crackerneck WMA, 12,000 m from PDCF, because the maximum distance calculated by ALOHA is 10,000 m.
Note: For hydrogen chloride, the ERPG-2 value is 20 ppm and the ERPG-3 value is 150 ppm.

Table 6.2-3. 50 Percent Average Consequence Assessment Results for Radiological Releases

Release Designation	Dose @ 30 m (rem)	Dose @ FB 150 m (rem)	Dose @ CTF 5000 m (rem)	Dose @ SB 9400 m (rem)	Dose @ WMA 12,000 m (rem)	Maximum Distance to PAC (m)	Maximum Distance to TEL (m)	Probable Event Class
RD-01	4.10E+02	3.90E+01	2.03E-01	1.32E-01	1.14E-01	870	66	**SAE**
RD-02	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-03-1	2.00E-04	2.00E+00	1.30E-02	8.50E-03	7.30E-03	250	Not Exceeded	**SAE**
RD-03-2	4.20E-08	4.10E-04	2.60E-06	1.70E-06	1.50E-06	Not Exceeded	Not Exceeded	< Alert
RD-04	8.90E-06	8.70E-02	5.50E-04	3.70E-04	3.20E-04	Not Exceeded	Not Exceeded	< Alert
RD-05	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-06	7.40E-10	7.30E-06	4.60E-08	3.10E-08	2.70E-08	Not Exceeded	Not Exceeded	< Alert
RD-07-1	4.10E-03	4.00E+01	2.50E-01	1.70E-01	1.50E-01	1340	Not Exceeded	**SAE**
RD-07-2	8.40E-07	8.20E-03	5.20E-05	3.50E-05	3.00E-05	Not Exceeded	Not Exceeded	< Alert
RD-08	7.60E-12	7.50E-08	4.70E-10	3.20E-10	2.70E-10	Not Exceeded	Not Exceeded	< Alert
RD-09	4.10E-03	4.00E+01	2.50E-01	1.70E-01	1.50E-01	1340	Not Exceeded	**SAE**
RD-10	2.30E-05	2.20E-01	4.50E-04	1.30E-04	7.40E-05	Not Exceeded	Not Exceeded	< Alert
RD-11	6.30E-06	6.20E-02	3.90E-04	2.60E-04	2.30E-04	Not Exceeded	Not Exceeded	< Alert
RD-12	2.20E+02	2.19E+01	1.08E-01	7.20E-02	6.20E-02	630	47	**SAE**
RD-13	0	0	0	0	0	Not Exceeded	Not Exceeded	< Alert
RD-14	4.70E-04	4.60E+00	2.90E-02	2.00E-02	1.70E-02	410	Not Exceeded	**SAE**
RD-15	8.30E+00	4.30E-01	1.70E-03	1.10E-03	9.60E-04	96	Not Exceeded	**SAE**
RD-16	4.50E+02	4.10E+01	2.01E-01	1.34E-01	1.15E-01	850	70	**SAE**
RD-17-1	1.40E-04	1.30E+00	8.50E-03	5.70E-03	5.00E-03	190	Not Exceeded	**SAE**
RD-17-2	4.50E-07	4.40E-03	2.80E-05	1.90E-05	1.60E-05	Not Exceeded	Not Exceeded	< Alert
RD-18	1.50E-11	1.40E-07	9.20E-10	6.10E-10	5.30E-10	Not Exceeded	Not Exceeded	< Alert

Table 6.2-4. 50 Percent Average Consequence Assessment Results for Chemical Releases

Release Designation	Conc. @ 30 m (ppm)	Conc. @ FB 150 m (ppm)	Conc. @ CTF 5000 m (ppm)	Conc. @ SB 9400 m (ppm)	Maximum Distance to PAC (ERPG-2) (m)	Maximum Distance to TEL (ERPG-3) (m)	Probable Event Class
RD-C-01	7.36	0.296	0.0	0.0	47	18	< Alert
RD-C-02	127	5.14	0.0	0.0	75	27	**Alert**

Note: Concentrations not calculated at the Crackerneck Wildlife Management Area, 12,000 m from PDCF, because the maximum distance allowed by ALOHA is 10,000 m.
Note: For hydrogen chloride, the ERPG-2 value is 20 ppm and the ERPG-3 value is 150 ppm.

7.0 EMERGENCY CLASSES AND EMERGENCY ACTION LEVELS

This section documents correlation of consequence assessment (Section 6.0) with requirements to classify events. Tables 6.2-1 through 6.2-4 summarize all consequences and probable event classifications. EALs are determined using 95th-percent adverse meteorology. For evaluated scenarios/release configurations that are classified as a GE or SAE EAL, back-calculations were performed to determine the threshold MAR required to reach such an operational emergency class (Ref. 18). For scenarios where the release to the environment is elevated (i.e., through the sand filtration [SF] system), the dose increases with distance until the release descends to ground level.

EALs form the link between the severities of a hazardous material operational emergency, as reflected in the event classification system, and the facility-specific indicators of the event. For any given type of event, EALs use one or more observable condition(s) individually or in combination as criteria for determining the scale of the event and if it is truly a classifiable emergency. The criteria relate to an actual release of hazardous materials, or to conditions that represent various levels of degradation or loss of ability to control those materials (Ref. 19).

For SAEs involving elevated releases, the maximum dose can occur at a distance greater than 150 m (the FB) but less than 9400 m (the SB) from the PDCF. In these cases, the maximum dose was used to establish the EAL. In addition, 95 percent adverse meteorology for elevated releases is defined by three sets of atmospheric conditions (see Table 6.1-1). In these cases, the conditions that yielded the maximum dose at the distance of interest were used to establish the EAL. This same procedure was used for Alerts for distances between 30 m and 150 m.

In some cases, accidents resulted in an elevated release and a ground-level release. In these cases, the EAL was established using the conditions that yielded the maximum dose at the point of interest. However, the conditions were not mixed (i.e., a ground-level release using Class E stability was not combined with an elevated release using Class A stability).

Some EALs are based on scenarios having different material types (e.g., plutonium and plutonium oxide) contributing to the total MAR in addition to different DRs, ARFs, RFs, and LPFs. For these cases, as a first-level approximation, the minimum MAR was estimated based on the combination of DR, ARF, RF, and LPF with the largest value. The MAR should be compared to the values in the tables as follows: for a GE, the MAR/source term should be greater than or equal to the GE value. For an SAE, the MAR/source term should be greater than or equal to the SAE value, but less than the GE value (if a GE value is listed). For an Alert, the MAR/source term should be greater than or equal to the Alert value, but less than the SAE value (if an SAE value is listed). For less than an Alert, the MAR/source term should be less than the Alert value. Scenarios that have consequences of less than an Alert are not listed in this section.

7.1 General Emergency EALs

None.

7.2 Site Area Emergency EALs

When the consequences attained result in a potential emergency classification (i.e., Alert, SAE, and GE), back-calculations were made where appropriate to determine the threshold of packages/MAR required to reach the highest classification and all lower-level classifications (lower-level classifications are discussed in Appendix D).

Security Phase III or IV Event:

Basis: Any event that causes a Security Phase III declaration has the potential to escalate into a more severe event or be an initiator for one of the following scenarios. Hostage-taking, a credible bomb threat, and confirmed attacks with explosives or flammable liquids are examples of malevolent acts.

Scenario RD-01: Room Fire Propagates to the Product NDA Module

Basis: A fire starts within the NDA room due to an electrical short, equipment failure, or human error. The fire spreads throughout the room, placing plutonium contained in 3013 cans and calibration sources at risk.

A portion of the release would be from the 100-ft PDCF main stack and a portion would be from ground level. The minimum source term for an SAE is estimated to be 0.017 Pu-238eq Ci for the elevated release and 0.010 Pu-238eq Ci for the ground-level release (i.e., the combination of the two releases yields an SAE).

Possibly indicated by:

- Fire in the Product NDA module (direct observation or fire/smoke/heat alarm)
- Rupture of one 3013 can or calibration source containing more than 8 g of Pu-238 oxide
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu Oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE (Elevated Release)	3.5E+02	0.16	0.017
SAE (Ground-Level Release)	3.5E+02	0.10	0.010

Scenario RD-03-1: AGV Fire in the Main Vault Impacting Four 3013 Cans

Basis: A fire starts within the AGV inside the vault due to an electrical short, equipment failure, or human error. Due to the limited combustibles within the vault, the fire does not propagate beyond the AGV; however, it is assumed that the fire impacts no more than one pallet of four plutonium oxide 3013 cans inside the vault.

The minimum source term for an SAE is estimated to be 0.10 Pu-238eq Ci.

Possibly indicated by:

- Fire involving the AGV (direct observation or fire/smoke alarm)
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE	1.0E+4	0.98	0.10

Scenario RD-07-1: Overpressurization of a 3013 Can in the Oxide Handling Module

Basis: During post-blending activities or while in storage, a 3013 can ruptures due to out-of-specification conditions associated with the product oxide, such as excessive moisture, which causes the 3013 can to overpressurize. It was assumed that a blender batch of eight 3013 cans containing 40 kg of plutonium oxide contained out-of-specification product.

The minimum source term for an SAE is estimated to be 0.10 Pu-238eq Ci.

Possibly indicated by:

- Bulging and rupture of one 3013 can (direct observation)
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE	1.0E+03	0.98	0.10

Scenario RD-09: Criticality in the Product NDA Module

Basis: A criticality occurs in the Product NDA module due to double-batched or misplaced containers that result in a loss of mass, geometry, or interaction controls. The number of fissions is estimated to be 1E+18, although a smaller value is more likely. The criticality causes a rupture and a pressurized release of plutonium oxide from eight 3013 cans due to release of fission product gases and elevated gas (internal) temperature/pressure resulting from the criticality event. Plutonium oxide, noble gases, and volatile radionuclides (i.e., iodine) would be released during the accident.

The minimum source term for an SAE is estimated to be 0.10 Pu-238eq Ci.

Possibly indicated by:

- Nuclear incident monitor alarms
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu Oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE	1.0E+03	0.98	0.10

Scenario RD-12: Earthquake-Induced Multiple-Room Fire

Basis: An earthquake-induced multiple-room fire is postulated. The fire was assumed to occur in Plutonium Conversion/Separation and Inner/Outer Canning. The accident includes failure of the PDCF fire suppression systems. The fire is postulated to be of long enough duration and high enough energy so that all plutonium material within the rooms is at risk. All the containers were assumed to fail by thermal-induced vent-burst release mechanisms, and metal forms of material were assumed to ignite or involve molten spills from the process furnaces. Material within vaults is not considered at risk.

A portion of the release would be from the 100-ft PDCF main stack and a portion would be from ground level. The minimum source term for an SAE is estimated to be 0.019 Pu-238eq Ci for the elevated release and 0.012 Pu-238eq Ci for the ground-level release (i.e., the combination of the two releases yields an SAE).

Possibly indicated by:

- Seismic event
- Direct observation of fire occurring in Plutonium Conversion/Separation and Inner/Outer Canning or fire/smoke/heat/sprinkler alarm
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE (Elevated Release)	2.0E+02	0.19	0.019
SAE (Ground-Level Release)	2.0E+02	0.12	0.012

Scenario RD-14: Earthquake-Induced Collapse of Interior Walls (Nonstructural) Causes a Loss of Confinement for Multiple Process Areas

Basis: The analysis evaluates a seismic event that fails interior (nonstructural) walls. The collapsed walls cause a loss of confinement (glovebox failure) and a release of materials in multiple areas in the facility. The collapsed walls could also rupture plutonium oxide containers. Material in the form of plutonium metal would not present a significant release hazard, so it is not evaluated for this event.

The minimum source term for an SAE is estimated to be 0.10 Pu-238eq Ci.

Possibly indicated by:

- Seismic event
- Direct observation of potential damage
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE	2.0E+04	0.98	0.10

Scenario RD-15: A Tornado or a Tornado-Generated Missile Impacts the SST Truck Bay

Basis: The accident scenario evaluates a tornado or tornado-generated missile impacting the SST truck bay. This event is assumed to include all of the MAR in the truck bay area, which is estimated to be 24 Type B packages totaling 120 kg of plutonium oxide. Impact/crush release mechanisms will apply for the release of the plutonium oxide from the failed containers.

The minimum source term for an SAE is estimated to be 7.7E-3 Pu-238eq Ci.

Possibly indicated by:

- Direct observation

Emergency Class	MAR Required (g Pu Oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE	4.1E+04	7.5E-02	7.7E-03

Scenario RD-16: Aircraft Crash

Basis: An aircraft crash was evaluated for the PDCF. This event is assumed to include all of the MAR at the point of impact (assumed to be Inner/Outer Canning, Plutonium Oxide Handling, and Auxiliary Uranium). Impact/crush release mechanisms and resulting fires/explosions will apply the release of the plutonium oxide from the failed containers.

A portion of the release would be from the 100-ft PDCF main stack and a portion would be from ground level. The minimum source term for an SAE is estimated to be 0.016 Pu-238eq Ci for the elevated release and 0.012 Pu-238eq Ci for the ground-level release (i.e., the combination of the two releases yields an SAE).

Possibly indicated by:

- Direct observation of aircraft crash
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (g Pu oxide)	ST Required (g Pu)	ST Required (Pu-238eq Ci)
SAE (Elevated Release)	3.4E+02	0.16	0.016
SAE (Ground-Level Release)	3.4E+02	0.12	0.012

Scenario RD-17-1: Tritium Release (Fire or Explosion)

Basis: A tritium release during a fire or explosion was evaluated for the PDCF. The tritium could be released during an event in which three HTVs were heated to above 250 ºC. Such an event could be the result of a fire or explosion. RD-17-1 evaluated the release of the maximum MAR (54 g of tritium or 520,000 Ci) involved in a fire or explosion. All tritium released to the environment in a fire or explosion is assumed to convert to HTO (tritiated water or tritium oxide).

The minimum source term for an SAE was estimated to be 400,000 Ci of tritium.

Possibly indicated by:

- Direct observation
- Tritium air monitors
- Continuous air monitor alarms
- Stack monitor alarm

Emergency Class	MAR Required (grams tritium)	ST Required (Ci tritium)
SAE	41	4.0E+05

7.3 Alert EALs

Security Phase II Event:

Basis: Any event that causes a Security Phase II declaration has the potential to escalate into a more severe event.

Scenario RD-C-01: Spill of 5 Liters of Hydrochloric Acid

Basis: RD-C-01 evaluates the drop of two 2.5-L bottles of 36 percent hydrochloric acid, resulting in an unconfined spill. The accident was assumed to occur on the loading dock. Possible initiators include forklift puncture, operator error, or drop from the loading dock. An earthquake or other natural phenomena could also cause this accident. The minimum amount of hydrochloric acid that could be spilled to yield an Alert is 1 L.

Possibly indicated by:

- Visual and/or probable olfactory detection of spilled hydrochloric acid

Scenario RD-C-02: Spill of 16 Liters of Hydrochloric Acid

Basis: RD-C-02 evaluates the drop of four 4-L bottles of 36 percent hydrochloric acid, resulting in an unconfined spill. This accident was assumed to occur on the loading dock. Possible initiators include forklift puncture, operator error, or drop from the loading dock. An earthquake or other natural phenomenon could also cause this accident. The minimum amount of hydrochloric acid that could be spilled to yield an Alert is 1 L.

Possibly indicated by:

- Visual and/or probable olfactory detection of spilled hydrochloric acid

8.0 EMERGENCY PLANNING ZONE DETERMINATION

The facility EPZ is defined as an area within which special planning and preparedness efforts are warranted as a means of apportioning preparedness resources. The methodology used in determining the facility EPZ is outlined in EMPP 6Q-001 (Ref. 1).

- The distance at which the 100-rem Committed Effective Dose Equivalent (CEDE) or ERPG-3 would be exceeded is used in defining an EPZ. The maximum distance to 100 rem for any accident is approximately 180 m (Scenario 1). This scenario is based on a significant or complete loss of engineered design features and/or mitigating barriers available. For all of the accidents, the maximum distance to 100 rem is much less than the closest SB distance of 9.4 km. This (180 m) is the smallest EPZ radius that should be considered.
- The maximum distance at which the PAC is exceeded is approximately 7.6 km (4.7 miles) (Scenarios 7-1 and 9). This distance, or 16 km (10 miles), whichever is smaller, is the largest EPZ radius that should be considered.
- If the most severe analyzed release would result from a single failure event, an EPZ radius closer to the maximum should be selected. As the most severe analyzed release (Scenarios 7-1 and 9) are multiple failure events, an EPZ radius closer to the 7.6 km (4.7 miles) is indicated.
- If the releases contribute a minor fraction of the total offsite risk from site emergencies, an EPZ radius closer to the minimum is indicated. Because no accidents result in offsite impacts (GE), the most severe analyzed releases contribute a minor fraction of the total offsite risk from site emergencies; hence, the minimum radius is indicated.
- Because the hazard is radiological, an EPZ radius closer to the minimum is indicated.
- The EPZ should conform to physical or jurisdictional realities of the site and surrounding areas.

A “test of reasonableness” is applied to determine if the EPZ should be further adjusted. Considerations include the following:

- The EPZ should be large enough to provide a credible basis for extending response activities outside the EPZ if conditions warrant.
- The EPZ should be large enough to support effective response at or near the scene.
- The EPZ should meet the expectations and needs of offsite agencies.

Based upon these tests, the PDCF EPZ should extend 7.6 km (4.7 miles) as cited above. Site preparedness is enhanced by extending the EPZ to the SB. However, if offsite impacts occur, ad hoc measures should be taken in conjunction with expanding the EPZ offsite.

9.0 REFERENCES

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16. Homann, S. G., *HOTSPOT Health Physics Codes for the PC*, Version 2.06, Lawrence Livermore National Laboratory, October 2004.

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Appendix A

Figures

Figure 1: PDCF Project Site Location, Savannah River Site

Figure 2: Aerial View of PDCF (Artist's Rendition), Savannah River Site

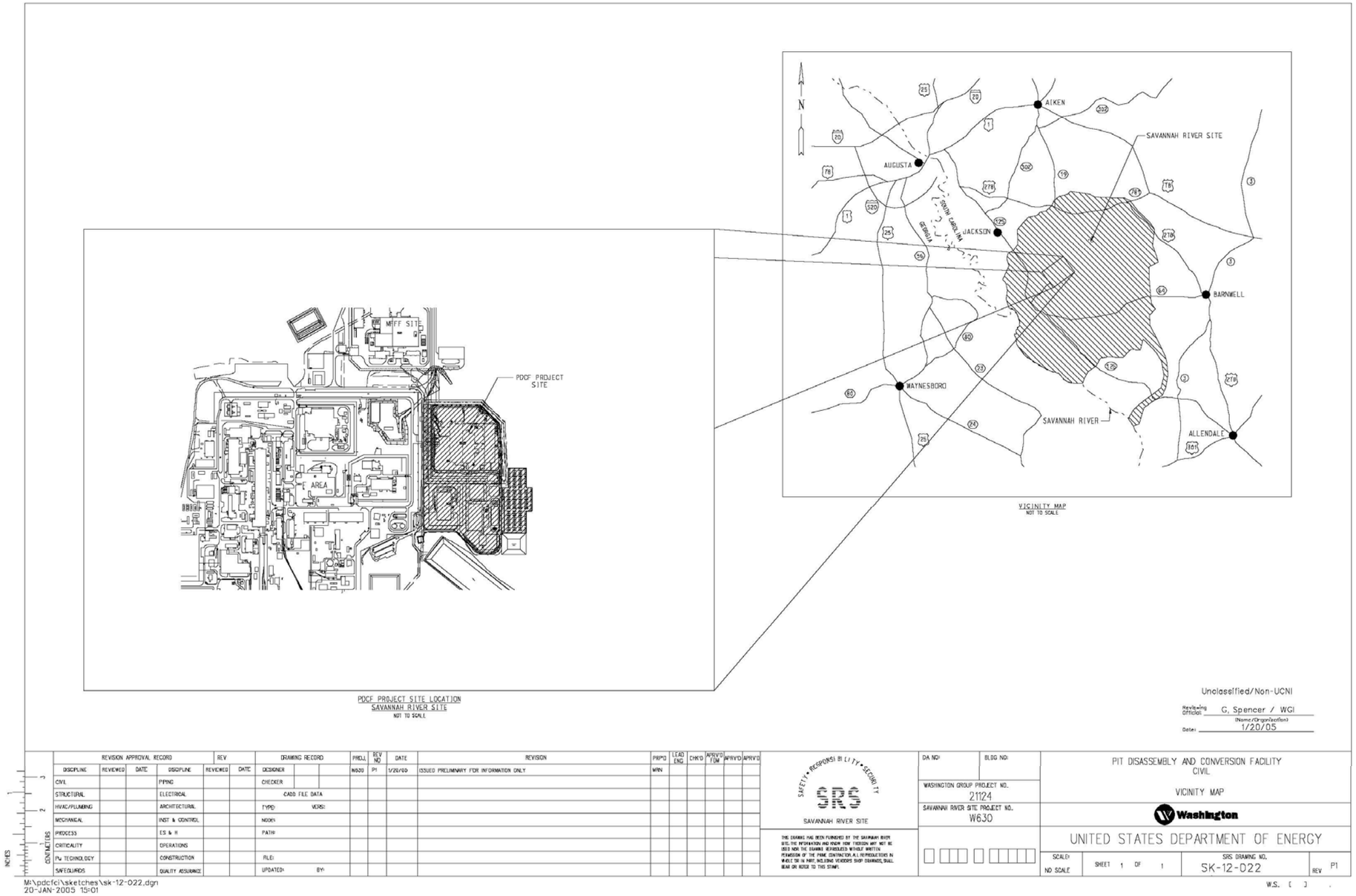


Figure 1. PDCF Project Site Location, Savannah River Site

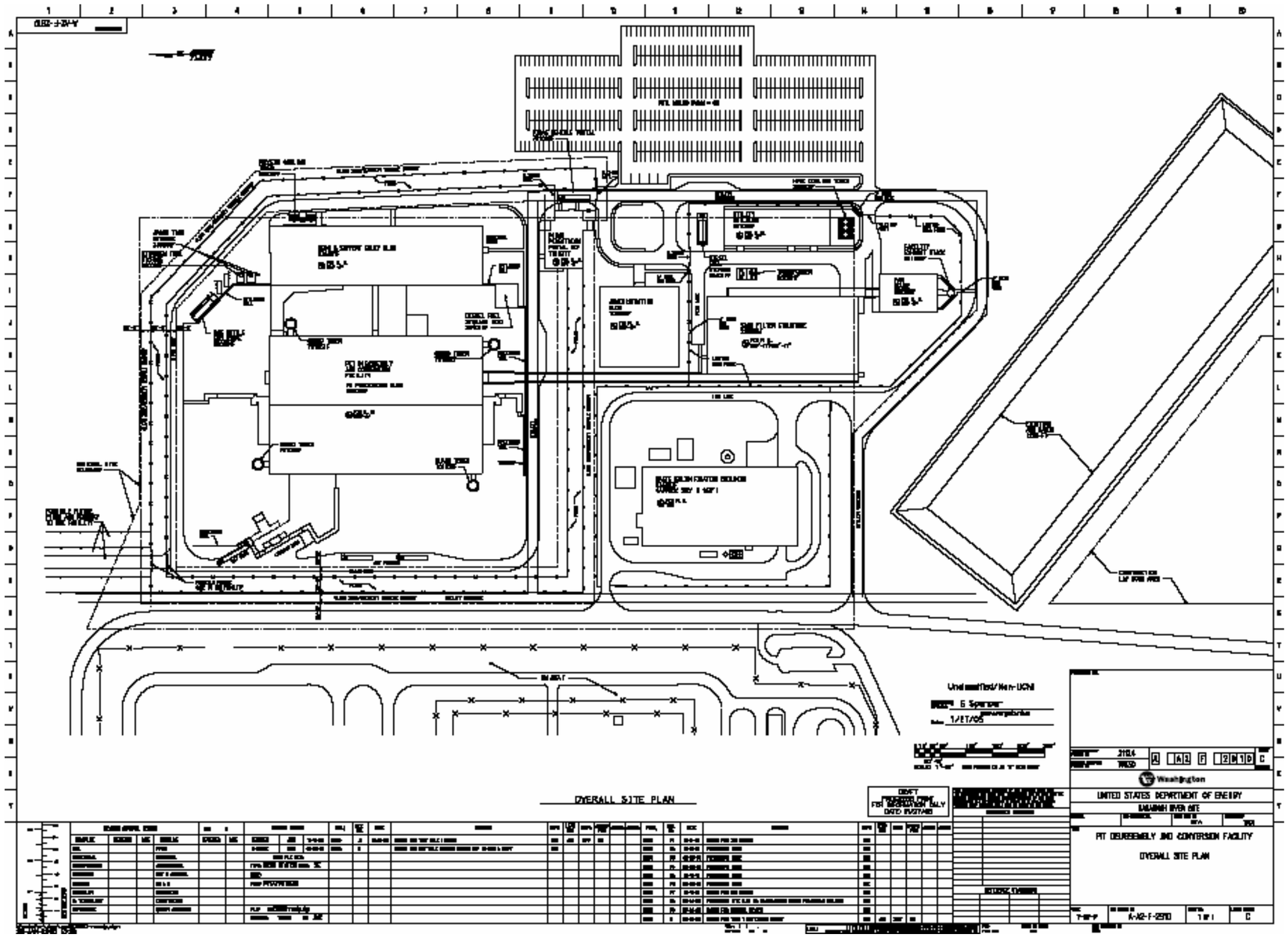


Figure 2. PDCF Site Layout, Savannah River Site

Figure 3. Aerial View of PDCF (Artist's Rendition), Savannah River Site

Appendix B

Calculations

B.1 CEDE versus TEDE

This calculation was prepared by Amber R. Martin on 12/22/1999 and reviewed by C.E. Shogren. This calculation explains how the Committed Effective Dose Equivalent (CEDE) calculated by the HOTSPOT Health Physics Codes is equivalent to the Total Effective Dose Equivalent (TEDE) called for in EPA-400 in regards the source terms found at the Savannah River Site.

B.1.1 Introduction

This calculation provides justification for the use of Committed Effective Dose Equivalent (CEDE) for the Protective Action Guide. Although analysis is based on historical data and distances at Savannah River Site (SRS), the contribution percentages estimated would be expected to vary insignificantly at alternative locations.

B.1.2 Analysis Methods and Computations

EPA 400, *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*, (Ref. 1) states the Protective Action Guides (PAGs) in terms of Total Effective Dose Equivalent (TEDE) not Committed Effective Dose Equivalent (CEDE). TEDE and CEDE are defined as:

> *Total Effective Dose Equivalent (TEDE) - The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (CEDE) (for internal exposures). Deep dose equivalent to the whole body may be used as effective dose equivalent for external exposures.*
>
> *Committed Effective Dose Equivalent (CEDE) ($H_{E,50}$) - The sum of the committed dose equivalents to various tissues in the body ($H_{T,50}$), each multiplied by the appropriate weighting factor (w_T) - that is $H_{E,50} = \Sigma w_T H_{T,50}$. Committed effective dose equivalent is expressed in units of rem.*

Within EPA 400 is the following statement concerning the various exposure pathways (inhalation, direct dose, etc.) and their relation to the PAG.

> Exposure pathways that make only a small contribution (e.g., less than about 10 percent) to the dose incurred in the early phase need not be considered. Inhalation of resuspended particulate materials will, for example, generally fall into this category.

This guidance has been used to eliminate the dose contribution from external exposures for the majority of accidents analyzed within the hazard assessment process. EMHA analysis therefore considers CEDE equivalent to TEDE.

This calculation quantifies the percent contribution to TEDE from external exposures. External exposures considered are:

- Resuspension of deposited material
- Direct shine from plume passage
- Ground shine from material deposition

B.1.3 Resuspension Contribution

In order to determine the dose from resuspension to areas adjacent to the contamination footprint, the HOTSPOT Resuspension routine is used (Ref. 4). For determining the resuspension dose to individuals assumed to be in the centerline of the plume, a manual calculation based on the HOTSPOT methodology will be used. The following is a discussion on how HOTSPOT determines the source term from resuspension.

HOTSPOT utilizes an upwind virtual source term to model the initial distribution of the isotope of interest. The virtual-term point source is positioned at an upwind distance that results in a σ_y, at the center of the contamination zone, equal to 50% of the input effective radius (Figure B.1-1).

The resuspension factor (S) for wind speed (u) at or below 3 m-sec^{-1} is calculated by:

$$S = (1.0\text{E}-04)\left(e^{-0.15\sqrt{t}}\right) + (1.0\text{E}-09) \qquad \text{[Eq. B.1-1]}$$

where:

S = resuspension factor (m^{-1})
t = time since contamination event (days)

Resuspension as a factor of wind speed is calculated by:

$$S(u) = (S)(u/3)^2 \quad \text{for } u > 3 \text{ m-sec}^{-1} \qquad \text{[Eq. B.1-2]}$$

$$S(u) = (S) \quad \text{for } u \le 3 \text{ m-sec}^{-1} \qquad \text{[Eq. B.1-3]}$$

Note: The resuspension factor can be determined empirically using measurements of the ground contamination (Ci-m^{-2}), and the radionuclide air concentration (Ci-m^{-3}) above the ground measurement location. The resuspension factor is then defined as the ratio of the air concentration to the ground concentration (m^{-1}).

Figure B.1-1 is a graphical representation of how HOTSPOT creates a virtual source term in order to disperse the resuspension source term to downwind receptors.

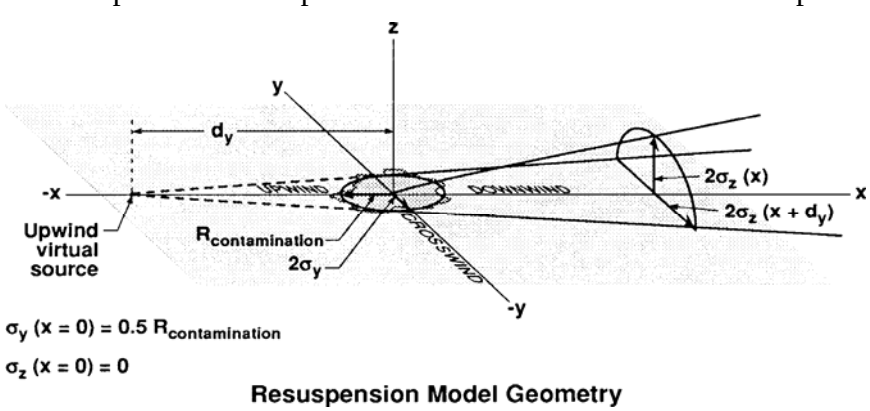


Figure B.1-1

The effective source term (Q_{eff}) associated with the observed ground contamination (G) is calculated by:

$$Q_{eff} = (S(u))(G)(\pi)(\sigma_{y,origin})(\sigma_{z,origin})(u) \qquad \text{[Eq. B.1-4]}$$

where:

Q_{eff} = effective source term (Ci-sec^{-1})

G = ground contamination (Ci-m^{-2})

$\sigma_{y,origin}$ = standard deviation of the integrated concentration distribution in the crosswind direction at the origin (m)

$\sigma_{z,origin}$ = standard deviation of the integrated concentration distribution in the vertical direction at the origin (m)

The Gaussian standard deviations are evaluated at a distance equal to the distance from the origin to the upwind virtual source position. Q_{eff} can then be used in a typical Gaussian dispersion equation to estimate the radionuclide concentration downwind from the contamination. Within HOTSPOT, the 50-year committed dose is calculated per one-hour residence time. Therefore, an individual would be committed to the output dose for each hour at the selected receptor location.

In order to calculate the resuspension percent contribution to the total CEDE, a HOTSPOT consequence assessment calculation was run using the following input parameters:

Stability class:	E
Wind speed:	1.7 m-sec^{-1}
Inversion layer:	200 m
Release time:	30 min
Source term:	10 Ci Pu-238
Release Height:	Ground level
Deposition velocity:	1 cm-sec^{-1}

Two receptor distances were selected for this evaluation. The first is a 670-m receptor that corresponds to the closest facility site boundary distance. The second distance is the average of the site boundary distance from facilities that are furthermost from the site boundary. This distance is 10,465 m. The resulting CEDE doses and contamination levels calculated by HOTSPOT at the receptors of interest are as follows:

Table B.1-1: Baseline HOTSPOT Results

Receptor (m)	CEDE (rem)	Deposition (μCi-m^2)
670	170.0	1.1E+01
10,465	1.5	9.7E-02

In order to calculate the potential dose to an individual standing in the plume during the release, the concentration of Pu-238 in the air after plume passage needs to be manually calculated. As stated in the note after equation 3, the resuspension factor can be empirically determined by ratio of the ground contamination to the airborne concentration. As such, the airborne concentration (*A*) can be estimated by:

$$A = G(S(u)) \qquad \text{[Eq. B.1-5]}$$

where:

A	=	airborne concentration (Ci-m^{-3})
G	=	ground contamination (Ci-m^{-2})
S(u)	=	resuspension factor (1.0E-04 m^{-1} at t = 0)

For the 670-m receptor location, *A* is calculated by:

$$(11\ \mu\text{Ci - m}^{-2})(1.0\text{E} - 04\ \text{m}^{-1})\left(\text{Ci}/10^6\ \mu\text{Ci}\right) = 1.10\text{E-09 Ci-m}^{-3}$$

At 10,465 meter receptor *A* is calculated by:

$$(0.097\ \mu\text{Ci - m}^{-2})(1.0\text{E} - 04\ \text{m}^{-1})\left(\text{Ci}/10^6\ \mu\text{Ci}\right) = 9.70\text{E-12 Ci-m}^{-3}$$

The air concentration can be converted to a CEDE by use of the DCF contained within Reference 6. The most restrictive DCF listed for Pu-238 is 4.6E+08 rem-Ci^{-1} of uptake. Assuming a breathing rate (*BR*) of 1.2 m^3-hr^{-1} (Ref. 7), the estimated CEDE ($H_{E,50}$), in rem, to an individual for breathing a concentration (*A*) of airborne contamination for 1 hour is calculated by:

$$H_{E,50} = (A)(t)(DCF)(BR) \qquad \text{[Eq. B.1-6]}$$

where:

A	=	airborne concentration (Ci-m^{-3})
t	=	time (hr)
DCF	=	dose conversion factor (rem-Ci^{-1})
BR	=	breathing rate (1.2 m^3-hr^{-1})

Using equation 6, the CEDE for the 670 m receptor is:

$$(1.10\text{E} - 09\ \text{Ci - m}^{-3})(1\ \text{hr})(4.6\text{E} + 08\ \text{rem - Ci}^{-1})(1.2\ \text{m}^3\ \text{- hr}^{-1}) = 6.07\text{E-01 rem}$$

The CEDE for the 10,465 receptor is:

$$(9.70\text{E} - 12\ \text{Ci - m}^{-3})(1\ \text{hr})(4.6\text{E} + 08\ \text{rem - Ci}^{-1})(1.2\ \text{m}^3\ \text{- hr}^{-1}) = 5.35\text{E-03 rem}$$

Table B.1-1 was modified to include the resuspension CEDE for an unsheltered individual standing in the centerline of the plume for one hour after plume passage and the calculation of the percent contribution to the overall plume inhalation CEDE.

Table B.1-2: Percent Contribution of Resuspension CEDE to Overall CEDE

Receptor (m)	CEDE (rem)	Contamination Levels (μCi-m2)	1 hour Resuspension CEDE (rem)	Total CEDE (rem)	Resuspension % Contribution
670	170.0	11.0	0.607	170.61	0.36
10,465	1.5	0.097	0.00535	1.51	0.36

The resuspension factor used in these calculations (1.0E-04 m^{-1}) is considered a very conservative estimate for the potential airborne from surface contamination. The value is based on 1964 studies by J. Mishima and K. Stewart, cited in reference 8, and represents the maximum value observed during the study period. The 1.0E-04 m^{-1} value should be considered "bounding" and the above results should be applied to situations where the exposure is of a relatively short duration (e.g., several hours) to preclude excessive conservatism within the analysis.

Within EPA-400 is the following statement concerning the length of time to be considered for exposure to deposited radiological material during the incident phase of an emergency:

> *Since the dose to persons who are not evacuated will continue until relocation can be implemented (if it is necessary), it is appropriate to include in the early phase the total dose that will be received prior to such relocation. For the purpose of planning, it will usually be convenient to assume that the early phase will last for four days -- that is, that the duration of the primary release is less than four days, and that exposure to deposited materials after four days can be addressed through other protective actions, such as relocation, if this is warranted. (Because of the unique characteristics of some facilities or situations, different time periods may be more appropriate for planning purposes, with corresponding modification of the dose conversion factors cited in Chapter 5.)*

As stated, the "rule-of-thumb" is to use a default four day exposure period unless some other period can be justified. Based on the industrial types of accidents associated with ORNL Legacy Waste facilities, an accident event release time is expected to be on the order of only a few minutes to a few hours. As such, the four-day exposure period, which is based on reactor type accidents, can be justifiably reduced. Even though it has already been shown that the contribution of resuspension would be less than 10% for any reasonably conservative assumptions, it is still an interesting exercise to calculate the percent contribution of resuspension for the entire four days using a more appropriate resuspension factor.

Reference 10 contains one of the most comprehensive collections of studies performed to determine the release fractions and release rates of radioactive material due to natural and man-made events. Reference 10 discusses the resuspension of powders from soil due to wind and cites many studies.

Location	Source Material	Resuspension Factor Range (m-1)
Nevada Test Site GMX near center GMX near edge	Pu	3.0E-10 3.0E-09
New York	Pu-238	5.0E-08
United Kingdom	Pu-238	5.0E-09
Palmares, Spain	Pu	1.4E-09 to 7.8E-06
Nevada Test Site Dusty rural air	Pu	7.0E-06
Rocky Flats	Pu	1.0E-09 to 1.0E-05

The three highest values shown are 7.0E-06, 7.8E-06, and 1.0E-05 m^{-1}. As the actual distribution of data points for the above studies are not included in reference 10, thus eliminating the ability to "weigh" the above results, the highest resuspension factor listed is selected. Using the resuspension factor of 1.0E-05 m^{-1} equations 5 and 6 are utilized to determine the dose contribution of Pu resuspension.

For the 670-m receptor location, *A* is calculated by:

$$\left(11\ \mu\text{Ci - m}^{-2}\right)\left(1.0\text{E}-05\ \text{m}^{-1}\right)\left(\text{Ci}/10^{6}\ \mu\text{Ci}\right) = 1.10\text{E-10 Ci-m}^{-3}$$

At 10,465 meter receptor *A* is calculated by:

$$\left(0.097\ \mu\text{Ci - m}^{-2}\right)\left(1.0\text{E}-05\ \text{m}^{-1}\right)\left(\text{Ci}/10^{6}\ \mu\text{Ci}\right) = 9.70\text{E-13 Ci-m}^{-3}$$

Using equation 6, the CEDE for the 670 m receptor is:

$$\left(1.10\text{E}-10\ \text{Ci - m}^{-3}\right)\left(96\ \text{hr}\right)\left(4.6\text{E}+08\ \text{rem - Ci}^{-1}\right)\left(1.2\ \text{m}^{3}\text{ - hr}^{-1}\right) = 5.83\text{E+00 rem}$$

The CEDE for the 10,465 receptor is:

$$\left(9.70\text{E}-13\ \text{Ci - m}^{-3}\right)\left(96\ \text{hr}\right)\left(4.6\text{E}+08\ \text{rem - Ci}^{-1}\right)\left(1.2\ \text{m}^{3}\text{ - hr}^{-1}\right) = 5.10\text{E-02 rem}$$

Again, Table B.1-1 was modified to include the resuspension CEDE for an individual standing unsheltered in the centerline of the plume for 96 hours after plume passage and the calculation of the percent contribution to the overall plume inhalation CEDE.

Table B.1-3: Percent Contribution of Resuspension CEDE to Overall CEDE

Receptor (m)	CEDE (rem)	Contamination Levels (μCi-m2)	1 hour Resuspension CEDE (rem)	Total CEDE (rem)	Resuspension % Contribution
670	170.00	11.0	5.83	175.83	3.30
10,465	1.50	0.097	0.051	1.55	3.30

B.1.4 Resuspension Contribution

Direct External Dose and Ground Shine

In order to show that the external exposure pathways contribute less than 10 percent to the total dose, the Dose Conversion Factors (DCFs) contained within Chapter 5 of EPA 400 are compared to show their relative contributions.

Within the DOE Emergency Management Guidance for Hazards Assessments (Ref. 9), statements specifically aimed at the four day (96-hour) ground shine component are included, the guidance states:

EPA-400 provides for use of a TEDE ground shine component of less than four days, and for not including exposure pathways contributing less than 10 percent of the TEDE. The following procedure is recommended for determining how (or if) the ground shine component of the EDE is to be computed.

- If the full four-day ground shine component of TEDE can be shown to represent less than 10 percent of the TEDE, it may be excluded.
- If the full four-day ground shine component cannot be eliminated by applying the 10 percent rule above, the ground shine should be included for a period equal to the estimated EPZ evacuation time. If no official estimate of EPZ evacuation time exists, conservative estimates should be used.
- If ground shine values of less than four days are to be used, then the four-day DCFs in Section 5.6 of EPA-400 should be reduced proportionately (e.g., a 16-hour estimate of evacuation time would call for use of 16/96, or 0.17 times the DCF values).

As it is anticipated that evacuation time would be significantly less than four days, a 24-hour ground shine exposure is also determined for comparison purposes.

Table B.1-4: Direct External Exposure and Ground Shine DCFs

Isotope	External Exposure DCF(1)	Inhalation Exposure DCF(1)	24-Hour Ground Shine Exposure DCF(1)	4-Day Ground Shine Exposure DCF(1)
Sr/Y-90	0.0E+00	1.6E+06	0.0E+00	0.0E+00
Cs-137	3.5E+02	3.8E+04	6.0E+03	2.4E+04
Pu-238	5.0E-02	4.7E+08	8.6E+00	3.4E+01

(1)DCF units are: rem-cm^3/μCi-hr

All of the DCFs are listed in the same units (based on an air concentration in μCi-cm^{-3}) and can be directly compared. The percent contribution to total dose for each exposure is listed in Table B-1-5 with a 24-hour ground shine component and in Table B.1-6 with a 96-hour ground shine component.

Table B.1-5: Direct External Exposure and 24-Hour Ground Shine

Isotope	External Exposure % Contribution	Inhalation Exposure % Contribution	24-Hour Ground Shine Exposure % Contribution
Sr/Y-90	0.00	100	0.00
Cs-137	1.0	86.0	14.0
Pu-238	0.00	100	0.00

Table B.1-6: Direct External Exposure and 96-Hour Ground Shine

Isotope	External Exposure % Contribution	Inhalation Exposure % Contribution	96-Hour Ground Shine Exposure % Contribution
Sr/Y-90	0.00	100	0.00
Cs-137	1.0	61.0	38.0
Pu-238	0.00	100	0.00

In the case of Cs-137, the ground shine component is significant. It is worth noting that in the cases where significant amounts of gamma emitters are encountered in an accident analysis, the analytical modeling used would calculate the external dose from immersion in the cloud in addition to the CEDE.

B.1.5 Results

Based on the above evaluation, the CEDE output from HOTSPOT, or other equivalent modeling, meets the EPA-400 requirements for calculation of the PAG and is considered equivalent to TEDE for the isotopes of interest at ORNL Legacy Waste facilities.

B.1.6 References

1. *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*, U. S. EPA, EPA 400-R-92-001, October 1991.
2. *Occupational Radiation Protection*, Title 10 Code of Federal Regulations Part 835, U. S. DOE.
3. Lightner, J. W., *Safety Analysis Engineering Section and Emergency Services Department Responses to States Request For Information (U)*, ECS-EST-97-0006, Rev. 1, May 27, 1997.
4. Homann, S. G., *HOTSPOT Health Physics Codes for the PC*, UCRL-MA-106315, March 1994.
5. Hadlock, D. J., *Consequence Assessment for Emergency Preparedness Hazards Assessments*, TP-95-002, Revision 3, January 22, 1997.
6. *Internal Dose Conversion Factors for Calculation of Dose to the Public*, U. S. DOE, DOE EH-0071, July 1988.

7. *Radiological Health Handbook*, U. S. Department of Health Education and Welfare, January 1970.
8. Anspaugh, L. R., et al, *Resuspension and Redistribution of Plutonium in Soils*, UCRL-76419, Lawrence Livermore Laboratory, January 1975.
9. *Hazards Surveys and Hazards Assessments*, DOE G 151.1-1 Emergency Management Guide Volume II, March 21, 1997.
10. *Airborne Release Fractions/Rates and Respirable Fractions for Non Reactor Nuclear Facilities*, DOE-HDBK-3010-94, December 1994.
11. *Savannah River Site Emergency Plan*, WSRC-SCD-7, June 16 1997.

B.2 HOTSPOT Runs

"RD-01 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 22 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.87 km
Exceeds Outer  Dose Out To : 6.19 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.9E-03	1.4E-08	1.4E-05	1.6E-13	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	2.2E+01	1.7E-04	1.7E-01	1.8E-09	<00:01	3.7686600E+01	-1.2170861E+02
0.150	1.8E+01	1.4E-04	1.4E-01	1.6E-09	<00:01	3.7686600E+01	-1.2170813E+02
0.250	9.3E+00	7.1E-05	7.1E-02	8.0E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.8E+00	2.1E-05	2.1E-02	2.4E-10	00:02	3.7686600E+01	-1.2170415E+02
1.000	7.8E-01	6.0E-06	6.0E-03	6.7E-11	00:05	3.7686600E+01	-1.2169848E+02
3.000	1.7E-01	1.3E-06	1.3E-03	1.4E-11	00:16	3.7686600E+01	-1.2167578E+02
5.000	1.2E-01	8.9E-07	8.9E-04	9.9E-12	00:26	3.7686600E+01	-1.2165307E+02
8.000	8.5E-02	6.5E-07	6.5E-04	7.3E-12	00:42	3.7686600E+01	-1.2161902E+02
9.400	7.7E-02	5.9E-07	5.9E-04	6.6E-12	00:50	3.7686600E+01	-1.2160313E+02
10.000	7.5E-02	5.7E-07	5.7E-04	6.4E-12	00:53	3.7686600E+01	-1.2159632E+02
12.000	6.7E-02	5.1E-07	5.1E-04	5.7E-12	01:04	3.7686600E+01	-1.2157362E+02
15.000	5.9E-02	4.5E-07	4.5E-04	5.0E-12	01:20	3.7686600E+01	-1.2153956E+02
20.000	5.0E-02	3.8E-07	3.8E-04	4.3E-12	01:46	3.7686600E+01	-1.2148281E+02
25.000	4.4E-02	3.4E-07	3.4E-04	3.8E-12	02:13	3.7686600E+01	-1.2142605E+02
30.000	4.0E-02	3.1E-07	3.1E-04	3.4E-12	02:40	3.7686600E+01	-1.2136930E+02

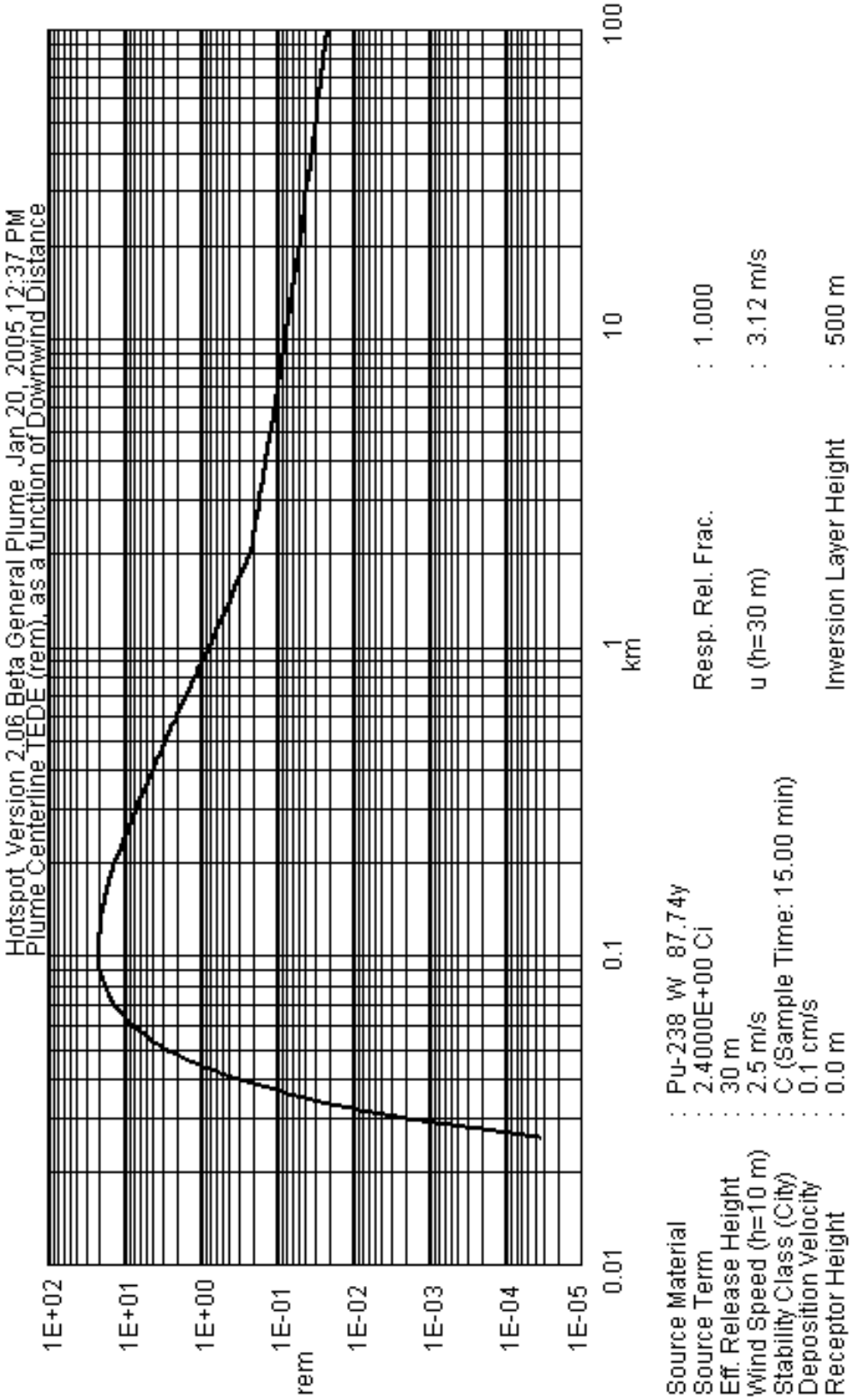
35.000	3.7E-02	2.8E-07	2.8E-04	3.1E-12	03:06	3.7686600E+01	-1.2131254E+02
40.000	3.4E-02	2.6E-07	2.6E-04	2.9E-12	03:33	3.7686600E+01	-1.2125578E+02
50.000	3.0E-02	2.3E-07	2.3E-04	2.6E-12	04:26	3.7686600E+01	-1.2114227E+02
65.000	2.7E-02	2.0E-07	2.0E-04	2.3E-12	05:46	3.7686600E+01	-1.2097201E+02
80.000	2.4E-02	1.8E-07	1.8E-04	2.0E-12	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:37 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 15.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-01 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 25 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.67 km
Exceeds Outer  Dose Out To : 1.99 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	9.6E-02	7.4E-07	7.4E-04	8.2E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	2.5E+01	1.9E-04	1.9E-01	2.2E-09	<00:01	3.7686600E+01	-1.2170884E+02
0.150	1.6E+01	1.3E-04	1.3E-01	1.4E-09	00:01	3.7686600E+01	-1.2170813E+02
0.250	7.1E+00	5.4E-05	5.4E-02	6.1E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.8E+00	1.4E-05	1.4E-02	1.6E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	4.3E-01	3.3E-06	3.3E-03	3.7E-11	00:07	3.7686600E+01	-1.2169848E+02
3.000	4.3E-02	3.3E-07	3.3E-04	3.7E-12	00:21	3.7686600E+01	-1.2167578E+02
5.000	1.5E-02	1.1E-07	1.1E-04	1.3E-12	00:36	3.7686600E+01	-1.2165307E+02
8.000	5.6E-03	4.3E-08	4.3E-05	4.8E-13	00:58	3.7686600E+01	-1.2161902E+02
9.400	4.0E-03	3.1E-08	3.1E-05	3.4E-13	01:08	3.7686600E+01	-1.2160313E+02
10.000	3.5E-03	2.7E-08	2.7E-05	3.0E-13	01:12	3.7686600E+01	-1.2159632E+02
12.000	2.4E-03	1.8E-08	1.8E-05	2.1E-13	01:27	3.7686600E+01	-1.2157362E+02
15.000	1.5E-03	1.2E-08	1.2E-05	1.3E-13	01:49	3.7686600E+01	-1.2153956E+02
20.000	8.5E-04	6.5E-09	6.5E-06	7.3E-14	02:25	3.7686600E+01	-1.2148281E+02
25.000	5.4E-04	4.1E-09	4.1E-06	4.6E-14	03:02	3.7686600E+01	-1.2142605E+02
30.000	3.7E-04	2.9E-09	2.9E-06	3.2E-14	03:38	3.7686600E+01	-1.2136930E+02

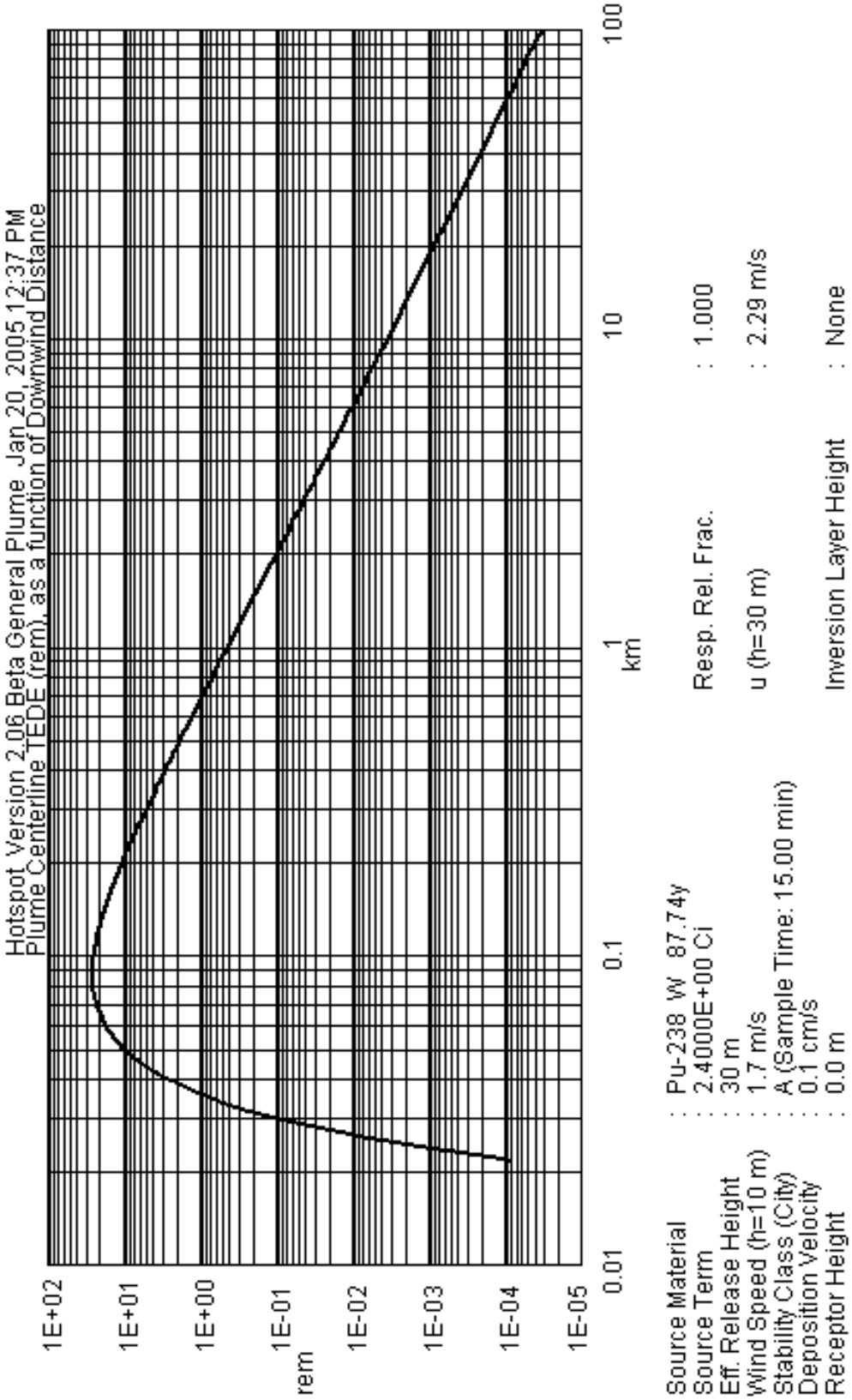
35.000	2.7E-04	2.1E-09	2.1E-06	2.3E-14	04:15	3.7686600E+01	-1.2131254E+02
40.000	2.1E-04	1.6E-09	1.6E-06	1.8E-14	04:51	3.7686600E+01	-1.2125578E+02
50.000	1.3E-04	1.0E-09	1.0E-06	1.1E-14	06:04	3.7686600E+01	-1.2114227E+02
65.000	7.9E-05	6.0E-10	6.0E-07	6.7E-15	07:54	3.7686600E+01	-1.2097201E+02
80.000	5.2E-05	4.0E-10	4.0E-07	4.4E-15	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:37 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 15.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-01 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 17 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.55 km
Exceeds Outer  Dose Out To : 3.05 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	6.3E-02	4.8E-07	4.8E-04	5.4E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.7E+01	1.3E-04	1.3E-01	1.4E-09	<00:01	3.7686600E+01	-1.2170884E+02
0.150	1.1E+01	8.2E-05	8.2E-02	9.1E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.6E+00	3.5E-05	3.5E-02	4.0E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.2E+00	9.2E-06	9.2E-03	1.0E-10	00:02	3.7686600E+01	-1.2170415E+02
1.000	2.8E-01	2.2E-06	2.2E-03	2.4E-11	00:04	3.7686600E+01	-1.2169848E+02
3.000	1.0E-01	7.8E-07	7.8E-04	8.7E-12	00:14	3.7686600E+01	-1.2167578E+02
5.000	7.1E-02	5.5E-07	5.5E-04	6.1E-12	00:23	3.7686600E+01	-1.2165307E+02
8.000	5.3E-02	4.0E-07	4.0E-04	4.5E-12	00:38	3.7686600E+01	-1.2161902E+02
9.400	4.8E-02	3.7E-07	3.7E-04	4.1E-12	00:44	3.7686600E+01	-1.2160313E+02
10.000	4.6E-02	3.5E-07	3.5E-04	3.9E-12	00:47	3.7686600E+01	-1.2159632E+02
12.000	4.1E-02	3.2E-07	3.2E-04	3.5E-12	00:57	3.7686600E+01	-1.2157362E+02
15.000	3.6E-02	2.8E-07	2.8E-04	3.1E-12	01:11	3.7686600E+01	-1.2153956E+02
20.000	3.1E-02	2.4E-07	2.4E-04	2.6E-12	01:35	3.7686600E+01	-1.2148281E+02
25.000	2.7E-02	2.1E-07	2.1E-04	2.3E-12	01:59	3.7686600E+01	-1.2142605E+02
30.000	2.5E-02	1.9E-07	1.9E-04	2.1E-12	02:23	3.7686600E+01	-1.2136930E+02

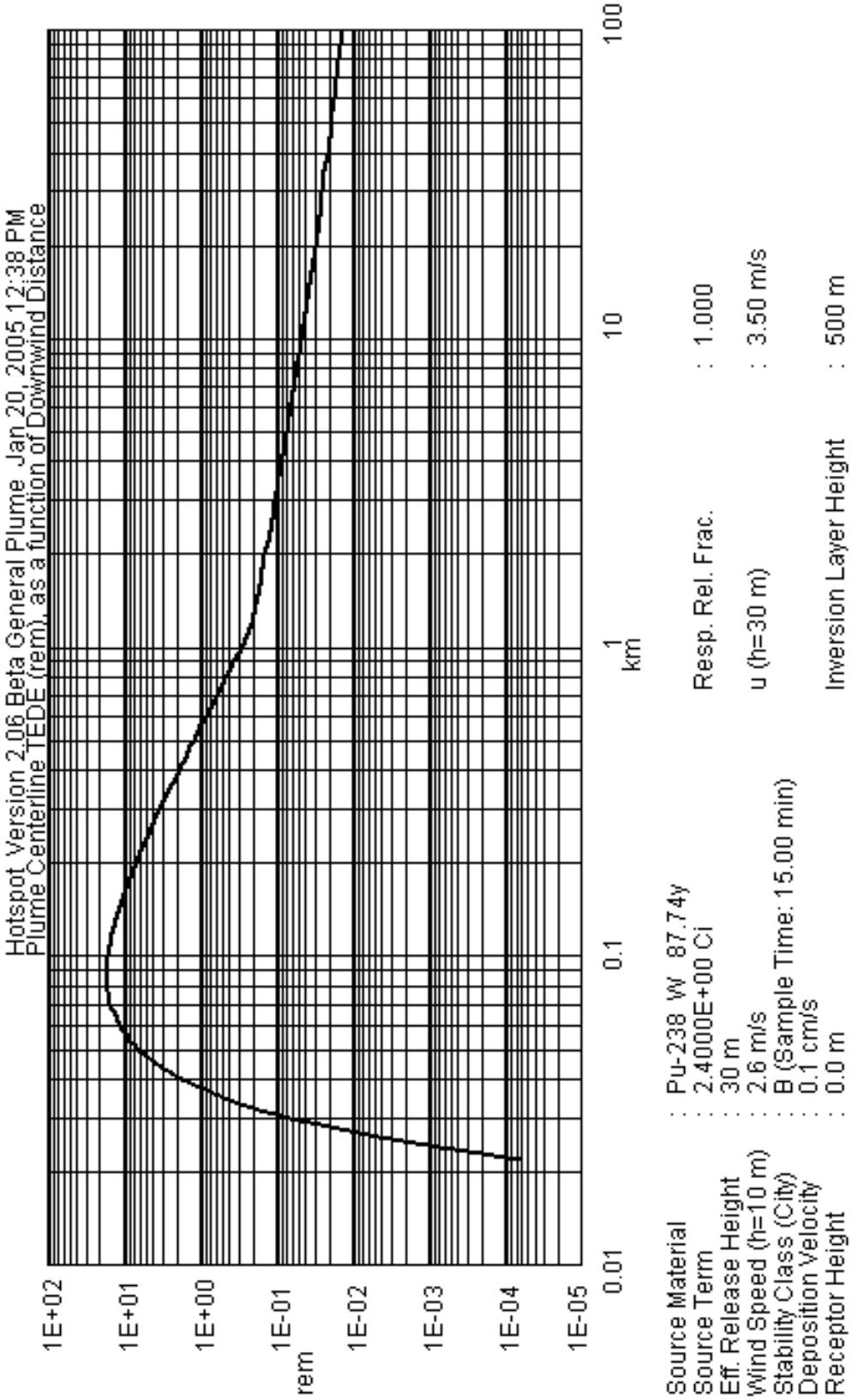
35.000	2.3E-02	1.7E-07	1.7E-04	1.9E-12	02:46	3.7686600E+01	-1.2131254E+02
40.000	2.1E-02	1.6E-07	1.6E-04	1.8E-12	03:10	3.7686600E+01	-1.2125578E+02
50.000	1.9E-02	1.4E-07	1.4E-04	1.6E-12	03:58	3.7686600E+01	-1.2114227E+02
65.000	1.6E-02	1.3E-07	1.3E-04	1.4E-12	05:09	3.7686600E+01	-1.2097201E+02
80.000	1.5E-02	1.1E-07	1.1E-04	1.3E-12	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 15.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-01 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 17 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 3.95 km
Exceeds Outer  Dose Out To : 63.50 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	3.8E+00	2.9E-05	2.9E-02	3.3E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.6E+01	1.2E-04	1.2E-01	1.3E-09	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	1.7E+01	1.3E-04	1.3E-01	1.5E-09	00:01	3.7686600E+01	-1.2170624E+02
0.500	1.4E+01	1.0E-04	1.0E-01	1.2E-09	00:03	3.7686600E+01	-1.2170415E+02
1.000	6.1E+00	4.6E-05	4.6E-02	5.2E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	1.4E+00	1.1E-05	1.1E-02	1.2E-10	00:18	3.7686600E+01	-1.2167578E+02
5.000	7.5E-01	5.8E-06	5.8E-03	6.4E-11	00:31	3.7686600E+01	-1.2165307E+02
8.000	4.3E-01	3.3E-06	3.3E-03	3.7E-11	00:50	3.7686600E+01	-1.2161902E+02
9.400	3.6E-01	2.8E-06	2.8E-03	3.1E-11	00:59	3.7686600E+01	-1.2160313E+02
10.000	3.4E-01	2.6E-06	2.6E-03	2.9E-11	01:02	3.7686600E+01	-1.2159632E+02
12.000	2.7E-01	2.1E-06	2.1E-03	2.3E-11	01:15	3.7686600E+01	-1.2157362E+02
15.000	2.2E-01	1.7E-06	1.7E-03	1.9E-11	01:34	3.7686600E+01	-1.2153956E+02
20.000	1.8E-01	1.4E-06	1.4E-03	1.6E-11	02:05	3.7686600E+01	-1.2148281E+02
25.000	1.7E-01	1.3E-06	1.3E-03	1.4E-11	02:36	3.7686600E+01	-1.2142605E+02
30.000	1.5E-01	1.2E-06	1.2E-03	1.3E-11	03:08	3.7686600E+01	-1.2136930E+02

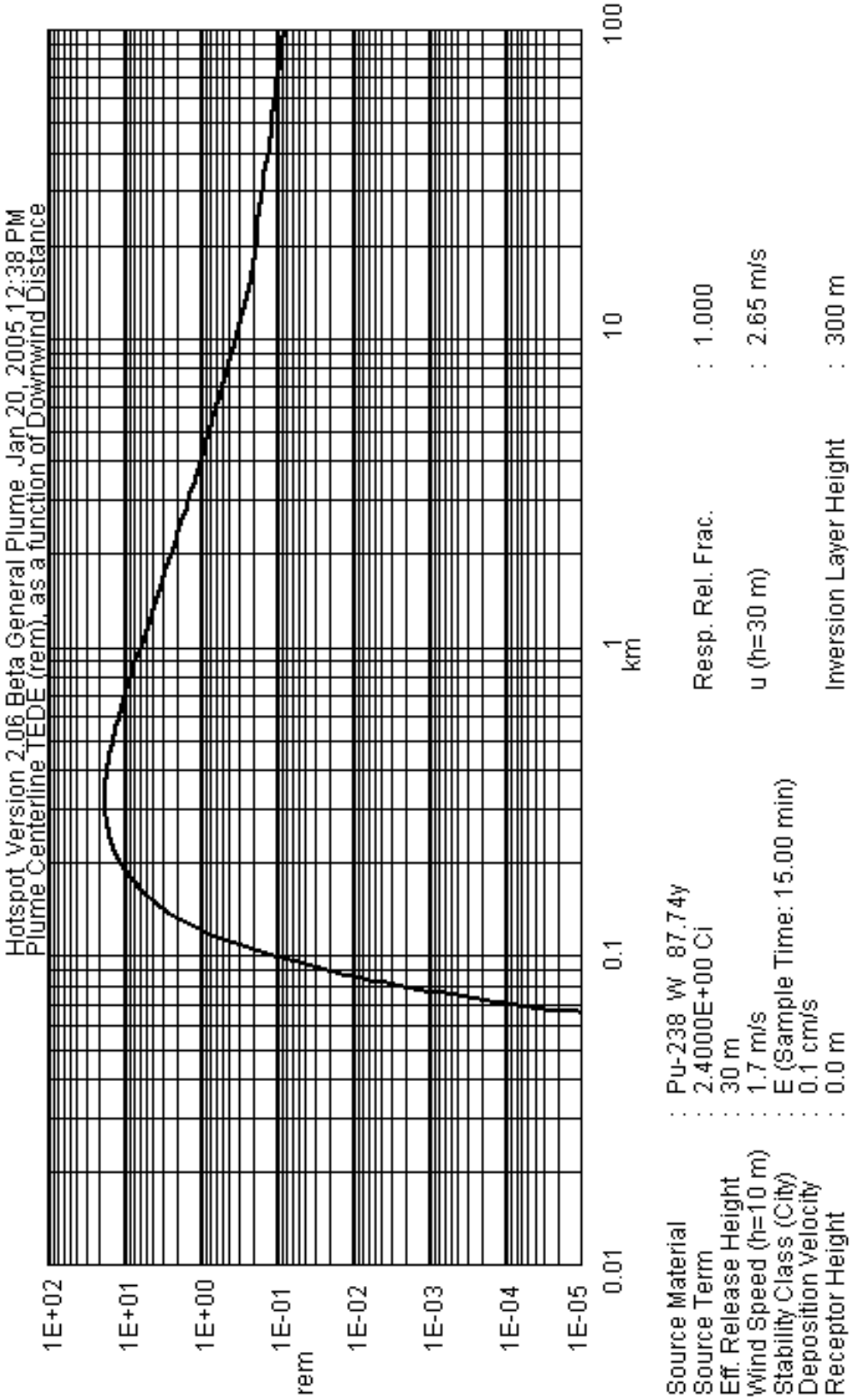
35.000	1.4E-01	1.1E-06	1.1E-03	1.2E-11	03:39	3.7686600E+01	-1.2131254E+02
40.000	1.3E-01	9.8E-07	9.8E-04	1.1E-11	04:11	3.7686600E+01	-1.2125578E+02
50.000	1.1E-01	8.7E-07	8.7E-04	9.7E-12	05:13	3.7686600E+01	-1.2114227E+02
65.000	9.9E-02	7.6E-07	7.6E-04	8.5E-12	06:48	3.7686600E+01	-1.2097201E+02
80.000	8.9E-02	6.8E-07	6.8E-04	7.6E-12	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 15.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-01 Ground Level Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : C
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   2.23E+03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.066 km
Exceeds Middle Dose Out To : 0.74 km
Exceeds Outer  Dose Out To : 3.80 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	2.2E+03	1.7E-02	1.7E+02	1.9E-06	<00:01	3.7686600E+01	-1.2170974E+02
0.030	4.1E+02	3.2E-03	3.2E+01	3.5E-07	<00:01	3.7686600E+01	-1.2170949E+02
0.150	2.1E+01	1.6E-04	1.6E+00	1.8E-08	00:01	3.7686600E+01	-1.2170813E+02
0.250	8.0E+00	6.1E-05	6.1E-01	6.8E-09	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.1E+00	1.6E-05	1.6E-01	1.8E-09	00:03	3.7686600E+01	-1.2170415E+02
1.000	5.7E-01	4.4E-06	4.4E-02	4.9E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	1.2E-01	9.1E-07	9.1E-03	1.0E-10	00:20	3.7686600E+01	-1.2167578E+02
5.000	8.3E-02	6.3E-07	6.3E-03	7.1E-11	00:33	3.7686600E+01	-1.2165307E+02
8.000	6.1E-02	4.7E-07	4.7E-03	5.2E-11	00:53	3.7686600E+01	-1.2161902E+02
9.400	5.5E-02	4.2E-07	4.2E-03	4.7E-11	01:02	3.7686600E+01	-1.2160313E+02
10.000	5.3E-02	4.1E-07	4.1E-03	4.5E-11	01:06	3.7686600E+01	-1.2159632E+02
12.000	4.7E-02	3.6E-07	3.6E-03	4.0E-11	01:20	3.7686600E+01	-1.2157362E+02
15.000	4.1E-02	3.2E-07	3.2E-03	3.5E-11	01:40	3.7686600E+01	-1.2153956E+02
20.000	3.5E-02	2.7E-07	2.7E-03	3.0E-11	02:13	3.7686600E+01	-1.2148281E+02
25.000	3.1E-02	2.4E-07	2.4E-03	2.6E-11	02:46	3.7686600E+01	-1.2142605E+02

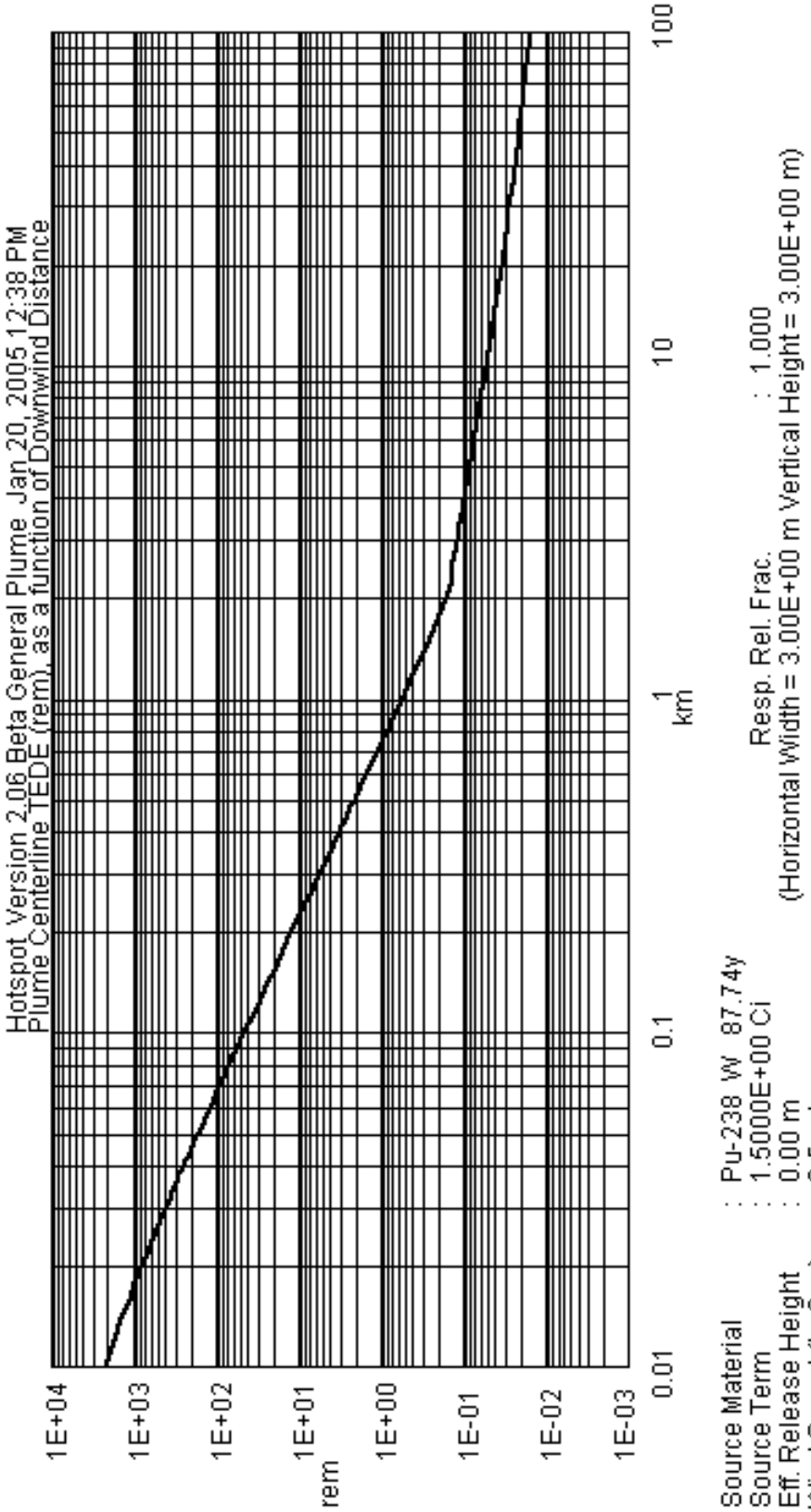
30.000	2.8E-02	2.1E-07	2.1E-03	2.4E-11	03:20	3.7686600E+01	-1.2136930E+02
35.000	2.6E-02	2.0E-07	2.0E-03	2.2E-11	03:53	3.7686600E+01	-1.2131254E+02
40.000	2.4E-02	1.8E-07	1.8E-03	2.1E-11	04:26	3.7686600E+01	-1.2125578E+02
50.000	2.1E-02	1.6E-07	1.6E-03	1.8E-11	05:33	3.7686600E+01	-1.2114227E+02
65.000	1.9E-02	1.4E-07	1.4E-03	1.6E-11	07:13	3.7686600E+01	-1.2097201E+02
80.000	1.7E-02	1.3E-07	1.3E-03	1.4E-11	08:53	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+04
1E+03
1E+02
1E+01
rem
1E+00
1E-01
1E-02
1E-03
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 15.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)
Inversion Layer Height : 500 m

"RD-01 Ground Level Release 95th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   8.07E+03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.18 km
Exceeds Middle Dose Out To : 3.11 km
Exceeds Outer  Dose Out To : 28.93 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	8.1E+03	6.2E-02	6.2E+02	6.9E-06	<00:01	3.7686600E+01	-1.2170974E+02
0.030	2.1E+03	1.6E-02	1.6E+02	1.8E-06	<00:01	3.7686600E+01	-1.2170949E+02
0.150	1.4E+02	1.1E-03	1.1E+01	1.2E-07	00:01	3.7686600E+01	-1.2170813E+02
0.250	5.7E+01	4.4E-04	4.4E+00	4.9E-08	00:02	3.7686600E+01	-1.2170699E+02
0.500	1.7E+01	1.3E-04	1.3E+00	1.4E-08	00:04	3.7686600E+01	-1.2170415E+02
1.000	5.4E+00	4.1E-05	4.1E-01	4.6E-09	00:09	3.7686600E+01	-1.2169848E+02
3.000	1.1E+00	8.1E-06	8.1E-02	9.1E-10	00:29	3.7686600E+01	-1.2167578E+02
5.000	5.4E-01	4.2E-06	4.2E-02	4.6E-10	00:49	3.7686600E+01	-1.2165307E+02
8.000	3.0E-01	2.3E-06	2.3E-02	2.6E-10	01:18	3.7686600E+01	-1.2161902E+02
9.400	2.5E-01	1.9E-06	1.9E-02	2.1E-10	01:32	3.7686600E+01	-1.2160313E+02
10.000	2.3E-01	1.8E-06	1.8E-02	2.0E-10	01:38	3.7686600E+01	-1.2159632E+02
12.000	1.9E-01	1.4E-06	1.4E-02	1.6E-10	01:57	3.7686600E+01	-1.2157362E+02
15.000	1.5E-01	1.1E-06	1.1E-02	1.3E-10	02:27	3.7686600E+01	-1.2153956E+02
20.000	1.2E-01	9.4E-07	9.4E-03	1.0E-10	03:16	3.7686600E+01	-1.2148281E+02
25.000	1.1E-01	8.4E-07	8.4E-03	9.4E-11	04:05	3.7686600E+01	-1.2142605E+02

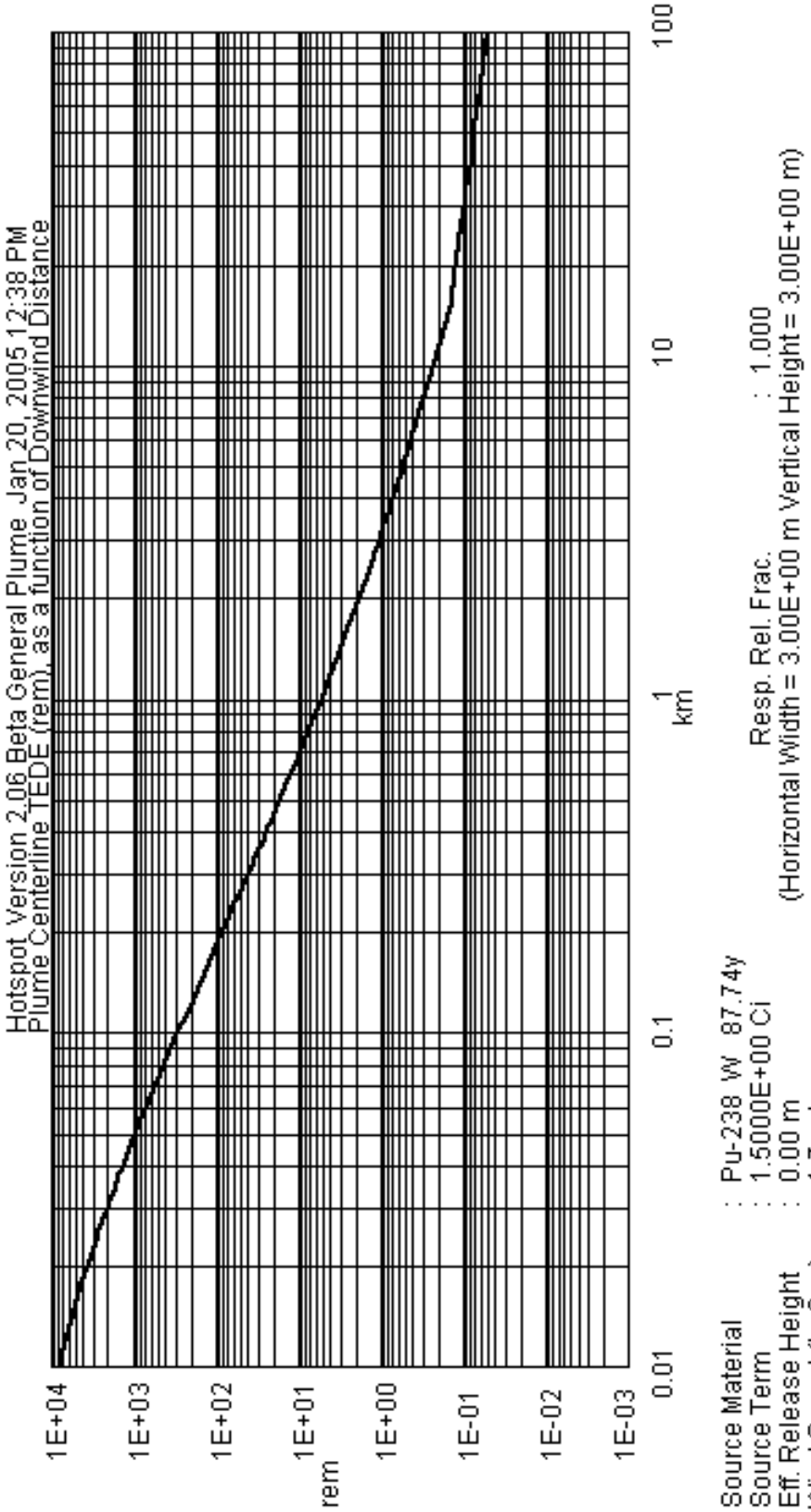
30.000	9.8E-02	7.5E-07	7.5E-03	8.4E-11	04:54	3.7686600E+01	-1.2136930E+02
35.000	9.0E-02	6.9E-07	6.9E-03	7.7E-11	05:43	3.7686600E+01	-1.2131254E+02
40.000	8.4E-02	6.4E-07	6.4E-03	7.1E-11	06:32	3.7686600E+01	-1.2125578E+02
50.000	7.4E-02	5.7E-07	5.7E-03	6.3E-11	08:10	3.7686600E+01	-1.2114227E+02
65.000	6.4E-02	4.9E-07	4.9E-03	5.5E-11	10:37	3.7686600E+01	-1.2097201E+02
80.000	5.7E-02	4.4E-07	4.4E-03	4.9E-11	13:04	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 15
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+04
1E+03
1E+02
1E+01
1E+00
1E-01
1E-02
1E-03
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 15.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)
Inversion Layer Height : 300 m

"RD-03-1 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.9000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 2.4 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.25 km
Exceeds Outer  Dose Out To : 0.92 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.0E-04	1.6E-09	1.6E-06	1.7E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	2.4E+00	1.8E-05	1.8E-02	2.0E-10	<00:01	3.7686600E+01	-1.2170861E+02
0.150	2.0E+00	1.5E-05	1.5E-02	1.7E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.0E+00	7.8E-06	7.8E-03	8.7E-11	00:01	3.7686600E+01	-1.2170699E+02
0.500	3.0E-01	2.3E-06	2.3E-03	2.6E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	8.5E-02	6.5E-07	6.5E-04	7.3E-12	00:05	3.7686600E+01	-1.2169848E+02
3.000	1.8E-02	1.4E-07	1.4E-04	1.5E-12	00:16	3.7686600E+01	-1.2167578E+02
5.000	1.3E-02	9.7E-08	9.7E-05	1.1E-12	00:26	3.7686600E+01	-1.2165307E+02
8.000	9.3E-03	7.1E-08	7.1E-05	8.0E-13	00:42	3.7686600E+01	-1.2161902E+02
9.400	8.5E-03	6.5E-08	6.5E-05	7.2E-13	00:50	3.7686600E+01	-1.2160313E+02
10.000	8.1E-03	6.2E-08	6.2E-05	7.0E-13	00:53	3.7686600E+01	-1.2159632E+02
12.000	7.3E-03	5.6E-08	5.6E-05	6.2E-13	01:04	3.7686600E+01	-1.2157362E+02
15.000	6.4E-03	4.9E-08	4.9E-05	5.5E-13	01:20	3.7686600E+01	-1.2153956E+02
20.000	5.5E-03	4.2E-08	4.2E-05	4.7E-13	01:46	3.7686600E+01	-1.2148281E+02
25.000	4.8E-03	3.7E-08	3.7E-05	4.1E-13	02:13	3.7686600E+01	-1.2142605E+02
30.000	4.4E-03	3.3E-08	3.3E-05	3.7E-13	02:40	3.7686600E+01	-1.2136930E+02

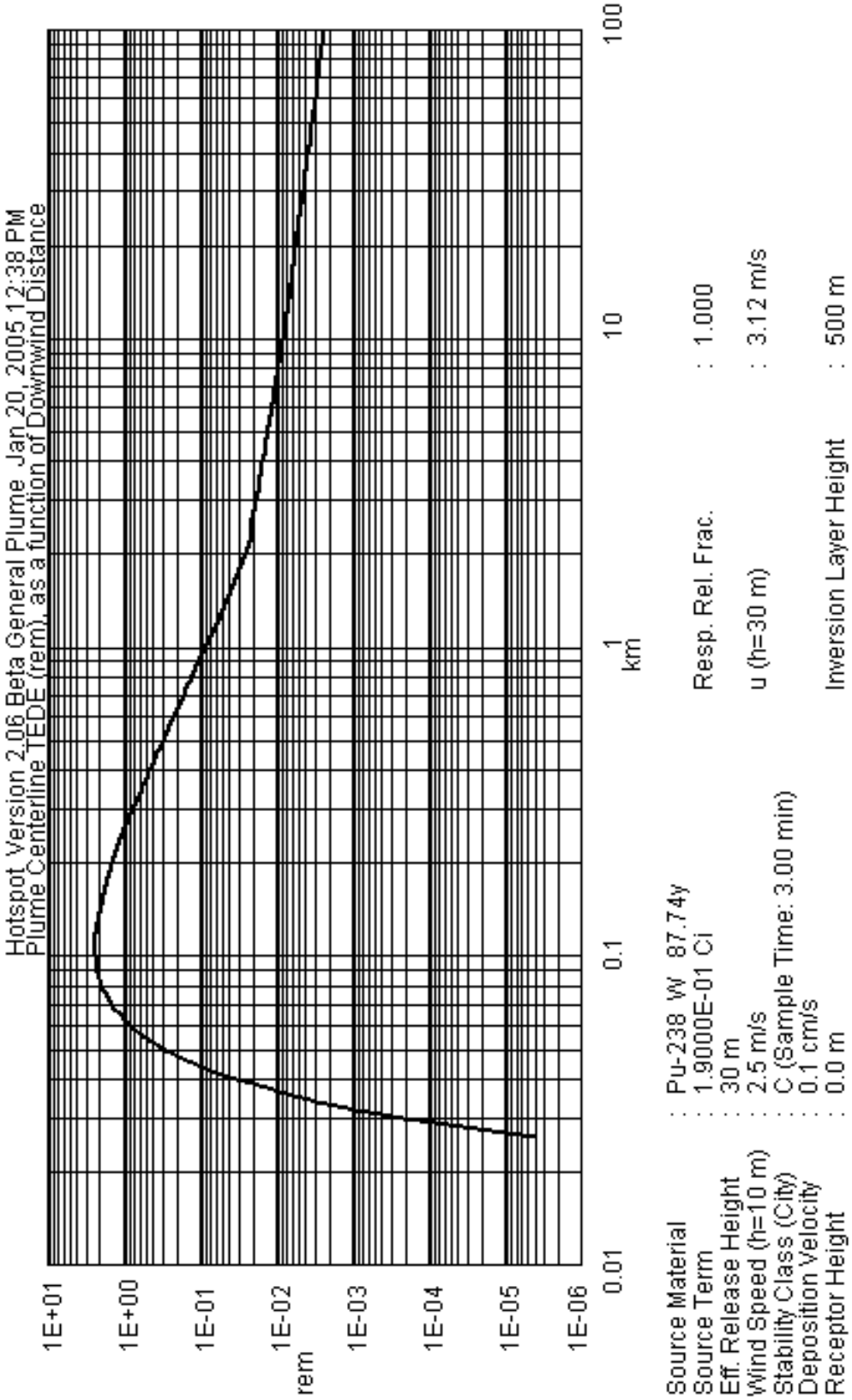
35.000	4.0E-03	3.1E-08	3.1E-05	3.4E-13	03:06	3.7686600E+01	-1.2131254E+02
40.000	3.7E-03	2.9E-08	2.9E-05	3.2E-13	03:33	3.7686600E+01	-1.2125578E+02
50.000	3.3E-03	2.5E-08	2.5E-05	2.8E-13	04:26	3.7686600E+01	-1.2114227E+02
65.000	2.9E-03	2.2E-08	2.2E-05	2.5E-13	05:46	3.7686600E+01	-1.2097201E+02
80.000	2.6E-03	2.0E-08	2.0E-05	2.2E-13	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.9E-1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.9000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-03-1 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.9000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 2.8 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.22 km
Exceeds Outer  Dose Out To : 0.69 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.1E-02	8.0E-08	8.0E-05	9.0E-13	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	2.8E+00	2.1E-05	2.1E-02	2.4E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	1.8E+00	1.4E-05	1.4E-02	1.5E-10	00:01	3.7686600E+01	-1.2170813E+02
0.250	7.7E-01	5.9E-06	5.9E-03	6.6E-11	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.0E-01	1.5E-06	1.5E-03	1.7E-11	00:03	3.7686600E+01	-1.2170415E+02
1.000	4.8E-02	3.6E-07	3.6E-04	4.1E-12	00:07	3.7686600E+01	-1.2169848E+02
3.000	4.7E-03	3.6E-08	3.6E-05	4.0E-13	00:21	3.7686600E+01	-1.2167578E+02
5.000	1.6E-03	1.2E-08	1.2E-05	1.4E-13	00:36	3.7686600E+01	-1.2165307E+02
8.000	6.1E-04	4.6E-09	4.6E-06	5.2E-14	00:58	3.7686600E+01	-1.2161902E+02
9.400	4.4E-04	3.3E-09	3.3E-06	3.7E-14	01:08	3.7686600E+01	-1.2160313E+02
10.000	3.8E-04	2.9E-09	2.9E-06	3.3E-14	01:12	3.7686600E+01	-1.2159632E+02
12.000	2.6E-04	2.0E-09	2.0E-06	2.3E-14	01:27	3.7686600E+01	-1.2157362E+02
15.000	1.7E-04	1.3E-09	1.3E-06	1.4E-14	01:49	3.7686600E+01	-1.2153956E+02
20.000	9.3E-05	7.1E-10	7.1E-07	8.0E-15	02:25	3.7686600E+01	-1.2148281E+02
25.000	5.9E-05	4.5E-10	4.5E-07	5.1E-15	03:02	3.7686600E+01	-1.2142605E+02
30.000	4.1E-05	3.1E-10	3.1E-07	3.5E-15	03:38	3.7686600E+01	-1.2136930E+02

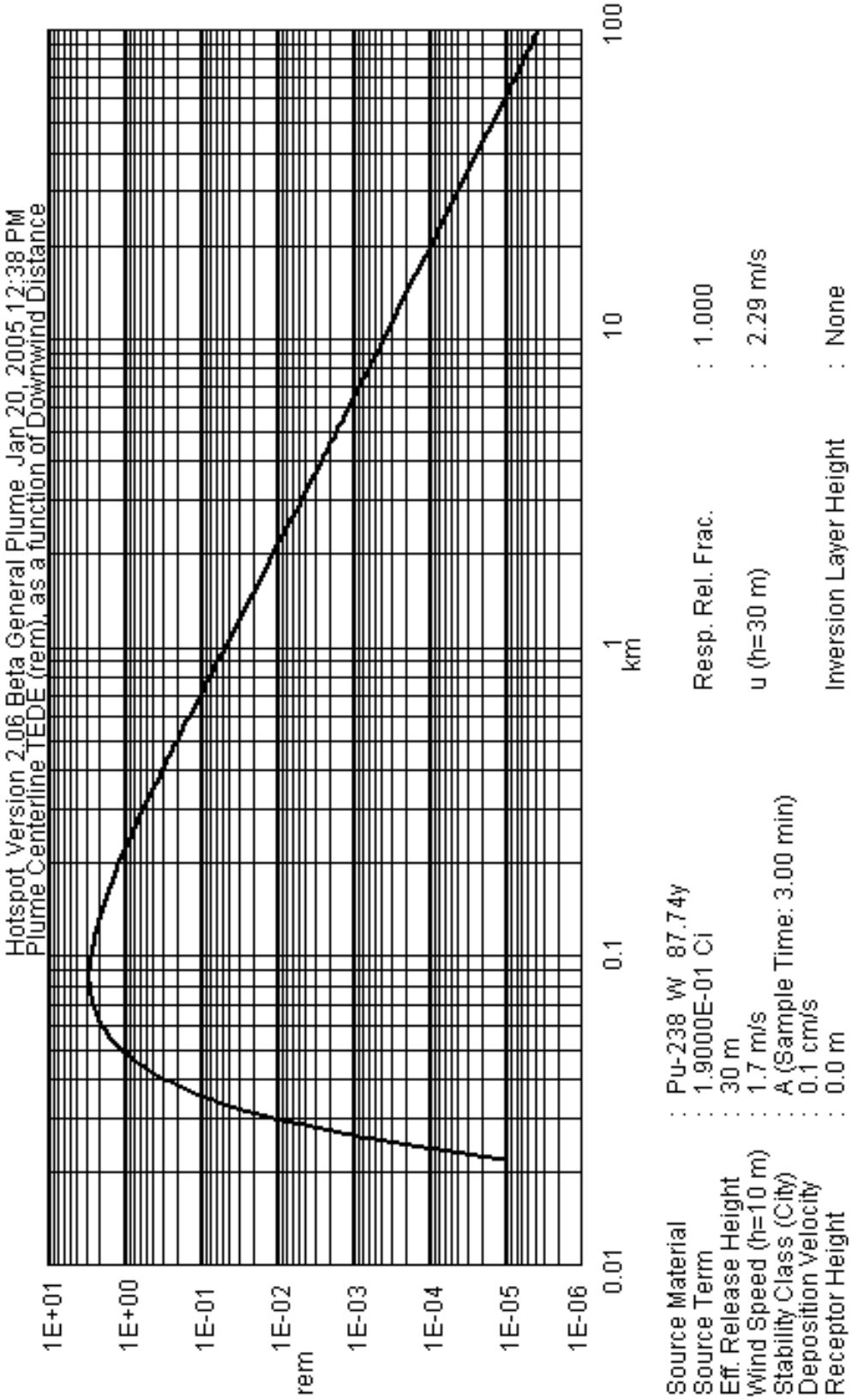
35.000	3.0E-05	2.3E-10	2.3E-07	2.6E-15	04:15	3.7686600E+01	-1.2131254E+02
40.000	2.3E-05	1.8E-10	1.8E-07	2.0E-15	04:51	3.7686600E+01	-1.2125578E+02
50.000	1.5E-05	1.1E-10	1.1E-07	1.2E-15	06:04	3.7686600E+01	-1.2114227E+02
65.000	8.6E-06	6.6E-11	6.6E-08	7.4E-16	07:54	3.7686600E+01	-1.2097201E+02
80.000	5.7E-06	4.3E-11	4.3E-08	4.8E-16	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.9E-1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.9000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-03-1 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.9000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.8 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.17 km
Exceeds Outer  Dose Out To : 0.57 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	6.9E-03	5.3E-08	5.3E-05	5.9E-13	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.8E+00	1.4E-05	1.4E-02	1.5E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	1.2E+00	8.9E-06	8.9E-03	1.0E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	5.1E-01	3.9E-06	3.9E-03	4.3E-11	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.3E-01	1.0E-06	1.0E-03	1.1E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.1E-02	2.4E-07	2.4E-04	2.7E-12	00:04	3.7686600E+01	-1.2169848E+02
3.000	1.1E-02	8.5E-08	8.5E-05	9.5E-13	00:14	3.7686600E+01	-1.2167578E+02
5.000	7.8E-03	6.0E-08	6.0E-05	6.7E-13	00:23	3.7686600E+01	-1.2165307E+02
8.000	5.8E-03	4.4E-08	4.4E-05	4.9E-13	00:38	3.7686600E+01	-1.2161902E+02
9.400	5.2E-03	4.0E-08	4.0E-05	4.5E-13	00:44	3.7686600E+01	-1.2160313E+02
10.000	5.0E-03	3.8E-08	3.8E-05	4.3E-13	00:47	3.7686600E+01	-1.2159632E+02
12.000	4.5E-03	3.5E-08	3.5E-05	3.9E-13	00:57	3.7686600E+01	-1.2157362E+02
15.000	4.0E-03	3.0E-08	3.0E-05	3.4E-13	01:11	3.7686600E+01	-1.2153956E+02
20.000	3.4E-03	2.6E-08	2.6E-05	2.9E-13	01:35	3.7686600E+01	-1.2148281E+02
25.000	3.0E-03	2.3E-08	2.3E-05	2.5E-13	01:59	3.7686600E+01	-1.2142605E+02
30.000	2.7E-03	2.1E-08	2.1E-05	2.3E-13	02:23	3.7686600E+01	-1.2136930E+02

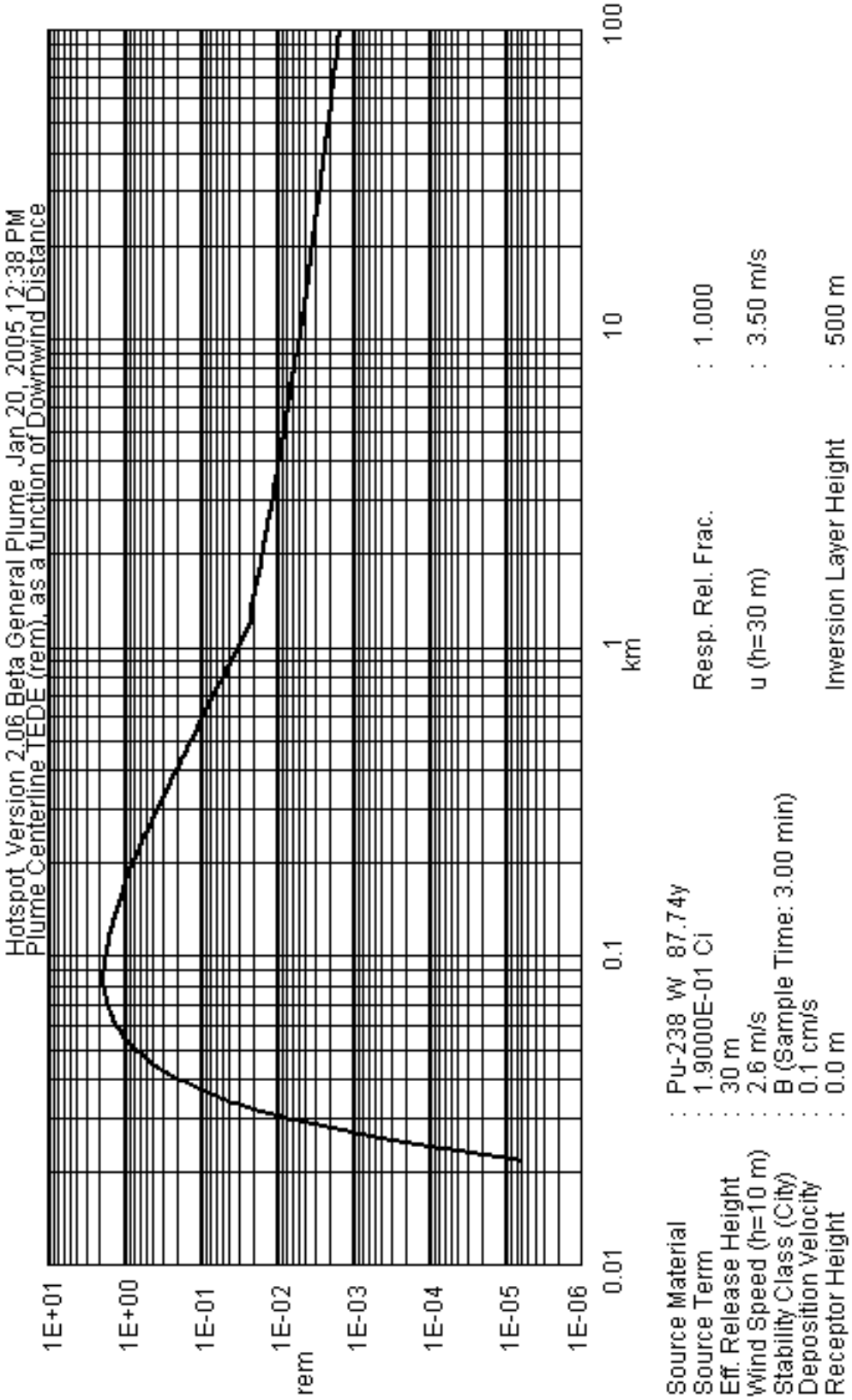
35.000	2.5E-03	1.9E-08	1.9E-05	2.1E-13	02:46	3.7686600E+01	-1.2131254E+02
40.000	2.3E-03	1.8E-08	1.8E-05	2.0E-13	03:10	3.7686600E+01	-1.2125578E+02
50.000	2.1E-03	1.6E-08	1.6E-05	1.8E-13	03:58	3.7686600E+01	-1.2114227E+02
65.000	1.8E-03	1.4E-08	1.4E-05	1.5E-13	05:09	3.7686600E+01	-1.2097201E+02
80.000	1.6E-03	1.2E-08	1.2E-05	1.4E-13	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.9E-1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.9000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-03-1 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.9000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 1.9 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.72 km
Exceeds Outer  Dose Out To : 4.24 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	4.2E-01	3.2E-06	3.2E-03	3.6E-11	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.7E+00	1.3E-05	1.3E-02	1.5E-10	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	1.9E+00	1.5E-05	1.5E-02	1.6E-10	00:01	3.7686600E+01	-1.2170624E+02
0.500	1.5E+00	1.1E-05	1.1E-02	1.3E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	6.6E-01	5.1E-06	5.1E-03	5.7E-11	00:06	3.7686600E+01	-1.2169848E+02
3.000	1.6E-01	1.2E-06	1.2E-03	1.3E-11	00:18	3.7686600E+01	-1.2167578E+02
5.000	8.2E-02	6.3E-07	6.3E-04	7.0E-12	00:31	3.7686600E+01	-1.2165307E+02
8.000	4.7E-02	3.6E-07	3.6E-04	4.0E-12	00:50	3.7686600E+01	-1.2161902E+02
9.400	3.9E-02	3.0E-07	3.0E-04	3.4E-12	00:59	3.7686600E+01	-1.2160313E+02
10.000	3.7E-02	2.8E-07	2.8E-04	3.1E-12	01:02	3.7686600E+01	-1.2159632E+02
12.000	3.0E-02	2.3E-07	2.3E-04	2.5E-12	01:15	3.7686600E+01	-1.2157362E+02
15.000	2.4E-02	1.8E-07	1.8E-04	2.0E-12	01:34	3.7686600E+01	-1.2153956E+02
20.000	2.0E-02	1.5E-07	1.5E-04	1.7E-12	02:05	3.7686600E+01	-1.2148281E+02
25.000	1.8E-02	1.4E-07	1.4E-04	1.6E-12	02:36	3.7686600E+01	-1.2142605E+02
30.000	1.6E-02	1.3E-07	1.3E-04	1.4E-12	03:08	3.7686600E+01	-1.2136930E+02

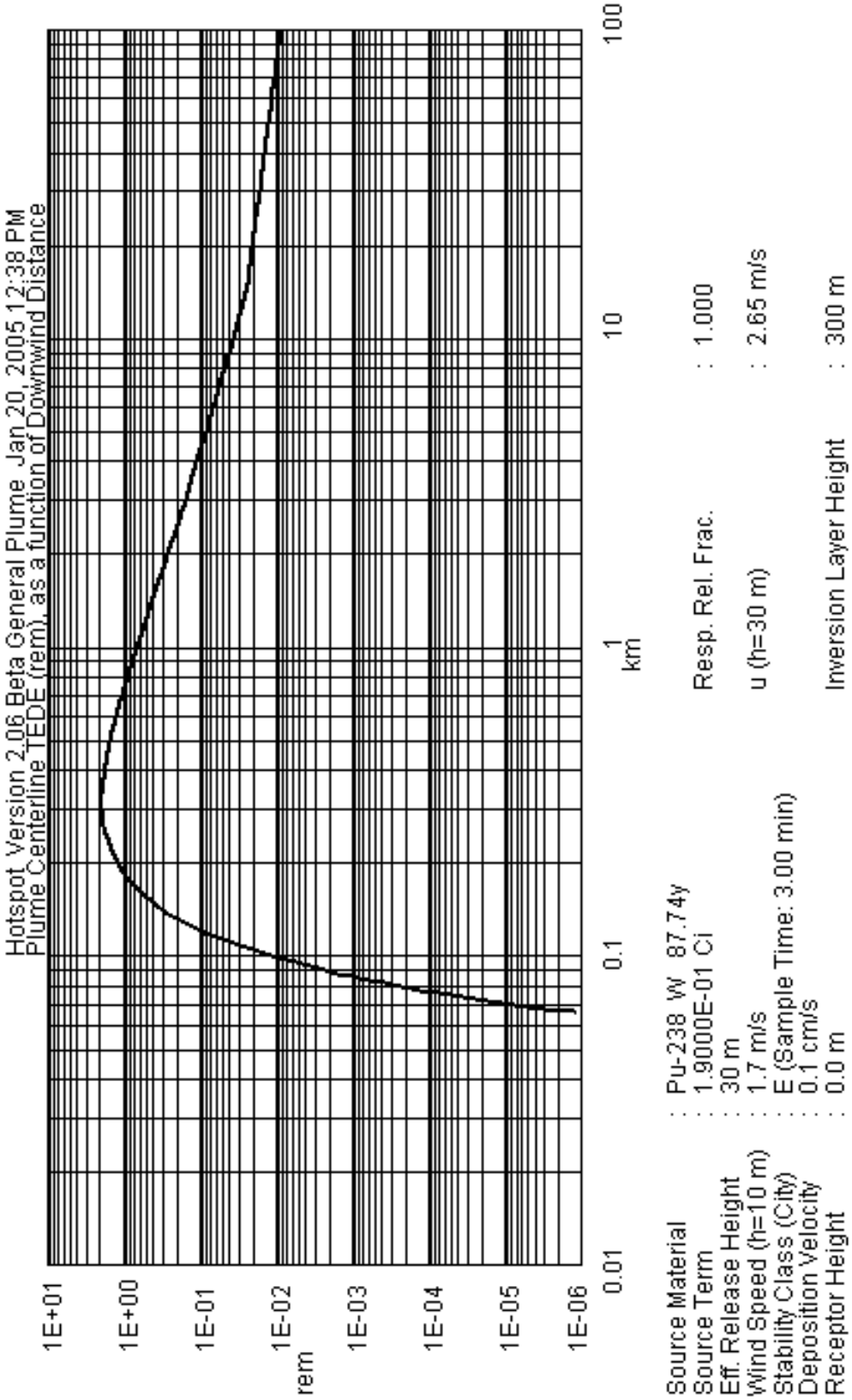
35.000	1.5E-02	1.2E-07	1.2E-04	1.3E-12	03:39	3.7686600E+01	-1.2131254E+02
40.000	1.4E-02	1.1E-07	1.1E-04	1.2E-12	04:11	3.7686600E+01	-1.2125578E+02
50.000	1.2E-02	9.5E-08	9.5E-05	1.1E-12	05:13	3.7686600E+01	-1.2114227E+02
65.000	1.1E-02	8.3E-08	8.3E-05	9.2E-13	06:48	3.7686600E+01	-1.2097201E+02
80.000	9.7E-03	7.4E-08	7.4E-05	8.3E-13	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.9E-1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.9000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-03-2 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.9000E-05 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 4.85E-04 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.2E-08	3.2E-13	3.2E-10	3.6E-18	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	4.9E-04	3.7E-09	3.7E-06	4.1E-14	<00:01	3.7686600E+01	-1.2170861E+02
0.150	4.1E-04	3.1E-09	3.1E-06	3.5E-14	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.1E-04	1.6E-09	1.6E-06	1.8E-14	00:01	3.7686600E+01	-1.2170699E+02
0.500	6.3E-05	4.8E-10	4.8E-07	5.3E-15	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.7E-05	1.3E-10	1.3E-07	1.5E-15	00:05	3.7686600E+01	-1.2169848E+02
3.000	3.7E-06	2.8E-11	2.8E-08	3.2E-16	00:16	3.7686600E+01	-1.2167578E+02
5.000	2.6E-06	2.0E-11	2.0E-08	2.2E-16	00:26	3.7686600E+01	-1.2165307E+02
8.000	1.9E-06	1.5E-11	1.5E-08	1.6E-16	00:42	3.7686600E+01	-1.2161902E+02
9.400	1.7E-06	1.3E-11	1.3E-08	1.5E-16	00:50	3.7686600E+01	-1.2160313E+02
10.000	1.7E-06	1.3E-11	1.3E-08	1.4E-16	00:53	3.7686600E+01	-1.2159632E+02
12.000	1.5E-06	1.1E-11	1.1E-08	1.3E-16	01:04	3.7686600E+01	-1.2157362E+02
15.000	1.3E-06	1.0E-11	1.0E-08	1.1E-16	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.1E-06	8.6E-12	8.6E-09	9.6E-17	01:46	3.7686600E+01	-1.2148281E+02
25.000	9.9E-07	7.6E-12	7.6E-09	8.5E-17	02:13	3.7686600E+01	-1.2142605E+02
30.000	9.0E-07	6.9E-12	6.9E-09	7.7E-17	02:40	3.7686600E+01	-1.2136930E+02

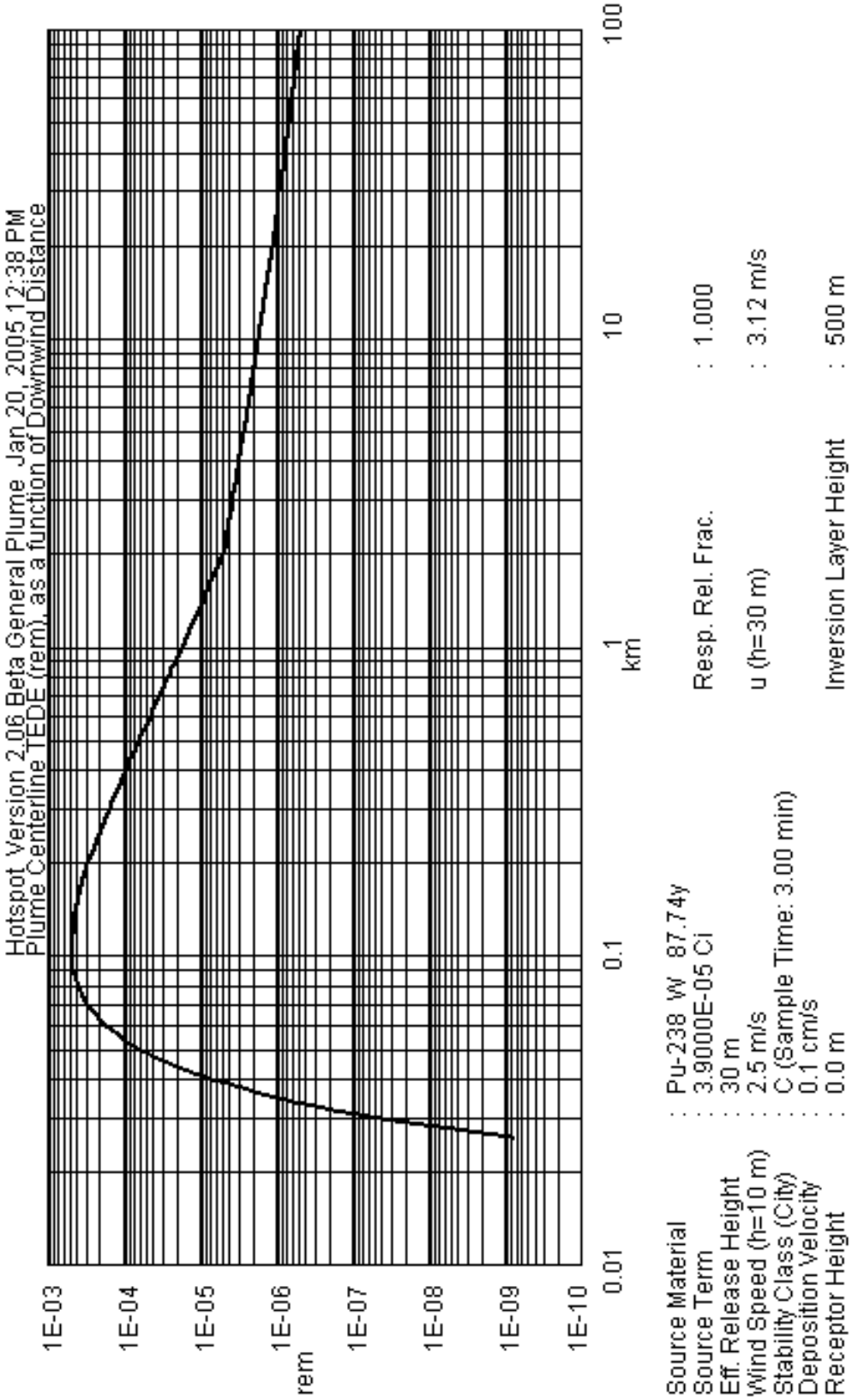
35.000	8.2E-07	6.3E-12	6.3E-09	7.0E-17	03:06	3.7686600E+01	-1.2131254E+02
40.000	7.7E-07	5.9E-12	5.9E-09	6.6E-17	03:33	3.7686600E+01	-1.2125578E+02
50.000	6.8E-07	5.2E-12	5.2E-09	5.8E-17	04:26	3.7686600E+01	-1.2114227E+02
65.000	5.9E-07	4.6E-12	4.6E-09	5.1E-17	05:46	3.7686600E+01	-1.2097201E+02
80.000	5.3E-07	4.1E-12	4.1E-09	4.6E-17	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.9e-5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-03
1E-04
1E-05
1E-06
rem
1E-07
1E-08
1E-09
1E-10
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.9000E-05 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-03-2 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.9000E-05 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 5.68E-04 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.2E-06	1.7E-11	1.7E-08	1.8E-16	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	5.7E-04	4.4E-09	4.4E-06	4.9E-14	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.7E-04	2.8E-09	2.8E-06	3.1E-14	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.6E-04	1.2E-09	1.2E-06	1.4E-14	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.1E-05	3.1E-10	3.1E-07	3.5E-15	00:03	3.7686600E+01	-1.2170415E+02
1.000	9.8E-06	7.5E-11	7.5E-08	8.3E-16	00:07	3.7686600E+01	-1.2169848E+02
3.000	9.6E-07	7.4E-12	7.4E-09	8.2E-17	00:21	3.7686600E+01	-1.2167578E+02
5.000	3.3E-07	2.5E-12	2.5E-09	2.8E-17	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.2E-07	9.5E-13	9.5E-10	1.1E-17	00:58	3.7686600E+01	-1.2161902E+02
9.400	8.9E-08	6.8E-13	6.8E-10	7.6E-18	01:08	3.7686600E+01	-1.2160313E+02
10.000	7.9E-08	6.0E-13	6.0E-10	6.7E-18	01:12	3.7686600E+01	-1.2159632E+02
12.000	5.4E-08	4.1E-13	4.1E-10	4.6E-18	01:27	3.7686600E+01	-1.2157362E+02
15.000	3.4E-08	2.6E-13	2.6E-10	2.9E-18	01:49	3.7686600E+01	-1.2153956E+02
20.000	1.9E-08	1.5E-13	1.5E-10	1.6E-18	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.2E-08	9.3E-14	9.3E-11	1.0E-18	03:02	3.7686600E+01	-1.2142605E+02
30.000	8.4E-09	6.4E-14	6.4E-11	0.0E+00	03:38	3.7686600E+01	-1.2136930E+02

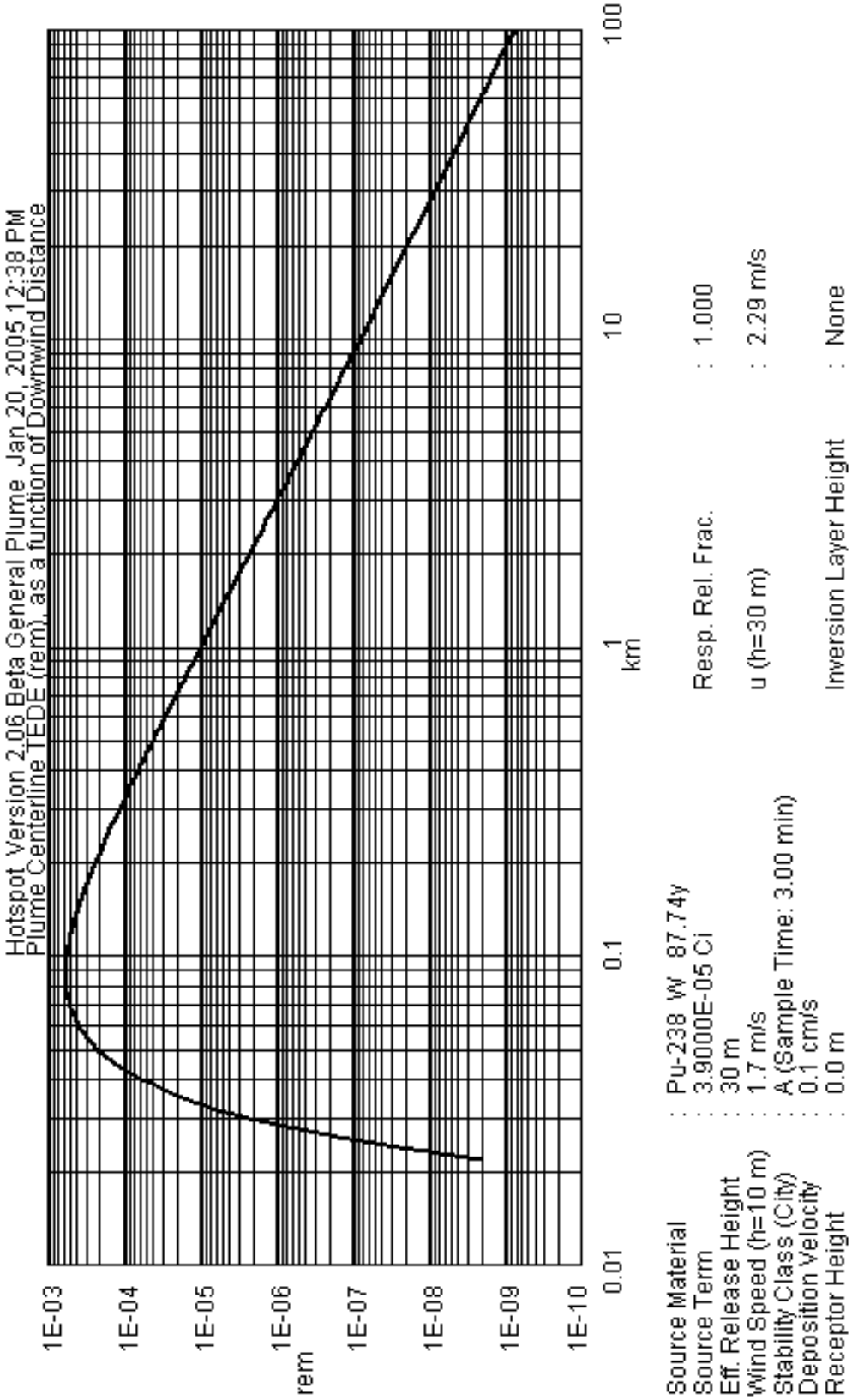
35.000	6.1E-09	4.7E-14	4.7E-11	0.0E+00	04:15	3.7686600E+01	-1.2131254E+02
40.000	4.7E-09	3.6E-14	3.6E-11	0.0E+00	04:51	3.7686600E+01	-1.2125578E+02
50.000	3.0E-09	2.3E-14	2.3E-11	0.0E+00	06:04	3.7686600E+01	-1.2114227E+02
65.000	1.8E-09	1.4E-14	1.4E-11	0.0E+00	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.2E-09	8.9E-15	8.9E-12	0.0E+00	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.9e-5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-03
1E-04
1E-05
1E-06
rem
1E-07
1E-08
1E-09
1E-10
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.9000E-05 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-03-2 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.9000E-05 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 3.72E-04 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.4E-06	1.1E-11	1.1E-08	1.2E-16	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	3.7E-04	2.8E-09	2.8E-06	3.2E-14	<00:01	3.7686600E+01	-1.2170884E+02
0.150	2.4E-04	1.8E-09	1.8E-06	2.1E-14	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.0E-04	8.0E-10	8.0E-07	8.9E-15	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.7E-05	2.1E-10	2.1E-07	2.3E-15	00:02	3.7686600E+01	-1.2170415E+02
1.000	6.4E-06	4.9E-11	4.9E-08	5.5E-16	00:04	3.7686600E+01	-1.2169848E+02
3.000	2.3E-06	1.7E-11	1.7E-08	2.0E-16	00:14	3.7686600E+01	-1.2167578E+02
5.000	1.6E-06	1.2E-11	1.2E-08	1.4E-16	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.2E-06	9.1E-12	9.1E-09	1.0E-16	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.1E-06	8.2E-12	8.2E-09	9.2E-17	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.0E-06	7.9E-12	7.9E-09	8.8E-17	00:47	3.7686600E+01	-1.2159632E+02
12.000	9.3E-07	7.1E-12	7.1E-09	7.9E-17	00:57	3.7686600E+01	-1.2157362E+02
15.000	8.1E-07	6.2E-12	6.2E-09	7.0E-17	01:11	3.7686600E+01	-1.2153956E+02
20.000	6.9E-07	5.3E-12	5.3E-09	5.9E-17	01:35	3.7686600E+01	-1.2148281E+02
25.000	6.1E-07	4.7E-12	4.7E-09	5.2E-17	01:59	3.7686600E+01	-1.2142605E+02
30.000	5.5E-07	4.2E-12	4.2E-09	4.7E-17	02:23	3.7686600E+01	-1.2136930E+02

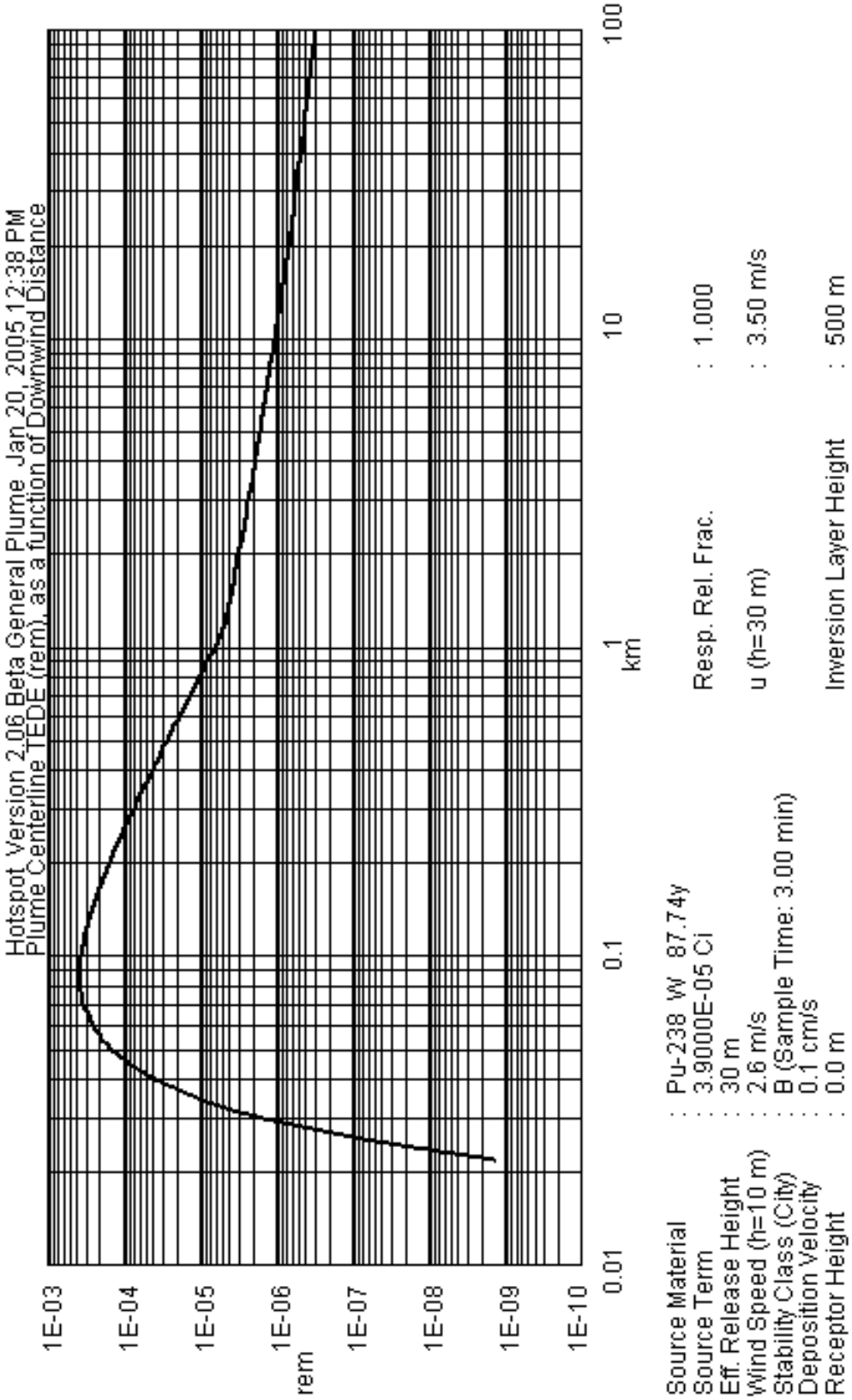
35.000	5.1E-07	3.9E-12	3.9E-09	4.4E-17	02:46	3.7686600E+01	-1.2131254E+02
40.000	4.8E-07	3.6E-12	3.6E-09	4.1E-17	03:10	3.7686600E+01	-1.2125578E+02
50.000	4.2E-07	3.2E-12	3.2E-09	3.6E-17	03:58	3.7686600E+01	-1.2114227E+02
65.000	3.7E-07	2.8E-12	2.8E-09	3.2E-17	05:09	3.7686600E+01	-1.2097201E+02
80.000	3.3E-07	2.5E-12	2.5E-09	2.8E-17	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.9e-5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-03
1E-04
1E-05
1E-06
rem
1E-07
1E-08
1E-09
1E-10
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.9000E-05 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-03-2 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.9000E-05 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 3.89E-04 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	8.6E-05	6.6E-10	6.6E-07	7.3E-15	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.5E-04	2.7E-09	2.7E-06	3.0E-14	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	3.9E-04	3.0E-09	3.0E-06	3.3E-14	00:01	3.7686600E+01	-1.2170624E+02
0.500	3.1E-04	2.3E-09	2.3E-06	2.6E-14	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.4E-04	1.0E-09	1.0E-06	1.2E-14	00:06	3.7686600E+01	-1.2169848E+02
3.000	3.2E-05	2.4E-10	2.4E-07	2.7E-15	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.7E-05	1.3E-10	1.3E-07	1.4E-15	00:31	3.7686600E+01	-1.2165307E+02
8.000	9.7E-06	7.4E-11	7.4E-08	8.3E-16	00:50	3.7686600E+01	-1.2161902E+02
9.400	8.1E-06	6.2E-11	6.2E-08	6.9E-16	00:59	3.7686600E+01	-1.2160313E+02
10.000	7.5E-06	5.8E-11	5.8E-08	6.4E-16	01:02	3.7686600E+01	-1.2159632E+02
12.000	6.1E-06	4.7E-11	4.7E-08	5.2E-16	01:15	3.7686600E+01	-1.2157362E+02
15.000	4.9E-06	3.7E-11	3.7E-08	4.2E-16	01:34	3.7686600E+01	-1.2153956E+02
20.000	4.1E-06	3.2E-11	3.2E-08	3.5E-16	02:05	3.7686600E+01	-1.2148281E+02
25.000	3.7E-06	2.9E-11	2.9E-08	3.2E-16	02:36	3.7686600E+01	-1.2142605E+02
30.000	3.4E-06	2.6E-11	2.6E-08	2.9E-16	03:08	3.7686600E+01	-1.2136930E+02

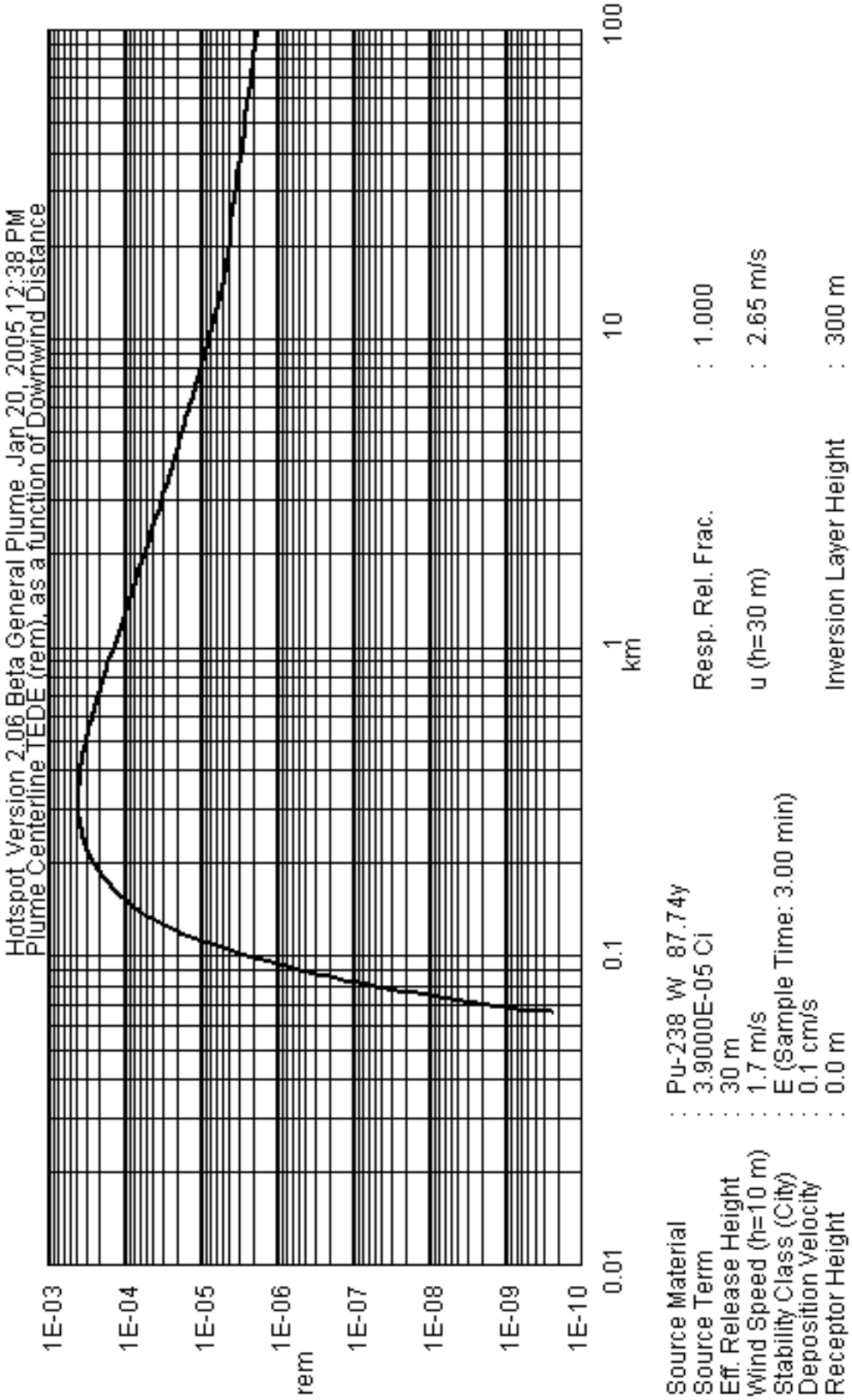
35.000	3.1E-06	2.4E-11	2.4E-08	2.7E-16	03:39	3.7686600E+01	-1.2131254E+02
40.000	2.9E-06	2.2E-11	2.2E-08	2.5E-16	04:11	3.7686600E+01	-1.2125578E+02
50.000	2.6E-06	2.0E-11	2.0E-08	2.2E-16	05:13	3.7686600E+01	-1.2114227E+02
65.000	2.2E-06	1.7E-11	1.7E-08	1.9E-16	06:48	3.7686600E+01	-1.2097201E+02
80.000	2.0E-06	1.5E-11	1.5E-08	1.7E-16	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.9e-5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:38 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-03
1E-04
1E-05
1E-06
rem
1E-07
1E-08
1E-09
1E-10
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.9000E-05 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-04 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 0.103 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.12 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	8.9E-06	6.8E-11	6.8E-08	7.6E-16	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	1.0E-01	7.9E-07	7.9E-04	8.8E-12	<00:01	3.7686600E+01	-1.2170861E+02
0.150	8.7E-02	6.7E-07	6.7E-04	7.4E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.4E-02	3.4E-07	3.4E-04	3.8E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.3E-02	1.0E-07	1.0E-04	1.1E-12	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.7E-03	2.8E-08	2.8E-05	3.2E-13	00:05	3.7686600E+01	-1.2169848E+02
3.000	7.9E-04	6.0E-09	6.0E-06	6.7E-14	00:16	3.7686600E+01	-1.2167578E+02
5.000	5.5E-04	4.2E-09	4.2E-06	4.7E-14	00:26	3.7686600E+01	-1.2165307E+02
8.000	4.1E-04	3.1E-09	3.1E-06	3.5E-14	00:42	3.7686600E+01	-1.2161902E+02
9.400	3.7E-04	2.8E-09	2.8E-06	3.2E-14	00:50	3.7686600E+01	-1.2160313E+02
10.000	3.6E-04	2.7E-09	2.7E-06	3.0E-14	00:53	3.7686600E+01	-1.2159632E+02
12.000	3.2E-04	2.4E-09	2.4E-06	2.7E-14	01:04	3.7686600E+01	-1.2157362E+02
15.000	2.8E-04	2.1E-09	2.1E-06	2.4E-14	01:20	3.7686600E+01	-1.2153956E+02
20.000	2.4E-04	1.8E-09	1.8E-06	2.0E-14	01:46	3.7686600E+01	-1.2148281E+02
25.000	2.1E-04	1.6E-09	1.6E-06	1.8E-14	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.9E-04	1.5E-09	1.5E-06	1.6E-14	02:40	3.7686600E+01	-1.2136930E+02

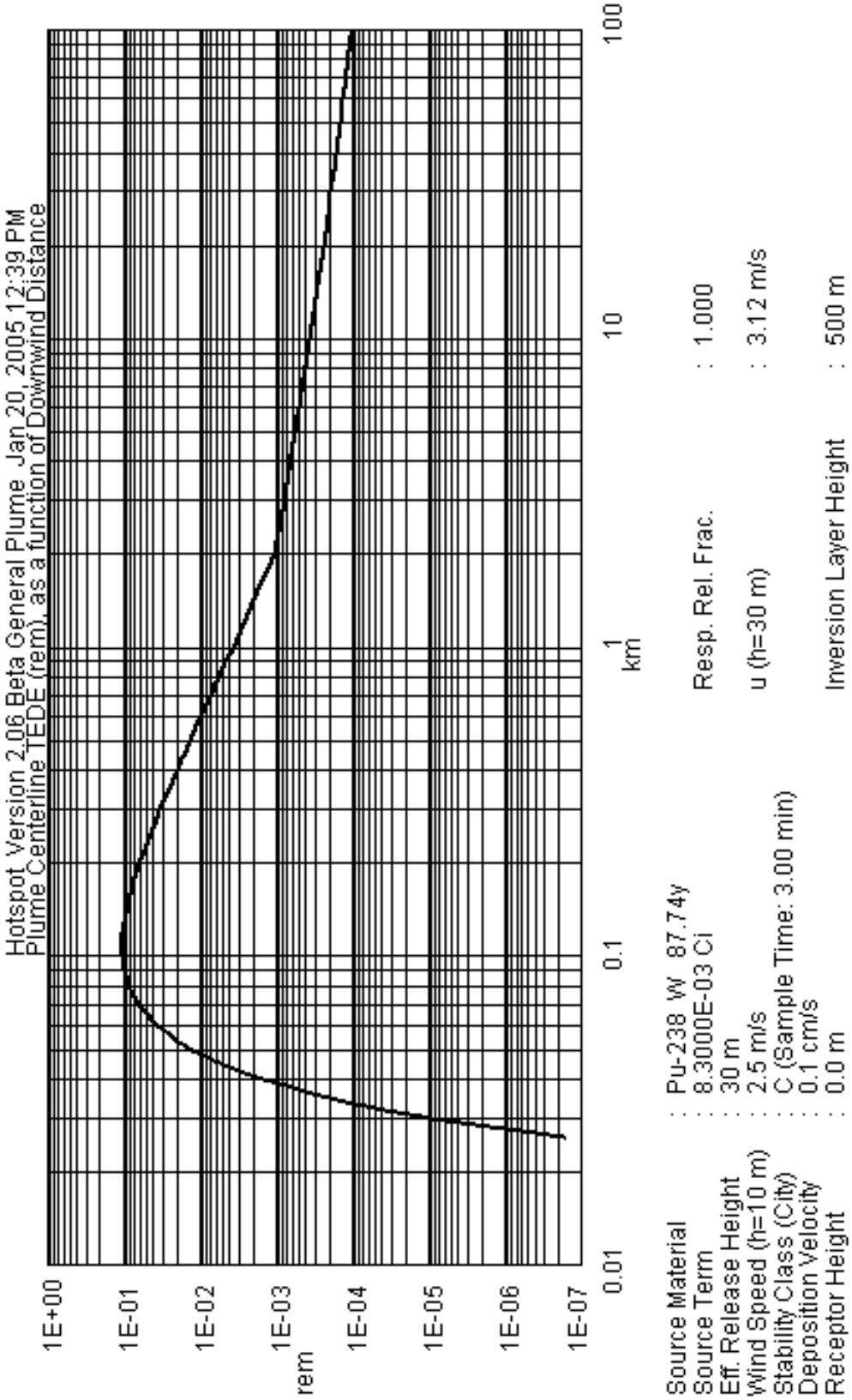
35.000	1.8E-04	1.3E-09	1.3E-06	1.5E-14	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.6E-04	1.3E-09	1.3E-06	1.4E-14	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.5E-04	1.1E-09	1.1E-06	1.2E-14	04:26	3.7686600E+01	-1.2114227E+02
65.000	1.3E-04	9.7E-10	9.7E-07	1.1E-14	05:46	3.7686600E+01	-1.2097201E+02
80.000	1.1E-04	8.7E-10	8.7E-07	9.7E-15	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0083
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
rem
1E-04
1E-05
1E-06
1E-07
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-04 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.121 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.12 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.6E-04	3.5E-09	3.5E-06	3.9E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.2E-01	9.3E-07	9.3E-04	1.0E-11	<00:01	3.7686600E+01	-1.2170884E+02
0.150	7.8E-02	6.0E-07	6.0E-04	6.7E-12	00:01	3.7686600E+01	-1.2170813E+02
0.250	3.4E-02	2.6E-07	2.6E-04	2.9E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	8.7E-03	6.7E-08	6.7E-05	7.5E-13	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.1E-03	1.6E-08	1.6E-05	1.8E-13	00:07	3.7686600E+01	-1.2169848E+02
3.000	2.0E-04	1.6E-09	1.6E-06	1.8E-14	00:21	3.7686600E+01	-1.2167578E+02
5.000	7.0E-05	5.4E-10	5.4E-07	6.0E-15	00:36	3.7686600E+01	-1.2165307E+02
8.000	2.7E-05	2.0E-10	2.0E-07	2.3E-15	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.9E-05	1.5E-10	1.5E-07	1.6E-15	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.7E-05	1.3E-10	1.3E-07	1.4E-15	01:12	3.7686600E+01	-1.2159632E+02
12.000	1.2E-05	8.8E-11	8.8E-08	9.8E-16	01:27	3.7686600E+01	-1.2157362E+02
15.000	7.3E-06	5.6E-11	5.6E-08	6.2E-16	01:49	3.7686600E+01	-1.2153956E+02
20.000	4.1E-06	3.1E-11	3.1E-08	3.5E-16	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.6E-06	2.0E-11	2.0E-08	2.2E-16	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.8E-06	1.4E-11	1.4E-08	1.5E-16	03:38	3.7686600E+01	-1.2136930E+02

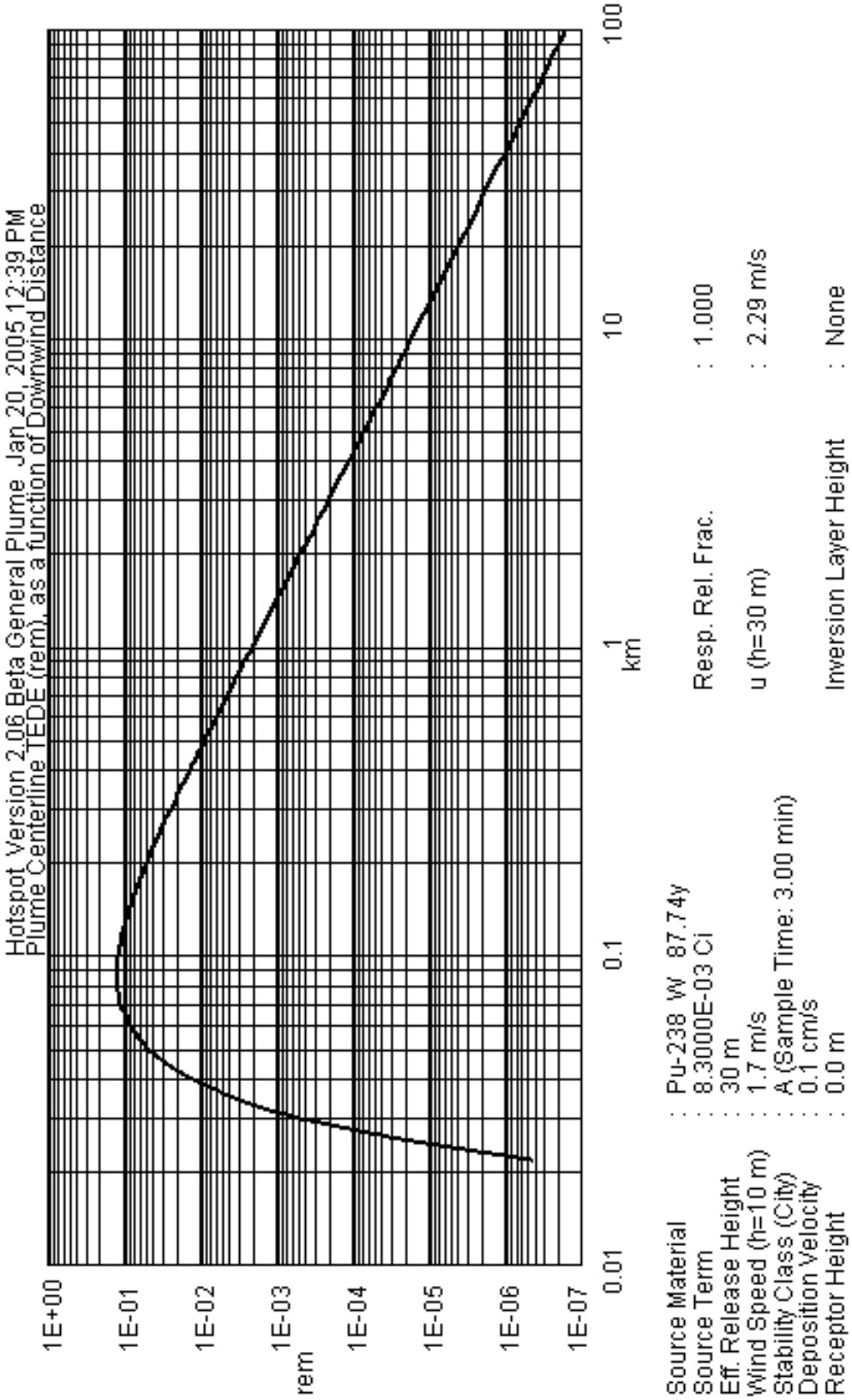
35.000	1.3E-06	1.0E-11	1.0E-08	1.1E-16	04:15	3.7686600E+01	-1.2131254E+02
40.000	1.0E-06	7.7E-12	7.7E-09	8.5E-17	04:51	3.7686600E+01	-1.2125578E+02
50.000	6.4E-07	4.9E-12	4.9E-09	5.4E-17	06:04	3.7686600E+01	-1.2114227E+02
65.000	3.8E-07	2.9E-12	2.9E-09	3.2E-17	07:54	3.7686600E+01	-1.2097201E+02
80.000	2.5E-07	1.9E-12	1.9E-09	2.1E-17	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0083
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
1E-04
1E-05
1E-06
1E-07
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 8.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-04 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.079 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	3.0E-04	2.3E-09	2.3E-06	2.6E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	7.9E-02	6.1E-07	6.1E-04	6.8E-12	<00:01	3.7686600E+01	-1.2170884E+02
0.150	5.1E-02	3.9E-07	3.9E-04	4.4E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.2E-02	1.7E-07	1.7E-04	1.9E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	5.7E-03	4.4E-08	4.4E-05	4.9E-13	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.4E-03	1.0E-08	1.0E-05	1.2E-13	00:04	3.7686600E+01	-1.2169848E+02
3.000	4.9E-04	3.7E-09	3.7E-06	4.2E-14	00:14	3.7686600E+01	-1.2167578E+02
5.000	3.4E-04	2.6E-09	2.6E-06	2.9E-14	00:23	3.7686600E+01	-1.2165307E+02
8.000	2.5E-04	1.9E-09	1.9E-06	2.2E-14	00:38	3.7686600E+01	-1.2161902E+02
9.400	2.3E-04	1.7E-09	1.7E-06	1.9E-14	00:44	3.7686600E+01	-1.2160313E+02
10.000	2.2E-04	1.7E-09	1.7E-06	1.9E-14	00:47	3.7686600E+01	-1.2159632E+02
12.000	2.0E-04	1.5E-09	1.5E-06	1.7E-14	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.7E-04	1.3E-09	1.3E-06	1.5E-14	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.5E-04	1.1E-09	1.1E-06	1.3E-14	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.3E-04	1.0E-09	1.0E-06	1.1E-14	01:59	3.7686600E+01	-1.2142605E+02
30.000	1.2E-04	9.0E-10	9.0E-07	1.0E-14	02:23	3.7686600E+01	-1.2136930E+02

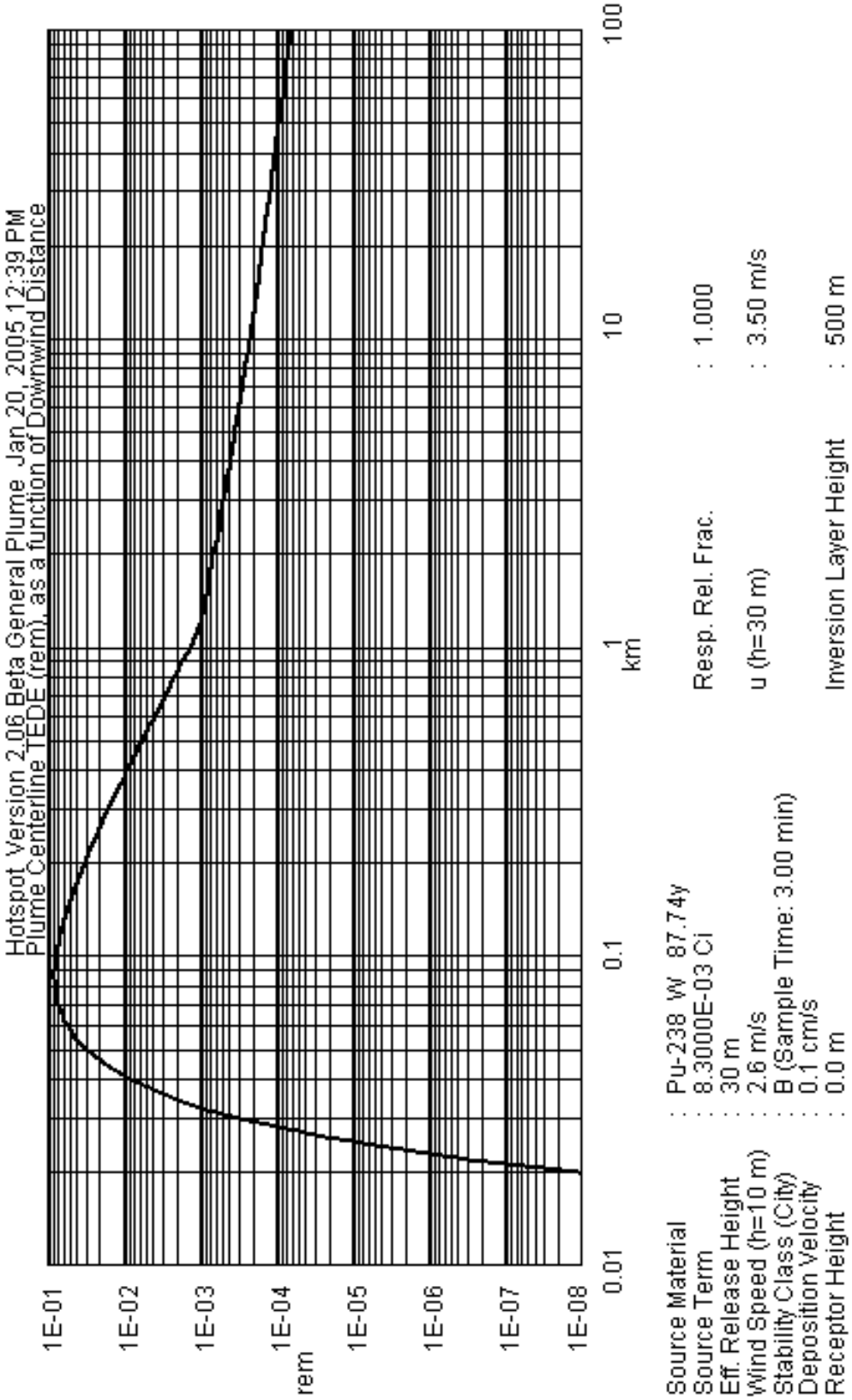
35.000	1.1E-04	8.3E-10	8.3E-07	9.3E-15	02:46	3.7686600E+01	-1.2131254E+02
40.000	1.0E-04	7.7E-10	7.7E-07	8.6E-15	03:10	3.7686600E+01	-1.2125578E+02
50.000	9.0E-05	6.9E-10	6.9E-07	7.7E-15	03:58	3.7686600E+01	-1.2114227E+02
65.000	7.8E-05	6.0E-10	6.0E-07	6.7E-15	05:09	3.7686600E+01	-1.2097201E+02
80.000	7.0E-05	5.4E-10	5.4E-07	6.0E-15	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0083
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
rem
1E-05
1E-06
1E-07
1E-08
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-04 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.083 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.8E-02	1.4E-07	1.4E-04	1.6E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	7.5E-02	5.7E-07	5.7E-04	6.4E-12	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	8.3E-02	6.3E-07	6.3E-04	7.1E-12	00:01	3.7686600E+01	-1.2170624E+02
0.500	6.5E-02	5.0E-07	5.0E-04	5.6E-12	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.9E-02	2.2E-07	2.2E-04	2.5E-12	00:06	3.7686600E+01	-1.2169848E+02
3.000	6.8E-03	5.2E-08	5.2E-05	5.8E-13	00:18	3.7686600E+01	-1.2167578E+02
5.000	3.6E-03	2.8E-08	2.8E-05	3.1E-13	00:31	3.7686600E+01	-1.2165307E+02
8.000	2.1E-03	1.6E-08	1.6E-05	1.8E-13	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.7E-03	1.3E-08	1.3E-05	1.5E-13	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.6E-03	1.2E-08	1.2E-05	1.4E-13	01:02	3.7686600E+01	-1.2159632E+02
12.000	1.3E-03	9.9E-09	9.9E-06	1.1E-13	01:15	3.7686600E+01	-1.2157362E+02
15.000	1.0E-03	7.9E-09	7.9E-06	8.9E-14	01:34	3.7686600E+01	-1.2153956E+02
20.000	8.8E-04	6.7E-09	6.7E-06	7.5E-14	02:05	3.7686600E+01	-1.2148281E+02
25.000	8.0E-04	6.1E-09	6.1E-06	6.8E-14	02:36	3.7686600E+01	-1.2142605E+02
30.000	7.2E-04	5.5E-09	5.5E-06	6.1E-14	03:08	3.7686600E+01	-1.2136930E+02

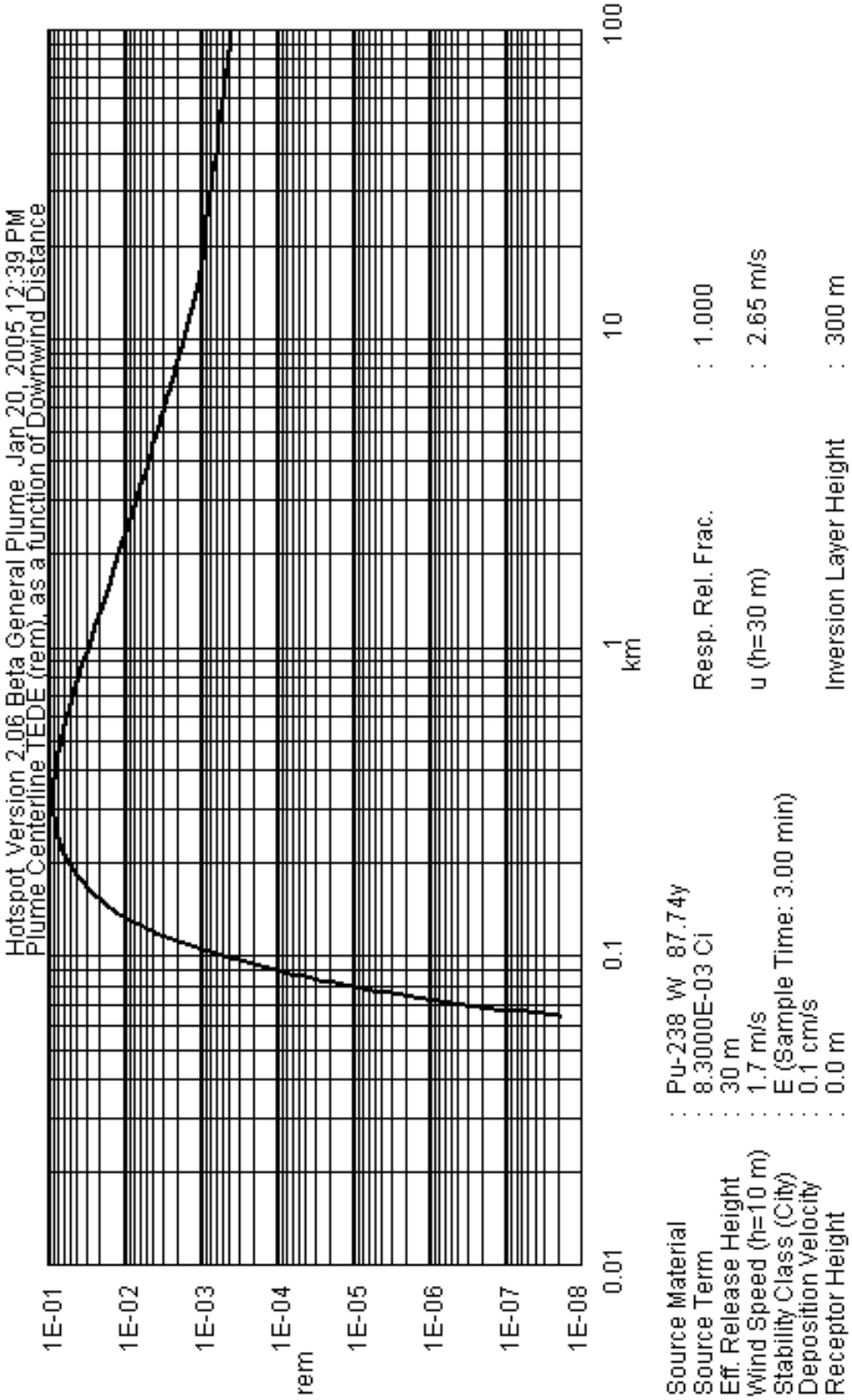
35.000	6.6E-04	5.1E-09	5.1E-06	5.6E-14	03:39	3.7686600E+01	-1.2131254E+02
40.000	6.1E-04	4.7E-09	4.7E-06	5.2E-14	04:11	3.7686600E+01	-1.2125578E+02
50.000	5.4E-04	4.2E-09	4.2E-06	4.6E-14	05:13	3.7686600E+01	-1.2114227E+02
65.000	4.7E-04	3.6E-09	3.6E-06	4.0E-14	06:48	3.7686600E+01	-1.2097201E+02
80.000	4.2E-04	3.2E-09	3.2E-06	3.6E-14	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0083
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
rem
1E-05
1E-06
1E-07
1E-08
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-06 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.1000E-06 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 8.64E-06 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	7.4E-10	5.7E-15	5.7E-12	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	8.6E-06	6.6E-11	6.6E-08	7.4E-16	<00:01	3.7686600E+01	-1.2170861E+02
0.150	7.3E-06	5.6E-11	5.6E-08	6.2E-16	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.7E-06	2.8E-11	2.8E-08	3.2E-16	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.1E-06	8.5E-12	8.5E-09	9.5E-17	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.1E-07	2.4E-12	2.4E-09	2.7E-17	00:05	3.7686600E+01	-1.2169848E+02
3.000	6.6E-08	5.0E-13	5.0E-10	5.6E-18	00:16	3.7686600E+01	-1.2167578E+02
5.000	4.6E-08	3.5E-13	3.5E-10	3.9E-18	00:26	3.7686600E+01	-1.2165307E+02
8.000	3.4E-08	2.6E-13	2.6E-10	2.9E-18	00:42	3.7686600E+01	-1.2161902E+02
9.400	3.1E-08	2.4E-13	2.4E-10	2.6E-18	00:50	3.7686600E+01	-1.2160313E+02
10.000	3.0E-08	2.3E-13	2.3E-10	2.5E-18	00:53	3.7686600E+01	-1.2159632E+02
12.000	2.7E-08	2.0E-13	2.0E-10	2.3E-18	01:04	3.7686600E+01	-1.2157362E+02
15.000	2.3E-08	1.8E-13	1.8E-10	2.0E-18	01:20	3.7686600E+01	-1.2153956E+02
20.000	2.0E-08	1.5E-13	1.5E-10	1.7E-18	01:46	3.7686600E+01	-1.2148281E+02
25.000	1.8E-08	1.3E-13	1.3E-10	1.5E-18	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.6E-08	1.2E-13	1.2E-10	1.4E-18	02:40	3.7686600E+01	-1.2136930E+02

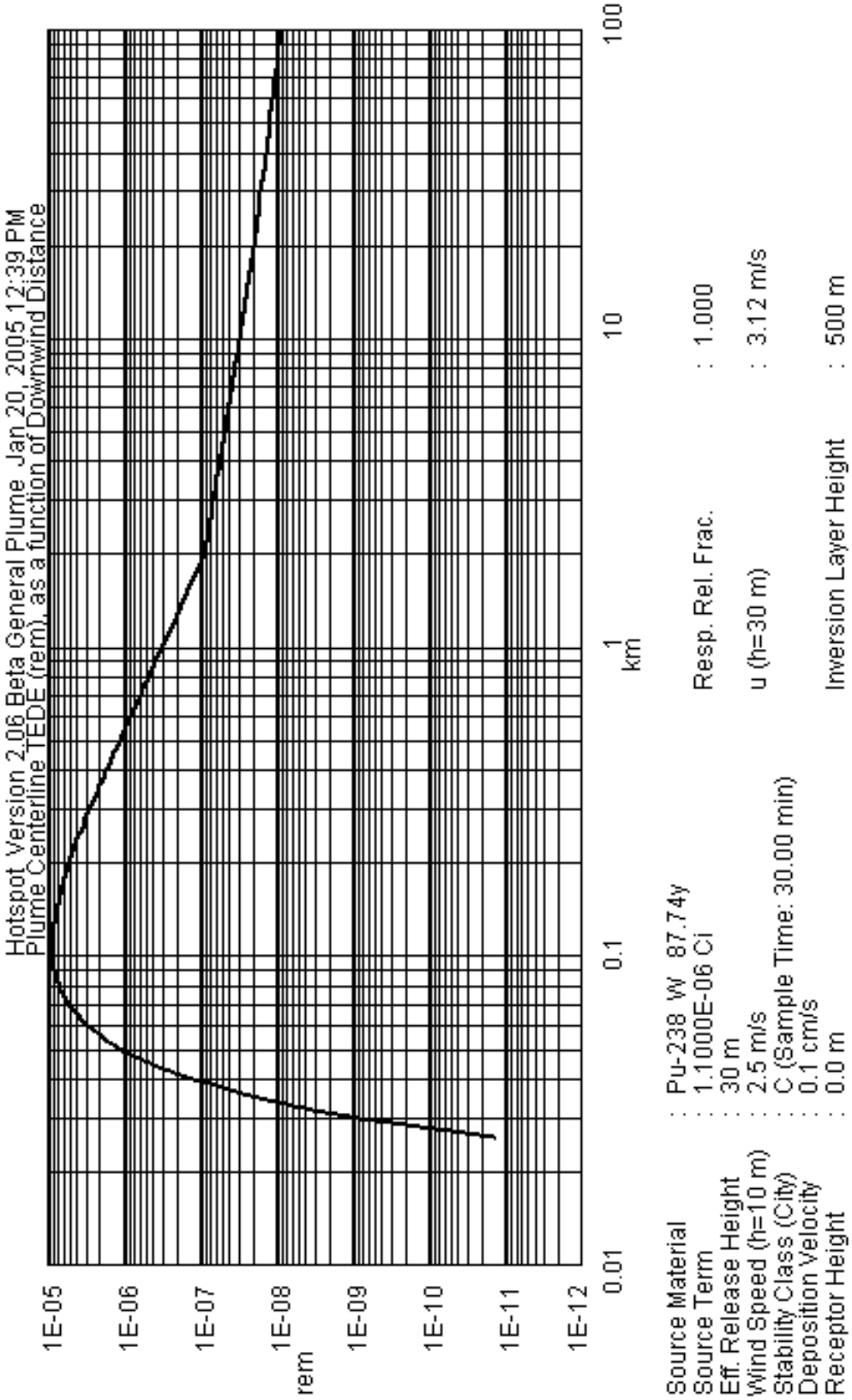
35.000	1.5E-08	1.1E-13	1.1E-10	1.3E-18	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.4E-08	1.0E-13	1.0E-10	1.2E-18	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.2E-08	9.3E-14	9.3E-11	1.0E-18	04:26	3.7686600E+01	-1.2114227E+02
65.000	1.1E-08	8.1E-14	8.1E-11	0.0E+00	05:46	3.7686600E+01	-1.2097201E+02
80.000	9.5E-09	7.3E-14	7.3E-11	0.0E+00	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.1e-6
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-05
1E-06
1E-07
1E-08
1E-09
1E-10
1E-11
1E-12
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 1.1000E-06 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-06 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.1000E-06 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.01E-05 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	3.8E-08	2.9E-13	2.9E-10	3.3E-18	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.0E-05	7.7E-11	7.7E-08	8.6E-16	<00:01	3.7686600E+01	-1.2170884E+02
0.150	6.5E-06	5.0E-11	5.0E-08	5.6E-16	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.8E-06	2.2E-11	2.2E-08	2.4E-16	00:01	3.7686600E+01	-1.2170699E+02
0.500	7.3E-07	5.6E-12	5.6E-09	6.2E-17	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.7E-07	1.3E-12	1.3E-09	1.5E-17	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.7E-08	1.3E-13	1.3E-10	1.5E-18	00:21	3.7686600E+01	-1.2167578E+02
5.000	5.9E-09	4.5E-14	4.5E-11	0.0E+00	00:36	3.7686600E+01	-1.2165307E+02
8.000	2.2E-09	1.7E-14	1.7E-11	0.0E+00	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.6E-09	1.2E-14	1.2E-11	0.0E+00	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.4E-09	1.1E-14	1.1E-11	0.0E+00	01:12	3.7686600E+01	-1.2159632E+02
12.000	9.6E-10	7.4E-15	7.4E-12	0.0E+00	01:27	3.7686600E+01	-1.2157362E+02
15.000	6.1E-10	4.7E-15	4.7E-12	0.0E+00	01:49	3.7686600E+01	-1.2153956E+02
20.000	3.4E-10	2.6E-15	2.6E-12	0.0E+00	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.2E-10	1.7E-15	1.7E-12	0.0E+00	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.5E-10	1.1E-15	1.1E-12	0.0E+00	03:38	3.7686600E+01	-1.2136930E+02

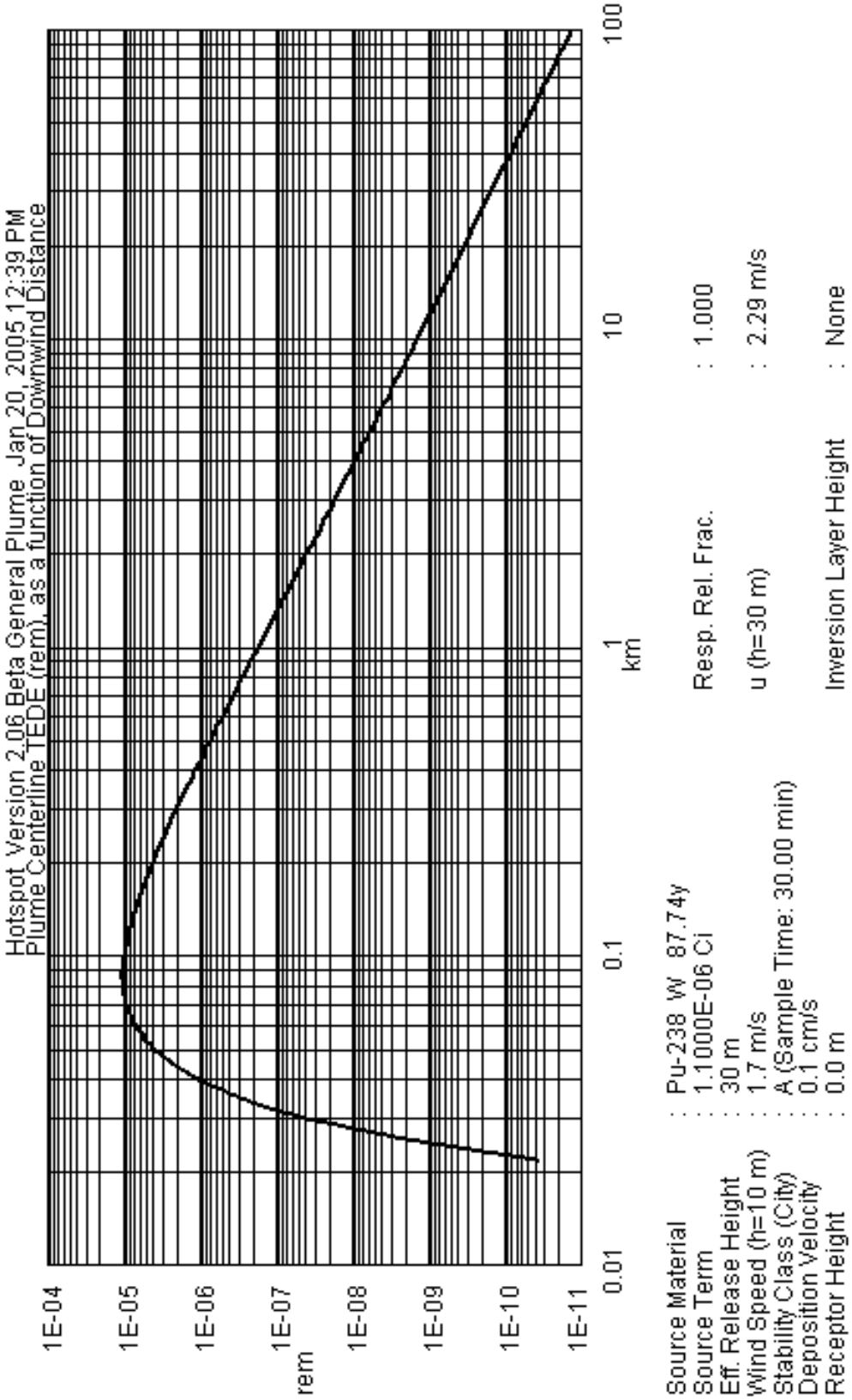
35.000	1.1E-10	8.4E-16	8.4E-13	0.0E+00	04:15	3.7686600E+01	-1.2131254E+02
40.000	8.4E-11	6.4E-16	6.4E-13	0.0E+00	04:51	3.7686600E+01	-1.2125578E+02
50.000	5.3E-11	4.1E-16	4.1E-13	0.0E+00	06:04	3.7686600E+01	-1.2114227E+02
65.000	3.1E-11	2.4E-16	2.4E-13	0.0E+00	07:54	3.7686600E+01	-1.2097201E+02
80.000	2.1E-11	1.6E-16	1.6E-13	0.0E+00	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.1e-6
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-04
1E-05
1E-06
1E-07
rem
1E-08
1E-09
1E-10
1E-11
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.1000E-06 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-06 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.1000E-06 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 6.61E-06 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.5E-08	1.9E-13	1.9E-10	2.1E-18	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	6.6E-06	5.1E-11	5.1E-08	5.7E-16	<00:01	3.7686600E+01	-1.2170884E+02
0.150	4.3E-06	3.3E-11	3.3E-08	3.6E-16	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.8E-06	1.4E-11	1.4E-08	1.6E-16	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.8E-07	3.7E-12	3.7E-09	4.1E-17	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.1E-07	8.7E-13	8.7E-10	9.7E-18	00:04	3.7686600E+01	-1.2169848E+02
3.000	4.1E-08	3.1E-13	3.1E-10	3.5E-18	00:14	3.7686600E+01	-1.2167578E+02
5.000	2.8E-08	2.2E-13	2.2E-10	2.4E-18	00:23	3.7686600E+01	-1.2165307E+02
8.000	2.1E-08	1.6E-13	1.6E-10	1.8E-18	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.9E-08	1.5E-13	1.5E-10	1.6E-18	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.8E-08	1.4E-13	1.4E-10	1.6E-18	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.6E-08	1.3E-13	1.3E-10	1.4E-18	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.4E-08	1.1E-13	1.1E-10	1.2E-18	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.2E-08	9.4E-14	9.4E-11	1.1E-18	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.1E-08	8.3E-14	8.3E-11	0.0E+00	01:59	3.7686600E+01	-1.2142605E+02
30.000	9.9E-09	7.6E-14	7.6E-11	0.0E+00	02:23	3.7686600E+01	-1.2136930E+02

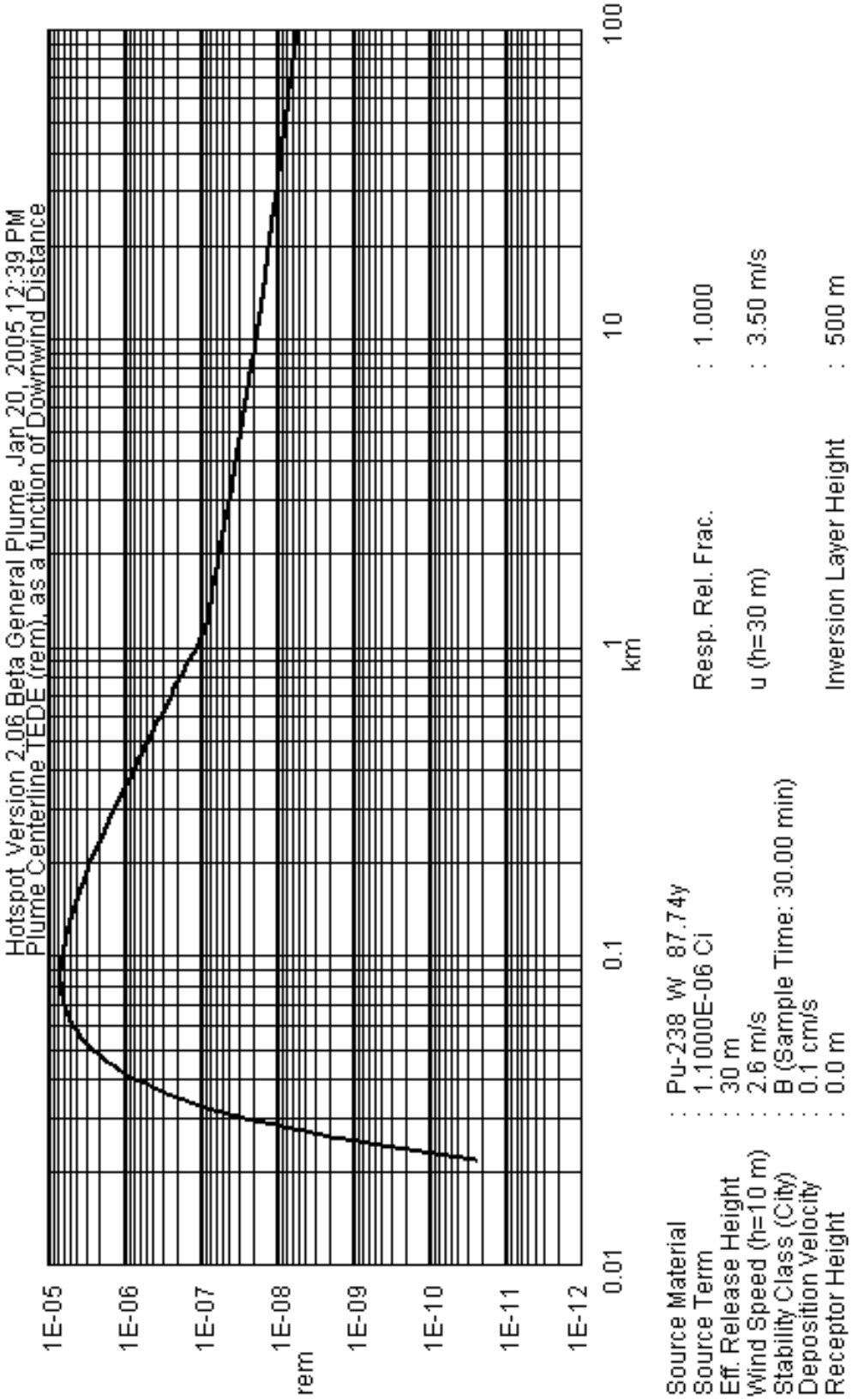
35.000	9.1E-09	7.0E-14	7.0E-11	0.0E+00	02:46	3.7686600E+01	-1.2131254E+02
40.000	8.5E-09	6.5E-14	6.5E-11	0.0E+00	03:10	3.7686600E+01	-1.2125578E+02
50.000	7.5E-09	5.8E-14	5.8E-11	0.0E+00	03:58	3.7686600E+01	-1.2114227E+02
65.000	6.6E-09	5.0E-14	5.0E-11	0.0E+00	05:09	3.7686600E+01	-1.2097201E+02
80.000	5.9E-09	4.5E-14	4.5E-11	0.0E+00	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.1e-6
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-05
1E-06
1E-07
1E-08
1E-09
1E-10
1E-11
1E-12
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 1.1000E-06 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-06 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.1000E-06 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 6.92E-06 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.5E-06	1.2E-11	1.2E-08	1.3E-16	<00:01	3.7686600E+01	-1.2170813E+02
0.250	6.2E-06	4.8E-11	4.8E-08	5.3E-16	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	6.9E-06	5.3E-11	5.3E-08	5.9E-16	00:01	3.7686600E+01	-1.2170624E+02
0.500	5.4E-06	4.2E-11	4.2E-08	4.7E-16	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.4E-06	1.9E-11	1.9E-08	2.1E-16	00:06	3.7686600E+01	-1.2169848E+02
3.000	5.7E-07	4.3E-12	4.3E-09	4.8E-17	00:18	3.7686600E+01	-1.2167578E+02
5.000	3.0E-07	2.3E-12	2.3E-09	2.6E-17	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.7E-07	1.3E-12	1.3E-09	1.5E-17	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.4E-07	1.1E-12	1.1E-09	1.2E-17	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.3E-07	1.0E-12	1.0E-09	1.1E-17	01:02	3.7686600E+01	-1.2159632E+02
12.000	1.1E-07	8.3E-13	8.3E-10	9.2E-18	01:15	3.7686600E+01	-1.2157362E+02
15.000	8.7E-08	6.6E-13	6.6E-10	7.4E-18	01:34	3.7686600E+01	-1.2153956E+02
20.000	7.4E-08	5.6E-13	5.6E-10	6.3E-18	02:05	3.7686600E+01	-1.2148281E+02
25.000	6.6E-08	5.1E-13	5.1E-10	5.7E-18	02:36	3.7686600E+01	-1.2142605E+02
30.000	6.0E-08	4.6E-13	4.6E-10	5.1E-18	03:08	3.7686600E+01	-1.2136930E+02

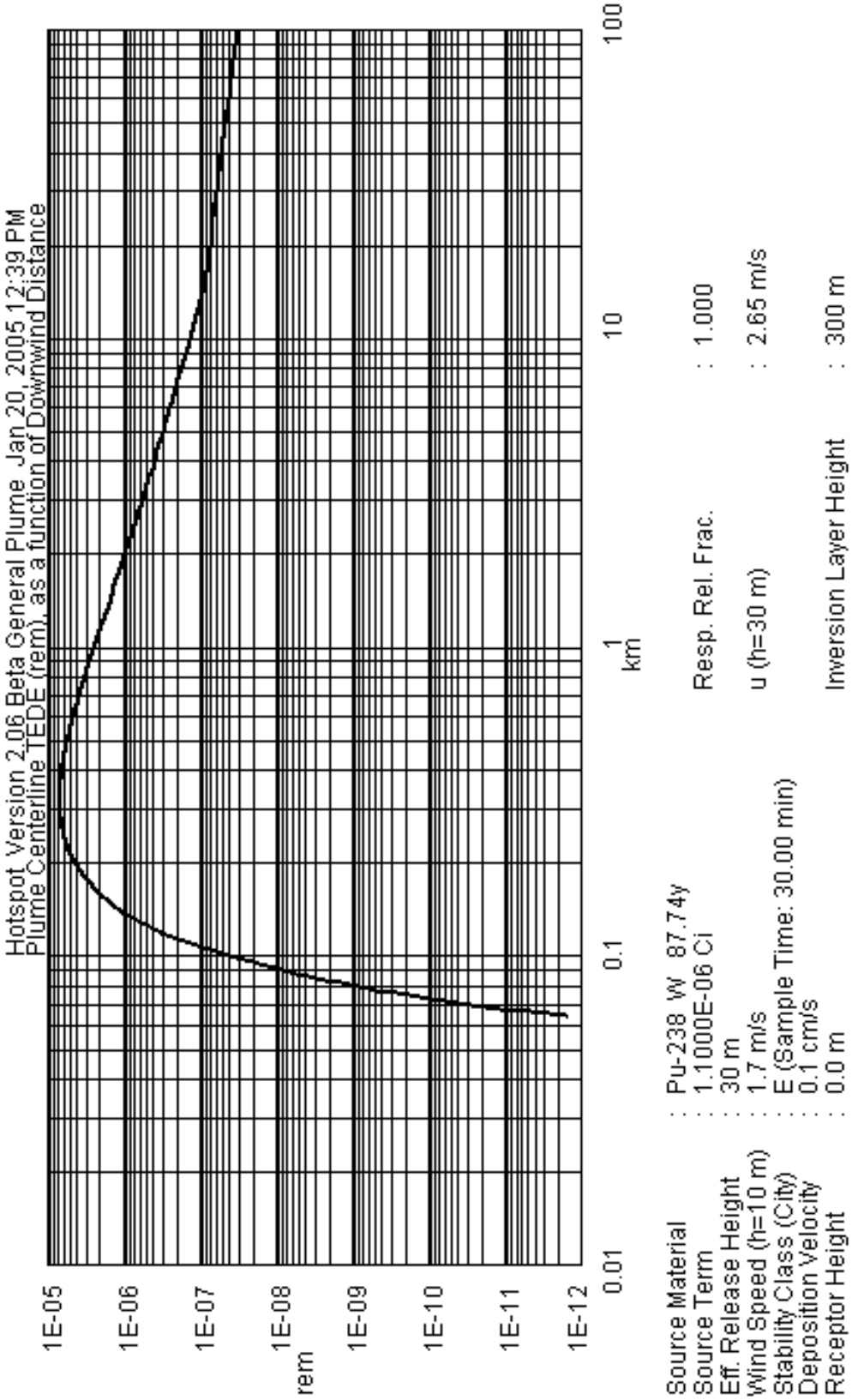
35.000	5.5E-08	4.2E-13	4.2E-10	4.7E-18	03:39	3.7686600E+01	-1.2131254E+02
40.000	5.1E-08	3.9E-13	3.9E-10	4.4E-18	04:11	3.7686600E+01	-1.2125578E+02
50.000	4.5E-08	3.5E-13	3.5E-10	3.9E-18	05:13	3.7686600E+01	-1.2114227E+02
65.000	3.9E-08	3.0E-13	3.0E-10	3.4E-18	06:48	3.7686600E+01	-1.2097201E+02
80.000	3.5E-08	2.7E-13	2.7E-10	3.0E-18	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.1e-6
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-05
1E-06
1E-07
1E-08
1E-09
1E-10
1E-11
1E-12
rem
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.1000E-06 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-07-1 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.8000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 47 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 1.34 km
Exceeds Outer  Dose Out To : 23.24 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.1E-03	3.1E-08	3.1E-05	3.5E-13	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	4.7E+01	3.6E-04	3.6E-01	4.0E-09	<00:01	3.7686600E+01	-1.2170861E+02
0.150	4.0E+01	3.1E-04	3.1E-01	3.4E-09	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.0E+01	1.6E-04	1.6E-01	1.7E-09	00:01	3.7686600E+01	-1.2170699E+02
0.500	6.1E+00	4.7E-05	4.7E-02	5.2E-10	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.7E+00	1.3E-05	1.3E-02	1.5E-10	00:05	3.7686600E+01	-1.2169848E+02
3.000	3.6E-01	2.8E-06	2.8E-03	3.1E-11	00:16	3.7686600E+01	-1.2167578E+02
5.000	2.5E-01	1.9E-06	1.9E-03	2.2E-11	00:26	3.7686600E+01	-1.2165307E+02
8.000	1.9E-01	1.4E-06	1.4E-03	1.6E-11	00:42	3.7686600E+01	-1.2161902E+02
9.400	1.7E-01	1.3E-06	1.3E-03	1.4E-11	00:50	3.7686600E+01	-1.2160313E+02
10.000	1.6E-01	1.2E-06	1.2E-03	1.4E-11	00:53	3.7686600E+01	-1.2159632E+02
12.000	1.5E-01	1.1E-06	1.1E-03	1.2E-11	01:04	3.7686600E+01	-1.2157362E+02
15.000	1.3E-01	9.8E-07	9.8E-04	1.1E-11	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.1E-01	8.3E-07	8.3E-04	9.3E-12	01:46	3.7686600E+01	-1.2148281E+02
25.000	9.6E-02	7.4E-07	7.4E-04	8.2E-12	02:13	3.7686600E+01	-1.2142605E+02
30.000	8.7E-02	6.7E-07	6.7E-04	7.5E-12	02:40	3.7686600E+01	-1.2136930E+02

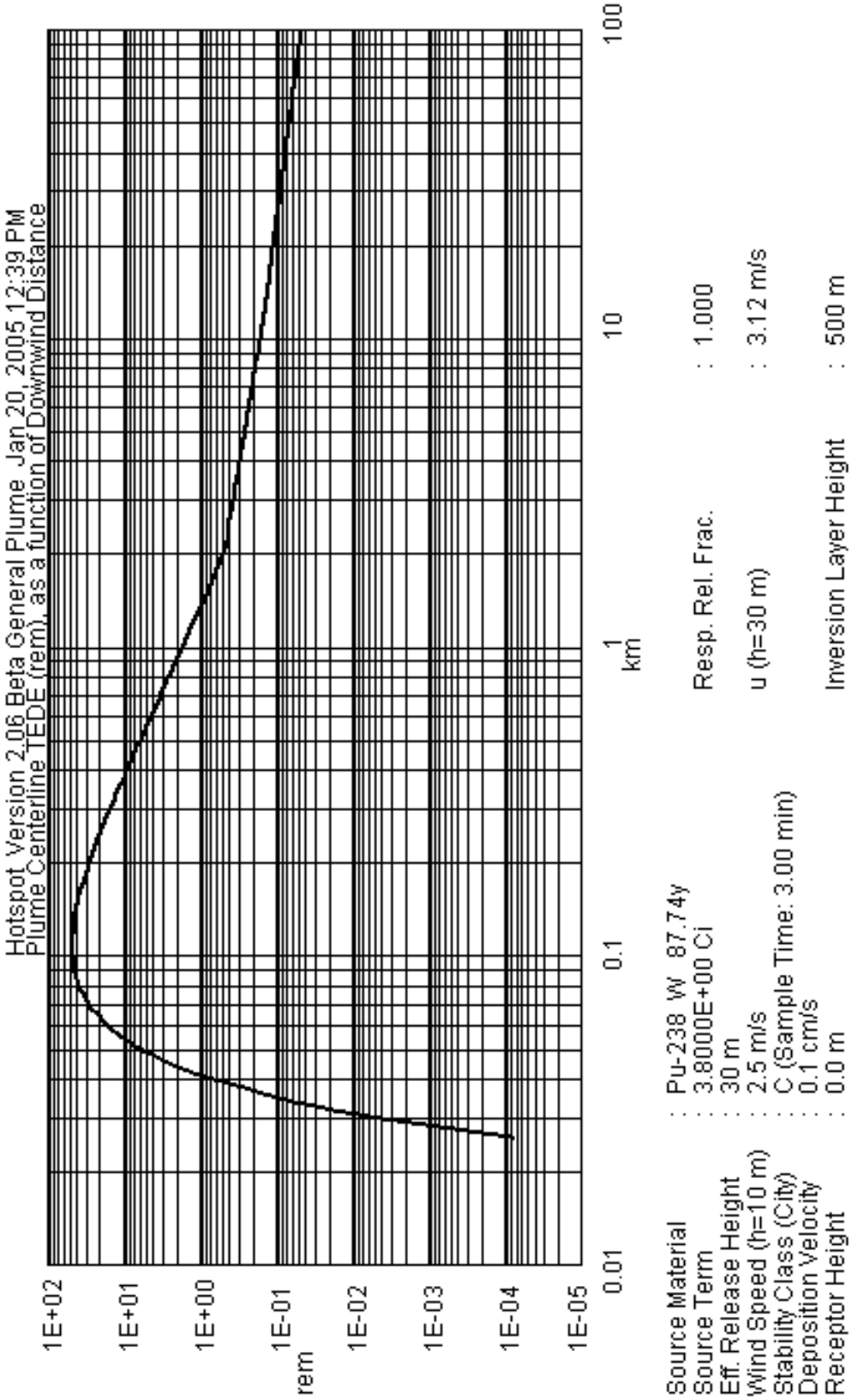
35.000	8.0E-02	6.2E-07	6.2E-04	6.9E-12	03:06	3.7686600E+01	-1.2131254E+02
40.000	7.5E-02	5.7E-07	5.7E-04	6.4E-12	03:33	3.7686600E+01	-1.2125578E+02
50.000	6.6E-02	5.1E-07	5.1E-04	5.7E-12	04:26	3.7686600E+01	-1.2114227E+02
65.000	5.8E-02	4.4E-07	4.4E-04	5.0E-12	05:46	3.7686600E+01	-1.2097201E+02
80.000	5.2E-02	4.0E-07	4.0E-04	4.4E-12	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.8000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-07-1 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.8000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 55 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.97 km
Exceeds Outer  Dose Out To : 2.90 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.1E-01	1.6E-06	1.6E-03	1.8E-11	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	5.5E+01	4.2E-04	4.2E-01	4.7E-09	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.6E+01	2.7E-04	2.7E-01	3.1E-09	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.5E+01	1.2E-04	1.2E-01	1.3E-09	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.0E+00	3.1E-05	3.1E-02	3.4E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	9.5E-01	7.3E-06	7.3E-03	8.1E-11	00:07	3.7686600E+01	-1.2169848E+02
3.000	9.4E-02	7.2E-07	7.2E-04	8.0E-12	00:21	3.7686600E+01	-1.2167578E+02
5.000	3.2E-02	2.5E-07	2.5E-04	2.8E-12	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.2E-02	9.3E-08	9.3E-05	1.0E-12	00:58	3.7686600E+01	-1.2161902E+02
9.400	8.7E-03	6.7E-08	6.7E-05	7.4E-13	01:08	3.7686600E+01	-1.2160313E+02
10.000	7.7E-03	5.9E-08	5.9E-05	6.6E-13	01:12	3.7686600E+01	-1.2159632E+02
12.000	5.3E-03	4.0E-08	4.0E-05	4.5E-13	01:27	3.7686600E+01	-1.2157362E+02
15.000	3.3E-03	2.6E-08	2.6E-05	2.9E-13	01:49	3.7686600E+01	-1.2153956E+02
20.000	1.9E-03	1.4E-08	1.4E-05	1.6E-13	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.2E-03	9.1E-09	9.1E-06	1.0E-13	03:02	3.7686600E+01	-1.2142605E+02
30.000	8.2E-04	6.3E-09	6.3E-06	7.0E-14	03:38	3.7686600E+01	-1.2136930E+02

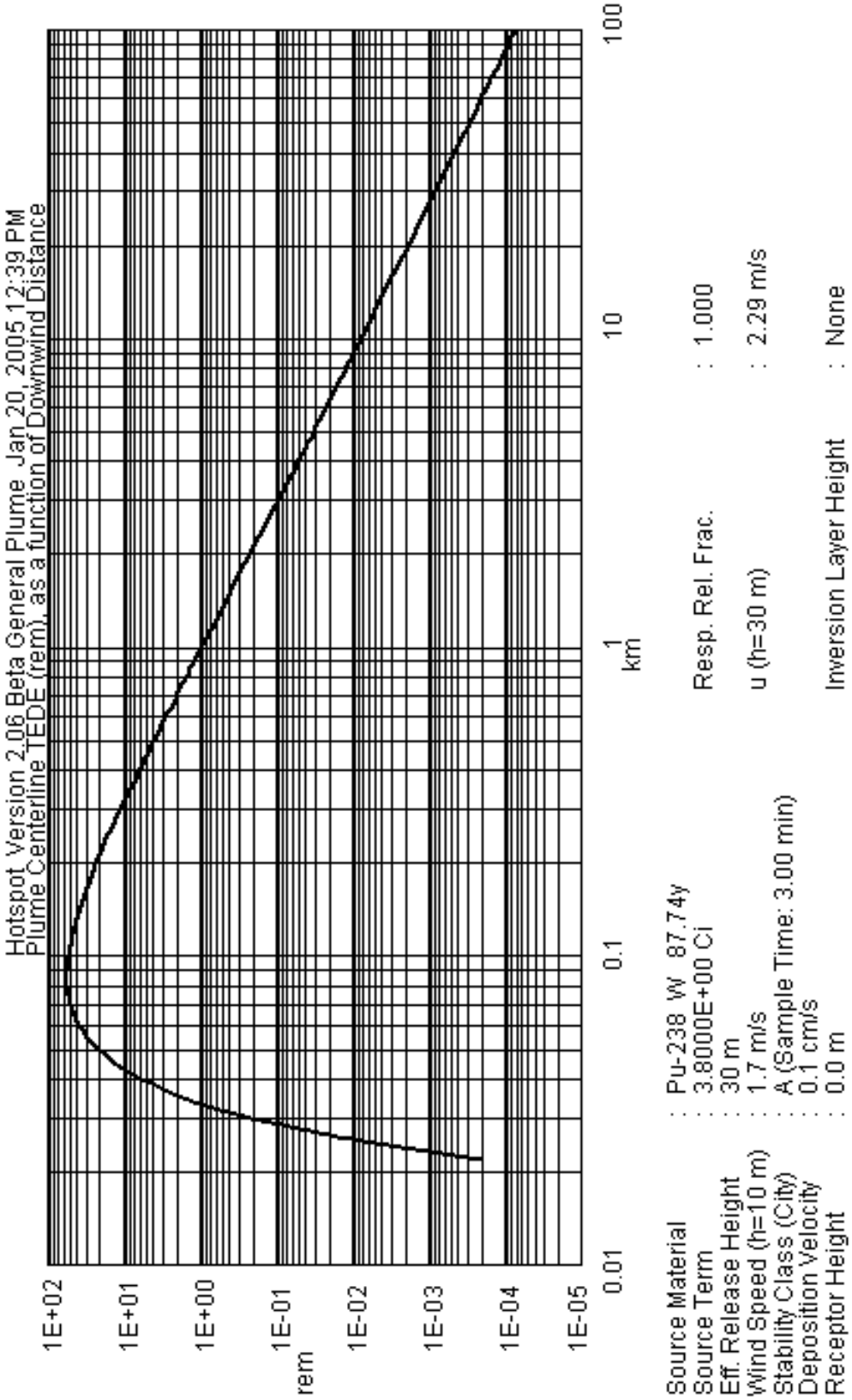
35.000	6.0E-04	4.6E-09	4.6E-06	5.1E-14	04:15	3.7686600E+01	-1.2131254E+02
40.000	4.6E-04	3.5E-09	3.5E-06	3.9E-14	04:51	3.7686600E+01	-1.2125578E+02
50.000	2.9E-04	2.2E-09	2.2E-06	2.5E-14	06:04	3.7686600E+01	-1.2114227E+02
65.000	1.7E-04	1.3E-09	1.3E-06	1.5E-14	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.1E-04	8.7E-10	8.7E-07	9.7E-15	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.8000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-07-1 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.8000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 36 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.80 km
Exceeds Outer  Dose Out To : 10.08 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.4E-01	1.1E-06	1.1E-03	1.2E-11	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	3.6E+01	2.8E-04	2.8E-01	3.1E-09	<00:01	3.7686600E+01	-1.2170884E+02
0.150	2.3E+01	1.8E-04	1.8E-01	2.0E-09	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.0E+01	7.8E-05	7.8E-02	8.7E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.6E+00	2.0E-05	2.0E-02	2.2E-10	00:02	3.7686600E+01	-1.2170415E+02
1.000	6.2E-01	4.8E-06	4.8E-03	5.3E-11	00:04	3.7686600E+01	-1.2169848E+02
3.000	2.2E-01	1.7E-06	1.7E-03	1.9E-11	00:14	3.7686600E+01	-1.2167578E+02
5.000	1.6E-01	1.2E-06	1.2E-03	1.3E-11	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.2E-01	8.8E-07	8.8E-04	9.8E-12	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.0E-01	8.0E-07	8.0E-04	8.9E-12	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.0E-01	7.7E-07	7.7E-04	8.6E-12	00:47	3.7686600E+01	-1.2159632E+02
12.000	9.0E-02	6.9E-07	6.9E-04	7.7E-12	00:57	3.7686600E+01	-1.2157362E+02
15.000	7.9E-02	6.1E-07	6.1E-04	6.8E-12	01:11	3.7686600E+01	-1.2153956E+02
20.000	6.7E-02	5.2E-07	5.2E-04	5.8E-12	01:35	3.7686600E+01	-1.2148281E+02
25.000	6.0E-02	4.6E-07	4.6E-04	5.1E-12	01:59	3.7686600E+01	-1.2142605E+02
30.000	5.4E-02	4.1E-07	4.1E-04	4.6E-12	02:23	3.7686600E+01	-1.2136930E+02

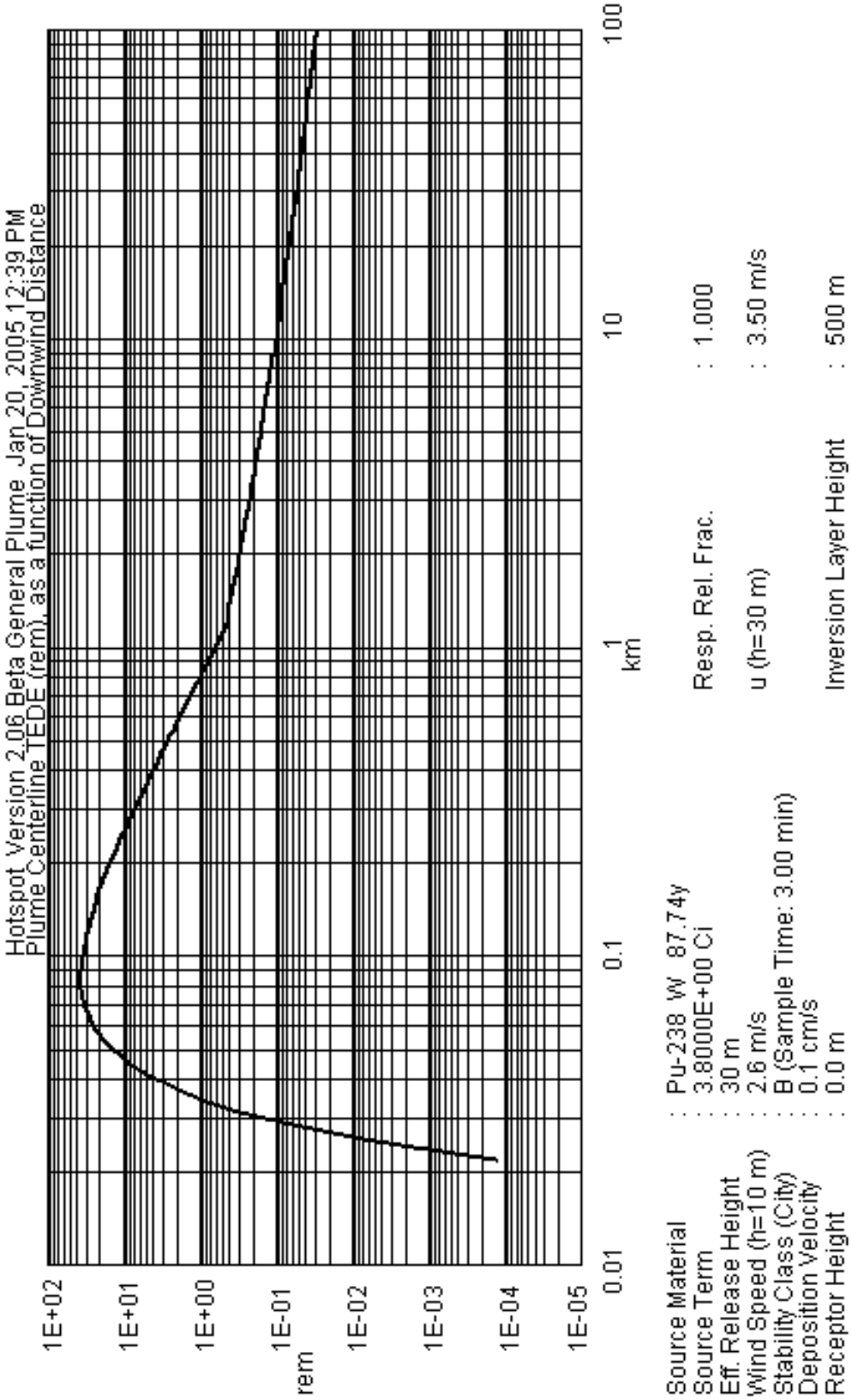
35.000	5.0E-02	3.8E-07	3.8E-04	4.3E-12	02:46	3.7686600E+01	-1.2131254E+02
40.000	4.6E-02	3.5E-07	3.5E-04	4.0E-12	03:10	3.7686600E+01	-1.2125578E+02
50.000	4.1E-02	3.2E-07	3.2E-04	3.5E-12	03:58	3.7686600E+01	-1.2114227E+02
65.000	3.6E-02	2.8E-07	2.8E-04	3.1E-12	05:09	3.7686600E+01	-1.2097201E+02
80.000	3.2E-02	2.5E-07	2.5E-04	2.8E-12	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.8000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-07-1 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 3.8000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 38 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 7.55 km
Exceeds Outer  Dose Out To : > 200  km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	8.4E+00	6.4E-05	6.4E-02	7.2E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.4E+01	2.6E-04	2.6E-01	2.9E-09	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	3.8E+01	2.9E-04	2.9E-01	3.2E-09	00:01	3.7686600E+01	-1.2170624E+02
0.500	3.0E+01	2.3E-04	2.3E-01	2.5E-09	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.3E+01	1.0E-04	1.0E-01	1.1E-09	00:06	3.7686600E+01	-1.2169848E+02
3.000	3.1E+00	2.4E-05	2.4E-02	2.7E-10	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.6E+00	1.3E-05	1.3E-02	1.4E-10	00:31	3.7686600E+01	-1.2165307E+02
8.000	9.4E-01	7.2E-06	7.2E-03	8.1E-11	00:50	3.7686600E+01	-1.2161902E+02
9.400	7.9E-01	6.0E-06	6.0E-03	6.7E-11	00:59	3.7686600E+01	-1.2160313E+02
10.000	7.3E-01	5.6E-06	5.6E-03	6.3E-11	01:02	3.7686600E+01	-1.2159632E+02
12.000	5.9E-01	4.5E-06	4.5E-03	5.1E-11	01:15	3.7686600E+01	-1.2157362E+02
15.000	4.7E-01	3.6E-06	3.6E-03	4.1E-11	01:34	3.7686600E+01	-1.2153956E+02
20.000	4.0E-01	3.1E-06	3.1E-03	3.4E-11	02:05	3.7686600E+01	-1.2148281E+02
25.000	3.6E-01	2.8E-06	2.8E-03	3.1E-11	02:36	3.7686600E+01	-1.2142605E+02
30.000	3.3E-01	2.5E-06	2.5E-03	2.8E-11	03:08	3.7686600E+01	-1.2136930E+02

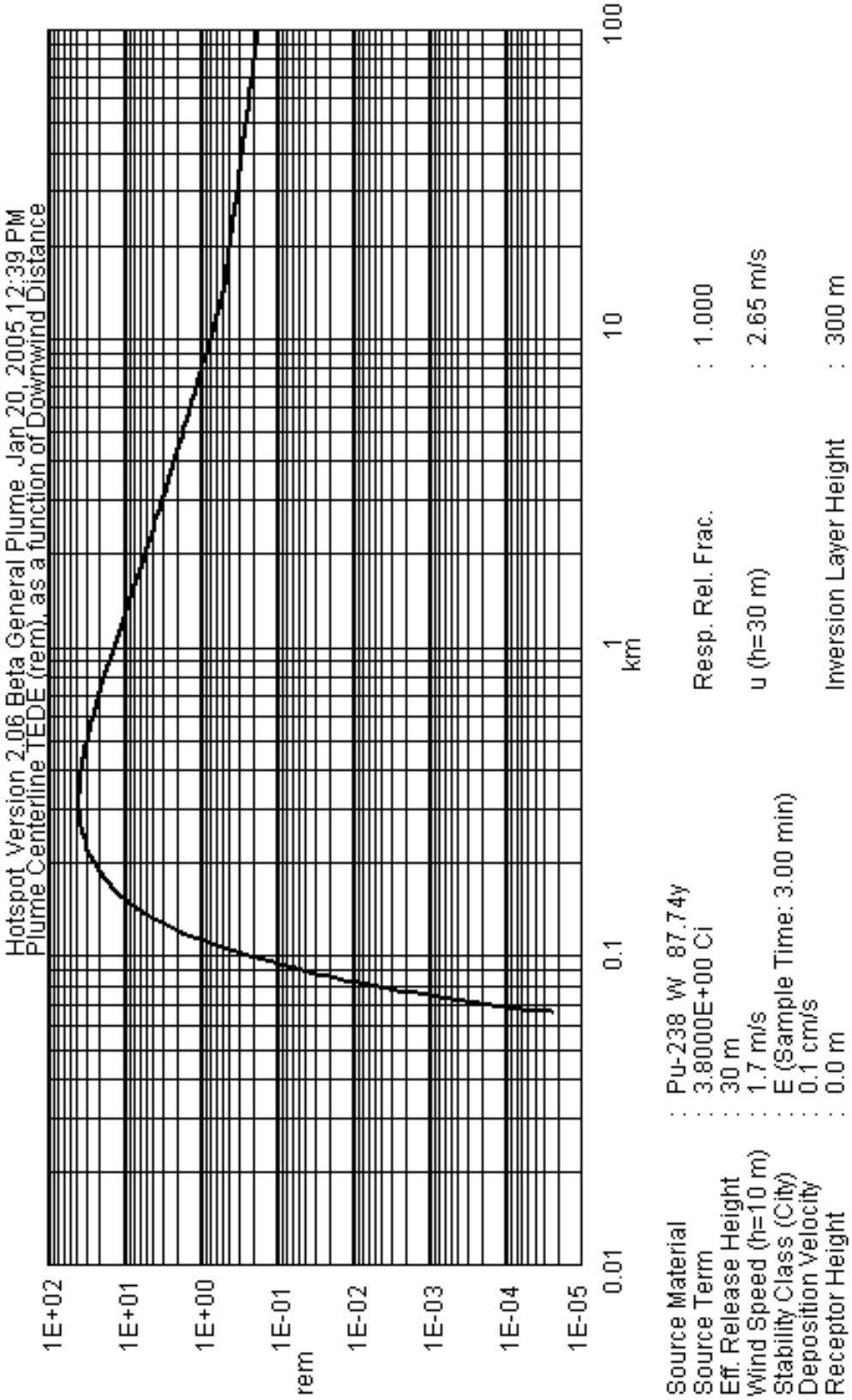
35.000	3.0E-01	2.3E-06	2.3E-03	2.6E-11	03:39	3.7686600E+01	-1.2131254E+02
40.000	2.8E-01	2.2E-06	2.2E-03	2.4E-11	04:11	3.7686600E+01	-1.2125578E+02
50.000	2.5E-01	1.9E-06	1.9E-03	2.1E-11	05:13	3.7686600E+01	-1.2114227E+02
65.000	2.2E-01	1.7E-06	1.7E-03	1.8E-11	06:48	3.7686600E+01	-1.2097201E+02
80.000	1.9E-01	1.5E-06	1.5E-03	1.7E-11	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 3.8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 3.8000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-07-2 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.8000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 9.70E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	8.4E-07	6.4E-12	6.4E-09	7.1E-17	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	9.7E-03	7.4E-08	7.4E-05	8.3E-13	<00:01	3.7686600E+01	-1.2170861E+02
0.150	8.2E-03	6.3E-08	6.3E-05	7.0E-13	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.2E-03	3.2E-08	3.2E-05	3.6E-13	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.3E-03	9.6E-09	9.6E-06	1.1E-13	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.5E-04	2.7E-09	2.7E-06	3.0E-14	00:05	3.7686600E+01	-1.2169848E+02
3.000	7.4E-05	5.7E-10	5.7E-07	6.3E-15	00:16	3.7686600E+01	-1.2167578E+02
5.000	5.2E-05	4.0E-10	4.0E-07	4.4E-15	00:26	3.7686600E+01	-1.2165307E+02
8.000	3.8E-05	2.9E-10	2.9E-07	3.3E-15	00:42	3.7686600E+01	-1.2161902E+02
9.400	3.5E-05	2.7E-10	2.7E-07	3.0E-15	00:50	3.7686600E+01	-1.2160313E+02
10.000	3.3E-05	2.6E-10	2.6E-07	2.9E-15	00:53	3.7686600E+01	-1.2159632E+02
12.000	3.0E-05	2.3E-10	2.3E-07	2.6E-15	01:04	3.7686600E+01	-1.2157362E+02
15.000	2.6E-05	2.0E-10	2.0E-07	2.3E-15	01:20	3.7686600E+01	-1.2153956E+02
20.000	2.2E-05	1.7E-10	1.7E-07	1.9E-15	01:46	3.7686600E+01	-1.2148281E+02
25.000	2.0E-05	1.5E-10	1.5E-07	1.7E-15	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.8E-05	1.4E-10	1.4E-07	1.5E-15	02:40	3.7686600E+01	-1.2136930E+02

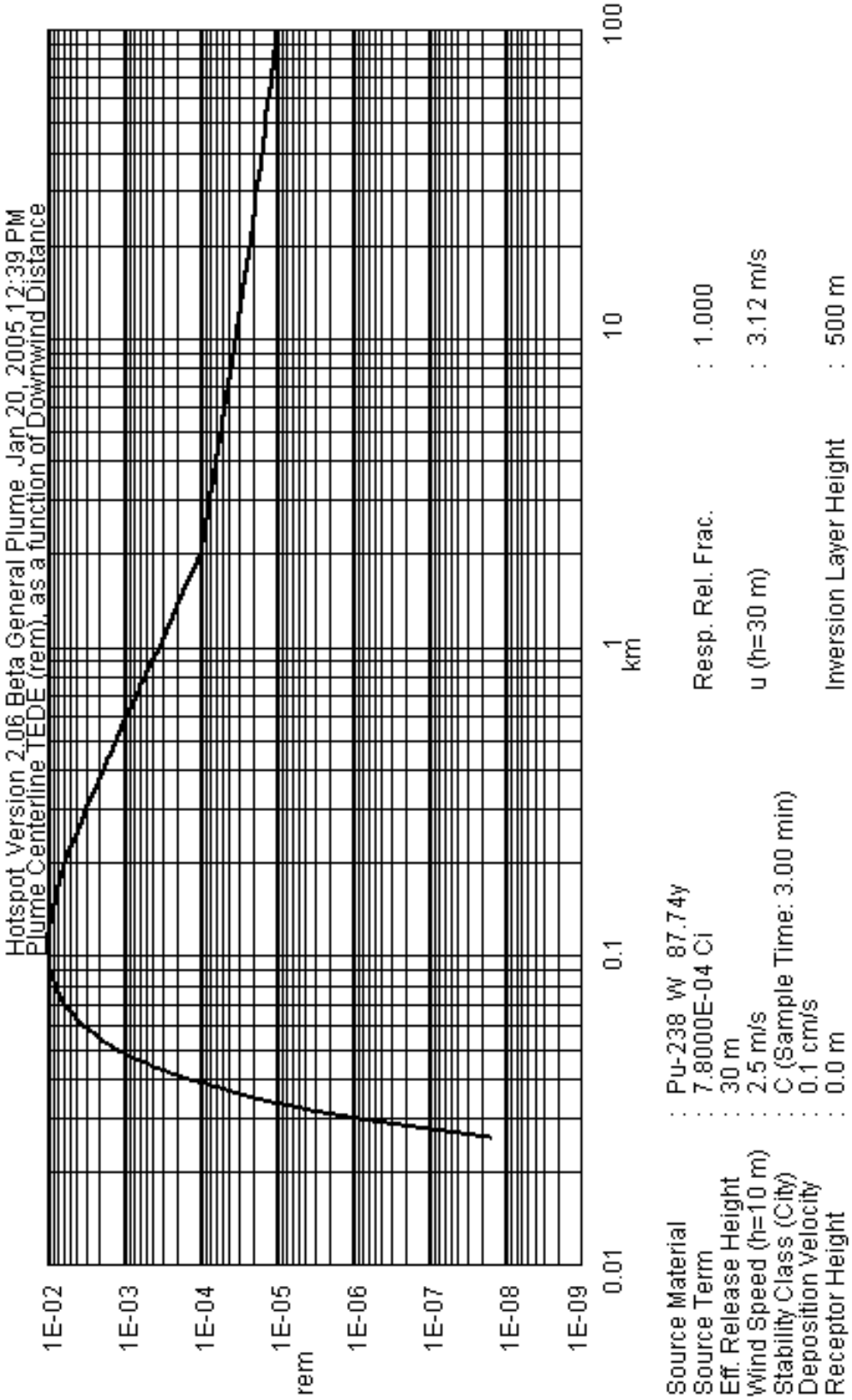
35.000	1.6E-05	1.3E-10	1.3E-07	1.4E-15	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.5E-05	1.2E-10	1.2E-07	1.3E-15	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.4E-05	1.0E-10	1.0E-07	1.2E-15	04:26	3.7686600E+01	-1.2114227E+02
65.000	1.2E-05	9.1E-11	9.1E-08	1.0E-15	05:46	3.7686600E+01	-1.2097201E+02
80.000	1.1E-05	8.2E-11	8.2E-08	9.1E-16	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.8e-4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:39 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-02
1E-03
1E-04
1E-05
rem
1E-06
1E-07
1E-08
1E-09
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.8000E-04 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-07-2 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.8000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.011 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.3E-05	3.3E-10	3.3E-07	3.7E-15	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.1E-02	8.7E-08	8.7E-05	9.7E-13	<00:01	3.7686600E+01	-1.2170884E+02
0.150	7.3E-03	5.6E-08	5.6E-05	6.3E-13	00:01	3.7686600E+01	-1.2170813E+02
0.250	3.2E-03	2.4E-08	2.4E-05	2.7E-13	00:01	3.7686600E+01	-1.2170699E+02
0.500	8.2E-04	6.3E-09	6.3E-06	7.0E-14	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.0E-04	1.5E-09	1.5E-06	1.7E-14	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.9E-05	1.5E-10	1.5E-07	1.6E-15	00:21	3.7686600E+01	-1.2167578E+02
5.000	6.6E-06	5.1E-11	5.1E-08	5.6E-16	00:36	3.7686600E+01	-1.2165307E+02
8.000	2.5E-06	1.9E-11	1.9E-08	2.1E-16	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.8E-06	1.4E-11	1.4E-08	1.5E-16	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.6E-06	1.2E-11	1.2E-08	1.3E-16	01:12	3.7686600E+01	-1.2159632E+02
12.000	1.1E-06	8.3E-12	8.3E-09	9.3E-17	01:27	3.7686600E+01	-1.2157362E+02
15.000	6.9E-07	5.3E-12	5.3E-09	5.9E-17	01:49	3.7686600E+01	-1.2153956E+02
20.000	3.8E-07	2.9E-12	2.9E-09	3.3E-17	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.4E-07	1.9E-12	1.9E-09	2.1E-17	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.7E-07	1.3E-12	1.3E-09	1.4E-17	03:38	3.7686600E+01	-1.2136930E+02

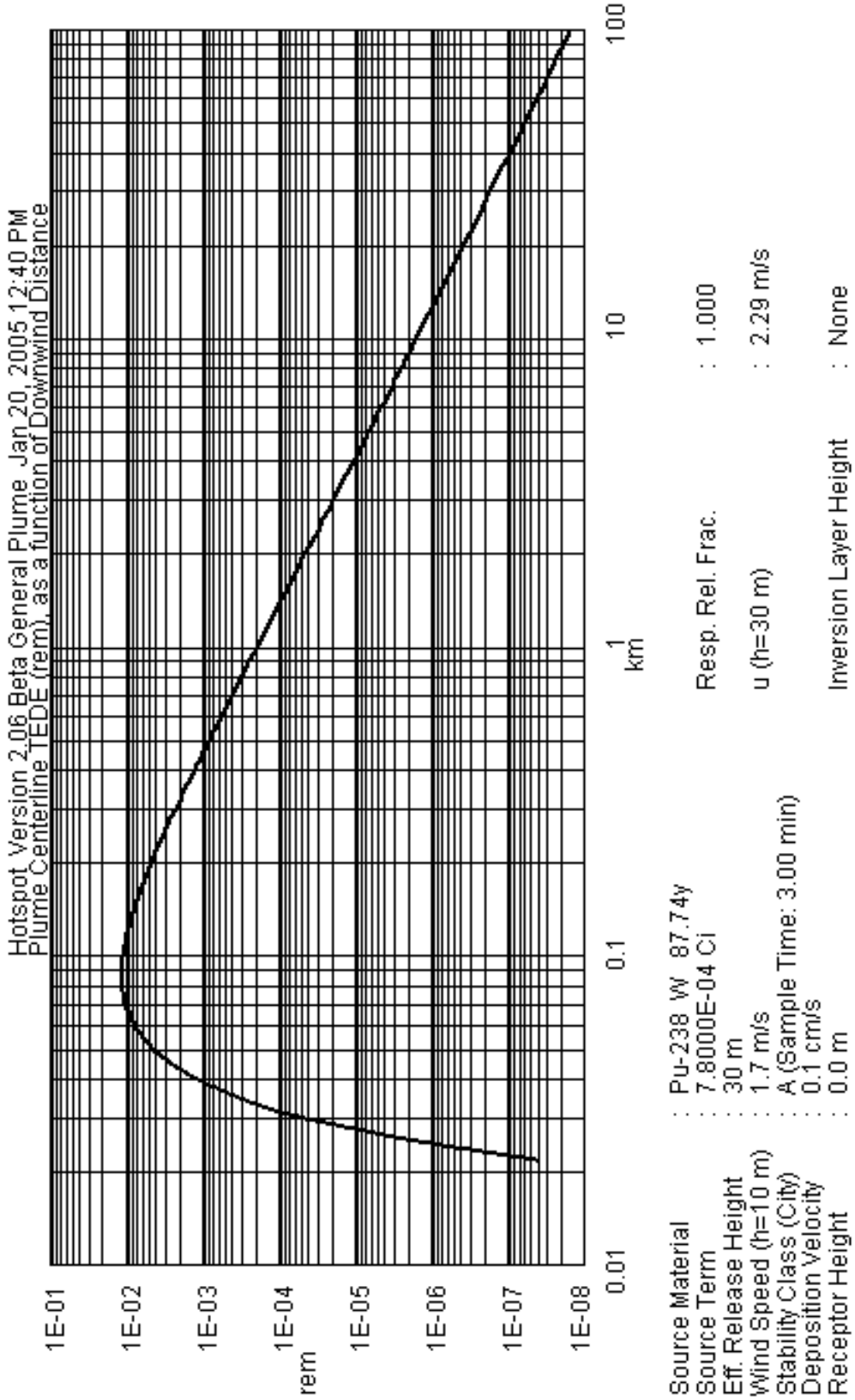
35.000	1.2E-07	9.4E-13	9.4E-10	1.1E-17	04:15	3.7686600E+01	-1.2131254E+02
40.000	9.4E-08	7.2E-13	7.2E-10	8.0E-18	04:51	3.7686600E+01	-1.2125578E+02
50.000	6.0E-08	4.6E-13	4.6E-10	5.1E-18	06:04	3.7686600E+01	-1.2114227E+02
65.000	3.5E-08	2.7E-13	2.7E-10	3.0E-18	07:54	3.7686600E+01	-1.2097201E+02
80.000	2.3E-08	1.8E-13	1.8E-10	2.0E-18	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.8e-4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
1E-05
1E-06
1E-07
1E-08
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 7.8000E-04 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-07-2 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.8000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 7.43E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.8E-05	2.2E-10	2.2E-07	2.4E-15	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	7.4E-03	5.7E-08	5.7E-05	6.4E-13	<00:01	3.7686600E+01	-1.2170884E+02
0.150	4.8E-03	3.7E-08	3.7E-05	4.1E-13	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.1E-03	1.6E-08	1.6E-05	1.8E-13	00:01	3.7686600E+01	-1.2170699E+02
0.500	5.4E-04	4.1E-09	4.1E-06	4.6E-14	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.3E-04	9.8E-10	9.8E-07	1.1E-14	00:04	3.7686600E+01	-1.2169848E+02
3.000	4.6E-05	3.5E-10	3.5E-07	3.9E-15	00:14	3.7686600E+01	-1.2167578E+02
5.000	3.2E-05	2.4E-10	2.4E-07	2.7E-15	00:23	3.7686600E+01	-1.2165307E+02
8.000	2.4E-05	1.8E-10	1.8E-07	2.0E-15	00:38	3.7686600E+01	-1.2161902E+02
9.400	2.1E-05	1.6E-10	1.6E-07	1.8E-15	00:44	3.7686600E+01	-1.2160313E+02
10.000	2.1E-05	1.6E-10	1.6E-07	1.8E-15	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.9E-05	1.4E-10	1.4E-07	1.6E-15	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.6E-05	1.2E-10	1.2E-07	1.4E-15	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.4E-05	1.1E-10	1.1E-07	1.2E-15	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.2E-05	9.4E-11	9.4E-08	1.0E-15	01:59	3.7686600E+01	-1.2142605E+02
30.000	1.1E-05	8.5E-11	8.5E-08	9.5E-16	02:23	3.7686600E+01	-1.2136930E+02

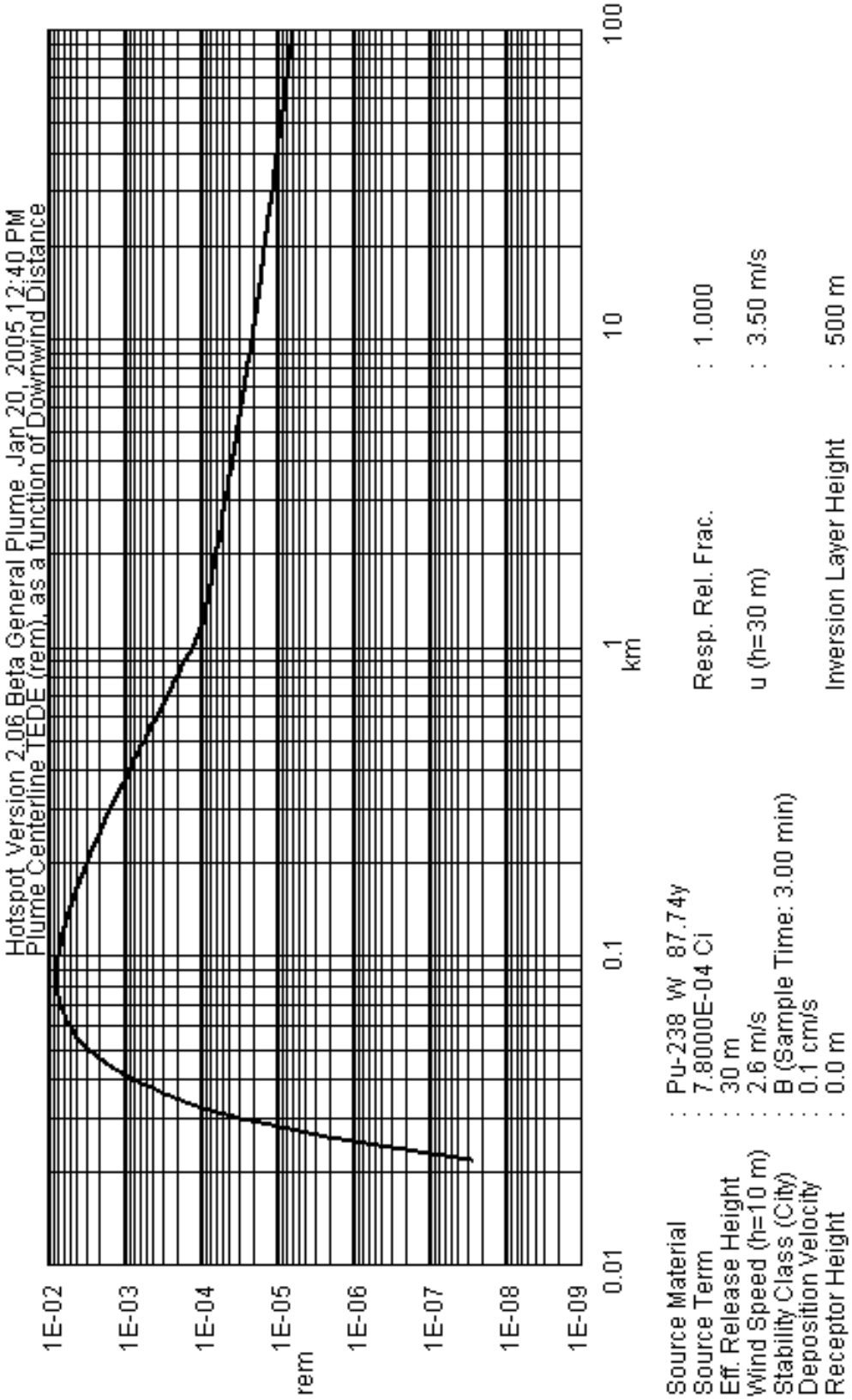
35.000	1.0E-05	7.8E-11	7.8E-08	8.7E-16	02:46	3.7686600E+01	-1.2131254E+02
40.000	9.5E-06	7.3E-11	7.3E-08	8.1E-16	03:10	3.7686600E+01	-1.2125578E+02
50.000	8.5E-06	6.5E-11	6.5E-08	7.2E-16	03:58	3.7686600E+01	-1.2114227E+02
65.000	7.4E-06	5.6E-11	5.6E-08	6.3E-16	05:09	3.7686600E+01	-1.2097201E+02
80.000	6.6E-06	5.1E-11	5.1E-08	5.7E-16	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.8e-4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-02
1E-03
1E-04
1E-05
rem
1E-06
1E-07
1E-08
1E-09
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.8000E-04 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-07-2 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.8000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 7.78E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.7E-03	1.3E-08	1.3E-05	1.5E-13	<00:01	3.7686600E+01	-1.2170813E+02
0.250	7.0E-03	5.4E-08	5.4E-05	6.0E-13	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	7.8E-03	6.0E-08	6.0E-05	6.7E-13	00:01	3.7686600E+01	-1.2170624E+02
0.500	6.1E-03	4.7E-08	4.7E-05	5.2E-13	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.7E-03	2.1E-08	2.1E-05	2.3E-13	00:06	3.7686600E+01	-1.2169848E+02
3.000	6.4E-04	4.9E-09	4.9E-06	5.4E-14	00:18	3.7686600E+01	-1.2167578E+02
5.000	3.4E-04	2.6E-09	2.6E-06	2.9E-14	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.9E-04	1.5E-09	1.5E-06	1.7E-14	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.6E-04	1.2E-09	1.2E-06	1.4E-14	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.5E-04	1.2E-09	1.2E-06	1.3E-14	01:02	3.7686600E+01	-1.2159632E+02
12.000	1.2E-04	9.3E-10	9.3E-07	1.0E-14	01:15	3.7686600E+01	-1.2157362E+02
15.000	9.7E-05	7.5E-10	7.5E-07	8.3E-15	01:34	3.7686600E+01	-1.2153956E+02
20.000	8.3E-05	6.3E-10	6.3E-07	7.1E-15	02:05	3.7686600E+01	-1.2148281E+02
25.000	7.5E-05	5.7E-10	5.7E-07	6.4E-15	02:36	3.7686600E+01	-1.2142605E+02
30.000	6.8E-05	5.2E-10	5.2E-07	5.8E-15	03:08	3.7686600E+01	-1.2136930E+02

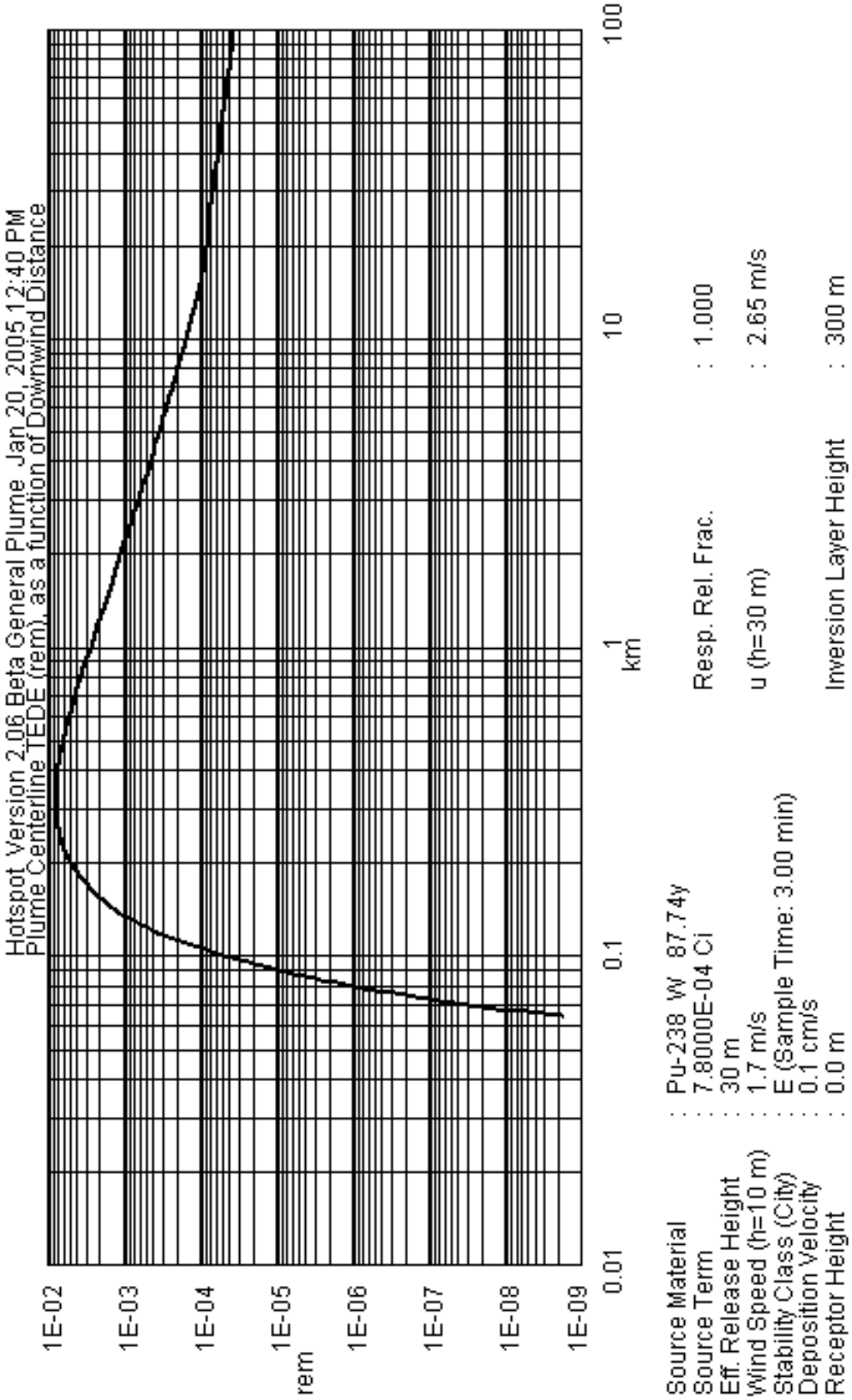
35.000	6.2E-05	4.7E-10	4.7E-07	5.3E-15	03:39	3.7686600E+01	-1.2131254E+02
40.000	5.8E-05	4.4E-10	4.4E-07	4.9E-15	04:11	3.7686600E+01	-1.2125578E+02
50.000	5.1E-05	3.9E-10	3.9E-07	4.4E-15	05:13	3.7686600E+01	-1.2114227E+02
65.000	4.4E-05	3.4E-10	3.4E-07	3.8E-15	06:48	3.7686600E+01	-1.2097201E+02
80.000	4.0E-05	3.0E-10	3.0E-07	3.4E-15	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.8e-4
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-02
1E-03
1E-04
1E-05
rem
1E-06
1E-07
1E-08
1E-09
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.8000E-04 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-08 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.1000E-09 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 8.83E-08 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	7.6E-12	5.8E-17	5.8E-14	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	8.8E-08	6.8E-13	6.8E-10	7.6E-18	<00:01	3.7686600E+01	-1.2170861E+02
0.150	7.5E-08	5.7E-13	5.7E-10	6.4E-18	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.8E-08	2.9E-13	2.9E-10	3.2E-18	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.1E-08	8.7E-14	8.7E-11	0.0E+00	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.2E-09	2.4E-14	2.4E-11	0.0E+00	00:05	3.7686600E+01	-1.2169848E+02
3.000	6.7E-10	5.2E-15	5.2E-12	0.0E+00	00:16	3.7686600E+01	-1.2167578E+02
5.000	4.7E-10	3.6E-15	3.6E-12	0.0E+00	00:26	3.7686600E+01	-1.2165307E+02
8.000	3.5E-10	2.7E-15	2.7E-12	0.0E+00	00:42	3.7686600E+01	-1.2161902E+02
9.400	3.2E-10	2.4E-15	2.4E-12	0.0E+00	00:50	3.7686600E+01	-1.2160313E+02
10.000	3.0E-10	2.3E-15	2.3E-12	0.0E+00	00:53	3.7686600E+01	-1.2159632E+02
12.000	2.7E-10	2.1E-15	2.1E-12	0.0E+00	01:04	3.7686600E+01	-1.2157362E+02
15.000	2.4E-10	1.8E-15	1.8E-12	0.0E+00	01:20	3.7686600E+01	-1.2153956E+02
20.000	2.0E-10	1.6E-15	1.6E-12	0.0E+00	01:46	3.7686600E+01	-1.2148281E+02
25.000	1.8E-10	1.4E-15	1.4E-12	0.0E+00	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.6E-10	1.2E-15	1.2E-12	0.0E+00	02:40	3.7686600E+01	-1.2136930E+02

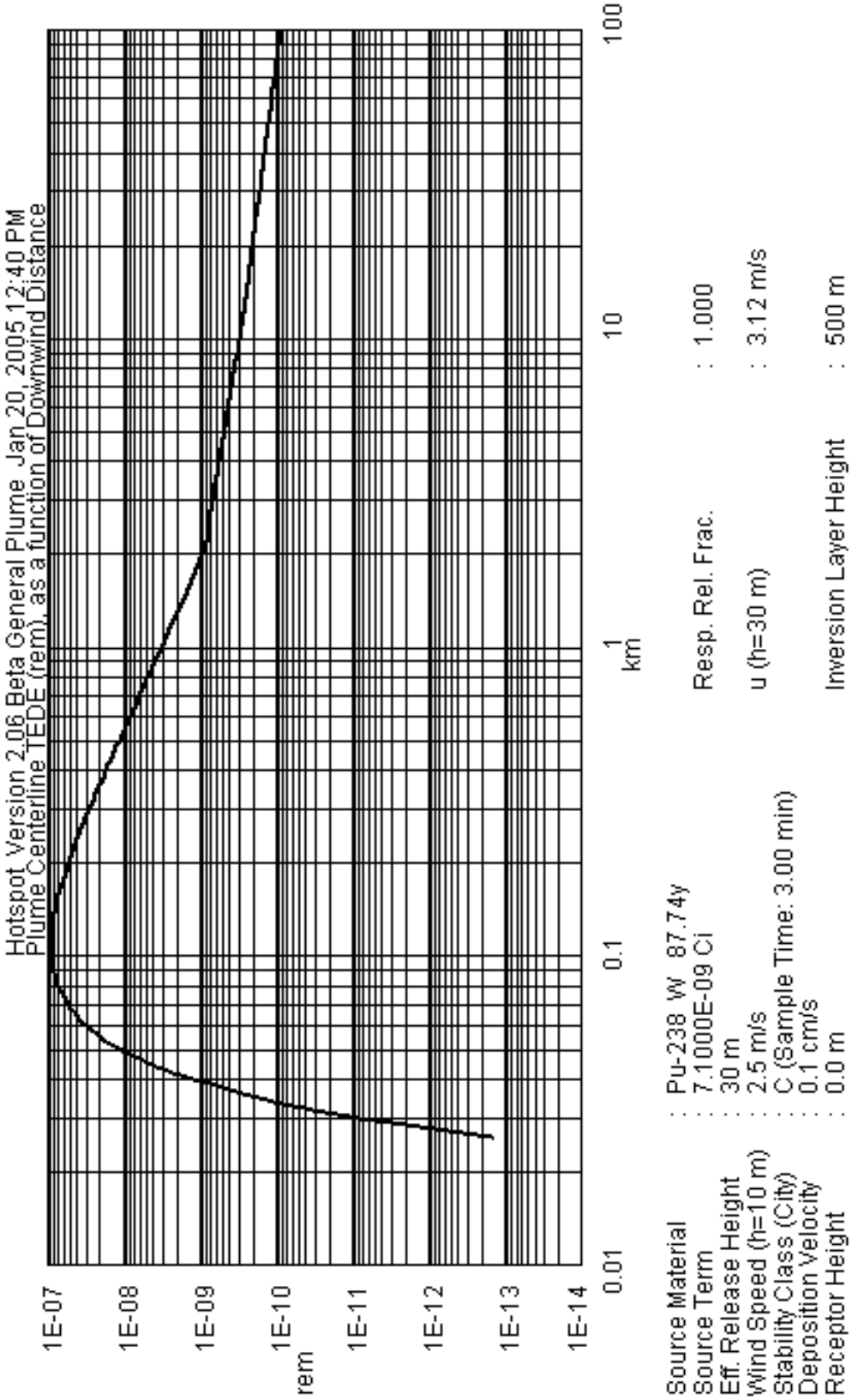
35.000	1.5E-10	1.1E-15	1.1E-12	0.0E+00	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.4E-10	1.1E-15	1.1E-12	0.0E+00	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.2E-10	9.5E-16	9.5E-13	0.0E+00	04:26	3.7686600E+01	-1.2114227E+02
65.000	1.1E-10	8.3E-16	8.3E-13	0.0E+00	05:46	3.7686600E+01	-1.2097201E+02
80.000	9.7E-11	7.4E-16	7.4E-13	0.0E+00	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.1e-9
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-07
1E-08
1E-09
1E-10
rem
1E-11
1E-12
1E-13
1E-14
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.1000E-09 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-08 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.1000E-09 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.03E-07 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	3.9E-10	3.0E-15	3.0E-12	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.0E-07	7.9E-13	7.9E-10	8.8E-18	<00:01	3.7686600E+01	-1.2170884E+02
0.150	6.7E-08	5.1E-13	5.1E-10	5.7E-18	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.9E-08	2.2E-13	2.2E-10	2.5E-18	00:01	3.7686600E+01	-1.2170699E+02
0.500	7.5E-09	5.7E-14	5.7E-11	0.0E+00	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.8E-09	1.4E-14	1.4E-11	0.0E+00	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.8E-10	1.3E-15	1.3E-12	0.0E+00	00:21	3.7686600E+01	-1.2167578E+02
5.000	6.0E-11	4.6E-16	4.6E-13	0.0E+00	00:36	3.7686600E+01	-1.2165307E+02
8.000	2.3E-11	1.7E-16	1.7E-13	0.0E+00	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.6E-11	1.2E-16	1.2E-13	0.0E+00	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.4E-11	1.1E-16	1.1E-13	0.0E+00	01:12	3.7686600E+01	-1.2159632E+02
12.000	9.9E-12	7.5E-17	7.5E-14	0.0E+00	01:27	3.7686600E+01	-1.2157362E+02
15.000	6.2E-12	4.8E-17	4.8E-14	0.0E+00	01:49	3.7686600E+01	-1.2153956E+02
20.000	3.5E-12	2.7E-17	2.7E-14	0.0E+00	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.2E-12	1.7E-17	1.7E-14	0.0E+00	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.5E-12	1.2E-17	1.2E-14	0.0E+00	03:38	3.7686600E+01	-1.2136930E+02

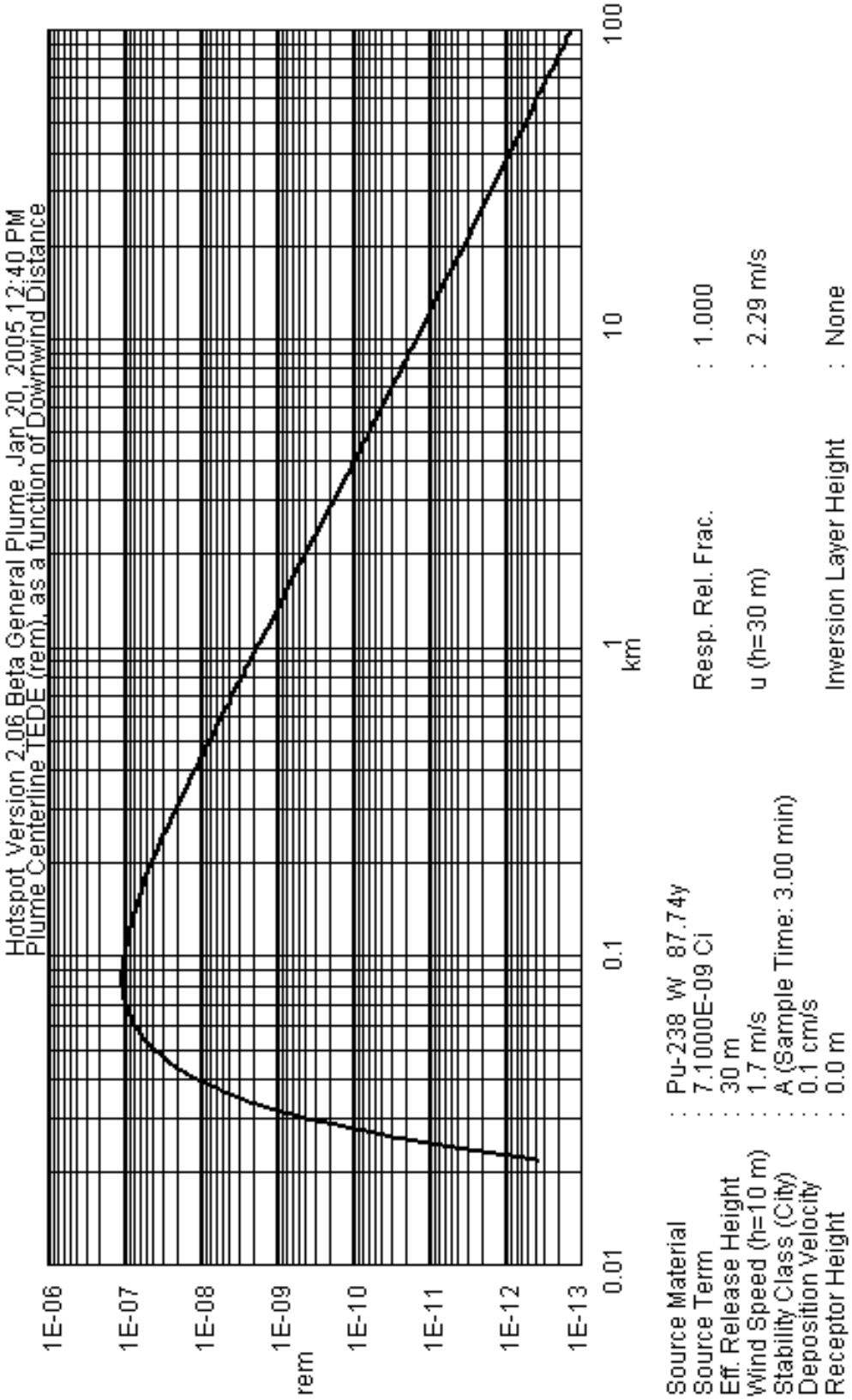
35.000	1.1E-12	8.6E-18	8.6E-15	0.0E+00	04:15	3.7686600E+01	-1.2131254E+02
40.000	8.5E-13	6.5E-18	6.5E-15	0.0E+00	04:51	3.7686600E+01	-1.2125578E+02
50.000	5.5E-13	4.2E-18	4.2E-15	0.0E+00	06:04	3.7686600E+01	-1.2114227E+02
65.000	3.2E-13	2.5E-18	2.5E-15	0.0E+00	07:54	3.7686600E+01	-1.2097201E+02
80.000	2.1E-13	1.6E-18	1.6E-15	0.0E+00	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.1e-9
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-06
1E-07
1E-08
1E-09
rem
1E-10
1E-11
1E-12
1E-13
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.1000E-09 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-08 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.1000E-09 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 6.77E-08 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.6E-10	2.0E-15	2.0E-12	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	6.8E-08	5.2E-13	5.2E-10	5.8E-18	<00:01	3.7686600E+01	-1.2170884E+02
0.150	4.4E-08	3.3E-13	3.3E-10	3.7E-18	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.9E-08	1.4E-13	1.4E-10	1.6E-18	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.9E-09	3.7E-14	3.7E-11	0.0E+00	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.2E-09	8.9E-15	8.9E-12	0.0E+00	00:04	3.7686600E+01	-1.2169848E+02
3.000	4.2E-10	3.2E-15	3.2E-12	0.0E+00	00:14	3.7686600E+01	-1.2167578E+02
5.000	2.9E-10	2.2E-15	2.2E-12	0.0E+00	00:23	3.7686600E+01	-1.2165307E+02
8.000	2.2E-10	1.6E-15	1.6E-12	0.0E+00	00:38	3.7686600E+01	-1.2161902E+02
9.400	2.0E-10	1.5E-15	1.5E-12	0.0E+00	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.9E-10	1.4E-15	1.4E-12	0.0E+00	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.7E-10	1.3E-15	1.3E-12	0.0E+00	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.5E-10	1.1E-15	1.1E-12	0.0E+00	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.3E-10	9.6E-16	9.6E-13	0.0E+00	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.1E-10	8.5E-16	8.5E-13	0.0E+00	01:59	3.7686600E+01	-1.2142605E+02
30.000	1.0E-10	7.7E-16	7.7E-13	0.0E+00	02:23	3.7686600E+01	-1.2136930E+02

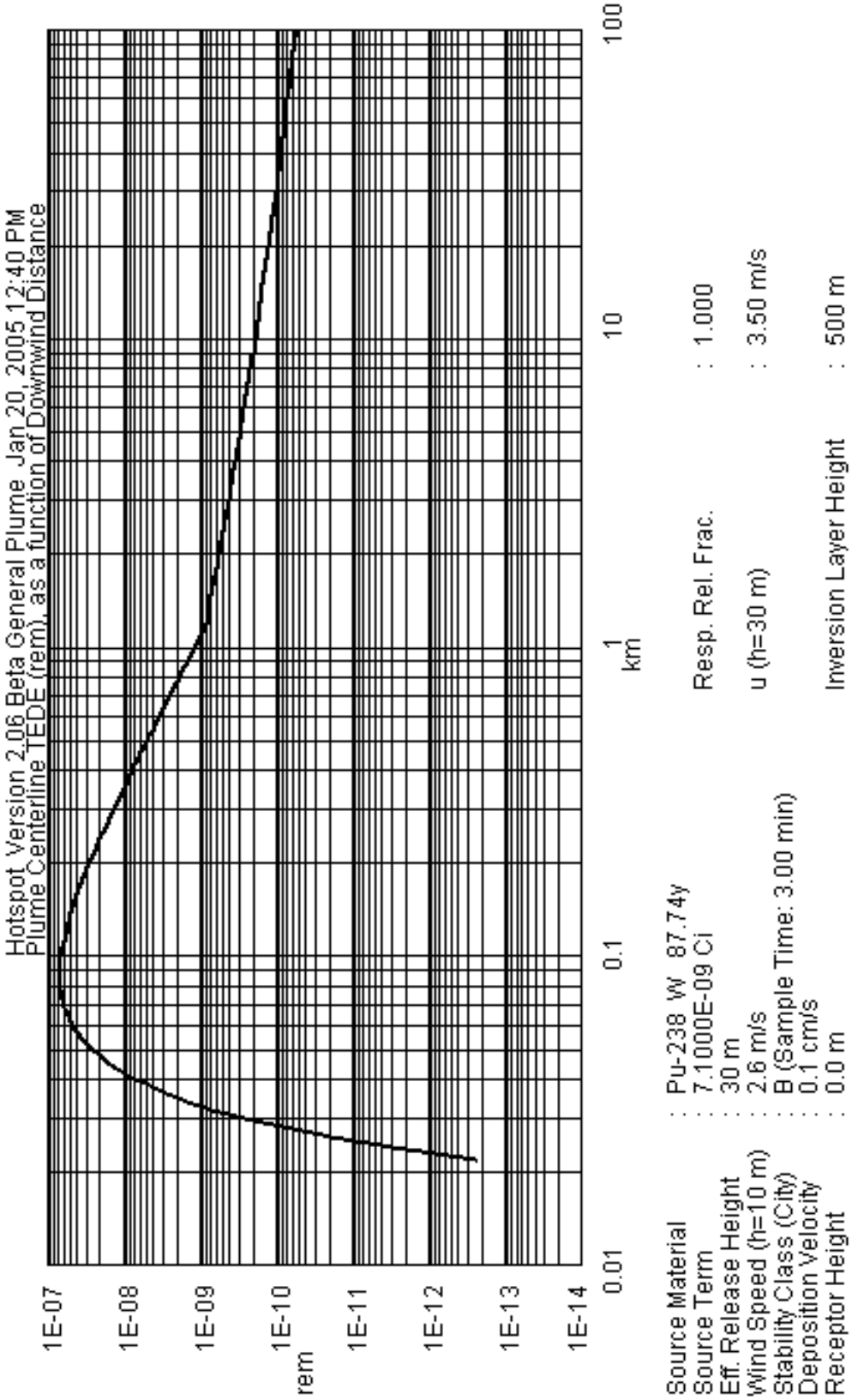
35.000	9.3E-11	7.1E-16	7.1E-13	0.0E+00	02:46	3.7686600E+01	-1.2131254E+02
40.000	8.7E-11	6.6E-16	6.6E-13	0.0E+00	03:10	3.7686600E+01	-1.2125578E+02
50.000	7.7E-11	5.9E-16	5.9E-13	0.0E+00	03:58	3.7686600E+01	-1.2114227E+02
65.000	6.7E-11	5.1E-16	5.1E-13	0.0E+00	05:09	3.7686600E+01	-1.2097201E+02
80.000	6.0E-11	4.6E-16	4.6E-13	0.0E+00	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.1e-9
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-07
1E-08
1E-09
1E-10
rem
1E-11
1E-12
1E-13
1E-14
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.1000E-09 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-08 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 7.1000E-09 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 7.08E-08 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.6E-08	1.2E-13	1.2E-10	1.3E-18	<00:01	3.7686600E+01	-1.2170813E+02
0.250	6.4E-08	4.9E-13	4.9E-10	5.5E-18	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	7.1E-08	5.4E-13	5.4E-10	6.1E-18	00:01	3.7686600E+01	-1.2170624E+02
0.500	5.6E-08	4.3E-13	4.3E-10	4.8E-18	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.5E-08	1.9E-13	1.9E-10	2.1E-18	00:06	3.7686600E+01	-1.2169848E+02
3.000	5.8E-09	4.4E-14	4.4E-11	0.0E+00	00:18	3.7686600E+01	-1.2167578E+02
5.000	3.1E-09	2.4E-14	2.4E-11	0.0E+00	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.8E-09	1.4E-14	1.4E-11	0.0E+00	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.5E-09	1.1E-14	1.1E-11	0.0E+00	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.4E-09	1.0E-14	1.0E-11	0.0E+00	01:02	3.7686600E+01	-1.2159632E+02
12.000	1.1E-09	8.5E-15	8.5E-12	0.0E+00	01:15	3.7686600E+01	-1.2157362E+02
15.000	8.9E-10	6.8E-15	6.8E-12	0.0E+00	01:34	3.7686600E+01	-1.2153956E+02
20.000	7.5E-10	5.8E-15	5.8E-12	0.0E+00	02:05	3.7686600E+01	-1.2148281E+02
25.000	6.8E-10	5.2E-15	5.2E-12	0.0E+00	02:36	3.7686600E+01	-1.2142605E+02
30.000	6.1E-10	4.7E-15	4.7E-12	0.0E+00	03:08	3.7686600E+01	-1.2136930E+02

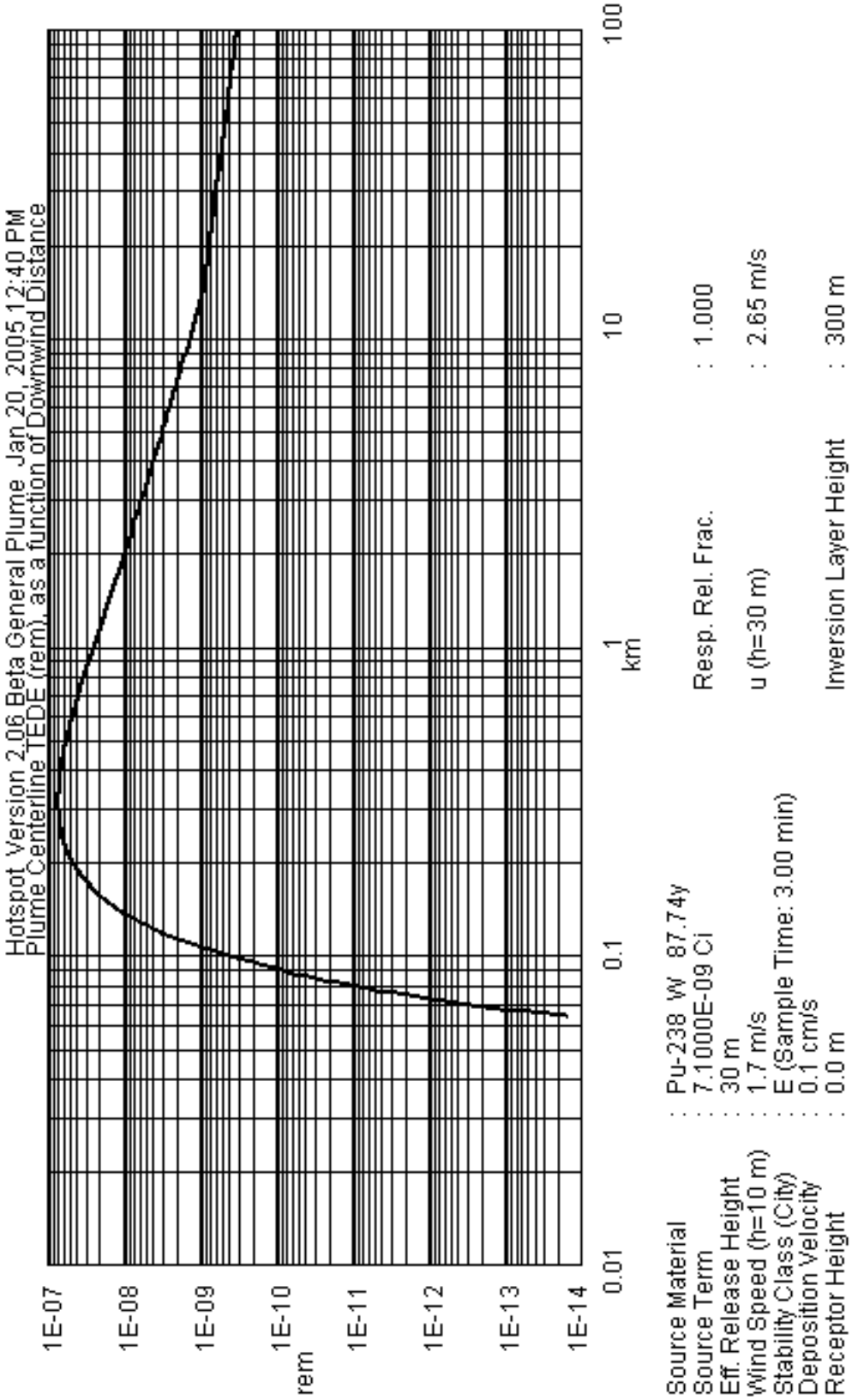
35.000	5.6E-10	4.3E-15	4.3E-12	0.0E+00	03:39	3.7686600E+01	-1.2131254E+02
40.000	5.2E-10	4.0E-15	4.0E-12	0.0E+00	04:11	3.7686600E+01	-1.2125578E+02
50.000	4.7E-10	3.6E-15	3.6E-12	0.0E+00	05:13	3.7686600E+01	-1.2114227E+02
65.000	4.0E-10	3.1E-15	3.1E-12	0.0E+00	06:48	3.7686600E+01	-1.2097201E+02
80.000	3.6E-10	2.8E-15	2.8E-12	0.0E+00	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 7.1e-9
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-07
1E-08
1E-09
1E-10
rem
1E-11
1E-12
1E-13
1E-14
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 7.1000E-09 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-09 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Term                : EPHA Criticality with Pu.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 47 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 1.34 km
Exceeds Outer  Dose Out To : 23.24 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.1E-03	1.8E-05	5.0E-03	1.6E-07	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	4.7E+01	2.0E-01	5.8E+01	1.8E-03	<00:01	3.7686600E+01	-1.2170861E+02
0.150	4.0E+01	1.7E-01	4.9E+01	1.5E-03	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.0E+01	8.5E-02	2.5E+01	7.7E-04	00:01	3.7686600E+01	-1.2170699E+02
0.500	6.1E+00	2.4E-02	7.4E+00	2.3E-04	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.7E+00	6.2E-03	2.0E+00	6.2E-05	00:05	3.7686600E+01	-1.2169848E+02
3.000	3.6E-01	9.5E-04	3.8E-01	1.2E-05	00:16	3.7686600E+01	-1.2167578E+02
5.000	2.5E-01	5.0E-04	2.4E-01	7.3E-06	00:26	3.7686600E+01	-1.2165307E+02
8.000	1.9E-01	2.6E-04	1.5E-01	4.5E-06	00:42	3.7686600E+01	-1.2161902E+02
9.400	1.7E-01	2.1E-04	1.3E-01	3.8E-06	00:50	3.7686600E+01	-1.2160313E+02
10.000	1.6E-01	1.9E-04	1.2E-01	3.5E-06	00:53	3.7686600E+01	-1.2159632E+02
12.000	1.5E-01	1.5E-04	9.8E-02	2.9E-06	01:04	3.7686600E+01	-1.2157362E+02
15.000	1.3E-01	1.1E-04	7.5E-02	2.1E-06	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.1E-01	7.1E-05	5.1E-02	1.4E-06	01:46	3.7686600E+01	-1.2148281E+02
25.000	9.6E-02	5.2E-05	3.7E-02	9.9E-07	02:13	3.7686600E+01	-1.2142605E+02
30.000	8.7E-02	4.0E-05	2.8E-02	7.2E-07	02:40	3.7686600E+01	-1.2136930E+02
35.000	8.0E-02	3.2E-05	2.2E-02	5.5E-07	03:06	3.7686600E+01	-1.2131254E+02
40.000	7.5E-02	2.6E-05	1.8E-02	4.2E-07	03:33	3.7686600E+01	-1.2125578E+02
50.000	6.6E-02	1.9E-05	1.2E-02	2.7E-07	04:26	3.7686600E+01	-1.2114227E+02
65.000	5.8E-02	1.3E-05	7.9E-03	1.6E-07	05:46	3.7686600E+01	-1.2097201E+02
80.000	5.2E-02	9.4E-06	5.7E-03	1.0E-07	07:06	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

```
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released               (Ci)  : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released               (Ci)  : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released               (Ci)  : 1.1
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released               (Ci)  : 120.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released               (Ci)  : 16.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
```

```
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                        (Years)    : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                        (Years)    : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                        (Years)    : 8.7740E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
```

```
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality with Pu.mix
```

```
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
```

```
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                         (Years)   : 5.1142E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                         (Years)   : 1.0720E+01
```

```
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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```
Nuclide [08] : Xe-133     5.245d
Halflife                          (Years)   : 1.4370E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.6100E-17
Total Activity Released             (Ci)    : 2.7000E+00
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
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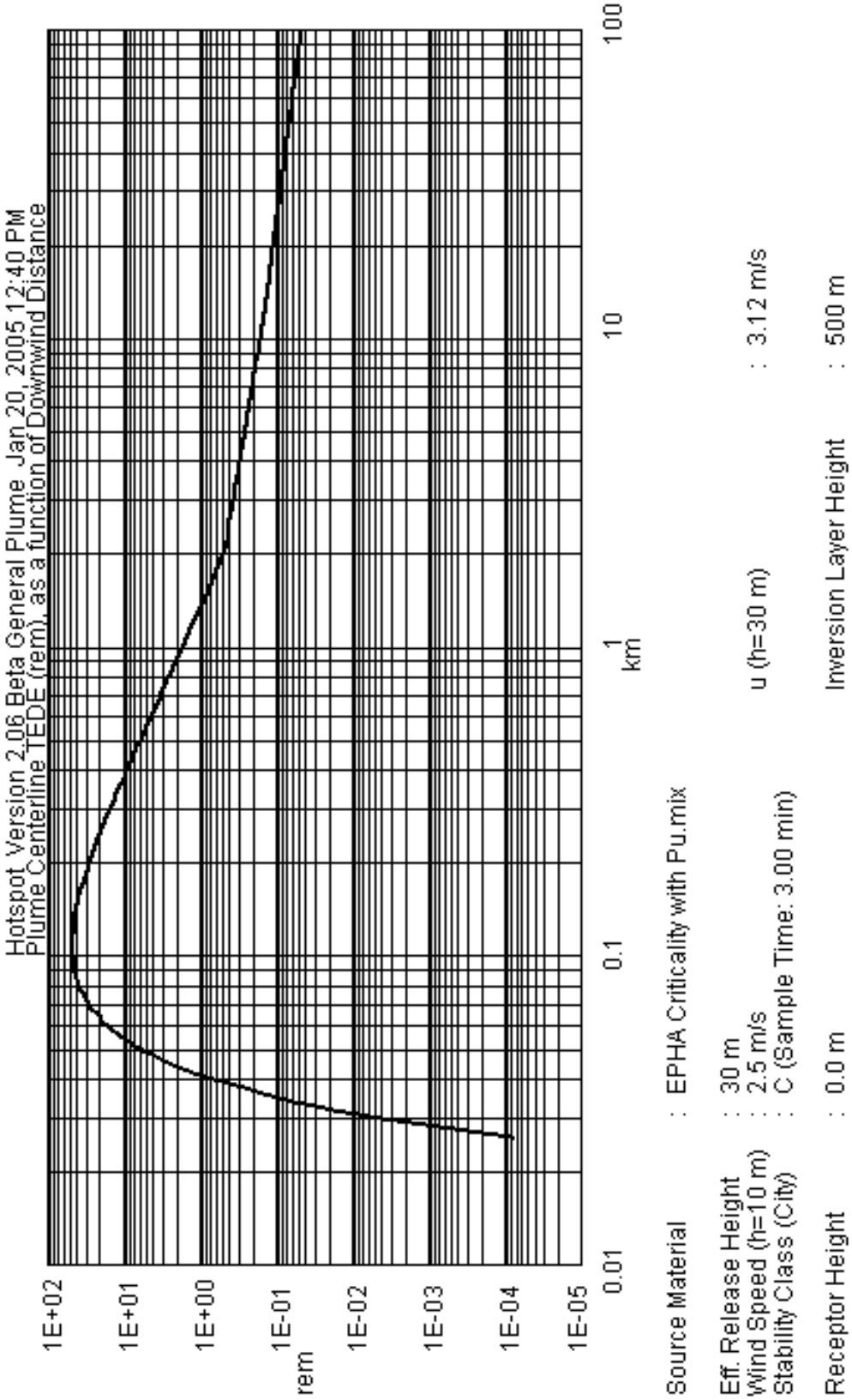
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                         (Years)   : 2.6256E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)   : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.2100E-15
Total Activity Released             (Ci)   : 120.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 16.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                         (Years)   : 8.7740E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
```

```
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________________
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality with Pu.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Receptor Height : 0.0 m
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-09 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Term                : EPHA Criticality with Pu.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 55 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.97 km
Exceeds Outer  Dose Out To : 2.90 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.1E-01	9.1E-04	2.6E-01	8.0E-06	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	5.5E+01	2.4E-01	6.8E+01	2.1E-03	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.6E+01	1.5E-01	4.4E+01	1.4E-03	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.5E+01	6.4E-02	1.9E+01	5.8E-04	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.0E+00	1.5E-02	4.8E+00	1.5E-04	00:03	3.7686600E+01	-1.2170415E+02
1.000	9.5E-01	3.3E-03	1.1E+00	3.4E-05	00:07	3.7686600E+01	-1.2169848E+02
3.000	9.4E-02	2.1E-04	9.3E-02	2.8E-06	00:21	3.7686600E+01	-1.2167578E+02
5.000	3.2E-02	5.1E-05	2.8E-02	8.3E-07	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.2E-02	1.3E-05	8.6E-03	2.5E-07	00:58	3.7686600E+01	-1.2161902E+02
9.400	8.7E-03	8.2E-06	5.6E-03	1.6E-07	01:08	3.7686600E+01	-1.2160313E+02
10.000	7.7E-03	6.9E-06	4.7E-03	1.4E-07	01:12	3.7686600E+01	-1.2159632E+02
12.000	5.3E-03	4.0E-06	2.9E-03	8.2E-08	01:27	3.7686600E+01	-1.2157362E+02
15.000	3.3E-03	2.1E-06	1.5E-03	4.3E-08	01:49	3.7686600E+01	-1.2153956E+02
20.000	1.9E-03	9.3E-07	6.6E-04	1.7E-08	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.2E-03	4.8E-07	3.3E-04	8.3E-09	03:02	3.7686600E+01	-1.2142605E+02
30.000	8.2E-04	2.8E-07	1.9E-04	4.5E-09	03:38	3.7686600E+01	-1.2136930E+02
35.000	6.0E-04	1.8E-07	1.2E-04	2.6E-09	04:15	3.7686600E+01	-1.2131254E+02
40.000	4.6E-04	1.2E-07	7.6E-05	1.6E-09	04:51	3.7686600E+01	-1.2125578E+02
50.000	2.9E-04	6.1E-08	3.8E-05	7.4E-10	06:04	3.7686600E+01	-1.2114227E+02
65.000	1.7E-04	2.8E-08	1.7E-05	2.9E-10	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.1E-04	1.5E-08	9.0E-06	1.4E-10	09:43	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

```
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine              (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released             (Ci)    : 120.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released             (Ci)    : 16.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                        (Years)    : 1.0008E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                        (Years)    : 7.5457E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                        (Years)    : 8.7740E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
```

```
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality with Pu.mix
```

```
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
```

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ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                         (Years)   : 5.1142E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                         (Years)   : 1.0720E+01
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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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Nuclide [08] : Xe-133     5.245d
Halflife                          (Years)   : 1.4370E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.6100E-17
Total Activity Released             (Ci)    : 2.7000E+00
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
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Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                         (Years)   : 2.6256E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)   : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.2100E-15
Total Activity Released             (Ci)   : 120.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 16.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                         (Years)   : 8.7740E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
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Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________________
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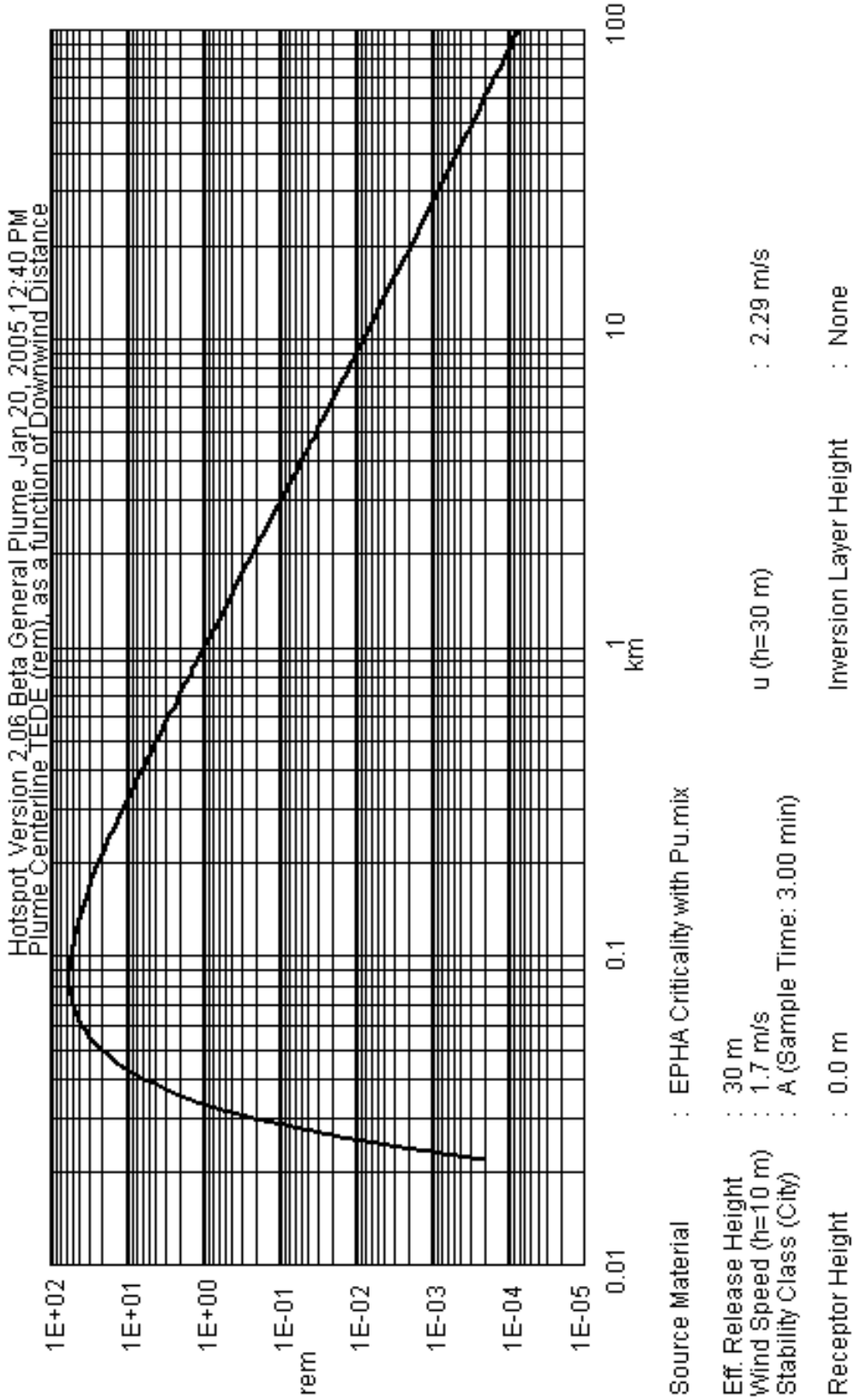
Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:40 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality with Pu.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
u (h=30 m) : 2.29 m/s
Receptor Height : 0.0 m
Inversion Layer Height : None

"RD-09 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Term                : EPHA Criticality with Pu.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 36 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.80 km
Exceeds Outer  Dose Out To : 10.08 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.4E-01	6.0E-04	1.7E-01	5.3E-06	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	3.6E+01	1.6E-01	4.5E+01	1.4E-03	<00:01	3.7686600E+01	-1.2170884E+02
0.150	2.3E+01	1.0E-01	2.9E+01	8.9E-04	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.0E+01	4.3E-02	1.2E+01	3.8E-04	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.6E+00	1.1E-02	3.2E+00	9.8E-05	00:02	3.7686600E+01	-1.2170415E+02
1.000	6.2E-01	2.3E-03	7.4E-01	2.3E-05	00:04	3.7686600E+01	-1.2169848E+02
3.000	2.2E-01	6.2E-04	2.4E-01	7.3E-06	00:14	3.7686600E+01	-1.2167578E+02
5.000	1.6E-01	3.3E-04	1.5E-01	4.6E-06	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.2E-01	1.8E-04	9.8E-02	2.9E-06	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.0E-01	1.4E-04	8.3E-02	2.5E-06	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.0E-01	1.3E-04	7.8E-02	2.3E-06	00:47	3.7686600E+01	-1.2159632E+02
12.000	9.0E-02	9.9E-05	6.4E-02	1.9E-06	00:57	3.7686600E+01	-1.2157362E+02
15.000	7.9E-02	7.2E-05	5.0E-02	1.4E-06	01:11	3.7686600E+01	-1.2153956E+02
20.000	6.7E-02	4.8E-05	3.5E-02	9.8E-07	01:35	3.7686600E+01	-1.2148281E+02
25.000	6.0E-02	3.5E-05	2.5E-02	7.0E-07	01:59	3.7686600E+01	-1.2142605E+02
30.000	5.4E-02	2.7E-05	1.9E-02	5.1E-07	02:23	3.7686600E+01	-1.2136930E+02
35.000	5.0E-02	2.2E-05	1.5E-02	3.9E-07	02:46	3.7686600E+01	-1.2131254E+02
40.000	4.6E-02	1.8E-05	1.2E-02	3.1E-07	03:10	3.7686600E+01	-1.2125578E+02
50.000	4.1E-02	1.3E-05	8.6E-03	2.0E-07	03:58	3.7686600E+01	-1.2114227E+02
65.000	3.6E-02	8.8E-06	5.6E-03	1.2E-07	05:09	3.7686600E+01	-1.2097201E+02
80.000	3.2E-02	6.5E-06	4.0E-03	7.6E-08	06:21	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

```
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine              (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released             (Ci)    : 120.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released             (Ci)    : 16.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                        (Years)    : 1.0008E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                        (Years)    : 7.5457E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                        (Years)    : 8.7740E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
```

```
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality with Pu.mix
```

```
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
```

```
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                         (Years)   : 5.1142E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                         (Years)   : 1.0720E+01
```

```
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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Nuclide [08] : Xe-133     5.245d
Halflife                          (Years)   : 1.4370E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.6100E-17
Total Activity Released             (Ci)    : 2.7000E+00
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
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Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                         (Years)   : 2.6256E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)   : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.2100E-15
Total Activity Released             (Ci)   : 120.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 16.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                         (Years)   : 8.7740E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
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Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________________
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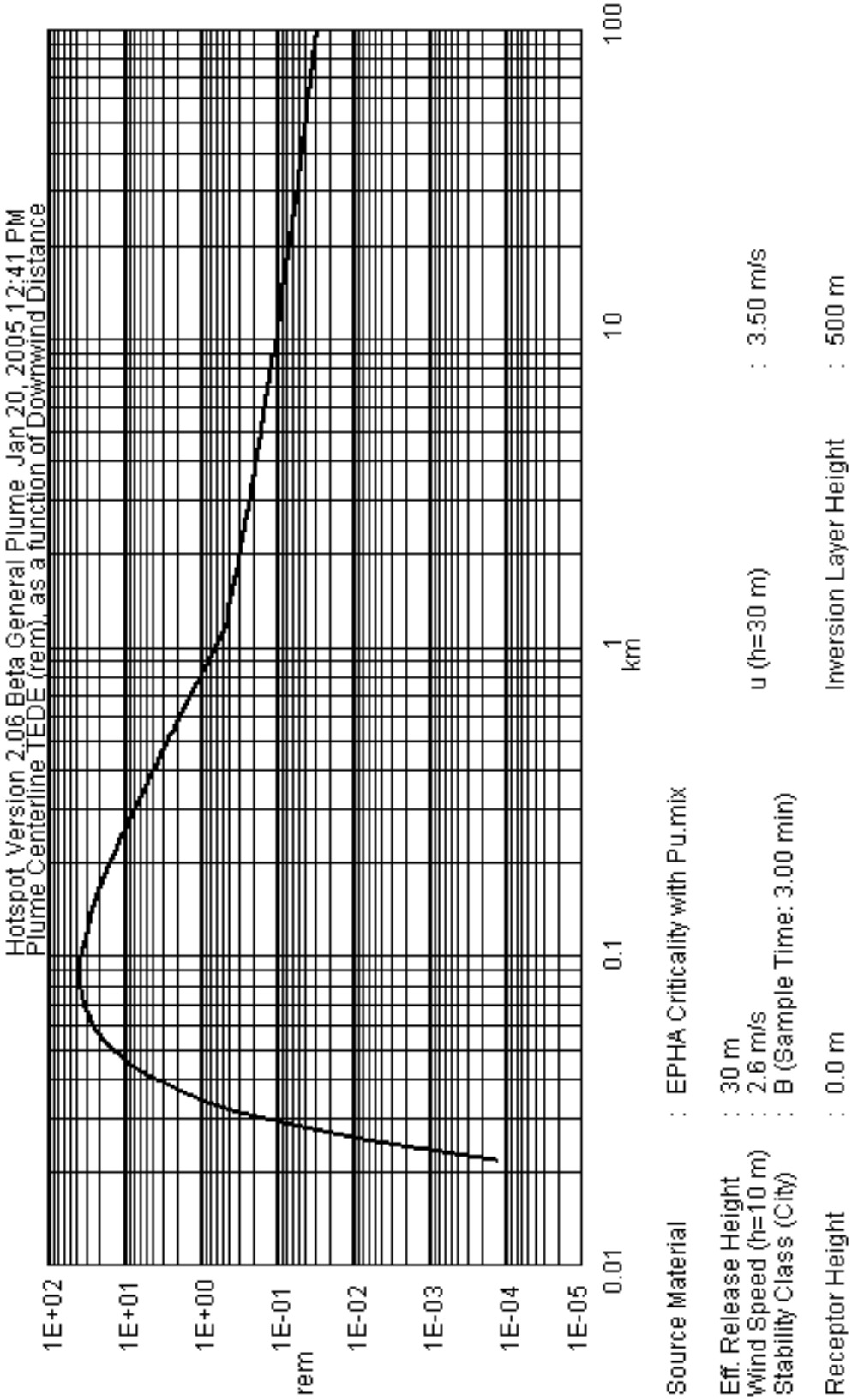
Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality with Pu.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
u (h=30 m) : 3.50 m/s
Receptor Height : 0.0 m
Inversion Layer Height : 500 m

"RD-09 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

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Source Term                : EPHA Criticality with Pu.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 38 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 7.55 km
Exceeds Outer  Dose Out To : > 200  km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	8.4E+00	3.5E-02	1.0E+01	3.2E-04	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.4E+01	1.4E-01	4.2E+01	1.3E-03	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	3.8E+01	1.6E-01	4.6E+01	1.4E-03	00:01	3.7686600E+01	-1.2170624E+02
0.500	3.0E+01	1.2E-01	3.6E+01	1.1E-03	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.3E+01	4.7E-02	1.5E+01	4.7E-04	00:06	3.7686600E+01	-1.2169848E+02
3.000	3.1E+00	7.6E-03	3.2E+00	9.7E-05	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.6E+00	2.9E-03	1.5E+00	4.5E-05	00:31	3.7686600E+01	-1.2165307E+02
8.000	9.5E-01	1.2E-03	7.2E-01	2.1E-05	00:50	3.7686600E+01	-1.2161902E+02
9.400	7.9E-01	8.5E-04	5.5E-01	1.6E-05	00:59	3.7686600E+01	-1.2160313E+02
10.000	7.3E-01	7.5E-04	5.0E-01	1.4E-05	01:02	3.7686600E+01	-1.2159632E+02
12.000	5.9E-01	5.2E-04	3.6E-01	1.0E-05	01:15	3.7686600E+01	-1.2157362E+02
15.000	4.8E-01	3.5E-04	2.5E-01	6.9E-06	01:34	3.7686600E+01	-1.2153956E+02
20.000	4.0E-01	2.3E-04	1.6E-01	4.4E-06	02:05	3.7686600E+01	-1.2148281E+02
25.000	3.6E-01	1.7E-04	1.2E-01	3.1E-06	02:36	3.7686600E+01	-1.2142605E+02
30.000	3.3E-01	1.3E-04	8.9E-02	2.2E-06	03:08	3.7686600E+01	-1.2136930E+02
35.000	3.0E-01	1.0E-04	6.9E-02	1.6E-06	03:39	3.7686600E+01	-1.2131254E+02
40.000	2.8E-01	8.6E-05	5.5E-02	1.3E-06	04:11	3.7686600E+01	-1.2125578E+02
50.000	2.5E-01	6.1E-05	3.8E-02	7.9E-07	05:13	3.7686600E+01	-1.2114227E+02
65.000	2.2E-01	4.2E-05	2.5E-02	4.6E-07	06:48	3.7686600E+01	-1.2097201E+02
80.000	1.9E-01	3.1E-05	1.8E-02	3.0E-07	08:22	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

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User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released             (Ci)    : 120.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released             (Ci)    : 16.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                        (Years)    : 1.0008E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                        (Years)    : 7.5457E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                        (Years)    : 8.7740E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
```

```
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality with Pu.mix
```

```
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
```

```
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality with Pu.mix
EPHA 1E+18 Fission Criticality with Pu Release
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                         (Years)   : 5.1142E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                         (Years)   : 1.0720E+01
```

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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-04
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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```
Nuclide [08] : Xe-133     5.245d
Halflife                          (Years)   : 1.4370E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.6100E-17
Total Activity Released             (Ci)    : 2.7000E+00
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+01
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00

Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 1.1
Airborne Fraction                           : 1.0000E+00
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Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                         (Years)   : 2.6256E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)   : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.2100E-15
Total Activity Released             (Ci)   : 120.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 16.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 430.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 45.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [17] : Pu-238  W   87.74y
Halflife                         (Years)   : 8.7740E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.0600E-04
Submersion              (Sv-m3)/(Bq-sec)   : 4.8800E-18
```

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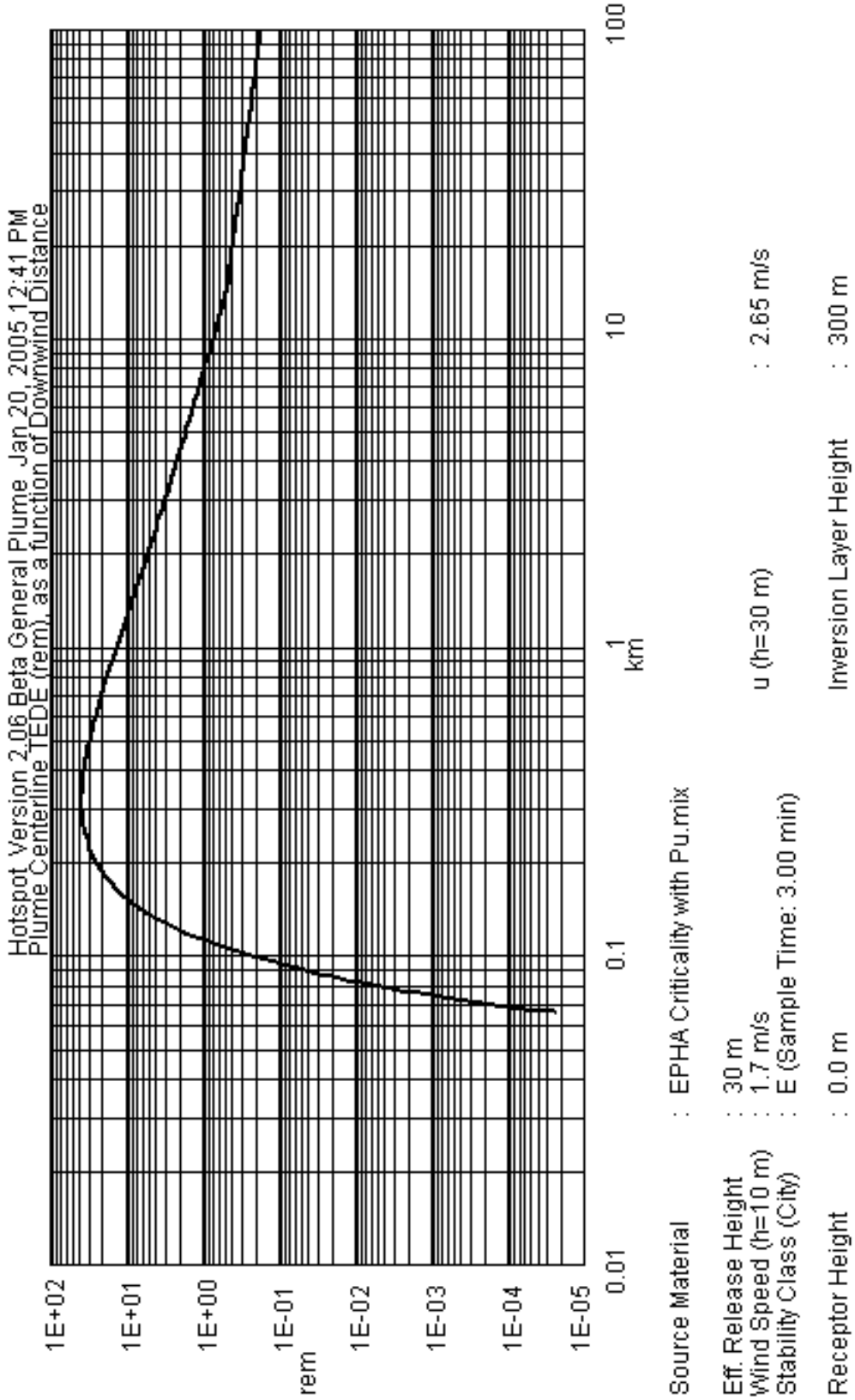
Ground Shine            (Sv-m2)/(Bq-sec)   : 8.3800E-19
Total Activity Released             (Ci)   : 3.8000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________________
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality with Pu.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
u (h=30 m) : 2.65 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Receptor Height : 0.0 m
Inversion Layer Height : 300 m

"RD-10 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Term                : EPHA Criticality.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+19 Fission Criticality
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 0.605 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.43 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	5.3E-05	1.8E-04	5.0E-02	1.6E-06	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	6.1E-01	2.0E+00	5.8E+02	1.8E-02	<00:01	3.7686600E+01	-1.2170861E+02
0.150	5.1E-01	1.7E+00	4.9E+02	1.5E-02	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.6E-01	8.5E-01	2.5E+02	7.7E-03	00:01	3.7686600E+01	-1.2170699E+02
0.500	7.4E-02	2.4E-01	7.3E+01	2.3E-03	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.9E-02	6.2E-02	2.0E+01	6.2E-04	00:05	3.7686600E+01	-1.2169848E+02
3.000	3.3E-03	9.5E-03	3.8E+00	1.2E-04	00:16	3.7686600E+01	-1.2167578E+02
5.000	1.9E-03	5.0E-03	2.4E+00	7.3E-05	00:26	3.7686600E+01	-1.2165307E+02
8.000	1.1E-03	2.6E-03	1.5E+00	4.5E-05	00:42	3.7686600E+01	-1.2161902E+02
9.400	9.4E-04	2.1E-03	1.3E+00	3.8E-05	00:50	3.7686600E+01	-1.2160313E+02
10.000	8.8E-04	1.9E-03	1.2E+00	3.5E-05	00:53	3.7686600E+01	-1.2159632E+02
12.000	7.1E-04	1.4E-03	9.7E-01	2.9E-05	01:04	3.7686600E+01	-1.2157362E+02
15.000	5.4E-04	1.1E-03	7.4E-01	2.1E-05	01:20	3.7686600E+01	-1.2153956E+02
20.000	3.8E-04	7.0E-04	5.0E-01	1.4E-05	01:46	3.7686600E+01	-1.2148281E+02
25.000	2.9E-04	5.1E-04	3.6E-01	9.9E-06	02:13	3.7686600E+01	-1.2142605E+02
30.000	2.3E-04	3.9E-04	2.7E-01	7.2E-06	02:40	3.7686600E+01	-1.2136930E+02
35.000	1.9E-04	3.1E-04	2.1E-01	5.5E-06	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.6E-04	2.6E-04	1.7E-01	4.2E-06	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.2E-04	1.8E-04	1.2E-01	2.7E-06	04:26	3.7686600E+01	-1.2114227E+02
65.000	8.6E-05	1.2E-04	7.5E-02	1.6E-06	05:46	3.7686600E+01	-1.2097201E+02
80.000	6.7E-05	9.0E-05	5.3E-02	1.0E-06	07:06	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

```
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine              (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
```

```
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released             (Ci)    : 160.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
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D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality.mix
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
```

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DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
```

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PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                        (Years)    : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)    : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
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Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 160.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
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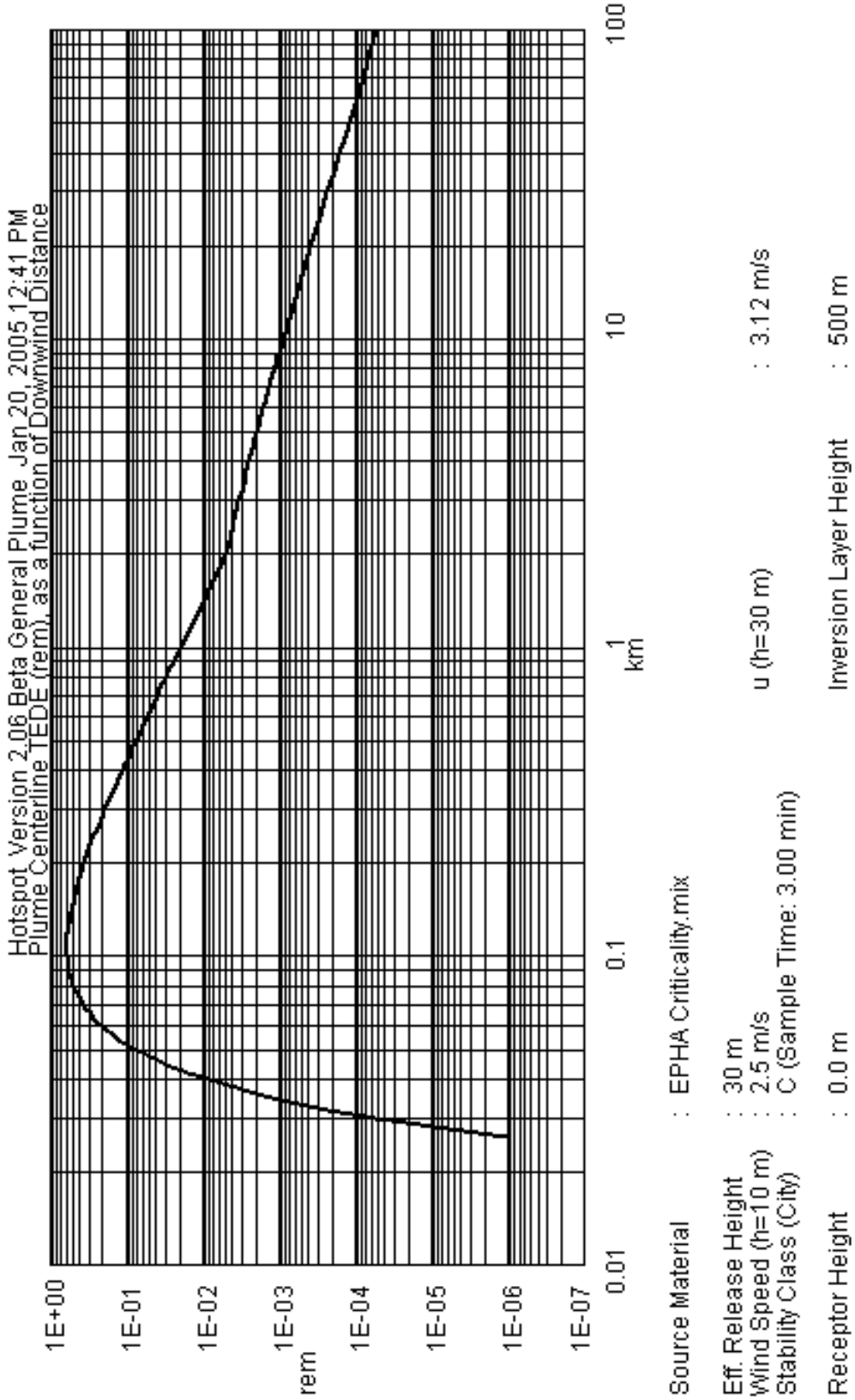
Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
rem
1E-04
1E-05
1E-06
1E-07
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
u (h=30 m) : 3.12 m/s
Receptor Height : 0.0 m
Inversion Layer Height : 500 m

"RD-10 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

Source Term : EPHA Criticality.mix (Mixture Scale Factor = 1.0000E+00)
EPHA 1E+19 Fission Criticality
Effective Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Distance Coordinates : All distances are on the Plume Centerline
Wind Speed (h=H-eff) : 2.29 m/s
Stability Class (City) : A
Receptor Height : 0.0 m
Inversion Layer Height : None
Sample Time : 3.000 min
Breathing Rate : 3.33E-04 m3/sec

Maximum Dose Distance : 0.087 km
MAXIMUM TEDE : 0.708 rem

Inner Contour Dose : 1.00E+02 rem
Middle Contour Dose : 1.0 rem
Outer Contour Dose : 0.100 rem
Exceeds Inner Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer Dose Out To : 0.35 km

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.7E-03	9.1E-03	2.6E+00	8.0E-05	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.087	7.1E-01	2.4E+00	6.8E+02	2.1E-02	<00:01	3.7686600E+01	-1.2170885E+02
0.150	4.5E-01	1.5E+00	4.4E+02	1.4E-02	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.9E-01	6.4E-01	1.9E+02	5.8E-03	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.8E-02	1.5E-01	4.7E+01	1.5E-03	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.0E-02	3.3E-02	1.1E+01	3.4E-04	00:07	3.7686600E+01	-1.2169848E+02
3.000	7.7E-04	2.1E-03	9.3E-01	2.8E-05	00:21	3.7686600E+01	-1.2167578E+02
5.000	2.1E-04	5.1E-04	2.8E-01	8.3E-06	00:36	3.7686600E+01	-1.2165307E+02
8.000	6.2E-05	1.3E-04	8.5E-02	2.5E-06	00:58	3.7686600E+01	-1.2161902E+02
9.400	4.0E-05	8.1E-05	5.5E-02	1.6E-06	01:08	3.7686600E+01	-1.2160313E+02
10.000	3.4E-05	6.8E-05	4.7E-02	1.4E-06	01:12	3.7686600E+01	-1.2159632E+02
12.000	2.1E-05	4.0E-05	2.8E-02	8.2E-07	01:27	3.7686600E+01	-1.2157362E+02
15.000	1.2E-05	2.1E-05	1.5E-02	4.3E-07	01:49	3.7686600E+01	-1.2153956E+02
20.000	5.2E-06	9.1E-06	6.4E-03	1.7E-07	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.8E-06	4.7E-06	3.2E-03	8.3E-08	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.7E-06	2.7E-06	1.8E-03	4.5E-08	03:38	3.7686600E+01	-1.2136930E+02
35.000	1.1E-06	1.7E-06	1.1E-03	2.6E-08	04:15	3.7686600E+01	-1.2131254E+02
40.000	7.7E-07	1.2E-06	7.2E-04	1.6E-08	04:51	3.7686600E+01	-1.2125578E+02
50.000	4.2E-07	5.9E-07	3.6E-04	7.4E-09	06:04	3.7686600E+01	-1.2114227E+02
65.000	2.1E-07	2.7E-07	1.6E-04	2.9E-09	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.2E-07	1.4E-07	8.1E-05	1.4E-09	09:43	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

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User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine              (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released               (Ci)  : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released               (Ci)  : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released               (Ci)  : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released               (Ci)  : 1200.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released               (Ci)  : 160.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
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D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality.mix
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
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DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
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PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                        (Years)    : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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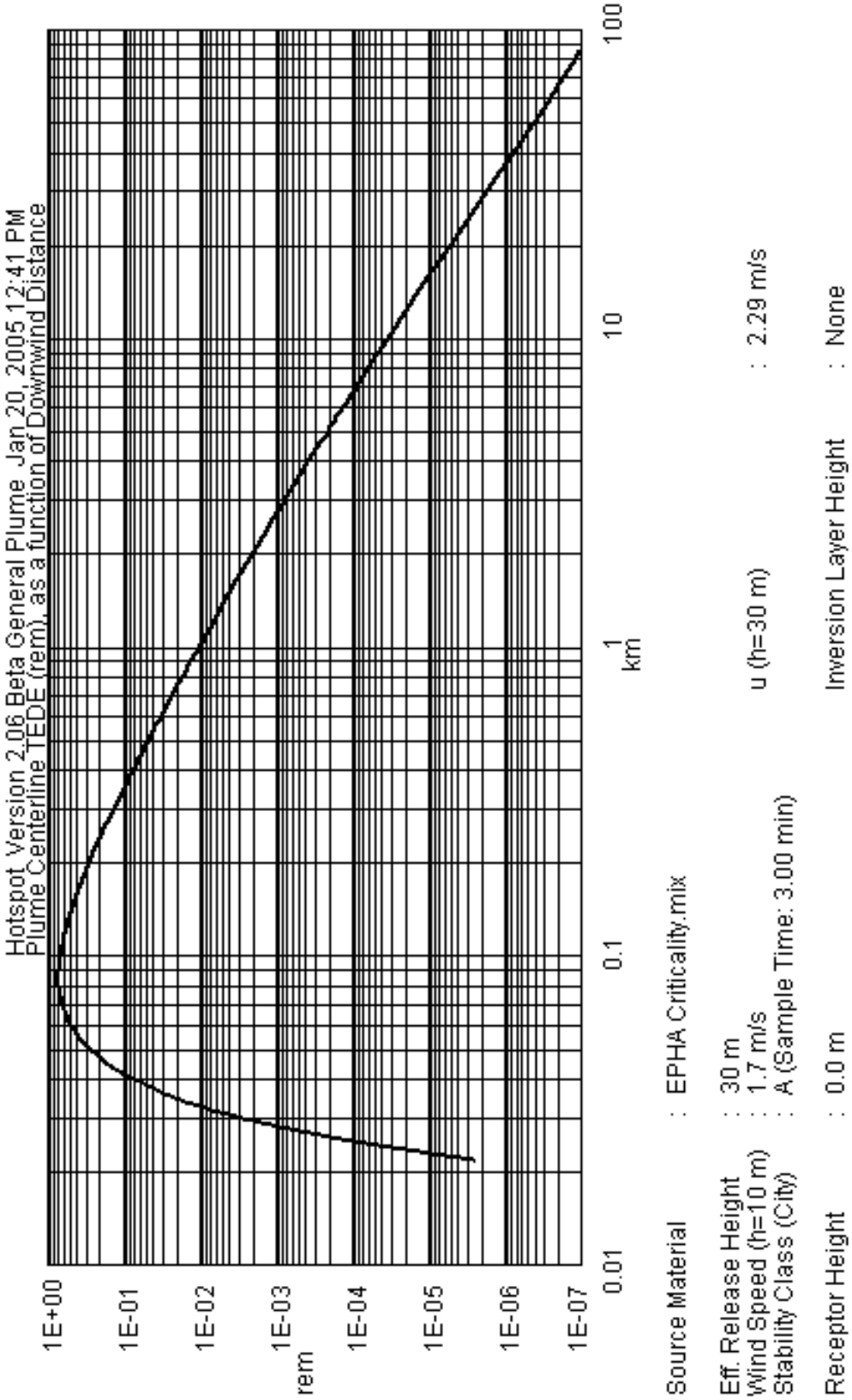
Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)    : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
```

```
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 160.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
rem
1E-04
1E-05
1E-06
1E-07
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
u (h=30 m) : 2.29 m/s
Receptor Height : 0.0 m
Inversion Layer Height : None

"RD-10 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Term                : EPHA Criticality.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+19 Fission Criticality
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.465 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.28 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.8E-03	6.0E-03	1.7E+00	5.3E-05	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	4.7E-01	1.6E+00	4.4E+02	1.4E-02	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.0E-01	1.0E+00	2.9E+02	8.9E-03	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.3E-01	4.3E-01	1.2E+02	3.8E-03	00:01	3.7686600E+01	-1.2170699E+02
0.500	3.2E-02	1.1E-01	3.1E+01	9.8E-04	00:02	3.7686600E+01	-1.2170415E+02
1.000	7.2E-03	2.3E-02	7.3E+00	2.3E-04	00:04	3.7686600E+01	-1.2169848E+02
3.000	2.1E-03	6.1E-03	2.4E+00	7.3E-05	00:14	3.7686600E+01	-1.2167578E+02
5.000	1.2E-03	3.3E-03	1.5E+00	4.6E-05	00:23	3.7686600E+01	-1.2165307E+02
8.000	7.4E-04	1.8E-03	9.7E-01	2.9E-05	00:38	3.7686600E+01	-1.2161902E+02
9.400	6.2E-04	1.4E-03	8.2E-01	2.5E-05	00:44	3.7686600E+01	-1.2160313E+02
10.000	5.7E-04	1.3E-03	7.7E-01	2.3E-05	00:47	3.7686600E+01	-1.2159632E+02
12.000	4.7E-04	9.8E-04	6.4E-01	1.9E-05	00:57	3.7686600E+01	-1.2157362E+02
15.000	3.6E-04	7.1E-04	4.9E-01	1.4E-05	01:11	3.7686600E+01	-1.2153956E+02
20.000	2.5E-04	4.8E-04	3.4E-01	9.8E-06	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.9E-04	3.5E-04	2.5E-01	7.0E-06	01:59	3.7686600E+01	-1.2142605E+02
30.000	1.5E-04	2.7E-04	1.9E-01	5.1E-06	02:23	3.7686600E+01	-1.2136930E+02
35.000	1.3E-04	2.2E-04	1.5E-01	3.9E-06	02:46	3.7686600E+01	-1.2131254E+02
40.000	1.1E-04	1.8E-04	1.2E-01	3.1E-06	03:10	3.7686600E+01	-1.2125578E+02
50.000	8.0E-05	1.3E-04	8.3E-02	2.0E-06	03:58	3.7686600E+01	-1.2114227E+02
65.000	5.8E-05	8.5E-05	5.3E-02	1.2E-06	05:09	3.7686600E+01	-1.2097201E+02
80.000	4.5E-05	6.2E-05	3.7E-02	7.6E-07	06:21	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

```
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released               (Ci)  : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released               (Ci)  : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released               (Ci)  : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released               (Ci)  : 1200.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released               (Ci)  : 160.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
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D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality.mix
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
```

```
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
```

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PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                        (Years)    : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)    : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
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Respirable Fraction                          : 1.0000E+00
Respirable Deposition Velocity (cm/sec)      : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)      : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)    : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)    : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)     : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)     : 5.9700E-16
Total Activity Released              (Ci)    : 160.0
Airborne Fraction                            : 1.0000E+00
Respirable Fraction                          : 1.0000E+00
Respirable Deposition Velocity (cm/sec)      : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)      : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                          (Years)    : 1.0008E-04
Inhalation        50-yr CEDE      (Sv/Bq)    : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)     : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)     : 2.5300E-15
Total Activity Released              (Ci)    : 4300.0
Airborne Fraction                            : 1.0000E+00
Respirable Fraction                          : 1.0000E+00
Respirable Deposition Velocity (cm/sec)      : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)      : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                          (Years)    : 7.5457E-04
Inhalation        50-yr CEDE      (Sv/Bq)    : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)     : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)     : 1.4700E-15
Total Activity Released              (Ci)    : 450.0
Airborne Fraction                            : 1.0000E+00
Respirable Fraction                          : 1.0000E+00
Respirable Deposition Velocity (cm/sec)      : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)      : 8.0000E+00
_____________________________________________________________________
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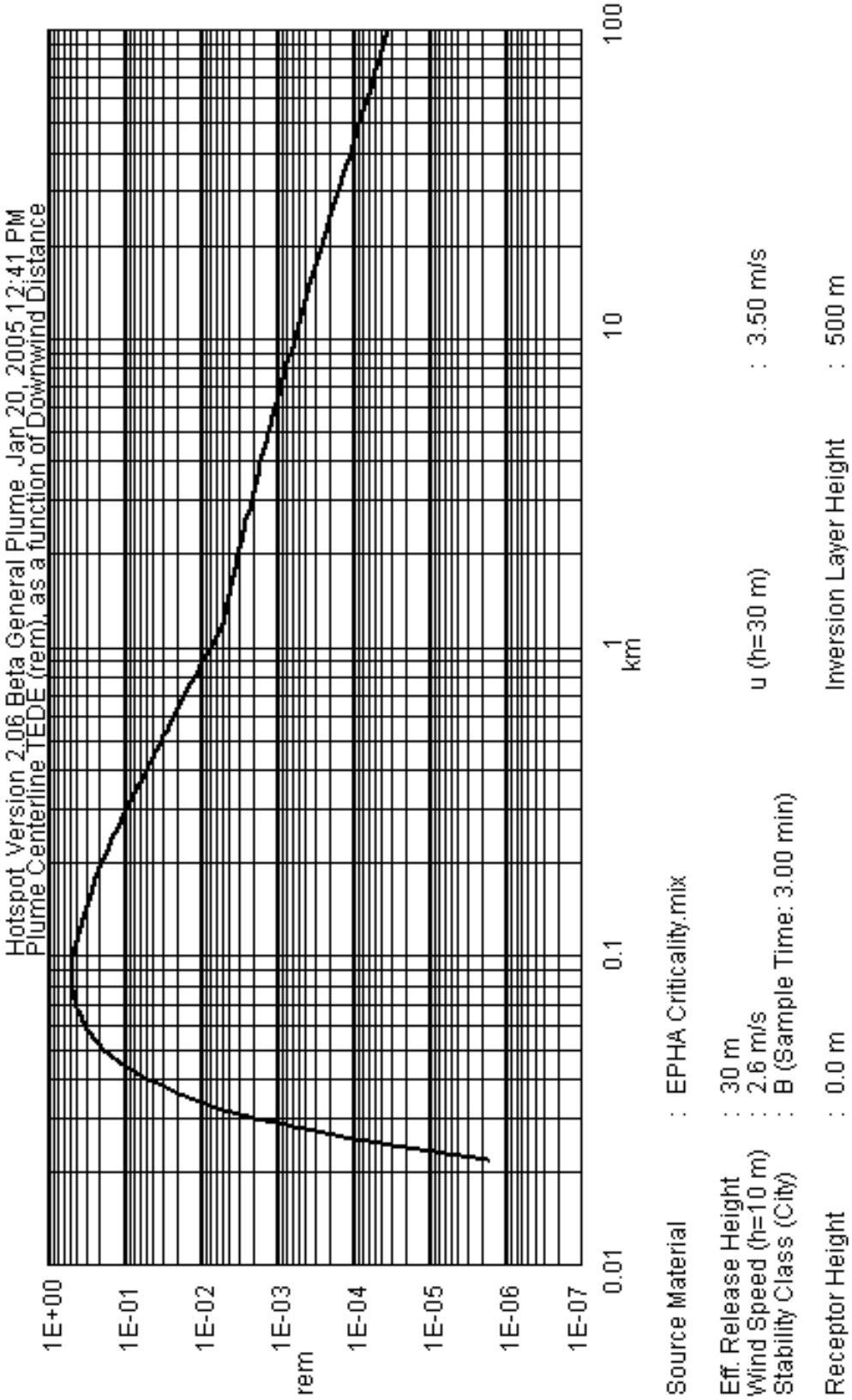
Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
rem
1E-04
1E-05
1E-06
1E-07
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
u (h=30 m) : 3.50 m/s
Receptor Height : 0.0 m
Inversion Layer Height : 500 m

"RD-10 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

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Source Term                : EPHA Criticality.mix (Mixture Scale Factor = 1.0000E+00)
                             EPHA 1E+19 Fission Criticality
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.31 km
MAXIMUM TEDE               : 0.469 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 1.30 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.1E-01	3.5E-01	1.0E+02	3.2E-03	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.3E-01	1.4E+00	4.2E+02	1.3E-02	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.313	4.7E-01	1.6E+00	4.6E+02	1.4E-02	00:01	3.7686600E+01	-1.2170628E+02
0.500	3.6E-01	1.2E+00	3.6E+02	1.1E-02	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.5E-01	4.7E-01	1.5E+02	4.7E-03	00:06	3.7686600E+01	-1.2169848E+02
3.000	2.7E-02	7.6E-02	3.2E+01	9.7E-04	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.2E-02	2.9E-02	1.5E+01	4.5E-04	00:31	3.7686600E+01	-1.2165307E+02
8.000	5.3E-03	1.2E-02	7.1E+00	2.1E-04	00:50	3.7686600E+01	-1.2161902E+02
9.400	4.0E-03	8.4E-03	5.4E+00	1.6E-04	00:59	3.7686600E+01	-1.2160313E+02
10.000	3.6E-03	7.5E-03	4.9E+00	1.4E-04	01:02	3.7686600E+01	-1.2159632E+02
12.000	2.6E-03	5.2E-03	3.5E+00	1.0E-04	01:15	3.7686600E+01	-1.2157362E+02
15.000	1.8E-03	3.4E-03	2.4E+00	6.9E-05	01:34	3.7686600E+01	-1.2153956E+02
20.000	1.3E-03	2.3E-03	1.6E+00	4.4E-05	02:05	3.7686600E+01	-1.2148281E+02
25.000	9.7E-04	1.7E-03	1.2E+00	3.1E-05	02:36	3.7686600E+01	-1.2142605E+02
30.000	7.7E-04	1.3E-03	8.6E-01	2.2E-05	03:08	3.7686600E+01	-1.2136930E+02
35.000	6.3E-04	1.0E-03	6.7E-01	1.6E-05	03:39	3.7686600E+01	-1.2131254E+02
40.000	5.3E-04	8.4E-04	5.3E-01	1.3E-05	04:11	3.7686600E+01	-1.2125578E+02
50.000	4.0E-04	6.0E-04	3.6E-01	7.9E-06	05:13	3.7686600E+01	-1.2114227E+02
65.000	2.9E-04	4.0E-04	2.3E-01	4.6E-06	06:48	3.7686600E+01	-1.2097201E+02
80.000	2.3E-04	2.9E-04	1.6E-01	3.0E-06	08:22	3.7686600E+01	-1.2080174E+02

Hotspot User Mixture Database

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User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE    (Sv/Bq)    : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
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Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                         (Years)   : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                         (Years)   : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                         (Years)   : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [09] : Xe-135m    15.29m
Halflife                         (Years)   : 2.9091E-05
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.2400E-16
Total Activity Released             (Ci)   : 3.3000E+03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
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Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 1.1900E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion                (Sv-m3)/(Bq-sec)  : 5.7700E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion                (Sv-m3)/(Bq-sec)  : 1.8200E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion                (Sv-m3)/(Bq-sec)  : 1.1200E-13
Ground Shine              (Sv-m2)/(Bq-sec)  : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                          (Years)   : 2.3744E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.5800E-09
Submersion                (Sv-m3)/(Bq-sec)  : 2.9400E-14
Ground Shine              (Sv-m2)/(Bq-sec)  : 5.9700E-16
Total Activity Released             (Ci)    : 160.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
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Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
The following variables were used in the above Hotspot calculations:
_____________________________________________________________________
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
```

```
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
ScenarioMixFileName = C:\Program Files\Hotspot20\UserMix\EPHA Criticality.mix
SourceTerm = 1
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
```

```
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
```

```
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
Hotspot User Mixture Database
User Mixture Name  : EPHA Criticality.mix
EPHA 1E+19 Fission Criticality
Mixture Scale Factor                        : 1.0000E+00
_____________________________________________________________________
Nuclide [01] : Kr-83m      1.83h
Halflife                            (Years): 2.0890E-04
Inhalation        50-yr CEDE        (Sv/Bq): 0.0000E+00
Submersion                 (Sv-m3)/(Bq-sec): 1.5000E-18
Ground Shine               (Sv-m2)/(Bq-sec): 3.8000E-19
Total Activity Released             (Ci)   : 1.1000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [02] : Kr-85m      4.48h
Halflife                        (Years)    : 5.1142E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 7.4800E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.5200E-16
Total Activity Released             (Ci)   : 7.1000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [03] : Kr-85      10.72y
Halflife                        (Years)    : 1.0720E+01
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.1900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.6400E-18
Total Activity Released             (Ci)   : 8.1000E-03
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [04] : Kr-87       76.3m
Halflife                        (Years)    : 1.4517E-04
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Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 4.1200E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 7.3200E-16
Total Activity Released             (Ci)   : 4.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [05] : Kr-88       2.84h
Halflife                        (Years)    : 3.2420E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.0200E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.7400E-15
Total Activity Released             (Ci)   : 2.3000E+02
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [06] : Xe-131m     11.9d
Halflife                        (Years)    : 3.2603E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 3.8900E-16
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.0600E-17
Total Activity Released             (Ci)   : 1.0000E-01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [07] : Xe-133m    2.188d
Halflife                        (Years)    : 5.9945E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.3700E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.0700E-17
Total Activity Released             (Ci)   : 2.2000E+00
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
_____________________________________________________________________
Nuclide [08] : Xe-133     5.245d
Halflife                        (Years)    : 1.4370E-02
Inhalation        50-yr CEDE     (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)   : 1.5600E-15
Ground Shine            (Sv-m2)/(Bq-sec)   : 4.6100E-17
Total Activity Released             (Ci)   : 2.7000E+01
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)    : 0.0000E+00
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Nuclide [09] : Xe-135m    15.29m
Halflife                          (Years)   : 2.9091E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 2.0400E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 4.2400E-16
Total Activity Released             (Ci)    : 3.3000E+03
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [10] : Xe-135      9.09h
Halflife                          (Years)   : 1.0377E-03
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 1.1900E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.4200E-16
Total Activity Released             (Ci)    : 4.1000E+02
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [11] : Xe-138     14.17m
Halflife                          (Years)   : 2.6960E-05
Inhalation        50-yr CEDE      (Sv/Bq)   : 0.0000E+00
Submersion              (Sv-m3)/(Bq-sec)    : 5.7700E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 1.0300E-15
Total Activity Released             (Ci)    : 1.1000E+04
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 0.0000E+00
Non-resp.  Deposition Velocity (cm/sec)     : 0.0000E+00
_____________________________________________________________
Nuclide [12] : I-131   D    8.04d
Halflife                          (Years)   : 2.2027E-02
Inhalation        50-yr CEDE      (Sv/Bq)   : 8.8900E-09
Submersion              (Sv-m3)/(Bq-sec)    : 1.8200E-14
Ground Shine            (Sv-m2)/(Bq-sec)    : 3.7600E-16
Total Activity Released             (Ci)    : 11.0
Airborne Fraction                           : 1.0000E+00
Respirable Fraction                         : 1.0000E+00
Respirable Deposition Velocity (cm/sec)     : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)     : 8.0000E+00
_____________________________________________________________
Nuclide [13] : I-132   D    2.30h
Halflife                          (Years)   : 2.6256E-04
Inhalation        50-yr CEDE      (Sv/Bq)   : 1.0300E-10
Submersion              (Sv-m3)/(Bq-sec)    : 1.1200E-13
Ground Shine            (Sv-m2)/(Bq-sec)    : 2.2100E-15
Total Activity Released             (Ci)    : 1200.0
Airborne Fraction                           : 1.0000E+00
```

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Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [14] : I-133   D    20.8h
Halflife                         (Years)   : 2.3744E-03
Inhalation        50-yr CEDE     (Sv/Bq)   : 1.5800E-09
Submersion              (Sv-m3)/(Bq-sec)   : 2.9400E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 5.9700E-16
Total Activity Released             (Ci)   : 160.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [15] : I-134   D    52.6m
Halflife                         (Years)   : 1.0008E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.5500E-11
Submersion              (Sv-m3)/(Bq-sec)   : 1.3000E-13
Ground Shine            (Sv-m2)/(Bq-sec)   : 2.5300E-15
Total Activity Released             (Ci)   : 4300.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
Nuclide [16] : I-135   D    6.61h
Halflife                         (Years)   : 7.5457E-04
Inhalation        50-yr CEDE     (Sv/Bq)   : 3.3200E-10
Submersion              (Sv-m3)/(Bq-sec)   : 7.9800E-14
Ground Shine            (Sv-m2)/(Bq-sec)   : 1.4700E-15
Total Activity Released             (Ci)   : 450.0
Airborne Fraction                          : 1.0000E+00
Respirable Fraction                        : 1.0000E+00
Respirable Deposition Velocity (cm/sec)    : 1.0000E-01
Non-resp.  Deposition Velocity (cm/sec)    : 8.0000E+00
_____________________________________________________________________
```
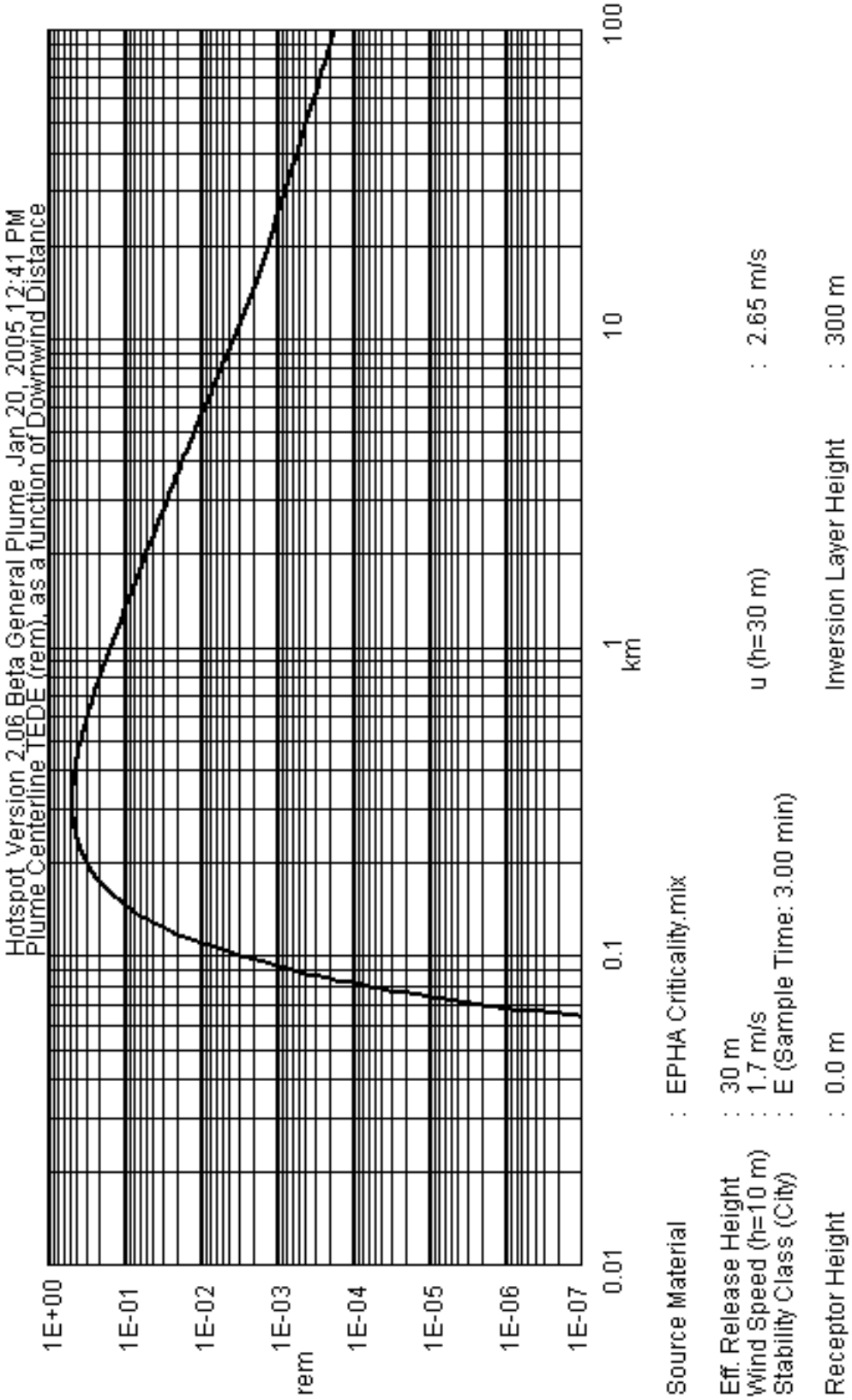


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+00
1E-01
1E-02
1E-03
rem
1E-04
1E-05
1E-06
1E-07
0.01
0.1
1
km
10
100
Source Material : EPHA Criticality.mix
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
u (h=30 m) : 2.65 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Receptor Height : 0.0 m
Inversion Layer Height : 300 m

"RD-11 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 0.073 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	6.3E-06	4.8E-11	4.8E-08	5.4E-16	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	7.3E-02	5.6E-07	5.6E-04	6.2E-12	<00:01	3.7686600E+01	-1.2170861E+02
0.150	6.2E-02	4.7E-07	4.7E-04	5.3E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	3.1E-02	2.4E-07	2.4E-04	2.7E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	9.4E-03	7.2E-08	7.2E-05	8.0E-13	00:02	3.7686600E+01	-1.2170415E+02
1.000	2.6E-03	2.0E-08	2.0E-05	2.2E-13	00:05	3.7686600E+01	-1.2169848E+02
3.000	5.6E-04	4.3E-09	4.3E-06	4.8E-14	00:16	3.7686600E+01	-1.2167578E+02
5.000	3.9E-04	3.0E-09	3.0E-06	3.3E-14	00:26	3.7686600E+01	-1.2165307E+02
8.000	2.9E-04	2.2E-09	2.2E-06	2.5E-14	00:42	3.7686600E+01	-1.2161902E+02
9.400	2.6E-04	2.0E-09	2.0E-06	2.2E-14	00:50	3.7686600E+01	-1.2160313E+02
10.000	2.5E-04	1.9E-09	1.9E-06	2.1E-14	00:53	3.7686600E+01	-1.2159632E+02
12.000	2.3E-04	1.7E-09	1.7E-06	1.9E-14	01:04	3.7686600E+01	-1.2157362E+02
15.000	2.0E-04	1.5E-09	1.5E-06	1.7E-14	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.7E-04	1.3E-09	1.3E-06	1.4E-14	01:46	3.7686600E+01	-1.2148281E+02
25.000	1.5E-04	1.1E-09	1.1E-06	1.3E-14	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.3E-04	1.0E-09	1.0E-06	1.2E-14	02:40	3.7686600E+01	-1.2136930E+02

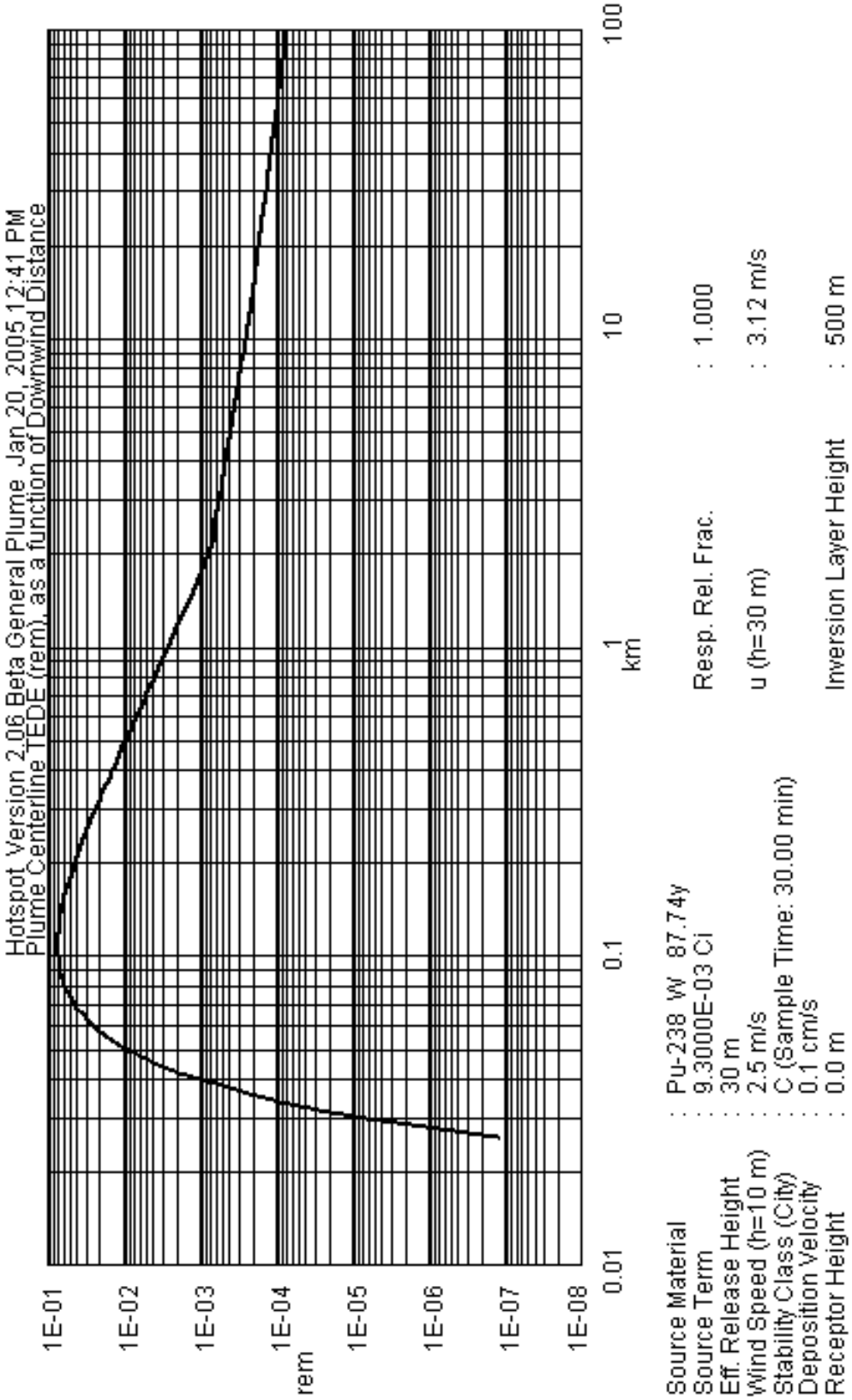
35.000	1.2E-04	9.5E-10	9.5E-07	1.1E-14	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.2E-04	8.8E-10	8.8E-07	9.9E-15	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.0E-04	7.9E-10	7.9E-07	8.8E-15	04:26	3.7686600E+01	-1.2114227E+02
65.000	8.9E-05	6.9E-10	6.9E-07	7.6E-15	05:46	3.7686600E+01	-1.2097201E+02
80.000	8.0E-05	6.2E-10	6.2E-07	6.9E-15	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0093
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
rem
1E-05
1E-06
1E-07
1E-08
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-11 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.086 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	3.2E-04	2.5E-09	2.5E-06	2.8E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	8.6E-02	6.5E-07	6.5E-04	7.3E-12	<00:01	3.7686600E+01	-1.2170884E+02
0.150	5.5E-02	4.2E-07	4.2E-04	4.7E-12	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.4E-02	1.8E-07	1.8E-04	2.0E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	6.2E-03	4.7E-08	4.7E-05	5.3E-13	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.5E-03	1.1E-08	1.1E-05	1.3E-13	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.4E-04	1.1E-09	1.1E-06	1.2E-14	00:21	3.7686600E+01	-1.2167578E+02
5.000	5.0E-05	3.8E-10	3.8E-07	4.2E-15	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.9E-05	1.4E-10	1.4E-07	1.6E-15	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.3E-05	1.0E-10	1.0E-07	1.1E-15	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.2E-05	9.1E-11	9.1E-08	1.0E-15	01:12	3.7686600E+01	-1.2159632E+02
12.000	8.1E-06	6.2E-11	6.2E-08	7.0E-16	01:27	3.7686600E+01	-1.2157362E+02
15.000	5.2E-06	4.0E-11	4.0E-08	4.4E-16	01:49	3.7686600E+01	-1.2153956E+02
20.000	2.9E-06	2.2E-11	2.2E-08	2.5E-16	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.8E-06	1.4E-11	1.4E-08	1.6E-16	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.3E-06	9.7E-12	9.7E-09	1.1E-16	03:38	3.7686600E+01	-1.2136930E+02

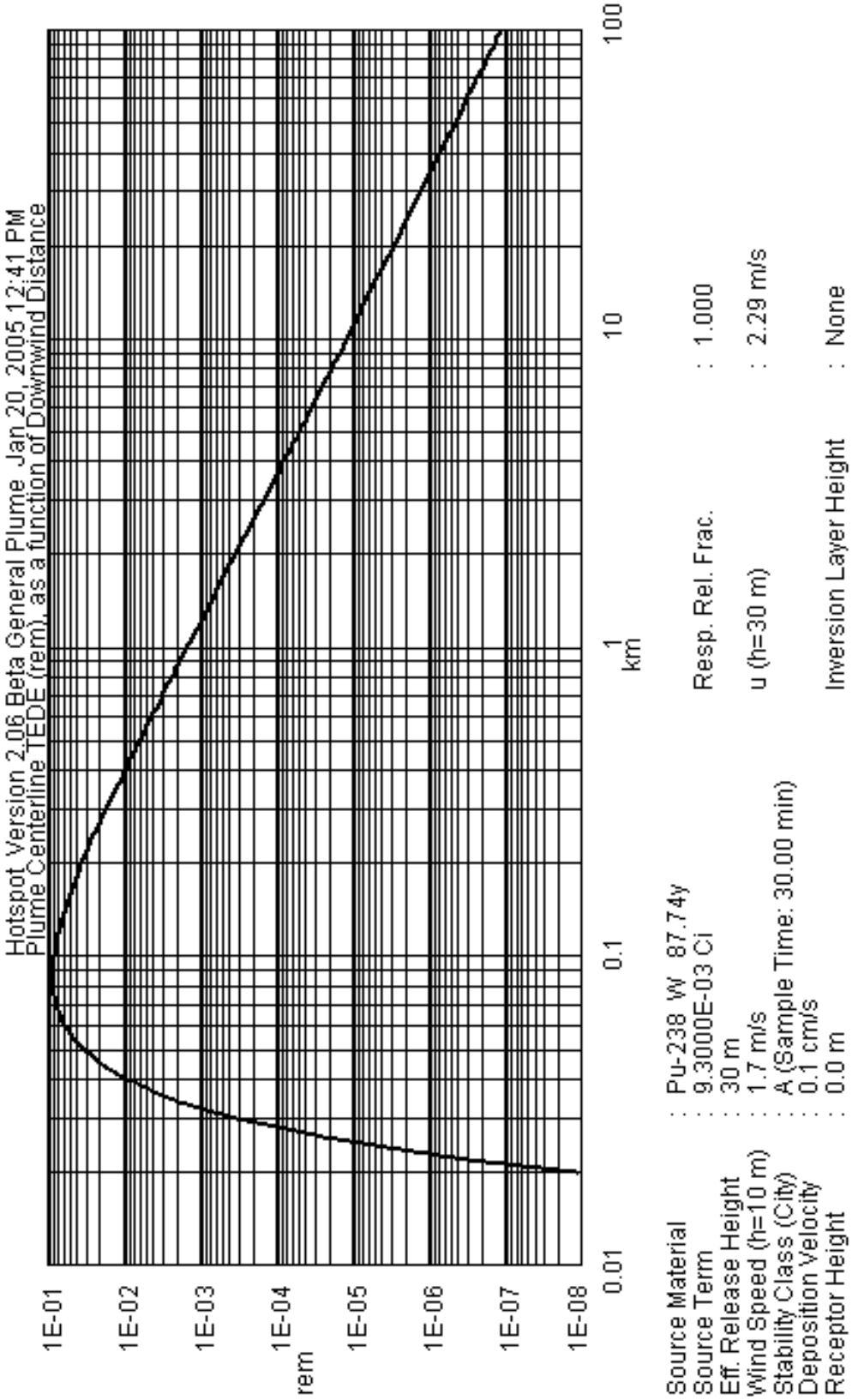
35.000	9.2E-07	7.1E-12	7.1E-09	7.9E-17	04:15	3.7686600E+01	-1.2131254E+02
40.000	7.1E-07	5.4E-12	5.4E-09	6.0E-17	04:51	3.7686600E+01	-1.2125578E+02
50.000	4.5E-07	3.4E-12	3.4E-09	3.9E-17	06:04	3.7686600E+01	-1.2114227E+02
65.000	2.7E-07	2.0E-12	2.0E-09	2.3E-17	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.8E-07	1.3E-12	1.3E-09	1.5E-17	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0093
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:41 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
rem
1E-05
1E-06
1E-07
1E-08
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-11 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.056 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.1E-04	1.6E-09	1.6E-06	1.8E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	5.6E-02	4.3E-07	4.3E-04	4.8E-12	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.6E-02	2.8E-07	2.8E-04	3.1E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.6E-02	1.2E-07	1.2E-04	1.3E-12	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.0E-03	3.1E-08	3.1E-05	3.5E-13	00:02	3.7686600E+01	-1.2170415E+02
1.000	9.6E-04	7.4E-09	7.4E-06	8.2E-14	00:04	3.7686600E+01	-1.2169848E+02
3.000	3.4E-04	2.6E-09	2.6E-06	2.9E-14	00:14	3.7686600E+01	-1.2167578E+02
5.000	2.4E-04	1.8E-09	1.8E-06	2.1E-14	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.8E-04	1.4E-09	1.4E-06	1.5E-14	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.6E-04	1.2E-09	1.2E-06	1.4E-14	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.6E-04	1.2E-09	1.2E-06	1.3E-14	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.4E-04	1.1E-09	1.1E-06	1.2E-14	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.2E-04	9.4E-10	9.4E-07	1.0E-14	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.0E-04	8.0E-10	8.0E-07	8.9E-15	01:35	3.7686600E+01	-1.2148281E+02
25.000	9.2E-05	7.1E-10	7.1E-07	7.9E-15	01:59	3.7686600E+01	-1.2142605E+02
30.000	8.3E-05	6.4E-10	6.4E-07	7.1E-15	02:23	3.7686600E+01	-1.2136930E+02

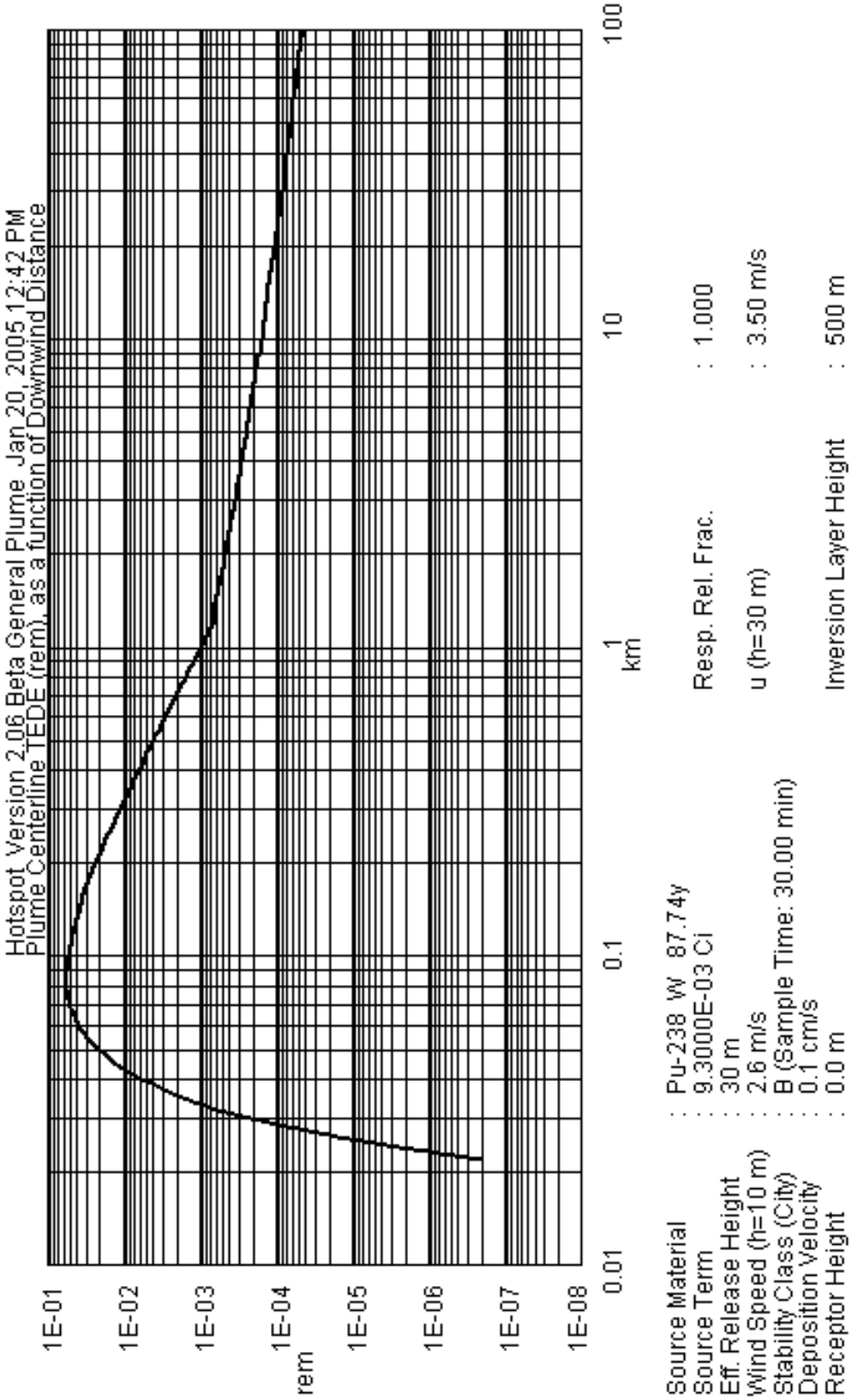
35.000	7.7E-05	5.9E-10	5.9E-07	6.6E-15	02:46	3.7686600E+01	-1.2131254E+02
40.000	7.2E-05	5.5E-10	5.5E-07	6.1E-15	03:10	3.7686600E+01	-1.2125578E+02
50.000	6.4E-05	4.9E-10	4.9E-07	5.4E-15	03:58	3.7686600E+01	-1.2114227E+02
65.000	5.5E-05	4.2E-10	4.2E-07	4.7E-15	05:09	3.7686600E+01	-1.2097201E+02
80.000	5.0E-05	3.8E-10	3.8E-07	4.3E-15	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0093
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:42 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
1E-05
1E-06
1E-07
1E-08
rem
0.01
0.1
1
10
100
km
Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-11 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.059 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.3E-02	9.9E-08	9.9E-05	1.1E-12	<00:01	3.7686600E+01	-1.2170813E+02
0.250	5.3E-02	4.0E-07	4.0E-04	4.5E-12	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	5.9E-02	4.5E-07	4.5E-04	5.0E-12	00:01	3.7686600E+01	-1.2170624E+02
0.500	4.6E-02	3.5E-07	3.5E-04	3.9E-12	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.0E-02	1.6E-07	1.6E-04	1.8E-12	00:06	3.7686600E+01	-1.2169848E+02
3.000	4.8E-03	3.7E-08	3.7E-05	4.1E-13	00:18	3.7686600E+01	-1.2167578E+02
5.000	2.5E-03	1.9E-08	1.9E-05	2.2E-13	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.5E-03	1.1E-08	1.1E-05	1.2E-13	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.2E-03	9.3E-09	9.3E-06	1.0E-13	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.1E-03	8.7E-09	8.7E-06	9.7E-14	01:02	3.7686600E+01	-1.2159632E+02
12.000	9.1E-04	7.0E-09	7.0E-06	7.8E-14	01:15	3.7686600E+01	-1.2157362E+02
15.000	7.3E-04	5.6E-09	5.6E-06	6.3E-14	01:34	3.7686600E+01	-1.2153956E+02
20.000	6.2E-04	4.8E-09	4.8E-06	5.3E-14	02:05	3.7686600E+01	-1.2148281E+02
25.000	5.6E-04	4.3E-09	4.3E-06	4.8E-14	02:36	3.7686600E+01	-1.2142605E+02
30.000	5.1E-04	3.9E-09	3.9E-06	4.3E-14	03:08	3.7686600E+01	-1.2136930E+02

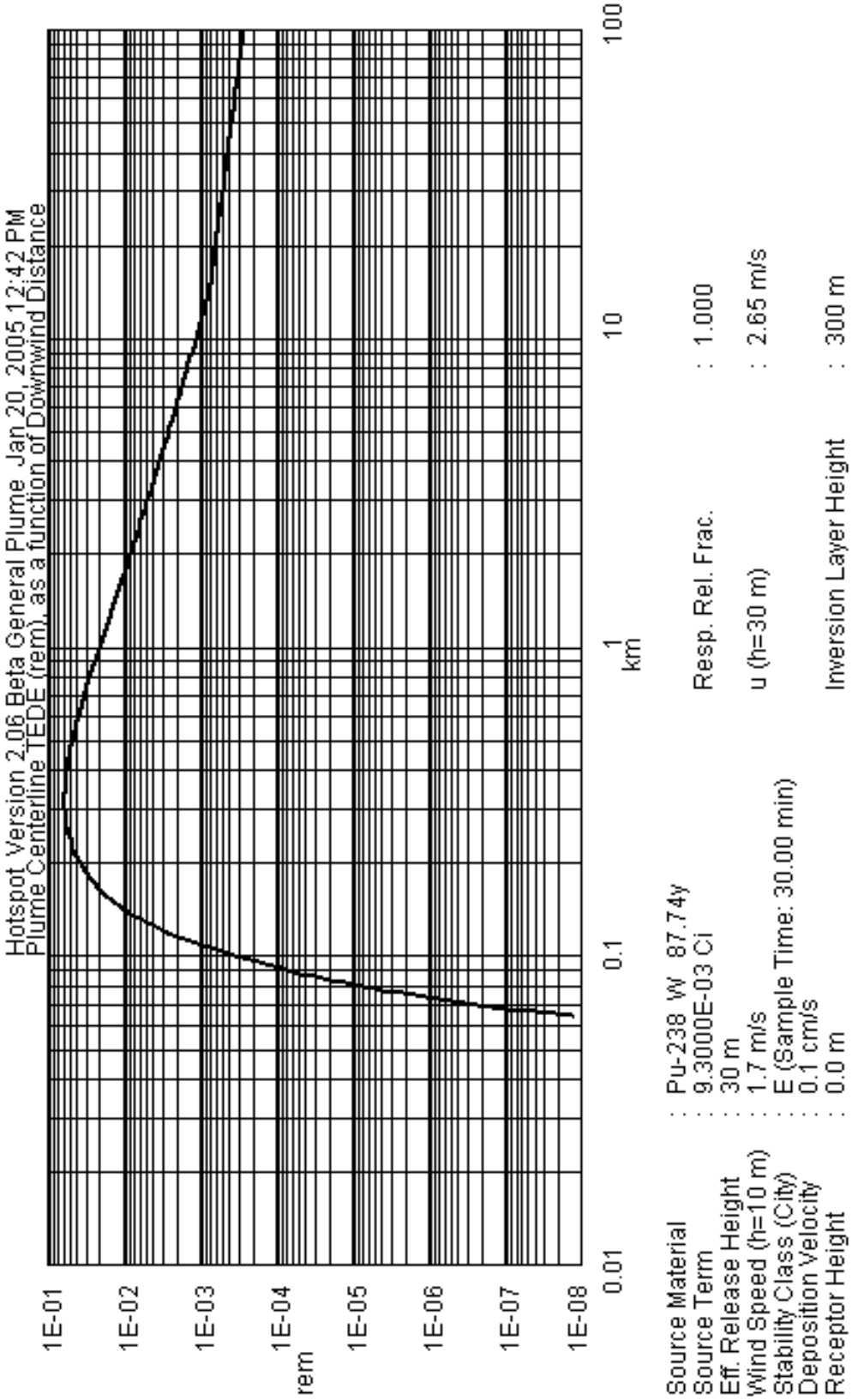
35.000	4.7E-04	3.6E-09	3.6E-06	4.0E-14	03:39	3.7686600E+01	-1.2131254E+02
40.000	4.3E-04	3.3E-09	3.3E-06	3.7E-14	04:11	3.7686600E+01	-1.2125578E+02
50.000	3.8E-04	2.9E-09	2.9E-06	3.3E-14	05:13	3.7686600E+01	-1.2114227E+02
65.000	3.3E-04	2.6E-09	2.6E-06	2.9E-14	06:48	3.7686600E+01	-1.2097201E+02
80.000	3.0E-04	2.3E-09	2.3E-06	2.6E-14	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.0093
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:42 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-01
1E-02
1E-03
1E-04
rem
1E-05
1E-06
1E-07
1E-08
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-03 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-12 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 12 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.63 km
Exceeds Outer  Dose Out To : 2.58 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.0E-03	7.8E-09	7.8E-06	8.7E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	1.2E+01	9.0E-05	9.0E-02	1.0E-09	<00:01	3.7686600E+01	-1.2170861E+02
0.150	9.9E+00	7.6E-05	7.6E-02	8.5E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	5.1E+00	3.9E-05	3.9E-02	4.3E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.5E+00	1.2E-05	1.2E-02	1.3E-10	00:02	3.7686600E+01	-1.2170415E+02
1.000	4.2E-01	3.2E-06	3.2E-03	3.6E-11	00:05	3.7686600E+01	-1.2169848E+02
3.000	9.0E-02	6.9E-07	6.9E-04	7.7E-12	00:16	3.7686600E+01	-1.2167578E+02
5.000	6.3E-02	4.8E-07	4.8E-04	5.4E-12	00:26	3.7686600E+01	-1.2165307E+02
8.000	4.6E-02	3.6E-07	3.6E-04	4.0E-12	00:42	3.7686600E+01	-1.2161902E+02
9.400	4.2E-02	3.2E-07	3.2E-04	3.6E-12	00:50	3.7686600E+01	-1.2160313E+02
10.000	4.1E-02	3.1E-07	3.1E-04	3.5E-12	00:53	3.7686600E+01	-1.2159632E+02
12.000	3.6E-02	2.8E-07	2.8E-04	3.1E-12	01:04	3.7686600E+01	-1.2157362E+02
15.000	3.2E-02	2.4E-07	2.4E-04	2.7E-12	01:20	3.7686600E+01	-1.2153956E+02
20.000	2.7E-02	2.1E-07	2.1E-04	2.3E-12	01:46	3.7686600E+01	-1.2148281E+02
25.000	2.4E-02	1.8E-07	1.8E-04	2.1E-12	02:13	3.7686600E+01	-1.2142605E+02
30.000	2.2E-02	1.7E-07	1.7E-04	1.9E-12	02:40	3.7686600E+01	-1.2136930E+02

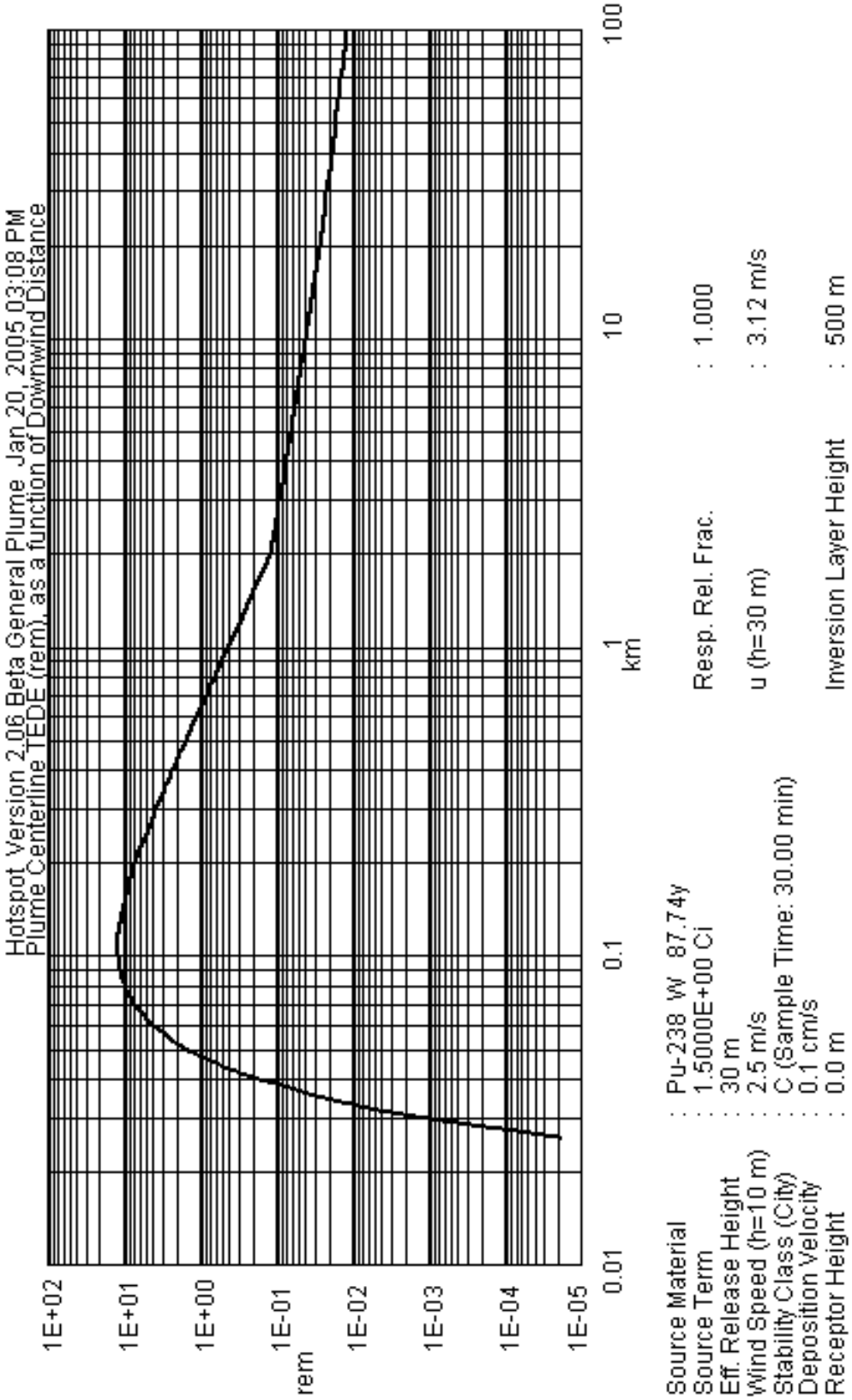
35.000	2.0E-02	1.5E-07	1.5E-04	1.7E-12	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.9E-02	1.4E-07	1.4E-04	1.6E-12	03:33	3.7686600E+01	-1.2125578E+02
50.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	04:26	3.7686600E+01	-1.2114227E+02
65.000	1.4E-02	1.1E-07	1.1E-04	1.2E-12	05:46	3.7686600E+01	-1.2097201E+02
80.000	1.3E-02	9.9E-08	9.9E-05	1.1E-12	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 03:08 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-12 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 14 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.49 km
Exceeds Outer  Dose Out To : 1.49 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	5.2E-02	4.0E-07	4.0E-04	4.5E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	1.4E+01	1.1E-04	1.1E-01	1.2E-09	<00:01	3.7686600E+01	-1.2170884E+02
0.150	8.9E+00	6.8E-05	6.8E-02	7.6E-10	00:01	3.7686600E+01	-1.2170813E+02
0.250	3.9E+00	3.0E-05	3.0E-02	3.3E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.0E+00	7.6E-06	7.6E-03	8.5E-11	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.4E-01	1.8E-06	1.8E-03	2.0E-11	00:07	3.7686600E+01	-1.2169848E+02
3.000	2.3E-02	1.8E-07	1.8E-04	2.0E-12	00:21	3.7686600E+01	-1.2167578E+02
5.000	8.0E-03	6.1E-08	6.1E-05	6.9E-13	00:36	3.7686600E+01	-1.2165307E+02
8.000	3.0E-03	2.3E-08	2.3E-05	2.6E-13	00:58	3.7686600E+01	-1.2161902E+02
9.400	2.2E-03	1.7E-08	1.7E-05	1.9E-13	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.9E-03	1.5E-08	1.5E-05	1.6E-13	01:12	3.7686600E+01	-1.2159632E+02
12.000	1.3E-03	1.0E-08	1.0E-05	1.1E-13	01:27	3.7686600E+01	-1.2157362E+02
15.000	8.3E-04	6.4E-09	6.4E-06	7.1E-14	01:49	3.7686600E+01	-1.2153956E+02
20.000	4.6E-04	3.5E-09	3.5E-06	4.0E-14	02:25	3.7686600E+01	-1.2148281E+02
25.000	2.9E-04	2.3E-09	2.3E-06	2.5E-14	03:02	3.7686600E+01	-1.2142605E+02
30.000	2.0E-04	1.6E-09	1.6E-06	1.7E-14	03:38	3.7686600E+01	-1.2136930E+02

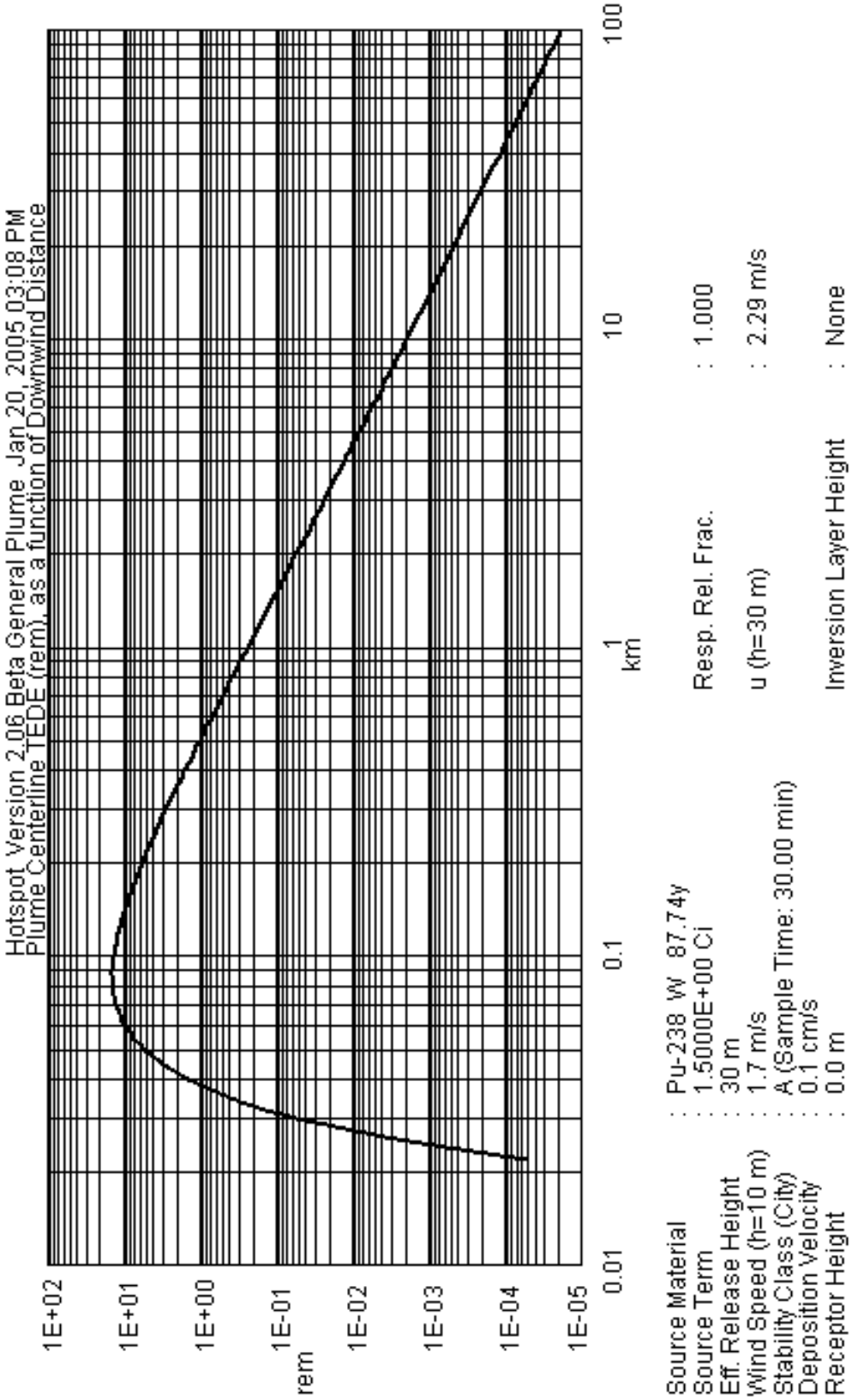
35.000	1.5E-04	1.1E-09	1.1E-06	1.3E-14	04:15	3.7686600E+01	-1.2131254E+02
40.000	1.1E-04	8.7E-10	8.7E-07	9.7E-15	04:51	3.7686600E+01	-1.2125578E+02
50.000	7.3E-05	5.6E-10	5.6E-07	6.2E-15	06:04	3.7686600E+01	-1.2114227E+02
65.000	4.3E-05	3.3E-10	3.3E-07	3.7E-15	07:54	3.7686600E+01	-1.2097201E+02
80.000	2.8E-05	2.2E-10	2.2E-07	2.4E-15	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 03:08 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+02
1E+01
1E+00
1E-01
rem
1E-02
1E-03
1E-04
1E-05
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-12 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 9.0 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.40 km
Exceeds Outer  Dose Out To : 1.39 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	3.4E-02	2.6E-07	2.6E-04	2.9E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	9.0E+00	6.9E-05	6.9E-02	7.7E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	5.8E+00	4.5E-05	4.5E-02	5.0E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.5E+00	1.9E-05	1.9E-02	2.2E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	6.5E-01	5.0E-06	5.0E-03	5.6E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.5E-01	1.2E-06	1.2E-03	1.3E-11	00:04	3.7686600E+01	-1.2169848E+02
3.000	5.5E-02	4.2E-07	4.2E-04	4.7E-12	00:14	3.7686600E+01	-1.2167578E+02
5.000	3.9E-02	3.0E-07	3.0E-04	3.3E-12	00:23	3.7686600E+01	-1.2165307E+02
8.000	2.9E-02	2.2E-07	2.2E-04	2.5E-12	00:38	3.7686600E+01	-1.2161902E+02
9.400	2.6E-02	2.0E-07	2.0E-04	2.2E-12	00:44	3.7686600E+01	-1.2160313E+02
10.000	2.5E-02	1.9E-07	1.9E-04	2.1E-12	00:47	3.7686600E+01	-1.2159632E+02
12.000	2.2E-02	1.7E-07	1.7E-04	1.9E-12	00:57	3.7686600E+01	-1.2157362E+02
15.000	2.0E-02	1.5E-07	1.5E-04	1.7E-12	01:11	3.7686600E+01	-1.2153956E+02
20.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	01:35	3.7686600E+01	-1.2148281E+02
25.000	1.5E-02	1.1E-07	1.1E-04	1.3E-12	01:59	3.7686600E+01	-1.2142605E+02
30.000	1.3E-02	1.0E-07	1.0E-04	1.1E-12	02:23	3.7686600E+01	-1.2136930E+02

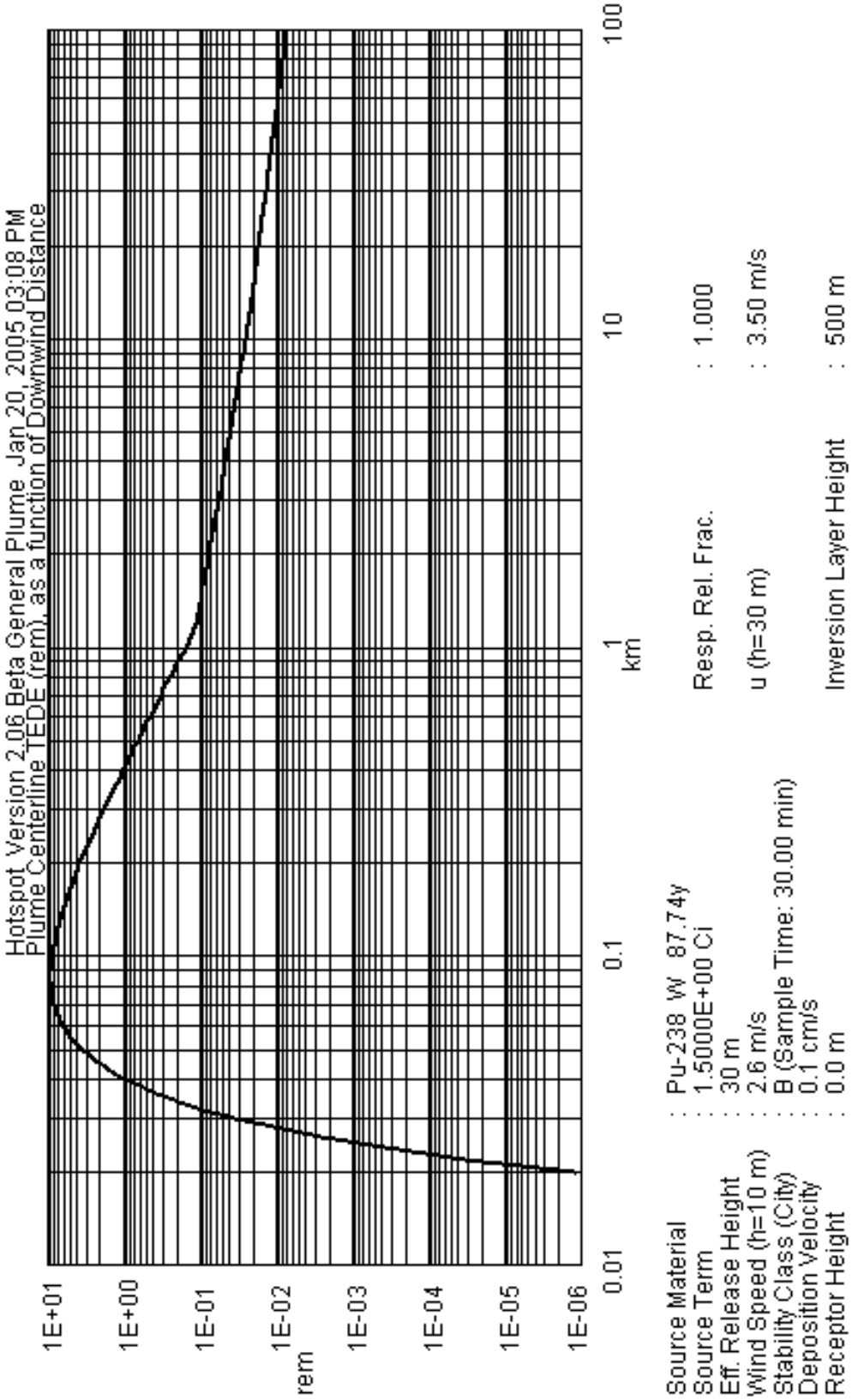
35.000	1.2E-02	9.5E-08	9.5E-05	1.1E-12	02:46	3.7686600E+01	-1.2131254E+02
40.000	1.2E-02	8.8E-08	8.8E-05	9.9E-13	03:10	3.7686600E+01	-1.2125578E+02
50.000	1.0E-02	7.9E-08	7.9E-05	8.8E-13	03:58	3.7686600E+01	-1.2114227E+02
65.000	8.9E-03	6.9E-08	6.9E-05	7.6E-13	05:09	3.7686600E+01	-1.2097201E+02
80.000	8.0E-03	6.2E-08	6.2E-05	6.9E-13	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 03:08 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-12 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 1.5000E+00 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 9.4 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 2.45 km
Exceeds Outer  Dose Out To : 20.02 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	2.1E+00	1.6E-05	1.6E-02	1.8E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	8.5E+00	6.5E-05	6.5E-02	7.3E-10	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	9.4E+00	7.2E-05	7.2E-02	8.1E-10	00:01	3.7686600E+01	-1.2170624E+02
0.500	7.4E+00	5.7E-05	5.7E-02	6.3E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	3.3E+00	2.5E-05	2.5E-02	2.8E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	7.7E-01	5.9E-06	5.9E-03	6.6E-11	00:18	3.7686600E+01	-1.2167578E+02
5.000	4.1E-01	3.1E-06	3.1E-03	3.5E-11	00:31	3.7686600E+01	-1.2165307E+02
8.000	2.4E-01	1.8E-06	1.8E-03	2.0E-11	00:50	3.7686600E+01	-1.2161902E+02
9.400	2.0E-01	1.5E-06	1.5E-03	1.7E-11	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.8E-01	1.4E-06	1.4E-03	1.6E-11	01:02	3.7686600E+01	-1.2159632E+02
12.000	1.5E-01	1.1E-06	1.1E-03	1.3E-11	01:15	3.7686600E+01	-1.2157362E+02
15.000	1.2E-01	9.1E-07	9.1E-04	1.0E-11	01:34	3.7686600E+01	-1.2153956E+02
20.000	1.0E-01	7.7E-07	7.7E-04	8.6E-12	02:05	3.7686600E+01	-1.2148281E+02
25.000	9.1E-02	6.9E-07	6.9E-04	7.7E-12	02:36	3.7686600E+01	-1.2142605E+02
30.000	8.2E-02	6.3E-07	6.3E-04	7.0E-12	03:08	3.7686600E+01	-1.2136930E+02

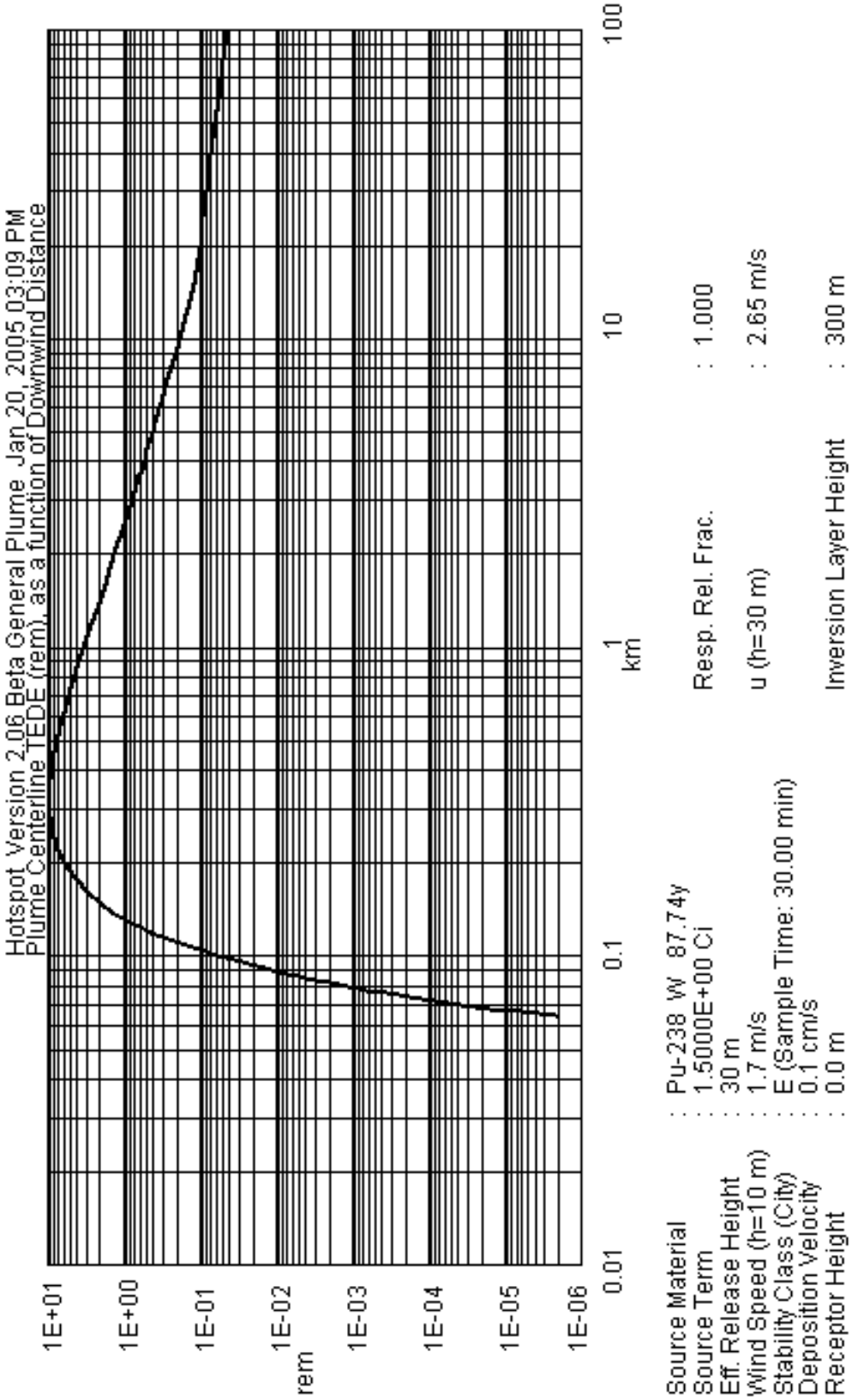
35.000	7.5E-02	5.8E-07	5.8E-04	6.4E-12	03:39	3.7686600E+01	-1.2131254E+02
40.000	7.0E-02	5.4E-07	5.4E-04	6.0E-12	04:11	3.7686600E+01	-1.2125578E+02
50.000	6.2E-02	4.7E-07	4.7E-04	5.3E-12	05:13	3.7686600E+01	-1.2114227E+02
65.000	5.4E-02	4.1E-07	4.1E-04	4.6E-12	06:48	3.7686600E+01	-1.2097201E+02
80.000	4.8E-02	3.7E-07	3.7E-04	4.1E-12	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 1.5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 03:09 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 1.5000E+00 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-12 Ground Level Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : C
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   1.21E+03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.047 km
Exceeds Middle Dose Out To : 0.53 km
Exceeds Outer  Dose Out To : 1.82 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	1.2E+03	9.2E-03	9.2E+01	1.0E-06	<00:01	3.7686600E+01	-1.2170974E+02
0.030	2.2E+02	1.7E-03	1.7E+01	1.9E-07	<00:01	3.7686600E+01	-1.2170949E+02
0.150	1.2E+01	8.8E-05	8.8E-01	9.8E-09	00:01	3.7686600E+01	-1.2170813E+02
0.250	4.3E+00	3.3E-05	3.3E-01	3.7E-09	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.1E+00	8.7E-06	8.7E-02	9.7E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	3.1E-01	2.3E-06	2.3E-02	2.6E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	6.4E-02	4.9E-07	4.9E-03	5.5E-11	00:20	3.7686600E+01	-1.2167578E+02
5.000	4.5E-02	3.4E-07	3.4E-03	3.8E-11	00:33	3.7686600E+01	-1.2165307E+02
8.000	3.3E-02	2.5E-07	2.5E-03	2.8E-11	00:53	3.7686600E+01	-1.2161902E+02
9.400	3.0E-02	2.3E-07	2.3E-03	2.5E-11	01:02	3.7686600E+01	-1.2160313E+02
10.000	2.9E-02	2.2E-07	2.2E-03	2.4E-11	01:06	3.7686600E+01	-1.2159632E+02
12.000	2.6E-02	2.0E-07	2.0E-03	2.2E-11	01:20	3.7686600E+01	-1.2157362E+02
15.000	2.2E-02	1.7E-07	1.7E-03	1.9E-11	01:40	3.7686600E+01	-1.2153956E+02
20.000	1.9E-02	1.5E-07	1.5E-03	1.6E-11	02:13	3.7686600E+01	-1.2148281E+02
25.000	1.7E-02	1.3E-07	1.3E-03	1.4E-11	02:46	3.7686600E+01	-1.2142605E+02

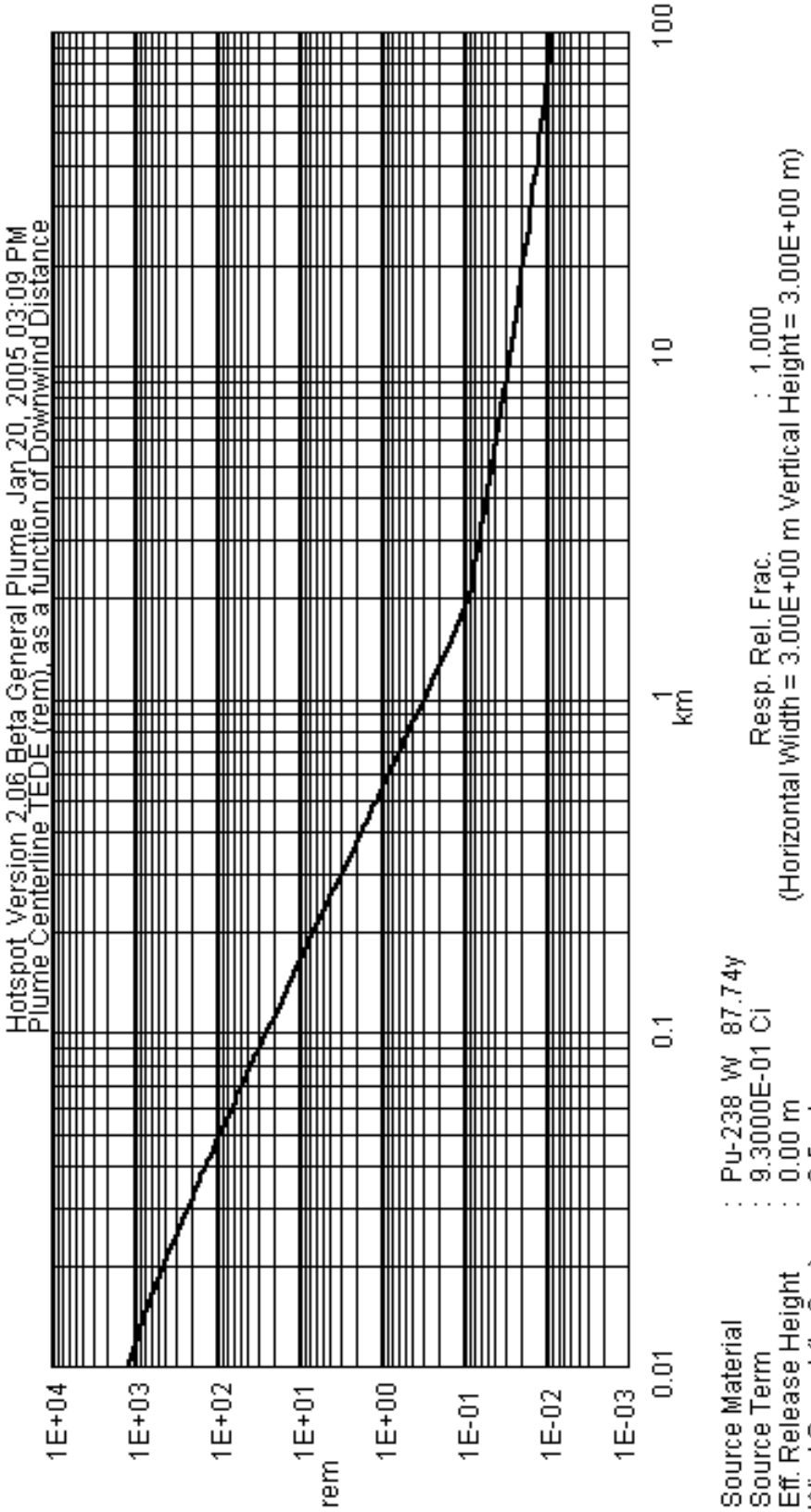
30.000	1.5E-02	1.2E-07	1.2E-03	1.3E-11	03:20	3.7686600E+01	-1.2136930E+02
35.000	1.4E-02	1.1E-07	1.1E-03	1.2E-11	03:53	3.7686600E+01	-1.2131254E+02
40.000	1.3E-02	9.9E-08	9.9E-04	1.1E-11	04:26	3.7686600E+01	-1.2125578E+02
50.000	1.2E-02	8.8E-08	8.8E-04	9.8E-12	05:33	3.7686600E+01	-1.2114227E+02
65.000	1.0E-02	7.7E-08	7.7E-04	8.6E-12	07:13	3.7686600E+01	-1.2097201E+02
80.000	9.0E-03	6.9E-08	6.9E-04	7.7E-12	08:53	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.93
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 03:09 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+04
1E+03
1E+02
1E+01
1E+00
1E-01
1E-02
1E-03
rem
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-01 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)
Inversion Layer Height : 500 m

"RD-12 Ground Level Release 95th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 9.3000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   4.35E+03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.13 km
Exceeds Middle Dose Out To : 2.01 km
Exceeds Outer  Dose Out To : 12.05 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	4.4E+03	3.3E-02	3.3E+02	3.7E-06	<00:01	3.7686600E+01	-1.2170974E+02
0.030	1.1E+03	8.7E-03	8.7E+01	9.7E-07	<00:01	3.7686600E+01	-1.2170949E+02
0.150	7.7E+01	5.9E-04	5.9E+00	6.6E-08	00:01	3.7686600E+01	-1.2170813E+02
0.250	3.1E+01	2.4E-04	2.4E+00	2.6E-08	00:02	3.7686600E+01	-1.2170699E+02
0.500	9.2E+00	7.0E-05	7.0E-01	7.8E-09	00:04	3.7686600E+01	-1.2170415E+02
1.000	2.9E+00	2.2E-05	2.2E-01	2.5E-09	00:09	3.7686600E+01	-1.2169848E+02
3.000	5.7E-01	4.4E-06	4.4E-02	4.9E-10	00:29	3.7686600E+01	-1.2167578E+02
5.000	2.9E-01	2.2E-06	2.2E-02	2.5E-10	00:49	3.7686600E+01	-1.2165307E+02
8.000	1.6E-01	1.3E-06	1.3E-02	1.4E-10	01:18	3.7686600E+01	-1.2161902E+02
9.400	1.4E-01	1.0E-06	1.0E-02	1.2E-10	01:32	3.7686600E+01	-1.2160313E+02
10.000	1.3E-01	9.7E-07	9.7E-03	1.1E-10	01:38	3.7686600E+01	-1.2159632E+02
12.000	1.0E-01	7.7E-07	7.7E-03	8.6E-11	01:57	3.7686600E+01	-1.2157362E+02
15.000	8.0E-02	6.1E-07	6.1E-03	6.8E-11	02:27	3.7686600E+01	-1.2153956E+02
20.000	6.6E-02	5.1E-07	5.1E-03	5.7E-11	03:16	3.7686600E+01	-1.2148281E+02
25.000	5.9E-02	4.5E-07	4.5E-03	5.1E-11	04:05	3.7686600E+01	-1.2142605E+02

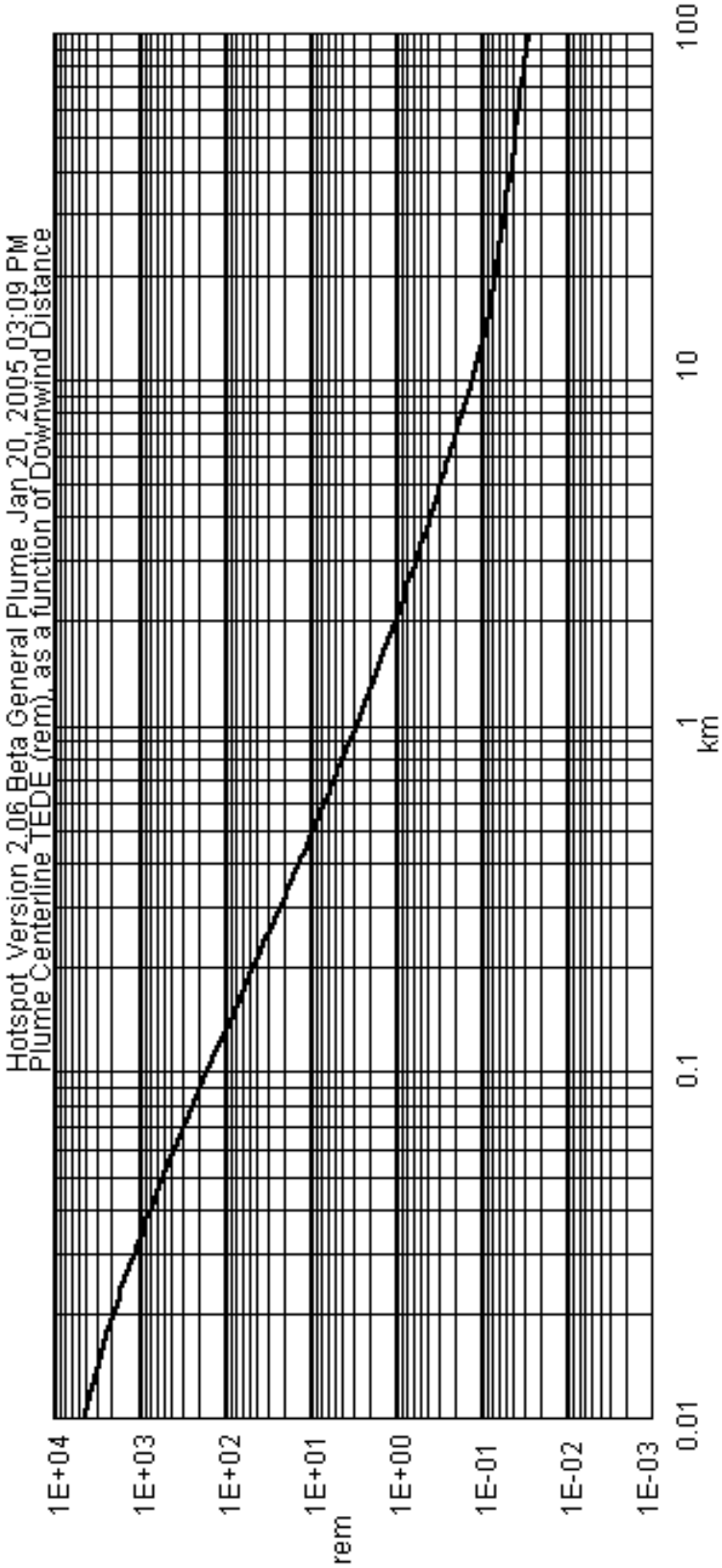
30.000	5.3E-02	4.1E-07	4.1E-03	4.5E-11	04:54	3.7686600E+01	-1.2136930E+02
35.000	4.9E-02	3.7E-07	3.7E-03	4.1E-11	05:43	3.7686600E+01	-1.2131254E+02
40.000	4.5E-02	3.5E-07	3.5E-03	3.9E-11	06:32	3.7686600E+01	-1.2125578E+02
50.000	4.0E-02	3.1E-07	3.1E-03	3.4E-11	08:10	3.7686600E+01	-1.2114227E+02
65.000	3.5E-02	2.6E-07	2.6E-03	3.0E-11	10:37	3.7686600E+01	-1.2097201E+02
80.000	3.1E-02	2.4E-07	2.4E-03	2.6E-11	13:04	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.93
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Pu-238 W 87.74y
Source Term : 9.3000E-01 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m

Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)

Inversion Layer Height : 300 m

"RD-14 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 4.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 5.5 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.41 km
Exceeds Outer  Dose Out To : 1.45 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.7E-04	3.6E-09	3.6E-06	4.0E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	5.5E+00	4.2E-05	4.2E-02	4.7E-10	<00:01	3.7686600E+01	-1.2170861E+02
0.150	4.6E+00	3.5E-05	3.5E-02	3.9E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.4E+00	1.8E-05	1.8E-02	2.0E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	7.1E-01	5.4E-06	5.4E-03	6.0E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	2.0E-01	1.5E-06	1.5E-03	1.7E-11	00:05	3.7686600E+01	-1.2169848E+02
3.000	4.2E-02	3.2E-07	3.2E-04	3.6E-12	00:16	3.7686600E+01	-1.2167578E+02
5.000	2.9E-02	2.2E-07	2.2E-04	2.5E-12	00:26	3.7686600E+01	-1.2165307E+02
8.000	2.2E-02	1.7E-07	1.7E-04	1.8E-12	00:42	3.7686600E+01	-1.2161902E+02
9.400	2.0E-02	1.5E-07	1.5E-04	1.7E-12	00:50	3.7686600E+01	-1.2160313E+02
10.000	1.9E-02	1.4E-07	1.4E-04	1.6E-12	00:53	3.7686600E+01	-1.2159632E+02
12.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	01:04	3.7686600E+01	-1.2157362E+02
15.000	1.5E-02	1.1E-07	1.1E-04	1.3E-12	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.3E-02	9.7E-08	9.7E-05	1.1E-12	01:46	3.7686600E+01	-1.2148281E+02
25.000	1.1E-02	8.5E-08	8.5E-05	9.5E-13	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.0E-02	7.7E-08	7.7E-05	8.6E-13	02:40	3.7686600E+01	-1.2136930E+02

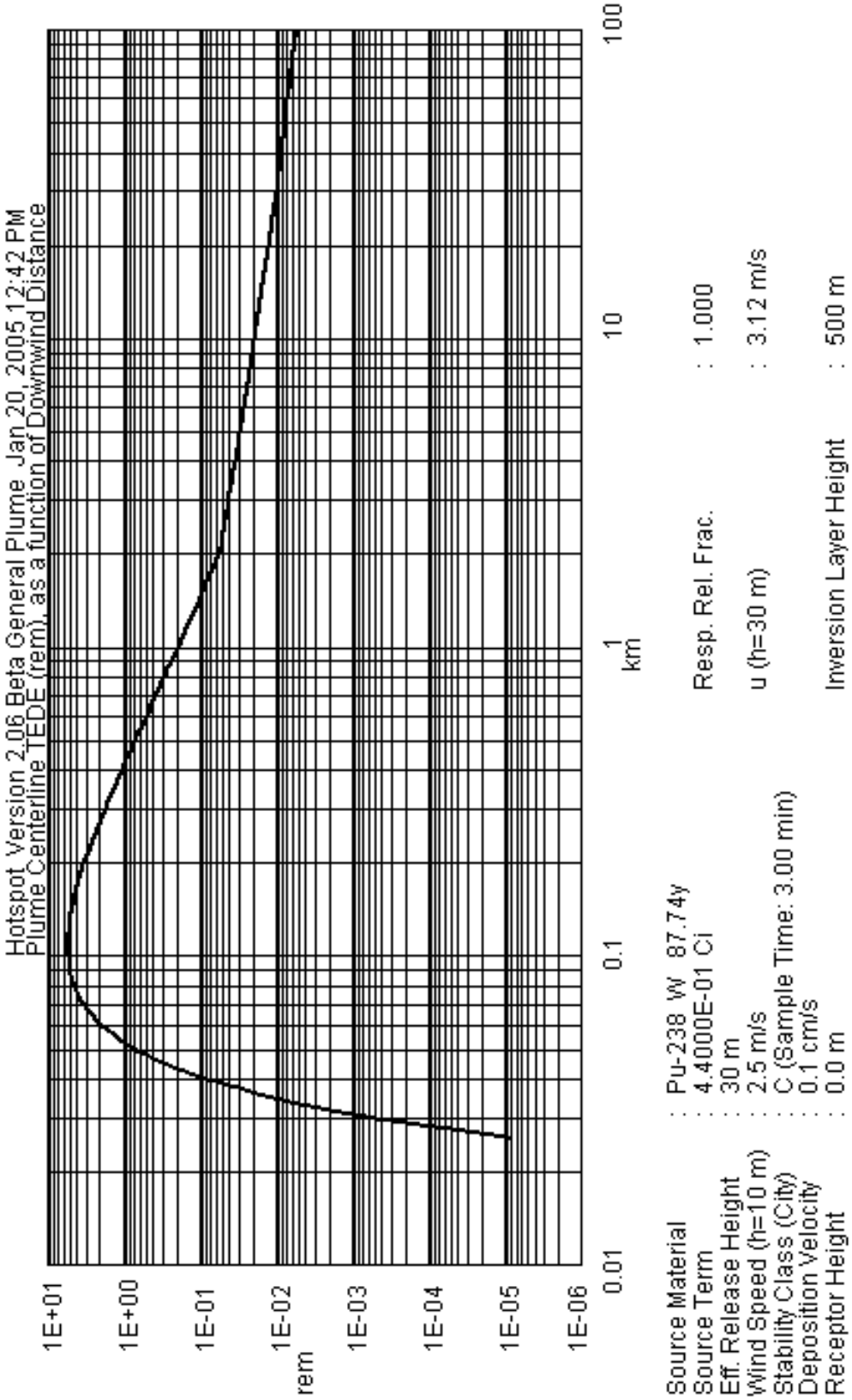
35.000	9.3E-03	7.1E-08	7.1E-05	7.9E-13	03:06	3.7686600E+01	-1.2131254E+02
40.000	8.7E-03	6.6E-08	6.6E-05	7.4E-13	03:33	3.7686600E+01	-1.2125578E+02
50.000	7.7E-03	5.9E-08	5.9E-05	6.6E-13	04:26	3.7686600E+01	-1.2114227E+02
65.000	6.7E-03	5.1E-08	5.1E-05	5.7E-13	05:46	3.7686600E+01	-1.2097201E+02
80.000	6.0E-03	4.6E-08	4.6E-05	5.1E-13	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .44
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:42 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 4.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-14 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 4.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 6.4 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.34 km
Exceeds Outer  Dose Out To : 1.04 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.4E-02	1.9E-07	1.9E-04	2.1E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	6.4E+00	4.9E-05	4.9E-02	5.5E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	4.1E+00	3.2E-05	3.2E-02	3.5E-10	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.8E+00	1.4E-05	1.4E-02	1.5E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.6E-01	3.5E-06	3.5E-03	4.0E-11	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.1E-01	8.4E-07	8.4E-04	9.4E-12	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.1E-02	8.3E-08	8.3E-05	9.3E-13	00:21	3.7686600E+01	-1.2167578E+02
5.000	3.7E-03	2.9E-08	2.9E-05	3.2E-13	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.4E-03	1.1E-08	1.1E-05	1.2E-13	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.0E-03	7.7E-09	7.7E-06	8.6E-14	01:08	3.7686600E+01	-1.2160313E+02
10.000	8.9E-04	6.8E-09	6.8E-06	7.6E-14	01:12	3.7686600E+01	-1.2159632E+02
12.000	6.1E-04	4.7E-09	4.7E-06	5.2E-14	01:27	3.7686600E+01	-1.2157362E+02
15.000	3.9E-04	3.0E-09	3.0E-06	3.3E-14	01:49	3.7686600E+01	-1.2153956E+02
20.000	2.2E-04	1.6E-09	1.6E-06	1.8E-14	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.4E-04	1.0E-09	1.0E-06	1.2E-14	03:02	3.7686600E+01	-1.2142605E+02
30.000	9.5E-05	7.3E-10	7.3E-07	8.1E-15	03:38	3.7686600E+01	-1.2136930E+02

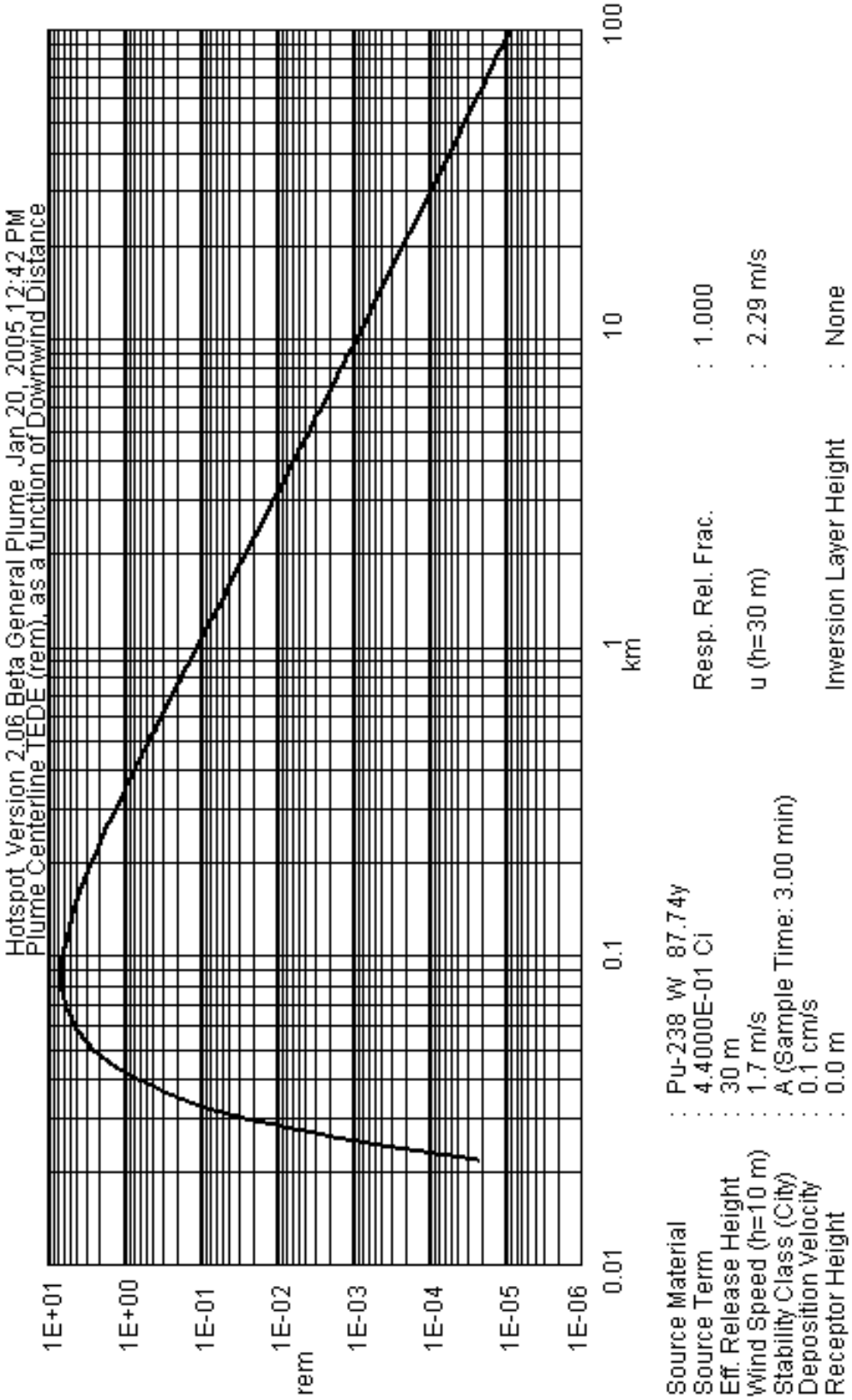
35.000	6.9E-05	5.3E-10	5.3E-07	5.9E-15	04:15	3.7686600E+01	-1.2131254E+02
40.000	5.3E-05	4.1E-10	4.1E-07	4.5E-15	04:51	3.7686600E+01	-1.2125578E+02
50.000	3.4E-05	2.6E-10	2.6E-07	2.9E-15	06:04	3.7686600E+01	-1.2114227E+02
65.000	2.0E-05	1.5E-10	1.5E-07	1.7E-15	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.3E-05	1.0E-10	1.0E-07	1.1E-15	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .44
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:42 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 4.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-14 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 4.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 4.2 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.27 km
Exceeds Outer  Dose Out To : 0.85 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.6E-02	1.2E-07	1.2E-04	1.4E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	4.2E+00	3.2E-05	3.2E-02	3.6E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	2.7E+00	2.1E-05	2.1E-02	2.3E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.2E+00	9.0E-06	9.0E-03	1.0E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	3.0E-01	2.3E-06	2.3E-03	2.6E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	7.2E-02	5.5E-07	5.5E-04	6.2E-12	00:04	3.7686600E+01	-1.2169848E+02
3.000	2.6E-02	2.0E-07	2.0E-04	2.2E-12	00:14	3.7686600E+01	-1.2167578E+02
5.000	1.8E-02	1.4E-07	1.4E-04	1.5E-12	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.3E-02	1.0E-07	1.0E-04	1.1E-12	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.2E-02	9.3E-08	9.3E-05	1.0E-12	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.2E-02	8.9E-08	8.9E-05	1.0E-12	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.0E-02	8.0E-08	8.0E-05	8.9E-13	00:57	3.7686600E+01	-1.2157362E+02
15.000	9.2E-03	7.0E-08	7.0E-05	7.8E-13	01:11	3.7686600E+01	-1.2153956E+02
20.000	7.8E-03	6.0E-08	6.0E-05	6.7E-13	01:35	3.7686600E+01	-1.2148281E+02
25.000	6.9E-03	5.3E-08	5.3E-05	5.9E-13	01:59	3.7686600E+01	-1.2142605E+02
30.000	6.3E-03	4.8E-08	4.8E-05	5.3E-13	02:23	3.7686600E+01	-1.2136930E+02

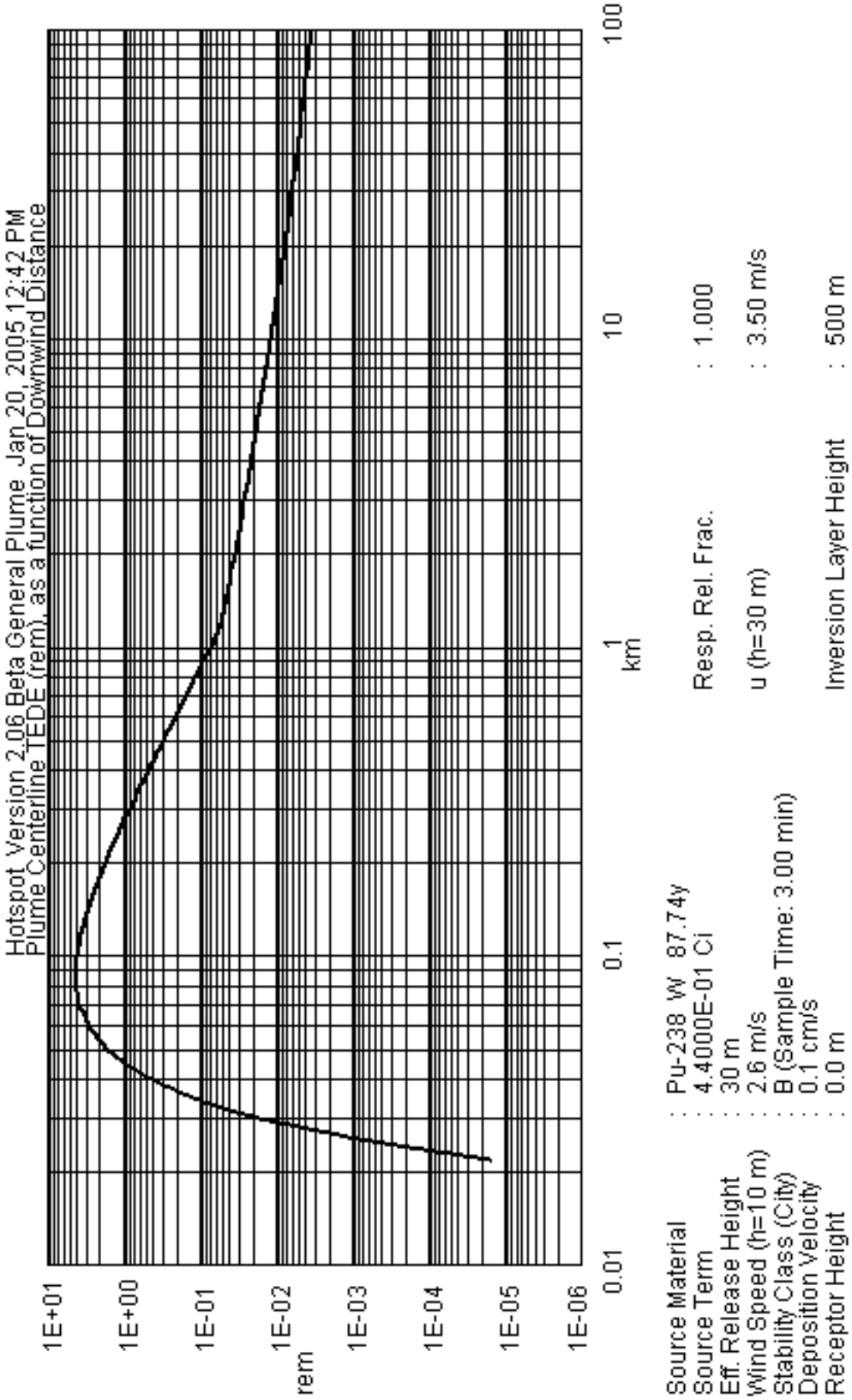
35.000	5.8E-03	4.4E-08	4.4E-05	4.9E-13	02:46	3.7686600E+01	-1.2131254E+02
40.000	5.4E-03	4.1E-08	4.1E-05	4.6E-13	03:10	3.7686600E+01	-1.2125578E+02
50.000	4.8E-03	3.7E-08	3.7E-05	4.1E-13	03:58	3.7686600E+01	-1.2114227E+02
65.000	4.2E-03	3.2E-08	3.2E-05	3.6E-13	05:09	3.7686600E+01	-1.2097201E+02
80.000	3.7E-03	2.9E-08	2.9E-05	3.2E-13	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .44
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:42 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 4.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-14 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 4.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 4.4 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 1.38 km
Exceeds Outer  Dose Out To : 8.59 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	9.7E-01	7.4E-06	7.4E-03	8.3E-11	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.0E+00	3.0E-05	3.0E-02	3.4E-10	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	4.4E+00	3.4E-05	3.4E-02	3.8E-10	00:01	3.7686600E+01	-1.2170624E+02
0.500	3.5E+00	2.6E-05	2.6E-02	2.9E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.5E+00	1.2E-05	1.2E-02	1.3E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	3.6E-01	2.8E-06	2.8E-03	3.1E-11	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.9E-01	1.5E-06	1.5E-03	1.6E-11	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.1E-01	8.4E-07	8.4E-04	9.4E-12	00:50	3.7686600E+01	-1.2161902E+02
9.400	9.1E-02	7.0E-07	7.0E-04	7.8E-12	00:59	3.7686600E+01	-1.2160313E+02
10.000	8.5E-02	6.5E-07	6.5E-04	7.2E-12	01:02	3.7686600E+01	-1.2159632E+02
12.000	6.9E-02	5.2E-07	5.2E-04	5.9E-12	01:15	3.7686600E+01	-1.2157362E+02
15.000	5.5E-02	4.2E-07	4.2E-04	4.7E-12	01:34	3.7686600E+01	-1.2153956E+02
20.000	4.7E-02	3.6E-07	3.6E-04	4.0E-12	02:05	3.7686600E+01	-1.2148281E+02
25.000	4.2E-02	3.2E-07	3.2E-04	3.6E-12	02:36	3.7686600E+01	-1.2142605E+02
30.000	3.8E-02	2.9E-07	2.9E-04	3.3E-12	03:08	3.7686600E+01	-1.2136930E+02

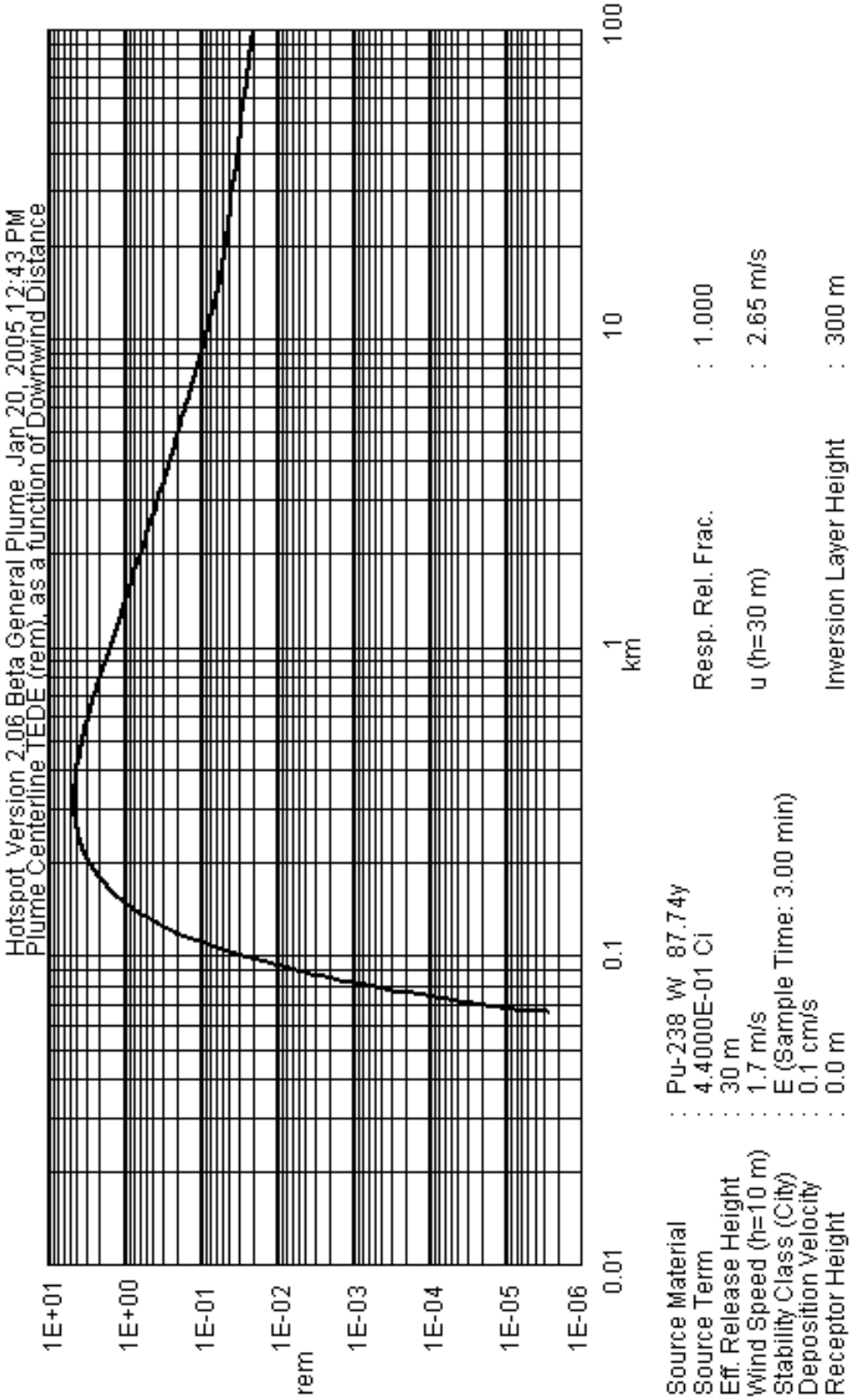
35.000	3.5E-02	2.7E-07	2.7E-04	3.0E-12	03:39	3.7686600E+01	-1.2131254E+02
40.000	3.3E-02	2.5E-07	2.5E-04	2.8E-12	04:11	3.7686600E+01	-1.2125578E+02
50.000	2.9E-02	2.2E-07	2.2E-04	2.5E-12	05:13	3.7686600E+01	-1.2114227E+02
65.000	2.5E-02	1.9E-07	1.9E-04	2.1E-12	06:48	3.7686600E+01	-1.2097201E+02
80.000	2.2E-02	1.7E-07	1.7E-04	1.9E-12	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .44
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 4.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-15 Ground Level Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.2000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : C
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   45 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.096 km
Exceeds Outer  Dose Out To : 0.32 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	4.5E+01	3.5E-04	3.5E+00	3.9E-08	<00:01	3.7686600E+01	-1.2170974E+02
0.030	8.3E+00	6.4E-05	6.4E-01	7.1E-09	<00:01	3.7686600E+01	-1.2170949E+02
0.150	4.3E-01	3.3E-06	3.3E-02	3.7E-10	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.6E-01	1.2E-06	1.2E-02	1.4E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	4.3E-02	3.3E-07	3.3E-03	3.6E-11	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.1E-02	8.8E-08	8.8E-04	9.8E-12	00:06	3.7686600E+01	-1.2169848E+02
3.000	2.4E-03	1.8E-08	1.8E-04	2.1E-12	00:20	3.7686600E+01	-1.2167578E+02
5.000	1.7E-03	1.3E-08	1.3E-04	1.4E-12	00:33	3.7686600E+01	-1.2165307E+02
8.000	1.2E-03	9.4E-09	9.4E-05	1.1E-12	00:53	3.7686600E+01	-1.2161902E+02
9.400	1.1E-03	8.5E-09	8.5E-05	9.5E-13	01:02	3.7686600E+01	-1.2160313E+02
10.000	1.1E-03	8.2E-09	8.2E-05	9.2E-13	01:06	3.7686600E+01	-1.2159632E+02
12.000	9.6E-04	7.3E-09	7.3E-05	8.2E-13	01:20	3.7686600E+01	-1.2157362E+02
15.000	8.4E-04	6.4E-09	6.4E-05	7.2E-13	01:40	3.7686600E+01	-1.2153956E+02
20.000	7.1E-04	5.4E-09	5.4E-05	6.1E-13	02:13	3.7686600E+01	-1.2148281E+02
25.000	6.3E-04	4.8E-09	4.8E-05	5.4E-13	02:46	3.7686600E+01	-1.2142605E+02

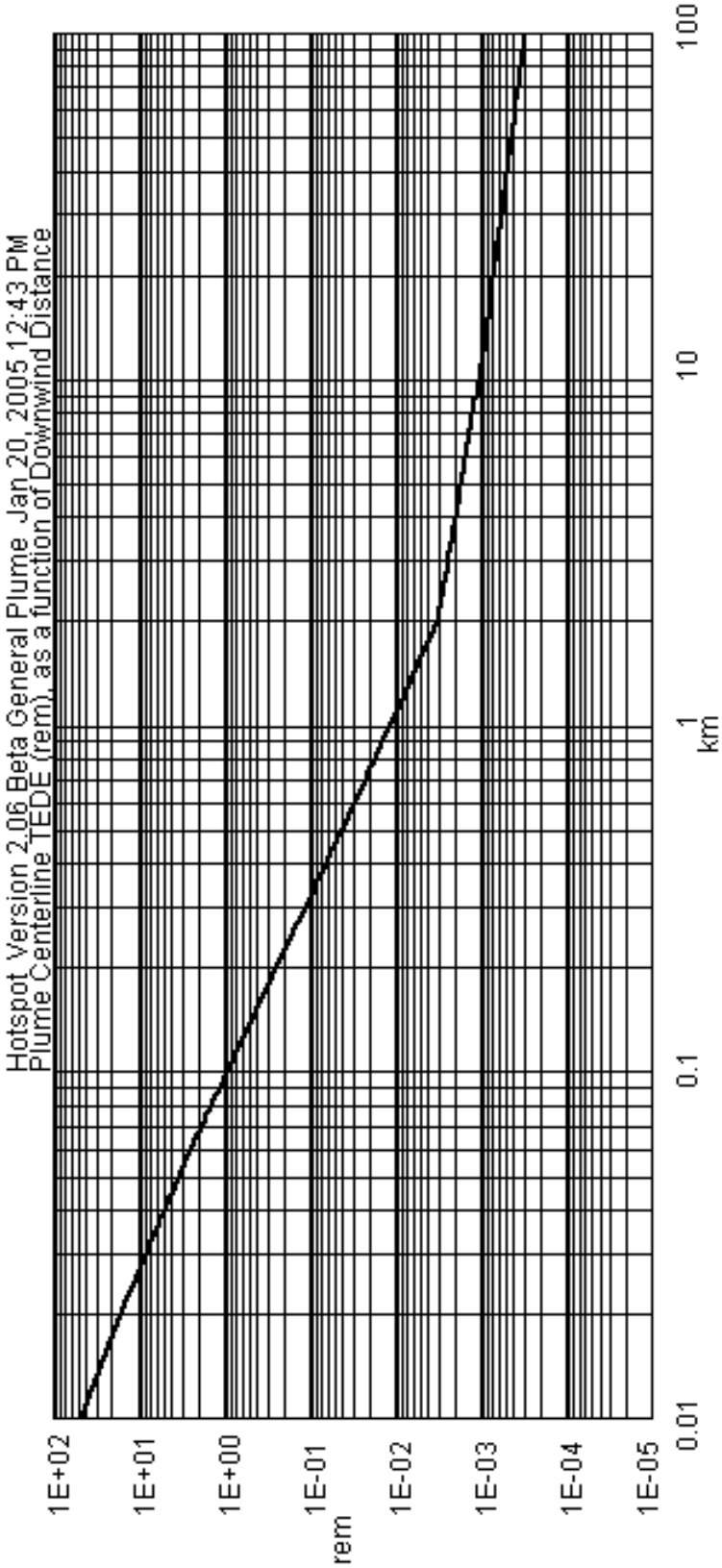
30.000	5.7E-04	4.3E-09	4.3E-05	4.8E-13	03:20	3.7686600E+01	-1.2136930E+02
35.000	5.2E-04	4.0E-09	4.0E-05	4.5E-13	03:53	3.7686600E+01	-1.2131254E+02
40.000	4.9E-04	3.7E-09	3.7E-05	4.2E-13	04:26	3.7686600E+01	-1.2125578E+02
50.000	4.3E-04	3.3E-09	3.3E-05	3.7E-13	05:33	3.7686600E+01	-1.2114227E+02
65.000	3.8E-04	2.9E-09	2.9E-05	3.2E-13	07:13	3.7686600E+01	-1.2097201E+02
80.000	3.4E-04	2.6E-09	2.6E-05	2.9E-13	08:53	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .022
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Pu-238 W 87.74y
Source Term : 2.2000E-02 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m

Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)

Inversion Layer Height : 500 m

"RD-15 Ground Level Release 95th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.2000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   1.63E+02 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.016 km
Exceeds Middle Dose Out To : 0.27 km
Exceeds Outer  Dose Out To : 1.05 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	1.6E+02	1.3E-03	1.3E+01	1.4E-07	<00:01	3.7686600E+01	-1.2170974E+02
0.030	4.3E+01	3.3E-04	3.3E+00	3.6E-08	<00:01	3.7686600E+01	-1.2170949E+02
0.150	2.9E+00	2.2E-05	2.2E-01	2.5E-09	00:01	3.7686600E+01	-1.2170813E+02
0.250	1.2E+00	8.9E-06	8.9E-02	9.9E-10	00:02	3.7686600E+01	-1.2170699E+02
0.500	3.4E-01	2.6E-06	2.6E-02	2.9E-10	00:04	3.7686600E+01	-1.2170415E+02
1.000	1.1E-01	8.3E-07	8.3E-03	9.3E-11	00:09	3.7686600E+01	-1.2169848E+02
3.000	2.1E-02	1.6E-07	1.6E-03	1.8E-11	00:29	3.7686600E+01	-1.2167578E+02
5.000	1.1E-02	8.4E-08	8.4E-04	9.4E-12	00:49	3.7686600E+01	-1.2165307E+02
8.000	6.2E-03	4.7E-08	4.7E-04	5.3E-12	01:18	3.7686600E+01	-1.2161902E+02
9.400	5.1E-03	3.9E-08	3.9E-04	4.3E-12	01:32	3.7686600E+01	-1.2160313E+02
10.000	4.7E-03	3.6E-08	3.6E-04	4.0E-12	01:38	3.7686600E+01	-1.2159632E+02
12.000	3.8E-03	2.9E-08	2.9E-04	3.2E-12	01:57	3.7686600E+01	-1.2157362E+02
15.000	3.0E-03	2.3E-08	2.3E-04	2.5E-12	02:27	3.7686600E+01	-1.2153956E+02
20.000	2.5E-03	1.9E-08	1.9E-04	2.1E-12	03:16	3.7686600E+01	-1.2148281E+02
25.000	2.2E-03	1.7E-08	1.7E-04	1.9E-12	04:05	3.7686600E+01	-1.2142605E+02

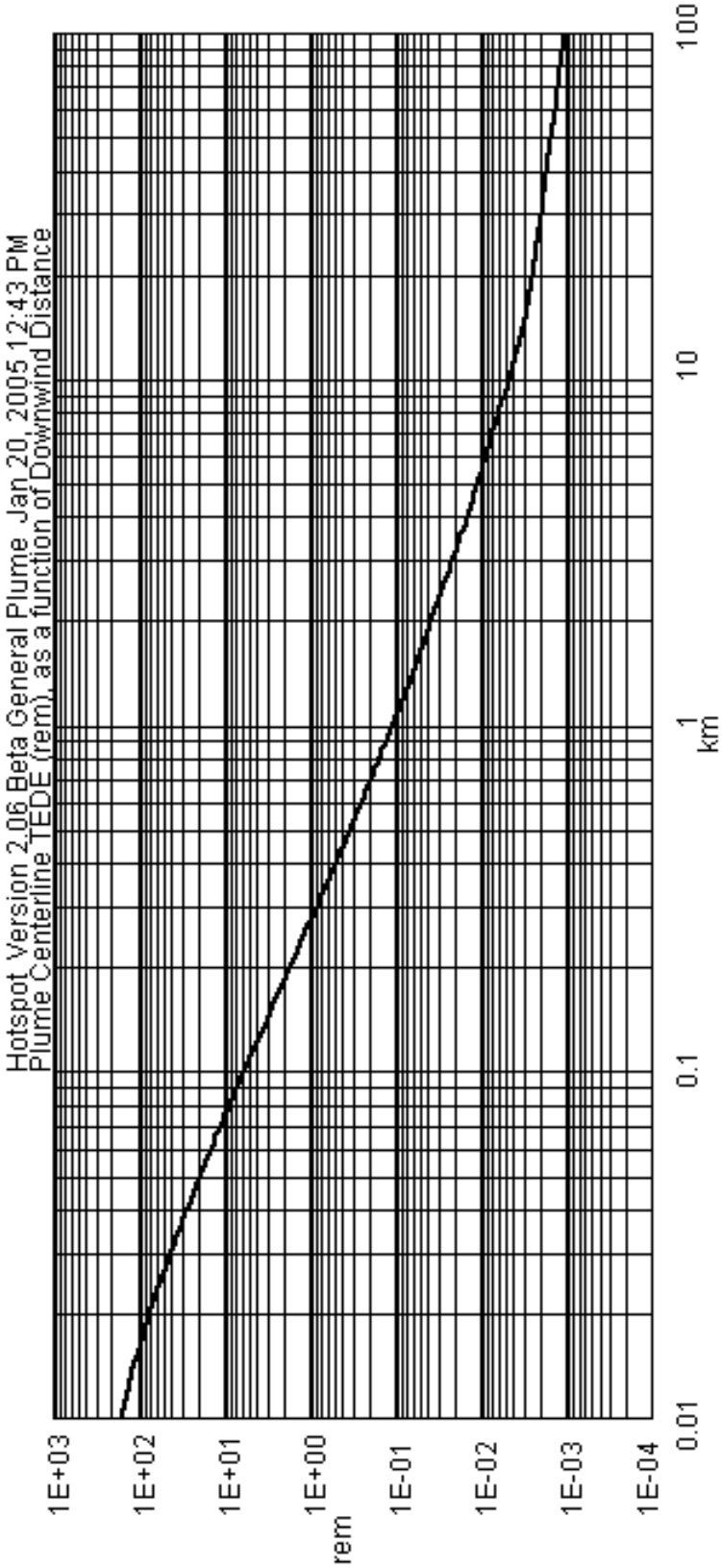
30.000	2.0E-03	1.5E-08	1.5E-04	1.7E-12	04:54	3.7686600E+01	-1.2136930E+02
35.000	1.8E-03	1.4E-08	1.4E-04	1.6E-12	05:43	3.7686600E+01	-1.2131254E+02
40.000	1.7E-03	1.3E-08	1.3E-04	1.4E-12	06:32	3.7686600E+01	-1.2125578E+02
50.000	1.5E-03	1.1E-08	1.1E-04	1.3E-12	08:10	3.7686600E+01	-1.2114227E+02
65.000	1.3E-03	9.9E-09	9.9E-05	1.1E-12	10:37	3.7686600E+01	-1.2097201E+02
80.000	1.2E-03	8.9E-09	8.9E-05	9.9E-13	13:04	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = .022
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Pu-238 W 87.74y
Source Term : 2.2000E-02 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m

Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)

Inversion Layer Height : 300 m

"RD-16 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 6.6 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.46 km
Exceeds Outer  Dose Out To : 1.60 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	5.7E-04	4.3E-09	4.3E-06	4.9E-14	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	6.6E+00	5.0E-05	5.0E-02	5.6E-10	<00:01	3.7686600E+01	-1.2170861E+02
0.150	5.6E+00	4.3E-05	4.3E-02	4.8E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.8E+00	2.2E-05	2.2E-02	2.4E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	8.5E-01	6.5E-06	6.5E-03	7.3E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	2.4E-01	1.8E-06	1.8E-03	2.0E-11	00:05	3.7686600E+01	-1.2169848E+02
3.000	5.0E-02	3.9E-07	3.9E-04	4.3E-12	00:16	3.7686600E+01	-1.2167578E+02
5.000	3.5E-02	2.7E-07	2.7E-04	3.0E-12	00:26	3.7686600E+01	-1.2165307E+02
8.000	2.6E-02	2.0E-07	2.0E-04	2.2E-12	00:42	3.7686600E+01	-1.2161902E+02
9.400	2.4E-02	1.8E-07	1.8E-04	2.0E-12	00:50	3.7686600E+01	-1.2160313E+02
10.000	2.3E-02	1.7E-07	1.7E-04	1.9E-12	00:53	3.7686600E+01	-1.2159632E+02
12.000	2.0E-02	1.6E-07	1.6E-04	1.7E-12	01:04	3.7686600E+01	-1.2157362E+02
15.000	1.8E-02	1.4E-07	1.4E-04	1.5E-12	01:20	3.7686600E+01	-1.2153956E+02
20.000	1.5E-02	1.2E-07	1.2E-04	1.3E-12	01:46	3.7686600E+01	-1.2148281E+02
25.000	1.3E-02	1.0E-07	1.0E-04	1.1E-12	02:13	3.7686600E+01	-1.2142605E+02
30.000	1.2E-02	9.3E-08	9.3E-05	1.0E-12	02:40	3.7686600E+01	-1.2136930E+02

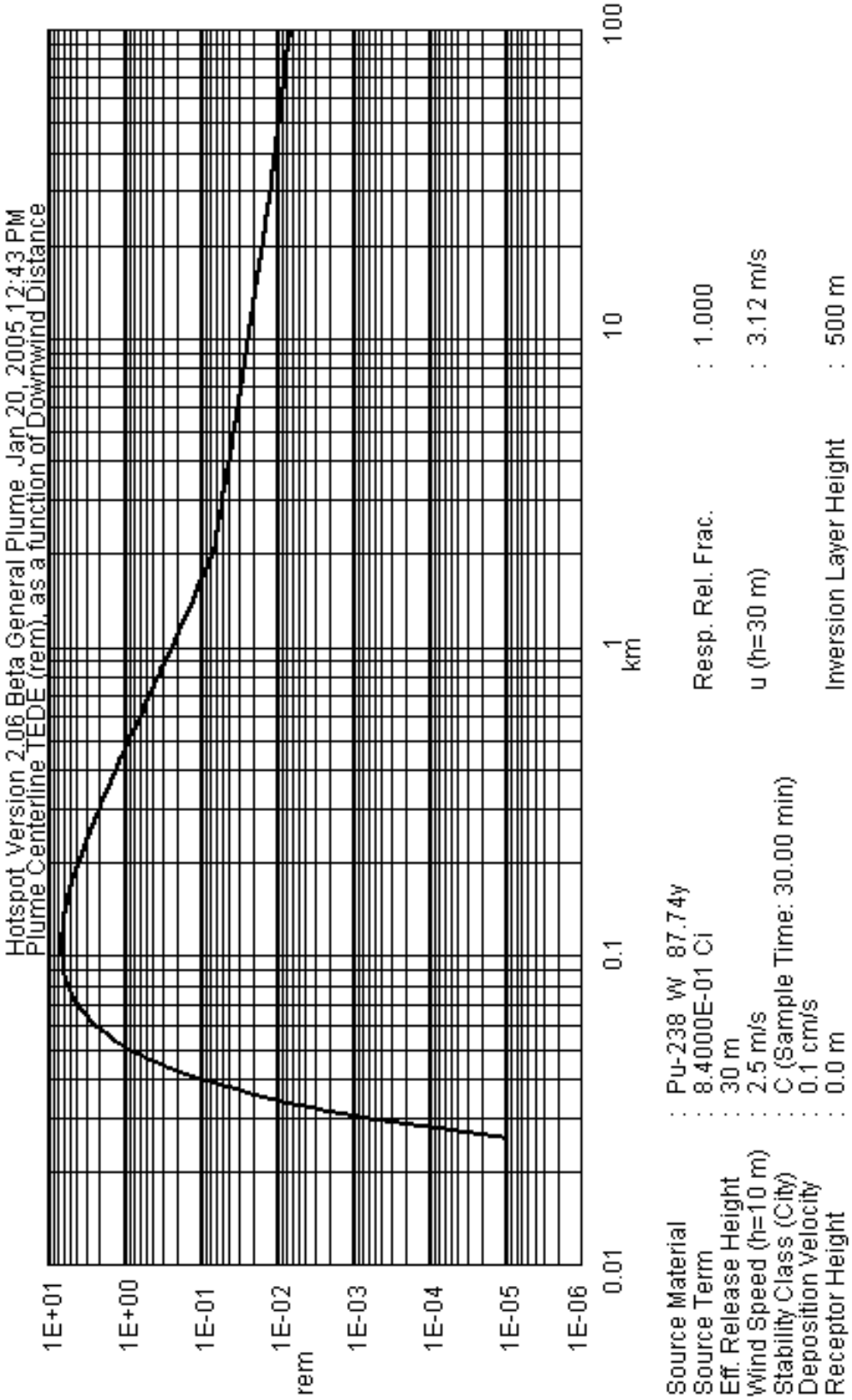
35.000	1.1E-02	8.6E-08	8.6E-05	9.6E-13	03:06	3.7686600E+01	-1.2131254E+02
40.000	1.0E-02	8.0E-08	8.0E-05	8.9E-13	03:33	3.7686600E+01	-1.2125578E+02
50.000	9.3E-03	7.1E-08	7.1E-05	7.9E-13	04:26	3.7686600E+01	-1.2114227E+02
65.000	8.1E-03	6.2E-08	6.2E-05	6.9E-13	05:46	3.7686600E+01	-1.2097201E+02
80.000	7.3E-03	5.6E-08	5.6E-05	6.2E-13	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.84
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-16 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 7.7 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.37 km
Exceeds Outer  Dose Out To : 1.14 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.9E-02	2.2E-07	2.2E-04	2.5E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	7.7E+00	5.9E-05	5.9E-02	6.6E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	5.0E+00	3.8E-05	3.8E-02	4.3E-10	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.2E+00	1.7E-05	1.7E-02	1.8E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	5.6E-01	4.3E-06	4.3E-03	4.8E-11	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.3E-01	1.0E-06	1.0E-03	1.1E-11	00:07	3.7686600E+01	-1.2169848E+02
3.000	1.3E-02	1.0E-07	1.0E-04	1.1E-12	00:21	3.7686600E+01	-1.2167578E+02
5.000	4.5E-03	3.4E-08	3.4E-05	3.8E-13	00:36	3.7686600E+01	-1.2165307E+02
8.000	1.7E-03	1.3E-08	1.3E-05	1.4E-13	00:58	3.7686600E+01	-1.2161902E+02
9.400	1.2E-03	9.3E-09	9.3E-06	1.0E-13	01:08	3.7686600E+01	-1.2160313E+02
10.000	1.1E-03	8.2E-09	8.2E-06	9.1E-14	01:12	3.7686600E+01	-1.2159632E+02
12.000	7.4E-04	5.6E-09	5.6E-06	6.3E-14	01:27	3.7686600E+01	-1.2157362E+02
15.000	4.7E-04	3.6E-09	3.6E-06	4.0E-14	01:49	3.7686600E+01	-1.2153956E+02
20.000	2.6E-04	2.0E-09	2.0E-06	2.2E-14	02:25	3.7686600E+01	-1.2148281E+02
25.000	1.7E-04	1.3E-09	1.3E-06	1.4E-14	03:02	3.7686600E+01	-1.2142605E+02
30.000	1.1E-04	8.7E-10	8.7E-07	9.8E-15	03:38	3.7686600E+01	-1.2136930E+02

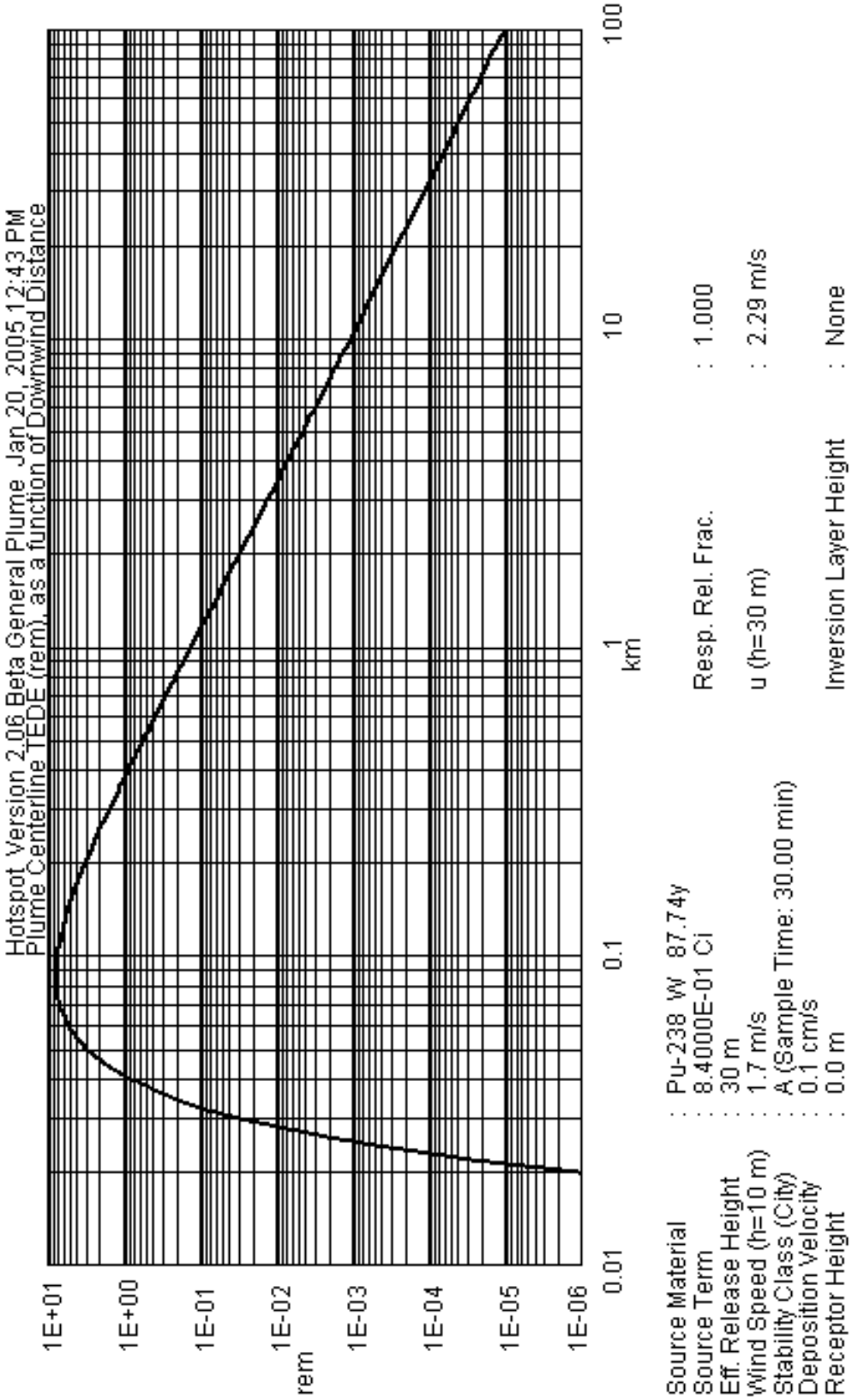
35.000	8.4E-05	6.4E-10	6.4E-07	7.1E-15	04:15	3.7686600E+01	-1.2131254E+02
40.000	6.4E-05	4.9E-10	4.9E-07	5.5E-15	04:51	3.7686600E+01	-1.2125578E+02
50.000	4.1E-05	3.1E-10	3.1E-07	3.5E-15	06:04	3.7686600E+01	-1.2114227E+02
65.000	2.4E-05	1.8E-10	1.8E-07	2.1E-15	07:54	3.7686600E+01	-1.2097201E+02
80.000	1.6E-05	1.2E-10	1.2E-07	1.4E-15	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.84
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-16 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 5.1 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.30 km
Exceeds Outer  Dose Out To : 0.93 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.9E-02	1.5E-07	1.5E-04	1.6E-12	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	5.1E+00	3.9E-05	3.9E-02	4.3E-10	<00:01	3.7686600E+01	-1.2170884E+02
0.150	3.3E+00	2.5E-05	2.5E-02	2.8E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.4E+00	1.1E-05	1.1E-02	1.2E-10	00:01	3.7686600E+01	-1.2170699E+02
0.500	3.6E-01	2.8E-06	2.8E-03	3.1E-11	00:02	3.7686600E+01	-1.2170415E+02
1.000	8.7E-02	6.6E-07	6.6E-04	7.4E-12	00:04	3.7686600E+01	-1.2169848E+02
3.000	3.1E-02	2.4E-07	2.4E-04	2.7E-12	00:14	3.7686600E+01	-1.2167578E+02
5.000	2.2E-02	1.7E-07	1.7E-04	1.9E-12	00:23	3.7686600E+01	-1.2165307E+02
8.000	1.6E-02	1.2E-07	1.2E-04	1.4E-12	00:38	3.7686600E+01	-1.2161902E+02
9.400	1.5E-02	1.1E-07	1.1E-04	1.2E-12	00:44	3.7686600E+01	-1.2160313E+02
10.000	1.4E-02	1.1E-07	1.1E-04	1.2E-12	00:47	3.7686600E+01	-1.2159632E+02
12.000	1.3E-02	9.6E-08	9.6E-05	1.1E-12	00:57	3.7686600E+01	-1.2157362E+02
15.000	1.1E-02	8.5E-08	8.5E-05	9.5E-13	01:11	3.7686600E+01	-1.2153956E+02
20.000	9.4E-03	7.2E-08	7.2E-05	8.0E-13	01:35	3.7686600E+01	-1.2148281E+02
25.000	8.3E-03	6.4E-08	6.4E-05	7.1E-13	01:59	3.7686600E+01	-1.2142605E+02
30.000	7.5E-03	5.8E-08	5.8E-05	6.4E-13	02:23	3.7686600E+01	-1.2136930E+02

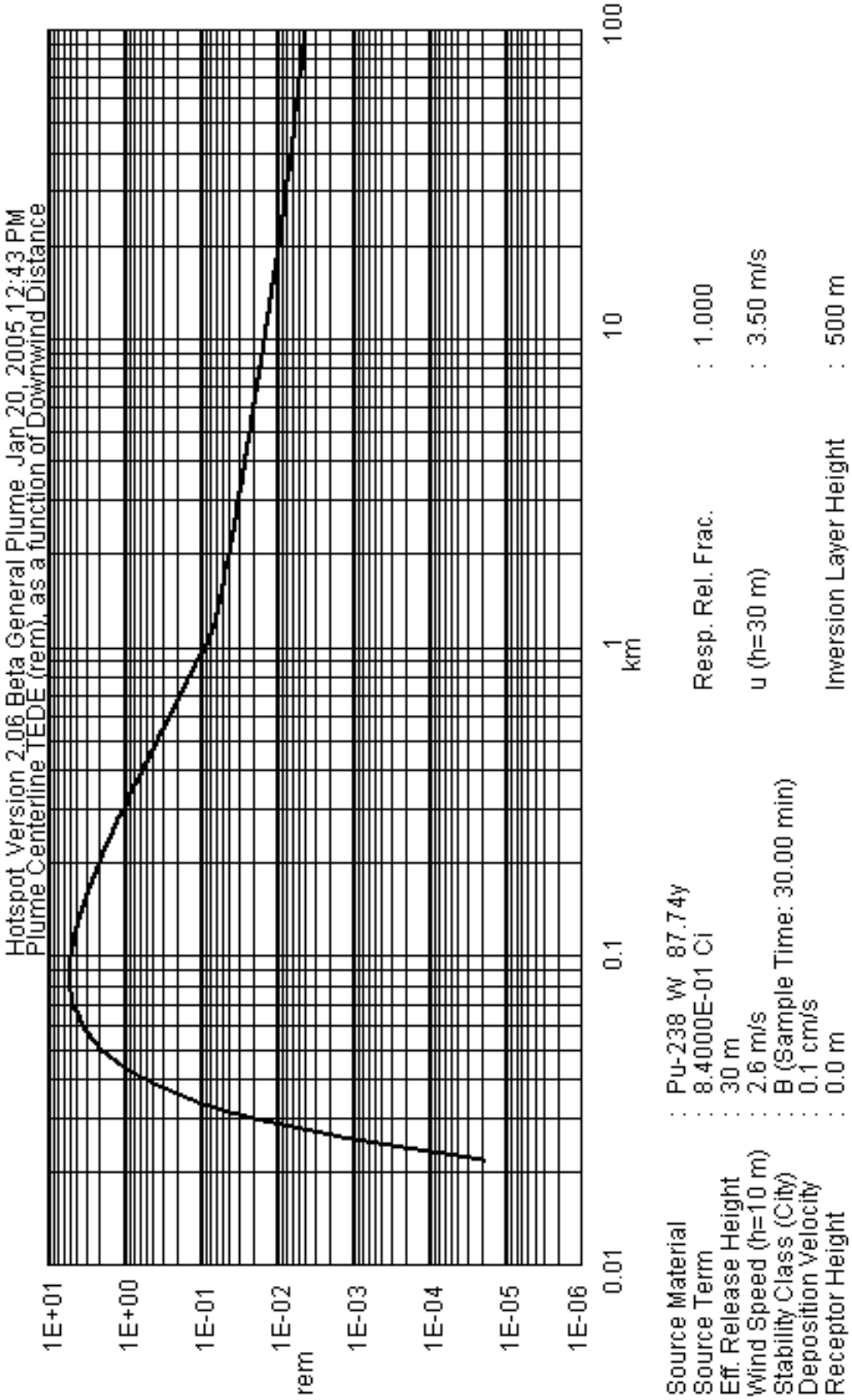
35.000	6.9E-03	5.3E-08	5.3E-05	5.9E-13	02:46	3.7686600E+01	-1.2131254E+02
40.000	6.5E-03	4.9E-08	4.9E-05	5.5E-13	03:10	3.7686600E+01	-1.2125578E+02
50.000	5.7E-03	4.4E-08	4.4E-05	4.9E-13	03:58	3.7686600E+01	-1.2114227E+02
65.000	5.0E-03	3.8E-08	3.8E-05	4.3E-13	05:09	3.7686600E+01	-1.2097201E+02
80.000	4.5E-03	3.4E-08	3.4E-05	3.8E-13	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.84
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-16 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 8.4000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 5.3 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 1.58 km
Exceeds Outer  Dose Out To : 10.18 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	1.2E+00	8.9E-06	8.9E-03	1.0E-10	<00:01	3.7686600E+01	-1.2170813E+02
0.250	4.8E+00	3.7E-05	3.7E-02	4.1E-10	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	5.3E+00	4.0E-05	4.0E-02	4.5E-10	00:01	3.7686600E+01	-1.2170624E+02
0.500	4.2E+00	3.2E-05	3.2E-02	3.6E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	1.8E+00	1.4E-05	1.4E-02	1.6E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	4.3E-01	3.3E-06	3.3E-03	3.7E-11	00:18	3.7686600E+01	-1.2167578E+02
5.000	2.3E-01	1.8E-06	1.8E-03	2.0E-11	00:31	3.7686600E+01	-1.2165307E+02
8.000	1.3E-01	1.0E-06	1.0E-03	1.1E-11	00:50	3.7686600E+01	-1.2161902E+02
9.400	1.1E-01	8.4E-07	8.4E-04	9.4E-12	00:59	3.7686600E+01	-1.2160313E+02
10.000	1.0E-01	7.8E-07	7.8E-04	8.7E-12	01:02	3.7686600E+01	-1.2159632E+02
12.000	8.3E-02	6.3E-07	6.3E-04	7.1E-12	01:15	3.7686600E+01	-1.2157362E+02
15.000	6.6E-02	5.1E-07	5.1E-04	5.7E-12	01:34	3.7686600E+01	-1.2153956E+02
20.000	5.6E-02	4.3E-07	4.3E-04	4.8E-12	02:05	3.7686600E+01	-1.2148281E+02
25.000	5.1E-02	3.9E-07	3.9E-04	4.3E-12	02:36	3.7686600E+01	-1.2142605E+02
30.000	4.6E-02	3.5E-07	3.5E-04	3.9E-12	03:08	3.7686600E+01	-1.2136930E+02

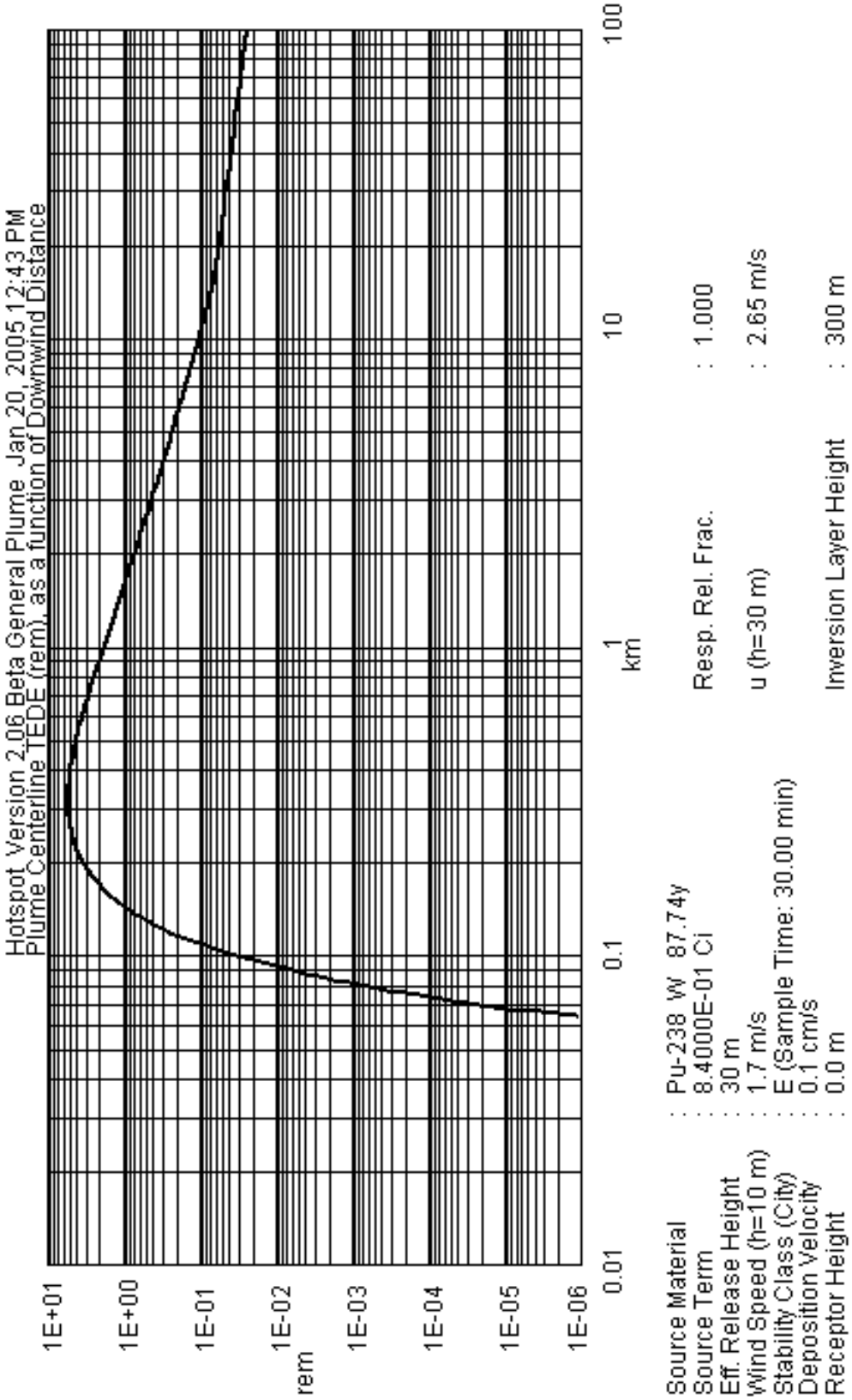
35.000	4.2E-02	3.2E-07	3.2E-04	3.6E-12	03:39	3.7686600E+01	-1.2131254E+02
40.000	3.9E-02	3.0E-07	3.0E-04	3.3E-12	04:11	3.7686600E+01	-1.2125578E+02
50.000	3.5E-02	2.7E-07	2.7E-04	3.0E-12	05:13	3.7686600E+01	-1.2114227E+02
65.000	3.0E-02	2.3E-07	2.3E-04	2.6E-12	06:48	3.7686600E+01	-1.2097201E+02
80.000	2.7E-02	2.1E-07	2.1E-04	2.3E-12	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.84
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 8.4000E-01 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

"RD-16 Ground Level Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 6.2000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : C
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   8.04E+02 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.038 km
Exceeds Middle Dose Out To : 0.43 km
Exceeds Outer  Dose Out To : 1.46 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	8.0E+02	6.2E-03	6.2E+01	6.9E-07	<00:01	3.7686600E+01	-1.2170974E+02
0.030	1.5E+02	1.1E-03	1.1E+01	1.3E-07	<00:01	3.7686600E+01	-1.2170949E+02
0.150	7.7E+00	5.9E-05	5.9E-01	6.6E-09	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.9E+00	2.2E-05	2.2E-01	2.5E-09	00:01	3.7686600E+01	-1.2170699E+02
0.500	7.6E-01	5.8E-06	5.8E-02	6.5E-10	00:03	3.7686600E+01	-1.2170415E+02
1.000	2.0E-01	1.6E-06	1.6E-02	1.7E-10	00:06	3.7686600E+01	-1.2169848E+02
3.000	4.3E-02	3.3E-07	3.3E-03	3.7E-11	00:20	3.7686600E+01	-1.2167578E+02
5.000	3.0E-02	2.3E-07	2.3E-03	2.5E-11	00:33	3.7686600E+01	-1.2165307E+02
8.000	2.2E-02	1.7E-07	1.7E-03	1.9E-11	00:53	3.7686600E+01	-1.2161902E+02
9.400	2.0E-02	1.5E-07	1.5E-03	1.7E-11	01:02	3.7686600E+01	-1.2160313E+02
10.000	1.9E-02	1.5E-07	1.5E-03	1.6E-11	01:06	3.7686600E+01	-1.2159632E+02
12.000	1.7E-02	1.3E-07	1.3E-03	1.5E-11	01:20	3.7686600E+01	-1.2157362E+02
15.000	1.5E-02	1.1E-07	1.1E-03	1.3E-11	01:40	3.7686600E+01	-1.2153956E+02
20.000	1.3E-02	9.7E-08	9.7E-04	1.1E-11	02:13	3.7686600E+01	-1.2148281E+02
25.000	1.1E-02	8.5E-08	8.5E-04	9.5E-12	02:46	3.7686600E+01	-1.2142605E+02

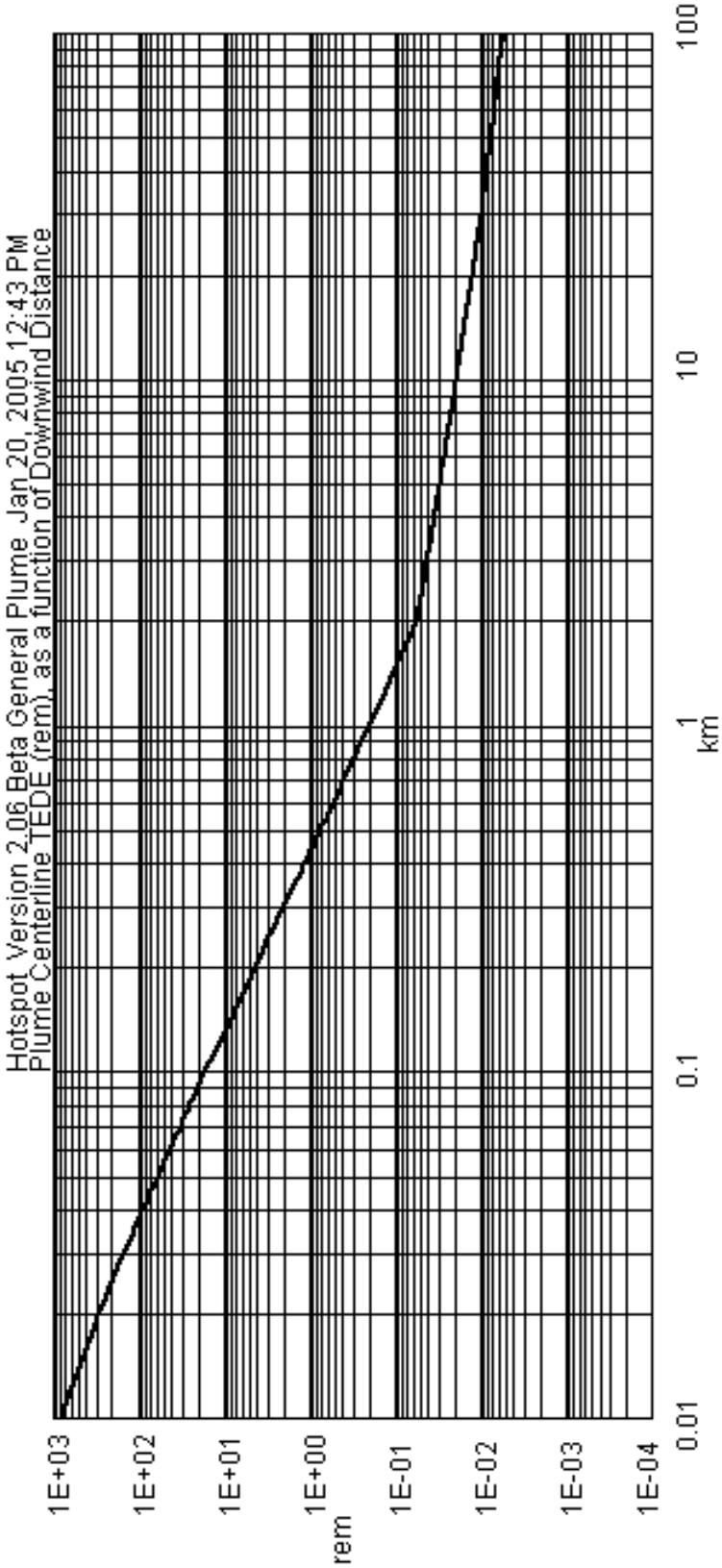
30.000	1.0E-02	7.7E-08	7.7E-04	8.6E-12	03:20	3.7686600E+01	-1.2136930E+02
35.000	9.3E-03	7.1E-08	7.1E-04	7.9E-12	03:53	3.7686600E+01	-1.2131254E+02
40.000	8.6E-03	6.6E-08	6.6E-04	7.4E-12	04:26	3.7686600E+01	-1.2125578E+02
50.000	7.7E-03	5.9E-08	5.9E-04	6.6E-12	05:33	3.7686600E+01	-1.2114227E+02
65.000	6.7E-03	5.1E-08	5.1E-04	5.7E-12	07:13	3.7686600E+01	-1.2097201E+02
80.000	6.0E-03	4.6E-08	4.6E-04	5.1E-12	08:53	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.62
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Pu-238 W 87.74y
Source Term : 6.2000E-01 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 30.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m

Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)

Inversion Layer Height : 500 m

"RD-16 Ground Level Release 95th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 6.2000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   2.90E+03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : 0.10 km
Exceeds Middle Dose Out To : 1.52 km
Exceeds Outer  Dose Out To : 8.59 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
Maximum TEDE							
0.010	2.9E+03	2.2E-02	2.2E+02	2.5E-06	<00:01	3.7686600E+01	-1.2170974E+02
0.030	7.6E+02	5.8E-03	5.8E+01	6.5E-07	<00:01	3.7686600E+01	-1.2170949E+02
0.150	5.1E+01	3.9E-04	3.9E+00	4.4E-08	00:01	3.7686600E+01	-1.2170813E+02
0.250	2.1E+01	1.6E-04	1.6E+00	1.8E-08	00:02	3.7686600E+01	-1.2170699E+02
0.500	6.1E+00	4.7E-05	4.7E-01	5.2E-09	00:04	3.7686600E+01	-1.2170415E+02
1.000	1.9E+00	1.5E-05	1.5E-01	1.7E-09	00:09	3.7686600E+01	-1.2169848E+02
3.000	3.8E-01	2.9E-06	2.9E-02	3.3E-10	00:29	3.7686600E+01	-1.2167578E+02
5.000	2.0E-01	1.5E-06	1.5E-02	1.7E-10	00:49	3.7686600E+01	-1.2165307E+02
8.000	1.1E-01	8.4E-07	8.4E-03	9.4E-11	01:18	3.7686600E+01	-1.2161902E+02
9.400	9.0E-02	6.9E-07	6.9E-03	7.7E-11	01:32	3.7686600E+01	-1.2160313E+02
10.000	8.4E-02	6.4E-07	6.4E-03	7.2E-11	01:38	3.7686600E+01	-1.2159632E+02
12.000	6.7E-02	5.1E-07	5.1E-03	5.7E-11	01:57	3.7686600E+01	-1.2157362E+02
15.000	5.3E-02	4.1E-07	4.1E-03	4.5E-11	02:27	3.7686600E+01	-1.2153956E+02
20.000	4.4E-02	3.4E-07	3.4E-03	3.8E-11	03:16	3.7686600E+01	-1.2148281E+02
25.000	3.9E-02	3.0E-07	3.0E-03	3.4E-11	04:05	3.7686600E+01	-1.2142605E+02

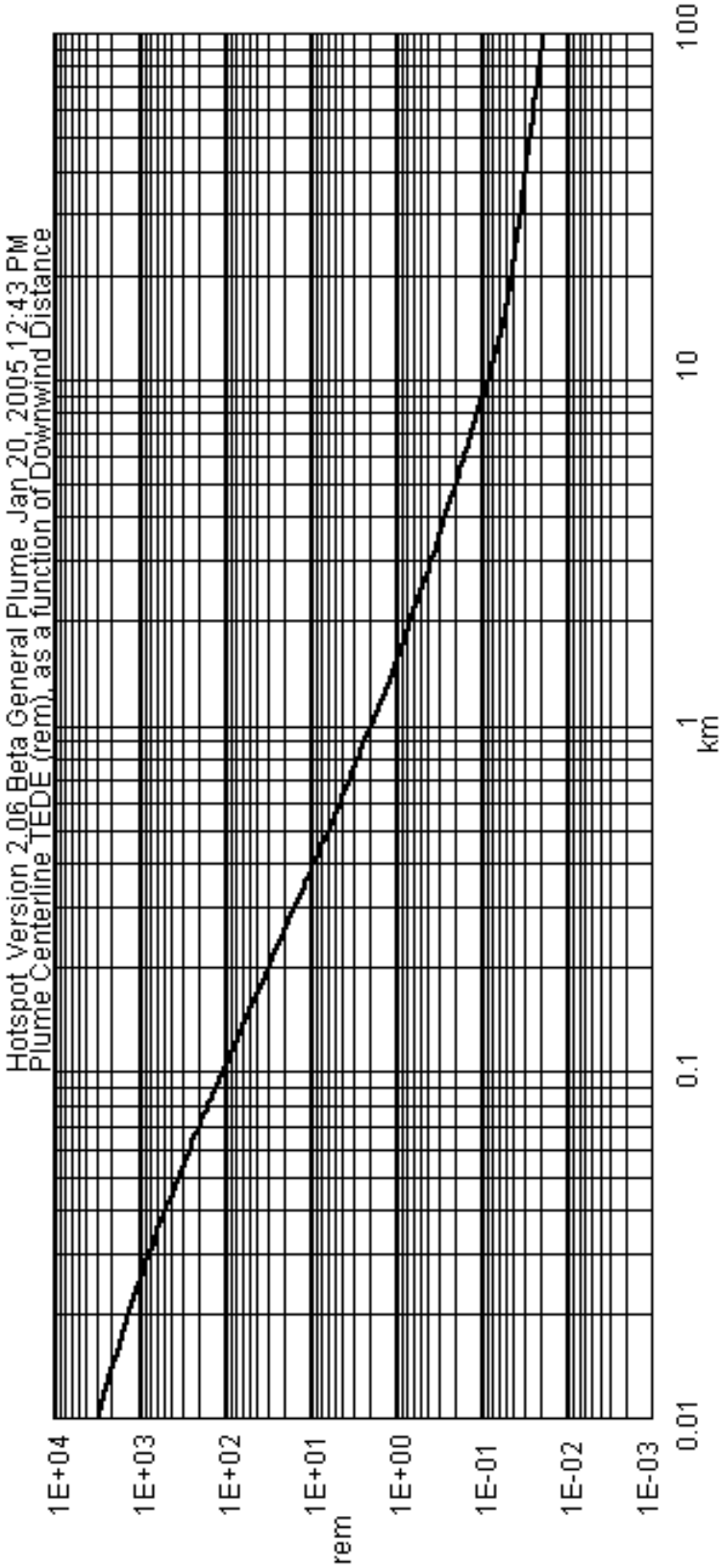
30.000	3.5E-02	2.7E-07	2.7E-03	3.0E-11	04:54	3.7686600E+01	-1.2136930E+02
35.000	3.2E-02	2.5E-07	2.5E-03	2.8E-11	05:43	3.7686600E+01	-1.2131254E+02
40.000	3.0E-02	2.3E-07	2.3E-03	2.6E-11	06:32	3.7686600E+01	-1.2125578E+02
50.000	2.7E-02	2.0E-07	2.0E-03	2.3E-11	08:10	3.7686600E+01	-1.2114227E+02
65.000	2.3E-02	1.8E-07	1.8E-03	2.0E-11	10:37	3.7686600E+01	-1.2097201E+02
80.000	2.1E-02	1.6E-07	1.6E-03	1.8E-11	13:04	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 2
Geometry = Complex
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 30
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 0.62
ReleaseDuration = N/A
ReleaseHeight = 0
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 1.50E+00
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = SurfaceAreaSource
```

```
HorizontalDiameter = 3.00E+00
VerticalDiameter = 3.00E+00
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Pu-238 W 87.74y
Source Term : 6.2000E-01 Ci
Eff. Release Height : 0.00 m
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 30.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m

Resp. Rel. Frac. : 1.000
(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)

Inversion Layer Height : 300 m

"RD-17-1 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 5.2000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 1.6 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.19 km
Exceeds Outer  Dose Out To : 0.74 km
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.4E-04	4.3E-03	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.108	1.6E+00	5.0E+01	<00:01	3.5007220E+01	-1.0643572E+02
0.150	1.3E+00	4.2E+01	<00:01	3.5007220E+01	-1.0643525E+02
0.250	6.8E-01	2.1E+01	00:01	3.5007220E+01	-1.0643416E+02
0.500	2.1E-01	6.4E+00	00:02	3.5007220E+01	-1.0643142E+02
1.000	5.7E-02	1.8E+00	00:05	3.5007220E+01	-1.0642593E+02
3.000	1.2E-02	3.8E-01	00:16	3.5007220E+01	-1.0640400E+02
5.000	8.5E-03	2.7E-01	00:26	3.5007220E+01	-1.0638206E+02
8.000	6.3E-03	2.0E-01	00:42	3.5007220E+01	-1.0634916E+02
9.400	5.7E-03	1.8E-01	00:50	3.5007220E+01	-1.0633381E+02
10.000	5.5E-03	1.7E-01	00:53	3.5007220E+01	-1.0632723E+02
12.000	5.0E-03	1.5E-01	01:04	3.5007220E+01	-1.0630529E+02
15.000	4.4E-03	1.4E-01	01:20	3.5007220E+01	-1.0627239E+02
20.000	3.7E-03	1.2E-01	01:46	3.5007220E+01	-1.0621756E+02
25.000	3.3E-03	1.0E-01	02:13	3.5007220E+01	-1.0616272E+02

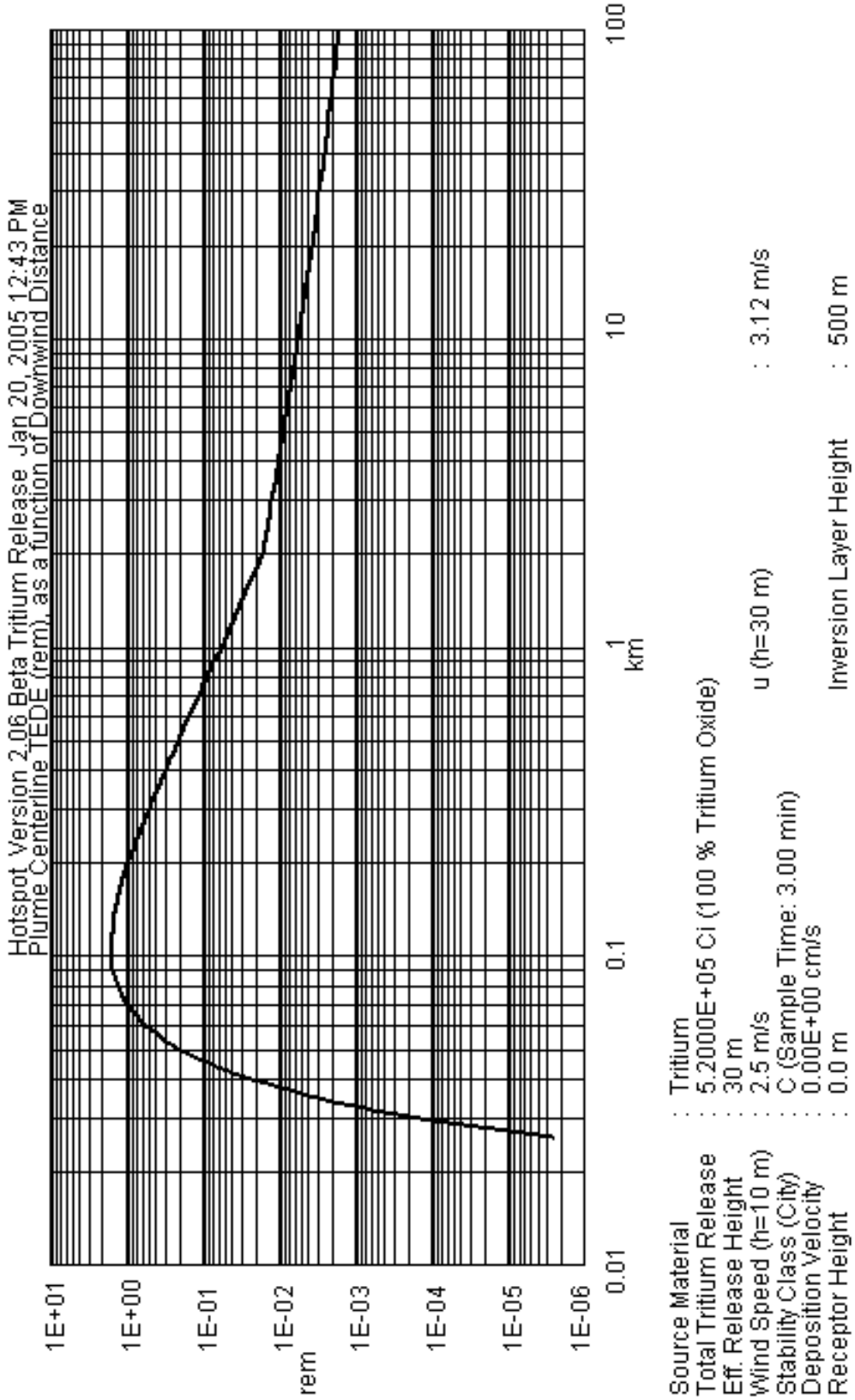
30.000	3.0E-03	9.3E-02	02:40	3.5007220E+01	-1.0610789E+02
35.000	2.7E-03	8.5E-02	03:06	3.5007220E+01	-1.0605305E+02
40.000	2.5E-03	7.9E-02	03:33	3.5007220E+01	-1.0599822E+02
50.000	2.3E-03	7.1E-02	04:26	3.5007220E+01	-1.0588855E+02
65.000	2.0E-03	6.2E-02	05:46	3.5007220E+01	-1.0572404E+02
80.000	1.8E-03	5.5E-02	07:06	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 5.2e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta Tritium Release Jan 20, 2005 12:43 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Tritium
Total Tritium Release : 5.2000E+05 Ci (100 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
u (h=30 m) : 3.12 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m
Inversion Layer Height : 500 m

"RD-17-1 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 5.2000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.9 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.17 km
Exceeds Outer  Dose Out To : 0.57 km
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	7.1E-03	2.2E-01	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.088	1.9E+00	5.8E+01	<00:01	3.5007220E+01	-1.0643594E+02
0.150	1.2E+00	3.7E+01	00:01	3.5007220E+01	-1.0643525E+02
0.250	5.2E-01	1.6E+01	00:01	3.5007220E+01	-1.0643416E+02
0.500	1.3E-01	4.2E+00	00:03	3.5007220E+01	-1.0643142E+02
1.000	3.2E-02	1.0E+00	00:07	3.5007220E+01	-1.0642593E+02
3.000	3.2E-03	9.9E-02	00:21	3.5007220E+01	-1.0640400E+02
5.000	1.1E-03	3.4E-02	00:36	3.5007220E+01	-1.0638206E+02
8.000	4.1E-04	1.3E-02	00:58	3.5007220E+01	-1.0634916E+02
9.400	2.9E-04	9.2E-03	01:08	3.5007220E+01	-1.0633381E+02
10.000	2.6E-04	8.1E-03	01:12	3.5007220E+01	-1.0632723E+02
12.000	1.8E-04	5.6E-03	01:27	3.5007220E+01	-1.0630529E+02
15.000	1.1E-04	3.5E-03	01:49	3.5007220E+01	-1.0627239E+02
20.000	6.3E-05	2.0E-03	02:25	3.5007220E+01	-1.0621756E+02
25.000	4.0E-05	1.2E-03	03:02	3.5007220E+01	-1.0616272E+02

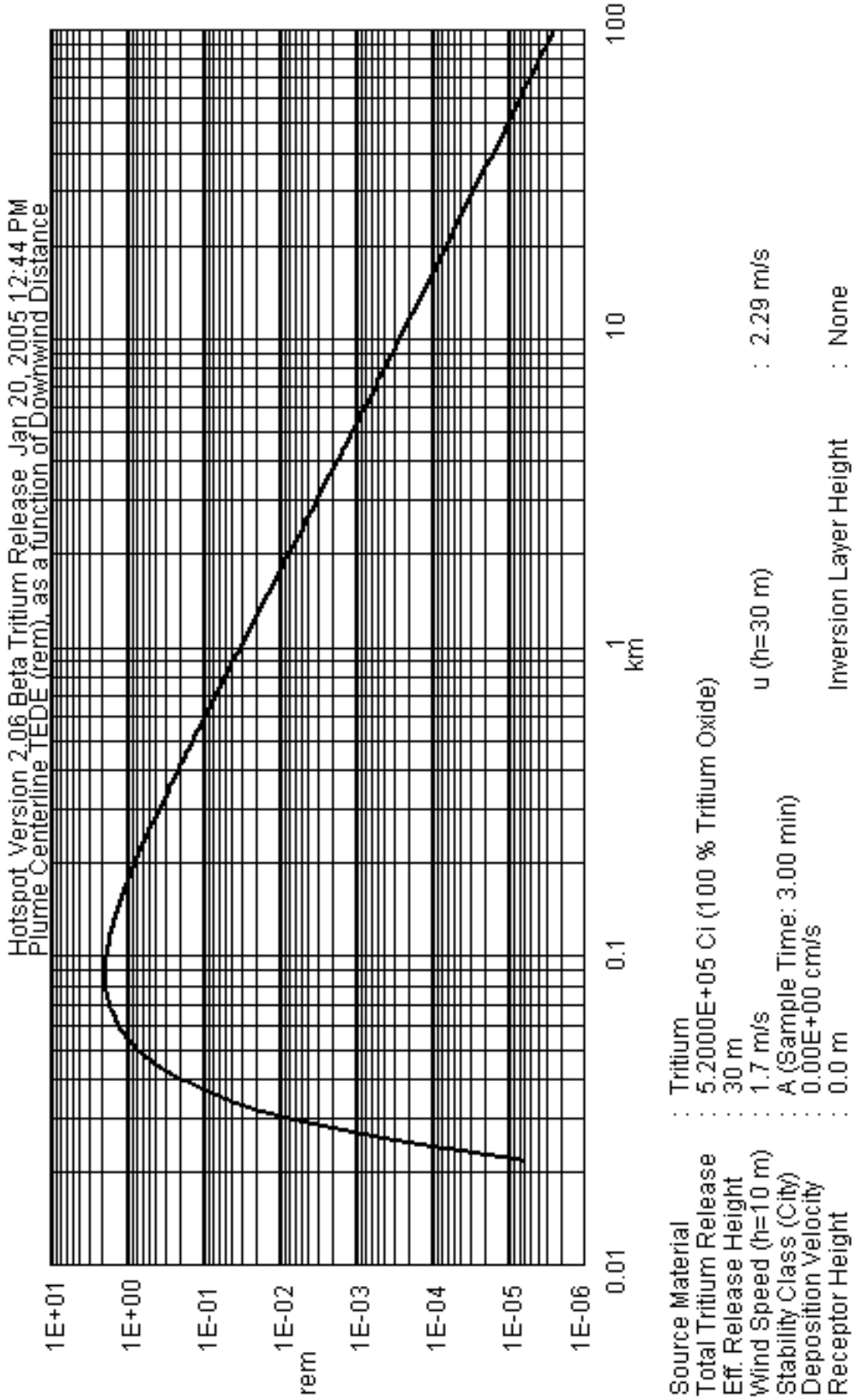
30.000	2.8E-05	8.6E-04	03:38	3.5007220E+01	-1.0610789E+02
35.000	2.0E-05	6.3E-04	04:15	3.5007220E+01	-1.0605305E+02
40.000	1.5E-05	4.8E-04	04:51	3.5007220E+01	-1.0599822E+02
50.000	9.9E-06	3.1E-04	06:04	3.5007220E+01	-1.0588855E+02
65.000	5.8E-06	1.8E-04	07:54	3.5007220E+01	-1.0572404E+02
80.000	3.8E-06	1.2E-04	09:43	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 5.2e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta Tritium Release Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Tritium
Total Tritium Release : 5.2000E+05 Ci (100 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
u (h=30 m) : 2.29 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m
Inversion Layer Height : None

"RD-17-1 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 5.2000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.2 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.12 km
Exceeds Outer  Dose Out To : 0.47 km
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.6E-03	1.4E-01	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.088	1.2E+00	3.8E+01	<00:01	3.5007220E+01	-1.0643594E+02
0.150	7.9E-01	2.5E+01	<00:01	3.5007220E+01	-1.0643525E+02
0.250	3.4E-01	1.1E+01	00:01	3.5007220E+01	-1.0643416E+02
0.500	8.8E-02	2.7E+00	00:02	3.5007220E+01	-1.0643142E+02
1.000	2.1E-02	6.5E-01	00:04	3.5007220E+01	-1.0642593E+02
3.000	7.5E-03	2.3E-01	00:14	3.5007220E+01	-1.0640400E+02
5.000	5.3E-03	1.6E-01	00:23	3.5007220E+01	-1.0638206E+02
8.000	3.9E-03	1.2E-01	00:38	3.5007220E+01	-1.0634916E+02
9.400	3.5E-03	1.1E-01	00:44	3.5007220E+01	-1.0633381E+02
10.000	3.4E-03	1.1E-01	00:47	3.5007220E+01	-1.0632723E+02
12.000	3.0E-03	9.5E-02	00:57	3.5007220E+01	-1.0630529E+02
15.000	2.7E-03	8.3E-02	01:11	3.5007220E+01	-1.0627239E+02
20.000	2.3E-03	7.1E-02	01:35	3.5007220E+01	-1.0621756E+02
25.000	2.0E-03	6.3E-02	01:59	3.5007220E+01	-1.0616272E+02

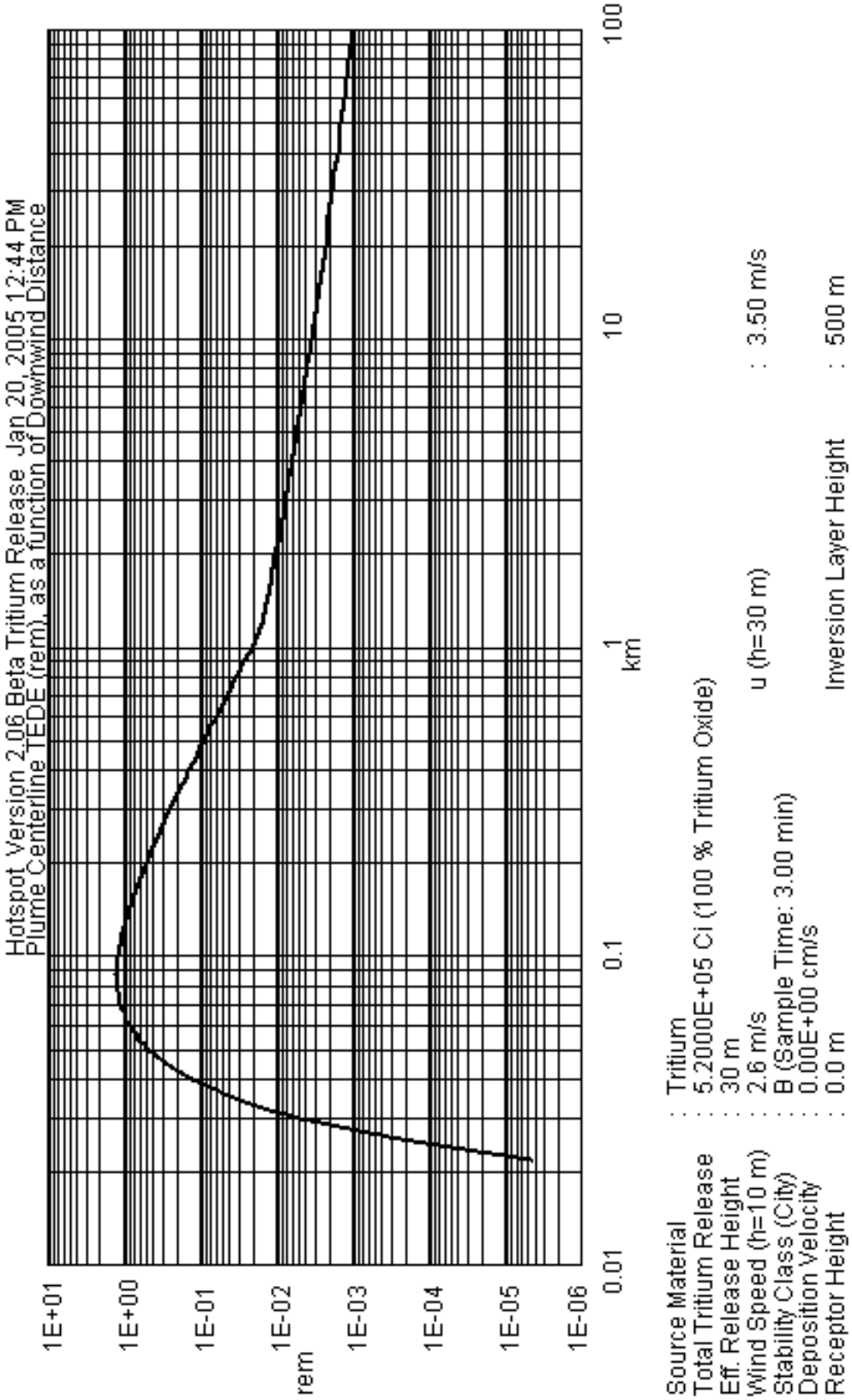
30.000	1.8E-03	5.7E-02	02:23	3.5007220E+01	-1.0610789E+02
35.000	1.7E-03	5.2E-02	02:46	3.5007220E+01	-1.0605305E+02
40.000	1.6E-03	4.9E-02	03:10	3.5007220E+01	-1.0599822E+02
50.000	1.4E-03	4.3E-02	03:58	3.5007220E+01	-1.0588855E+02
65.000	1.2E-03	3.8E-02	05:09	3.5007220E+01	-1.0572404E+02
80.000	1.1E-03	3.4E-02	06:21	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 5.2e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta Tritium Release Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E+01
1E+00
1E-01
1E-02
rem
1E-03
1E-04
1E-05
1E-06
0.01
0.1
1
km
10
100
Source Material : Tritium
Total Tritium Release : 5.2000E+05 Ci (100 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
u (h=30 m) : 3.50 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m
Inversion Layer Height : 500 m

"RD-17-1 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 5.2000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 1.3 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.50 km
Exceeds Outer  Dose Out To : 3.15 km
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	<00:01	3.5007220E+01	-1.0643663E+02
0.150	2.8E-01	8.8E+00	<00:01	3.5007220E+01	-1.0643525E+02
0.250	1.2E+00	3.6E+01	00:01	3.5007220E+01	-1.0643416E+02
Maximum TEDE					
0.319	1.3E+00	4.0E+01	00:02	3.5007220E+01	-1.0643340E+02
0.500	1.0E+00	3.1E+01	00:03	3.5007220E+01	-1.0643142E+02
1.000	4.5E-01	1.4E+01	00:06	3.5007220E+01	-1.0642593E+02
3.000	1.1E-01	3.3E+00	00:18	3.5007220E+01	-1.0640400E+02
5.000	5.7E-02	1.8E+00	00:31	3.5007220E+01	-1.0638206E+02
8.000	3.3E-02	1.0E+00	00:50	3.5007220E+01	-1.0634916E+02
9.400	2.7E-02	8.5E-01	00:59	3.5007220E+01	-1.0633381E+02
10.000	2.6E-02	8.0E-01	01:02	3.5007220E+01	-1.0632723E+02
12.000	2.1E-02	6.5E-01	01:15	3.5007220E+01	-1.0630529E+02
15.000	1.7E-02	5.2E-01	01:34	3.5007220E+01	-1.0627239E+02
20.000	1.4E-02	4.4E-01	02:05	3.5007220E+01	-1.0621756E+02
25.000	1.3E-02	4.0E-01	02:36	3.5007220E+01	-1.0616272E+02

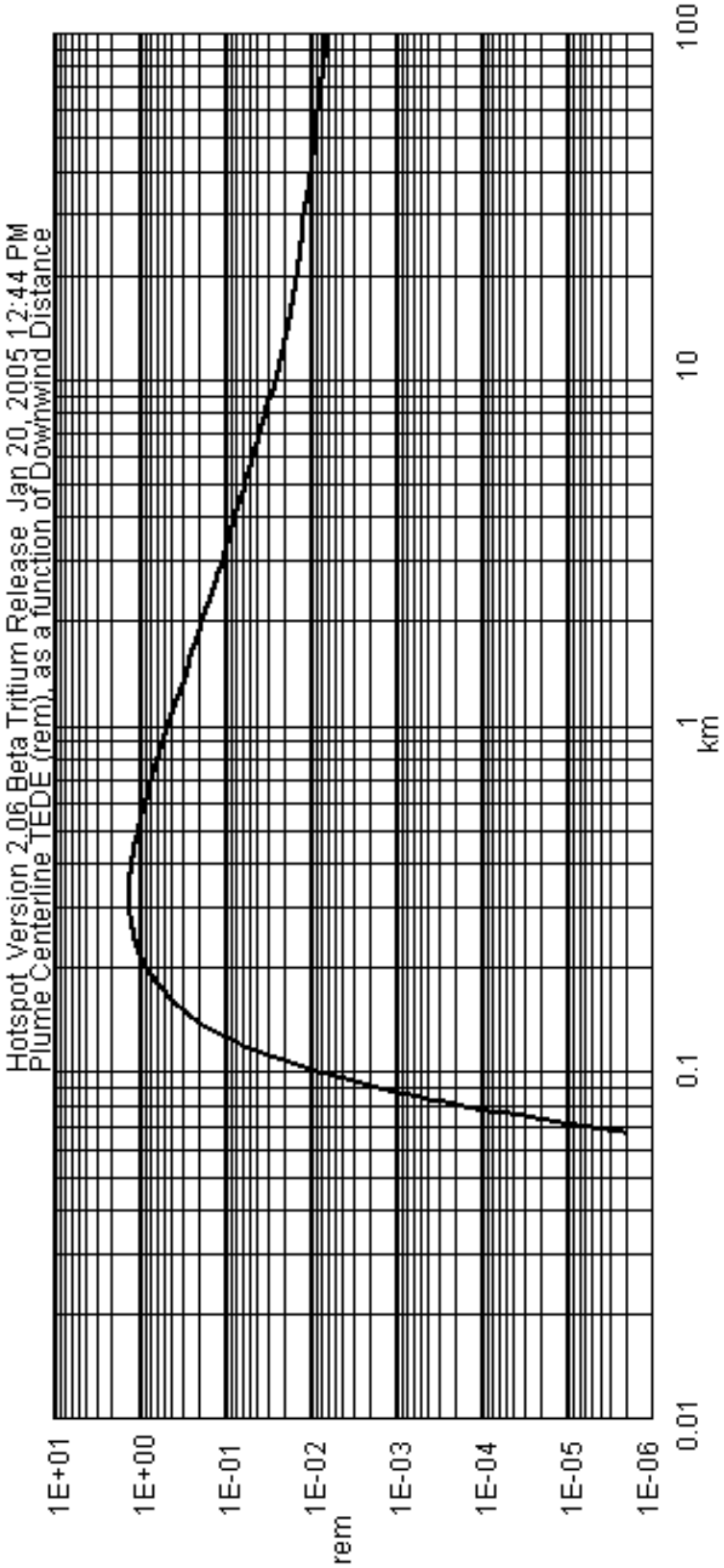
30.000	1.2E-02	3.6E-01	03:08	3.5007220E+01	-1.0610789E+02
35.000	1.1E-02	3.3E-01	03:39	3.5007220E+01	-1.0605305E+02
40.000	1.0E-02	3.1E-01	04:11	3.5007220E+01	-1.0599822E+02
50.000	8.9E-03	2.8E-01	05:13	3.5007220E+01	-1.0588855E+02
65.000	7.7E-03	2.4E-01	06:48	3.5007220E+01	-1.0572404E+02
80.000	6.9E-03	2.2E-01	08:22	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 5.2e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Tritium
Total Tritium Release : 5.2000E+05 Ci (100 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s u (h=30 m) : 2.65 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 300 m

"RD-17-2 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 1.7000E+05 Ci  1.0 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 5.21E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	4.5E-07	1.4E-03	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.108	5.2E-03	1.6E+01	<00:01	3.5007220E+01	-1.0643572E+02
0.150	4.4E-03	1.4E+01	<00:01	3.5007220E+01	-1.0643525E+02
0.250	2.2E-03	7.0E+00	00:01	3.5007220E+01	-1.0643416E+02
0.500	6.7E-04	2.1E+00	00:02	3.5007220E+01	-1.0643142E+02
1.000	1.9E-04	5.9E-01	00:05	3.5007220E+01	-1.0642593E+02
3.000	4.0E-05	1.2E-01	00:16	3.5007220E+01	-1.0640400E+02
5.000	2.8E-05	8.7E-02	00:26	3.5007220E+01	-1.0638206E+02
8.000	2.1E-05	6.4E-02	00:42	3.5007220E+01	-1.0634916E+02
9.400	1.9E-05	5.8E-02	00:50	3.5007220E+01	-1.0633381E+02
10.000	1.8E-05	5.6E-02	00:53	3.5007220E+01	-1.0632723E+02
12.000	1.6E-05	5.1E-02	01:04	3.5007220E+01	-1.0630529E+02
15.000	1.4E-05	4.4E-02	01:20	3.5007220E+01	-1.0627239E+02
20.000	1.2E-05	3.8E-02	01:46	3.5007220E+01	-1.0621756E+02
25.000	1.1E-05	3.3E-02	02:13	3.5007220E+01	-1.0616272E+02

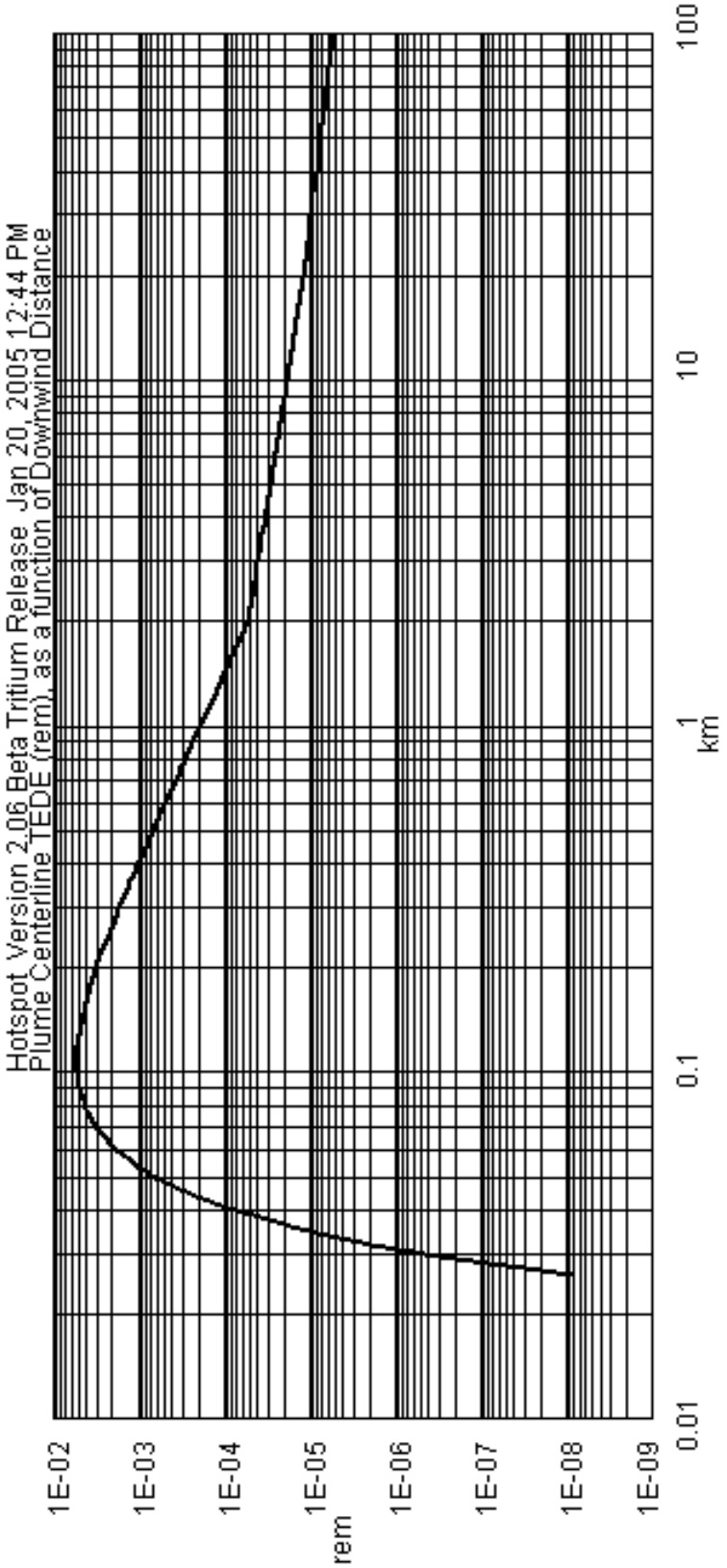
30.000	9.7E-06	3.0E-02	02:40	3.5007220E+01	-1.0610789E+02
35.000	9.0E-06	2.8E-02	03:06	3.5007220E+01	-1.0605305E+02
40.000	8.3E-06	2.6E-02	03:33	3.5007220E+01	-1.0599822E+02
50.000	7.4E-06	2.3E-02	04:26	3.5007220E+01	-1.0588855E+02
65.000	6.5E-06	2.0E-02	05:46	3.5007220E+01	-1.0572404E+02
80.000	5.8E-06	1.8E-02	07:06	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12.0
D12 = 15.0
D13 = 20.0
D14 = 25.0
D15 = 30.0
D16 = 35.0
D17 = 40.0
D18 = 50.0
D19 = 65.0
D20 = 80.0
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 1.7e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 1.0
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Tritium
Total Tritium Release : 1.7000E+05 Ci (1.0 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s u (h=30 m) : 3.12 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 500 m

"RD-17-2 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 1.7000E+05 Ci  1.0 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 6.10E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.3E-05	7.2E-02	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.088	6.1E-03	1.9E+01	<00:01	3.5007220E+01	-1.0643594E+02
0.150	3.9E-03	1.2E+01	00:01	3.5007220E+01	-1.0643525E+02
0.250	1.7E-03	5.3E+00	00:01	3.5007220E+01	-1.0643416E+02
0.500	4.4E-04	1.4E+00	00:03	3.5007220E+01	-1.0643142E+02
1.000	1.1E-04	3.3E-01	00:07	3.5007220E+01	-1.0642593E+02
3.000	1.0E-05	3.2E-02	00:21	3.5007220E+01	-1.0640400E+02
5.000	3.6E-06	1.1E-02	00:36	3.5007220E+01	-1.0638206E+02
8.000	1.3E-06	4.2E-03	00:58	3.5007220E+01	-1.0634916E+02
9.400	9.7E-07	3.0E-03	01:08	3.5007220E+01	-1.0633381E+02
10.000	8.5E-07	2.6E-03	01:12	3.5007220E+01	-1.0632723E+02
12.000	5.8E-07	1.8E-03	01:27	3.5007220E+01	-1.0630529E+02
15.000	3.7E-07	1.2E-03	01:49	3.5007220E+01	-1.0627239E+02
20.000	2.1E-07	6.4E-04	02:25	3.5007220E+01	-1.0621756E+02
25.000	1.3E-07	4.1E-04	03:02	3.5007220E+01	-1.0616272E+02

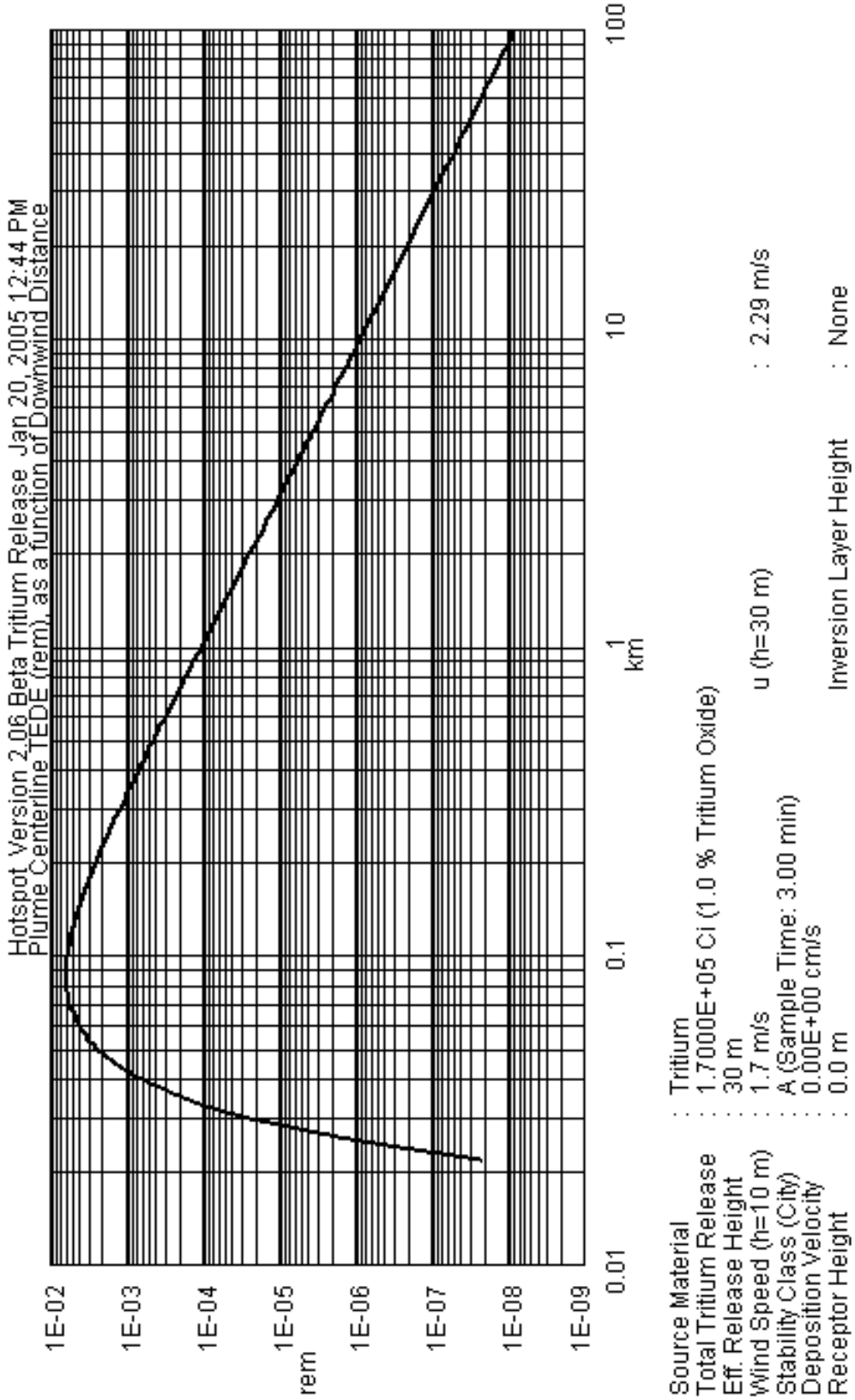
30.000	9.1E-08	2.8E-04	03:38	3.5007220E+01	-1.0610789E+02
35.000	6.6E-08	2.1E-04	04:15	3.5007220E+01	-1.0605305E+02
40.000	5.1E-08	1.6E-04	04:51	3.5007220E+01	-1.0599822E+02
50.000	3.2E-08	1.0E-04	06:04	3.5007220E+01	-1.0588855E+02
65.000	1.9E-08	5.9E-05	07:54	3.5007220E+01	-1.0572404E+02
80.000	1.3E-08	3.9E-05	09:43	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12.0
D12 = 15.0
D13 = 20.0
D14 = 25.0
D15 = 30.0
D16 = 35.0
D17 = 40.0
D18 = 50.0
D19 = 65.0
D20 = 80.0
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 1.7e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 1.0
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta Tritium Release Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-02
1E-03
1E-04
1E-05
rem
1E-06
1E-07
1E-08
1E-09
0.01
0.1
1
km
10
100
Source Material : Tritium
Total Tritium Release : 1.7000E+05 Ci (1.0 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
u (h=30 m) : 2.29 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m
Inversion Layer Height : None

"RD-17-2 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 1.7000E+05 Ci  1.0 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 3.99E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.5E-05	4.7E-02	<00:01	3.5007220E+01	-1.0643663E+02
Maximum TEDE					
0.088	4.0E-03	1.2E+01	<00:01	3.5007220E+01	-1.0643594E+02
0.150	2.6E-03	8.0E+00	<00:01	3.5007220E+01	-1.0643525E+02
0.250	1.1E-03	3.5E+00	00:01	3.5007220E+01	-1.0643416E+02
0.500	2.9E-04	9.0E-01	00:02	3.5007220E+01	-1.0643142E+02
1.000	6.9E-05	2.1E-01	00:04	3.5007220E+01	-1.0642593E+02
3.000	2.5E-05	7.6E-02	00:14	3.5007220E+01	-1.0640400E+02
5.000	1.7E-05	5.4E-02	00:23	3.5007220E+01	-1.0638206E+02
8.000	1.3E-05	4.0E-02	00:38	3.5007220E+01	-1.0634916E+02
9.400	1.2E-05	3.6E-02	00:44	3.5007220E+01	-1.0633381E+02
10.000	1.1E-05	3.5E-02	00:47	3.5007220E+01	-1.0632723E+02
12.000	1.0E-05	3.1E-02	00:57	3.5007220E+01	-1.0630529E+02
15.000	8.8E-06	2.7E-02	01:11	3.5007220E+01	-1.0627239E+02
20.000	7.5E-06	2.3E-02	01:35	3.5007220E+01	-1.0621756E+02
25.000	6.6E-06	2.1E-02	01:59	3.5007220E+01	-1.0616272E+02

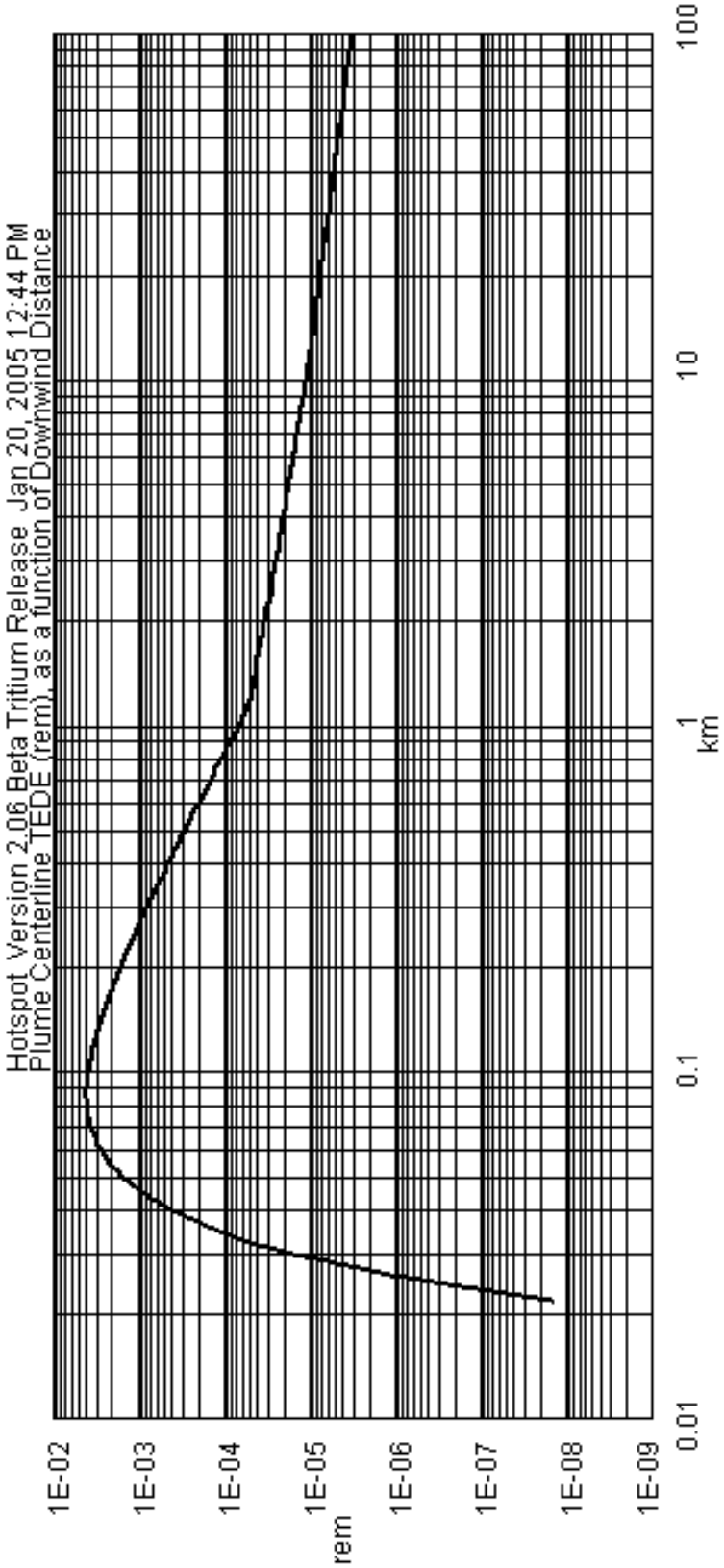
30.000	6.0E-06	1.9E-02	02:23	3.5007220E+01	-1.0610789E+02
35.000	5.5E-06	1.7E-02	02:46	3.5007220E+01	-1.0605305E+02
40.000	5.1E-06	1.6E-02	03:10	3.5007220E+01	-1.0599822E+02
50.000	4.6E-06	1.4E-02	03:58	3.5007220E+01	-1.0588855E+02
65.000	4.0E-06	1.2E-02	05:09	3.5007220E+01	-1.0572404E+02
80.000	3.6E-06	1.1E-02	06:21	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12.0
D12 = 15.0
D13 = 20.0
D14 = 25.0
D15 = 30.0
D16 = 35.0
D17 = 40.0
D18 = 50.0
D19 = 65.0
D20 = 80.0
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 1.7e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 1.0
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Tritium
Total Tritium Release : 1.7000E+05 Ci (1.0 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s u (h=30 m) : 3.50 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 500 m

"RD-17-2 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Tritium
Total Tritium Release      : 1.7000E+05 Ci  1.0 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 4.19E-03 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	<00:01	3.5007220E+01	-1.0643663E+02
0.150	9.2E-04	2.9E+00	<00:01	3.5007220E+01	-1.0643525E+02
0.250	3.8E-03	1.2E+01	00:01	3.5007220E+01	-1.0643416E+02
Maximum TEDE					
0.319	4.2E-03	1.3E+01	00:02	3.5007220E+01	-1.0643340E+02
0.500	3.3E-03	1.0E+01	00:03	3.5007220E+01	-1.0643142E+02
1.000	1.5E-03	4.6E+00	00:06	3.5007220E+01	-1.0642593E+02
3.000	3.5E-04	1.1E+00	00:18	3.5007220E+01	-1.0640400E+02
5.000	1.9E-04	5.8E-01	00:31	3.5007220E+01	-1.0638206E+02
8.000	1.1E-04	3.4E-01	00:50	3.5007220E+01	-1.0634916E+02
9.400	9.0E-05	2.8E-01	00:59	3.5007220E+01	-1.0633381E+02
10.000	8.4E-05	2.6E-01	01:02	3.5007220E+01	-1.0632723E+02
12.000	6.8E-05	2.1E-01	01:15	3.5007220E+01	-1.0630529E+02
15.000	5.5E-05	1.7E-01	01:34	3.5007220E+01	-1.0627239E+02
20.000	4.6E-05	1.4E-01	02:05	3.5007220E+01	-1.0621756E+02
25.000	4.2E-05	1.3E-01	02:36	3.5007220E+01	-1.0616272E+02

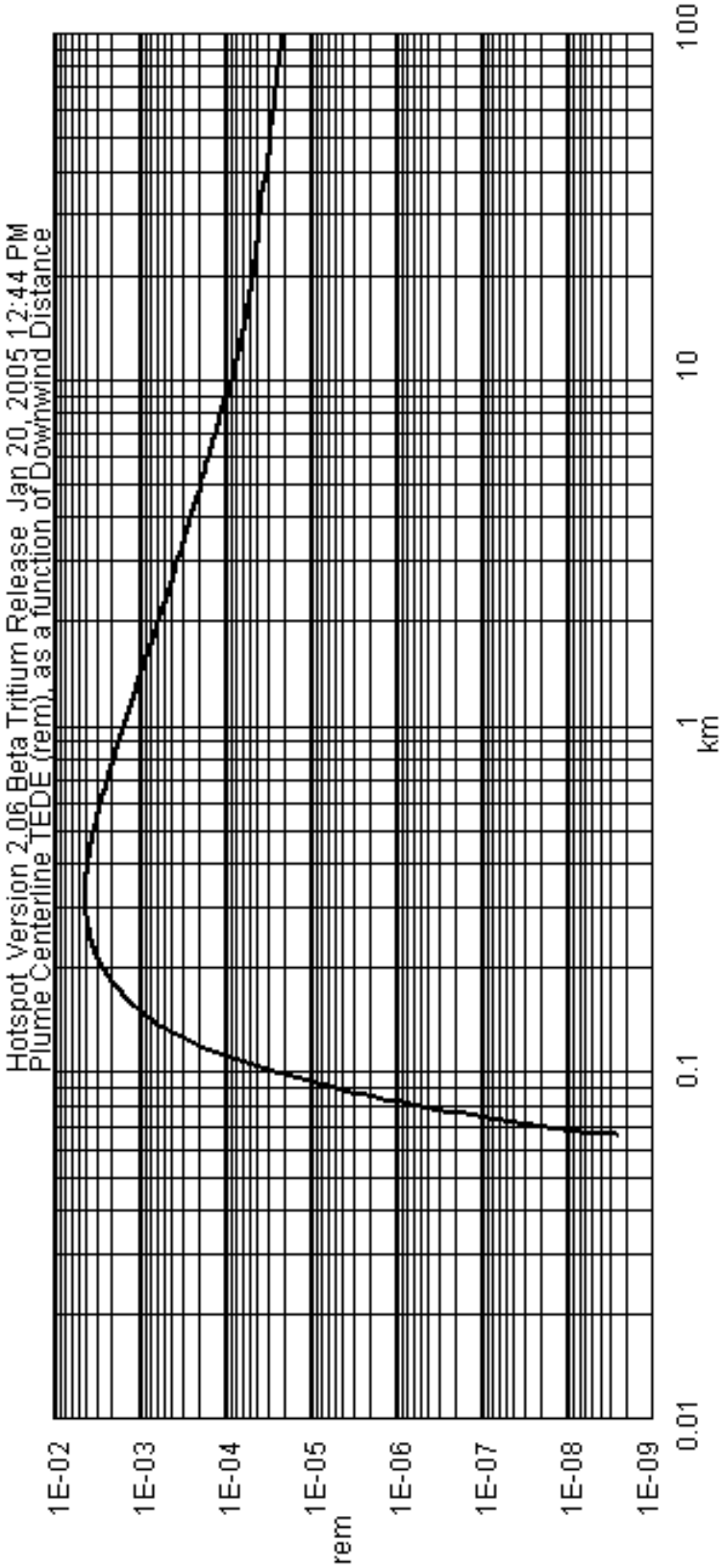
30.000	3.8E-05	1.2E-01	03:08	3.5007220E+01	-1.0610789E+02
35.000	3.5E-05	1.1E-01	03:39	3.5007220E+01	-1.0605305E+02
40.000	3.3E-05	1.0E-01	04:11	3.5007220E+01	-1.0599822E+02
50.000	2.9E-05	9.1E-02	05:13	3.5007220E+01	-1.0588855E+02
65.000	2.5E-05	7.9E-02	06:48	3.5007220E+01	-1.0572404E+02
80.000	2.3E-05	7.1E-02	08:22	3.5007220E+01	-1.0555953E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 100
MiddleDep = 10
OuterDep = 1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.150
D3 = 0.250
D4 = 0.50
D5 = 1.0
D6 = 3.0
D7 = 5.0
D8 = 8.0
D9 = 9.4
D10 = 10.0
D11 = 12.0
D12 = 15.0
D13 = 20.0
D14 = 25.0
D15 = 30.0
D16 = 35.0
D17 = 40.0
D18 = 50.0
D19 = 65.0
D20 = 80.0
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 35.00722N106.43690W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3.0
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
```

```
D1CheckBox = 1
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = Tritium Release
SourceTermName = Tritium
SourceTerm = 1.7e5
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 1.0
AlphaSpecificActivity =
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
```

```
HorizontalDiameter = N/A
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = N/A
EffectiveWindSpeed = = N/A
InnerNuclearDoseContour = N/A
MiddleNuclearDoseContour = N/A
OuterNuclearDoseContour = N/A
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```



Source Material : Tritium
Total Tritium Release : 1.7000E+05 Ci (1.0 % Tritium Oxide)
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s u (h=30 m) : 2.65 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.00E+00 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 300 m

"RD-18 Elevated Release 50th Met".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E-08 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.5 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.12 m/s
Stability Class (City)     : C
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.11 km
MAXIMUM TEDE               : 2.99E-07 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	2.6E-11	2.0E-16	2.0E-13	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.108	3.0E-07	2.3E-12	2.3E-09	2.6E-17	<00:01	3.7686600E+01	-1.2170861E+02
0.150	2.5E-07	1.9E-12	1.9E-09	2.2E-17	<00:01	3.7686600E+01	-1.2170813E+02
0.250	1.3E-07	9.8E-13	9.8E-10	1.1E-17	00:01	3.7686600E+01	-1.2170699E+02
0.500	3.9E-08	2.9E-13	2.9E-10	3.3E-18	00:02	3.7686600E+01	-1.2170415E+02
1.000	1.1E-08	8.2E-14	8.2E-11	0.0E+00	00:05	3.7686600E+01	-1.2169848E+02
3.000	2.3E-09	1.7E-14	1.7E-11	0.0E+00	00:16	3.7686600E+01	-1.2167578E+02
5.000	1.6E-09	1.2E-14	1.2E-11	0.0E+00	00:26	3.7686600E+01	-1.2165307E+02
8.000	1.2E-09	9.0E-15	9.0E-12	0.0E+00	00:42	3.7686600E+01	-1.2161902E+02
9.400	1.1E-09	8.2E-15	8.2E-12	0.0E+00	00:50	3.7686600E+01	-1.2160313E+02
10.000	1.0E-09	7.9E-15	7.9E-12	0.0E+00	00:53	3.7686600E+01	-1.2159632E+02
12.000	9.2E-10	7.1E-15	7.1E-12	0.0E+00	01:04	3.7686600E+01	-1.2157362E+02
15.000	8.1E-10	6.2E-15	6.2E-12	0.0E+00	01:20	3.7686600E+01	-1.2153956E+02
20.000	6.9E-10	5.3E-15	5.3E-12	0.0E+00	01:46	3.7686600E+01	-1.2148281E+02
25.000	6.1E-10	4.7E-15	4.7E-12	0.0E+00	02:13	3.7686600E+01	-1.2142605E+02
30.000	5.5E-10	4.2E-15	4.2E-12	0.0E+00	02:40	3.7686600E+01	-1.2136930E+02

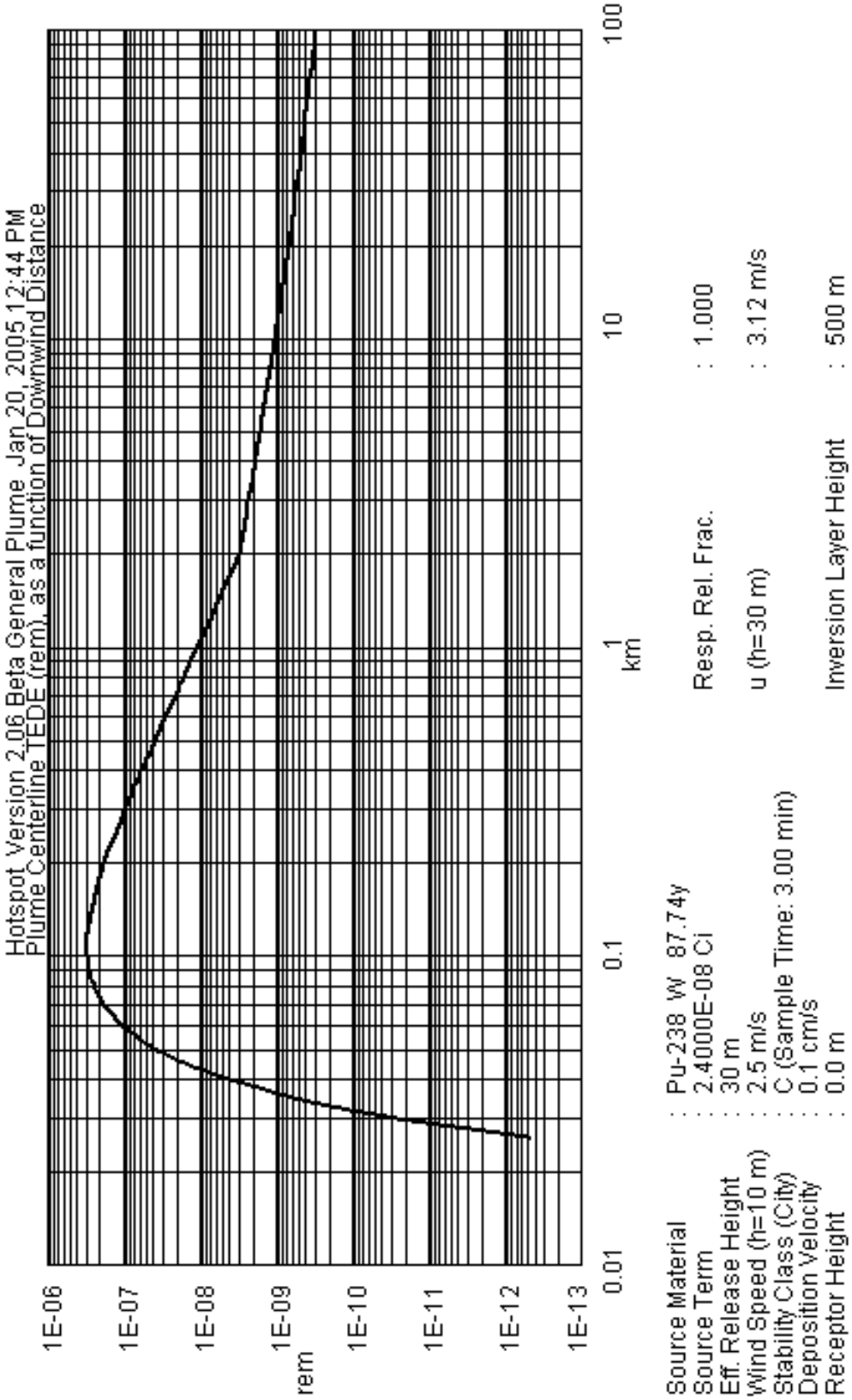
35.000	5.1E-10	3.9E-15	3.9E-12	0.0E+00	03:06	3.7686600E+01	-1.2131254E+02
40.000	4.7E-10	3.6E-15	3.6E-12	0.0E+00	03:33	3.7686600E+01	-1.2125578E+02
50.000	4.2E-10	3.2E-15	3.2E-12	0.0E+00	04:26	3.7686600E+01	-1.2114227E+02
65.000	3.7E-10	2.8E-15	2.8E-12	0.0E+00	05:46	3.7686600E+01	-1.2097201E+02
80.000	3.3E-10	2.5E-15	2.5E-12	0.0E+00	07:06	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4e-8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = C
SigmaTheta = N/A
WindSpeed = 2.5
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-06
1E-07
1E-08
1E-09
rem
1E-10
1E-11
1E-12
1E-13
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E-08 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.5 m/s
Stability Class (City) : C (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.12 m/s
Inversion Layer Height : 500 m

"RD-18 Elevated Release 95th Met Class A".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E-08 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 3.50E-07 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	1.3E-09	1.0E-14	1.0E-11	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	3.5E-07	2.7E-12	2.7E-09	3.0E-17	<00:01	3.7686600E+01	-1.2170884E+02
0.150	2.3E-07	1.7E-12	1.7E-09	1.9E-17	00:01	3.7686600E+01	-1.2170813E+02
0.250	9.8E-08	7.5E-13	7.5E-10	8.4E-18	00:01	3.7686600E+01	-1.2170699E+02
0.500	2.5E-08	1.9E-13	1.9E-10	2.2E-18	00:03	3.7686600E+01	-1.2170415E+02
1.000	6.0E-09	4.6E-14	4.6E-11	0.0E+00	00:07	3.7686600E+01	-1.2169848E+02
3.000	5.9E-10	4.5E-15	4.5E-12	0.0E+00	00:21	3.7686600E+01	-1.2167578E+02
5.000	2.0E-10	1.6E-15	1.6E-12	0.0E+00	00:36	3.7686600E+01	-1.2165307E+02
8.000	7.7E-11	5.9E-16	5.9E-13	0.0E+00	00:58	3.7686600E+01	-1.2161902E+02
9.400	5.5E-11	4.2E-16	4.2E-13	0.0E+00	01:08	3.7686600E+01	-1.2160313E+02
10.000	4.8E-11	3.7E-16	3.7E-13	0.0E+00	01:12	3.7686600E+01	-1.2159632E+02
12.000	3.3E-11	2.6E-16	2.6E-13	0.0E+00	01:27	3.7686600E+01	-1.2157362E+02
15.000	2.1E-11	1.6E-16	1.6E-13	0.0E+00	01:49	3.7686600E+01	-1.2153956E+02
20.000	1.2E-11	9.0E-17	9.0E-14	0.0E+00	02:25	3.7686600E+01	-1.2148281E+02
25.000	7.5E-12	5.7E-17	5.7E-14	0.0E+00	03:02	3.7686600E+01	-1.2142605E+02
30.000	5.2E-12	4.0E-17	4.0E-14	0.0E+00	03:38	3.7686600E+01	-1.2136930E+02

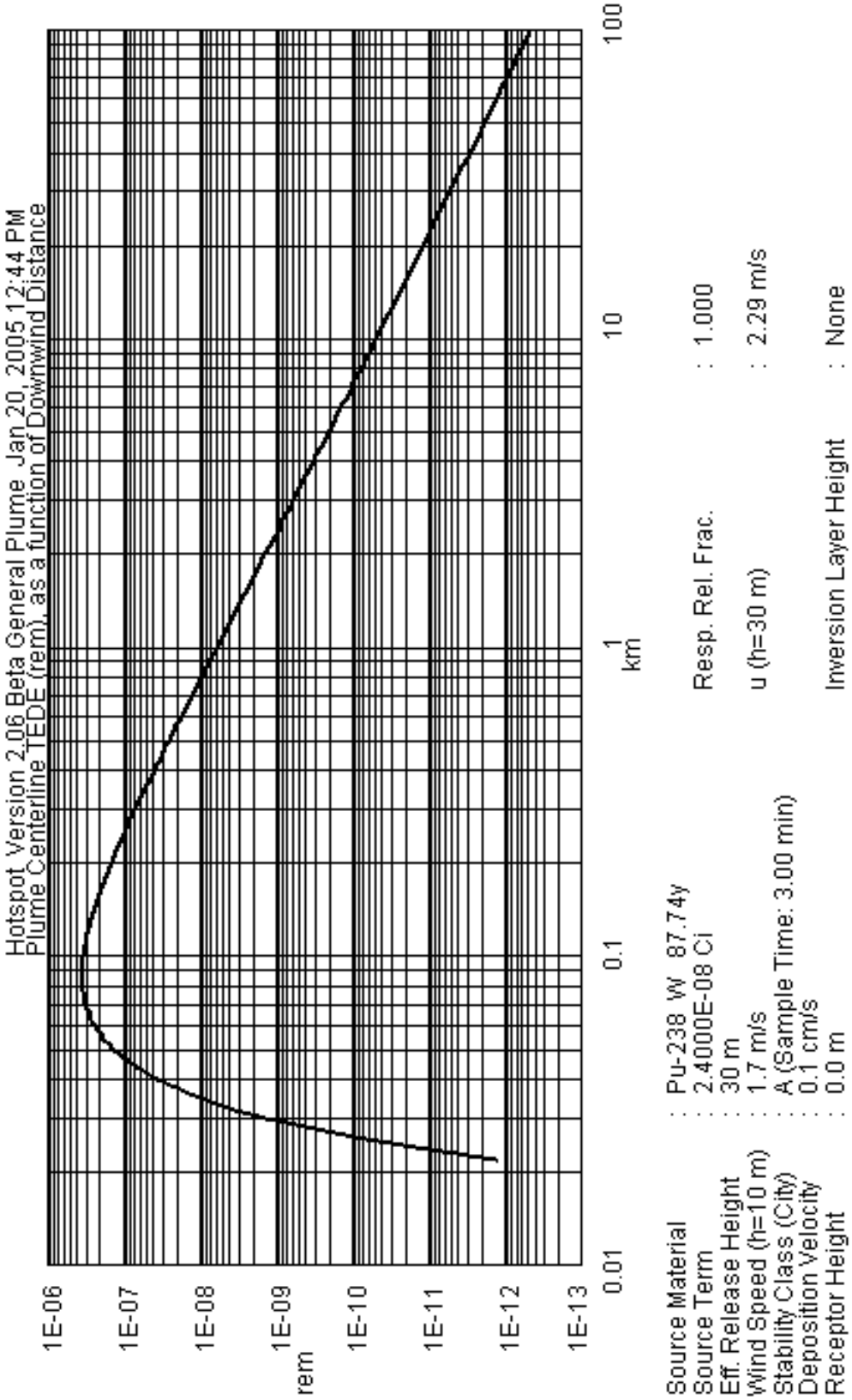
35.000	3.8E-12	2.9E-17	2.9E-14	0.0E+00	04:15	3.7686600E+01	-1.2131254E+02
40.000	2.9E-12	2.2E-17	2.2E-14	0.0E+00	04:51	3.7686600E+01	-1.2125578E+02
50.000	1.8E-12	1.4E-17	1.4E-14	0.0E+00	06:04	3.7686600E+01	-1.2114227E+02
65.000	1.1E-12	8.3E-18	8.3E-15	0.0E+00	07:54	3.7686600E+01	-1.2097201E+02
80.000	7.2E-13	5.5E-18	5.5E-15	0.0E+00	09:43	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5001
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4e-8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = A
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-06
1E-07
1E-08
1E-09
rem
1E-10
1E-11
1E-12
1E-13
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E-08 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : A (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.29 m/s
Inversion Layer Height : None

"RD-18 Elevated Release 95th Met Class B".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E-08 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 2.6 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 3.50 m/s
Stability Class (City)     : B
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 500 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 2.29E-07 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	8.7E-10	6.6E-15	6.6E-12	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
Maximum TEDE							
0.088	2.3E-07	1.8E-12	1.8E-09	2.0E-17	<00:01	3.7686600E+01	-1.2170884E+02
0.150	1.5E-07	1.1E-12	1.1E-09	1.3E-17	<00:01	3.7686600E+01	-1.2170813E+02
0.250	6.4E-08	4.9E-13	4.9E-10	5.5E-18	00:01	3.7686600E+01	-1.2170699E+02
0.500	1.7E-08	1.3E-13	1.3E-10	1.4E-18	00:02	3.7686600E+01	-1.2170415E+02
1.000	3.9E-09	3.0E-14	3.0E-11	0.0E+00	00:04	3.7686600E+01	-1.2169848E+02
3.000	1.4E-09	1.1E-14	1.1E-11	0.0E+00	00:14	3.7686600E+01	-1.2167578E+02
5.000	9.8E-10	7.5E-15	7.5E-12	0.0E+00	00:23	3.7686600E+01	-1.2165307E+02
8.000	7.3E-10	5.6E-15	5.6E-12	0.0E+00	00:38	3.7686600E+01	-1.2161902E+02
9.400	6.6E-10	5.0E-15	5.0E-12	0.0E+00	00:44	3.7686600E+01	-1.2160313E+02
10.000	6.4E-10	4.9E-15	4.9E-12	0.0E+00	00:47	3.7686600E+01	-1.2159632E+02
12.000	5.7E-10	4.4E-15	4.4E-12	0.0E+00	00:57	3.7686600E+01	-1.2157362E+02
15.000	5.0E-10	3.8E-15	3.8E-12	0.0E+00	01:11	3.7686600E+01	-1.2153956E+02
20.000	4.3E-10	3.3E-15	3.3E-12	0.0E+00	01:35	3.7686600E+01	-1.2148281E+02
25.000	3.8E-10	2.9E-15	2.9E-12	0.0E+00	01:59	3.7686600E+01	-1.2142605E+02
30.000	3.4E-10	2.6E-15	2.6E-12	0.0E+00	02:23	3.7686600E+01	-1.2136930E+02

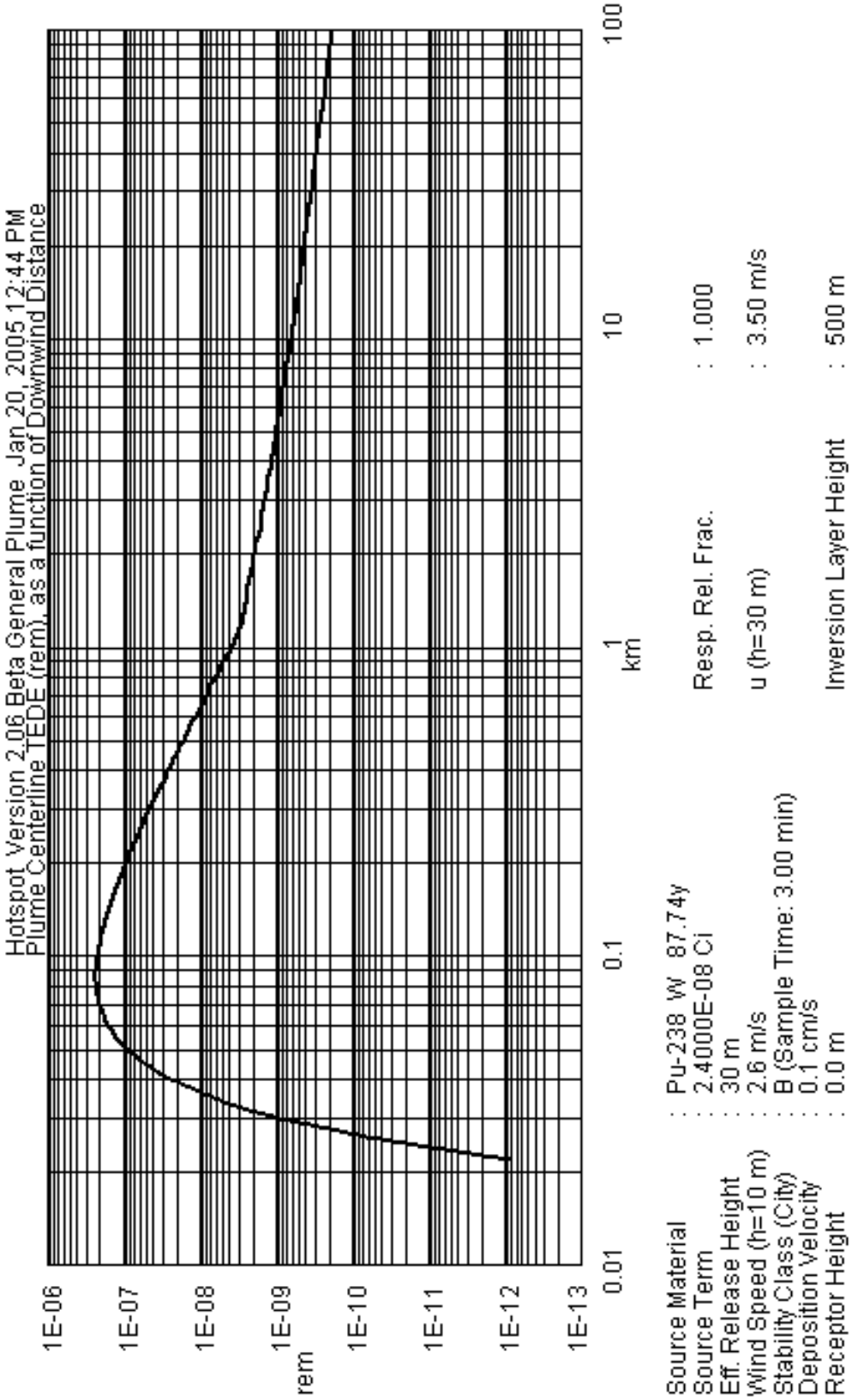
35.000	3.1E-10	2.4E-15	2.4E-12	0.0E+00	02:46	3.7686600E+01	-1.2131254E+02
40.000	2.9E-10	2.2E-15	2.2E-12	0.0E+00	03:10	3.7686600E+01	-1.2125578E+02
50.000	2.6E-10	2.0E-15	2.0E-12	0.0E+00	03:58	3.7686600E+01	-1.2114227E+02
65.000	2.3E-10	1.7E-15	1.7E-12	0.0E+00	05:09	3.7686600E+01	-1.2097201E+02
80.000	2.0E-10	1.6E-15	1.6E-12	0.0E+00	06:21	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 5.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4e-8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = B
SigmaTheta = N/A
WindSpeed = 2.6
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-06
1E-07
1E-08
1E-09
rem
1E-10
1E-11
1E-12
1E-13
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E-08 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 2.6 m/s
Stability Class (City) : B (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 3.50 m/s
Inversion Layer Height : 500 m

"RD-18 Elevated Release 95th Met Class E".out
Hotspot Version 2.06

```
Source Material            : Pu-238  W   87.74y
Source Term                : 2.4000E-08 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 2.39E-07 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : Not Exceeded
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)	Latitude	Longitude
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01	3.7686600E+01	-1.2170956E+02
0.150	5.3E-08	4.0E-13	4.0E-10	4.5E-18	<00:01	3.7686600E+01	-1.2170813E+02
0.250	2.2E-07	1.7E-12	1.7E-09	1.8E-17	00:01	3.7686600E+01	-1.2170699E+02
Maximum TEDE							
0.316	2.4E-07	1.8E-12	1.8E-09	2.0E-17	00:01	3.7686600E+01	-1.2170624E+02
0.500	1.9E-07	1.4E-12	1.4E-09	1.6E-17	00:03	3.7686600E+01	-1.2170415E+02
1.000	8.4E-08	6.4E-13	6.4E-10	7.2E-18	00:06	3.7686600E+01	-1.2169848E+02
3.000	2.0E-08	1.5E-13	1.5E-10	1.7E-18	00:18	3.7686600E+01	-1.2167578E+02
5.000	1.0E-08	8.0E-14	8.0E-11	0.0E+00	00:31	3.7686600E+01	-1.2165307E+02
8.000	6.0E-09	4.6E-14	4.6E-11	0.0E+00	00:50	3.7686600E+01	-1.2161902E+02
9.400	5.0E-09	3.8E-14	3.8E-11	0.0E+00	00:59	3.7686600E+01	-1.2160313E+02
10.000	4.6E-09	3.5E-14	3.5E-11	0.0E+00	01:02	3.7686600E+01	-1.2159632E+02
12.000	3.7E-09	2.9E-14	2.9E-11	0.0E+00	01:15	3.7686600E+01	-1.2157362E+02
15.000	3.0E-09	2.3E-14	2.3E-11	0.0E+00	01:34	3.7686600E+01	-1.2153956E+02
20.000	2.5E-09	1.9E-14	1.9E-11	0.0E+00	02:05	3.7686600E+01	-1.2148281E+02
25.000	2.3E-09	1.8E-14	1.8E-11	0.0E+00	02:36	3.7686600E+01	-1.2142605E+02
30.000	2.1E-09	1.6E-14	1.6E-11	0.0E+00	03:08	3.7686600E+01	-1.2136930E+02

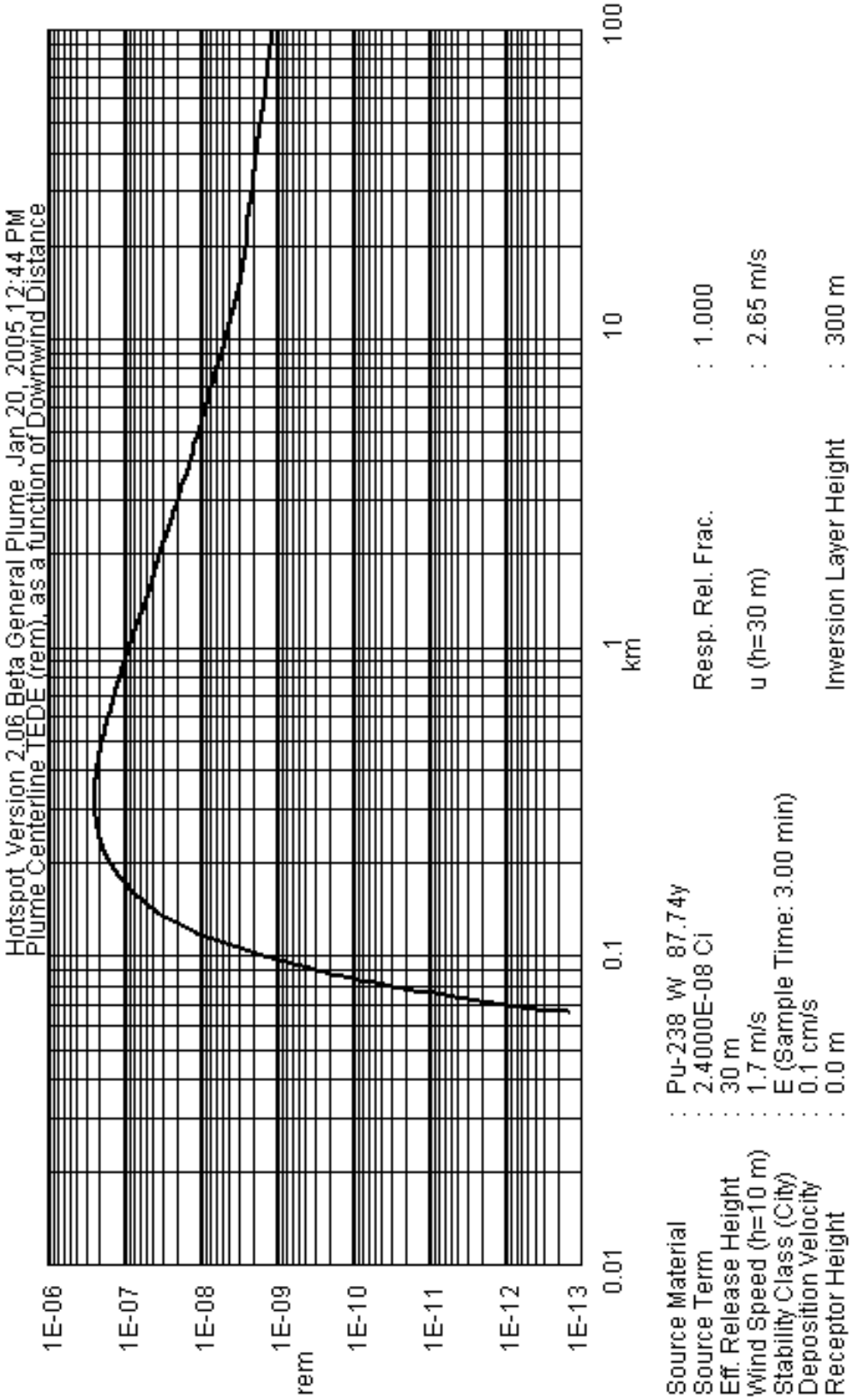
35.000	1.9E-09	1.5E-14	1.5E-11	0.0E+00	03:39	3.7686600E+01	-1.2131254E+02
40.000	1.8E-09	1.4E-14	1.4E-11	0.0E+00	04:11	3.7686600E+01	-1.2125578E+02
50.000	1.6E-09	1.2E-14	1.2E-11	0.0E+00	05:13	3.7686600E+01	-1.2114227E+02
65.000	1.4E-09	1.0E-14	1.0E-11	0.0E+00	06:48	3.7686600E+01	-1.2097201E+02
80.000	1.2E-09	9.4E-15	9.4E-12	0.0E+00	08:22	3.7686600E+01	-1.2080174E+02

The following variables were used in the above Hotspot calculations:

```
Terrain = City
DistanceUnits = Classic
Inner = 100.0
Middle = 1.0
Outer = 0.10
InnerDep = 1
MiddleDep = 0.5
OuterDep = 0.1
ReceptorHeight = 0
WindSpeedHeight = 10
Geometry = Simple
RainOutConstant = 0
D1 = 0.03
D2 = 0.15
D3 = 0.25
D4 = 0.5
D5 = 1
D6 = 3
D7 = 5
D8 = 8
D9 = 9.4
D10 = 10
D11 = 12
D12 = 15
D13 = 20
D14 = 25
D15 = 30
D16 = 35
D17 = 40
D18 = 50
D19 = 65
D20 = 80
InversionHeight = 3.00E+02
Coordinates = Degrees
Ellipsoid = WGS 84
SetupDefaultLocation = 37.68660N121.70983W
MapScale = 250
HoldUpTime = 0
BreathingRate = 0.000333
DCFData = ICRP
SampleTime = 3
NonRespirableDepositionVelocity = 8
LocationOfAttack = KNOWN
D1CheckBox = 1
```

```
D2CheckBox = 1
D3CheckBox = 1
D4CheckBox = 1
D5CheckBox = 1
D6CheckBox = 1
D7CheckBox = 1
D8CheckBox = 1
D9CheckBox = 1
D10CheckBox = 1
D11CheckBox = 1
D12CheckBox = 1
D13CheckBox = 1
D14CheckBox = 1
D15CheckBox = 1
D16CheckBox = 1
D17CheckBox = 1
D18CheckBox = 1
D19CheckBox = 1
D20CheckBox = 1
TypeOfCoordinates = Rectangular
IncludeFourDaysofGroundShine = False
TypeOfRelease = General Plume
SourceTermName = Pu-238 W   87.74y
SourceTerm = 2.4e-8
ReleaseDuration = N/A
ReleaseHeight = 30.48
PercentTritiumOxide = 100
AlphaSpecificActivity = 0.081
HighExplosive = N/A
SourceRadius = 0
ReleaseFraction = 1
StabilityClass = E
SigmaTheta = N/A
WindSpeed = 1.7
DepositionVelocity = 0.1
SunStatus = None
FuelFire = N/A
OtherFire = N/A
HeatInput = N/A
VolumeOfFuel = N/A
AirTemperature = N/A
CombustionHeat = N/A
DurationOfBurn = N/A
HeatEmissionRate = N/A
ResuspensionFactor =  N/A
WindDirection = 270
PlumeCenterline = True
PercentU235 = N/A
TypeOfUranium = N/A
ContaminationAge = N/A
ComplexSourceGeometry = None
HorizontalDiameter = N/A
```

```
VerticalDiameter = N/A
DepositionUnits = uCi/m2
SystemName = Hotspot Automatic Table
AirborneFraction = 1
RespirableFraction = 1
PhysicalStackHeight = N/A
StackExitVelocity = N/A
StackDiameter = N/A
StackEffluentTemperature = N/A
EnvironmentalTemperature = N/A
IncludeMomentum = False
UseHeatEmission = False
StackPlumeRise = False
Filter = 0.000000
PhysicalFireHeight = N/A
FireCloudTop = N/A
SourceAltitude = 0
NuclearYield = 1.00E+01
EffectiveWindSpeed = 6.8
InnerNuclearDoseContour = 1000
MiddleNuclearDoseContour = 500
OuterNuclearDoseContour = 100
HelpFileLocation = C:\Program Files\Hotspot 2.06
ShowVirtualInstruments = False
BendAllowed = False
PlumeBendRadius1 = 0.10
WindDirection1 = 270
EnableBend1 = False
PlumeBendRadius2 = 0.20
WindDirection2 = 250
EnableBend2 = False
PlumeBendRadius3 = 0.30
WindDirection3 = 230
EnableBend3 = False
PlumeBendRadius4 = 0.40
WindDirection4 = 200
EnableBend4 = False
FalloutDoseTimePeriod = F
ContourExtentUnits = km
InnerContourExtent = 0.0E+00
MiddleContourExtent = 0.0E+00
OuterContourExtent = 0.0E+00
ContourAreaUnits = km2
InnerContourArea = 0.0E+00
MiddleContourArea = 0.0E+00
OuterContourArea = 0.0E+00
```


Hotspot Version 2.06 Beta General Plume Jan 20, 2005 12:44 PM
Plume Centerline TEDE (rem), as a function of Downwind Distance
1E-06
1E-07
1E-08
1E-09
rem
1E-10
1E-11
1E-12
1E-13
0.01
0.1
1
km
10
100
Source Material : Pu-238 W 87.74y
Source Term : 2.4000E-08 Ci
Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 0.1 cm/s
Receptor Height : 0.0 m
Resp. Rel. Frac. : 1.000
u (h=30 m) : 2.65 m/s
Inversion Layer Height : 300 m

B.3 Plutonium Conversion Factors

It is standard practice at the Savannah River Site to convert radionuclide releases consisting of a mixture of several radionuclides to releases of Pu-238eq Ci. The Pu-238 is assumed to be Class W inhalation class. The Pu-238eq Ci is calculated using the following equation:

$$\text{Pu - 238eq Ci} = \frac{1}{\text{DCF}_{\text{Pu - 238}}} \sum_i (A_i)(\text{DCF}_i)$$

In this equation, the $DCF_{Pu\text{-}238}$ is the inhalation dose conversion factor for Class W Pu-238, and is often referred to as the potential dose for Pu-238. A_i is the number of curies of the *i*th radionuclide and DCF_i is the inhalation dose conversion factor for the *i*th radionuclide. The inhalation dose conversion factor is specific to the inhalation class of the particular mixture of radionuclides. The quantity $\sum_i (A_i)(\text{DCF}_i)$ is often referred to as the potential dose for the mixture of radionuclides.

Pu-238eq Ci conversion factors were calculated for:

- Grams Pu (Class Y)
- Grams Pu (Class W)
- Grams U (Class Y)
- Grams PuO_2 (Class Y)
- Grams U_3O_8 (Class Y)
- Grams Pu-238 Oxide (Class Y)

Atomic masses were obtained from Ref. 1. Specific activities were obtained from Ref. 2. Inhalation dose conversion factors were obtained from Ref. 3.

B.3.1 Plutonium and Uranium Isotopic Distribution

The plutonium and uranium isotopic distributions are given in Table B.3-1.

Table B.3-1. Plutonium and Uranium Isotopic Distribution

Radionuclide	Weight Fraction	Radionuclide	Weight Fraction
Pu-238	0.0005	U-234	0.01
Pu-239	0.9235	U-235	0.931
Pu-240	0.065	U-236	0.005
Pu-241[a]	0.0	U-238	0.054
Pu-242	0.001		
Am-241	0.01		
a. Pu-241 assumed to be decayed to Am-241, giving maximum consequence.			

B.3.2 Potential Dose for Pu-238eq Ci

The potential dose for Pu-238 (Class W) (i.e., the inhalation dose conversion factor) was obtained from Ref. 3:

$$\text{Potential Dose for Pu - 238 (Class W)} = 1.06\text{E - 4}\,\frac{\text{Sv}}{\text{Bq}}$$

$$\text{Potential Dose for Pu - 238 (Class W)} = 1.06\text{E - 4}\,\frac{\text{Sv}}{\text{Bq}} \times 100\,\frac{\text{rem}}{\text{Sv}} \times 3.7\text{E} + 10\,\frac{\text{Bq}}{\text{Ci}} = 3.92\text{E} + 8\,\frac{\text{rem}}{\text{Ci}}$$

B.3.3 Conversion of Grams Plutonium (Class Y) to Pu-238eq Ci

The conversion factor for grams of plutonium (Class Y) to Pu-238eq Ci was estimated to be 0.1019 Pu-238eq Ci/gram Pu (Class Y) (Table B.3-2).

Table B.3-2. Conversion of Grams Pu (Class Y) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram Pu (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
Pu-238	Y	0.0005	1.71E+1	8.55E-3	7.79E-05	2.88E+08	2.46E+06
Pu-239	Y	0.9235	6.21E-2	5.73E-2	8.33E-05	3.08E+08	1.77E+07
Pu-240	Y	0.065	2.27E-1	1.48E-2	8.33E-05	3.08E+08	4.55E+06
Pu-242	Y	0.001	3.93E-3	3.93E-6	7.92E-05	2.93E+08	1.15E+03
Am-241	W	0.01	3.44E+0	3.44E-2	1.20E-04	4.44E+08	1.53E+07
Total		1.0					4.00E+07
Potential Dose for 1 gram of Pu (Class Y) = 4.00E+7 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 4.00E+7 rem ÷ 3.92E+8 rem = 0.1019 Pu-238eq Ci/gram Pu (Class Y)							

B.3.4 Conversion of Grams Plutonium (Class W) to Pu-238eq Ci

The conversion factor for grams of plutonium (Class W) to Pu-238eq Ci was estimated to be 0.1260 Pu-238eq Ci/gram Pu (Class W) (Table B.3-3).

Table B.3-3. Conversion of Grams Pu (Class W) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram Pu (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
Pu-238	W	0.0005	1.71E+1	8.55E-3	1.06E-04	3.92E+08	3.33E+06
Pu-239	W	0.9235	6.21E-2	5.73E-2	1.16E-04	4.29E+08	2.46E+07
Pu-240	W	0.065	2.27E-1	1.48E-2	1.16E-04	4.29E+08	6.42E+06
Pu-242	W	0.001	3.93E-3	3.93E-6	1.11E-04	4.11E+08	1.60E+03
Am-241	W	0.01	3.44E+0	3.44E-2	1.20E-04	4.44E+08	1.51E+07
Total		1.0					4.94E+07
Potential Dose for 1 gram of Pu (Class W) = 4.94E+7 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 4.94E+7 rem ÷ 3.92E+8 rem = 0.1260 Pu-238eq Ci/gram Pu (Class W)							

B.3.5 Conversion of Grams Uranium (Class Y) to Pu-238eq Ci

The conversion factor for grams of uranium (Class Y) to Pu-238eq Ci was estimated to be 2.181E-5 Pu-238eq Ci/gram U (Class Y) (Table B.3-4).

Table B.3-4. Conversion of Grams U (Class Y) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram U (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
U-234	Y	0.01	6.24E-3	6.24E-5	3.58E-05	1.32E+08	8.27E+03
U-235	Y	0.931	2.16E-6	2.01E-6	3.32E-05	1.23E+08	2.47E+02
U-236	Y	0.005	6.47E-5	3.24E-7	3.39E-05	1.25E+08	4.06E+01
U-238	Y	0.054	3.36E-7	1.81E-8	3.20E-05	1.18E+08	2.15E+00
Total		1.0					8.56E+03
Potential Dose for 1 gram of U (Class Y) = 8.56E+3 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 8.56E+3 rem ÷ 3.92E+8 rem = 2.181E-5 Pu-238eq Ci/gram U (Class Y)							

B.3.6 Conversion of Grams Plutonium Oxide (Class Y) to Pu-238eq Ci

The conversion factor for grams of plutonium oxide (Class Y) to Pu-238eq Ci was estimated to be 0.08990 Pu-238eq Ci/gram PuO_2 (Class Y) (Tables B.3-5 and B.3-6).

Table B.3-5. Conversion of Grams PuO_2 to Grams Pu

Radionuclide	Weight Fraction	Atomic Mass	Gram Pu per gram PuO_2
Pu-238	0.0005	238.0495599	4.41E-4
Pu-239	0.9235	239.0521634	8.14E-1
Pu-240	0.065	240.0538135	5.74E-2
Pu-242	0.001	242.0587426	8.83E-4
Am-241	0.01	241.0568291	8.83E-3
Total	1.0		0.8820
Atomic mass of O = 15.9994 Mass of O per gram PuO_2 = 0.1180			

Table B.3-6. Conversion of Grams PuO_2 (Class Y) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram PuO_2 (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
Pu-238	Y	4.41E-4	1.71E+1	7.54E-3	7.79E-05	2.88E+08	2.17E+06
Pu-239	Y	8.14E-1	6.21E-2	5.06E-2	8.33E-05	3.08E+08	1.56E+07
Pu-240	Y	5.74E-2	2.27E-1	1.30E-2	8.33E-05	3.08E+08	4.01E+06
Pu-242	Y	8.83E-4	3.93E-3	3.47E-6	7.92E-05	2.93E+08	1.02E+03
Am-241	W	8.83E-3	3.44E+0	3.04E-2	1.20E-04	4.44E+08	1.35E+07
Total		0.8820					3.53E+07
Potential Dose for 1 gram of PuO_2 (Class Y) = 3.53E+7 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 3.53E+7 rem ÷ 3.92E+8 rem = 0.08990 Pu-238eq Ci/gram PuO_2 (Class Y)							

B.3.7 Conversion of Grams Uranium Oxide (Class Y) to Pu-238eq Ci

The conversion factor for grams of uranium oxide (Class Y) to Pu-238eq Ci was estimated to be 1.845E-5 Pu-238eq Ci/gram U_3O_8 (Class Y) (Tables B.3-7 and B.3-8).

Table B.3-7. Conversion of Grams U_3O_8 to Grams U

Radionuclide	Weight Fraction	Atomic Mass	Gram U per gram U_3O_8
U-234	0.01	234.0409521	8.46E-3
U-235	0.931	235.0439299	7.88E-1
U-236	0.005	236.0455680	4.23E-3
U-238	0.054	238.0507882	4.58E-2
Total	1.0		0.8465
Atomic mass of O = 15.9994 Mass of O per gram U_3O_8 = 0.1535			

Table B.3-8. Conversion of Grams U_3O_8 (Class Y) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram U_3O_8 (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
U-234	Y	8.46E-3	6.24E-3	5.28E-5	3.58E-05	1.32E+08	6.99E+03
U-235	Y	7.88E-1	2.16E-6	1.70E-6	3.32E-05	1.23E+08	2.09E+02
U-236	Y	4.23E-3	6.47E-5	2.74E-7	3.39E-05	1.25E+08	3.44E+01
U-238	Y	4.58E-2	3.36E-7	1.54E-8	3.20E-05	1.18E+08	1.82E+00
Total		0.8465					7.24E+03
Potential Dose for 1 gram of U_3O_8 (Class Y) = 7.24E+3 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 7.24E+3 rem ÷ 3.92E+8 rem = 1.845E-5 Pu-238eq Ci/gram U_3O_8 (Class Y)							

B.3.8 Conversion of Grams Pu-238 Oxide (Class Y) to Pu-238eq Ci

The conversion factor for grams of Pu-238 oxide (Class Y) to Pu-238eq Ci was estimated to be 11.08 Pu-238eq Ci/gram Pu-238 oxide (Class Y) (Tables B.3-9 and B.3-10).

Table B.3-9. Conversion of Grams Pu-238 Oxide to Grams Pu-238

Radionuclide	Weight Fraction	Atomic Mass	Gram Pu per gram PuO_2
Pu-238	1.0	238.0495599	0.8815
Total	1.0		0.8815
Atomic mass of O = 15.9994 Mass of O per gram Pu-238 oxide = 0.1185			

Table B.3-10. Conversion of Grams Pu-238 Oxide (Class Y) to Pu-238eq Ci

Radionuclide	Solubility Class	Weight Fraction	Specific Activity (Ci/g)	Activity Per Gram Pu-238 Oxide (Ci)	Inhalation DCF (Sv/Bq)	Inhalation DCF (rem/Ci)	Potential Dose (rem)
Pu-238	Y	0.8815	1.71E+1	1.51E+1	7.79E-05	2.88E+08	4.34E+9
Total		0.8820					
Potential Dose for 1 gram of Pu-238 oxide (Class Y) = 4.34E+9 rem Potential Dose for 1 Ci of Pu-238 (Class W) = 3.92E+8 rem Conversion Factor = 4.34E+9 rem ÷ 3.92E+8 rem = 11.08 Pu-238eq Ci/gram Pu-238 oxide (Class Y)							

B.3.9 References

1. "The Ame2003 Atomic Mass Evaluation (II). Tables, Graphs, and References," G. Audi, A.H. Wapstra, and C. Thibault, authors; *Nuclear Physics* A 729 p. 337-676, December 22, 2003.

2. *Common Safety Analysis Radionuclide Specific Activities*, J.M. East, author; ECS-CAT-96-0041, Westinghouse Savannah River Company, Aiken, SC, May 21, 1996.

3. *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, Federal Guidance Report No. 11; Report No. EPA-520/1-88-020, K.F. Eckerman, A.B. Wolbarst, A.C.B. Richardson, authors; U.S. Environmental Protection Agency, Washington, D.C., 1988.

B.4 Chemical Screening Analysis

This section describes the chemical screening analyses performed for the EPHA. More details and ALOHA runs for the screened chemicals are provided in Ref. 1.

B.4.1 Hazardous Chemicals

A chemical screening analysis was conducted for the hazardous chemicals that will be used at the PDCF. These chemicals are primarily present in three areas:

- Chemical Storage and Distribution System
- HVAC Chilled Water System
- Analytical Laboratory

The chemicals that will be used in the Chemical Storage and Distribution System and the HVAC Chilled Water System are listed in Table B.4-1. Also listed in Table B.4-1 are the amounts that will be supplied in a single delivery. In addition, the chemicals listed in Table B.4-1 will be diluted for use, so analyzing the chemicals as they are delivered would bound releases from tanks and pipes.

Table B.4-1. Chemicals Used in the Chemical Storage and Distribution System and the HVAC Chilled Water System

Chemical	Formula	CAS Registry No.	Amount Per Delivery
Sodium Hydroxide (25 weight percent)	$NaOH$	1310-73-2	55 gallons
Sulfuric Acid (95 weight percent)	H_2SO_4	7664-93-9	55 gallons
Sodium Sulfate (solid)	Na_2SO_4	7757-82-6	150 lbs.
Bleach (30 weight percent)	$NaOCl$	7681-59-9	55 gallons
Tolyltriazole (solid)	$C_7H_7N_3$	29385-43-1	50 lbs.

For the Analytical Laboratory, the chemicals are listed in Table B.4-2. Because a wide variety of solution strengths would be used in the Analytical Laboratory, depending on the specific chemical analysis, the chemicals were assumed to be present as stock solutions. Because the chemicals will be diluted for use, analyzing the chemicals as stock solutions would bound potential impacts. Also, since any intermediate chemical compounds would be created in milliliter quantities, they will not contribute significantly to the chemical hazard when compared to the stock solutions. As with the chemicals in the Chemical Storage and Distribution System and the HVAC Chilled Water System, the amount that will be supplied in a single delivery was estimated.

Table B.4-2. Chemicals Used in the Analytical Laboratory

Chemical	Formula	CAS Registry No.	Amount Per Delivery
Acetone	C_3H_6O	67-64-1	16 L
Aluminum Nitrate	$Al(NO_3)_3$	13473-90-0	1 kg
Ascorbic acid	$C_6H_8O_6$	50-81-7	1 kg
Barium chloride	$BaCl_2$	10361-37-2	1 kg
Ethanol	C_2H_6O	64-17-5	16 L
Ferrous Sulfamate	$Fe(SO_3NH_2)_2$	14017-39-1	5 kg
Ferrous Sulfate	$FeSO_4$	7720-78-7	1 kg
Hydrochloric Acid (36 weight percent)	HCl	7647-01-0	16 L
Hydrofluoric Acid (49 weight percent)	HF	7664-39-3	16 L
Hydrogen Peroxide (30 weight percent)	H_2O_2	7722-84-1	16 L
Isopropanol	$(CH_3)_2CHOH$	67-63-0	16 L
Magnesium Perchlorate	$MgCl_2O_8$	10034-81-3	1 kg
Methanol	CH_3OH	67-56-1	16 L
Nitric Acid (68 weight percent)	HNO_3	7697-37-2	16 L
Oxalic Acid	$HO(CO)_2OH$	122-62-7	1 kg
Potassium Chloride	KCl	7447-40-7	16 L
Potassium Dichromate	$K_2Cr_2O_7$	231-906-6	1 kg
Poatssium Oxalite	$K_2(CO)_2$	583-52-8	1 kg
Scintillation cocktail		9016-45-9	1 kg
Sodium Carbonate	Na_2CO_3	497-19-8	1 kg
Sodium Hydroxide	NaOH	1310-73-2	16 L
Sodium Nitrite	Na_2SO_3	7632-00-0	1 kg
Sodium Pyrophosphate	$Na_4P_2O_7$	7722-88-5	1 kg
Sulfuric Acid (95 weight percent)	H_2SO_4	7664-93-9	16 L

The chemical screening analysis consisted of four steps:

1. The amount of a chemical that would be supplied in a single delivery was estimated.

2. A spill was assumed to occur with this amount of the chemical. For volatile chemicals, releases were estimated using the ALOHA Evaporation Calculator or by using the puddle model in ALOHA. For non-volatile and volatile chemicals, releases were estimated using the bounding airborne release fractions (ARFs) for < 3-meter (m) free-fall spills of aqueous liquids or powders from DOE-HDBK-3010-94 (Ref. 2). For volatile chemicals, spills were assumed to have two components, a volatile component where the release was estimated using the Evaporation Calculator or puddle model, and a direct release component where the release was estimated using the ARFs from DOE-HDBK-3010-94.

   The ARF used for < 3 m free-fall spills of aqueous liquids was 2.0E-4 (page 3-4, Ref. 2). This ARF was also used for spills of organic liquids. The ARF used for < 3 m free-fall spills of powders was 2.0E-3 (page 4-9, Ref. 2). In both cases the RF was assumed to be 1.0, to account for the ability of some chemicals to act externally without being inhaled.

3. ALOHA was used to determine the atmospheric concentration of the chemical at 30 m from the spill, using adverse meteorological conditions. Table B.4-3 lists the specific conditions used in the analysis. General plume dispersion modeling parameters are as follows:

   - Reference wind speed height is 10 m for elevated releases and 2 m for ground releases.
   - Ground-level release height is at 0 m.
   - Elevated release height is 30.48 m (100 ft), the height of the PDCF stack.
   - Ground roughness is assumed to be urban or forest (i.e., 100 cm).
   - 15-minute release time was assumed.
   - For spills involving hazardous chemicals, all releases were assumed to be from ground-level.

Table B.4-3. Meteorological Input Parameters

Release Height (m)	Meteorological Conditions	Stability Class	Wind Speed (m/s)	Temperature (ºC)	Inversion Layer (m)	Cloud Cover	Humidity
# 10	Adverse	E	1.7	29	300	10%	50%
> 10	Adverse	A	1.7	29	None	10%	50%
> 10	Adverse	B	2.6	29	500	10%	50%
> 10	Adverse	E	1.7	29	300	10%	50%

4. These atmospheric concentrations were compared to ERPG-2 or TEEL-2 values. If the atmospheric concentration was greater than the ERPG-2 or TEEL-2 value, then an accident scenario was developed and analyzed in the EPHA.

The results of the chemical screening analysis are contained in Table B.4-4. Only hydrochloric acid (36 weight percent) exceeded the ERPG-2 or TEEL-2 values at 30 m. Therefore, an accident scenario involving hydrochloric acid was developed and analyzed in the EPHA.

B.4.2 Pressurized Gases

Pressurized gases will be used at several locations at the PDCF. For the analysis, it is assumed that the high pressure gas cylinders used in the facility are the largest bottles commercially available for argon, helium, 4 percent hydrogen in helium, nitrogen, and oxygen. For propane, it is assumed that a standard 50 pound storage cylinder containing pressurized liquid propane will be used.

The high pressure gas bottles have are made of steel, have a length of 60 inches, an outside diameter of 9.25 inches, have an internal volume of 49.9 liters and a name plate rating of 2400 psig. While their typical fill pressure is 2200 psig, the higher pressure will be used to make the analysis conservative.

Table B.4-4. Results of Chemical Screening Analysis

Chemical	ERPG-2 or TEEL-2 Value	Conc. At 30 m	Units	Amount Delivered	Amount Necessary to Exceed ERGP-2 or TEEL-2
Acetone	8500	1.2E+02	ppm	16 L	1.2E+3 L
Aluminum Nitrate	75	7.7E-02	mg/m^3	1 kg	9.7E+02 kg
Ascorbic acid	500	7.7E-02	mg/m^3	1 kg	6.5E+03 kg
Barium chloride	2.5	7.7E-02	mg/m^3	1 kg	3.2E+01 kg
Bleach	500	7.1E-01	mg/m^3	55 gallons	3.9E+4 gallons
Ethanol	3300	2.7E+01	ppm	16 L	1.9E+03 L
Ferrous Sulfamate	2.5	3.9E-01	mg/m^3	5 kg	3.2E+01 kg
Ferrous Sulfate	12.5	7.7E-02	mg/m^3	1 kg	1.6E+02 kg
Hydrochloric Acid	20	3.2E+02	ppm	16 L	1.0E+00 L
Hydrofluoric Acid	20	1.7E+01	ppm	16 L	1.9E+01 L
Hydrogen Peroxide	50	3.8E-01	ppm	16 L	2.1E+03 L
Isopropanol	400	2.0E+01	ppm	16 L	3.2E+02 L
Magnesium Perchlorate	500	7.7E-02	mg/m^3	1 kg	6.5E+03 kg
Methanol	1000	5.7E+01	mg/m^3	16 L	2.8E+02 L
Nitric Acid	6	5.5E+00	ppm	16 L	1.7E+01 L
Oxalic Acid	5	7.6E-02	mg/m^3	1 kg	6.6E+01 kg
Potassium Chloride	15	3.8E-02	mg/m^3	16 L	6.3E+03 L
Potassium Dichromate	2.5	7.7E-02	mg/m^3	1 kg	3.2E+01 kg
Poatssium Oxalite	150	7.7E-02	mg/m^3	1 kg	1.9E+03 kg
Scintillation cocktail	1000	5.0E-03	mg/m^3	1 L	2.0E+05 L
Sodium Carbonate	50	7.7E-02	mg/m^3	1 kg	6.5E+02 kg
Sodium Hydroxide	5	5.1E-01	mg/m^3	55 gallons	5.4E+02 gallons
Sodium Nitrite	1	7.7E-02	mg/m^3	1 kg	1.3E+01 kg
Sodium Pyrophosphate	50	7.7E-02	mg/m^3	1 kg	6.5E+02 kg
Sodium Sulfate	500	5.3E+00	mg/m^3	150 lbs.	1.4E+04 lbs.
Sulfuric Acid	10	2.8E+00	mg/m^3	55 gallons	2.0E+02 gallons
Tolyltriazole solid	50	1.8E+00	mg/m^3	50 lbs.	1.4E+03 lbs.

Using the ideal gas law and assuming the temperature of the tanks is 25 °C, the gas bottles will hold 335.2 gram moles of any of the gasses or 0.7391 pound moles of the gases. For the helium and 4 percent hydrogen-helium tanks, the total weight of gas is less than 3 pounds so these tanks can be screened out of the EPHA analysis based on the guidance in the SRS *Chemical Screening White Paper*. The remaining gases have gas weights in excess of 20 pounds so they cannot be screened out.

The remaining gases were modeled using ALOHA. The same assumptions as were used for hazardous chemicals were used, except that all the gas was assumed to be released over 15 minutes.

Table B.4-5 shows the results of the ALOHA analyses. No gases exceeded the TEEL-2 value at 30 m. Therefore, detailed accident scenarios were not developed for the EPHA.

Table B.4-5. Results of Pressurized Gas Analyses

Gas	Concentration at 30 m (ppm)	TEEL-2 Concentration
Argon	321	280,000
Nitrogen	321	280,000
Oxygen	321	750,000
Propane	492	2100

B.4.3 Uranium Releases

In Section 5.0 of the EPHA, the release with the largest release of plutonium was Release Designation RD-07. This accident also releases uranium as U_3O_8 (RD-07-2). This section analyzes the chemical (as opposed to radiological) hazards of the U_3O_8 release.

Table B.4-6 lists the parameters used to estimate the release of U_3O_8. The scenario for RD-07-2 is described in Section 5.2.7 of the EPHA. The U_3O_8 release was modeled with ALOHA using the assumptions listed in Appendix B, Section B.4.1. RD-07-2 involved a release from the 100-ft PDCF main stack. RD-07-2 was also analyzed as a ground-level release to determine if a TEEL-2 could be exceeded for the largest release assuming it was from ground-level.

Table B.4-7 lists the results for the U_3O_8 chemical hazard analysis. The analysis shows that the TEEL-2 value would not be exceeded at 30 m, even if the release were from ground level. Therefore, detailed chemical consequence analyses of uranium releases were not performed for the EPHA.

Table B.4-6. RD-07-2 Parameter Summary

Release Designation	MAR (g)	DR	ARF	RF	LPF	ST (g)
RD-07-2	40,000 ($_{U3O8}$)	1.0	0.31	0.7	0.0049	42.532

Note: Release time = 3 minutes.

Table B.4-7. Results of U_3O_8 Chemical Hazard Analysis for Adverse Conditions

Scenario	Stability Class	Concentration at 30 m (mg/m^3)	TEEL-2 (mg/m^3)
Elevated	A	0.0	10
Elevated	B	0.0	10
Elevated	E	0.0	10
Ground-Level	E	8.21	10

B.4.4 References

1. *EPHA Chemical Screening Analysis (U)*, Calculation Set No. S-CLC-F-00460, Washington Group International, Denver, CO, January 24, 2005.

2. *Airborne Release Fractions/Rates and Respirable Fractions for Non-Reactor Nuclear Facilities*, DOE-HDBK-3010-94, Change Notice. No. 1, U.S. Department of Energy, Washington, D.C., March 2000.

B.5 ALOHA Runs

HCL_50_05L_0030.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00213 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 128 grams/min
   Total Amount Released: 1.92 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: less than 10 meters(10.9
yards)
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 18 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 47 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 7.36 ppm
      Indoor:  0.884 ppm
```

HCL_50_05L_0150.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00213 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 128 grams/min
   Total Amount Released: 1.92 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: less than 10 meters(10.9
yards)
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 18 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 47 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       150 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 0.296 ppm
      Indoor:  0.0356 ppm
```

HCL_50_05L_5000.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00213 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 128 grams/min
   Total Amount Released: 1.92 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: less than 10 meters(10.9
yards)
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 18 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 47 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       5000 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

HCL_50_05L_9400.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00213 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 128 grams/min
   Total Amount Released: 1.92 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: less than 10 meters(10.9
yards)
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 18 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 47 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       9400 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

HCL_50_16L_0030.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00641 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 385 grams/min
   Total Amount Released: 5.77 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 27 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 199 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 127 ppm
      Indoor:  14.8 ppm
```

HCL_50_16L_0150.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00641 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 385 grams/min
   Total Amount Released: 5.77 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 27 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 199 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       150 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 5.14 ppm
      Indoor:  0.596 ppm
```

HCL_50_16L_5000.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00641 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 385 grams/min
   Total Amount Released: 5.77 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 27 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 199 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       5000 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

HCL_50_16L_9400.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.51 (sheltered single storied)
   Time: June 30, 2005  1200 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 2.5 meters/sec from N at 2 meters
   Inversion Height: 500 meters
   Stability Class: C (user override)     Air Temperature: 25° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 8 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00641 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 385 grams/min
   Total Amount Released: 5.77 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 27 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 199 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       9400 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

HCL_95_05L_0030.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00202 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 121 grams/min
   Total Amount Released: 1.82 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 25 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 208 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 117 ppm
      Indoor:  11.9 ppm
```

HCL_95_05L_0150.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00202 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 121 grams/min
   Total Amount Released: 1.82 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 25 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 208 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       150 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 5.5 ppm
      Indoor:  0.564 ppm
```

HCL_95_05L_5000.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00202 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 121 grams/min
   Total Amount Released: 1.82 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 25 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 208 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       5000 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 0.00744 ppm
      Indoor:  7.51e-04 ppm
```

HCL_95_05L_9400.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00202 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 121 grams/min
   Total Amount Released: 1.82 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 25 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 75 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 208 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       9400 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

HCL_95_16L_0030.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00608 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 365 grams/min
   Total Amount Released: 5.47 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 46 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 134 meters
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 372 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 318 ppm
      Indoor:  32.3 ppm
```

HCL_95_16L_0150.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00608 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 365 grams/min
   Total Amount Released: 5.47 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 46 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 134 meters
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 372 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       150 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 16.3 ppm
      Indoor:  1.67 ppm
```

HCL_95_16L_5000.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00608 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 365 grams/min
   Total Amount Released: 5.47 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 46 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 134 meters
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 372 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       5000 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 0.0224 ppm
      Indoor:  0.00226 ppm
```

HCL_95_16L_9400.txt

```
 SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: 100 centimeters
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.00608 kilograms/sec
   Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 365 grams/min
   Total Amount Released: 5.47 kilograms
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION:
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 46 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 134 meters
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 372 meters

 TIME DEPENDENT INFORMATION:
   Concentration Estimates at the point:
   Downwind:       9400 meters
   Off Centerline: 0 meters
   Note: Conc/Dose pictures not drawn because
      there is no significant concentration/dose at the point selected.
```

Appendix C

Emergency Preparedness Hazards Assessment Definitions

The Emergency Preparedness Hazards Assessment uses some terms that may have meanings different from other safety documentation. This appendix highlights important terms used.

Barriers – "Layers of protection" afforded facility/site personnel, the general public, and the environment by the design and operational controls of each facility. Facility design features that contain hazardous materials or separate them from people or the environment are physical barriers. Examples include the following:

- Type B containers
- Tanks for liquid waste
- 3013 cans
- Cylinders
- Containment cells
- Buildings
- Piping systems
- Gloveboxes

Committed Dose Equivalent (CDE) ($H_{T,50}$) – The dose equivalent calculated to be received by a tissue or organ over a 50-year period after the intake of a radionuclide into the body. It does not include contributions from radiation sources external to the body. Expressed in units of rem.

Note: 50-year committed doses are assigned to an individual in the year of the intake. For example: an individual receiving a 50-year committed dose of 5 rem from internally deposited Pu-238 in March of 1996 has the entire 5 rem assigned to his or her 1996 annual dose.

Committed Effective Dose Equivalent (CEDE) ($H_{E,50}$) – The sum of the committed dose equivalents (CDEs) to various tissues in the body ($H_{T,50}$), each multiplied by the appropriate weighting factor (w_T) - that is, $H_{E,50} = \Sigma\, w_T\, H_{T,50}$. Committed effective dose is expressed in units of rem.

Note: The CEDE includes all intakes of radioactive material if there is more than one intake during a year.

Consequence – The result or effect (especially projected exposure to radiological or chemical hazards) of a release of hazardous materials to the environment.

Deep Dose Equivalent (DDE) – The dose equivalent derived from external radiation at a tissue depth of 1 cm in tissue.

Effective Dose Equivalent (EDE) (H_E) – The summation of the products of the dose equivalent received by specified tissues of the body (H_T) and the appropriate weighting factor (W_T)—that is, ($H_E = \Sigma W_T H_T$). It includes the dose from radiation sources internal and/or external to the body. Expressed in units of rem.

Emergency – The most serious event, consisting of any unwanted operational, civil, natural phenomena, or security occurrence, that could endanger or adversely affect people, property, or the environment.

Emergency Classification System – Standard classifications of nuclear and hazardous material related events, ranging in severity, used to communicate facility status. Each category is defined as follows:

- **Alert** – represents events in progress or having occurred that involves an actual or potential substantial reduction in the level of facility safety and protection. An Alert has occurred if an unplanned event results in hazardous material being released to the environment in concentrations that are expected to exceed Protective Action Criteria (PAC) at 30 meters from the point of release but that are less than a PAC at the FB.
- **Site Area Emergency (SAE)** – represents events that are in progress or have occurred involving actual or likely major failure(s) of facility safety or safeguards systems needed for the protection of on site personnel, the public health and safety, the environment, or national security. Any environmental releases of hazardous materials are expected to exceed the appropriate PAC at or beyond the FB but are not expected to exceed the appropriate PAC at or beyond the site boundary.
- **General Emergency (GE)** – represents events that are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with potential for loss of confinement integrity, catastrophic degradation of facility protection systems, or catastrophic failure in safety or protection systems threatening the integrity of a weapon or test device which could lead to substantial off site impacts. Any environmental release of hazardous materials can reasonably be expected to exceed the appropriate PAC at the site boundary.

Emergency Duty Officer (EDO) – WSRC employee trained in emergency response actions and command and control functions, on duty 24 hours per day in the SRS Operations Center (SRSOC).

Emergency Response Planning Guideline (ERPG) – An estimate of the concentration ranges above which one could reasonably anticipate observing adverse effects, as described in the definitions for ERPG-1, -2, and -3, as a consequence of exposure to the specific substance. ERPG values are the preferred guidelines when dealing with chemical exposures; however, ERPGs exist for relatively few chemicals. Temporary Emergency Exposure Limits (TEELs) are approved for use as an equivalent. With the exception of recommended averaging time, TEELs-1, -2, and -3 have the same definitions as the equivalent ERPGs. (It is recommended that the peak 15-minute time-weighted average concentration at the receptor point of interest be used for comparison with the TEEL value.) The most recent TEEL list may be found on DOE's Chemical Safety home page (http://tis-hq.eh.doe.gov/web/chem_safety/), under "Documents."

NOTE: ERPGs are to be used for emergency planning, not for determining personnel exposure limits.

- **ERPG/TEEL-1 –** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.
- **ERPG/TEEL-2 –** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.
- **ERPG/TEEL-3 –** The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

The evaluation of the effects of hazardous chemical exposure is not as well defined as that of radiation effects. There is no standard protective action criterion or effectiveness rating for chemicals that is similar to the one used for radiation. This is because of the multitude of chemicals and hazardous materials and substances.

Facility Boundary – Takes into consideration both material processing operation boundaries and physical barriers (i.e. structural or geographical). For emergency planning purposes, several structures or component units with a common purpose constitute a single facility.

Hazardous Material – Any solid, liquid, or gaseous material that is toxic, flammable, radioactive, corrosive, chemically reactive or unstable upon prolonged storage, in quantities that could pose a threat to life, property, or the environment.

Material-at-Risk (MAR) – The amount of hazardous material that is available to be acted on by a given physical stress. Multiply the MAR by the appropriate release fraction to determine the source term.

Mitigative Features – Controls that are set in place to maintain the safe configuration of a system. These are basically intrinsic or engineered actions/systems that do not require human intervention to either prevent or limit the quantity released of a hazardous material. Examples of mitigative features include:

- Segregated storage
- Process control systems/interlocks
- Sand filtration (SF) system
- Bermed/diked areas surrounding process vessels
- Security systems

Operational Emergency (OE) – Event or condition that poses a significant hazard to safety, health, and/or the environment and requires time urgent response from outside the facility. An operational emergency involving release of significant quantities of hazardous materials requires further classification as an Alert, Site Area Emergency, or General Emergency. The Emergency

Duty Officer (EDO) in the SRS Operations Center is the site categorization and reporting authority for operational emergencies that do not require further classification.

Plutonium-238 Equivalent (Pu-238$_{eq}$) – An analytic technique of summing the dose potential from all the isotopes of interest in a source term into a single "equivalent" isotope in order to facilitate quick consequence assessment of that source term.

Primary Barrier – The barrier that is closest to a material. For gases or liquids, for example, the primary barrier is a piping system, tank, or cylinder. This barrier keeps the material in its physical form or shape.

Protective Actions – Those actions taken to avoid or reduce a projected or actual exposure. Protective actions are used to ensure the physical safety of personnel and facilities during radiological or hazardous material incidents. Protective actions are formulated after determining a projected dose. They are taken only when the benefits of the protective action either outweigh the possible undesirable consequences of doing nothing or are sufficient to offset the possible undesirable consequences resulting from not implementing the protective action.

Protective Action Criteria (PAC) – A radiological dose or toxic material concentration level that acts as a trigger, for the receptor point of interest, to declare an operational emergency and initiate the recommendation or issuance of protective actions to protect workers or the general public. The PAC that pertain to Savannah River Site (SRS) onsite and offsite radiological and chemical exposure are as follows:

- For a radiological hazard, 1 rem Total Effective Dose Equivalent (TEDE) or 5 rem CDE thyroid is used as the trigger for classification of operational emergencies and offsite protective action recommendations. The onsite precautionary PAC uses the limit of 100 millirem TEDE or 500 millirem Effective Dose Equivalent thyroid as the initial trigger to clear an area of nonessential workers as a precaution against worsening conditions.
- For a chemical hazard, the limit of Emergency Response Planning Guideline (ERPG)-2 or equivalent value is used as the trigger for classification of operational emergencies and offsite protective action recommendations. The onsite precautionary PAC uses the limit of ERPG-1 as the trigger to clear the area of nonessential workers as a precaution against worsening conditions.

Receptor Locations – Three receptor locations have been established for ERPGs — the site boundary, facility boundary, and 30 m from the release. These receptor locations are used in classifying an emergency. The threshold between emergency classes is defined in terms of actual or potential consequences from a release of hazardous material resulting in PAC being exceeded at or beyond each receptor. Consequences at these locations form the basis for emergency planning and preparedness. Receptor locations are analyzed for each facility and for transportation incidents occurring within the facility boundary.

- 30 m from the release (or edge of the spill): the threshold for an incident that requires emergency response organization involvement (i.e., Alert).

- The facility boundary: the demarcation between a facility and its vicinity and the remainder of the site. The facility boundary receptor is the demarcation between an Alert and an SAE.
- The closest site boundary: the nearest location to the facility where SRS does not have ownership and control over access. The site boundary receptor is the demarcation between an SAE and a GE.

Release – Normally an airborne release, as this pathway typically is the most time-urgent and requires rapid, coordinated emergency response on the part of the facility, collocated facilities, and surrounding jurisdictions to protect workers, the public, and the environment. Releases to aquatic and ground pathways, in most instances, do not have the same time urgency as airborne releases. When a release to an aquatic or ground pathway could have a near-term effect (e.g. through a community water supply), then it is considered in the hazards assessment.

Release Fraction – The coefficient used to estimate the amount of hazardous material (MAR) suspended in air and available for airborne transport under a specific set of induced physical stress. The release fraction is a combination of the fraction of the material released (airborne release fraction [ARF]) and the fraction that is respirable (respirable fraction [RF]).

Scenarios – Combinations of events and conditions that could cause release of each hazardous material characterized.

Site Boundary – In general, the perimeter of DOE-owned and controlled land. If the general public can gain unescorted access to areas of the site, such as visitor's centers, these areas should be considered as offsite for purposes of emergency class definition, unless it is assured that those areas can be evacuated and access control established within about one hour of any emergency declaration.

Source Term – The amount of respirable material released to the environment. The source term takes into consideration the MAR, the damage ratio (fraction), airborne release fraction, respirable fraction, leak path factor (fraction), airborne release rate (fraction/hour), and in some cases the release duration (hours). There can be both a chemical and a radiological source term.

Total Effective Dose Equivalent (TEDE) – The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). Deep dose equivalent to the whole body may be used as effective dose equivalent for external exposures. For accidents associated with most SRS facilities, the CEDE calculated by SRS dispersion models is equivalent to the TEDE.

NOTE:

Additional terms and definitions are listed in procedure EMPP 6Q 001, *Standards for Development and Maintenance of an Emergency Preparedness Hazards Assessment*.

Appendix D

Technical Support Room (TSR) EAL Data

for the PDCF

PDCF Area EALs

1.0 – Radiological Release (CATEGORY 1)	
SAE-RD-01 A-RD-01	Room Fire Propagates to the Product NDA Module
SAE-RD-03-1 A-RD-03-1	Automated Guided Vehicle Fire in the Main Vault
SAE-RD-07-1 A-RD-07-1	Overpressurization of a 3013 Can in the Oxide Handling Module
SAE-RD-09 A-RD-09	Criticality in the Product NDA Module
SAE-RD-12 A-RD-12	Earthquake-Induced Multiple-Room Fire
SAE-RD-14 A-RD-14	Earthquake-Induced Collapse of Interior Walls
SAE-RD-15 A-RD-15	A Tornado or Tornado-Generated Missile Impacts the SST Truck Bay
SAE-RD-16 A-RD-16	Aircraft Crash
SAE-RD-17-1 A-RD-17-1	Tritium Releases

END OF CATEGORY 1

2.0 – Chemical Release (CATEGORY 2)	
A-RD-C-01	Spill of 5 liters of Hydrochloric Acid
A-RD-C-02	Spill of 16 liters of Hydrochloric Acid

END OF CATEGORY 2

3.0 – Other (CATEGORY 3)

END OF CATEGORY 3

Release Designation RD-01 / Room Fire Propagates to the Product NDA Module

SAE-RD-01	Fire occurs and propagates to the Product NDA Module. 10 Cans of PuO_2 in 3013 cans and 32 grams of $^{238}PuO_2$ (various weight ranges) in calibration standards exposed to the fire. Failure of Calibration Standards containing more than 8 grams Pu-238 oxide or one 3013 Can containing 5 kg of PuO_2 fails in the fire. Possibly indicated by: • Direct observation or fire/heat/smoke alarm • Rupture of one 3013 can or calibration source containing more than 8 grams of Pu-238 oxide • Continuous air monitor alarms • Stack monitor alarm

A-RD-01	Fire occurs and propagates to the Product NDA Module. 10 Cans of PuO_2 in 3013 cans and 32 grams of $^{238}PuO_2$ various weight ranges) in calibration standards exposed to the fire. Failure of a Calibration Standards containing > 0.6 grams Pu-238 oxide or one 3013 Can of PuO_2. Possibly indicated by: • Direct observation or fire/heat/smoke alarm • Rupture of one 3013 can or calibration source containing > 0.6 grams of Pu-238 oxide • Continuous air monitor alarms • Stack monitor alarm

Assumptions:
A portion of the release comes from ground-level and a portion of the release is elevated, from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.017 Pu-238eq Ci (elevated) and 0.010 Pu-238eq Ci (ground-level), i.e., the combination of these two releases yields an SAE. Class E stability and a wind speed of 1.7 m/s are the conditions that yield the SAE. The HOTSPOT runs are contained in Table D-1 and Table D-2. The HOTSPOT plots are contained in Figures D-1 and D-2.

The minimum source term to obtain an Alert is 7.1E-4 Pu-238eq Ci (ground-level). Class E stability and a wind speed of 1.7 m/s are the conditions that yield the Alert. The elevated release

using Class E stability and a wind speed of 1.7 m/s overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run for the ground-level release is contained in Table D-3. The HOTSPOT plot is contained in Figure D-3.

Table D-1. HOTSPOT Output for SAE-RD-01 Elevated Release.

```
"RD-01 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.6700E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.121 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.47 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.7E-02	2.0E-07	2.0E-04	2.3E-12	<00:01
0.250	1.1E-01	8.3E-07	8.3E-04	9.3E-12	00:01
Maximum TEDE					
0.316	1.2E-01	9.2E-07	9.2E-04	1.0E-11	00:01
0.500	9.5E-02	7.3E-07	7.3E-04	8.1E-12	00:03
1.000	4.2E-02	3.2E-07	3.2E-04	3.6E-12	00:06
3.000	9.9E-03	7.6E-08	7.6E-05	8.5E-13	00:18
5.000	5.2E-03	4.0E-08	4.0E-05	4.5E-13	00:31
8.000	3.0E-03	2.3E-08	2.3E-05	2.6E-13	00:50
9.400	2.5E-03	1.9E-08	1.9E-05	2.1E-13	00:59

Table D-2. HOTSPOT Output for SAE-RD-01 Ground-Level Release.

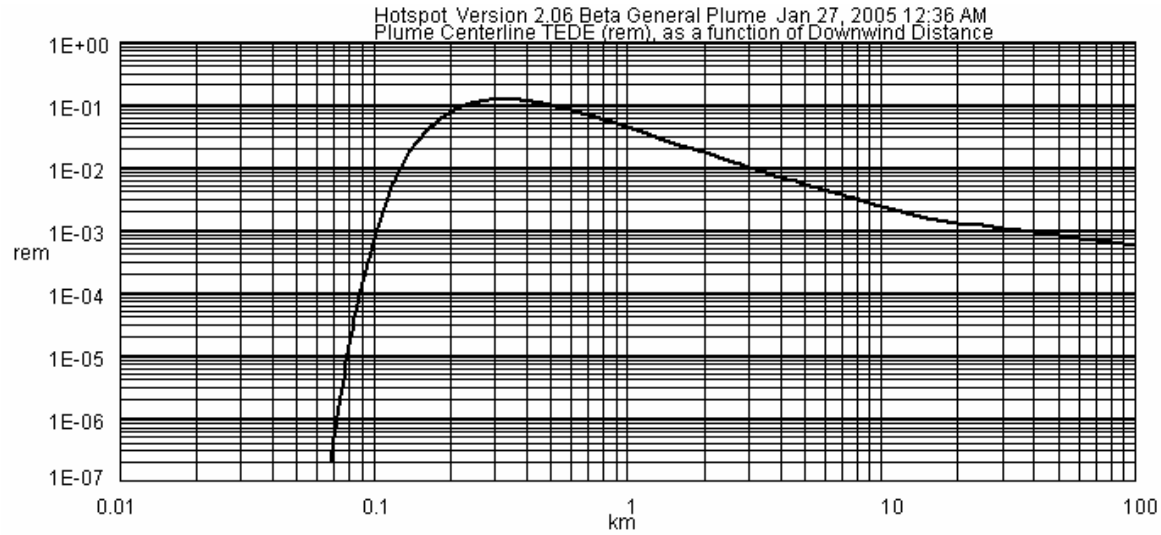
```
"RD-01 Ground Level Release 95th Met (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.0200E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   55 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.15 km
Exceeds Outer  Dose Out To : 0.54 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	5.5E+01	4.2E-04	4.2E+00	4.7E-08	<00:01
0.030	1.4E+01	1.1E-04	1.1E+00	1.2E-08	<00:01
0.150	9.7E-01	7.4E-06	7.4E-02	8.3E-10	00:01
0.250	3.9E-01	3.0E-06	3.0E-02	3.3E-10	00:02
0.500	1.2E-01	8.8E-07	8.8E-03	9.9E-11	00:04
1.000	3.7E-02	2.8E-07	2.8E-03	3.1E-11	00:09
3.000	7.2E-03	5.5E-08	5.5E-04	6.2E-12	00:29
5.000	3.7E-03	2.8E-08	2.8E-04	3.2E-12	00:49
8.000	2.1E-03	1.6E-08	1.6E-04	1.8E-12	01:18
9.400	1.7E-03	1.3E-08	1.3E-04	1.5E-12	01:32

Table D-3. HOTSPOT Output for A-RD-01 Ground-Level Release.

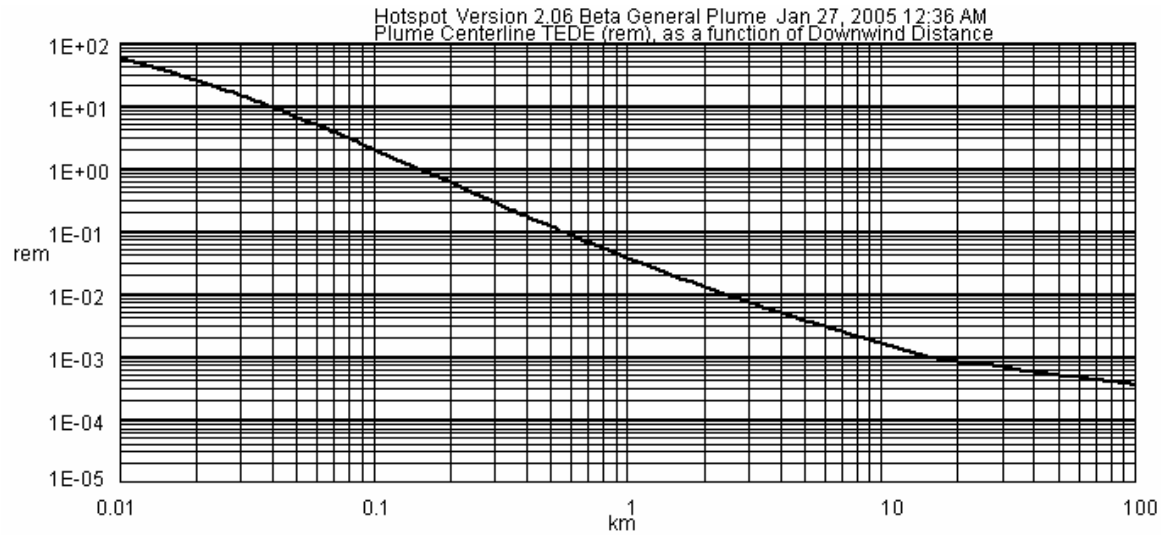
```
"RD-01 Ground Level Release 95th Met (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 7.1000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 15.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   3.8 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.030 km
Exceeds Outer  Dose Out To : 0.12 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	3.8E+00	2.9E-05	2.9E-01	3.3E-09	<00:01
0.030	1.0E+00	7.6E-06	7.6E-02	8.5E-10	<00:01
0.150	6.8E-02	5.2E-07	5.2E-03	5.8E-11	00:01
0.250	2.7E-02	2.1E-07	2.1E-03	2.3E-11	00:02
0.500	8.0E-03	6.1E-08	6.1E-04	6.9E-12	00:04
1.000	2.5E-03	1.9E-08	1.9E-04	2.2E-12	00:09
3.000	5.0E-04	3.8E-09	3.8E-05	4.3E-13	00:29
5.000	2.6E-04	2.0E-09	2.0E-05	2.2E-13	00:49
8.000	1.4E-04	1.1E-09	1.1E-05	1.2E-13	01:18
9.400	1.2E-04	9.1E-10	9.1E-06	1.0E-13	01:32



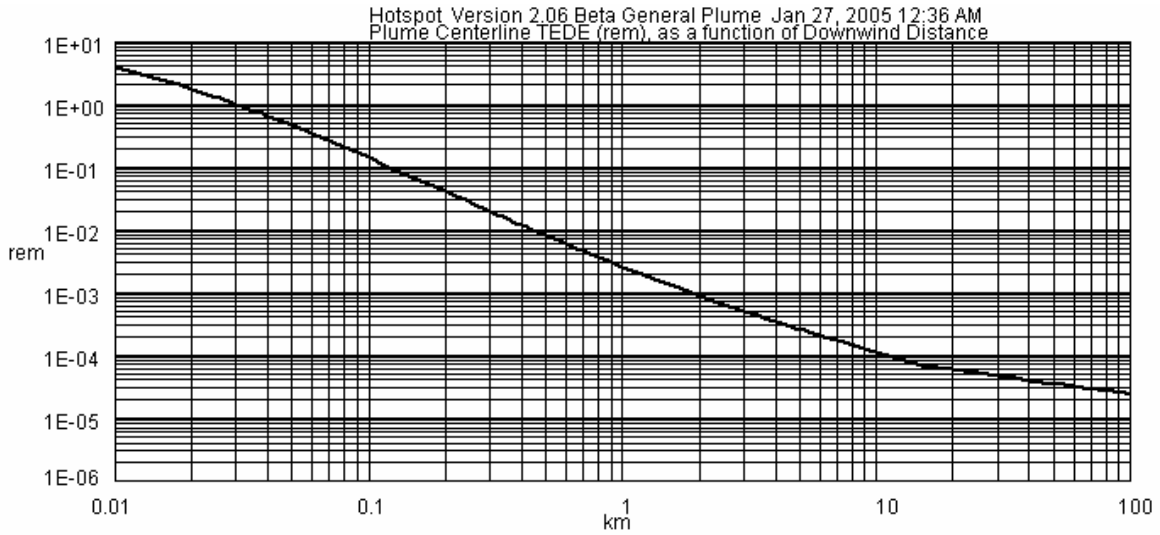
Source Material	: Pu-238 W 87.74y		
Source Term	: 1.6700E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 15.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-1. SAE-RD-01 Elevated Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.0200E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 15.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-2. SAE-RD-01 Ground-Level Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 7.1000E-04 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 15.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-3. A-RD-01 Ground-Level Release Plot.

Release Designation RD-03-1 / Automated Guided Vehicle Fire in the Main Vault

SAE-RD-03-1	Fire occurs in automated guided vehicle occurs. More than 2 of the 3013 cans of PuO_2 rupture. Possibly indicated by: • Fire involving the AGV (direct observation or fire/smoke alarm). • Continuous air monitor alarms. • Stack monitor alarm.

A-RD-03-1	Fire occurs in automated guided vehicle occurs. More than 1 of the 3013 cans of PuO_2 rupture. Possibly indicated by: • Fire involving the AGV (direct observation or fire/smoke alarm). • Continuous air monitor alarms. • Stack monitor alarm.

Assumptions:
The release comes from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.10 Pu-238eq Ci. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-4. The HOTSPOT plot is contained in Figure D-4.

The minimum source term to obtain an Alert is 0.067 Pu-238eq Ci. Class A and 1.7 m/s wind speed are the conditions that yield the Alert. If Class E stability and 1.7 m/s wind speed is used, the release overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run is contained in Table D-5. The HOTSPOT plot is contained in Figure D-5.

Table D-4. HOTSPOT Output for SAE-RD-03-1.

```
"RD-03-1 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.0000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.998 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 2.55 km

FGR-11 Dose Conversion Data
```

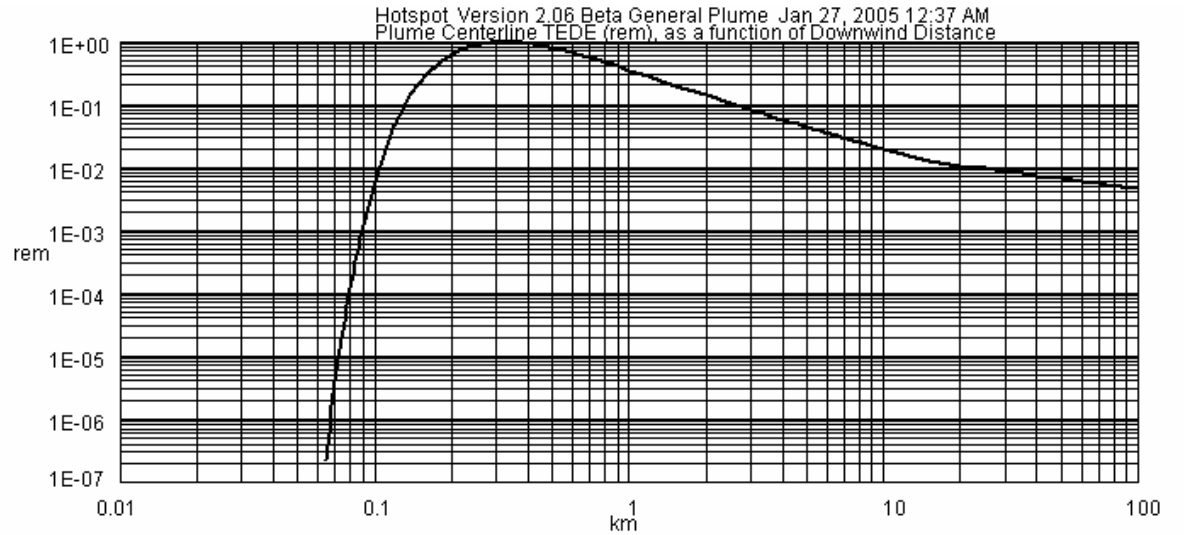
DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.2E-01	1.7E-06	1.7E-03	1.9E-11	<00:01
0.250	9.0E-01	6.9E-06	6.9E-03	7.7E-11	00:01
Maximum TEDE					
0.316	1.0E+00	7.6E-06	7.6E-03	8.5E-11	00:01
0.500	7.8E-01	6.0E-06	6.0E-03	6.7E-11	00:03
1.000	3.5E-01	2.7E-06	2.7E-03	3.0E-11	00:06
3.000	8.2E-02	6.3E-07	6.3E-04	7.0E-12	00:18
5.000	4.3E-02	3.3E-07	3.3E-04	3.7E-12	00:31
8.000	2.5E-02	1.9E-07	1.9E-04	2.1E-12	00:50
9.400	2.1E-02	1.6E-07	1.6E-04	1.8E-12	00:59

Table D-5. HOTSPOT Output for A-RD-03-1.

```
"RD-03-1 Elevated Release 95th Met Class A (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 6.7000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.976 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.42 km
```

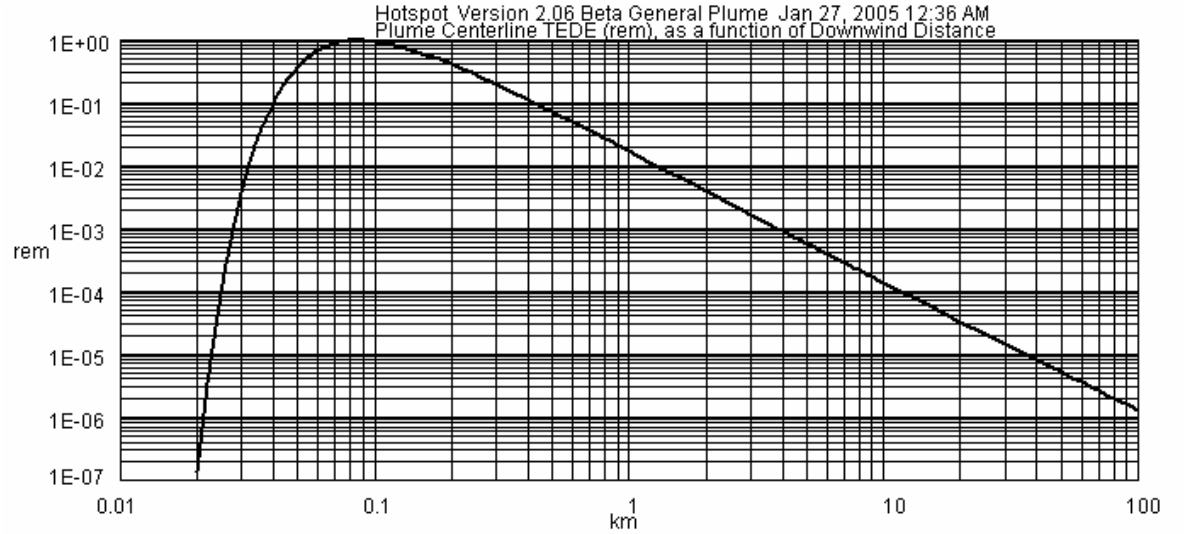
FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	3.7E-03	2.8E-08	2.8E-05	3.2E-13	<00:01
Maximum TEDE					
0.088	9.8E-01	7.5E-06	7.5E-03	8.3E-11	<00:01
0.150	6.3E-01	4.8E-06	4.8E-03	5.4E-11	00:01
0.250	2.7E-01	2.1E-06	2.1E-03	2.3E-11	00:01
0.500	7.0E-02	5.4E-07	5.4E-04	6.0E-12	00:03
1.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	00:07
3.000	1.7E-03	1.3E-08	1.3E-05	1.4E-13	00:21
5.000	5.7E-04	4.3E-09	4.3E-06	4.9E-14	00:36
8.000	2.1E-04	1.6E-09	1.6E-06	1.8E-14	00:58
9.400	1.5E-04	1.2E-09	1.2E-06	1.3E-14	01:08



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.0000E-01 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-4. SAE-RD-03-1 Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 6.7000E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.29 m/s
Stability Class (City)	: A (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: None

Figure D-5. A-RD-03-1 Plot.

Release Designation RD-07-1 / Overpressurization of a 3013 Can in the Oxide Handling Module

SAE-RD-07-1	Excess moisture present in batch containing 32 kg of PuO_2 in eight 3013 cans. Pressure builds in cans and one of the cans ruptures. Possibly indicated by: • Bulging and rupture of one 3013 can (direct onbservation). • Continuous air monitor alarms. • Stack monitor alarm.

A-RD-07-1	Excess moisture present in batch containing 32 kg of PuO_2 in eight 3013 cans. Pressure builds in cans and one of the cans ruptures. Possibly indicated by: • Bulging and rupture of one 3013 can (direct onbservation). • Continuous air monitor alarms. • Stack monitor alarm.

Assumptions:
The release comes from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.10 Pu-238eq Ci. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-6. The HOTSPOT plot is contained in Figure D-6.

The minimum source term to obtain an Alert is 0.067 Pu-238eq Ci. Class A and 1.7 m/s wind speed are the conditions that yield the Alert. If Class E stability and 1.7 m/s wind speed is used, the release overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run is contained in Table D-7. The HOTSPOT plot is contained in Figure D-7.

Table D-6. HOTSPOT Output for SAE-RD-07-1.

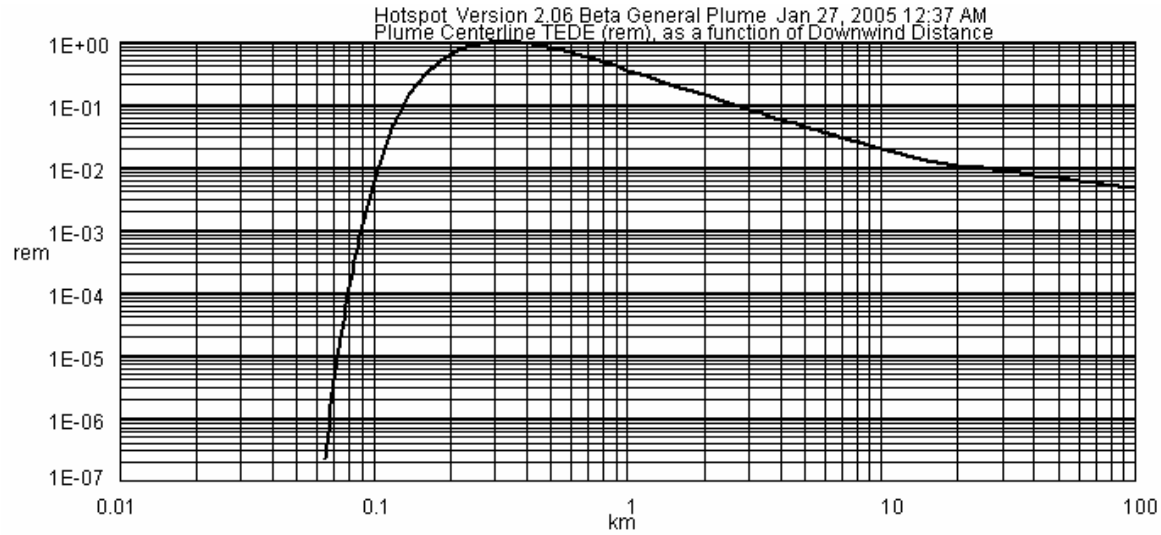
```
"RD-07-1 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.0000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.998 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 2.55 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.2E-01	1.7E-06	1.7E-03	1.9E-11	<00:01
0.250	9.0E-01	6.9E-06	6.9E-03	7.7E-11	00:01
Maximum TEDE					
0.316	1.0E+00	7.6E-06	7.6E-03	8.5E-11	00:01
0.500	7.8E-01	6.0E-06	6.0E-03	6.7E-11	00:03
1.000	3.5E-01	2.7E-06	2.7E-03	3.0E-11	00:06
3.000	8.2E-02	6.3E-07	6.3E-04	7.0E-12	00:18
5.000	4.3E-02	3.3E-07	3.3E-04	3.7E-12	00:31
8.000	2.5E-02	1.9E-07	1.9E-04	2.1E-12	00:50
9.400	2.1E-02	1.6E-07	1.6E-04	1.8E-12	00:59

Table D-7. HOTSPOT Output for A-RD-07-1.

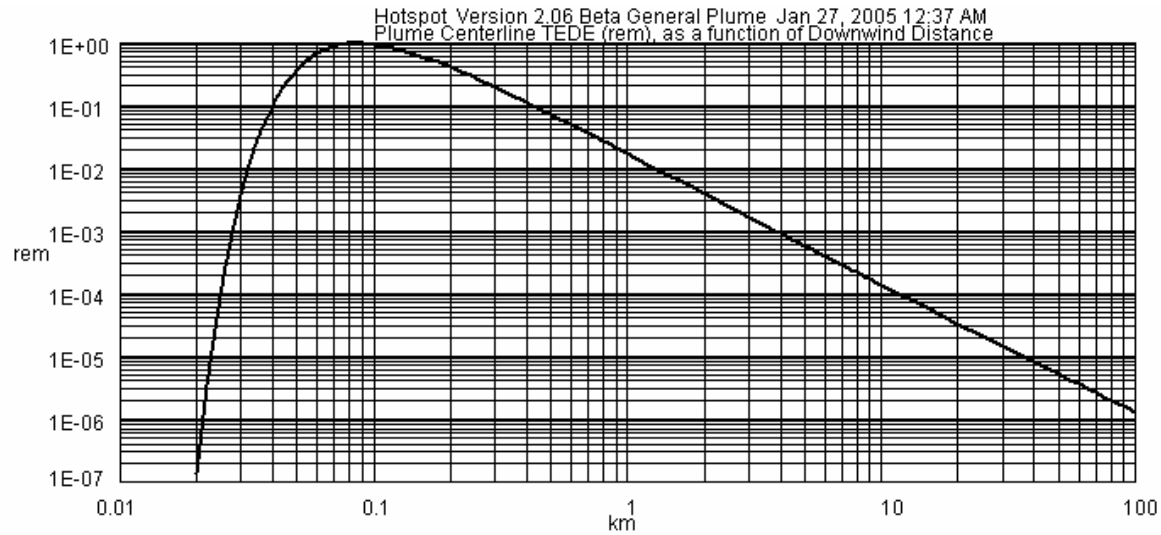
```
"RD-07-1 Elevated Release 95th Met Class A (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 6.7000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.976 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.42 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	3.7E-03	2.8E-08	2.8E-05	3.2E-13	<00:01
Maximum TEDE					
0.088	9.8E-01	7.5E-06	7.5E-03	8.3E-11	<00:01
0.150	6.3E-01	4.8E-06	4.8E-03	5.4E-11	00:01
0.250	2.7E-01	2.1E-06	2.1E-03	2.3E-11	00:01
0.500	7.0E-02	5.4E-07	5.4E-04	6.0E-12	00:03
1.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	00:07
3.000	1.7E-03	1.3E-08	1.3E-05	1.4E-13	00:21
5.000	5.7E-04	4.3E-09	4.3E-06	4.9E-14	00:36
8.000	2.1E-04	1.6E-09	1.6E-06	1.8E-14	00:58
9.400	1.5E-04	1.2E-09	1.2E-06	1.3E-14	01:08



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.0000E-01 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-6. SAE-RD-07-1 Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 6.7000E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.29 m/s
Stability Class (City)	: A (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: None

Figure D-7. A-RD-07-1 Plot.

Release Designation RD-09 / Criticality in the Product NDA Module

SAE-RD-09	Loss of material process control occurs. Containers double batched or misplaced as a result of process control loss resulting in two pallets being stacked on top of each other. Criticality involving eight 3013 cans of PuO_2 occurs, releasing plutonium oxide, noble gases, and volatile radionuclides (i.e., iodine). Possibly indicated by: • Nuclear incident monitor alarms. • Continuous air monitor alarms. • Stack monitoring alarm.

A-RD-09	Loss of material process control occurs. Containers double batched or misplaced as a result of process control loss resulting in two pallets being stacked on top of each other. Criticality involving eight 3013 cans of PuO_2 occurs, releasing plutonium oxide, noble gases, and volatile radionuclides (i.e., iodine). Possibly indicated by: • Nuclear incident monitor alarms. • Continuous air monitor alarms. • Stack monitoring alarm.

Assumptions:
Release is from 100-foot PDCF main stack.

EAL Thresholds:
The fission product source term from the criticality does not contribute significantly to the dose when compared to the plutonium source term. The minimum source term to obtain an SAE is 0.10 Pu-238eq Ci. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-8. The HOTSPOT plot is contained in Figure D-8.

The fission product source term from the criticality does not contribute significantly to the dose when compared to the plutonium source term. The minimum source term to obtain an Alert is 0.067 Pu-238eq Ci. Class A and 1.7 m/s wind speed are the conditions that yield the Alert. If Class E stability and 1.7 m/s wind speed is used, the release overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run is contained in Table D-9. The HOTSPOT plot is contained in Figure D-9.

Table D-8. HOTSPOT Output for SAE-RD-09.

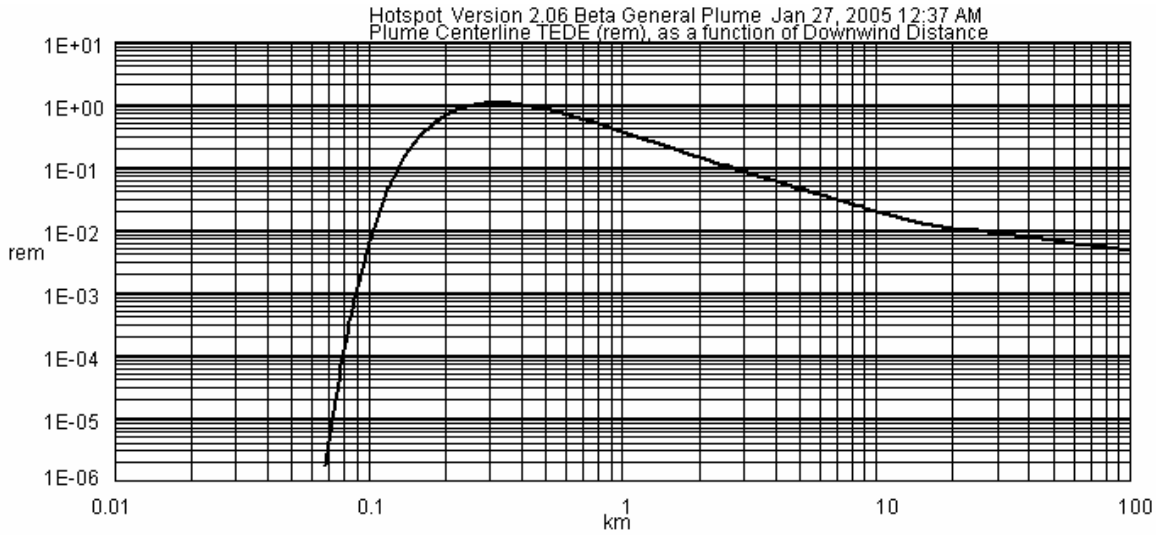
```
"RD-09 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Term                : EPHA Criticality with Pu (SAE).mix (Mixture Scale Factor =
1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 1.0 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.38 km
Exceeds Outer  Dose Out To : 2.63 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.3E-01	3.5E-02	1.0E+01	3.2E-04	<00:01
0.250	9.4E-01	1.4E-01	4.2E+01	1.3E-03	00:01
Maximum TEDE					
0.316	1.0E+00	1.6E-01	4.6E+01	1.4E-03	00:01
0.500	8.2E-01	1.2E-01	3.6E+01	1.1E-03	00:03
1.000	3.6E-01	4.7E-02	1.5E+01	4.7E-04	00:06
3.000	8.4E-02	7.6E-03	3.2E+00	9.7E-05	00:18
5.000	4.4E-02	2.9E-03	1.5E+00	4.5E-05	00:31
8.000	2.5E-02	1.2E-03	7.1E-01	2.1E-05	00:50
9.400	2.1E-02	8.4E-04	5.4E-01	1.6E-05	00:59

Table D-9. HOTSPOT Output for A-RD-09.

```
"RD-09 Elevated Release 95th Met Class A (Alert)".out
Hotspot Version 2.06

Source Term                : EPHA Criticality with Pu (Alert).mix (Mixture Scale Factor
= 1.0000E+00)
                             EPHA 1E+18 Fission Criticality with Pu Release
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.0 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.10 km
Exceeds Outer  Dose Out To : 0.43 km
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	4.0E-03	9.1E-04	2.6E-01	8.0E-06	<00:01
Maximum TEDE					
0.088	1.0E+00	2.4E-01	6.8E+01	2.1E-03	<00:01
0.150	6.8E-01	1.5E-01	4.4E+01	1.4E-03	00:01
0.250	2.9E-01	6.4E-02	1.9E+01	5.8E-04	00:01
0.500	7.5E-02	1.5E-02	4.7E+00	1.5E-04	00:03
1.000	1.8E-02	3.3E-03	1.1E+00	3.4E-05	00:07
3.000	1.7E-03	2.1E-04	9.3E-02	2.8E-06	00:21
5.000	5.9E-04	5.1E-05	2.8E-02	8.3E-07	00:36
8.000	2.2E-04	1.3E-05	8.5E-03	2.5E-07	00:58
9.400	1.6E-04	8.1E-06	5.5E-03	1.6E-07	01:08

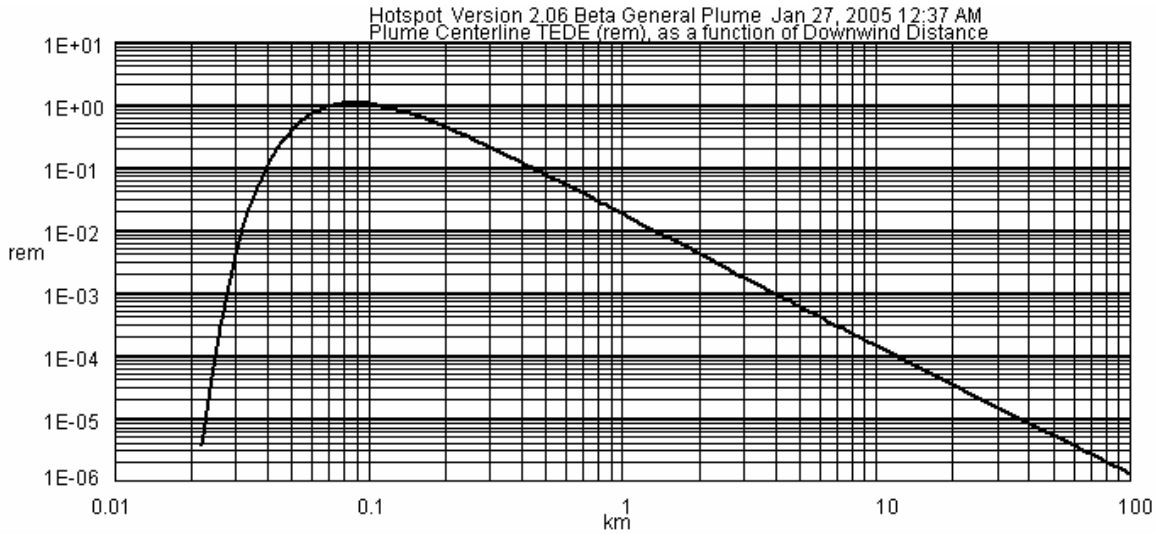


Source Material : EPHA Criticality with Pu (SAE).mix

Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s u (h=30 m) : 2.65 m/s
Stability Class (City) : E (Sample Time: 3.00 min)

Receptor Height : 0.0 m Inversion Layer Height : 300 m

Figure D-8. SAE-RD-09 Plot



Source Material : EPHA Criticality with Pu (Alert).mix

Eff. Release Height : 30 m
Wind Speed (h=10 m) : 1.7 m/s u (h=30 m) : 2.29 m/s
Stability Class (City) : A (Sample Time: 3.00 min)

Receptor Height : 0.0 m Inversion Layer Height : None

Figure D-9. A-RD-09 Plot.

Release Designation RD-12 / Earthquake-Induced Multiple-Room Fire

SAE-RD-12	Earthquake that exceeds PC-2 but not PC-3 design criteria occurs. Multiple room fire occurs in Plutonium Conversion/Separation and Inner/Outer Canning rooms. Fire suppression system fails. One or more 3013 cans fail in the fire. Possibly indicated by: • Seismic event. • Direct observation of fire occurring in Plutonium Conversion/Separation and Inner/Outer Canning or fire/smoke/heat/sprinkler alarm. • Continuous air monitor alarms. • Stack monitor alarm.

A-RD-12	Earthquake that exceeds PC-2 but not PC-3 design criteria occurs. Multiple room fire occurs in Plutonium Conversion/Separation and Inner/Outer Canning rooms. Fire suppression system fails. One or more 3013 cans fail in the fire. Possibly indicated by: • Seismic event. • Direct observation of fire occurring in Plutonium Conversion/Separation and Inner/Outer Canning or fire/smoke/heat/sprinkler alarm. • Continuous air monitor alarms. • Stack monitor alarm.

Assumptions:
A portion of the release comes from ground-level and a portion of the release is elevated, from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.019 Pu-238eq Ci (elevated) and 0.012 Pu-238eq Ci (ground-level), i.e., the combination of these two releases yields an SAE. Class E

stability and a wind speed of 1.7 m/s are the conditions that yield the SAE. The HOTSPOT runs are contained in Table D-10 and Table D-11. The HOTSPOT plots are contained in Figures D-10 and D-11.

The minimum source term to obtain an Alert is 8.3E-4 Pu-238eq Ci (ground-level). Class E stability and a wind speed of 1.7 m/s are the conditions that yield the Alert. The elevated release using Class E stability and a wind speed of 1.7 m/s overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run for the ground-level release is contained in Table D-12. The HOTSPOT plot is contained in Figure D-12.

Table D-10. HOTSPOT Output for SAE-RD-12 Elevated Release.

```
"RD-12 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.9100E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.120 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.47 km
```

FGR-11 Dose Conversion Data

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.7E-02	2.0E-07	2.0E-04	2.3E-12	<00:01
0.250	1.1E-01	8.3E-07	8.3E-04	9.3E-12	00:01
Maximum TEDE					
0.316	1.2E-01	9.2E-07	9.2E-04	1.0E-11	00:01
0.500	9.5E-02	7.2E-07	7.2E-04	8.1E-12	00:03
1.000	4.2E-02	3.2E-07	3.2E-04	3.6E-12	00:06
3.000	9.8E-03	7.5E-08	7.5E-05	8.4E-13	00:18
5.000	5.2E-03	4.0E-08	4.0E-05	4.5E-13	00:31
8.000	3.0E-03	2.3E-08	2.3E-05	2.6E-13	00:50
9.400	2.5E-03	1.9E-08	1.9E-05	2.1E-13	00:59

Table D-11. HOTSPOT Output for SAE-RD-12 Ground-Level Release.

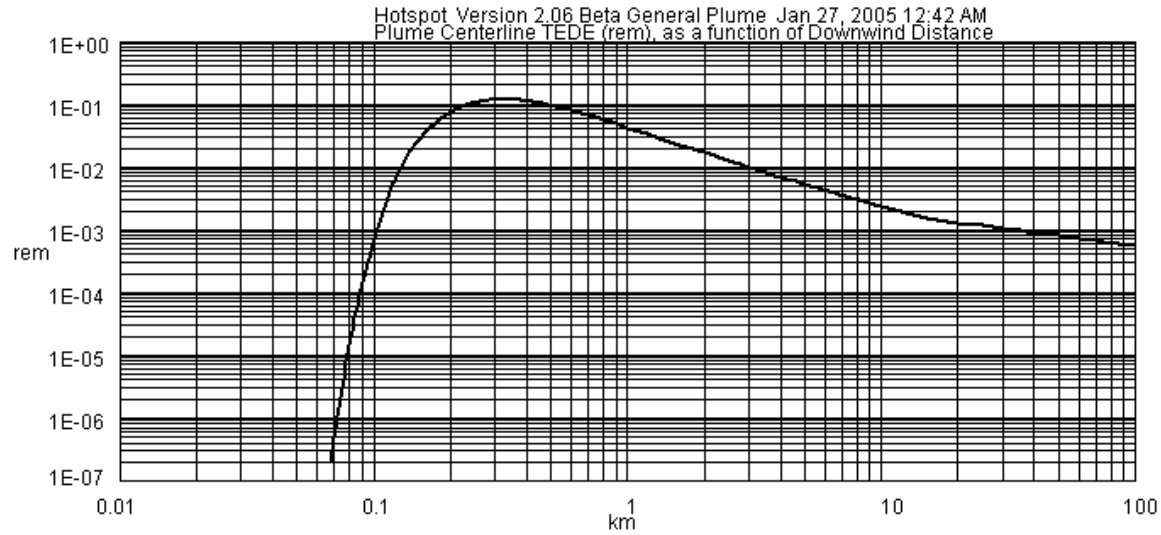
```
"RD-12 Ground Level Release 95th Met (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.1700E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   55 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.15 km
Exceeds Outer  Dose Out To : 0.54 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	5.5E+01	4.2E-04	4.2E+00	4.7E-08	<00:01
0.030	1.4E+01	1.1E-04	1.1E+00	1.2E-08	<00:01
0.150	9.7E-01	7.4E-06	7.4E-02	8.3E-10	00:01
0.250	3.9E-01	3.0E-06	3.0E-02	3.3E-10	00:02
0.500	1.2E-01	8.8E-07	8.8E-03	9.8E-11	00:04
1.000	3.7E-02	2.8E-07	2.8E-03	3.1E-11	00:09
3.000	7.2E-03	5.5E-08	5.5E-04	6.2E-12	00:29
5.000	3.7E-03	2.8E-08	2.8E-04	3.2E-12	00:49
8.000	2.1E-03	1.6E-08	1.6E-04	1.8E-12	01:18
9.400	1.7E-03	1.3E-08	1.3E-04	1.5E-12	01:32

Table D-12. HOTSPOT Output for A-RD-12 Ground-Level Release.

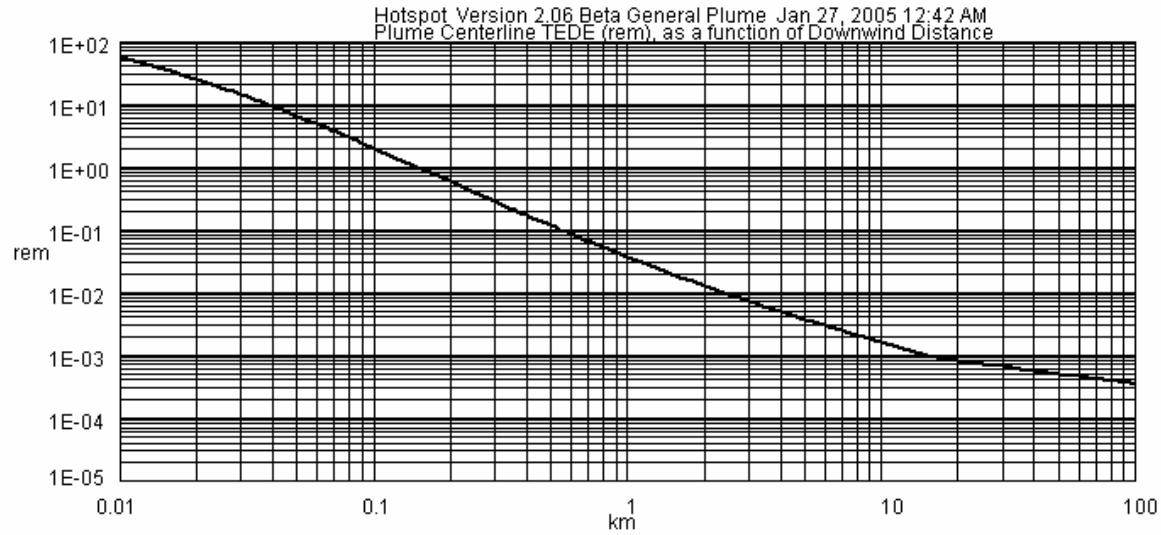
```
"RD-12 Ground Level Release 95th Met (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.00E+00 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   3.9 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.030 km
Exceeds Outer  Dose Out To : 0.12 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	3.9E+00	3.0E-05	3.0E-01	3.3E-09	<00:01
0.030	1.0E+00	7.8E-06	7.8E-02	8.7E-10	<00:01
0.150	6.9E-02	5.3E-07	5.3E-03	5.9E-11	00:01
0.250	2.8E-02	2.1E-07	2.1E-03	2.4E-11	00:02
0.500	8.2E-03	6.3E-08	6.3E-04	7.0E-12	00:04
1.000	2.6E-03	2.0E-08	2.0E-04	2.2E-12	00:09
3.000	5.1E-04	3.9E-09	3.9E-05	4.4E-13	00:29
5.000	2.6E-04	2.0E-09	2.0E-05	2.2E-13	00:49
8.000	1.5E-04	1.1E-09	1.1E-05	1.3E-13	01:18
9.400	1.2E-04	9.3E-10	9.3E-06	1.0E-13	01:32



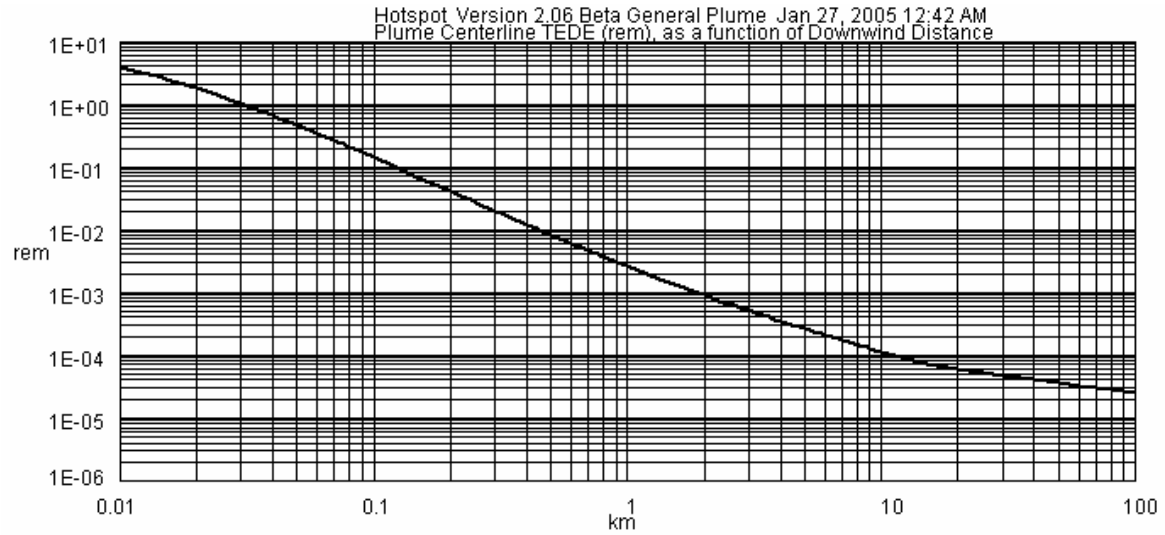
Source Material	: Pu-238 W 87.74y		
Source Term	: 1.9100E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-10. SAE-RD-12 Elevated Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.1700E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-11. SAE-RD-12 Ground-Level Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 8.3000E-04 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.00E+00 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-12. A-RD-12 Ground-Level Release Plot.

Release Designation RD-14 / Earthquake-Induced Collapse of Interior Walls

SAE-RD-14	Design Basis Earthquake occurs. Earthquake collapses internal walls. Collapsed walls cause loss of containment (failure) of gloveboxes throughout the facility. Four 3013 cans, inner cans, convenience cans, or milk bottles fail. Possibly indicated by: • Seismic event. • Direct observation of potential damage. • Continuous air monitor alarms. • Stack monitor alarms.

A-RD-14	Design Basis Earthquake occurs. Earthquake collapses internal walls. Collapsed walls cause loss of containment (failure) of gloveboxes throughout the facility. Three 3013 cans, inner cans, convenience cans, or milk bottles fail. Possibly indicated by: • Seismic event. • Direct observation of potential damage. • Continuous air monitor alarms. • Stack monitor alarms.

Assumptions:
Release is from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.10 Pu-238eq Ci. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-13. The HOTSPOT plot is contained in Figure D-13.

The minimum source term to obtain an Alert is 0.067 Pu-238eq Ci. Class A and 1.7 m/s wind speed are the conditions that yield the Alert. If Class E stability and 1.7 m/s wind speed is used, the release overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run is contained in Table D-14. The HOTSPOT plot is contained in Figure D-14.

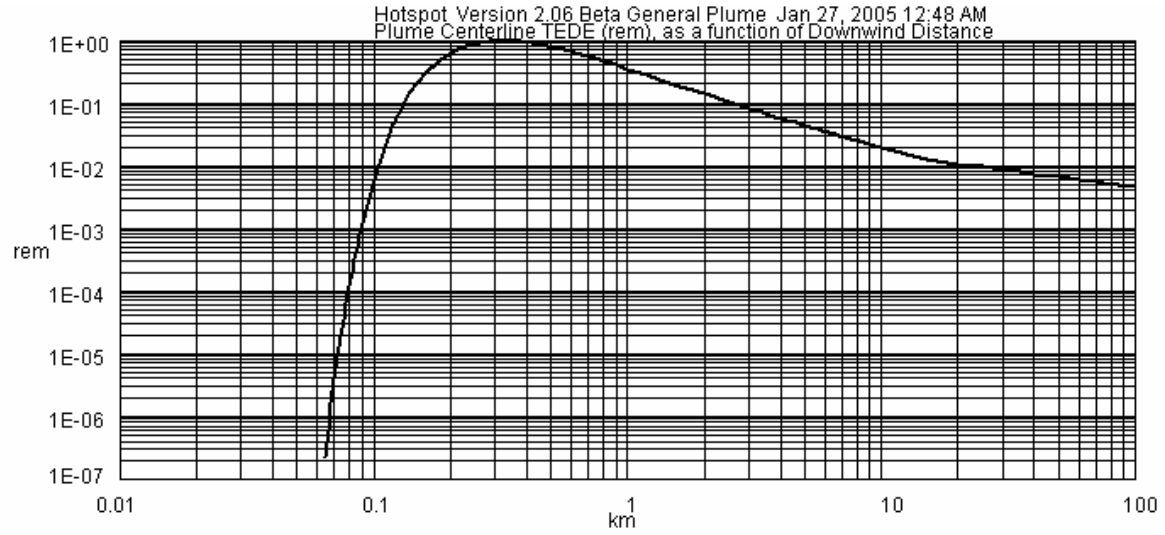
Table D-13. HOTSPOT Output for SAE-RD-14.

```
"RD-14 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.0000E-01 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.998 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 2.55 km

FGR-11 Dose Conversion Data
 DISTANCE      T E D E     TIME-INTEGRATED   GROUND SURFACE    GROUND SHINE    ARRIVAL
                          AIR CONCENTRATION    DEPOSITION       DOSE RATE       TIME
    km          (rem)        (Ci-sec)/m3        (uCi/m2)         (rem/hr)    (hour:min)
_____________________________________________________________________________________________
   0.030        0.0E+00         0.0E+00          0.0E+00          0.0E+00       <00:01
   0.150        2.2E-01         1.7E-06          1.7E-03          1.9E-11       <00:01
   0.250        9.0E-01         6.9E-06          6.9E-03          7.7E-11        00:01
 Maximum TEDE
   0.316        1.0E+00         7.6E-06          7.6E-03          8.5E-11        00:01
   0.500        7.8E-01         6.0E-06          6.0E-03          6.7E-11        00:03
   1.000        3.5E-01         2.7E-06          2.7E-03          3.0E-11        00:06
   3.000        8.2E-02         6.3E-07          6.3E-04          7.0E-12        00:18
   5.000        4.3E-02         3.3E-07          3.3E-04          3.7E-12        00:31
   8.000        2.5E-02         1.9E-07          1.9E-04          2.1E-12        00:50
   9.400        2.1E-02         1.6E-07          1.6E-04          1.8E-12        00:59
```

Table D-14. HOTSPOT Output for A-RD-14.

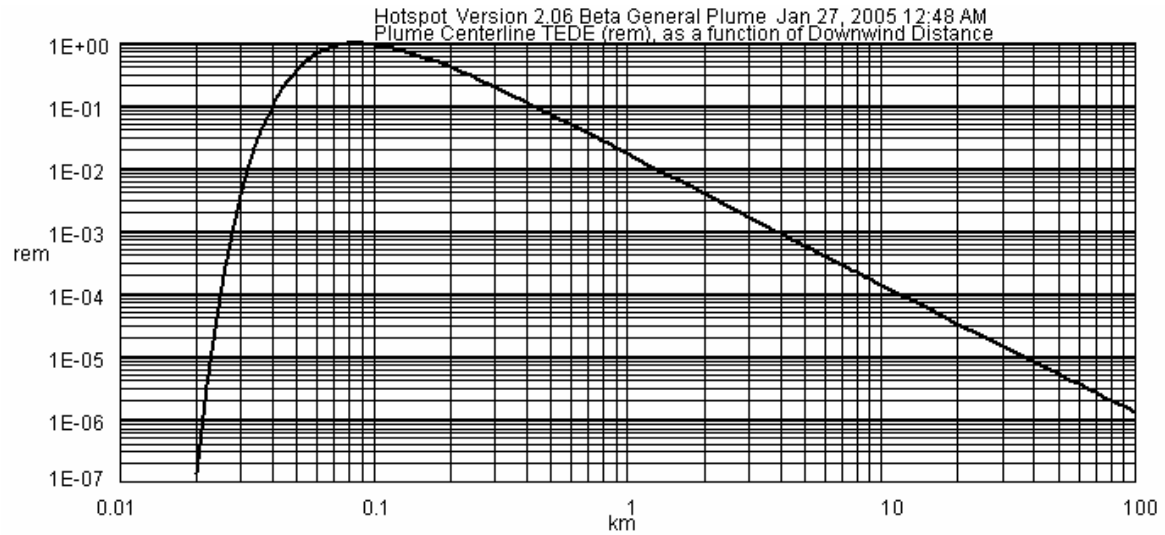
```
"RD-14 Elevated Release 95th Met Class A (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 6.7000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 0.976 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.42 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	3.7E-03	2.8E-08	2.8E-05	3.2E-13	<00:01
Maximum TEDE					
0.088	9.8E-01	7.5E-06	7.5E-03	8.3E-11	<00:01
0.150	6.3E-01	4.8E-06	4.8E-03	5.4E-11	00:01
0.250	2.7E-01	2.1E-06	2.1E-03	2.3E-11	00:01
0.500	7.0E-02	5.4E-07	5.4E-04	6.0E-12	00:03
1.000	1.7E-02	1.3E-07	1.3E-04	1.4E-12	00:07
3.000	1.7E-03	1.3E-08	1.3E-05	1.4E-13	00:21
5.000	5.7E-04	4.3E-09	4.3E-06	4.9E-14	00:36
8.000	2.1E-04	1.6E-09	1.6E-06	1.8E-14	00:58
9.400	1.5E-04	1.2E-09	1.2E-06	1.3E-14	01:08



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.0000E-01 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-13. SAE-RD-14 Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 6.7000E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.29 m/s
Stability Class (City)	: A (Sample Time: 3.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: None

Figure D-14. A-RD-14 Plot.

Release Designation RD-15 / A Tornado or Tornado-Generated Missile Impacts the SST Truck Bay

SAE-RD-15	Tornado occurs and strikes SST Truck bay at a time the SST contains 24 type B packages containing 3013 cans of PuO_2. One or more of the Type B packages struck by tornado generated missile, failing eight 3013 cans. Possibly indicated by: • Direct observation.

A-RD-15	Tornado occurs and strikes SST Truck bay at a time the SST contains 24 type B packages containing 3013 cans of PuO_2. One or more of the Type B packages struck by tornado generated missile, failing two 3013 cans. Possibly indicated by: • Direct observation.

Assumptions:
Release is from ground-level.

EAL Thresholds:
The minimum source term to obtain an SAE is 7.7E-3 Pu-238eq Ci. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-15. The HOTSPOT plot is contained in Figure D-15.

The minimum source term to obtain an Alert is 5.3E-4 Pu-238eq Ci. Class E and 1.7 m/s wind speed are the conditions that yield the Alert. The HOTSPOT run is contained in Table D-16. The HOTSPOT plot is contained in Figure D-16.

Table D-15. HOTSPOT Output for SAE-RD-15.

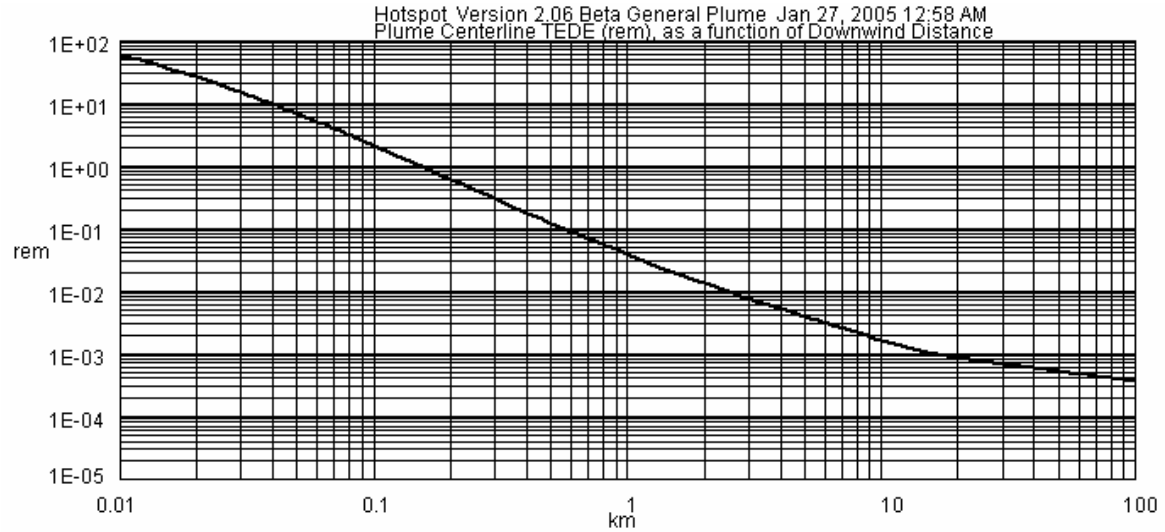
```
"RD-15 Ground Level Release 95th Met (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 7.7000E-03 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   57 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.15 km
Exceeds Outer  Dose Out To : 0.55 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	5.7E+01	4.4E-04	4.4E+00	4.9E-08	<00:01
0.030	1.5E+01	1.1E-04	1.1E+00	1.3E-08	<00:01
0.150	1.0E+00	7.8E-06	7.8E-02	8.7E-10	00:01
0.250	4.1E-01	3.1E-06	3.1E-02	3.5E-10	00:02
0.500	1.2E-01	9.2E-07	9.2E-03	1.0E-10	00:04
1.000	3.8E-02	2.9E-07	2.9E-03	3.3E-11	00:09
3.000	7.5E-03	5.8E-08	5.8E-04	6.4E-12	00:29
5.000	3.8E-03	2.9E-08	2.9E-04	3.3E-12	00:49
8.000	2.2E-03	1.7E-08	1.7E-04	1.8E-12	01:18
9.400	1.8E-03	1.4E-08	1.4E-04	1.5E-12	01:32

Table D-16. HOTSPOT Output for A-RD-15.

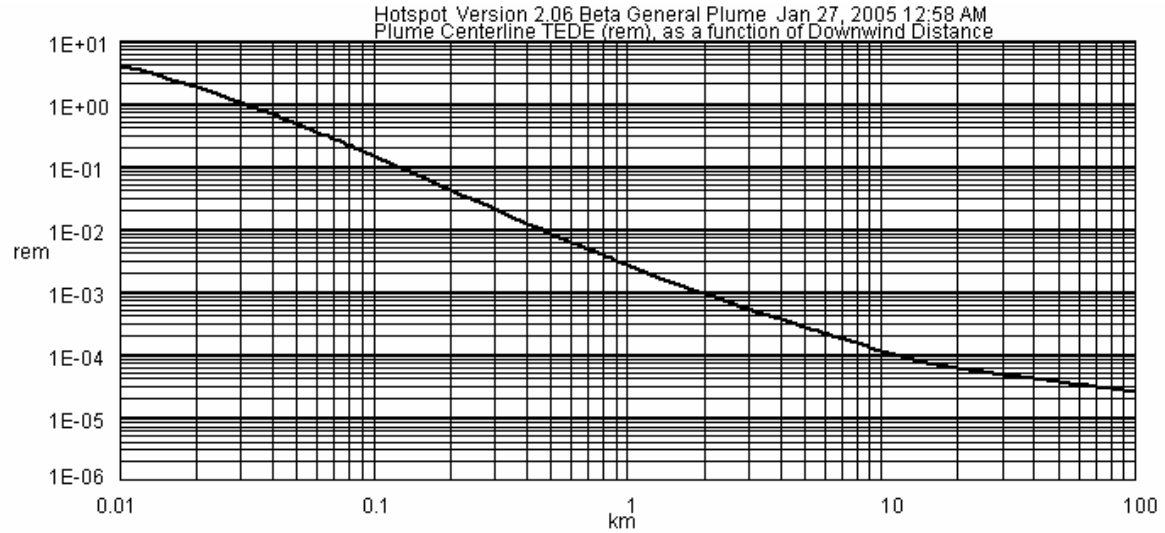
```
"RD-15 Ground Level Release 95th Met (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 5.3000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   3.9 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.030 km
Exceeds Outer  Dose Out To : 0.12 km

FGR-11 Dose Conversion Data
 DISTANCE      T E D E     TIME-INTEGRATED   GROUND SURFACE    GROUND SHINE    ARRIVAL
                          AIR CONCENTRATION    DEPOSITION       DOSE RATE       TIME
    km          (rem)        (Ci-sec)/m3        (uCi/m2)         (rem/hr)    (hour:min)
```

Maximum TEDE					
0.010	3.9E+00	3.0E-05	3.0E-01	3.4E-09	<00:01
0.030	1.0E+00	7.9E-06	7.9E-02	8.8E-10	<00:01
0.150	7.0E-02	5.3E-07	5.3E-03	6.0E-11	00:01
0.250	2.8E-02	2.1E-07	2.1E-03	2.4E-11	00:02
0.500	8.3E-03	6.3E-08	6.3E-04	7.1E-12	00:04
1.000	2.6E-03	2.0E-08	2.0E-04	2.2E-12	00:09
3.000	5.2E-04	4.0E-09	4.0E-05	4.4E-13	00:29
5.000	2.6E-04	2.0E-09	2.0E-05	2.3E-13	00:49
8.000	1.5E-04	1.1E-09	1.1E-05	1.3E-13	01:18
9.400	1.2E-04	9.4E-10	9.4E-06	1.0E-13	01:32



Source Material : Pu-238 W 87.74y
Source Term : 7.7000E-03 Ci Resp. Rel. Frac. : 1.000
Eff. Release Height : 0.00 m (Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 300 m

Figure D-15. SAE-RD-15 Plot



Source Material : Pu-238 W 87.74y
Source Term : 5.3000E-04 Ci Resp. Rel. Frac. : 1.000
Eff. Release Height : 0.00 m (Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)
Wind Speed (h=2 m) : 1.7 m/s
Stability Class (City) : E (Sample Time: 3.00 min)
Deposition Velocity : 1.0 cm/s
Receptor Height : 0.0 m Inversion Layer Height : 300 m

Figure D-16. A-RD-15 Plot.

Release Designation RD-16 / Aircraft Crash

SAE-RD-16	Airplane crashes into PDCF and catches fire. Debris from airplane breaches PDCF and fire spreads into the facility. Fire propagates into three PDCF rooms, causing one 3013 can, inner can, convenience can, or milk bottle to fail. Possibly indicated by • Direct observation of aircraft crash. • Continuous air monitor alarms. • Stack monitor alarm.

A-RD-16	Airplane crashes into PDCF and catches fire. Debris from airplane breaches PDCF and fire spreads into the facility. Fire propagates into three PDCF rooms, causing one 3013 can, inner can, convenience can, or milk bottle to fail. Possibly indicated by • Direct observation of aircraft crash. • Continuous air monitor alarms. • Stack monitor alarm.

Assumptions:
A portion of the release comes from ground-level and a portion of the release is elevated, from the 100-foot PDCF main stack.

EAL Thresholds:
The minimum source term to obtain an SAE is 0.016 Pu-238eq Ci (elevated) and 0.012 Pu-238eq Ci (ground-level), i.e., the combination of these two releases yields an SAE. Class E stability and a wind speed of 1.7 m/s are the conditions that yield the SAE. The HOTSPOT runs are contained in Table D-17 and Table D-18. The HOTSPOT plots are contained in Figures D-17 and D-18.

The minimum source term to obtain an Alert is 8.3E-4 Pu-238eq Ci (ground-level). Class E stability and a wind speed of 1.7 m/s are the conditions that yield the Alert. The elevated release using Class E stability and a wind speed of 1.7 m/s overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run for the ground-level release is contained in Table D-19. The HOTSPOT plot is contained in Figure D-19.

Table D-17. HOTSPOT Output for SAE-RD-16 Elevated Release.

```
"RD-16 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.6000E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.10 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.101 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.34 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
0.030	0.0E+00	0.0E+00	0.0E+00	0.0E+00	<00:01
0.150	2.2E-02	1.7E-07	1.7E-04	1.9E-12	<00:01
0.250	9.1E-02	7.0E-07	7.0E-04	7.8E-12	00:01
Maximum TEDE					
0.316	1.0E-01	7.7E-07	7.7E-04	8.6E-12	00:01
0.500	7.9E-02	6.1E-07	6.1E-04	6.8E-12	00:03
1.000	3.5E-02	2.7E-07	2.7E-04	3.0E-12	00:06
3.000	8.2E-03	6.3E-08	6.3E-05	7.1E-13	00:18
5.000	4.4E-03	3.3E-08	3.3E-05	3.7E-13	00:31
8.000	2.5E-03	1.9E-08	1.9E-05	2.1E-13	00:50
9.400	2.1E-03	1.6E-08	1.6E-05	1.8E-13	00:59

Table D-18. HOTSPOT Output for SAE-RD-16 Ground-Level Release.

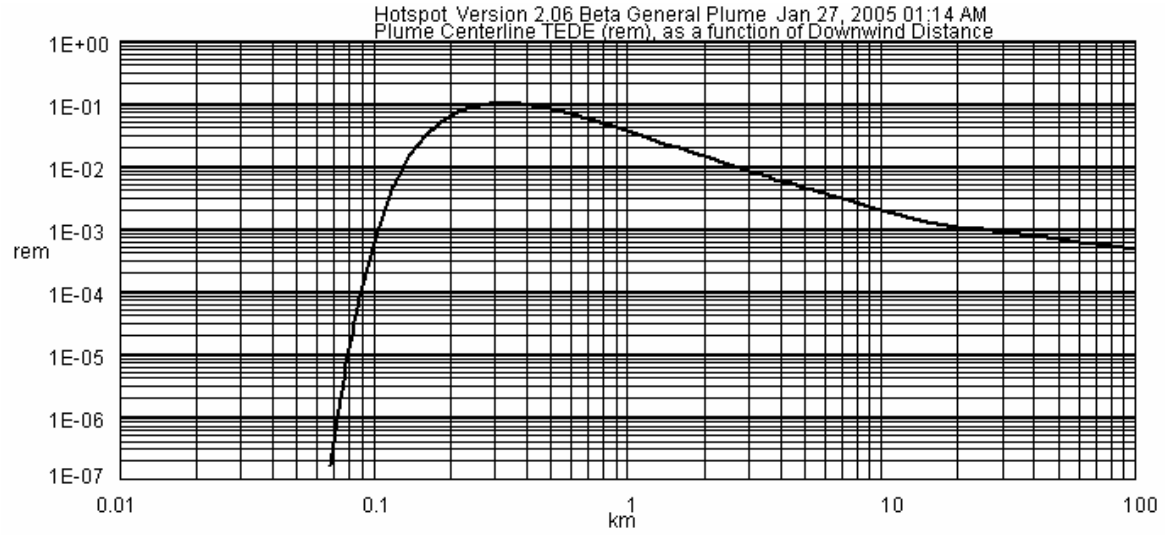
```
"RD-16 Ground Level Release 95th Met (SAE)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 1.1800E-02 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   55 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.15 km
Exceeds Outer  Dose Out To : 0.54 km

FGR-11 Dose Conversion Data
```

DISTANCE km	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
Maximum TEDE					
0.010	5.5E+01	4.2E-04	4.2E+00	4.7E-08	<00:01
0.030	1.4E+01	1.1E-04	1.1E+00	1.2E-08	<00:01
0.150	9.8E-01	7.5E-06	7.5E-02	8.4E-10	00:01
0.250	3.9E-01	3.0E-06	3.0E-02	3.4E-10	00:02
0.500	1.2E-01	8.9E-07	8.9E-03	9.9E-11	00:04
1.000	3.7E-02	2.8E-07	2.8E-03	3.1E-11	00:09
3.000	7.3E-03	5.6E-08	5.6E-04	6.2E-12	00:29
5.000	3.7E-03	2.8E-08	2.8E-04	3.2E-12	00:49
8.000	2.1E-03	1.6E-08	1.6E-04	1.8E-12	01:18
9.400	1.7E-03	1.3E-08	1.3E-04	1.5E-12	01:32

Table D-19. HOTSPOT Output for A-RD-16 Ground-Level Release.

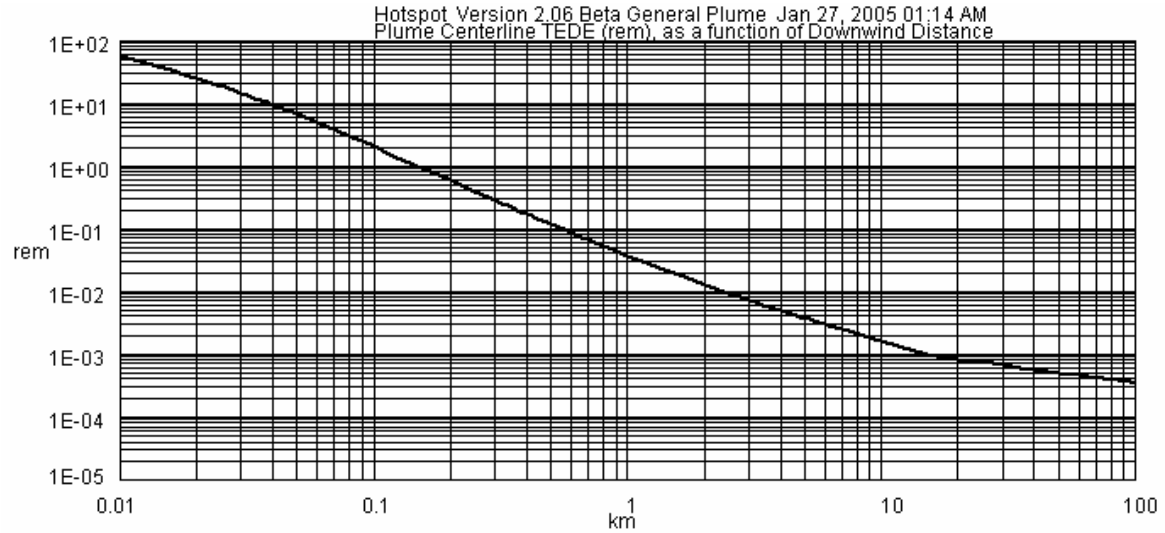
```
"RD-16 Ground Level Release 95th Met (Alert)".out
Hotspot Version 2.06

Source Material            : Pu-238  W   87.74y
Source Term                : 8.3000E-04 Ci
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Vertical Height            : 3.00E+00 m
Horizontal Width           : 3.0 m
Effective Release Height   : 0.00 m
Wind Speed (h=2 m)         : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Stability Class (City)     : E
Respirable Dep. Vel.       : 1.00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 30.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.010 km
MAXIMUM TEDE               :   3.9 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.030 km
Exceeds Outer  Dose Out To : 0.12 km

FGR-11 Dose Conversion Data
 DISTANCE      T E D E     TIME-INTEGRATED   GROUND SURFACE    GROUND SHINE    ARRIVAL
                          AIR CONCENTRATION    DEPOSITION       DOSE RATE       TIME
    km          (rem)        (Ci-sec)/m3        (uCi/m2)         (rem/hr)    (hour:min)
```

Maximum TEDE					
0.010	3.9E+00	3.0E-05	3.0E-01	3.3E-09	<00:01
0.030	1.0E+00	7.8E-06	7.8E-02	8.7E-10	<00:01
0.150	6.9E-02	5.3E-07	5.3E-03	5.9E-11	00:01
0.250	2.8E-02	2.1E-07	2.1E-03	2.4E-11	00:02
0.500	8.2E-03	6.3E-08	6.3E-04	7.0E-12	00:04
1.000	2.6E-03	2.0E-08	2.0E-04	2.2E-12	00:09
3.000	5.1E-04	3.9E-09	3.9E-05	4.4E-13	00:29
5.000	2.6E-04	2.0E-09	2.0E-05	2.2E-13	00:49
8.000	1.5E-04	1.1E-09	1.1E-05	1.3E-13	01:18
9.400	1.2E-04	9.3E-10	9.3E-06	1.0E-13	01:32



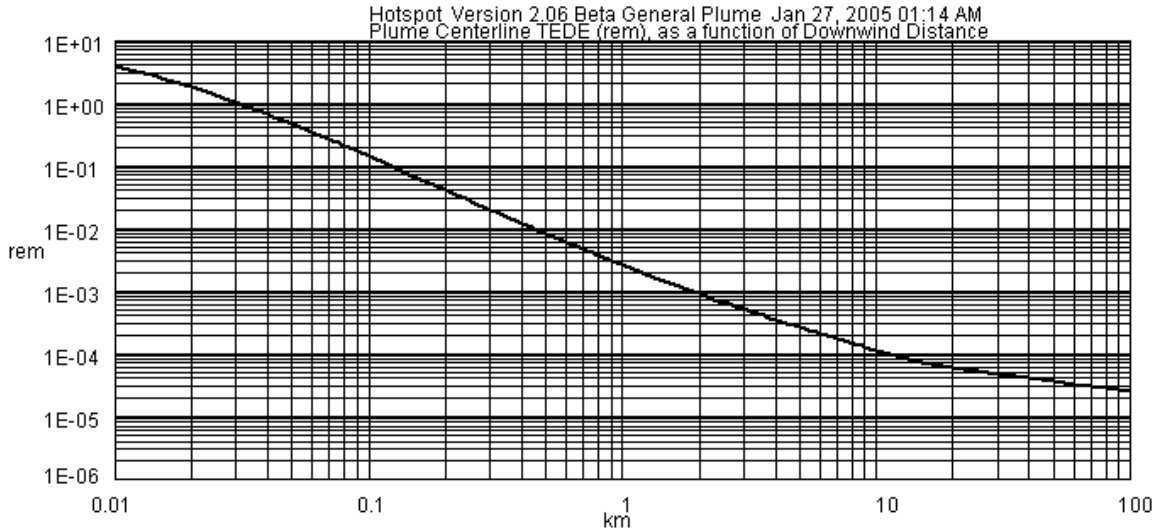
Source Material	: Pu-238 W 87.74y		
Source Term	: 1.6000E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 0.1 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-17. SAE-RD-16 Elevated Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 1.1800E-02 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-18. SAE-RD-16 Ground-Level Release Plot.



Source Material	: Pu-238 W 87.74y		
Source Term	: 8.3000E-04 Ci	Resp. Rel. Frac.	: 1.000
Eff. Release Height	: 0.00 m	(Horizontal Width = 3.0 m Vertical Height = 3.00E+00 m)	
Wind Speed (h=2 m)	: 1.7 m/s		
Stability Class (City)	: E (Sample Time: 30.00 min)		
Deposition Velocity	: 1.0 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-19. A-RD-16 Ground-Level Release Plot.

Release Designation RD-17-1 / Tritium Releases

SAE-RD-17-1	Fire or explosion occurs in SRL Module where tritium is collected. 54 grams of tritium present in three HTVs in the SRL room. All three HTVs damaged in fire or explosion, exposing UT3 to air and releasing HTO. Possibly indicated by: • Direct observation. • Tritium air monitors. • Continuous air monitor alarms. • Stack monitor alarm.

A-RD-17-1	Fire or explosion occurs in SRL Module where tritium is collected. 54 grams of tritium present in three HTVs in the SRL room. Two HTVs damaged in fire or explosion, exposing UT3 to air and releasing HTO. Possibly indicated by: • Direct observation. • Tritium air monitors. • Continuous air monitor alarms. • Stack monitor alarm.

Assumptions:
Release is from the 100-foot PDCF main stack. Release is 100 percent tritium oxide (HTO).

EAL Thresholds:
The minimum source term to obtain an SAE is 400,000 Ci of H-3. Class E stability and 1.7 m/s wind speed are the conditions that yield the SAE. The HOTSPOT run is contained in Table D-20. The HOTSPOT plot is contained in Figure D-20.

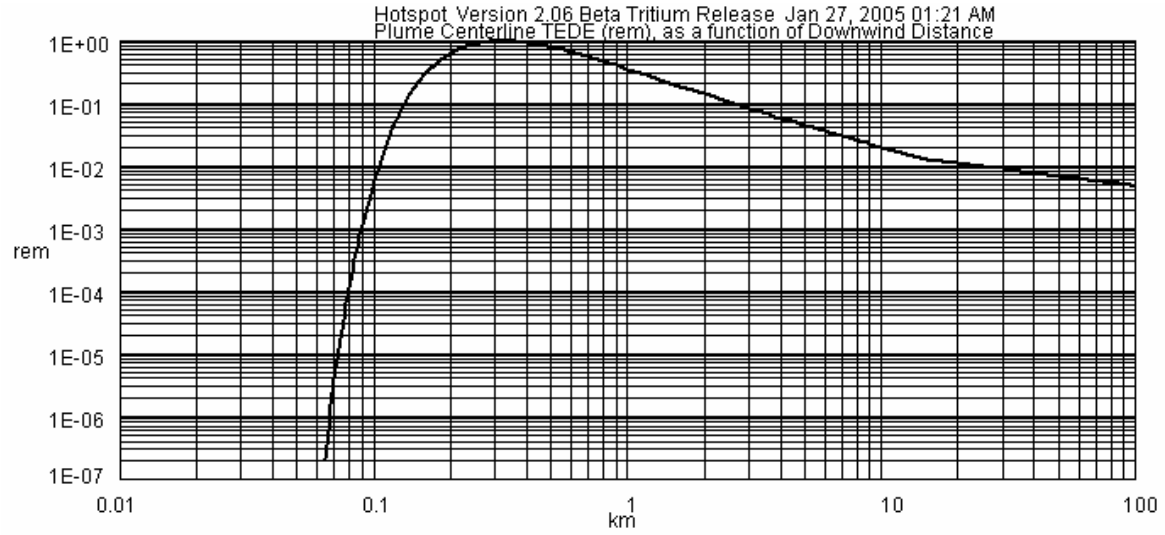
The minimum source term to obtain an Alert is 280,000 Ci of H-3. Class A and 1.7 m/s wind speed are the conditions that yield the Alert. If Class E stability and 1.7 m/s wind speed is used, the release overshoots the receptor at 30 to 150 m, resulting in 0.0 dose. The HOTSPOT run is contained in Table D-21. The HOTSPOT plot is contained in Figure D-21.

Table D-20. HOTSPOT Output for SAE-RD-17-1.

```
"RD-17-1 Elevated Release 95th Met Class E (SAE)".out
Hotspot Version 2.06

Source Material            : Tritium
Total Tritium Release      : 4.0000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.65 m/s
Stability Class (City)     : E
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     : 300 m
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.32 km
MAXIMUM TEDE               : 0.982 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 2.55 km

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption
 DISTANCE      T E D E        TIME-INTEGRATED       ARRIVAL TIME
                              AIR CONCENTRATION
    km          (rem)           (Ci-sec)/m3          (hour:min)
 ____________________________________________________________________
   0.030        0.0E+00          0.0E+00               <00:01
   0.150        2.2E-01          6.8E+00               <00:01
   0.250        8.9E-01          2.8E+01                00:01
 Maximum TEDE
   0.319        9.8E-01          3.1E+01                00:02
   0.500        7.7E-01          2.4E+01                00:03
   1.000        3.5E-01          1.1E+01                00:06
   3.000        8.2E-02          2.6E+00                00:18
   5.000        4.4E-02          1.4E+00                00:31
   8.000        2.5E-02          7.9E-01                00:50
   9.400        2.1E-02          6.6E-01                00:59
```

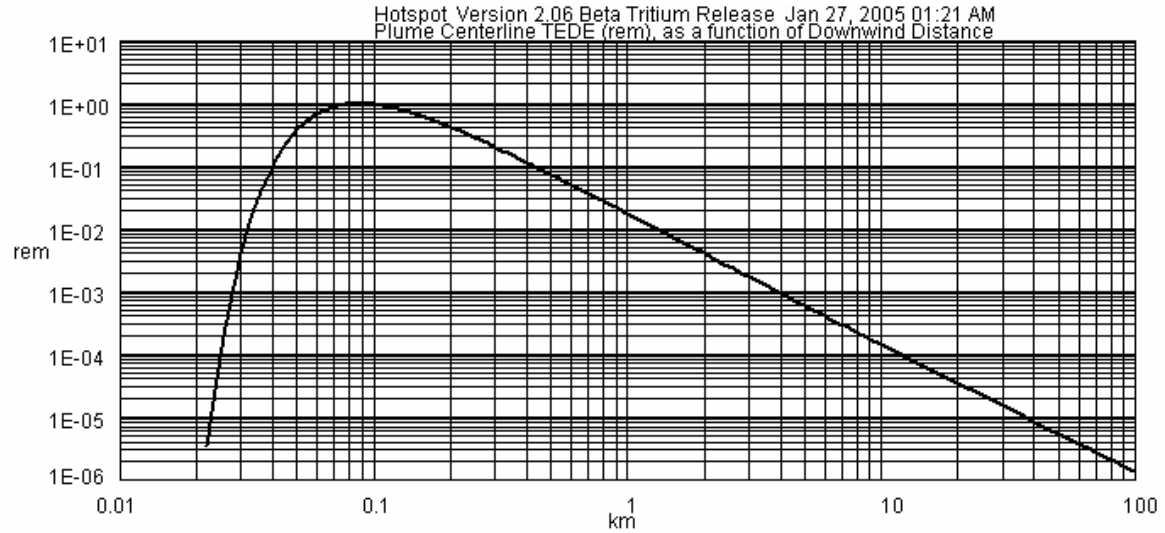
Table D-21. HOTSPOT Output for A-RD-17-1.

```
"RD-17-1 Elevated Release 95th Met Class A (Alert)".out
Hotspot Version 2.06

Source Material            : Tritium
Total Tritium Release      : 2.8000E+05 Ci  100 % Tritium Oxide
Airborne Fraction          : 1.000
Respirable Fraction        : 1.000
Respirable Release Fraction: 1.000
Effective Release Height   : 30 m
Wind Speed (h=10 m)        : 1.7 m/s
Distance Coordinates       : All distances are on the Plume Centerline
Wind Speed (h=H-eff)       : 2.29 m/s
Stability Class (City)     : A
Respirable Dep. Vel.       : 0.00E+00 cm/s
Non-respirable Dep. Vel.   : 8.00 cm/s
Receptor Height            : 0.0 m
Inversion Layer Height     :  None
Sample Time                : 3.000 min
Breathing Rate             : 3.33E-04 m3/sec

Maximum Dose Distance      : 0.088 km
MAXIMUM TEDE               : 1.0 rem

Inner  Contour Dose        : 1.00E+02 rem
Middle Contour Dose        : 1.0 rem
Outer  Contour Dose        : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : 0.089 km
Exceeds Outer  Dose Out To : 0.43 km

FGR-11 Dose Conversion Data
Note: Dose Results Include HTO Skin Absorption
 DISTANCE      T E D E        TIME-INTEGRATED       ARRIVAL TIME
                              AIR CONCENTRATION
    km          (rem)           (Ci-sec)/m3          (hour:min)
 ____________________________________________________________________
   0.030        3.8E-03          1.2E-01               <00:01
 Maximum TEDE
   0.088        1.0E+00          3.1E+01               <00:01
   0.150        6.5E-01          2.0E+01                00:01
   0.250        2.8E-01          8.7E+00                00:01
   0.500        7.2E-02          2.3E+00                00:03
   1.000        1.7E-02          5.4E-01                00:07
   3.000        1.7E-03          5.3E-02                00:21
   5.000        5.9E-04          1.8E-02                00:36
   8.000        2.2E-04          6.9E-03                00:58
   9.400        1.6E-04          4.9E-03                01:08
```



Source Material	: Tritium		
Total Tritium Release	: 4.0000E+05 Ci (100 % Tritium Oxide)		
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.65 m/s
Stability Class (City)	: E (Sample Time: 3.00 min)		
Deposition Velocity	: 0.00E+00 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: 300 m

Figure D-20. SAE-RD-17-1 Plot.



Source Material	: Tritium		
Total Tritium Release	: 2.8000E+05 Ci (100 % Tritium Oxide)		
Eff. Release Height	: 30 m		
Wind Speed (h=10 m)	: 1.7 m/s	u (h=30 m)	: 2.29 m/s
Stability Class (City)	: A (Sample Time: 3.00 min)		
Deposition Velocity	: 0.00E+00 cm/s		
Receptor Height	: 0.0 m	Inversion Layer Height	: None

Figure D-21. A-RD-17-1 Plot.

Release Designation C-01 / Spill of 5 liters of Hydrochloric Acid

A-RD-C-01	Due to a forklift puncture or operator error two 2.5-liter (L) bottles of 36 weight percent hydrochloric acid break, resulting in an unconfined spill. An earthquake or other natural phenomenon could also cause this accident. Possibly indicated by: • Visual and/or probable olfactory detection of spilled hydrochloric acid.

Assumptions:
Release is from ground-level.

The releases from this accident were estimated using the ALOHA Evaporation Calculator for 36 weight percent hydrochloric acid.

EAL Threshold:
The EAL for an Alert is a concentration of 20 ppm (the ERPG-2 value) at 30 m from the spill, using adverse meteorological conditions (Stability Class E, 1.7 m/s wind speed).

If the hydrochloric acid spill is modeled as a heavy gas, the minimum spill necessary for an Alert is about 0.75 liters, based on a release rate of 0.33 g/s (see Table D-22).

If the hydrochloric acid spill is not modeled as a heavy gas, minimum spill necessary for an Alert is about 2 liters, based on a release rate of 0.84 g/s (see Table D-23).

Because of this uncertainty, the EAL threshold was set at a spill of greater than 1.0 liters of 36 wt. % hydrochloric acid.

Table D-22. ALOHA Output for A-RD-C-01 (Heavy Gas Dispersion).

```
SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from n at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: urban or forest
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.33 grams/sec          Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 19.8 grams/min
   Total Amount Released: 297 grams
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION: (HEAVY GAS SELECTED)
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 11 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 30 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 78 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration/Dose Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 19.5 ppm
      Indoor:  1.98 ppm
```

Table D-23. ALOHA Output for A-RD-C-01 (Gaussian dispersion).

```
SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: urban or forest
   Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:
   Direct Source: .84 grams/sec           Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 50.4 grams/min
   Total Amount Released: 756 grams
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION: (GAUSS SELECTED)
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 11 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 30 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 78 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration/Dose Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 19.8 ppm
      Indoor:  2.06 ppm
```

Release Designation C-02 / Spill of 16 liters of Hydrochloric Acid

A-RD-C-02	Due to a forklift puncture or operator error four 4-liter (L) bottles of 36 weight percent hydrochloric acid break, resulting in an unconfined spill. An earthquake or other natural phenomenon could also cause this accident. Possibly indicated by: • Visual and/or probable olfactory detection of spilled hydrochloric acid.

Assumptions:
Release is from ground-level.

The releases from this accident were estimated using the ALOHA Evaporation Calculator for 36 weight percent hydrochloric acid.

EAL Threshold:
The EAL for an Alert is a concentration of 20 ppm (the ERPG-2 value) at 30 m from the spill, using adverse meteorological conditions (Stability Class E, 1.7 m/s wind speed).

If the hydrochloric acid spill is modeled as a heavy gas, the minimum spill necessary for an Alert is about 0.75 liters, based on a release rate of 0.33 g/s (see Table D-24).

If the hydrochloric acid spill is not modeled as a heavy gas, minimum spill necessary for an Alert is about 2 liters, based on a release rate of 0.84 g/s (see Table D-25).

Because of this uncertainty, the EAL threshold was set at a spill of greater than 1.0 liters of 36 wt. % hydrochloric acid.

Table D-24. ALOHA Output for A-RD-C-02 (Heavy Gas Dispersion).

```
SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from n at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: urban or forest
   Cloud Cover: 1 tenths

 SOURCE STRENGTH INFORMATION:
   Direct Source: 0.33 grams/sec          Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 19.8 grams/min
   Total Amount Released: 297 grams
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION: (HEAVY GAS SELECTED)
   Model Run: Heavy Gas
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 11 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 30 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 78 meters
   Note: Footprint was not drawn because effects of
     near-field patchiness make dispersion predictions
     unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration/Dose Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 19.5 ppm
      Indoor:  1.98 ppm
```

Table D-25. ALOHA Output for A-RD-C-02 (Gaussian dispersion).

```
SITE DATA INFORMATION:
   Location: AIKEN, SOUTH CAROLINA
   Building Air Exchanges Per Hour: 0.44 (sheltered single storied)
   Time: June 30, 2005  2359 hours EDT (user specified)

 CHEMICAL INFORMATION:
   Warning: HYDROGEN CHLORIDE can react with water and/or water
   vapor.  This can affect the evaporation rate and downwind
   dispersion.  ALOHA cannot accurately predict the air hazard if
   this substance comes in contact with water.
   Chemical Name: HYDROGEN CHLORIDE       Molecular Weight: 36.46 g/mol
   ERPG-3: 150 ppm    ERPG-2: 20 ppm      ERPG-1: 3 ppm
   IDLH: 50 ppm
   Normal Boiling Point: -85.0° C         Ambient Boiling Point: -85.4° C
   Vapor Pressure at Ambient Temperature: greater than 1 atm
   Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

 ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)
   Wind: 1.7 meters/sec from N at 2 meters
   Inversion Height: 300 meters
   Stability Class: E                     Air Temperature: 29° C
   Relative Humidity: 50%                 Ground Roughness: urban or forest
   Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:
   Direct Source: .84 grams/sec           Source Height: 0
   Release Duration: 15 minutes
   Release Rate: 50.4 grams/min
   Total Amount Released: 756 grams
   Note: This chemical may flash boil and/or result in two phase flow.

 FOOTPRINT INFORMATION: (GAUSS SELECTED)
   Dispersion Module: Gaussian
   Red LOC (150 ppm = ERPG-3) Max Threat Zone: 11 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Orange LOC (20 ppm = ERPG-2) Max Threat Zone: 30 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.
   Yellow LOC (3 ppm = ERPG-1) Max Threat Zone: 78 meters
   Note: Footprint was not drawn because
      effects of near-field patchiness make dispersion
      predictions unreliable for short distances.

 TIME DEPENDENT INFORMATION:
   Concentration/Dose Estimates at the point:
   Downwind:       30 meters
   Off Centerline: 0 meters
   Max Concentration:
      Outdoor: 19.8 ppm
      Indoor:  2.06 ppm
```

Appendix E

PDCF Materials Inventory and

Release Fraction Information

E.1 Materials Inventory

Table E.1-1. Facility Hazardous Materials Screening for the Receiving and Unpacking Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Safe Secure Trailer (SST) Dock	Pu metal (pits) 24 pits in shipping containers (SCs) (Max MAR of 156 kilograms [kg])
Radioactive Material	Cargo Restraint Transporter (CRT) Vault	Pu metal (pits) 24 pits in SCs (Max MAR of 156 kg)
Radioactive Material	CRT Unpacking/Packing Area	Pu metal (pits) four pits in SCs (Max MAR of 26 kg)
Radioactive Material	Receiving NDA Area	Pu metal (pits) three pits in NDA units (Max MAR of 19.5 kg) Cf-252 NDA Shuffler and a Gamma Ray Isotopic System (GRIS) unit Max MAR of 500 micrograms [µg] Cf-252)
Radioactive Material	SC Packing/Unpacking Area	Pu metal (pits) one pit in containment vessel (Max MAR of 6.5 kg)
Radioactive Material	Containment Vessel Transfer Area/Tilt Table	Pu metal (pits) one pit in containment vessel (Max MAR of 6.5 kg)
Radioactive Material	Containment Vessel Unpacking Area	Pu metal (pits) one pit in basket (Max MAR of 6.5 kg)
Radioactive Material	CRT Receiving and Inspection Area	Transuranic (TRU) waste/satellite collection 5-gal can – foot-actuated cover
Radioactive Material	CRT Receiving and Inspection Area	Low-level waste (LLW)/satellite collection 5-gal can – foot-actuated cover
Hazardous Material	Containment Vessel Unpacking Area	Beryllium – **(cv)**[b]
Radioactive Material	SST Dock	Pu metal 24 cans in 9975 containers (Max MAR of 105.6 kg)
Radioactive Material	CRT Vault	Pu metal 24 cans in 9975 containers (Max MAR of 105.6 kg)
Radioactive Material	CRT Unpacking/Packing Area	Pu metal four cans in 9975 containers (Max MAR of 17.6 kg)
Radioactive Material	Shipping & Receiving NDA Area	Pu metal three cans in NDA units (Max MAR of 13.2 kg) Cf-252 NDA Shuffler and a GRIS units Max MAR of 500 µg of Cf-252)
Radioactive Material	SC Packing/Unpacking Area	Pu metal four cans in 3013 cans (Max MAR of 17.6 kg)
Radioactive Material	3013 Transfer Area/Tilt Table	Pu metal four cans in 3013 cans (Max MAR of 17.6 kg)
Radioactive Material	3013 Unpacking Area	Pu metal one can in 3013 cans in basket (Max MAR of 4.4 kg)
Radioactive Material	CRT Receiving and Inspection Area	TRU waste/satellite collection 5-gal can – foot-actuated cover
Radioactive Material	CRT Receiving and Inspection Area	LLW/satellite collection 5-gal can – foot-actuated cover

a. Maximum inventories tabulated.
b. **(cv)** = classified value.

Table E.1-2. Facility Hazardous Materials Screening for the Vaults Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	CRT Vault	Pu (pits/metal in FL-like SC or PuO_2 in 9975 – four per CRT) Maximum of 624 kg (96 pits) or 480 kg (96 9975 cans – 5 kg each) for all storage locations
	Main Vault	Pu (pits/metal in containment vessel or PuO_2/U_3O_8 in 3013) Maximum of 1200 pallet storage locations (four cans/pallet) = 24,000 kg PuO_2 (4800 locations of 3013 cans) for all storage locations
	Main Vault Vestibule	Pu (pits/metal in containment vessel or PuO_2/U_3O_8 in 3013 cans) = 280 kg PuO_2 (56 locations of 3013 cans) for all storage locations
	Interim Storage Area	PuO_2 (Pu in milk bottles) Maximum of 750 kg (150 containers – 5 kg each) for all storage locations
	Product Vault	PuO_2 (Pu in 3013 cans and 9975 SCs) Maximum of 112 pallet storage locations (four cans/pallet) and 48 SCs = 2480 kg PuO_2 (448 cans – 5 kg each) for all storage locations
	Product Vault Vestibule	Pu (in 3013 cans) on 14 pallets (four cans/pallet) = 280 kg PuO_2 (56 locations of 3013 cans) for all storage locations
Radioactive Material	Forklift movement within CRT Vault	Pu (pits/metal in FL-like SC or PuO_2 in 9975 – four per CRT) Maximum of 26 kg Pu metal (four pits) for forklift CRT movement
	AGV movement within Main Vault	Pu (pits/metal in containment vessel or PuO_2/U_3O_8 in 3013) Maximum of 20 kg PuO_2 (four cans) on pallet for AGV 3013 cans movement or one pit/metal piece per containment vessel movement
	Overhead crane movement within Interim Storage area	PuO_2 (Pu in milk bottles) Maximum of 5 kg (one container/can) for overhead crane movement
	AGV movement within Product Vault	PuO_2 (Pu in 3013 cans) Maximum of 20 kg (four cans) on pallet for AGV 3013 cans movement
Hazardous Material	CRT Vault and Main Vault	Beryllium – **(cv)**

a. Maximum inventories tabulated.

Table E.1-3. Facility Hazardous Materials Screening for the Pit Disassembly Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	Pit Disassembly Module – Lag Storage Input	Pu metal – one pit (Max MAR of 6.5 kg - one pit) or 4.4 kg metal pieces
Radioactive Material	Pit Disassembly Module – Glovebox	Pu metal (Max MAR of 6.5 kg - one pit in the lathe)
Radioactive Material	Pit Disassembly Module – Glovebox	Pu oxide (PuO_2) – 5 kg – one can Note: It is assumed that if a 3013 can is introduced into Pit Disassembly for opening, all other material will be removed.
Radioactive Material	Pit Disassembly Module Glovebox – Lag Storage Output (Post-bisector/Lathe)	Pu metal - 4 kg in four locations – total 16 kg
Hazardous Material	Pit Disassembly Module	Beryllium - **(cv)**
Radioactive Material	Pit Disassembly Module Room/Satellite Waste Collection (Maintenance side)	TRU waste/satellite collection 55-gal drum – Potential for 246 grams (g) PuO_2 (Waste Isolation Pilot Plant [WIPP] Waste Acceptance Criteria [WAC] limit of 200 Pu-239 equivalents)
Radioactive Material	Pit Disassembly Module Room/Satellite Waste Collection (Maintenance side)	LLW/satellite collection 55-gal drum

a. Maximum inventories tabulated.

Table E.1-4. Facility Hazardous Materials Screening for the SRL Module

Hazard Type	Location/Activity	Type/Form/Quantity per Glovebox (GB) Line
New HTVs		
Radioactive Material	HTV (residual tritium retained as hydrides of uranium)	Tritium (residual storage as hydride in getter beds). Assume 1% residual loading = 0.18 g Tritium per HTV or 1.1 g total for six HTVs.
Radioactive Material	HTV (depleted uranium [DU] metal as content of HTV getter bed)	DU (storage medium for Tritium). Three HTV getters in each of two SRL furnaces, connected through a header. Total of six getters with 493 g DU metal powder each, for a total of 2958 g.
Tritium Interim Storage within Full HTVs		
Radioactive Material	Tritium in HTVs	Tritium (retained in HTV as UT_3 but will evolve as Tritium if heated to 450 °C; limit is 18 g Tritium per HTV). Assume a maximum of three full HTVs between the two SRL Furnace Gas Treatment Systems (FGTSs), for a total of 54 g tritium. Each full HTV may be stored in either a H1616-1 or UC609 transportation package.[(a)]
Radioactive Material	HTV (DU metal as content of HTV getter bed)	DU (storage medium for $tritium_2$). Three HTV getters in each of two SRL furnaces, connected through a header. Total of six getters with 493 g DU hydride each, for a total of 2958 g DU.
Flammable/Explosive	Tritium in HTVs	Tritium (retained in HTV as UT_3 but will evolve as Tritium if heated to 450 °C; limit is 18 g Tritium per HTV). Assume a maximum of three full HTVs between the two SRL FGTS, for a total of 54 g tritium. Each full HTV may be stored in either a H1616-1 or UC609 transportation package.[(a)]

a. Maximum tritium inventory is the total content of three full HTVs plus three residual storage HTVs and any room storage of HTVs, contained in H1616-1 or UC609 containers, in the room where the HTVs are loaded. It is assumed that the replacement of the HTV is infrequent enough that it is reasonable to conclude that there will never be a tritium inventory in the SRL room of more than 54 g of tritium.

Table E.1-5. Facility Hazardous Materials Screening for the DMO Process

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Input Lag Storage	Pu metal of 4 kg per batch Two input batches in two lag storage racks Max MAR of 8 kg metal
Radioactive Material	Glovebox Furnace	Pu metal or PuO_2 powder of 5 kg per unit One input unit in basket Max MAR of 5 kg oxide
Radioactive Material	Output Lag Storage	PuO_2 powder of 5 kg per unit One milk bottle Max MAR of 5 kg oxide
Oxidizer	Glovebox Furnace	O_2 (gas)
Radioactive Material	Waste Drums	Contamination quantities of TRU waste and LLW

Table E.1-6. Facility Hazardous Materials Screening for the Direct Oxide Calcination Process[(a)]

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Input Lag Storage	PuO_2 unit of 5 kg per unit One input unit in first lag storage rack One input unit in second lag storage rack Max MAR of 10 kg PuO_2
Radioactive Material	Glovebox Furnace	PuO_2 powder of 5 kg per unit One input unit in basket Max MAR of 5 kg oxide
Radioactive Material	Output Lag Storage	PuO_2 powder of 5 kg per unit One milk bottle Max MAR of 5 kg PuO_2
Oxidizer	Glovebox Furnace	O_2 (gas)
Radioactive Material	Waste Drums	Contamination quantities of TRU waste and LLW

a. Maximum inventories tabulated.

Table E.1-7. Facility Hazardous Materials Screening for the Product Oxide Handling Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	Product Oxide Handling Module Entry Box Input Lag Storage	PuO_2 (powder in milk bottle) 5 kg (one position)
Radioactive Material	Product Oxide Handling Module In Process Input Storage	PuO_2 (powder in milk bottle) 5 kg (one position)
Radioactive Material	Product Oxide Handling Module Sieving/Milling/Blending	PuO_2 (powder in process equip) 30 kg
Radioactive Material	Product Oxide Handling Module In Process Output Storage	PuO_2 (powder in mixed oxide [MOX] convenience cans) 35 kg (seven positions)
Radioactive Material	Product Oxide Handling Module Drop Box Output Lag Storage	PuO_2 (powder in MOX convenience can) 5 kg (one position)
Radioactive Material	Product Oxide Handling Room Satellite Waste Collection (Maintenance side)	TRU waste/satellite collection 55-gal drum
Radioactive Material	Product Oxide Handling Room Satellite Waste Collection (Maintenance side)	LLW/satellite collection 55-gal drum

a. Maximum inventories tabulated.

Table E.1-8. Facility Hazardous Materials Screening for the Plutonium Canning Module[a,b,c]

Hazard Type	Location/Activity	Type/Form/Quantity per GB Line
Radioactive Material	Inner Canning Glovebox 1 & 2	PuO_2 (powder in convenience can or inner can) 5 kg (one in each glovebox)
Radioactive Material	Outer Canning Module	PuO_2 (powder in inner can or 3013 can) 5 kg (one can in process)
Voltage/ Radiation Source	Canning Modules/Room	Welding systems/power supplies
Radioactive Material	Canning Room/ Satellite Waste Collection	TRU waste/satellite collection 5-gal pail or 55-gal drum
Radioactive Material	Canning Room/ Satellite Waste Collection	LLW/satellite collection 5-gal pail or 55-gal drum
Chemical Material	Inner Canning Glovebox/ Contaminated Side Decontamination Chamber	$FeSO_4$, H_2SO_4, NaOH, and Na_2SO_4 (liter quantities)

a. Realistic inventories tabulated based on criticality limits.
b. Two inner canning lines.
c. One outer canning line.

Table E.1-9. Facility Hazardous Materials Screening for the Sample Transfer System Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Pit Disassembly Glovebox to DMO Glovebox	4 kg Pu metal pieces (Pu metal feed)
Radioactive Material	SRL Disassembly Glovebox to DMO Glovebox	4 kg Pu metal pieces (Pu metal feed)
Radioactive Material	DMO Glovebox to Interim Storage Area	5 kg Pu oxide (per milk bottle)
Radioactive Material	Interim Storage Area to Oxide Handling Glovebox	5 kg Pu oxide (per milk bottle)
Radioactive Material	Oxide Handling Glovebox to Inner Canning Glovebox	5 kg Pu oxide (per MOX convenience can)
Radioactive Material	Outer Canning Area to Product NDA Room	5 kg Pu oxide (per 3013 can)
Radioactive Material	Product NDA Room to/from Main Vault	20 kg Pu oxide per 3013 can (four per AGV)
Radioactive Material	Main Vault to Product Vault	20 kg Pu oxide per 3013 can (four per AGV)
Radioactive Material	Product Vault to Plutonium Oxide Packaging Area	20 kg Pu oxide per 3013 can (four per AGV)
Hazardous Material	Pit Disassembly Glovebox to Sanitization Module	Beryllium – **(cv)**
Hazardous Material	SRL Disassembly Glovebox to Sanitization Module	Beryllium – **(cv)**
Hazardous Material	Hydride/Dehyride Glovebox to Sanitization Module	Beryllium – **(cv)**

a. Maximum inventories tabulated.

Table E.1-10. Facility Hazardous Materials Screening for the NDA Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	Product NDA Module/ Staging (scale) – one position	Maximum product MAR per instrument: Pu oxide (3013 cans) 5 kg Pu oxide (one position) Maximum MAR: 40 kg Pu oxide (eight instruments)
Radioactive Material	Product NDA Module/ Calorimeter wells – four positions	
Radioactive Material	Product NDA Module/ GRIS well – one position	
Radioactive Material	Product NDA Module/ Neutron Counter well - one position	
Radioactive Material	Product NDA Module/ X-ray well – one position	
Radioactive Material	Product NDA Module/ Input/Output Lag Storage NDA Module Platform Product Oxide Calibration Std Storage Array at NDA Module Platform PuO_2 Standards	Maximum product MAR for module platform: Pu oxide (3013 cans) 120 kg Pu oxide (24 positions, excludes 8 in instrument storage positions) Multiple standards stored in module platform required (likely to be four standards containing 0.5,1.5, 2.5, & 4.5 kg of PuO_2; conservatively assume each contains 5 kg PuO_2)
Radioactive Material	Product NDA Module/ Pallet storage location	Four 3013 cans 20 kg PuO_2
Radioactive Material	Product NDA Module/ Calibration Std Storage Array at NDA Module Platform Pu-238 Standards	One or more standards required (estimates have ranged from 1 to 16 watts; conservatively assume maximum value) Maximum MAR: Pu-238 (sealed radioactive source) 32 g Pu-238 (16 watts)
Radioactive Material	Product NDA Module	Maximum product MAR for room: Pu oxide (3013 cans) 180 kg Pu oxide (32 positions) All 24 module platform positions and 8 instrument locations are filled

a. Maximum inventories tabulated.

Table E.1-11. Facility Hazardous Materials Screening for the Product Shipping and Packing Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Plutonium Oxide Packaging	Pu oxide Four cans in 3013 cans (Max MAR of 20 kg Pu oxide)
Radioactive Material	Shipping & Receiving Weighing Area	Pu oxide One can in 9975 SC (Max MAR of 5 kg Pu oxide)
Radioactive Material	CRT Unpacking/Packing Area	Pu oxide Four cans in 9975 SCs (Max MAR of 20 kg)
Radioactive Material	CRT Staging Area	Pu oxide 24 cans in 9975 SCs (Max MAR of 120 kg)
Radioactive Material	SST Dock	Pu oxide 24 cans in 9975 SCs (Max MAR of 120 kg)
Radioactive Material	Plutonium Oxide Packaging	TRU waste/satellite collection 5-gal can – foot-actuated cover
Radioactive Material	Plutonium Oxide Packaging	LLW/satellite collection 5-gal can – foot-actuated cover
Radioactive Material	CRT Unpacking/Packing Area	TRU waste/satellite collection 5-gal can – foot-actuated cover
Radioactive Material	CRT Unpacking/Packing Area	LLW/satellite collection 5-gal can – foot-actuated cover

a. Maximum inventories tabulated.

Table E.1-12. Facility Hazardous Materials Screening for the Uranium Operations Module[a,b,c]

Hazard Type	Location/Activity	Type/Form/Quantity per GB Line
Main Uranium Decontamination (MD) – for each of three lines		
Radioactive Material	Main Uranium Drop Box	U metal/Pu contamination 25 kg (two hemispheres) Pu contamination Two hemispheres (see PHA Appendix S, Section 3.7)
Radioactive Material	Main Uranium Decontamination Glovebox/Contaminated Side Input Lag Storage	U metal/Pu contamination 12.5 kg (one hemisphere) Pu contamination Two hemispheres (see PHA Appendix S, Section 3.7)
Radioactive Material	Main Uranium Decontamination Glovebox/Contaminated Side Weighing Station	U metal/Pu contamination 12.5 kg (one hemisphere) Pu contamination One hemisphere (see PHA Appendix S, Section 3.7)
Radioactive Material	Main Uranium Decontamination Glovebox/Decon Fixture	U metal/Pu contamination 12.5 kg (one hemisphere) Pu contamination One hemisphere (see PHA Appendix S, Section 3.7)
Radioactive Material	Main Uranium Decontamination Glovebox/Drying/Weighing/Swiping Area	U metal/Pu contamination 12.5 kg (one hemisphere) Pu contamination One hemisphere (see PHA Appendix S, Section 3.7)
Radioactive Material	Main Uranium Decontamination Glovebox/Clean side Output Lag Storage/Metal Prep	U metal 75 kg (six hemispheres)
Radioactive Material	Decon Fluids Glovebox	Pu/U precipitate/Pu contamination One hemisphere (see PHA Appendix S, Section 3.7)
Main Uranium Process Room (MR) – for each of three lines		
Radioactive Material	Canning Room/ Satellite Waste Collection	TRU waste/satellite collection 55-gal drum/ 217 g Pu contamination
Radioactive Material	Canning Room/ Satellite Waste Collection	LLW/satellite collection 55-gal drum
Auxiliary Uranium Inner Canning/Electrolytic Decontamination/Outer Canning (AC) – for one line shared with Pu operations		
Radioactive Material	Inner Canning Glovebox/ Drop Box	U oxide powder 5 kg (one MOX convenience can) Pu contamination One MOX convenience can (see PHA Appendix S) Note: Only one position for both lines.
Radioactive Material	Inner Canning Glovebox/ Contaminated Side In Process Storage	U oxide powder 5 kg (one MOX convenience can) Pu contamination One MOX convenience can (see PHA Appendix S)
Radioactive Material	Inner Canning Glovebox/ Contaminated Side Weighing Station	U oxide powder 5 kg (one MOX convenience/inner can) Pu contamination One MOX convenience/inner can (see PHA Appendix S, Section 3.7)

Table E.1-12. Facility Hazardous Materials Screening for the Uranium Operations Module (Continued)[a,b,c]

Hazard Type	Location/Activity	Type/Form/Quantity per GB Line
Radioactive Material	Inner Canning Glovebox/ Contaminated Side Welding Station	U oxide powder 5 kg (one MOX convenience/inner can) Pu contamination One MOX convenience/inner can (see PHA Appendix S, Section 3.7)
Radioactive Material	Inner Canning Glovebox/ Contaminated Side Leak Test Station	U oxide powder 5 kg (one inner can) Pu contamination One inner can (see PHA Appendix S, Section 3.7)
Radioactive Material	Inner Canning Glovebox/ Contaminated Side Can Opener Lag Storage	U oxide powder 5 kg Pu contamination One inner can (see PHA Appendix S, Section 3.7)
Radioactive Material	Inner Canning Glovebox/ Contaminated Side Decontamination Chamber	U oxide powder 5 kg (one inner can) Pu contamination One inner can (see PHA Appendix S, Section 3.7)
Radioactive Material	Inner Canning Glovebox/ Clean Side Activities Contamination Survey Station	U oxide powder 5 kg (one inner can) Pu contamination One inner can (see PHA Appendix S, Section 3.7)
Radioactive Material	Outer Canning Area Weighing Station	U oxide powder 5 kg (one 3013 can) Pu contamination One 3013 can (see PHA Appendix S, Section 3.7)
Radioactive Material	Outer Canning Area Contamination Station Storage	U oxide powder 5 kg (one 3013 can) Pu contamination One 3013 can (see PHA Appendix S, Section 3.7)
Radioactive Material	Canning Room Satellite Waste Collection	TRU waste/satellite collection 55-gal drum/ 217 g Pu contamination
Radioactive Material	Canning Room Satellite Waste Collection	LLW/satellite collection 55-gal drum
Uranium Vault Storage (UV) – for one line		
Radioactive Material	Main Vault Storage – Main Uranium Oxide	U oxide powder (HEU oxide cans) 24,000 kg (1200 positions)
Radioactive Material	Movement of Main Uranium Oxide within Vault Storage	U oxide powder (HEU oxide cans) 20 kg (two positions on pallet)
Radioactive Material	CRT Vault Storage – Main Uranium Oxide	U oxide powder (ES-3100 SCs) 240 kg (24 positions)
Radioactive Material	CRT Vault Storage – Auxiliary Uranium Oxide	U oxide powder (9975 SCs) 120 kg (24 positions) Pu contamination 24 9975 SCs (see PHA Appendix S)

a. Maximum inventories tabulated for unique process lines.
b. One inner canning line is shared with Pu product operations (see PHA Appendix J).
c. One outer canning line is shared with Pu product operations (see PHA Appendix J).

Table E.1-13. Facility Hazardous Materials Screening for the Sanitization Module[(a)]

Hazard Type	Location/Activity	Type/Form/Quantity per GB Line
Radioactive Material	Input Sanitization Glovebox Lag Storage/ Furnaces/ Output Sanitization Glovebox Lag Storage	Pu metal or PuO_2 contamination Eight input crucibles in lag storage rack Multiple units per furnace in three furnaces Three output ingots in storage Max MAR of 200 g of Pu metal or 227 g PuO_2 in a single furnace
Hazardous Material	Input Sanitization Glovebox Lag Storage/ Furnaces/ Output Sanitization Glovebox Lag Storage	Beryllium - **(cv)** Eight input crucibles in lag storage rack Multiple units per furnace in three furnaces Three output ingots in storage Max MAR of 42 kg of beryllium
Radioactive Material	Sanitization Room/Satellite Waste Collection (Maintenance side)	TRU waste/satellite collection Three 55-gal drums – Potential for each drum to have 246 g PuO_2 (WIPP WAC limit of 200 Pu-239 equivalents) Max MAR of 600 g of Pu-239 equivalent
Radioactive Material	Sanitization Module Room/Satellite Waste Collection (Maintenance side)	LLW/satellite collection 55-gal drum

a. Maximum inventories tabulated.

Table E.1-14. Facility Hazardous Materials Screening for the Waste Management Operations Module[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	Analytical Lab	Solid TRU • Waste from analytical lab operations, sample containers, plastic, paper, etc. Max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid Mixed TRU (MTRU) • Solid waste from analytical lab operations, leaded gloves. Max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid LLW • Waste from analytical lab operations. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Liquid Mixed LLW (MLLW) • Liquid waste from analytical lab operations. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Liquid HAW • Liquid waste from analytical lab operations. Max MAR 3.6 g Pu per year. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum). Concentrated Liquid Waste • Liquid waste from analytical lab operations. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid/Liquid Hazardous Waste • Solid laboratory wastes. No radiological component/contamination
Radioactive Material	Electro-decontamination of Pu and aux. uranium cans	Solid TRU • U/Pu decontamination sludge, spent filters, rags. Max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid MTRU • Metal hydroxide sludge. Max MAR of 295 PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	General Maintenance	Solid TRU • Metal, glass, plastics, paper and cloth wipes, high efficiency particulate air (HEPA) filters. Max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid LLW • Metal, glass, plastics, paper and cloth wipes, HEPA filters. Bound by TRU waste with max MAR of 295 PuO_2/drum (240 g Pu metal/drum)

Table E.1-14. Facility Hazardous Materials Screening for the Waste Management Operations Module (Continued)[a]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	Glovebox operations	Solid TRU • Glovebox equipment, metal, cleaning equipment, rejected cans, etc. Max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid MTRU • Leaded gloves (1812 cubic feet per year). Max MAR of 295 PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	Sanitization	Solid TRU • Non-SNM sanitized pit parts, Beryllium waste products max MAR of 295 g PuO_2/drum (240 g Pu metal/drum) Solid LLW • Sanitized waste products. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	SRL	Solid LLW • Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	Pit Receiving	Solid LLW • Packaging material. Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	Fire Water/Safety Shower	Liquid LAW • Fire water, safety shower test water Bound by TRU waste with max MAR of 295 g PuO_2/drum (240 g Pu metal/drum)
Radioactive Material	Waste Management Satellite Waste Collection Area	TRU, LLW, MTRU, MLLW • 55-gal drums (max. 80 drums); • 246 g PuO_2/drum = Max MAR of 19.7 kg PuO_2
Radioactive Material	Shipping Dock	TRU, LLW, MTRU, MLLW • 55-gal drums (max. 80 drums); • 246 g PuO_2/drum = Max MAR of 19.7 kg PuO_2
Corrosive, toxic	Liquid Waste Neutralization	10% NaOH

a. Maximum inventories tabulated.

Table E.1-15. Facility Hazardous Materials Screening for the Analytical Laboratory Operations[(a)]

Hazard Type	Location/Activity	Type/Form/Quantity/Basis
Radioactive Material	PDCF Analytical Laboratory	Maximum Pu inventory in the PDCF Analytical Laboratory is: ▪ 560 g of PuO_2 powder ▪ 80 g of Pu Nitrate, $Pu(NO_3)_4$ in solution, represented by 160 g PuO_2 powder. ▪ 100 g of PuO_2 as standards For respirable release fraction (RRF), assume 820 g PuO_2 powder.
Flammable/Explosive	PDCF Analytical Laboratory	Laboratory gases/chemicals, including acetone, ascorbic acid, toluene, ethanol, acetic acid, isopropyl alcohol, propane.
Oxidizer	PDCF Analytical Laboratory	Laboratory gases/chemicals, including aluminum nitrate, anhydrone (magnesium perchlorate), fluoride standard, hydrogen peroxide, potassium dichromate, sodium nitrite

a. Maximum inventories tabulated.

Table E.1-16. Facility Hazardous Materials Screening for the Hydride/Dehydride Process

Hazard Type	Location/Activity	Type/Form/Quantity per Room
Radioactive Material	Input/Glovebox Furnace	Pu metal, two pieces of bonded metal one in input – 4 kg one in furnace – 4 kg U content is bounded by Pu metal A maximum of 200 g $PuH_{2.7}$. Quantity is limited by H_2 gas limited volume lecture bottle.
Radioactive Material	Uranium Hydride/Dehydride Storage Beds (two)	DU metal of 2 kg/storage bed unit Two storage beds per hydride/dehydride process
Radioactive Material	Output Lag Storage	Residual Pu/Pu-H contamination on “cleaned parts” of <200 g metal/hydride Two ingots – 4 kg each, total 8 kg
Hazardous Material	Hydride/Dehyride Module	Beryllium – **(cv)**
Flammable/Explosive	Glovebox Furnace	H_2 (gas) limited volume lecture bottle of 12.5 moles H_2 per H/D process plus two hydride beds of 3.5 moles each for each process, for a total of 19.5 moles H_2 for each of two glovebox lines.

E.2 Release Fraction Information for PDCF Accidents

Container	Release Mechanism	ARF	RF	RRF	Basis
Plutonium Metal					
Bare Pit or Hemisphere	Impact/No Thermal Stress	5.00E-07	1.00E+00	5.00E-07	ARF: Bounding HDBK value (DOE-3010, pp 4-12 – 18, applied to 12" diameter sphere for 168 hours
	Thermal Stress/No Ignition	3.00E-05	4.00E-02	1.20E-06	ARF: Bounding HDBK value (DOE-3010, p 4-1 and p 4-11 to 4-21) RF: Bounding HDBK value (DOE-3010, p 4-1 and p 4-11 to 4-21)
	Thermal Stress/Ignition	5.00E-04	5.00E-01	2.50E-04	ARF: Bounding HDBK value (DOE-3010, p 4-2 and p 4-11 to 4-25) RF: Bounding HDBK value (DOE-3010, p 4-2 and p 4-11 to 4-25)
	Blast Effects/Shielded	0.00E+00	0.00E+00	0.00E+00	No significant airborne release is postulated (DOE-3010, p 4-45)
Type B Inner Container (of Shipping Package)	Impact/No Thermal Stress	5.00E-07	1.00E+00	5.00E-07	ARF: Bounding HDBK value (DOE-3010, pp 4-12 to 4-18, applied to 12" diameter sphere for 168 hours
	Thermal Stress/No Ignition	3.00E-05	4.00E-02	1.20E-06	The inner container provides limited thermal protection. This configuration is conservatively assumed to behave as a bare pit
	Thermal Stress/Ignition	5.00E-04	5.00E-01	2.50E-04	The inner container provides limited thermal protection. This configuration is conservatively assumed to behave as a bare pit
Type B Outer Container (of Shipping Package)	Impact/No Thermal Stress	5.00E-08	1.00E+00	5.00E-08	ARF: Bounding HDBK value (DOE-3010, pp 4-12 to 4-18, applied to 12" diameter sphere for 168 hours with LPF = 0.1
	Thermal Stress/No Ignition	3.00E-06	4.00E-02	1.20E-07	ARF: Bounding HDBK value of 3E-5 used for airborne release within outer container (DOE-3010, p 4-1 and p 4-19 to 4-21); LPF of 0.1 conservatively applied for release from outer container.[2] RF: Bounding HDBK value (DOE-3010, p 4-1 and p 4-19 to 4-21)

Container	Release Mechanism	ARF	RF	RRF	Basis
Uranium Metal					
Bare	Thermal Stress/Oxidation	1.00E-03	1.00E+00	1.00E-03	ARF: Bounding HDBK value (DOE-3010, p 4-3 and p 4-37 to 4-42). RF: Bounding HDBK value (DOE-3010, p 4-3 and p 4-37 to 4-42).
	Blast Effects/Shielded	0	0	0	No significant airborne release is postulated (DOE-3010, p 4-45)
Inner Container	Thermal Stress/Oxidation	1.00E-03	1.00E+00	1.00E-03	The inner container provides limited thermal protection. This configuration is conservatively assumed to behave as bare metal.
Outer Container	Thermal Stress/No Ignition	1.00E-04	1.00E+00	1.00E-04	ARF: Bounding HDBK value of 1E-3 used for airborne release within outer container (DOE-3010, p 4-3 and p 4-37 to 4-42); LPF of 0.1 conservatively applied for release from outer container.[2] RF: Bounding HDBK value (DOE-3010, p 4-3 and p 4-37 to 4-42).
PuO_2 and Uranium Oxide Powder					
Free	Thermal Stress/Nonreactive, Natural Convection	6.00E-03	1.00E-02	6.00E-05	ARF: Bounding HDBK value (DOE-3010, p 4-7 and p 4-55 to 4-57) RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Spill/Impact for Cohesionless Powders	2.00E-03	3.00E-01	6.00E-04	ARF: Bounding HDBK value (DOE-3010, p 4-9 and p 4-74 to 4-82) RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Blast Effects/Unshielded in Confined Space	1.00E+00	1.00E+00	1.00E+00	ARF: Bounding HDBK value (DOE-3010, p 4-8 and p 4-63 to 4-65) RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Powder Criticality	6.00E-03	1.00E-02	6.00E-05	ARF: Bounding HDBK value (DOE-3010, page 7-11) RF: Bounding oxide product values are used based on the previous discussion on RFs.

Container	Release Mechanism	ARF	RF	RRF	Basis
	Blast Effects/Shielded (Also applied to powder in convenience cans, 3013 inner and outer can, and HEU outer container)	5.00E-03	3.00E-01	1.50E-03	ARF: Bounding HDBK value (DOE-3010, p 4-8 and p 4-63 to 4-69) RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Resuspension Powder Under Ambient Conditions (per Hour)	4.00E-05	1.00E+00	4.00E-05	ARF: Bounding HDBK value (DOE-3010, p 4-10 and p 4-88 to 4-102) RF: Value based on the previous discussion of RFs (DOE-3010, p 4-10 and p 4-88 to 4-102).
	Resuspension Powder Under Debris	4.00E-06	1.00E+00	4.00E-06	ARF: Bounding HDBK value (DOE-3010, p 4-10 and p 4-88 to 4-102) RF: Bounding value is used based on the previous discussion on RFs
PuO_2 Contaminated Hemispheres or Metal	Low Pressure Burst/Vent or Crush	5.00E-03	4.00E-01	2.00E-03	ARF: Bounding HDBK value (DOE-3010, p 4-73) for venting at 25 psig or less RF: Bounding HDBK value (DOE-3010, p 4-74) for venting at 25 psig or less.
	Moderate Pressure Vent/Burst	1.00E-01	7.00E-01	7.00E-02	ARF: Bounding HDBK value (DOE-3010, p 4-70) for venting from 25 psig to 500 psig RF: Bounding oxide product values are used based on the previous discussion on RFs.
Convenience Can	Low Pressure Burst/Vent or Crush	5.00E-03	4.00E-01	2.00E-03	ARF: Bounding HDBK value (DOE-3010, p 4-73) for venting at 25 psig or less RF: Bounding oxide product values are used based on the previous discussion on RFs.
Inner 3013 Can, Milk Bottle, or HEU Oxide Container	Impact/Crush	5.00E-03	4.00E-01	2.00E-03	ARF: Bounding HDBK value (DOE-3010, p 4-73) for venting at 25 psig or less used to represent crush events RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Moderate Pressure Vent/Burst	1.00E-01	7.00E-01	7.00E-02	ARF: Bounding HDBK value (DOE-3010, p 4-70) for venting from 25 psig to 500 psig RF: Bounding oxide product values are used based on the previous discussion on RFs.

Container	Release Mechanism	ARF	RF	RRF	Basis
Outer 3013 Can or HEU Oxide Outer Container	Impact/Crush	5.00E-03	4.00E-01	2.50E-03	ARF: Bounding HDBK value (DOE-3010, p 4-73) for venting at 25 psig or less used to represent crush events RF: Bounding oxide product values are used based on the previous discussion on RFs.
	High-Pressure Vent/Burst	3.10E-01	7.00E-01	2.17E-01	ARF: Bounding value for venting greater than 500 psig (ARF = 2.74E-04 Vp1.4) RF: Based on discussion on Page 4-71 of DOE Handbook.
Type B Outer Container	Impact/Crush	5.00E-04	4.00E-01	2.50E-04	ARF: Bounding HDBK value (DOE-3010, p 4-73) for venting at 25 psig or less used to represent crush events RF: Bounding oxide product values are used based on the previous discussion on RFs.
	High-Pressure Vent/Burst	3.10E-02	7.00E-01	2.17E-02	ARF: Bounding value for venting greater than 500 psia (ARF = 2.74E-04 $V_p^{1.4}$) (Ref. 26, Section 3.3.1.12) RF: Based on discussion on Page 4-71 of DOE Handbook LPF of 0.1 conservatively applied for release from outer container.[2]
Liquid Metal/Steam					
Molten Plutonium	Disturbed Molten Metal Surface	1.0E-02	1.0E+00	1.0E-02	ARF: Bound HDBK Value (DOE-3010, p 4-2)
High Temperature Interaction	Oxidation of Small Molten Metal Drops Passing Through Air	1.00E+00	5.00E-01	5.00E-01	ARF: Bounding HDBK value (DOE-3010, p 4-2 and p 4-31 to 4-32). RF: Bounding product values (DOE-3010, p 4-2 and p 4-31 to 4-32).
Surface Contamination					
55-Gallon Drum	Thermal Stress/ignition	5.00E-04	1.00E+00	5.00E-04	ARF: Bounding HDBK value (DOE-3010, p 5-1) for heated/burned packages with largely uncontaminated exterior surfaces. RF: Bounding value. Surface contamination will consist of both fine metal pieces and oxide particles. RF will be driven by the oxide component of contamination.

Container	Release Mechanism	ARF	RF	RRF	Basis
	Impact/Crush	1.00E-03	1.00E+00	1.00E-03	ARF: Bounding HDBK value (DOE-3010, p 5-4) for robust container that is opened or fails due to impact. RF: Bounding value. Surface contamination will consist of both fine metal pieces and oxide particles. RF will be driven by the oxide component of contamination.
	Moderate Pressure Vent/Burst	1.00E-03	1.00E+00	1.00E-03	ARF: Bounding HDBK value (DOE-3010, p 5-3) for venting of pressurized gases over contaminated, combustible waste. RF: Bounding value. Surface contamination will consist of both fine metal pieces and oxide particles. RF will be driven by the oxide component of contamination.
Non-Combustible/Non-Brittle Solid	Thermal Stress	6.00E-03	1.00E-02	6.00E-05	ARF: Bounding HDBK value (DOE-3010, p 5-5 and p 5-21) for noncombustible surfaces under thermal stress RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Explosive Stress	5.00E-03	3.00E-01	1.50E-03	ARF: Bounding HDBK value (DOE-3010, p 5-6 and p 5-21 to 5-22) for blast stress w/o significant pressurization of confinement space RF: Bounding oxide product values are used based on the previous discussion on RFs.
	Impaction Stress	1.00E-03	1.00E+00	1.00E-03	ARF: Bounding HDBK value (DOE-3010, p 5-7 and p 5-23 to 5-24) for impaction stress involving solids that do not have brittle fracture RF: Bounding RF value from page 5-7 of DOE Handbook.
	Impaction Stress/Robust Container	1.00E-03	1.00E-01	1.00E-04	ARF: Bounding HDBK value (DOE-3010, p 5-20) for impaction stress involving solids that do not have brittle fracture RF: Bounding RF value from page 5-20 of DOE Handbook.

Container	Release Mechanism	ARF	RF	RRF	Basis
Combustible Solid	Thermal Stress/Ignition	5.00E-04	1.00E+00	5.00E-04	ARF: Bounding HDBK value (DOE-3010, p 5-1) for heated/burned packages with largely non-contaminated exterior surfaces. RF: Bounding value. Surface contamination will consist of both fine metal pieces and oxide particles. RF will be driven by the oxide component of contamination.

Notes:

1. RRF = ARF x RF

2. U.S. Department of Transportation (DOT) Type B packaging performance characteristics have been evaluated in several documents, including NUREG-0170 and NUREG/CR-4829. Testing has demonstrated that Type B packaging failures do not result in catastrophic loss of containment. NUREG-0170 tabulates realistically conservative release fractions ranging from 0.01 to 0.1 for extremely severe accidents (Category VI through VIII) for Type B plutonium shipping packages (NUREG-0170, Table 5-8, 1975 container design). These accident categories include thermal events in excess of 2 hours. On this basis, a conservative LPF of 0.1 has been selected.