UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	January 30, 2012

APPLICANT'S MOTION IN LIMINE TO EXCLUDE PORTIONS OF THE PREFILED TESTIMONY, REPORT, AND EXHIBITS FILED BY NEW YORK STATE AND DR. FRANCOIS LEMAY IN SUPPORT OF CONSOLIDATED CONTENTION NYS-12C

William C. Dennis, Esq.
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
Fax: (914) 272-3205
E-mail: wdennis@entergy.com

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Phone: (202) 739-5738
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com

Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1000 Louisiana Street
Suite 4000
Houston, TX 77002
Phone: (713) 890-5710
E-mail: martin.oneill@morganlewis.com

COUNSEL FOR ENTERGY NUCLEAR
OPERATIONS, INC.

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I. INTRODUCTION

In accordance with 10 C.F.R. §§ 2.1204, 2.319, 2.323, 2.337, the Atomic Safety and Licensing Board's ("Board") Scheduling Order of July 1, 2010, and subsequent Order dated November 17, 2011,[1] Entergy Nuclear Operations, Inc. ("Entergy") hereby moves to exclude from the hearing record certain evidence proffered by New York State ("NYS" or "the State") on December 21, 2011, in support of Consolidated Contention NYS-12C. Specifically, Entergy seeks to exclude from the record of this proceeding: (1) portions of Exhibit NYS000241, Dr. François LeMay's prefiled written testimony;[2] (2) portions of Exhibit NYS000242, Dr. LeMay's related report;[3] and (3) certain related exhibits. Attachment 1 to this Motion identifies the specific evidence that should be excluded, including a description of the information and basis for exclusion.

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[1] Licensing Board Order (Granting Unopposed Motion by the State of New York and Riverkeeper, Inc. to Amend the Scheduling Order) at 1 (unpublished) (Nov. 17, 2011).

[2] Exh. NYS000241, Pre-Filed Written Testimony of Dr. François J. LeMay Regarding Consolidated NYS-12-C (NYS-12/12-A/12-B/12-C) (Dec. 21, 2011) ("LeMay Testimony").

[3] Exh. NYS000242, Review of Indian Point Severe Accident Off Site Consequence Analysis, ISR Report 13014-01-01, prepared by International Safety Research ("ISR") for the Office of the Attorney General – State of New York (Dec. 21, 2011) ("LeMay Report").

NYS-12C challenges Entergy's severe accident mitigation alternatives ("SAMA") analysis for Indian Point Units 2 and 3 ("IP2" and "IP3"), specifically the cost figure for nonfarm decontamination used by Entergy in its MACCS2 analysis.[4] As set forth below, portions of Dr. LeMay's prefiled testimony and report substantially and belatedly expand the scope of the admitted contention. NYS's new, sweeping challenge to numerous other economic cost model (*i.e.*, CHRONC, discussed further below) assumptions in MACCS2 could not be reasonably inferred or anticipated from the State's prior pleadings or expert submissions on this contention. Accordingly, those portions of Dr. LeMay's testimony and report, and certain supporting exhibits referenced therein, that stray well outside the confines of the admitted contention are irrelevant and should be excluded from the evidentiary record pursuant to 10 C.F.R. §§ 2.319 and 2.337(a). As discussed below, controlling Nuclear Regulatory Commission ("NRC" or "Commission") precedent compels that result.

II. LEGAL STANDARDS

Commission regulations governing the admissibility of evidence provide that "[o]nly relevant, material, and reliable evidence which is not unduly repetitious will be admitted. Immaterial or irrelevant parts of an admissible document will be segregated and excluded so far as is practicable."[5] Thus, pursuant to 10 C.F.R. § 2.319(d), the Board may "strike any portion of a written presentation or a response to a written question that is irrelevant, immaterial, unreliable, duplicative or cumulative," and under Section 2.319(e) the Board may restrict evidence or arguments for the same reasons.

Because only relevant and material evidence is admissible, the Board may exclude or accord no weight to testimony and exhibits that are outside the admitted contention's scope or

[4] Board Memorandum and Order (Ruling on Pending Motions for Leave to File New and Amended Contentions) at 3, 8 (July 6, 2011) (unpublished) ("July 2011 Board Amended Contentions Order").

[5] 10 C.F.R. § 2.337(a).

that raise issues that were not properly presented in earlier pleadings.[6] Similarly, it may exclude testimony and supporting evidence that is outside the scope of this license renewal proceeding,[7] or, in accordance with 10 C.F.R. § 2.335(a), evidence attacking the validity of NRC regulations.

Recent Commission decisions explicitly hold that Intervenors are not permitted to change the scope of a contention as admitted by the Board. In the *Vogtle* proceeding, the Commission upheld a Board ruling excluding testimony at hearing that strayed beyond the scope of the bases as pled and admitted, which "defined the scope of the . . . contention."[8] The Commission emphasized that the scope of a contention is limited to issues of law and fact pled with particularity in the intervention petition, including its stated bases.[9]

Similarly, in the recent *Pilgrim* decision, the Commission reiterated that longstanding precedent requires a Board to look back at the bases to determine the scope of a contention, because the "reach of a contention *necessarily* hinges upon its terms *coupled* with its stated

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[6] *See*, *e.g.*, *S. Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), Licensing Board Memorandum and Order (Ruling on In Limine Motions) at 3-7 (Jan. 26, 2009) (unpublished) (granting in part motion to exclude testimony and exhibits outside the scope of the admitted contentions); *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), Licensing Board Order (Ruling on Pending Matters and Addressing Preparation of Exhibits for Hearing) at 2 (Mar. 24, 2008) (unpublished) (granting in part motions to exclude testimony on topics outside the scope of a license renewal proceeding, because such issues "do not relate to aging and/or because they are addressed as part of ongoing regulatory processes"); *AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), Licensing Board Memorandum and Order (Ruling on Motions in Limine and Motion for Clarification) at 1-2 (Aug. 9, 2007) (unpublished) (granting in part motion to exclude evidence on topics outside scope of contention and license renewal proceeding); *La. Energy Servs., L.P.* (National Enrichment Facility), Licensing Board Memorandum and Order (Ruling on In Limine Motions and Providing Administrative Directives) at 4-10 (Jan. 21, 2005) (unpublished) (granting in part motions to exclude testimony on topics outside the scope of the admitted contention, including topics raised and rejected at the pleadings stage).

[7] *See* cases cited *supra* note 6.

[8] *S. Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-10-05, 71 NRC 90, 101 (2010). Thus, to the extent Intervenors may seek to argue, based on *Entergy Nuclear Vt. Yankee, LLC* (Vt. Yankee Nuclear Power Station), LBP-06-20, 64 NRC 131, 147 (2006) and *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-04-35, 60 NRC 619, 623 (2004), that it may freely add bases after the contention pleading stage, the Board should reject this argument. These rulings interpreted the contention admissibility rule, not the question of whether testimony at hearing that strayed beyond the stated bases of an admitted contention was admissible.

[9] *Vogtle*, CLI-10-05, 71 NRC at 100.

bases.[10] A key reason for this requirement is to provide notice to the opposing parties of the issues they will need to defend against.[11] Because of this principle:

> Intervenors therefore may not "freely change the focus of an admitted contention at will" to add a host of new issues and objections that could have been raised at the outset. Where warranted we allow for amendment of admitted contentions, but do not allow distinctly new complaints to be added at will as litigation progresses, stretching the scope of admitted contentions beyond their *reasonably inferred* bounds.[12]

Based on this standard, the Commission affirmed a Board decision to exclude allegations related to "health costs" from a contention challenging the input data on "economic consequences" in a SAMA evaluation, because the stated *bases* did not include such costs.[13] The Commission stressed that "NRC adjudicatory proceedings would prove endless if parties were free . . . to introduce entirely new claims which they either originally opted not to make or which simply did not occur to them at the outset."[14]

III. BACKGROUND

A. Procedural History of the Admitted Contention

As filed over four years ago, NYS-12 alleged that Entergy's SAMA analysis is deficient because the MACCS2 computer code used by Entergy underestimates the costs associated with a severe accident due to its use of "decontamination and clean-up costs" that are based on "large-sized" radionuclides.[15] NYS asserted that a severe accident at a nuclear power plant likely would

10 *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 309 (2010) (emphasis added) (*citing Pub. Serv. Co. of N. H.* (Seabrook Station, Units 1 & 2), ALAB-899, 28 NRC 93, 97 (1988)).

11 *See id*.

12 *Id*. at 308-309 (emphasis added) (citations omitted).

13 *See id*. at 309-10.

14 *Id*. at 311 (*quoting La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-05-28, 62 NRC 721, 727-28 (2005)).

15 *See* New York State Notice of Intention to Participate and Petition to Intervene at 140-45 (Nov. 30, 2007) ("NYS Petition"), *available at* ADAMS Accession No. ML073400187.

result in the dispersion of "small-sized radionuclides" that are more expensive to remove and clean up than large-sized radionuclide particles.[16] As principal support for this argument, NYS cited the 1996 *Site Restoration* report issued by Sandia National Laboratories:

> In place of the outdated *decontamination cost figure contained in the MACCS2 code*, the SAMA analysis for IP2 and/or IP3 should incorporate the analytical framework contained in the 1996 Sandia National Laboratories report concerning site restoration costs as well as recent studies examining the cost consequences in the New York metropolitan area.[17]

According to NYS, *Site Restoration* recognized that earlier estimates (such as those incorporated within the MACCS2 code) of decontamination costs are incorrect because they are based on studies of nuclear weapons that produce large particles.[18] As cited by NYS, *Site Restoration* also discusses decontamination factors ("DF") (*i.e.*, estimates of the effectiveness of clean up measures) after severe reactor accidents. The Board admitted NYS-12 in July 2008 to the extent that it "challenges the *cost data for decontamination and clean-up* used by MACCS2."[19]

In MACCS2, decontamination/clean-up cost is entered as two parameters, CDFRM (farmland decontamination cost-not applicable here) and CDNFRM (nonfarm decontamination cost).[20] While NYS, in its original contention, did not specifically identify these parameters by name, NYS—as discussed below—has since confirmed that it is challenging the nonfarm decontamination cost inputs.[21]

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16 *See id.* at 140-41.

17 *Id.* at 142 (*citing* D. Chanin and W. Murfin, *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, *SAND96-0957, Unlimited Release, UC-502* (May 1996) ("Site Restoration") (Exh. NYS000249)).

18 *Id.* at 143.

19 *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 102 (2008) (emphasis added).

20 *See* Exh. NYS000243, NUREG/CR-6613, SAND97-0594, Vol. 1, *Code Manual for MACCS2, User's Guide* at 7-11 (May 1998) ("MACCS2 User's Guide").

21 *See* Indian Point Energy Center Environmental Report ("ER"), Att. E (Severe Accident Mitigation Alternatives Analysis) at E.1-88 to E.1-89 (IP2), E.3-83 (IP3) (Apr. 2007) (providing nonfarm and farmland

Since that time, the State has amended NYS-12 three separate times to "reassert" the contention and apply it to Staff's draft supplemental environmental impact statement ("DSEIS"),[22] Entergy's December 2009 revised SAMA analysis,[23] and the Staff's final SEIS ("FSEIS").[24] In the first two amendments, NYS-12A and NYS-12B, which Entergy did not oppose, NYS sought to apply NYS-12 to the Staff's DSEIS and Entergy's revised SAMA analysis, respectively). In both cases, NYS essentially repeated verbatim the supporting bases and evidence stated in its original contention. Thus, the scope of the contention did not change.[25]

In NYS-12C (the third and final version of the contention), NYS again sought to "update" its previously-admitted contentions, this time in response to the NRC Staff's FSEIS.[26] NYS-12C also sought to challenge the discussion in Section G.2.3 of the FSEIS as it applies to those contentions.[27] NYS and its former consultant, Mr. David Chanin, argued that the FSEIS (1) incorrectly accepts and applies cost data for moderate decontamination efforts in lieu of cost data for heavy contamination events, and (2) fails to "scale up" the 1996 *Site Restoration*

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decontamination cost values for a DF =3 and a DF = 15, as used by Entergy in the IP2 and IP3 SAMA analyses). The State has not challenged Entergy's farmland decontamination cost figure in the prefiled testimony of Dr. LeMay or in prior submissions by its former consultant, Mr. Chanin.

22 State of New York Contentions Concerning NRC Staff's Draft Supplemental Environmental Impact Statement (Feb. 27, 2009) ("NYS DSEIS Contentions"), *available at* ADAMS Accession No. ML090690303.

23 *See* State of New York's New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives (Mar. 11, 2010) ("Amended Contention NYS-12B"), *available at* ADAMS Accession No. ML100780366.

24 *See* State of New York New Contention 12-C Concerning NRC Staff's December 2010 Final Environmental Impact Statement and the Underestimation of Decontamination and Clean Up Costs Associated with a Severe Reactor Accident in the New York Metropolitan Area (Feb. 3, 2011) at 3-15 ("Amended Contention NYS-12C"), *available at* ADAMS Accession No. ML110680212.

25 *See* Licensing Board Order (Ruling on New York State's New and Amended Contentions) at 3-4 (June 16, 2009) (unpublished) (admitting NYS-12A and stating that "[w]e see no issue with an intervenor proactively asking the Board to recognize that an admitted contention relative to the ER challenges the same issue when included in the Draft SEIS."); *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), LBP-10-13, 71 NRC 673, 683 (2010) (noting " no material opposition … to admission of NYS-12B to the degree New York is relying on the *same analytic framework* that the Board accepted in admitting NYS-12/12A") (emphasis added).

26 State of New York's Motion for Leave to File New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives at 1 (Mar. 11, 2010), *available at* ADAMS Accession No. ML100780366.

27 *See id.* at 1-2.

decontamination cost data to a "hyper-density" urban area such as New York City.[28] Thus, although NYS proffered some additional arguments and an expert report in support of its contention, it maintained the contention's focus on the decontamination cost figure used in Entergy's MACCS2 analysis. Notably, the *only* MACCS2 input value explicitly challenged by Mr. Chanin in his report was the per capita cost of nonfarm heavy decontamination (CDNFRM, DF = 15), for which Entergy used a value of $13,824 per person.[29] This is entirely consistent with the limited focus of the prior proffered and admitted versions of this contention.

Thus, as pled and admitted, and as reasonably construed, NYS-12C challenges only the adequacy of Entergy's nonfarm decontamination cost value, principally vis-à-vis information contained in the *Site Restoration* report and other studies cited by NYS. The Board recognized as much in admitting NYS-12C, noting that it mirrors the basic allegation found in the original contention, and that the "overarching aspect of this contention, including its citation to the 1996 Sandia National Laboratories Report, has *not differed significantly*" in four years.[30]

B. New York State's Prefiled Testimony

NYS's prefiled testimony, in contrast, discusses issues that are well beyond the scope of its original limited challenges to the nonfarm decontamination cost (CDNFRM) value used in the Indian Point SAMA analysis. New York's new consultant, Dr. LeMay, now takes issue with numerous other Entergy inputs to the MACCS2 economic cost model, *i.e.*, CHRONC,[31] in order

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28 *See* Amended Contention NYS-12C at 7; *see id*. at attachment, D.I. Chanin, "Errors and Omissions in NRC Staff's Economic Cost Estimates of Severe Accident Mitigation Alternatives Analysis Contained in December 2010 Indian Point Final Supplemental Environmental Impact Statement (FSEIS), NUREG-1437, Supplement 38" at 1, 3 (Feb. 2011) ("Chanin Report"), *available at* ADAMS Accession No. ML110680212.

29 *See* Chanin Report at 3, 8, 16 (stating that *Site Restoration* and other studies cited by Mr. Chanin "should be considered conclusive proof that [Entergy's and] NRC's use of $13,824/person for cleanup of the Indian Point area results in a gross underestimation of costs"); Amended Contention NYS-12C at 14 (same).

30 July 2011 Board Amended Contentions Order at 7-8 (emphasis added).

31 MACCS2 executes three modules in sequence to calculate consequence and risk values necessary for a SAMA analysis. The third module is CHRONC, which uses radioactivity concentrations calculated by the first module (ATMOS) and other inputs (*e.g.*, population and economic data) to calculate the long-term doses due to

to substantially ratchet up the offsite economic costs estimated by the code. Those new and additional MACCS2 parameters—never explicitly challenged or mentioned by NYS or its former expert in prior pleadings—include the following:

- Decontamination time ("TIMDEC"), defined as the time required for completion of each of the decontamination levels selected by the user in MACCS2;
- Value of nonfarm wealth ("VALWNF"), defined as the public and private property (*e.g.*, cost of land, buildings, infrastructure) not associated with farming that would be unusable if the region was rendered either temporarily or permanently uninhabitable;
- Societal discount rate of property ("DSRATE"), defined as the expected rate of return from land, buildings, equipment, etc. (*e.g.*, the inflation-adjusted real mortgage rate for land and buildings);
- Fraction of nonfarm property due to improvements ("FRNFIM"), defined as the fraction of nonfarm wealth in the region due to improvements (*e.g.*, the value of buildings and infrastructure such as roads and utilities and non-recoverable equipment or machinery);
- Depreciation rate ("DPRATE"), defined as the depreciation rate that accounts for the loss of value of buildings and other structures due to a lack of habitation and maintenance;
- Relocation costs ("POPCST"), defined as the per capita removal cost for temporary or permanent relocation of population and businesses in a region rendered uninhabitable during the long-term phase time period.[32]

Dr. LeMay also criticizes Entergy (and the broader nuclear industry) for using certain parameter values contained in "Sample Problem A" of the *MACCS2 User's Guide*. This, again, is another new challenge.

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exposure after the emergency phase and the economic impacts from each accident sequence. *See* Exh. NYS000243, *MACCS2 User's Guide*, at 2-1 to 2-4, 7- 4 (May 1998). The economic costs calculated by CHRONC include a variety of cost types, including decontamination and other costs. *See id.* at 7-9 to 7-14, 7-48 to 7-52. In the MACCS2 framework, these costs are derived from numerous CHRONC input parameters (over 40 such parameters, as listed in Table 14 of the LeMay Report).

[32] *See*, *e.g.*, Exh. NYS000241, LeMay Testimony at 71, Table 13 (Summary of ISR proposed inputs and calculated OECRs (costs in 2005 USD)); Exh. NYS000242, LeMay Report at 32, Table 13 ((Summary of ISR proposed inputs and calculated OECRs (costs in 2005 USD)).

IV. ARGUMENT

A. Controlling Precedent Requires The Board To Strike Those Portions of Dr. LeMay's Prefiled Written Testimony and Report That Challenge Inputs to Entergy's SAMA Analysis Other Than The Decontamination Cost

NYS's prior filings contain no discernible, much less particularized, references to the numerous other parameters (beyond nonfarm decontamination cost) now challenged by Dr. LeMay in his prefiled testimony. The State fails to acknowledge, much less attempt to justify, its belated and substantially broadened challenges to other MACCS2 inputs. NYS had ample opportunities to assert such challenges to Entergy's MACCS2 analysis in this proceeding;[33] *e.g.*, when the Staff issued its DSEIS in 2008; when Entergy submitted its revised SAMA analysis in 2009; and when the Staff issued its FSEIS in 2010.

Indeed, since the Board admitted NYS in 2008, Entergy has disclosed substantial documentation related to its SAMA analyses, including supporting calculations, related vendor reports, and the MACCS2 input and output computer files for its SAMA analyses.[34] NYS also retained a consultant with pertinent expertise, Mr. Chanin, the self-described "architect and developer of the MACCS2 computer code" and coauthor of *Site Restoration*.[35] Thus, NYS's initial lack of familiarity with MACCS2 or relevant technical expertise could not provide a valid excuse for its failure to previously identify all of its specific criticisms of Entergy's SAMA

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[33] In fact, in Sections E.1.5.2.4 and E.3.5.2.4 of its April 2007 Environmental Report, Entergy provided the regional economic data used in its MACCS2 analyses for IP2 and IP3, respectively. Those sections included inputs for the following parameters discussed by Dr. LeMay in his testimony and report: VALWNF, DSRATE, DPRATE, POPCST, and CDNFRM. *See* ER, Att. E at E.1-88 to E.1-89, E.3-82 to E.3-83.

[34] *See*, *e.g.*, Enercon, Site Specific MACCS2 Input Data for Indian Point Energy Center, Revision 1 (Dec. 1, 2009) (Exhs. NYS000270A & NYS000270B); Entergy, IP-CALC-09-00265, Revision 0, Re-analysis of MACCS2 Models for IPEC (Dec. 2, 2009) (Att. 2 to this Motion) (containing the MACCS2 input and output files in Att. A); Entergy, IP-RPT-09-00044, Revision 0, Re-Analysis of IP2 and IP3 Severe Accident Mitigation Alternatives (SAMAs) (Dec. 3, 2009) (Att. 3 to this Motion). These documents, all of which were disclosed by Entergy on December 20, 2009, contain *all* of the MACCS2 input values challenged by Dr. LeMay in his testimony and report.

[35] *See* Amended Contention NYS-12B at attachment, Statement of David Chanin at 1 (Mar. 11, 2010), *available at* ADAMS Accession No. ML100780366.

analysis. The State had numerous opportunities to properly raise specific objections to Entergy's MACCS2 inputs at appropriate points in the proceeding and—with the exception of the nonfarm decontamination cost figure—failed to do so.

On this point, it bears emphasis that NYS and its former consultant, Mr. Chanin, reviewed Entergy's December 2009 revised SAMA analysis, including the supporting MACCS2 calculation reports and computer files cited above.[36] But in filing NYS-12B, NYS merely sought to "reassert" NYS-12A as applicable to the revised SAMA analysis.[37] It did not seek to amend the contention to challenge any additional aspects of, or inputs to, the SAMA analysis. Entergy's decontamination cost figure remained the sole focus of the contention.

Moreover, in February 2011, when NYS filed NYS-12C in response to the Staff's FSEIS, NYS and its then-consultant again confined their challenges to Entergy's MACCS2 nonfarm decontamination cost input, as reviewed by the Staff and in relation to information contained in the *Site Restoration* report.[38] Indeed, NYS characterized the contention as follows:

> The essence of Proposed Contention 12-C is *identical* to the essence of the previously admitted versions of this Contention – *i.e.*, the methodology used for calculating the *cost of decontamination* and clean up following a severe accident, and the results obtained therefrom, are flawed. Specific examples of these flaws were provided in support of the *previously admitted* contentions.[39]

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[36] *See id.* at 2.

[37] *See* State of New York's Motion for Leave to File New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives at 10 (Mar. 11, 2010); *see also* Amended Contention NYS-12B at 1-6.

[38] *See* Amended Contention NYS-12C at 3-15. On page 7 of its associated Motion for Leave, NYS stated: "The proposed contention brings forward the State's previously admitted contentions on the issue of decontamination costs to the recently issued FSEIS." State of New York's Motion for Leave to File New and Amended Contention 12-C Concerning NRC Staff's December 2010 Final Supplemental Environmental Impact Statement and the Underestimation of Decontamination and Clean Up Costs Associated with a Severe Reactor Accident in the New York Metropolitan Area (Feb. 3, 2011), *available at* ADAMS Accession No. ML110680212.

[39] State of New York's Combined Reply to NRC Staff and Entergy's Answers to Contention 12-C Concerning NRC Staff's December 2010 Final Environmental Impact Statement and the Underestimation of Decontamination and Clean Up Costs Associated with a Severe Reactor Accident in the New York

As discussed above, Dr. LeMay's testimony and report now challenge numerous CHRONC input values other than the nonfarm decontamination cost value (*i.e.*, CDNFRM), including certain values from Sample Problem A of the *MACCS2 User's Guide*. Such challenges are distinctly new, deprive Entergy and the Staff of adequate notice of the State's principal substantive arguments, and are not encompassed by NYS-12C as pled by NYS and admitted by the Board. Therefore, those portions of Dr. LeMay's testimony and report raising such challenges should be stricken.

Controlling NRC precedent compels the relief sought here. The Commission's recent ruling in *Pilgrim*, in particular, is directly on point.[40] In that case, the admitted contention challenged the applicant's SAMA analysis for Pilgrim Nuclear Power Station for failure to account for "the loss of economic activity in Plymouth County."[41] The contention claimed that the economic cost analysis only included the "assessed value" of property and did not assess "business value" (*i.e.*, value associated with inventory equipment and income generation capability).[42] It also cited potential tourism losses, noting that the SAMA analysis did not account for adverse impacts to the region's economy as a major tourist, historical and recreational area. The Commission noted: "These were the specific bases for Pilgrim Watch's challenge to the [applicant's] SAMA analysis of off-site economic costs."[43]

Metropolitan Area at 7 (Mar. 18, 2011) (emphasis added), *available at* ADAMS Accession No. ML110830780.

40 *See Pilgrim*, CLI-10-11, 71 NRC at 308-11.

41 *Id.* at 309.

42 *Id.*

43 *Id.*

After the applicant moved for summary disposition, intervenor Pilgrim Watch responded with numerous distinctly new asserted deficiencies in the SAMA analysis.[44] Pilgrim Watch claimed that the applicant had not adequately accounted for various health costs and cancer risks, the difficulty of restoring coastal and wetlands sites, and decontamination or clean-up costs.[45]

On appeal, the Commission affirmed the Board's rejection of the various new health or cancer risk arguments as late because they were not fairly encompassed by the description of the contention in Pilgrim Watch's petition for hearing.[46] It also found that Pilgrim Watch's new claims of underestimated decontamination costs were not reasonably inferable from, or encompassed by, the specific economic cost challenges proffered in the admitted contention.[47] The Commission stressed that Pilgrim Watch had failed to amend its contention to add these issues, and that the record was never developed on them.[48]

The facts in this proceeding are on all fours with those in *Pilgrim*. Here, the specific bases for NYS's challenge to Entergy's SAMA analysis are set forth in NYS-12C. As in *Pilgrim*, NYS's new challenges to the numerous other MACCS2/CHRONC inputs cited above are not reasonably inferable from, or encompassed by, the admitted contention or its stated bases.[49] The State did not argue in its original or amended contentions that these *other* MACCS2 inputs are invalid, as Dr. LeMay now asserts in his testimony. Moreover, the State's vague and generalized references to "economic costs" in its prior pleadings do not authorize it to expand the scope of its contention to include new challenges to Entergy's MACCS2 analysis.[50]

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44 *See id.* at 310.

45 *See id.* at 310.

46 *Id.*

47 *Id.* at 310-11.

48 *Id.* at 311.

49 *See id.* at 310-11.

50 *See id.* at 310.

To be sure, this Board has observed that NRC regulations do not require a petitioner to submit all possible arguments for a contention "*as long as all are within the scope of what is admitted by the Board*."[51] Entergy respectfully submits that the contention pled by NYS and admitted by the Board contemplated a hearing on the validity of the decontamination cost figure used by Entergy in its MACCS2 analysis. By now asserting new and broader challenges to the MACCS2 economic consequences model and its associated inputs, the State has done much more than merely "elaborate" on a previously-admitted issue. It has injected entirely new issues in a manner that prejudices the other parties, because it deprives them of adequate notice of the issues to be litigated at hearing.[52]

In short, NYS may not use the testimony or report of its new expert to cure prior pleading deficiencies or to introduce new issues for hearing. Such a practice violates fundamental principles of fairness and one of the key purposes of the contention rule. As the Commission explained in *Oconee*: "[T]he rule's requirement of detailed pleadings puts other parties in the proceeding on notice of the petitioners' *specific grievances* and thus gives them a good idea of the claims they will be either supporting or opposing."[53] Based on the State's prior pleadings, Entergy reasonably planned to submit testimony addressing the State's challenge to its MACCS2 decontamination cost figure, the State's (and Mr. Chanin's) criticisms in NYS-12C of the

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51 Licensing Board Memorandum and Order (Ruling on Motion for Summary Disposition of NYS-26/26A/Riverkeeper TC-1/1A (Metal Fatigue of Reactor Components) and Motion for Leave to File New Contention NYS-26B/Riverkeeper TC-1B) at 6 (Nov. 4, 2010) (unpublished) (emphasis added).

52 *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-05-12, 61 NRC 319, 329 (2005), *aff'd*, CLI-05-19, 62 NRC 403, 413-14 (2005) (citation omitted) ("[T]he State failed at any point to put specifically in issue the concern it now expresses about reduced shielding. Perhaps the State believed that such an argument was evident from its overall presentation. But we hold that neither we nor the State's opponents had notice of the need to address that theory.").

53 *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 334 (1999) (emphasis added); *see also Private Fuel Storage*, CLI-05-19, 62 NRC at 413-14 (2005) (*quoting Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 553 (1978) (holding that "[i]t was Utah's burden to 'structure their participation so that it is meaningful, so that it alerts the agency to [its] position and contentions'").

relevant FSEIS discussion, and the State's reliance on *Site Restoration* and other studies cited in NYS-12C. Entergy did not reasonably envision or infer the need to prepare testimony on the spectrum of other MACCS2 input parameters newly challenged by Dr. LeMay in his testimony and report.

Accordingly, the Board should strike from evidence all substantive arguments in Dr. LeMay's prefiled testimony and report related to issues or inputs other than the nonfarm decontamination cost (CDNFRM) values used by Entergy in its MACCS2-based SAMA analysis.[54] The specific portions of those documents requiring exclusion are identified in Attachment 1 to this Motion. In addition, to the extent that Dr. LeMay relies on the results of MACCS2 runs using alternative CHRONC input values, those alternative values should be limited to the nonfarm decontamination cost (CDNFRM) parameter.

B. The Board Should Strike Those Portions of Dr. LeMay's Prefiled Written Testimony and Report That Rely on His Modifications to the MACCS2 Source Code

Dr. LeMay's testimony and report also should be stricken to the extent they rely on source code modifications to MACCS2 described by Dr. LeMay in those documents. In particular, Dr. LeMay states as follows:

- "[T]he MACCS2 code limits CDNFRM to a maximum of $100,000/person…. ISR had to modify the MACCS2 source code to allow for the greater decontamination costs calculated by the approaches I just presented and which are discussed in its report. ISR found where the authors of the code had limited the value of CDNFRM to be less than $100,000 per person and removed this single line of code."[55]

- "[T]he MACCS2 code limits decontamination times to a maximum of one year. Thus, ISR had to modify the source code to allow for the likelihood that decontamination

54 As noted above, those other MACCS2 parameters include: (1) value of nonfarm wealth (VALWNF), (2) societal discount rate of property (DSRATE), (3) fraction of nonfarm property due to improvements (FRNFIM), (4) depreciation rate (DPRATE), (5) relocation costs (POPCST), and (6) decontamination times (TIMDEC).

55 Exh. NYS000241, LeMay Testimony at 50, lines 1026-27, 1030-35. This change also is noted on page 22 of the LeMay Report (Exh. NYS000242).

> would take longer than the values from Sample Problem A and longer than one year."[56]

When the Board admitted NYS-12, it expressly stated that that "NYS-12 is neither a challenge to the acceptability of using the MACCS2 computer program nor a direct challenge to MACCS2 itself."[57] Dr. LeMay's rewriting of the MACCS2 source code to substitute his own larger input values in place of MACCS2's hardcoded maximum values is precisely that—a challenge to MACCS2 itself. Accordingly, the results of any MACCS2 runs performed by Dr. LeMay using this modified version of the source code should be excluded from the evidentiary record.[58] To the extent Dr. LeMay seeks to rely on his own MACCS2 runs, such runs should be performed using an unmodified, configuration-controlled version of MACCS2.

C. The Board Should Strike All Exhibits to Dr. LeMay's Testimony and Report That Are Not Relevant to the Decontamination Cost Challenges Admitted in NYS-12C

As discussed above, the Board admitted NYS-12C insofar as it "challenges the cost data for decontamination and cleanup used by MACCS2."[59] Therefore, the Board should exclude from the record any exhibits that relate solely to Dr. LeMay's inadmissible challenges to other aspects of or inputs to Entergy's SAMA analysis, as described above. Attachment 1 to this Motion identifies those exhibits that Entergy submits should be stricken from the record.

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56 Exh. NYS000241, LeMay Testimony at 54, lines 1108-1111. This change also is noted on page 24 of the LeMay Report (Exh. NYS000242).

57 *Indian Point*, LBP-08-13, 68 NRC at 102.

58 There also are reliability concerns associated with Dr. LeMay's modifications to the MACCS2 source code. By modifying the source code, Dr. LeMay may have generated a software configuration control nonconformity.

59 *Indian Point*, LBP-08-13, 68 NRC at 102.

D. **Portions of New York State's Statement of Position Addressing Excluded Evidence Also Should Be Excluded and Accorded No Weight**

NYS also discuss the preceding testimony and supporting evidence in their Position Statement on this contention.[60] Those portions of NYS's Position Statement that rely on inadmissible evidence or otherwise raise excluded issues may be stricken.[61] Therefore, to the extent the Board grants this Motion and excludes evidence indentified in Attachment 1 to this Motion, the associated discussions in the Position Statement should be excluded and accorded no weight in the Board's merits decision on NYS-12C.

In addition, Entergy requests that the Board strike footnote 26 on page 41 of the Statement of Position.[62] The federal government's indemnification obligations under the Price Anderson Act, 42 U.S.C. § 2210, are irrelevant to the adequacy of the decontamination cost inputs used by Entergy's NEPA-mandated SAMA analysis.

V. **CONCLUSION**

For the above reasons, the Board should exclude the portions of Dr. LeMay's prefiled testimony and report, as well as the related exhibits, identified in Attachment 1 to this Motion.

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[60] Exh. NYS000240, State of New York Initial Statement of Position, Consolidated Contention NYS-12-C at 23, 31-42 (Dec. 21, 2011) ("Position Statement").

[61] *See AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), Licensing Board Memorandum and Order (Ruling on Motions in Limine and Motion for Clarification) at 2 (Aug. 9, 2007) (unpublished); *Entergy Nuclear Vt. Yankee* (Vt. Yankee Nuclear Power Station), Licensing Board Order (Ruling on Motions to Strike and Motions in Limine) at 2-3 (July 16, 2008) (unpublished). *But see Calvert Cliffs 3 Nuclear Project, LLC* (Combined License Application for Calvert Cliffs Unit 3), Licensing Board Order (Granting in Part and Denying in Part NRC Staff's Motion in Limine) at 5 (Jan. 17, 2012) (unpublished) ("We need not rule on the admissibility of statements of position because they will not be admitted as evidence, but will only be considered by the Board in its merits ruling to the extent they are based on admitted evidence.").

[62] Position Statement at 41 n.26.

Respectfully submitted,

<u>Signed (electronically) by Martin J. O'Neill</u>

Kathryn M. Sutton, Esq.
Paul M. Bessette, Esq.
Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Phone: (202) 739-3000
Fax: (202) 739-3001
E-mail: ksutton@morganlewis.com
E-mail: pbessette@morganlewis.com
E-mail: martin.oneill@morganlewis.com

William C. Dennis, Esq.
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601
Phone: (914) 272-3202
Fax: (914) 272-3205
E-mail: wdennis@entergy.com

Counsel for Entergy Nuclear Operations, Inc.

Dated in Washington, D.C.
this 30th day of January 2012

TABLE OF ENTERGY ATTACHMENTS

MOTION IN LIMINE TO EXCLUDE PORTIONS OF THE PREFILED TESTIMONY, REPORT, AND EXHIBITS FILED BY NEW YORK STATE AND DR. FRANCOIS LEMAY IN SUPPORT OF CONSOLIDATED CONTENTION NYS-12C

Attachment	Description
1	Table Showing NYS Testimony and Evidence to be Stricken
2	Entergy, IP-CALC-09-00265, Revision 0, Re-analysis of MACCS2 Models for IPEC (Dec. 2, 2009)
3	Entergy, IP-RPT-09-00044, Revision 0, Re-Analysis of IP2 and IP3 Severe Accident Mitigation Alternatives (SAMAs) (Dec. 3, 2009)

Entergy Attachment 1 to Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. François Lemay in Support of Consolidated Contention NYS-12C

NYS Testimony and Evidence to be Stricken

Entergy Attachment 1 to Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. François Lemay in Support of Consolidated Contention NYS-12C

NYS Testimony and Evidence to be Stricken

Location of Information to Be Stricken	Basis for Exclusion
NYS000241: Lemay Testimony	
Page 9, line 199, strike: "and times"	Relates to new issue that is beyond the scope of NYS-12C
Page 14, line 303, strike: "and long-term economic"	Relates to new issue that is beyond the scope of NYS-12C
Page 21, lines 462-464, strike: "Value of nonfarm wealth along with the value of farm wealth and the long-term exposure period were the only values not derived from Sample Problem A."	Relates to new issue that is beyond the scope of NYS-12C
Page 27, lines 591-592 strike: "and decontamination time"	Relates to new issue that is beyond the scope of NYS-12C
Page 50, line 1028, to page 62, line 1288, strike entire passage (including figures)	Relates to new issue that is beyond the scope of NYS-12C; also relies on unauthorized modifications to MACCS2 source code (see Section IV.B of Entergy's Motion in Limine)
Page 63, line 1310, strike: "and relocation costs, POPCST"	Relates to new issue that is beyond the scope of NYS-12C
Page 63, line 1311 to line 1328, strike entire passage beginning with "The value of non-farm wealth" and ending with "of a severe accident."	Raises new issue that is beyond the scope of NYS-12C
Page 70, line 1472-1474, strike: "primarily because of the direct use of MACCS2 Sample Problem A input values for the CHRONC module."	Relates to new issue that is beyond the scope of NYS-12C
Page 70, line 1475, strike: "and times"	Relates to new issue that is beyond the scope of NYS-12C
Page 71, Table 13, strike the <u>entire row</u> for each of the following parameters: "TIMDEC (DF = 3)", "TIMDEC (DF = 15)", "VALWNF", "DPRATE", "DSRATE", "POPCST", "FRNFIM"	Relates to new issue that is beyond the scope of NYS-12C
Page 71, Table 13, strike: "9.07E+05 (4.28)" and "1.47E+06 (6.96)" in second-to-last row of table	Relates to new issue that is beyond the scope of NYS-12C; relies on unauthorized modifications to MACCS2

Location of Information to Be Stricken	Basis for Exclusion
	source code
Page 71, line 1492, strike: "all of"	Relates to new issue that is beyond the scope of NYS-12C
NYS000242: LeMay Report	
Page iv, para. 1, strike: "and times; • value of nonfarm wealth; • depreciation rate; • societal discount rate of property; • relocation costs; and • fraction of nonfarm property due to improvements"	Raises new issue that is beyond the scope of NYS-12C
Page iv, para. 3, strike: "and time"	Raises new issue that is beyond the scope of NYS-12C
Page iv, para. 4, strike: "and time"	Relates to new issue that is beyond the scope of NYS-12C
Page iv, para. 5, strike: "four" and "seven"	Relates to new issue that is beyond the scope of NYS-12C
Page v, Table of Contents, strike: entries for Sections 4.3 to 4.7 of the report, including all subsections listed under those sections.	Relates to new issue that is beyond the scope of NYS-12C
Page vi, Table of Contents, strike: "Annex D VALWNF Calculation"	Relates to new issue that is beyond the scope of NYS-12C
Page vi, List of Tables, strike: "Table 29: VALWNF values and calculation"	Relates to new issue that is beyond the scope of NYS-12C
Page vii, List of Figures, strike: "Figure 5: OECR vs heavy decontamination cost (2005 USD)" and "Figure 6: OECR (2005 USD) for decontamination times up to 50 years"	Relates to new issue that is beyond the scope of NYS-12C
Page 2, third-to-last sentence, strike: "Annex D contains the calculation for the value of nonfarm wealth."	Relates to new issue that is beyond the scope of NYS-12C
Page 8, only paragraph on page, strike: "the value of nonfarm wealth (VALWNF), the value of farm wealth (VALWF) and the long-term exposure period (EXPTIM). As determined in the following section,	Relates to new issue that is beyond the scope of NYS-12C

Location of Information to Be Stricken	Basis for Exclusion
of the three values, only the value of nonfarm wealth is a cost sensitive parameter."	
Page 10, last paragraph, strike: "and TIMDEC" and "ISR assessed the remaining five sensitive parameters in Sections 4.3 to 4.7 respectively."	Relates to new issue that is beyond the scope of NYS-12C
Page 11, Section 4.2 header, strike: "and times"	Relates to new issue that is beyond the scope of NYS-12C
Page 11, Subsection 4.2.1, strike the following passage: "Parameter name: TIMDEC Entergy values: 5.18E+06 s, 1.04E+07 s (60 d, 120 d) TIMDEC is the time required for completion of each decontamination level (i.e. decontamination factor, described below)."	Relates to new issue that is beyond the scope of NYS-12C
Page 12, Subsection 4.2.2, first sentence, strike: "and their corresponding decontamination times, 60 days and 120 days respectively,"	Relates to new issue that is beyond the scope of NYS-12C
Page 22, para. 2, strike: "; therefore, ISR modified the source code to allow for the greater decontamination costs proposed here"	Relies on unauthorized modifications to MACCS2 source code (see Section IV.B of Entergy's Motion in Limine) (see Section IV.B of Entergy's Motion in Limine)
Pages 22-23, strike: "The total economic cost, and therefore the OECR, reaches a maximum for decontamination costs around $200,000/person as shown in Figure 5. This is the threshold near which the cost of decontaminating equals that of condemning and thus the total cost of condemnation, which is governed by the value of nonfarm wealth (VALWNF)."	Relates to new issue that is beyond the scope of NYS-12C; also relies on unauthorized modifications to MACCS2 source code (see Section IV.B of Entergy's Motion in Limine)
Page 23, para. 2, strike: "$200,000/person" and "$581,000/year" and "2.74"	Relies on unauthorized modifications to MACCS2 source code (see Section IV.B of Entergy's Motion in Limine)
Page 24, Figure 5: OECR vs heavy decontamination	Relies on unauthorized modifications to

Location of Information to Be Stricken	Basis for Exclusion
cost (2005 USD), strike: the entire figure	MACCS2 source code (see Section IV.B of Entergy's Motion in Limine)
Pages 24-25, Subsection 4.2.4, "Discussion of TIMDEC", strike: the entire subsection, including "Figure 6: OECR (2005 USD) for decontamination times up to 30 years"	Relates to new issue that is beyond the scope of NYS-12C; also relies on unauthorized modifications to MACCS2 source code (see Section IV.B of Entergy's Motion in Limine)
Pages 25-26, Section 4.3, "Value of nonfarm wealth", strike the entire section (including all subsections)	Relates to new issue that is beyond the scope of NYS-12C
Page 27, Section 4.4, "Property depreciation rate", strike the entire section (including all subsections)	Relates to new issue that is beyond the scope of NYS-12C
Page 28, Section 4.5, "Societal discount rate for property", strike: the entire section (including all subsections)	Relates to new issue that is beyond the scope of NYS-12C
Pages 28-29, Section 4.6, "Per capita cost of long-term relocation", strike: the entire section (including all subsections)	Relates to new issue that is beyond the scope of NYS-12C
Pages 29-30, Section 4.7, "Nonfarm wealth improvements fraction", strike: the entire section (including all subsections)	Relates to new issue that is beyond the scope of NYS-12C
Page 30, Section 4.8, strike "to 4.7"	Relates to new issue that is beyond the scope of NYS-12C
Page 31, Table 12: "Comparison of sensitive parameter values for IP with other US nuclear stations (costs in 2005 USD)", strike the entire column for each of the following parameters: "TIMDEC (DF = 3/DF = 15)", "VALWNF", "DPRATE", "DSRATE", "POPCST", "FRNFIM"	Relates to new issue that is beyond the scope of NYS-12C
Page 31, para. 1, strike: "and relocation costs (POPCST)" and the entire sentence reading "The value of non-farm wealth (VALWNF) appears to be site-specific, likely resulting from location census data."	Relates to new issue that is beyond the scope of NYS-12C
Page 31, para. 2, strike the entire paragraph: "The decontamination times (TIMDEC), depreciation rate (DPRATE), rate of return (DSRATE) and fraction of non-farm wealth due to improvements (FRNFIM) are all equivalent to the values used in the Surry analysis (i.e. Sample Problem A)."	Relates to new issue that is beyond the scope of NYS-12C

Location of Information to Be Stricken	Basis for Exclusion
Page 31, para. 3, strike: "(with the exception of VALWNF)"	Relates to new issue that is beyond the scope of NYS-12C
Page 32, Section 5, "Conclusion", para. 1, strike: "and times"	Relates to new issue that is beyond the scope of NYS-12C
Page 32, Table 13, strike: the entire row for each of the following parameters: "TIMDEC (DF = 3)", "TIMDEC (DF = 15)", "VALWNF", "DPRATE", "DSRATE", "POPCST", "FRNFIM"	Relates to new issue that is beyond the scope of NYS-12C
Pages 34 to 35, under Section 6, "References", strike reference numbers 31 to 38	Relates to new issue that is beyond the scope of NYS-12C
Pages 57-58, Annex D, "VALWNF Calculation", strike: all of Annex D, including "Table 29: VALWNF values and calculation	Relates to new issue that is beyond the scope of NYS-12C
NYS000271: NUREG/CR-6525, Rev. 1, SECPOP2000: Sector Population, Land Fraction, and Economic Estimation Program (ML032310279) (August 2003)	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000272: Table 1.1.5. Gross Domestic Product, National Income and Product Accounts Table, U.S. Department of Commerce, Bureau of Economic Analysis	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000273: Figuring Depreciation Under MACRS, Internal Revenue Service	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000274: HSH's National Monthly Mortgage Statistics: 2005, HSH Associates (2005)	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000275: State & County QuickFacts, New York, U.S. Census Bureau	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the

Location of Information to Be Stricken	Basis for Exclusion
	scope of NYS-12C
NYS000276: Important News, Disaster Unemployment Assistance, NYS 3-month Average Unemployment Rate & Increase of Extended Benefits (EB) (Last updated October 11, 2011), New York State Benefit Extensions (Last updated October 11, 2011), 1099G Now Available Online, New York State Department of Labor	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000277: The Price of Land in the New York Metropolitan Area, Current Issues in Economics and Finance, Vol. 14, No. 3, A. Haughwout, et al. (Apr./May 2008)	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C
NYS000278: Property Values in New York Show Vibrancy, S. Chan and R. Rivera, The New York Times (Jan. 13, 2007)	
Strike entire exhibit	Relied upon by Dr. LeMay for sole purpose of supporting new issue that is beyond the scope of NYS-12C

Entergy Attachment 2 to Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. François Lemay in Support of Consolidated Contention NYS-12C

Entergy, IP-CALC-09-00265, Revision 0,
Re-analysis of MACCS2 Models for IPEC (Dec. 2, 2009)

ATTACHMENT 9.2 **ENGINEERING CALCULATION COVER PAGE**

Sheet 1 of 1

☐ ANO-1 ☐ ANO-2 ☐ GGNS ■ IP-2 ■ IP-3 ☐ PLP

☐ JAF ☐ PNPS ☐ RBS ☐ VY ☐ W3

☐ NP-GGNS-3 ☐ NP-RBS-3

CALCULATION COVER PAGE	(1) **EC # 18781** (2)**Page 1 of 17** (**a total of 258 pages incl. attachment**)
(3) Design Basis Calc ☐ YES ■ NO	(4) ■ CALCULATION ☐ EC Markup
(5) **Calculation No: IP-CALC-09-00265**	(6) **Revision: 0**
(7) **Title: : Re-analysis of MACCS2 Models for IPEC**	(8) **Editorial:** ☐ YES ■ NO
(9) **System(s): NA**	(10) **Review Org (Department): PSA**
(11) **Safety Class:** ☐ **Safety / Quality Related** ☐ **Augmented Quality Program** ■ **Non-Safety Related**	(12) **Component/Equipment/Structure Type/Number:**
(13) **Document Type: Calculation**	
(14) **Keywords (Description/Topical Codes): MACCS2**	

REVIEWS

(15) Name/Signature/Date	(16) Name/Signature/Date	(17) Name/Signature/Date
K. Hong Kou Tsh Hong 12/2/09	M. Golshani M. Golshani 12/2/09	C. Yeh C Yeh 12/2/09
Responsible Engineer	☐ **Design Verifier** ■ **Reviewer**	**Supervisor/Approval**
	☐ Comments Attached	☐ Comments Attached

I. EC Markups Incorporated - none

II. Relationships:	Sec.	Rev	Input Doc	Output Doc	Impact Y/N	Tracking No.
ENERCON Report	-	1	■	☐	N	N/A
REA-03-04	-	0	■	☐	N	N/A
REA-03-40	-	0	■	☐	N	N/A

III. CROSS REFERENCES:

NUREG/CR-4551, Vol. 2, Rev. 1

IV. SOFTWARE USED:

Title: MACCS2 Version/Release: 1.13.1 Disk/CD No._______

V. DISK/CDS INCLUDED: No, See Attachment

Title:________Version/Release____________Disk/CD No._______

VI. OTHER CHANGES:

ATTACHMENT 9.4 RECORD OF REVISION

Sheet 1 of 1

Revision	Record of Revision
0	Initial issue.

TABLE OF CONTENTS

List of Effective Pages

Page No.	**Revision**	**Page No.**	**Revision**
1 – 17	**0**		

1.0 Purpose

The purpose of this calculation is to re-analyze the baseline population dose risk (PDR) and offsite economic cost risk (OECR) to support the severe accident mitigation alternative (SAMA) evaluations required for IPEC license renewal application using Year 2000 meteorological data. The baseline case includes economic losses due to tourism and business. The re-analysis is required to address an error found in methodology used to derive five year average wind direction input into the computer code, MACCS2, used for the SAMA evaluations. In the re-analysis, a single year (i.e. Year 2000) rather than the five year average is used. The previous IP2 and IP3 analyses are documented in calculations IP-CALC-07-00016 [Ref. 1] and IP-CALC-07-00019 [Ref. 2], respectively.

2.0 Summary of Results

The baseline case was evaluated using MACCS2 with site specific source term information, no evacuation scenario, and inclusion of economic losses due to tourism and business.

For IP2, the estimated mean values of PDR and OECR from postulated internal events are 87.4 person-rem/yr and $212,000/yr, respectively.

For IP3, the estimated mean values of PDR and OECR from postulated internal events are 94.8 person-rem/yr and $261,000/yr, respectively.

3.0 Input Data

Key input data common to IP2 and IP3 are listed for the following modules:

ATMOS

1. Containment dimensions: (Refs. 3, 4)
   Width (W) = 42.5m
   Height (H) = 66.8m

2. Initial value of dispersion parameters: (Ref. 5)
   Sigma-y = W/4.3 = 42.5/4.3 = 9.9 m
   Sigma-z = H/2.15 = 66.8/2.15 = 31.1 m

CHRONC (Ref. 6)

1. Value of farm wealth in the region = $50,071/hectare
2. Fraction of farm wealth in the region due to improvements = 0.25
3. Value of non-farm wealth in the region = $208,838/person
4. Fraction of non-farm wealth in the region due to improvements = 0.8

METEOROLOGICAL DATA (Ref. 6)

The meteorological data are hourly measured data of Year 2000.

SITE DATA (Ref. 6)

The site data include population distribution, land fractions, watershed index, crop season and share, watershed definition, and regional economic data. The data were derived in Ref. 6 and included in the MACCS2 files of Attachment A.

Source term information tables are site specific. The source terms are given in Table 1 and Table 2 for IP2, and IP3, respectively.

Other input data were obatained from Ref. 5 and Ref. 7 and included in Attachment A.

Table 1 Source Terms for Postulated Internal Events at IP2

	Release Mode	Frequency (/year)	Warning Time (sec)	Elevation (m)	Release Start (sec)	Release Duration (sec)	Release Energy (W)	Release Fractions								
								NG	I	Cs	Te	Sr	Ru	La	Ce	Ba
1	NCF	1.19E-05	1.66E+04	3.00E+01	0.00E+00	1.28E+05	9.20E+05	9.27E-05	3.94E-06	1.61E-06	1.21E-06	3.74E-08	2.37E-07	2.11E-09	1.77E-08	1.05E-07
2	EARLY HIGH	6.50E-07	1.36E+04	3.00E+01	1.32E+04	8.24E+04	1.08E+06	7.01E-01	2.43E-01	2.29E-01	2.26E-01	2.47E-02	9.13E-02	7.95E-04	4.84E-03	4.56E-02
3	EARLY MEDIUM	4.23E-07	1.00E+04	3.00E+01	1.25E+04	9.72E+04	1.33E+06	9.87E-01	2.02E-02	1.75E-02	2.66E-02	8.33E-04	2.03E-02	4.92E-05	3.28E-04	1.33E-02
4	EARLY LOW	1.11E-07	1.09E+04	3.00E+01	1.73E+04	1.16E+05	1.60E+06	7.55E-01	5.93E-03	4.06E-03	3.89E-03	1.04E-04	1.97E-03	4.58E-06	3.31E-05	7.75E-04
5	LATE HIGH	6.88E-07	5.58E+03	3.00E+01	7.38E+04	1.30E+05	9.20E+05	9.89E-01	1.17E-01	2.26E-02	4.81E-03	2.08E-04	3.74E-03	1.32E-05	1.22E-04	9.06E-04
6	LATE MEDIUM	3.43E-06	8.94E+03	3.00E+01	8.04E+04	1.30E+05	9.20E+05	8.23E-01	1.53E-02	4.30E-03	1.49E-03	8.01E-05	1.44E-03	5.11E-06	4.72E-05	3.50E-04
7	LATE LOW	6.43E-07	2.19E+04	3.00E+01	9.90E+04	1.30E+05	9.20E+05	6.98E-01	1.06E-03	7.91E-04	1.23E-03	8.69E-05	3.47E-06	2.59E-06	2.38E-05	7.42E-05
8	LATE LOWLOW	5.82E-08	2.56E+04	3.00E+01	1.13E+05	1.30E+05	9.20E+05	9.09E-01	8.14E-04	6.96E-04	7.55E-04	3.63E-05	2.08E-06	1.14E-06	1.20E-05	3.33E-05

Table 2 Source Terms for Postulated Internal Events at IP3

	Release Mode	Frequency (/year)	Warning Time (sec)	Elevation (m)	Release Start (sec)	Release Duration (sec)	Release Energy (W)	Release Fractions								
								NG	I	Cs	Te	Sr	Ru	La	Ce	Ba
1	NCF	6.30E-06	1.26E+04	3.00E+01	0.00E+00	1.27E+05	9.20E+05	9.62E-05	6.51E-06	2.65E-06	2.08E-06	6.09E-08	5.20E-07	3.26E-09	2.72E-08	1.79E-07
2	EARLY HIGH	9.43E-07	1.27E+04	3.00E+01	1.20E+04	7.92E+04	1.03E+06	6.35E-01	1.63E-01	1.48E-01	1.47E-01	1.57E-02	6.48E-02	5.55E-04	3.03E-03	3.07E-02
3	EARLY MEDIUM	1.24E-06	9.18E+03	3.00E+01	9.22E+03	8.21E+04	1.07E+06	9.87E-01	1.31E-02	1.18E-02	2.65E-02	8.51E-04	2.95E-02	5.17E-05	3.07E-04	1.95E-02
4	EARLY LOW	1.46E-07	9.31E+03	3.00E+01	9.90E+03	8.49E+04	1.11E+06	2.43E-01	2.03E-03	1.62E-03	2.90E-03	8.98E-05	2.97E-03	5.17E-06	3.11E-05	1.87E-03
5	LATE HIGH	4.23E-07	5.58E+03	3.00E+01	7.38E+04	1.30E+05	9.20E+05	9.89E-01	1.17E-01	2.26E-02	4.81E-03	2.08E-04	3.74E-03	1.32E-05	1.22E-04	9.06E-04
6	LATE MEDIUM	2.01E-06	7.17E+03	3.00E+01	7.70E+04	1.30E+05	9.20E+05	8.23E-01	1.53E-02	4.30E-03	1.49E-03	8.01E-05	1.44E-03	5.11E-06	4.72E-05	3.50E-04
7	LATE LOW	3.75E-07	2.19E+04	3.00E+01	9.13E+04	1.30E+05	9.20E+05	6.98E-01	1.06E-03	7.91E-04	1.23E-03	8.69E-05	3.47E-06	2.59E-06	2.38E-05	7.41E-05
8	LATE LOWLOW	5.66E-08	2.56E+04	3.00E+01	1.13E+05	1.30E+05	9.20E+05	9.09E-01	8.14E-04	6.96E-04	7.55E-04	3.63E-05	2.08E-06	1.14E-06	1.20E-05	3.33E-05

4.0 Methodology

MACCS2 was used to calculate the consequences of atmospheric releases of radiological materials from postulated severe accidents. The principal consequences considered in this calculation are population dose and offsite economic cost resulting from the releases.

A MACCS2 calculation consists of three phases: input processing and validation, phenomenological modeling and output processing. The phenomenological models are based mostly on empirical data. The modeling software is subdivided into three modules:

- ATMOS treats atmospheric transport and dispersion of material and its deposition from the air utilizing a Gaussian plume model with Pasquill-Gifford dispersion parameters.
- EARLY models consequences of the accident to the surrounding area during an emergency action period.
- CHRONC considers the long-term impact in the period subsequent to the emergency action period.

Detailed site-specific meteorological, population and economic data are required. Model parameters can be varied by the user via input files, thus facilitating the analysis of consequence sensitivities due to uncertainties in specific model parameters.

This calculation evaluates a baseline case to provide best-estimated consequences for postulated internal events. Instead of considering various emergency planning scenarios, the baseline case uses a conservative assumption of no evacuation.

The population dose risk (PDR) was estimated by summing the product of population dose, obtained from the MACCS2 calculation, and frequency for each accidental release over all releases. The same process was used to estimate offsite economic cost risk (OECR). The offsite economic cost includes the cost that could incur during emergency response phase and long-term protective actions.

5.0 Analysis and Results

5.1 Assumptions

5.1.1 Assumptions common to IP2 and IP3

Major assumptions included in this calculation are as follows:

1. The base case assumes a conservative no evacuation scenario.
2. The Consumer Price Index (CPI) is assumed to be 195.3, which is the average value for Year 2005.
3. Population distributions are projected for Year 2035. County level permanent population projections were obtained from the New York Statistical Information System from 2000 to 2030, the New Jersey Department of Labor and Workforce Development from 2000 to 2025, the Connecticut State Data Center from 2000 to 2020, and the Pennsylvania State Data Center from 2000 to 2020. Population estimates for Connecticut were provided by municipalities and converted to county to maintain consistency.

5.1.2 Assumptions specific to IP2

Core inventory (Table 3) is based on a power level of 3216 MWth. The values are derived from ORIGEN2 results based on the fuel management data for the proposed fuel management designs for Cycles 16, 17, 18, and 19 (Ref. 8).

Table 3 Estimated IP2 Core Inventory (Becquerels)*

Nuclide	Inventory	Nuclide	Inventory
Co-58	3.04E+16	Te-131m	4.64E+17
Co-60	2.32E+16	Te-132	4.57E+18
Kr-85	3.84E+16	I-131	3.20E+18
Kr-85m	8.48E+17	I-132	4.64E+18
Kr-87	1.63E+18	I-133	6.56E+18
Kr-88	2.29E+18	I-134	7.19E+18
Rb-86	8.31E+15	I-135	6.11E+18
Sr-89	3.08E+18	Xe-133	6.28E+18
Sr-90	3.05E+17	Xe-135	1.67E+18
Sr-91	3.87E+18	Cs-134	7.19E+17
Sr-92	4.19E+18	Cs-136	2.10E+17
Y-90	3.18E+17	Cs-137	4.15E+17
Y-91	3.98E+18	Ba-139	5.83E+18
Y-92	4.19E+18	Ba-140	5.62E+18
Y-93	4.85E+18	La-140	6.04E+18
Zr-95	5.38E+18	La-141	5.34E+18
Zr-97	5.41E+18	La-142	5.17E+18
Nb-95	5.45E+18	Ce-141	5.31E+18
Mo-99	6.11E+18	Ce-143	4.96E+18
Tc-99m	5.34E+18	Ce-144	4.19E+18
Ru-103	4.89E+18	Pr-143	4.78E+18
Ru-105	3.36E+18	Nd-147	2.13E+18
Ru-106	1.71E+18	Np-239	6.56E+19
Rh-105	3.09E+18	Pu-238	1.44E+16
Sb-127	3.47E+17	Pu-239	1.22E+15
Sb-129	1.04E+18	Pu-240	1.83E+15
Te-127	3.43E+17	Pu-241	4.12E+17
Te-127m	4.50E+16	Am-241	4.92E+14
Te-129	1.02E+18	Cm-242	1.23E+17
Te-129m	1.50E+17	Cm-244	1.33E+16

***Derived from Ref. 8 for a power level of 3216 MWth except Co-58 and Co-60, which were power scaled from the reference inventory given in Ref. 5.

5.1.3 Assumptions specific to IP3

Core inventory (Table 4) is based on a power level of 3216 MWth. The values are derived from ORIGEN2 results based on the fuel management data for the proposed fuel management designs for Cycles 14, 15 and 16 (Ref. 9).

Table 4 Estimated IP3 Core Inventory (Becquerels)*

Nuclide	Inventory	Nuclide	Inventory
Co-58	3.04E+16	Te-131m	4.64E+17
Co-60	2.32E+16	Te-132	4.54E+18
Kr-85	3.87E+16	I-131	3.18E+18
Kr-85m	8.52E+17	I-132	4.64E+18
Kr-87	1.64E+18	I-133	6.56E+18
Kr-88	2.30E+18	I-134	7.19E+18
Rb-86	8.24E+15	I-135	6.14E+18
Sr-89	3.09E+18	Xe-133	6.25E+18
Sr-90	3.07E+17	Xe-135	1.67E+18
Sr-91	3.87E+18	Cs-134	7.16E+17
Sr-92	4.19E+18	Cs-136	2.08E+17
Y-90	3.20E+17	Cs-137	4.15E+17
Y-91	3.98E+18	Ba-139	5.86E+18
Y-92	4.22E+18	Ba-140	5.58E+18
Y-93	4.85E+18	La-140	5.76E+18
Zr-95	5.38E+18	La-141	5.34E+18
Zr-97	5.41E+18	La-142	5.17E+18
Nb-95	5.45E+18	Ce-141	5.31E+18
Mo-99	6.11E+18	Ce-143	4.99E+18
Tc-99m	5.34E+18	Ce-144	4.19E+18
Ru-103	4.85E+18	Pr-143	4.78E+18
Ru-105	3.34E+18	Nd-147	2.12E+18
Ru-106	1.69E+18	Np-239	6.53E+19
Rh-105	3.08E+18	Pu-238	1.43E+16
Sb-127	3.45E+17	Pu-239	1.22E+15
Sb-129	1.04E+18	Pu-240	1.82E+15
Te-127	3.43E+17	Pu-241	4.08E+17
Te-127m	4.47E+16	Am-241	5.03E+14
Te-129	1.02E+18	Cm-242	1.21E+17
Te-129m	1.49E+17	Cm-244	1.29E+16

***** Derived from Ref. 9 for a power level of 3216 MWth except Co-58 and Co-60, which were power scaled from the reference inventory given in Ref. 5.

5.2 Results

Risk estimates for baseline case were analyzed with MACCS2. The baseline mean risk values for postulated internal events are given in Table 5 and Table 6 for IP2 and IP3, respectively.

Table 5 IP2 Mean PDR and OECR Using Year 2000 Meteorological Data

Release Mode	Frequency (/yr)	Population Dose (person-sv)*	Offsite Economic Cost ($)	Population Dose Risk (PDR) (person-rem/yr)	Offsite Economic Cost Risk (OECR) ($/yr)
NCF	1.19E-05	4.75E+01	9.98E+04	5.64E-02**	1.18E+00
EARLY HIGH	6.50E-07	6.51E+05	2.05E+11	4.23E+01	1.33E+05
EARLY MEDIUM	4.23E-07	1.94E+05	5.87E+10	8.21E+00	2.48E+04
EARLY LOW	1.11E-07	7.93E+04	6.39E+09	8.81E-01	7.10E+02
LATE HIGH	6.88E-07	1.63E+05	4.64E+10	1.12E+01	3.19E+04
LATE MEDIUM	3.43E-06	6.87E+04	6.06E+09	2.36E+01	2.08E+04
LATE LOW	6.43E-07	1.61E+04	6.59E+08	1.04E+00	4.24E+02
LATE LOWLOW	5.82E-08	1.38E+04	5.62E+08	8.04E-02	3.27E+01
			Totals	8.74E+01	2.12E+05

* 1 sv = 100 rem
** 5.64E-02 (person-rem/yr) = 1.19E-05 (/yr) x 4.75E+01 (person-sv) x 100 (rem/sv)

Table 6 IP3 Mean PDR and OECR Using Year 2000 Meteorological Data

Release Mode	Frequency (/yr)	Population Dose (person-sv)*	Offsite Economic Cost ($)	Population Dose Risk (PDR) (person-rem/yr)	Offsite Economic Cost Risk (OECR) ($/yr)
NCF	6.30E-06	8.04E+01	2.95E+05	5.06E-02**	1.86E+00
EARLY HIGH	9.43E-07	5.08E+05	1.70E+11	4.79E+01	1.60E+05
EARLY MEDIUM	1.24E-06	2.00E+05	5.55E+10	2.47E+01	6.87E+04
EARLY LOW	1.46E-07	5.21E+04	3.58E+09	7.59E-01	5.21E+02
LATE HIGH	4.23E-07	1.63E+05	4.61E+10	6.89E+00	1.95E+04
LATE MEDIUM	2.01E-06	6.85E+04	6.06E+09	1.37E+01	1.22E+04
LATE LOW	3.75E-07	1.61E+04	6.58E+08	6.03E-01	2.47E+02
LATE LOWLOW	5.66E-08	1.38E+04	5.62E+08	7.81E-02	3.18E+01
			Totals	9.48E+01	2.61E+05

* 1 sv = 100 rem
** 5.06E-02 (person-rem/yr) = 6.30E-06 (/yr) x 8.04E+01 (person-sv) x 100 (rem/sv)

6.0 REFERENCES

1. IP2 Calculation IP-CALC-07-00016, MACCS2 Model for IP2
2. IP3 Calculation IP-CALC-07-00019, MACCS2 Model for IP3
3. IP2 Final Safety Analysis Report, Figure 5.1-5
4. IP3 Final Safety Analysis Report, Figure 5.1-5
5. SAND97-0594, Code Manual for MACCS2: Volume 1, User's Guide, Sandia National Laboratories, March 1997
6. ENERCON Services: Site Specific MACCS2 Input Data for Indian Point Energy Center, Rev. 1
7. NUREG/CR-4551, Vol. 2, Rev. 1, Part 7, Evaluation of Severe Accident Risks: Quantification of Major Input Parameters, MACCS Input, December 1990
8. IP2 Calculation REA-03-4: Core Radiation Sources to Support Indian Point 2 Power Uprate Project, Westinghouse Electric Company, CN-REA-03-4
9. IP3 Calculation REA-03-40: Core Radiation Sources to Support Indian Point 3 SPU Project, Westinghouse Electric Company, CN-REA-03-40

Attachment A

MACCS2 Input and Output File

Attachment A lists all MACCS2 files generated for this calculation. Each MACCS2 file includes input data and results output. The files appear in the following order:

A.1 IP2 MACCS2 Input and Output File
A.2 IP2 MACCS2 Input and Output File

Attachment A.1

IP2 MACCS2 Input and Output File

```
MACCS2 11-NOV-09  19:34:05   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
P1:  ATMOS USER INPUT (UNIT 24) = atmbi2NS.INP
P2:  EARLY USER INPUT (UNIT 25) = earbi-noE.INP
P3: CHRONC USER INPUT (UNIT 26) = chrbiEC.INP
P4:  METEOROLOGY DATA (UNIT 28) = meti00.INP
P5:   SITE DATA INPUT (UNIT 29) = siteiEC.INP
P6:       LIST OUTPUT (UNIT 06) = conbi2NS-noE-NmetEC.OUT



USER INPUT IS READ FROM UNIT 24
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                  RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "ATMOS" INPUT
       *
    1  RIATNAM1001 'ATMOS INPUT FOR IPEC CALCULATIONS'
       ********************************************************************************
       * GEOMETRY DATA BLOCK, LOADED BY INPGEO, STORED IN /GEOM/
       *
       * NUMBER OF RADIAL SPATIAL ELEMENTS
       *
    2  GENUMRAD001  15
       *
       *
       *
    3  GESPAEND001     0.32      1.61      3.22      4.83      6.44
    4  GESPAEND002     8.05      9.66     11.27     12.87     14.48
    5  GESPAEND003    16.09     32.19     48.28     64.37     80.47
       ********************************************************************************
       * NUCLIDE DATA BLOCK, LOADED BY INPISO, STORED IN /ISOGRP/, /ISONAM/
       *
       * Number of pseudo-stable nuclides (used to truncate the decay chains)
       *
    6  ISNUMSTB001      27
       *
       * List of pseudo-stable nuclides
       *
    7  ISNAMSTB001     I-129    (daughter of Te-129 and Te-129m)
    8  ISNAMSTB002     Xe-131m  (daughter of I-131)
    9  ISNAMSTB003     Xe-133m  (daughter of I-133)
   10  ISNAMSTB004     Xe-135m  (daughter of I-135)
   11  ISNAMSTB005     Cs-135   (daughter of Xe-135 and Xe-135m)
   12  ISNAMSTB006     Sm-147   (daughter of Pm-147)
   13  ISNAMSTB007     U-234    (daughter of Pu-238)
   14  ISNAMSTB008     U-235    (daughter of Pu-239)
   15  ISNAMSTB009     U-236    (daughter of Pu-240)
   16  ISNAMSTB010     U-237    (daughter of Pu-241)
   17  ISNAMSTB011     Np-237   (daughter of Am-241)
   18  ISNAMSTB012     Rb-87    (daughter of Kr-87)
   19  ISNAMSTB013     Ba-137m  (daughter of Cs-137)
   20  ISNAMSTB014     Rb-88    (daughter of Kr-88)
   21  ISNAMSTB015     Y-91m    (daughter of Sr-91)
   22  ISNAMSTB016     Zr-93    (daughter of Y-93)
   23  ISNAMSTB017     Nb-93m   (daughter of Zr-93)
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24  ISNAMSTB018     Nb-95m   (daughter of Zr-95)
25  ISNAMSTB019     Nb-97    (daughter of Zr-97 and Nb-97m)
26  ISNAMSTB020     Nb-97m   (daughter of Zr-97)
27  ISNAMSTB021     Tc-99    (daughter of Mo-99)
28  ISNAMSTB022     Rh-103m  (daughter of Ru-103)
29  ISNAMSTB023     Rh-106   (daughter of Ru-106)
30  ISNAMSTB024    Te-131    (daughter of Te-131m)
31  ISNAMSTB025     Pr-144   (daughter of Ce-144 and Pr-144m)
32  ISNAMSTB026     Pr-144m  (daughter of Ce-144)
33  ISNAMSTB027     Pm-147   (daughter of Nd-147)
    *
    * Number of radioactive nuclides to be considered
    *
34  ISNUMISO001 60
    *
    * NUMBER OF NUCLIDE GROUPS
    *
35  ISMAXGRP001  9
    *
    * WET AND DRY DEPOSITION FLAGS FOR EACH NUCLIDE GROUP
    *
    *              WETDEP     DRYDEP
    *
36  ISDEPFLA001    .FALSE.   .FALSE.
37  ISDEPFLA002    .TRUE.    .TRUE.
38  ISDEPFLA003    .TRUE.    .TRUE.
39  ISDEPFLA004    .TRUE.    .TRUE.
40  ISDEPFLA005    .TRUE.    .TRUE.
41  ISDEPFLA006    .TRUE.    .TRUE.
42  ISDEPFLA007    .TRUE.    .TRUE.
43  ISDEPFLA008    .TRUE.    .TRUE.
44  ISDEPFLA009    .TRUE.    .TRUE.
    *
    * NUCLIDE GROUP DATA FOR 9 NUCLIDE GROUPS
    *
    *               NUCNAM    IGROUP
    *
45  ISOTPGRP001     Co-58        6
46  ISOTPGRP002     Co-60        6
47  ISOTPGRP003     Kr-85        1
48  ISOTPGRP004     Kr-85m       1
49  ISOTPGRP005     Kr-87        1
50  ISOTPGRP006     Kr-88        1
51  ISOTPGRP007     Rb-86        3
52  ISOTPGRP008     Sr-89        5
53  ISOTPGRP009     Sr-90        5
54  ISOTPGRP010     Sr-91        5
55  ISOTPGRP011     Sr-92        5
56  ISOTPGRP012     Y-90         7
57  ISOTPGRP013     Y-91         7
58  ISOTPGRP014     Y-92         7
59  ISOTPGRP015     Y-93         7
60  ISOTPGRP016     Zr-95        7
61  ISOTPGRP017     Zr-97        7
62  ISOTPGRP018     Nb-95        7
63  ISOTPGRP019     Mo-99        6
64  ISOTPGRP020     Tc-99m       6
65  ISOTPGRP021     Ru-103       6
66  ISOTPGRP022     Ru-105       6
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 67  ISOTPGRP023     Ru-106       6
 68  ISOTPGRP024     Rh-105       6
 69  ISOTPGRP025     Sb-127       4
 70  ISOTPGRP026     Sb-129       4
 71  ISOTPGRP027     Te-127       4
 72  ISOTPGRP028     Te-127m      4
 73  ISOTPGRP029     Te-129       4
 74  ISOTPGRP030     Te-129m      4
 75  ISOTPGRP031     Te-131m      4
 76  ISOTPGRP032     Te-132       4
 77  ISOTPGRP033     I-131        2
 78  ISOTPGRP034     I-132        2
 79  ISOTPGRP035     I-133        2
 80  ISOTPGRP036     I-134        2
 81  ISOTPGRP037     I-135        2
 82  ISOTPGRP038     Xe-133       1
 83  ISOTPGRP039     Xe-135       1
 84  ISOTPGRP040     Cs-134       3
 85  ISOTPGRP041     Cs-136       3
 86  ISOTPGRP042     Cs-137       3
 87  ISOTPGRP043     Ba-139       9
 88  ISOTPGRP044     Ba-140       9
 89  ISOTPGRP045     La-140       7
 90  ISOTPGRP046     La-141       7
 91  ISOTPGRP047     La-142       7
 92  ISOTPGRP048     Ce-141       8
 93  ISOTPGRP049     Ce-143       8
 94  ISOTPGRP050     Ce-144       8
 95  ISOTPGRP051     Pr-143       7
 96  ISOTPGRP052     Nd-147       7
 97  ISOTPGRP053     Np-239       8
 98  ISOTPGRP054     Pu-238       8
 99  ISOTPGRP055     Pu-239       8
100  ISOTPGRP056     Pu-240       8
101  ISOTPGRP057     Pu-241       8
102  ISOTPGRP058     Am-241       7
103  ISOTPGRP059     Cm-242       7
104  ISOTPGRP060     Cm-244       7
     *******************************************************************************
     * WET DEPOSITION DATA BLOCK, LOADED BY INPWET, STORED IN /WETCON/
     *
     * WASHOUT COEFFICIENT NUMBER ONE, LINEAR FACTOR
     *
105  WDCWASH1001  9.5E-5   (JON HELTON AFTER JONES, 1986)
     *
     * WASHOUT COEFFICIENT NUMBER TWO, EXPONENTIAL FACTOR
     *
106  WDCWASH2001  0.8      (JON HELTON AFTER JONES, 1986)
     ********************************************************************************
     * DRY DEPOSITION DATA BLOCK, LOADED BY INPDRY, STORED IN /DRYCON/
     *
     * NUMBER OF PARTICLE SIZE GROUPS
     *
107  DDNPSGRP001   1
     *
     * DEPOSITION VELOCITY OF EACH PARTICLE SIZE GROUP (M/S)
     *
108  DDVDEPOS001   0.01   (VALUE SELECTED BY S. ACHARYA, NRC)
     ********************************************************************************
```

```
     * DISPERSION PARAMETER DATA BLOCK, LOADED BY INPDIS, STORED IN /DISPY/, /DISPZ/
     *
     * # of distances in plume-size tables--which can be used as an alternative to the power-law model:
     * (to utilize the power-law model, set NUM_DIST to zero or delete the following data card)
     *
109  NUM_DIST001   0
     *
     * SIGMA = A * X ** B
     *
     * Tadmor and Gur Parameterization for Distance Range 0.5 to 5.0 km
     * as taken from Atmospheric Motion and Air Pollution (Dobbins 1979).
     * P-G CLASS:         A            B            C           D            E            F
110  DPCYSIGA001       0.3658       0.2751       0.2089      0.1474       0.1046     0.0722
111  DPCYSIGB001       0.9031       0.9031       0.9031      0.9031       0.9031     0.9031
112  DPCZSIGA001       2.5E-4       1.9E-3       0.2         0.3          0.4        0.2
113  DPCZSIGB001       2.125        1.6021       0.8543      0.6532       0.6021     0.6020
     *
     *  LINEAR SCALING FACTOR FOR SIGMA-Y FUNCTION, NORMALLY 1
     *
114  DPYSCALE001    1.
     *
     *  LINEAR SCALING FACTOR FOR SIGMA-Z FUNCTION,
     *  NORMALLY USED FOR SURFACE ROUGHNESS LENGTH CORRECTION.
     *  (Z1 / Z0) ** 0.2,   FROM CRAC2 WE HAVE  (10 CM / 3 CM) ** 0.2 = 1.27
     *
115  DPZSCALE001    1.27
     ******************************************************************************** *
     * EXPANSION FACTOR DATA BLOCK, LOADED BY INPEXP, STORED IN /EXPAND/
     *
     * TIME BASE FOR EXPANSION FACTOR (SECONDS)
     *
116  PMTIMBAS001    600.   (10 MINUTES)
     *
     * BREAK POINT FOR FORMULA CHANGE (SECONDS)
     *
117  PMBRKPNT001   3600.   (1 HOUR)
     *
     * EXPONENTIAL EXPANSION FACTOR NUMBER 1
     *
118  PMXPFAC1001      0.2
     *
     * EXPONENTIAL EXPANSION FACTOR NUMBER 2
     *
119  PMXPFAC2001      0.25
     ********************************************************************************
     * PLUME RISE DATA BLOCK, LOADED BY INPLRS, STORED IN /PLUMRS/
     *
     * SCALING FACTOR FOR THE CRITICAL WIND SPEED FOR ENTRAINMENT OF A BOUYANT PLUME
     * (USED BY FUNCTION CAUGHT)
     *
120  PRSCLCRW001   1.
     *
     * SCALING FACTOR FOR THE A-D STABILITY PLUME RISE FORMULA
     * (USED BY FUNCTION PLMRIS)
     *
121  PRSCLADP001   1.
     *
     * SCALING FACTOR FOR THE E-F STABILITY PLUME RISE FORMULA
     * (USED BY FUNCTION PLMRIS)
```

```
     *
122  PRSCLEFP001   1.
     ********************************************************************************
     * RELEASE DATA BLOCK, LOADED BY INPREL, STORED IN /ATNAM2/, /MULREL/
     *********************** RELEASE DATA BLOCK ************
     * SOURCE TERM NUMBER  1 OF 8
123  RDATNAM2001 'NCF'
     *
     * TIME AFTER ACCIDENT INITIATION WHEN THE ACCIDENT REACHES GENERAL EMERGENCY
     * CONDITIONS (AS DEFINED IN NUREG-0654), OR WHEN PLANT PERSONNEL CAN RELIABLY
     * PREDICT THAT GENERAL EMERGENCY CONDITIONS WILL BE ATTAINED
     *
124  RDOALARM001   1.66E+04
     *
     * NUMBER OF PLUME SEGMENTS THAT ARE RELEASED
     *
125  RDNUMREL001          1
     *
     * SELECTION OF RISK DOMINANT PLUME
     *
126  RDMAXRIS001          1
     *
     * REFERENCE TIME FOR DISPERSION AND RADIOACTIVE DECAY
     *
127  RDREFTIM001        0.5
     *
     * HEAT CONTENT OF THE RELEASE SEGMENTS (W)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
128  RDPLHEAT001   9.20E+05
     *
     * HEIGHT OF THE PLUME SEGMENTS AT RELEASE (M)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
129  RDPLHITE001        30.
     *
     * DURATION OF THE PLUME SEGMENTS (S)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
130  RDPLUDUR001   8.64E+04
     *
     * TIME OF RELEASE FOR EACH PLUME (S AFTER SCRAM)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
131  RDPDELAY001   0.00E+00
     *
     * Initial value of sigma-y for each plume--Note: values required for each plume
     *
132  SIGYINIT001   9.9  (initial sigma-y = W/4.3 = 42.5/4.3)
     *
     * Initial value of sigma-z for each plume--Note: values required for each plume
     *
133  SIGZINIT001  31.1  (initial sigma-z = H/2.15 = 66.8/2.15)
     *
     * Building height (meters)--Note: values required for each plume
     *
134  WEBUILDH001   66.8
     *
     * PARTICLE SIZE DISTRIBUTION OF EACH NUCLIDE GROUP
```

```
     * YOU MUST SPECIFY A COLUMN OF DATA FOR EACH OF THE PARTICLE SIZE GROUPS
     *
135  RDPSDIST001      1.
136  RDPSDIST002      1.
137  RDPSDIST003      1.
138  RDPSDIST004      1.
139  RDPSDIST005      1.
140  RDPSDIST006      1.
141  RDPSDIST007      1.
142  RDPSDIST008      1.
143  RDPSDIST009      1.
     *
     *
     *               NUCNAM  CORINV (Bq)
     *
144  RDCORINV001     Co-58    3.04E+16
145  RDCORINV002     Co-60    2.32E+16
146  RDCORINV003     Kr-85    3.84E+16
147  RDCORINV004     Kr-85m   8.48E+17
148  RDCORINV005     Kr-87    1.63E+18
149  RDCORINV006     Kr-88    2.29E+18
150  RDCORINV007     Rb-86    8.31E+15
151  RDCORINV008     Sr-89    3.08E+18
152  RDCORINV009     Sr-90    3.05E+17
153  RDCORINV010     Sr-91    3.87E+18
154  RDCORINV011     Sr-92    4.19E+18
155  RDCORINV012     Y-90     3.18E+17
156  RDCORINV013     Y-91     3.98E+18
157  RDCORINV014     Y-92     4.19E+18
158  RDCORINV015     Y-93     4.85E+18
159  RDCORINV016     Zr-95    5.38E+18
160  RDCORINV017     Zr-97    5.41E+18
161  RDCORINV018     Nb-95    5.45E+18
162  RDCORINV019     Mo-99    6.11E+18
163  RDCORINV020     Tc-99m   5.34E+18
164  RDCORINV021     Ru-103   4.89E+18
165  RDCORINV022     Ru-105   3.36E+18
166  RDCORINV023     Ru-106   1.71E+18
167  RDCORINV024     Rh-105   3.09E+18
168  RDCORINV025     Sb-127   3.47E+17
169  RDCORINV026     Sb-129   1.04E+18
170  RDCORINV027     Te-127   3.43E+17
171  RDCORINV028     Te-127m  4.50E+16
172  RDCORINV029     Te-129   1.02E+18
173  RDCORINV030     Te-129m  1.50E+17
174  RDCORINV031     Te-131m  4.64E+17
175  RDCORINV032     Te-132   4.57E+18
176  RDCORINV033     I-131    3.20E+18
177  RDCORINV034     I-132    4.64E+18
178  RDCORINV035     I-133    6.56E+18
179  RDCORINV036     I-134    7.19E+18
180  RDCORINV037     I-135    6.11E+18
181  RDCORINV038     Xe-133   6.28E+18
182  RDCORINV039     Xe-135   1.67E+18
183  RDCORINV040     Cs-134   7.19E+17
184  RDCORINV041     Cs-136   2.10E+17
185  RDCORINV042     Cs-137   4.15E+17
186  RDCORINV043     Ba-139   5.83E+18
187  RDCORINV044     Ba-140   5.62E+18
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188  RDCORINV045     La-140   6.04E+18
189  RDCORINV046     La-141   5.34E+18
190  RDCORINV047     La-142   5.17E+18
191  RDCORINV048     Ce-141   5.31E+18
192  RDCORINV049     Ce-143   4.96E+18
193  RDCORINV050     Ce-144   4.19E+18
194  RDCORINV051     Pr-143   4.78E+18
195  RDCORINV052     Nd-147   2.13E+18
196  RDCORINV053     Np-239   6.56E+19
197  RDCORINV054     Pu-238   1.44E+16
198  RDCORINV055     Pu-239   1.22E+15
199  RDCORINV056     Pu-240   1.83E+15
200  RDCORINV057     Pu-241   4.12E+17
201  RDCORINV058     Am-241   4.92E+14
202  RDCORINV059     Cm-242   1.23E+17
203  RDCORINV060     Cm-244   1.33E+16
     *
     *  SCALING FACTOR TO ADJUST THE CORE INVENTORY FOR POWER LEVEL
     *
     *
204  RDCORSCA001   1.0
     *
205  RDAPLFRC001   PARENT      (apply rel fracs the same as prior versions)
     *
     * RELEASE FRACTIONS FOR ISOTOPE GROUPS IN RELEASE
     *
     *  ISOTOPE GROUPS:
     *
     *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
     *
206  RDRELFRC001 9.3E-05 3.9E-06 1.6E-06 1.2E-06 3.7E-08 2.4E-07 2.1E-09 1.8E-08 1.1E-07
     *
     ********************************************************************************
     * OUTPUT CONTROL DATA BLOCK, LOADED BY INPOPT, STORED IN /STOPME/, /ATMOPT/
     *
     * FLAG TO INDICATE THAT THIS IS THE LAST PROGRAM IN THE SERIES TO BE RUN
     *
207  OCENDAT1001  .FALSE. (SET THIS VALUE TO .TRUE. TO SKIP EARLY AND CHRONC)
     *
208  OCIDEBUG001  0
     *
     * NAME OF THE NUCLIDE TO BE LISTED ON THE DISPERSION LISTINGS
     *
     *OCNUCOUT001  Cs-137
     *
     *              NUM0
209  TYPE0NUMBER      0
     *
     *              INDREL   INDRAD
     *TYPE0OUT001      1        9
     *TYPE0OUT002      1       10         CCDF
     ********************************************************************************
     * METEOROLOGICAL SAMPLING DATA BLOCK
     *
     * METEOROLOGICAL SAMPLING OPTION CODE:
     *
     * METCOD = 1, USER SPECIFIED DAY AND HOUR IN THE YEAR (FROM MET FILE),
     *          2, WEATHER CATEGORY BIN SAMPLING,
     *          3, 120 HOURS OF WEATHER SPECIFIED ON THE ATMOS USER INPUT FILE,
```

```
       *          4, CONSTANT MET (BOUNDARY WEATHER USED FROM THE START),
       *          5, STRATIFIED RANDOM SAMPLES FOR EACH DAY OF THE YEAR.
       *
  210  M1METCOD001  2
       *
       * LAST SPATIAL INTERVAL FOR MEASURED WEATHER
       *
  211  M2LIMSPA001  15
       *
       * BOUNDARY WEATHER MIXING LAYER HEIGHT
       *
  212  M2BNDMXH001  1000.  (METERS)
       *
       * BOUNDARY WEATHER STABILITY CLASS INDEX
       *
  213  M2IBDSTB001  4      (D-STABILITY)
       *
       * BOUNDARY WEATHER RAIN RATE
       *
  214  M2BNDRAN001  0.     (MM/HR)
       *
       * BOUNDARY WEATHER WIND SPEED
       *
  215  M2BNDWND001  5.     (M/S)
       *
       * NUMBER OF RAIN DISTANCE INTERVALS FOR BINNING
       *
  216  M4NRNINT001  6
       *
       * ENDPOINTS OF THE RAIN DISTANCE INTERVALS (KILOMETERS)
       *
       * NOTE: THESE MUST BE CHOSEN TO MATCH THE SPATIAL ENDPOINT DISTANCES
       *       SPECIFIED FOR THE ARRAY SPAEND (10 % ERROR IS ALLOWED).
       *
       *             2.0    4.0      7     10.0     20.0   40.0   MILES
       *
  217  M4RNDSTS001  3.23  6.45    11.29   16.13    32.26  64.52   KM
       *
       * NUMBER OF RAIN INTENSITIY BREAKPOINTS
       *
  218  M4NRINTN001   3
       *
       * RAIN INTENSITY BREAKPOINTS FOR WEATHER BINNING (MILLIMETERS PER HOUR)
       *
  219  M4RNRATE001   2.  4.  6.
       *
       * NUMBER OF SAMPLES PER BIN
       *
  220  M4NSMPLS001  4  (THIS NUMBER SHOULD BE SET TO 4 FOR RISK ASSESSMENT)
       *
       * INITIAL SEED FOR RANDOM NUMBER GENERATOR
       *
  221  M4IRSEED001   79
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE
```

```
NUMBER OF RECORDS READ                          =  449
NUMBER OF BLANK OR COMMENT RECORDS READ         =  227
NUMBER OF TERMINATOR RECORDS                    =    1
NUMBER OF RECORDS PROCESSED                     =  221
     NUMBER OF PROCESSED RECORDS DUPLICATED     =    0
     NUMBER OF PROCESSED RECORDS SORTED         =  221
****************************************************************************************************



Decay Chain #  Ba-139

Decay Chain #  Ba-140   La-140
Fraction of Ba-140  going to La-140  in this chain = 1.000000

Decay Chain #  Ce-143   Pr-143
Fraction of Ce-143  going to Pr-143  in this chain = 1.000000

Decay Chain #  Ce-144

Decay Chain #  Cm-242   Pu-238
Fraction of Cm-242  going to Pu-238  in this chain = 1.000000

Decay Chain #  Cm-244   Pu-240
Fraction of Cm-244  going to Pu-240  in this chain = 1.000000

Decay Chain #  Co-58

Decay Chain #  Co-60

Decay Chain #  Cs-134

Decay Chain #  Cs-136

Decay Chain #  Cs-137

Decay Chain #  I-133    Xe-133
Fraction of I-133   going to Xe-133  in this chain = 0.971000

Decay Chain #  I-134

Decay Chain #  I-135    Xe-135
Fraction of I-135   going to Xe-135  in this chain = 0.846000

Decay Chain #  Kr-85m   Kr-85
Fraction of Kr-85m  going to Kr-85   in this chain = 0.211000

Decay Chain #  Kr-87

Decay Chain #  Kr-88

Decay Chain #  La-141   Ce-141
Fraction of La-141  going to Ce-141  in this chain = 1.000000

Decay Chain #  La-142

Decay Chain #  Mo-99    Tc-99m
Fraction of Mo-99   going to Tc-99m  in this chain = 0.876000
```

```
Decay Chain #  Nd-147

Decay Chain #  Np-239   Pu-239
Fraction of Np-239  going to Pu-239  in this chain = 1.000000

Decay Chain #  Pu-241   Am-241
Fraction of Pu-241  going to Am-241  in this chain = 1.000000

Decay Chain #  Rb-86

Decay Chain #  Ru-103

Decay Chain #  Ru-105   Rh-105
Fraction of Ru-105  going to Rh-105  in this chain = 1.000000

Decay Chain #  Ru-106

Decay Chain #  Sb-127   Te-127
Fraction of Sb-127  going to Te-127  in this chain = 0.824000

Decay Chain #  Sb-127   Te-127m  Te-127
Fraction of Sb-127  going to Te-127m in this chain = 0.176000
Fraction of Sb-127  going to Te-127  in this chain = 0.171776
Fraction of Te-127m going to Te-127  in this chain = 0.976000

Decay Chain #  Sb-129   Te-129
Fraction of Sb-129  going to Te-129  in this chain = 0.775000

Decay Chain #  Sb-129   Te-129m  Te-129
Fraction of Sb-129  going to Te-129m in this chain = 0.225000
Fraction of Sb-129  going to Te-129  in this chain = 0.146250
Fraction of Te-129m going to Te-129  in this chain = 0.650000

Decay Chain #  Sr-89

Decay Chain #  Sr-90    Y-90
Fraction of Sr-90   going to Y-90    in this chain = 1.000000

Decay Chain #  Sr-91    Y-91
Fraction of Sr-91   going to Y-91    in this chain = 0.422000

Decay Chain #  Sr-92    Y-92
Fraction of Sr-92   going to Y-92    in this chain = 1.000000

Decay Chain #  Te-131m  I-131
Fraction of Te-131m going to I-131   in this chain = 0.778000

Decay Chain #  Te-132   I-132
Fraction of Te-132  going to I-132   in this chain = 1.000000

Decay Chain #  Y-93

Decay Chain #  Zr-95    Nb-95
Fraction of Zr-95   going to Nb-95   in this chain = 0.993000

Decay Chain #  Zr-97


RELEASED INVENTORY OF ALL PLUMES
```

Co-58	7.26E+09
Co-60	5.57E+09
Kr-85	3.57E+12
Kr-85m	1.23E+13
Kr-87	2.19E+11
Kr-88	1.14E+13
Rb-86	1.31E+10
Sr-89	1.13E+11
Sr-90	1.13E+10
Sr-91	5.97E+10
Sr-92	7.20E+09
Y-90	1.96E+09
Y-91	8.55E+09
Y-92	2.56E+10
Y-93	4.47E+09
Zr-95	1.12E+10
Zr-97	6.94E+09
Nb-95	1.14E+10
Mo-99	1.29E+12
Tc-99m	1.21E+12
Ru-103	1.16E+12
Ru-105	1.24E+11
Ru-106	4.10E+11
Rh-105	6.60E+11
Sb-127	3.81E+11
Sb-129	1.82E+11
Te-127	3.92E+11
Te-127m	5.41E+10
Te-129	3.09E+11
Te-129m	1.79E+11
Te-131m	4.22E+11
Te-132	4.93E+12
I-131	1.20E+13
I-132	5.41E+12
I-133	1.72E+13
I-134	2.12E+09
I-135	6.77E+12
Xe-133	5.48E+14
Xe-135	6.85E+13
Cs-134	1.15E+12
Cs-136	3.27E+11
Cs-137	6.64E+11
Ba-139	1.54E+09
Ba-140	6.02E+11
La-140	1.24E+11
La-141	1.35E+09
La-142	4.93E+07
Ce-141	9.46E+10
Ce-143	6.94E+10
Ce-144	7.53E+10
Pr-143	1.18E+10
Nd-147	4.33E+09
Np-239	1.02E+12
Pu-238	2.59E+08
Pu-239	2.20E+07
Pu-240	3.29E+07
Pu-241	7.42E+09
Am-241	1.05E+06
Cm-242	2.58E+08

Cm-244 2.79E+07

READING FROM A WEATHER FILE WITH THE FOLLOWING HEADER:

INDIAN POINT ENERGY CENTER METEORLOGICAL DATAFILE

Input file for the MACCS2 model using the year 2000

METEOROLOGICAL DATA FILE CONTAINS 397 HOURS OF OBSERVED RAIN DATA.

ACCUMULATED RAIN MEASUREMENTS TOTALED 30.31 INCHES FOR THE YEAR.

CONSTANT LID HEIGHTS (M) FOR 4 SEASONS = 1100 1500 1500 1300

NON-ZERO WINDSPEEDS LESS THAN 0.5 M/S ARE SET TO 0.5 M/S

NUMTRI= 155

* * * * METEOROLOGICAL BIN SUMMARY * * * *

BIN PRIORITIES

RI XX - RAIN INTENSITY I WITHIN THE INTERVAL ENDING AT XX

INTERVAL ENDPOINTS ARE IN KILOMETERS FROM THE ACCIDENT SITE, THE 6 INTERVAL ENDPOINTS ARE 3 6 11 16 32 65

RAIN INTENSITIES ARE IN MILLIMETERS OF RAIN PER HOUR, THE 3 INTENSITY BREAKPOINTS ARE 2.0 4.0 6.0

S V - INITIAL WEATHER CONDITIONS WITH STABILITY CLASS S AND WIND SPEED INTERVAL V

STABILITY CLASSES ARE B = A/B, D = C/D, E = E, AND F = F

WIND SPEED INTERVALS ARE IN METERS PER SECOND, 1 (0-1), 2 (1-2), 3 (2-3), 4 (3-5), 5 (5-7), 6 (GT 7)

	WIND DIRECTION																	
METBIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	PER CENT
1 B 3	0.083	0.009	0.009	0.092	0.083	0.128	0.165	0.174	0.092	0.000	0.009	0.000	0.000	0.009	0.000	0.147	109	1.2443
2 B 4	0.066	0.033	0.022	0.000	0.022	0.044	0.154	0.077	0.275	0.055	0.000	0.000	0.000	0.000	0.000	0.253	91	1.0388
3 D 1	0.115	0.073	0.055	0.032	0.009	0.014	0.005	0.023	0.032	0.064	0.060	0.064	0.115	0.101	0.142	0.096	218	2.4886
4 D 2	0.158	0.092	0.041	0.049	0.047	0.039	0.046	0.063	0.109	0.113	0.071	0.043	0.020	0.012	0.025	0.071	1377	15.7192
5 D 3	0.124	0.047	0.021	0.033	0.067	0.107	0.099	0.102	0.192	0.125	0.029	0.004	0.002	0.000	0.003	0.046	1699	19.3950
6 D 4	0.075	0.020	0.007	0.011	0.040	0.129	0.191	0.111	0.223	0.138	0.017	0.001	0.000	0.000	0.001	0.036	1453	16.5868
7 D 5	0.055	0.021	0.014	0.000	0.021	0.034	0.274	0.068	0.342	0.144	0.000	0.000	0.000	0.000	0.000	0.027	146	1.6667
8 D 6	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.200	0.400	0.200	0.000	0.000	0.000	0.000	0.000	0.000	5	0.0571
9 E 1	0.118	0.087	0.076	0.037	0.022	0.028	0.024	0.031	0.081	0.109	0.061	0.059	0.041	0.072	0.081	0.076	543	6.1986
10 E 2	0.188	0.094	0.065	0.026	0.017	0.007	0.009	0.010	0.047	0.190	0.163	0.051	0.024	0.010	0.013	0.087	898	10.2511
11 E 3	0.227	0.054	0.003	0.003	0.007	0.007	0.003	0.014	0.044	0.424	0.163	0.003	0.000	0.000	0.000	0.047	295	3.3676
12 E 4	0.298	0.053	0.035	0.000	0.000	0.018	0.000	0.018	0.246	0.211	0.035	0.000	0.000	0.000	0.000	0.088	57	0.6507
13 F 1	0.051	0.017	0.039	0.000	0.022	0.034	0.045	0.090	0.225	0.208	0.073	0.056	0.034	0.011	0.045	0.051	178	2.0320
14 F 2	0.017	0.008	0.008	0.004	0.008	0.000	0.000	0.004	0.054	0.675	0.171	0.033	0.004	0.004	0.000	0.008	240	2.7397
15 F 3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.276	0.000	0.000	0.000	0.000	0.017	58	0.6621
16 F 4	0.143	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.429	0.286	0.000	0.000	0.000	0.000	0.000	7	0.0799
17 R1 3	0.107	0.017	0.014	0.014	0.007	0.031	0.034	0.038	0.214	0.259	0.055	0.034	0.041	0.045	0.034	0.055	290	3.3105
18 R1 6	0.149	0.043	0.021	0.000	0.000	0.000	0.000	0.000	0.106	0.106	0.085	0.128	0.128	0.085	0.043	0.106	47	0.5365
19 R1 11	0.095	0.053	0.032	0.000	0.000	0.042	0.011	0.021	0.084	0.253	0.074	0.074	0.074	0.021	0.063	0.105	95	1.0845
20 R1 16	0.192	0.041	0.000	0.014	0.014	0.027	0.014	0.055	0.110	0.164	0.055	0.055	0.027	0.082	0.041	0.110	73	0.8333
21 R1 32	0.149	0.035	0.045	0.015	0.005	0.040	0.005	0.015	0.069	0.243	0.099	0.050	0.035	0.030	0.020	0.149	202	2.3059
22 R1 65	0.124	0.074	0.029	0.021	0.018	0.029	0.003	0.029	0.115	0.203	0.109	0.029	0.026	0.035	0.021	0.135	340	3.8813
23 R2 3	0.108	0.031	0.000	0.015	0.031	0.000	0.015	0.046	0.231	0.277	0.062	0.046	0.015	0.046	0.000	0.077	65	0.7420
24 R2 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000	0.000	0.200	0.400	0.200	5	0.0571
25 R2 11	0.214	0.071	0.000	0.000	0.000	0.000	0.000	0.071	0.071	0.143	0.000	0.000	0.000	0.000	0.071	0.357	14	0.1598
26 R2 16	0.429	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.000	0.143	0.143	7	0.0799
27 R2 32	0.263	0.211	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.211	0.053	0.000	0.053	0.000	0.053	0.105	19	0.2169
28 R2 65	0.233	0.047	0.070	0.023	0.000	0.000	0.000	0.000	0.070	0.163	0.116	0.023	0.023	0.023	0.093	0.116	43	0.4909
29 R3 3	0.143	0.048	0.048	0.000	0.048	0.000	0.000	0.000	0.095	0.286	0.048	0.095	0.048	0.048	0.000	0.095	21	0.2397
30 R3 6	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.250	4	0.0457
31 R3 11	0.000	0.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.286	0.143	0.286	7	0.0799
32 R3 16	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	2	0.0228
33 R3 32	0.214	0.357	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.000	0.000	0.071	0.143	0.000	0.143	14	0.1598
34 R3 65	0.276	0.138	0.000	0.000	0.034	0.000	0.000	0.034	0.034	0.172	0.069	0.000	0.034	0.000	0.000	0.207	29	0.3311
35 R4 3	0.133	0.033	0.000	0.033	0.000	0.033	0.000	0.000	0.033	0.300	0.033	0.067	0.067	0.067	0.100	0.100	30	0.3425

36	R4	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1	0.0114
37	R4	11	0.200	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.100	0.000	0.100	0.000	0.000	0.100	10	0.1142
38	R4	16	0.000	0.000	0.167	0.167	0.000	0.000	0.000	0.000	0.000	0.333	0.167	0.000	0.000	0.000	0.167	0.000	6	0.0685
39	R4	32	0.227	0.045	0.091	0.136	0.000	0.045	0.000	0.045	0.045	0.227	0.045	0.000	0.000	0.000	0.000	0.091	22	0.2511
40	R4	65	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.150	0.300	0.025	0.000	0.000	0.000	0.000	0.125	40	0.4566
41	ALL		0.128	0.056	0.030	0.025	0.035	0.059	0.072	0.063	0.140	0.174	0.068	0.027	0.018	0.017	0.021	0.069	8760	

* * * * METEOROLOGICAL BIN SUMMARY * * * *

BIN PRIORITIES

RI XX - RAIN INTENSITY I WITHIN THE INTERVAL ENDING AT XX

INTERVAL ENDPOINTS ARE IN KILOMETERS FROM THE ACCIDENT SITE, THE 6 INTERVAL ENDPOINTS ARE 3 6 11 16 32 65

RAIN INTENSITIES ARE IN MILLIMETERS OF RAIN PER HOUR, THE 3 INTENSITY BREAKPOINTS ARE 2.0 4.0 6.0

S V - INITIAL WEATHER CONDITIONS WITH STABILITY CLASS S AND WIND SPEED INTERVAL V

STABILITY CLASSES ARE B = A/B, D = C/D, E = E, AND F = F

WIND SPEED INTERVALS ARE IN METERS PER SECOND (M/S), 1 (0-1), 2 (1-2), 3 (2-3), 4 (3-5), 5 (5-7), 6 (GT 7)

	WIND DIRECTION																	
METBIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	PER CENT
1 B 3	9	1	1	10	9	14	18	19	10	0	1	0	0	1	0	16	109	1.2443
2 B 4	6	3	2	0	2	4	14	7	25	5	0	0	0	0	0	23	91	1.0388
3 D 1	25	16	12	7	2	3	1	5	7	14	13	14	25	22	31	21	218	2.4886
4 D 2	218	127	57	67	65	54	64	87	150	155	98	59	27	16	35	98	1377	15.7192
5 D 3	210	80	35	56	114	181	168	174	326	213	49	7	3	0	5	78	1699	19.3950
6 D 4	109	29	10	16	58	187	278	162	324	201	25	1	0	0	1	52	1453	16.5868
7 D 5	8	3	2	0	3	5	40	10	50	21	0	0	0	0	0	4	146	1.6667
8 D 6	0	0	0	0	1	0	0	1	2	1	0	0	0	0	0	0	5	0.0571
9 E 1	64	47	41	20	12	15	13	17	44	59	33	32	22	39	44	41	543	6.1986
10 E 2	169	84	58	23	15	6	8	9	42	171	146	46	22	9	12	78	898	10.2511
11 E 3	67	16	1	1	2	2	1	4	13	125	48	1	0	0	0	14	295	3.3676
12 E 4	17	3	2	0	0	1	0	1	14	12	2	0	0	0	0	5	57	0.6507
13 F 1	9	3	7	0	4	6	8	16	40	37	13	10	6	2	8	9	178	2.0320
14 F 2	4	2	2	1	2	0	0	1	13	162	41	8	1	1	0	2	240	2.7397
15 F 3	0	0	0	0	0	0	0	0	0	41	16	0	0	0	0	1	58	0.6621
16 F 4	1	0	0	0	0	1	0	0	0	3	2	0	0	0	0	0	7	0.0799
17 R1 3	31	5	4	4	2	9	10	11	62	75	16	10	12	13	10	16	290	3.3105
18 R1 6	7	2	1	0	0	0	0	0	5	5	4	6	6	4	2	5	47	0.5365
19 R1 11	9	5	3	0	0	4	1	2	8	24	7	7	7	2	6	10	95	1.0845
20 R1 16	14	3	0	1	1	2	1	4	8	12	4	4	2	6	3	8	73	0.8333
21 R1 32	30	7	9	3	1	8	1	3	14	49	20	10	7	6	4	30	202	2.3059
22 R1 65	42	25	10	7	6	10	1	10	39	69	37	10	9	12	7	46	340	3.8813
23 R2 3	7	2	0	1	2	0	1	3	15	18	4	3	1	3	0	5	65	0.7420
24 R2 6	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	5	0.0571
25 R2 11	3	1	0	0	0	0	0	1	1	2	0	0	0	0	1	5	14	0.1598
26 R2 16	3	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	7	0.0799
27 R2 32	5	4	0	0	0	0	0	0	1	4	1	0	1	0	1	2	19	0.2169
28 R2 65	10	2	3	1	0	0	0	0	3	7	5	1	1	1	4	5	43	0.4909
29 R3 3	3	1	1	0	1	0	0	0	2	6	1	2	1	1	0	2	21	0.2397
30 R3 6	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	4	0.0457
31 R3 11	0	2	0	0	0	0	0	0	0	0	0	0	0	2	1	2	7	0.0799
32 R3 16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0.0228
33 R3 32	3	5	0	0	0	0	0	0	0	1	0	0	1	2	0	2	14	0.1598
34 R3 65	8	4	0	0	1	0	0	1	1	5	2	0	1	0	0	6	29	0.3311
35 R4 3	4	1	0	1	0	1	0	0	1	9	1	2	2	2	3	3	30	0.3425
36 R4 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.0114
37 R4 11	2	3	0	0	0	0	0	0	0	2	1	0	1	0	0	1	10	0.1142
38 R4 16	0	0	1	1	0	0	0	0	0	2	1	0	0	0	1	0	6	0.0685
39 R4 32	5	1	2	3	0	1	0	1	1	5	1	0	0	0	0	2	22	0.2511
40 R4 65	16	0	0	0	0	0	0	0	6	12	1	0	0	0	0	5	40	0.4566

* * * * SUMMARIES * * * *

R	204	74	34	22	14	35	15	36	168	308	106	56	53	55	47	159	1386	15.8219
B	15	4	3	10	11	18	32	26	35	5	1	0	0	1	0	39	200	2.2831

D		570	255	116	146	243	430	551	439	859	605	185	81	55	38	72	253	4898	55.9132
E		317	150	102	44	29	24	22	31	113	367	229	79	44	48	56	138	1793	20.4680
F		14	5	9	1	6	7	8	17	53	243	72	18	7	3	8	12	483	5.5137
	1	98	66	60	27	18	24	22	38	91	110	59	56	53	63	83	71	939	10.7192
	2	391	213	117	92	83	60	78	101	206	488	286	113	50	26	47	180	2531	28.8927
	3	286	97	37	66	124	197	181	193	348	379	113	8	3	1	5	107	2145	24.4863
	4	132	34	14	16	60	193	292	170	360	221	29	1	0	0	1	79	1602	18.2877
	5	9	4	2	0	3	5	40	10	53	21	0	0	0	0	0	5	152	1.7352
	6	0	0	0	0	1	0	0	1	2	1	0	0	0	0	0	0	5	0.0571

* * * * * BIN WINDROSE SUMMARY * * * * *

BIN	DIRECTION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
1	0.083	0.009	0.009	0.092	0.083	0.128	0.165	0.174	0.092	0.000	0.009	0.000	0.000	0.009	0.000	0.147	1.000000
2	0.066	0.033	0.022	0.000	0.022	0.044	0.154	0.077	0.275	0.055	0.000	0.000	0.000	0.000	0.000	0.253	1.000000
3	0.115	0.073	0.055	0.032	0.009	0.014	0.005	0.023	0.032	0.064	0.060	0.064	0.115	0.101	0.142	0.096	1.000000
4	0.158	0.092	0.041	0.049	0.047	0.039	0.046	0.063	0.109	0.113	0.071	0.043	0.020	0.012	0.025	0.071	1.000000
5	0.124	0.047	0.021	0.033	0.067	0.107	0.099	0.102	0.192	0.125	0.029	0.004	0.002	0.000	0.003	0.046	1.000000
6	0.075	0.020	0.007	0.011	0.040	0.129	0.191	0.111	0.223	0.138	0.017	0.001	0.000	0.000	0.001	0.036	1.000000
7	0.055	0.021	0.014	0.000	0.021	0.034	0.274	0.068	0.342	0.144	0.000	0.000	0.000	0.000	0.000	0.027	1.000000
8	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.200	0.400	0.200	0.000	0.000	0.000	0.000	0.000	0.000	1.000000
9	0.118	0.087	0.076	0.037	0.022	0.028	0.024	0.031	0.081	0.109	0.061	0.059	0.041	0.072	0.081	0.076	1.000000
10	0.188	0.094	0.065	0.026	0.017	0.007	0.009	0.010	0.047	0.190	0.163	0.051	0.024	0.010	0.013	0.087	1.000000
11	0.227	0.054	0.003	0.003	0.007	0.007	0.003	0.014	0.044	0.424	0.163	0.003	0.000	0.000	0.000	0.047	1.000000
12	0.298	0.053	0.035	0.000	0.000	0.018	0.000	0.018	0.246	0.211	0.035	0.000	0.000	0.000	0.000	0.088	1.000000
13	0.051	0.017	0.039	0.000	0.022	0.034	0.045	0.090	0.225	0.208	0.073	0.056	0.034	0.011	0.045	0.051	1.000000
14	0.017	0.008	0.008	0.004	0.008	0.000	0.000	0.004	0.054	0.675	0.171	0.033	0.004	0.004	0.000	0.008	1.000000
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.276	0.000	0.000	0.000	0.000	0.017	1.000000
16	0.143	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.429	0.286	0.000	0.000	0.000	0.000	0.000	1.000000
17	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
18	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
19	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
20	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
21	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
22	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
23	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
24	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
25	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
26	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
27	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
28	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
29	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
30	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
31	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
32	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
33	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
34	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
35	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
36	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
37	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
38	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
39	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
40	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
41	0.128	0.056	0.030	0.025	0.035	0.059	0.072	0.063	0.140	0.174	0.068	0.027	0.018	0.017	0.021	0.069	1.000000

```
******** BEGINNING OF CHANGE CASE   1 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  2 OF 8
       *
  222  RDATNAM2001 'EARLY HIGH'
********   RECORD NUMBER   222 REPLACES RECORD NUMBER   123   ********
       *
  223  RDOALARM001   1.36E+04
********   RECORD NUMBER   223 REPLACES RECORD NUMBER   124   ********
  224  RDNUMREL001   1
********   RECORD NUMBER   224 REPLACES RECORD NUMBER   125   ********
  225  RDMAXRIS001   1
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********   RECORD NUMBER   225 REPLACES RECORD NUMBER   126   ********
  226  RDREFTIM001   0.0
********   RECORD NUMBER   226 REPLACES RECORD NUMBER   127   ********
  227  RDPLHEAT001   1.08E+06
********   RECORD NUMBER   227 REPLACES RECORD NUMBER   128   ********
  228  RDPLHITE001   30.
********   RECORD NUMBER   228 REPLACES RECORD NUMBER   129   ********
  229  RDPLUDUR001   8.24E+04
********   RECORD NUMBER   229 REPLACES RECORD NUMBER   130   ********
  230  RDPDELAY001   1.32E+04
********   RECORD NUMBER   230 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  231  RDRELFRC001 7.0E-01 2.4E-01 2.3E-01 2.3E-01 2.5E-02 9.1E-02 8.0E-04 4.8E-03 4.6E-02
********   RECORD NUMBER   231 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   1 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   1
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************



RELEASED INVENTORY OF ALL PLUMES
Co-58      2.76E+15
Co-60      2.11E+15
Kr-85      2.69E+16
Kr-85m     3.37E+17
Kr-87      1.55E+17
Kr-88      6.55E+17
Rb-86      1.90E+15
Sr-89      7.68E+16
Sr-90      7.62E+15
Sr-91      7.40E+16
Sr-92      4.10E+16
Y-90       5.41E+14
Y-91       3.24E+15
Y-92       3.46E+16
Y-93       3.02E+15
Zr-95      4.30E+15
Zr-97      3.72E+15
Nb-95      4.36E+15
Mo-99      5.35E+17
Tc-99m     4.83E+17
Ru-103     4.44E+17
Ru-105     1.72E+17
Ru-106     1.56E+17
Rh-105     2.78E+17
Sb-127     7.76E+16
Sb-129     1.33E+17
Te-127     7.79E+16
Te-127m    1.04E+16
Te-129     1.59E+17
Te-129m    3.45E+16
Te-131m    9.81E+16
Te-132     1.02E+18
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I-131      7.59E+17
I-132      1.06E+18
I-133      1.39E+18
I-134      9.50E+16
I-135      9.98E+17
Xe-133     4.34E+18
Xe-135     1.13E+18
Cs-134     1.65E+17
Cs-136     4.79E+16
Cs-137     9.54E+16
Ba-139     4.24E+16
Ba-140     2.56E+17
La-140     2.03E+16
La-141     2.24E+15
La-142     7.95E+14
Ce-141     2.54E+16
Ce-143     2.20E+16
Ce-144     2.01E+16
Pr-143     3.97E+15
Nd-147     1.69E+15
Np-239     3.01E+17
Pu-238     6.91E+13
Pu-239     5.86E+12
Pu-240     8.78E+12
Pu-241     1.98E+15
Am-241     3.95E+11
Cm-242     9.83E+13
Cm-244     1.06E+13


******** BEGINNING OF CHANGE CASE   2 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  3 OF 8
       *
  232  RDATNAM2001 'EARLY MEDIUM'
********   RECORD NUMBER   232 REPLACES RECORD NUMBER   123   ********
       *
  233  RDOALARM001   1.00E+04
********   RECORD NUMBER   233 REPLACES RECORD NUMBER   124   ********
  234  RDNUMREL001   1
********   RECORD NUMBER   234 REPLACES RECORD NUMBER   125   ********
  235  RDMAXRIS001   1
********   RECORD NUMBER   235 REPLACES RECORD NUMBER   126   ********
  236  RDREFTIM001   0.0
********   RECORD NUMBER   236 REPLACES RECORD NUMBER   127   ********
  237  RDPLHEAT001   1.33E+06
********   RECORD NUMBER   237 REPLACES RECORD NUMBER   128   ********
  238  RDPLHITE001   30.
********   RECORD NUMBER   238 REPLACES RECORD NUMBER   129   ********
  239  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   239 REPLACES RECORD NUMBER   130   ********
  240  RDPDELAY001   1.25E+04
********   RECORD NUMBER   240 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  241  RDRELFRC001 9.9E-01 2.0E-02 1.8E-02 2.7E-02 8.3E-04 2.0E-02 4.9E-05 3.3E-04 1.3E-02
********   RECORD NUMBER   241 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   2 USER INPUT ********
```

```
USER INPUT PROCESSING SUMMARY - CHANGE CASE   2
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************
```

RELEASED INVENTORY OF ALL PLUMES

Co-58	6.07E+14
Co-60	4.64E+14
Kr-85	3.80E+16
Kr-85m	4.91E+17
Kr-87	2.43E+17
Kr-88	9.71E+17
Rb-86	1.49E+14
Sr-89	2.55E+15
Sr-90	2.53E+14
Sr-91	2.49E+15
Sr-92	1.43E+15
Y-90	2.43E+13
Y-91	1.97E+14
Y-92	1.19E+15
Y-93	1.87E+14
Zr-95	2.63E+14
Zr-97	2.30E+14
Nb-95	2.67E+14
Mo-99	1.18E+17
Tc-99m	1.06E+17
Ru-103	9.76E+16
Ru-105	3.91E+16
Ru-106	3.42E+16
Rh-105	6.11E+16
Sb-127	9.13E+15
Sb-129	1.61E+16
Te-127	9.16E+15
Te-127m	1.22E+15
Te-129	1.91E+16
Te-129m	4.05E+15
Te-131m	1.16E+16
Te-132	1.20E+17
I-131	6.33E+16
I-132	1.11E+17
I-133	1.17E+17
I-134	9.24E+15
I-135	8.49E+16
Xe-133	6.10E+18
Xe-135	1.29E+18
Cs-134	1.29E+16
Cs-136	3.75E+15
Cs-137	7.47E+15
Ba-139	1.32E+16
Ba-140	7.25E+16
La-140	4.50E+15
La-141	1.42E+14
La-142	5.32E+13
Ce-141	1.75E+15
Ce-143	1.52E+15

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Ce-144     1.38E+15
Pr-143     2.44E+14
Nd-147     1.03E+14
Np-239     2.07E+16
Pu-238     4.75E+12
Pu-239     4.03E+11
Pu-240     6.04E+11
Pu-241     1.36E+14
Am-241     2.42E+10
Cm-242     6.02E+12
Cm-244     6.52E+11


******** BEGINNING OF CHANGE CASE   3 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  4 OF 8
       *
  242  RDATNAM2001 'EARLY LOW'
********   RECORD NUMBER   242 REPLACES RECORD NUMBER   123   ********
       *
  243  RDOALARM001   1.09E+04
********   RECORD NUMBER   243 REPLACES RECORD NUMBER   124   ********
  244  RDNUMREL001   1
********   RECORD NUMBER   244 REPLACES RECORD NUMBER   125   ********
  245  RDMAXRIS001   1
********   RECORD NUMBER   245 REPLACES RECORD NUMBER   126   ********
  246  RDREFTIM001   0.0
********   RECORD NUMBER   246 REPLACES RECORD NUMBER   127   ********
  247  RDPLHEAT001   1.60E+06
********   RECORD NUMBER   247 REPLACES RECORD NUMBER   128   ********
  248  RDPLHITE001   30.
********   RECORD NUMBER   248 REPLACES RECORD NUMBER   129   ********
  249  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   249 REPLACES RECORD NUMBER   130   ********
  250  RDPDELAY001   1.73E+04
********   RECORD NUMBER   250 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  251  RDRELFRC001 7.6E-01 5.9E-03 4.1E-03 3.9E-03 1.0E-04 2.0E-03 4.6E-06 3.3E-05 7.8E-04
********   RECORD NUMBER   251 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   3 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   3
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      6.07E+13
Co-60      4.64E+13
Kr-85      2.92E+16
Kr-85m     3.06E+17
Kr-87      9.02E+16
Kr-88      5.39E+17
Rb-86      3.38E+13
```

```
Sr-89      3.07E+14
Sr-90      3.05E+13
Sr-91      2.73E+14
Sr-92      1.23E+14
Y-90       2.94E+12
Y-91       1.86E+13
Y-92       1.41E+14
Y-93       1.60E+13
Zr-95      2.47E+13
Zr-97      2.04E+13
Nb-95      2.51E+13
Mo-99      1.16E+16
Tc-99m     1.06E+16
Ru-103     9.75E+15
Ru-105     3.17E+15
Ru-106     3.42E+15
Rh-105     6.05E+15
Sb-127     1.31E+15
Sb-129     1.88E+15
Te-127     1.32E+15
Te-127m    1.76E+14
Te-129     2.33E+15
Te-129m    5.85E+14
Te-131m    1.62E+15
Te-132     1.71E+16
I-131      1.86E+16
I-132      1.97E+16
I-133      3.30E+16
I-134      9.49E+14
I-135      2.18E+16
Xe-133     4.65E+18
Xe-135     8.87E+17
Cs-134     2.95E+15
Cs-136     8.52E+14
Cs-137     1.70E+15
Ba-139     4.06E+14
Ba-140     4.34E+15
La-140     3.72E+14
La-141     1.05E+13
La-142     2.74E+12
Ce-141     1.75E+14
Ce-143     1.48E+14
Ce-144     1.38E+14
Pr-143     2.33E+13
Nd-147     9.67E+12
Np-239     2.04E+15
Pu-238     4.75E+11
Pu-239     4.03E+10
Pu-240     6.04E+10
Pu-241     1.36E+13
Am-241     2.28E+09
Cm-242     5.65E+11
Cm-244     6.12E+10


******** BEGINNING OF CHANGE CASE   4 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  5 OF 8
       *
```

```
  252  RDATNAM2001 'LATE HIGH'
********   RECORD NUMBER   252 REPLACES RECORD NUMBER   123   ********
       *
  253  RDOALARM001   5.58E+03
********   RECORD NUMBER   253 REPLACES RECORD NUMBER   124   ********
  254  RDNUMREL001   1
********   RECORD NUMBER   254 REPLACES RECORD NUMBER   125   ********
  255  RDMAXRIS001   1
********   RECORD NUMBER   255 REPLACES RECORD NUMBER   126   ********
  256  RDREFTIM001   0.5
********   RECORD NUMBER   256 REPLACES RECORD NUMBER   127   ********
  257  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   257 REPLACES RECORD NUMBER   128   ********
  258  RDPLHITE001   30.
********   RECORD NUMBER   258 REPLACES RECORD NUMBER   129   ********
  259  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   259 REPLACES RECORD NUMBER   130   ********
  260  RDPDELAY001   7.38E+04
********   RECORD NUMBER   260 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  261  RDRELFRC001 9.9E-01 1.2E-01 2.3E-02 4.8E-03 2.1E-04 3.7E-03 1.3E-05 1.2E-04 9.1E-04
********   RECORD NUMBER   261 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   4 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   4
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      1.11E+14
Co-60      8.58E+13
Kr-85      3.80E+16
Kr-85m     5.50E+15
Kr-87      3.27E+10
Kr-88      8.14E+14
Rb-86      1.82E+14
Sr-89      6.35E+14
Sr-90      6.40E+13
Sr-91      7.59E+13
Sr-92      2.16E+11
Y-90       2.19E+13
Y-91       5.30E+13
Y-92       4.34E+12
Y-93       6.78E+12
Zr-95      6.89E+13
Zr-97      1.85E+13
Nb-95      7.08E+13
Mo-99      1.61E+16
Tc-99m     1.54E+16
Ru-103     1.77E+16
Ru-105     7.78E+13
Ru-106     6.31E+15
Rh-105     6.98E+15
```

```
Sb-127     1.31E+15
Sb-129     2.71E+13
Te-127     1.40E+15
Te-127m    2.16E+14
Te-129     4.88E+14
Te-129m    7.06E+14
Te-131m    1.05E+15
Te-132     1.64E+16
I-131      3.42E+17
I-132      1.70E+16
I-133      2.67E+17
I-134      5.97E+06
I-135      2.43E+16
Xe-133     5.27E+18
Xe-135     2.23E+17
Cs-134     1.65E+16
Cs-136     4.50E+15
Cs-137     9.54E+15
Ba-139     4.23E+08
Ba-140     4.75E+15
La-140     2.15E+15
La-141     2.25E+11
La-142     3.03E+07
Ce-141     6.19E+14
Ce-143     3.01E+14
Ce-144     5.01E+14
Pr-143     8.67E+13
Nd-147     2.54E+13
Np-239     5.28E+15
Pu-238     1.73E+12
Pu-239     1.47E+11
Pu-240     2.20E+11
Pu-241     4.94E+13
Am-241     6.69E+09
Cm-242     1.59E+12
Cm-244     1.73E+11


******** BEGINNING OF CHANGE CASE   5 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  6 OF 8
       *
  262  RDATNAM2001 'LATE MEDIUM'
********   RECORD NUMBER   262 REPLACES RECORD NUMBER   123   ********
       *
  263  RDOALARM001   8.94E+03
********   RECORD NUMBER   263 REPLACES RECORD NUMBER   124   ********
  264  RDNUMREL001   1
********   RECORD NUMBER   264 REPLACES RECORD NUMBER   125   ********
  265  RDMAXRIS001   1
********   RECORD NUMBER   265 REPLACES RECORD NUMBER   126   ********
  266  RDREFTIM001   0.5
********   RECORD NUMBER   266 REPLACES RECORD NUMBER   127   ********
  267  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   267 REPLACES RECORD NUMBER   128   ********
  268  RDPLHITE001   30.
********   RECORD NUMBER   268 REPLACES RECORD NUMBER   129   ********
  269  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   269 REPLACES RECORD NUMBER   130   ********
```

```
  270  RDPDELAY001   8.04E+04
********   RECORD NUMBER   270 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  271  RDRELFRC001 8.2E-01 1.5E-02 4.3E-03 1.5E-03 8.0E-05 1.4E-03 5.1E-06 4.7E-05 3.5E-04
********   RECORD NUMBER   271 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   5 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   5
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************



RELEASED INVENTORY OF ALL PLUMES
Co-58      4.20E+13
Co-60      3.25E+13
Kr-85      3.15E+16
Kr-85m     3.43E+15
Kr-87      9.97E+09
Kr-88      4.31E+14
Rb-86      3.39E+13
Sr-89      2.42E+14
Sr-90      2.44E+13
Sr-91      2.53E+13
Sr-92      5.15E+10
Y-90       8.69E+12
Y-91       2.08E+13
Y-92       1.17E+12
Y-93       2.34E+12
Zr-95      2.70E+13
Zr-97      6.75E+12
Nb-95      2.78E+13
Mo-99      5.96E+15
Tc-99m     5.73E+15
Ru-103     6.68E+15
Ru-105     2.21E+13
Ru-106     2.39E+15
Rh-105     2.55E+15
Sb-127     4.02E+14
Sb-129     6.32E+12
Te-127     4.33E+14
Te-127m    6.76E+13
Te-129     1.50E+14
Te-129m    2.20E+14
Te-131m    3.15E+14
Te-132     5.06E+15
I-131      4.25E+16
I-132      5.21E+15
I-133      3.13E+16
I-134      1.75E+05
I-135      2.50E+15
Xe-133     4.27E+18
Xe-135     1.09E+17
Cs-134     3.09E+15
Cs-136     8.37E+14
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Cs-137     1.78E+15
Ba-139     6.48E+07
Ba-140     1.82E+15
La-140     8.58E+14
La-141     6.39E+10
La-142     5.21E+06
Ce-141     2.42E+14
Ce-143     1.13E+14
Ce-144     1.96E+14
Pr-143     3.43E+13
Nd-147     9.92E+12
Np-239     2.02E+15
Pu-238     6.77E+11
Pu-239     5.76E+10
Pu-240     8.60E+10
Pu-241     1.94E+13
Am-241     2.63E+09
Cm-242     6.23E+11
Cm-244     6.78E+10


******** BEGINNING OF CHANGE CASE   6 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  7 OF 8
       *
  272  RDATNAM2001 'LATE LOW'
********   RECORD NUMBER   272 REPLACES RECORD NUMBER   123   ********
       *
  273  RDOALARM001   2.19E+04
********   RECORD NUMBER   273 REPLACES RECORD NUMBER   124   ********
  274  RDNUMREL001   1
********   RECORD NUMBER   274 REPLACES RECORD NUMBER   125   ********
  275  RDMAXRIS001   1
********   RECORD NUMBER   275 REPLACES RECORD NUMBER   126   ********
  276  RDREFTIM001   0.5
********   RECORD NUMBER   276 REPLACES RECORD NUMBER   127   ********
  277  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   277 REPLACES RECORD NUMBER   128   ********
  278  RDPLHITE001   30.
********   RECORD NUMBER   278 REPLACES RECORD NUMBER   129   ********
  279  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   279 REPLACES RECORD NUMBER   130   ********
  280  RDPDELAY001   9.90E+04
********   RECORD NUMBER   280 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  281  RDRELFRC001 7.0E-01 1.1E-03 7.9E-04 1.2E-03 8.7E-05 3.5E-06 2.6E-06 2.4E-05 7.4E-05
********   RECORD NUMBER   281 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   6 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   6
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************
```

RELEASED INVENTORY OF ALL PLUMES

Co-58	1.05E+11
Co-60	8.12E+10
Kr-85	2.69E+16
Kr-85m	1.32E+15
Kr-87	5.09E+08
Kr-88	1.04E+14
Rb-86	6.18E+12
Sr-89	2.62E+14
Sr-90	2.65E+13
Sr-91	1.89E+13
Sr-92	1.49E+10
Y-90	9.77E+12
Y-91	1.10E+13
Y-92	4.77E+11
Y-93	8.38E+11
Zr-95	1.37E+13
Zr-97	2.78E+12
Nb-95	1.42E+13
Mo-99	1.41E+13
Tc-99m	1.36E+13
Ru-103	1.66E+13
Ru-105	2.47E+10
Ru-106	5.97E+12
Rh-105	5.76E+12
Sb-127	3.10E+14
Sb-129	2.21E+12
Te-127	3.35E+14
Te-127m	5.41E+13
Te-129	1.17E+14
Te-129m	1.75E+14
Te-131m	2.24E+14
Te-132	3.86E+15
I-131	3.09E+15
I-132	3.98E+15
I-133	1.93E+15
I-134	2.16E+02
I-135	1.07E+14
Xe-133	3.54E+18
Xe-135	5.80E+16
Cs-134	5.67E+14
Cs-136	1.52E+14
Cs-137	3.28E+14
Ba-139	1.02E+06
Ba-140	3.80E+14
La-140	2.03E+14
La-141	1.31E+10
La-142	2.60E+05
Ce-141	1.23E+14
Ce-143	5.19E+13
Ce-144	1.00E+14
Pr-143	1.79E+13
Nd-147	4.99E+12
Np-239	9.70E+14
Pu-238	3.46E+11
Pu-239	2.94E+10
Pu-240	4.39E+10
Pu-241	9.89E+12
Am-241	1.35E+09

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Cm-242     3.18E+11
Cm-244     3.46E+10


******** BEGINNING OF CHANGE CASE   7 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  8 OF 8
       *
  282  RDATNAM2001 'LATE LOWLOW'
********   RECORD NUMBER   282 REPLACES RECORD NUMBER   123   ********
       *
  283  RDOALARM001   2.56E+04
********   RECORD NUMBER   283 REPLACES RECORD NUMBER   124   ********
  284  RDNUMREL001   1
********   RECORD NUMBER   284 REPLACES RECORD NUMBER   125   ********
  285  RDMAXRIS001   1
********   RECORD NUMBER   285 REPLACES RECORD NUMBER   126   ********
  286  RDREFTIM001   0.5
********   RECORD NUMBER   286 REPLACES RECORD NUMBER   127   ********
  287  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   287 REPLACES RECORD NUMBER   128   ********
  288  RDPLHITE001   30.
********   RECORD NUMBER   288 REPLACES RECORD NUMBER   129   ********
  289  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   289 REPLACES RECORD NUMBER   130   ********
  290  RDPDELAY001   1.13E+05
********   RECORD NUMBER   290 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  291  RDRELFRC001 9.1E-01 8.1E-04 7.0E-04 7.6E-04 3.6E-05 2.1E-06 1.1E-06 1.2E-05 3.3E-05
********   RECORD NUMBER   291 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   7 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   7
NUMBER OF RECORDS CHANGED              =   10
NUMBER OF RECORDS ADDED                =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      6.27E+10
Co-60      4.87E+10
Kr-85      3.49E+16
Kr-85m     9.37E+14
Kr-87      7.95E+07
Kr-88      5.25E+13
Rb-86      5.44E+12
Sr-89      1.08E+14
Sr-90      1.10E+13
Sr-91      5.88E+12
Sr-92      2.28E+09
Y-90       4.34E+12
Y-91       4.66E+12
Y-92       9.41E+10
Y-93       2.72E+11
Zr-95      5.80E+12
```

```
Zr-97      1.00E+12
Nb-95      5.99E+12
Mo-99      8.14E+12
Tc-99m     7.83E+12
Ru-103     9.95E+12
Ru-105     8.07E+09
Ru-106     3.58E+12
Rh-105     3.20E+12
Sb-127     1.90E+14
Sb-129     7.49E+11
Te-127     2.07E+14
Te-127m    3.43E+13
Te-129     7.29E+13
Te-129m    1.11E+14
Te-131m    1.29E+14
Te-132     2.36E+15
I-131      2.24E+15
I-132      2.44E+15
I-133      1.25E+15
I-134      7.35E+00
I-135      5.23E+13
Xe-133     4.50E+18
Xe-135     5.59E+16
Cs-134     5.02E+14
Cs-136     1.34E+14
Cs-137     2.90E+14
Ba-139     6.43E+04
Ba-140     1.68E+14
La-140     9.55E+13
La-141     2.79E+09
La-142     1.92E+04
Ce-141     6.13E+13
Ce-143     2.39E+13
Ce-144     5.01E+13
Pr-143     8.22E+12
Nd-147     2.09E+12
Np-239     4.62E+14
Pu-238     1.73E+11
Pu-239     1.47E+10
Pu-240     2.20E+10
Pu-241     4.94E+12
Am-241     5.80E+08
Cm-242     1.34E+11
Cm-244     1.46E+10


USER INPUT IS READ FROM UNIT 25
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                  RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "EARLY" INPUT FILE
       *
    1  MIEANAM1001 'EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES'
    2  DCF_FILE001 'DOSDATA.INP'  (DCF file of MACCS 1.5.11.1)
       *
```

```
    *              ORGNAM          ORGFLG
    *
 3  MIORGDEF001  'A-SKIN'         .TRUE.
 4  MIORGDEF002  'A-RED MARR'     .TRUE.
 5  MIORGDEF003  'A-LUNGS'        .TRUE.
 6  MIORGDEF004  'A-THYROIDH'     .TRUE.
 7  MIORGDEF005  'A-STOMACH'      .TRUE.
 8  MIORGDEF006  'A-LOWER LI'     .FALSE.  (does not contribute to early fatalities)
 9  MIORGDEF007  'L-EDEWBODY'     .TRUE.
10  MIORGDEF008  'L-RED MARR'     .TRUE.
11  MIORGDEF009  'L-BONE SUR'     .TRUE.
12  MIORGDEF010  'L-BREAST'       .TRUE.
13  MIORGDEF011  'L-LUNGS'        .TRUE.
14  MIORGDEF012  'L-THYROID'      .TRUE.
15  MIORGDEF013  'L-LOWER LI'     .TRUE.
16  MIORGDEF014  'L-BLAD WAL'     .TRUE.
17  MIORGDEF015  'L-LIVER'        .FALSE.
18  MIORGDEF016  'L-THYROIDH'     .TRUE.
    *
    * FLAG TO INDICATE THAT THIS IS THE LAST PROGRAM IN THE SERIES TO BE RUN
    *
19  MIENDAT2001  .FALSE.    (SET THIS VALUE TO .TRUE. TO SKIP CHRONC)
    *
    * DISPERSION MODEL OPTION CODE:  1  *  STRAIGHT LINE
    *                                2  *  WIND-SHIFT WITH ROTATION
    *                                3  *  WIND-SHIFT WITHOUT ROTATION
    *
20  MIIPLUME001  2
    *
    * NUMBER OF FINE GRID SUBDIVISIONS USED BY THE MODEL
    *
21  MINUMFIN001  7    (3, 5 OR 7 ALLOWED)
    *
    * LEVEL OF DEBUG OUTPUT REQUIRED, NORMAL RUNS SHOULD SPECIFY ZERO
    *
22  MIIPRINT001  0
    *
    * LOGICAL FLAG SIGNIFYING THAT THE BREAKDOWN OF RISK BY WEATHER CATEGORY
    * BIN ARE TO BE PRESENTED TO SHOW THEIR RELATIVE CONTRIBUTION TO THE MEAN
    *
    *              RISBIN
    *
23  MIRISCAT001   .FALSE.
    *
    * FLAG INDICATING IF WIND-ROSES FROM ATMOS ARE TO BE OVERRIDDEN
    *
24  MIOVRRID001  .FALSE.  (USE THE WIND ROSE CALCULATED FOR EACH WEATHER BIN)
    ********************************************************************************
    * POPULATION DISTRIBUTION DATA BLOCK, LOADED BY INPOPU, STORED IN /POPDAT/
    *
25  PDPOPFLG001  FILE
    *
    *PDPOPFLG001  UNIFORM
    *PDIBEGIN001  1   (SPATIAL INTERVAL AT WHICH POPULATION BEGINS)
    *PDPOPDEN001  50. (POPULATION DENSITY (PEOPLE PER SQUARE KILOMETER))
    ********************************************************************************
    * SHIELDING AND EXPOSURE FACTORS, LOADED BY INDFAC, STORED IN /EADFAC/
    *
    * THREE VALUES OF EACH PROTECTION FACTOR ARE SUPPLIED,
```

```
    * ONE FOR EACH TYPE OF ACTIVTY:
    *
    * ACTIVITY TYPE:
    *      1 - EVACUEES WHILE MOVING
    *      2 - NORMAL ACTIVITY IN SHELTERING AND EVACUATION ZONE
    *      3 - SHELTERED ACTIVITY
    *
    * CLOUD SHIELDING FACTOR
    *
    *    SITE        GG   PB   SEQ  SUR  ZION
    *    SHELTERING  0.7  0.5  0.65 0.6  0.5
    *
    *            EVACUEES  NORMAL  SHELTER
    *
26  SECSFACT001      1.     0.75     0.6   *  SURRY SHELTERING VALUE
    *
    * PROTECTION FACTOR FOR INHALATION
    *
27  SEPROTIN001      1.     0.41      0.33  * VALUES FOR NORMAL ACTIVITY AND
    *                                         SHELTERING SELECTED BY NRC STAFF
    *
    * BREATHING RATE (CUBIC METERS PER SECOND)
    *
28  SEBRRATE001  2.66E-4  2.66E-4  2.66E-4
    *
    * SKIN PROTECTION FACTOR
    *
29  SESKPFAC001  1.0      0.41     0.33    * VALUES FOR NORMAL ACTIVITY AND
    *                                        SHELTERING SELECTED BY NRC STAFF
    *
    * GROUND SHIELDING FACTOR
    *
    *    SITE        GG   PB   SEQ  SUR  ZION
    *    SHELTERING  0.25 0.1  0.2  0.2  0.1
    *
30  SEGSHFAC001      0.5    0.4    0.2   * VALUE FOR NORMAL ACTIVITY SELECTED BY
    *                                       NRC STAFF
    *
    * RESUSPENSION INHALATION MODEL CONCENTRATION COEFFICIENT (/METER)
    *
    *   RESCON = 1.E-4 IS APPROPRIATE FOR MECHANICAL RESUSPENSION BY VEHICLES.
    *   RESHAF = 2.11 DAYS CAUSES 1.E-4 TO DECAY IN ONE WEEK TO 1.E-5, THE VALUE
    *   OF RESCON USED IN THE FIRST TERM OF THE LONG-TERM RESUSPENSION EQUATION
    *   USED IN CHRONC.
    *
31  SERESCON001   1.E-4     (RESUSPENSION IS TURNED ON)
    *
    * RESUSPENSION CONCENTRATION COEFFICIENT HALF-LIFE (SEC)
    *
32  SERESHAF001   1.82E5    (2.11 DAYS)
    ********************************************************************************
    * EVACUATION ZONE DATA BLOCK, LOADED BY EVNETW, STORED IN /NETWOR/, /EOPTIO/
    *
    * SPECIFIC DESCRIPTION OF THE EMERGENCY RESPONSE SCENARIO BEING USED
    *
33  EZEANAM2001  'NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE'
    *
    * THE TYPE OF WEIGHTING TO BE APPLIED TO THE EMERGENCY RESPONSE SCENARIOS
    * YOU MUST SUPPLY A VALUE OF 'TIME' OR 'PEOPLE'
```

```
    *
34  EZWTNAME001  'PEOPLE'
    *
    * WEIGHTING FRACTION APPLICABLE TO THIS SCENARIO
    *
35  EZWTFRAC001  1.00
    *
    * LAST RING IN THE MOVEMENT ZONE
    *
36  EZLASMOV001     0   (A ZERO TURNS OFF THE EVACUATION MODEL)
    *
    ***********************************************************************
    * SHELTER AND RELOCATION ZONE DATA BLOCK, LOADED BY INPEMR,
    *                                         STORED IN /INPSRZ/, /RELOCA/
    *
    * DURATION OF THE EMERGENCY PHASE (SECONDS FROM PLUME ARRIVAL)
    *
37  SRENDEMP001  604800.   (ONE WEEK)
    *
    * CRITICAL ORGAN FOR RELOCATION DECISIONS
    *
38  SRCRIORG001 'L-EDEWBODY'
    *
    * HOT SPOT RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)
    *
39  SRTIMHOT001  43200.    (ONE-HALF DAY)
    *
    * NORMAL RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)
    *
40  SRTIMNRM001  86400.    (ONE DAY)
    *
    * HOT SPOT RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
    *
41  SRDOSHOT001  0.5    (50 REM DOSE TO WHOLE BODY IN 1 WEEK TRIGGERS RELOCATION)
    *
    * NORMAL RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
    *
42  SRDOSNRM001  0.25   (25 REM DOSE TO WHOLE BODY IN 1 WEEK TRIGGERS RELOCATION)
    ********************************************************************************
    * EARLY FATALITY MODEL PARAMETERS, LOADED BY INEFAT, STORED IN /EFATAL/
    *
    * NUMBER OF EARLY FATALITY EFFECTS
    *
43  EFNUMEFA001   2
    *
    *            ORGNAM       EFFACA   EFFACB   EFFTHR
    *
44  EFATAGRP001 'A-RED MARR'      3.8      5.0    1.5
45  EFATAGRP002 'A-LUNGS'        10.0      7.0    5.0
    ********************************************************************************
    * EARLY INJURY MODEL PARAMETERS, LOADED BY INEINJ, STORED IN /EINJUR/
    *
    * NUMBER OF EARLY INJURY EFFECTS
    *
46  EINUMEIN001  7
    *
    *            EINAME           ORGNAM   EISUSC EITHRE EIFACA EIFACB
    *
47  EINJUGRP001 'PRODROMAL VOMIT' 'A-STOMACH'  1.     .5     2.     3.
```

```
48  EINJUGRP002 'DIARRHEA'        'A-STOMACH'  1.     1.     3.     2.5
49  EINJUGRP003 'PNEUMONITIS'     'A-LUNGS'    1.     5.    10.     7.
50  EINJUGRP004 'SKIN ERYTHEMA'   'A-SKIN'     1.     3.     6.     5.
51  EINJUGRP005 'TRANSEPIDERMAL'  'A-SKIN'     1.    10.    20.     5.
52  EINJUGRP006 'THYROIDITIS'     'A-THYROIDH' 1.    40.   240.     2.
53  EINJUGRP007 'HYPOTHYROIDISM'  'A-THYROIDH' 1.     2.    60.     1.3
    ********************************************************************************
    * ACUTE EXPOSURE CANCER PARAMETERS, LOADED BY INACAN STORED IN /ACANCR/.
    *
    * NUMBER OF ACUTE EXPOSURE CANCER EFFECTS
    *
54  LCNUMACA001   7
    *
    * THRESHOLD DOSE FOR APPLYING THE DOSE DEPENDENT REDUCTION FACTOR
    *
55  LCDDTHRE001   0.2  (LOWEST DOSE FOR WHICH DDREFA WILL BE APPLIED)
    *
    * DOSE THRESHOLD FOR LINEAR DOSE RESPONSE (Sv)
    *
56  LCACTHRE001   0.0  (LINEAR-QUADRATIC MODEL IS NOT BEING USED)
    *
    *            ACNAME     ORGNAM  ACSUSC DOSEFA DOSEFB CFRISK   CIRISK  DDREFA
    *
57  LCANCERS001 'LEUKEMIA' 'L-RED MARR'  1.0   1.0   0.0   9.70E-3   0.0     2.0
58  LCANCERS002 'BONE'     'L-BONE SUR'  1.0   1.0   0.0   9.00E-4   0.0     2.0
59  LCANCERS003 'BREAST'   'L-BREAST'    1.0   1.0   0.0   5.40E-3   1.7E-2  1.0
60  LCANCERS004 'LUNG'     'L-LUNGS'     1.0   1.0   0.0   1.55E-2   0.0     2.0
61  LCANCERS005 'THYROID'  'L-THYROIDH'  1.0   1.0   0.0   7.20E-4   7.2E-3  1.0
62  LCANCERS006 'GI'       'L-LOWER LI'  1.0   1.0   0.0   3.36E-2   0.0     2.0
63  LCANCERS007 'OTHER'    'L-EDEWBODY'  1.0   1.0   0.0   2.76E-2   0.0     2.0
    ********************************************************************************
    * RESULT 1 OPTIONS BLOCK, LOADED BY INOUT1, STORED IN /INOUT1/
    * TOTAL NUMBER OF A GIVEN EFFECT (LATENT CANCER, EARLY DEATH, EARLY INJURY)
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
64  TYPE1NUMBER    4
    *
65  TYPE1OUT001    'ERL FAT/TOTAL'                1  15   NOCCDF (0 TO 50 MILES)
66  TYPE1OUT009    'CAN FAT/TOTAL'                1  15   NOCCDF
67  TYPE1OUT019    'CAN FAT/TOTAL'                1  11   NOCCDF (0 TO 10 MILES)
68  TYPE1OUT020    'ERL FAT/TOTAL'                1  11          (0 TO 10 MILES)
    *******************************************************************************
    * RESULT 2 OPTIONS BLOCK, LOADED BY INOUT2, STORED IN /INOUT2/
    * FURTHEST DISTANCE AT WHICH A GIVEN RISK OF EARLY DEATH IS EXCEEDED.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
69  TYPE2NUMBER  0
    *
    *            FATALITY RISK THRESHOLD
    *
    *TYPE2OUT001  0.
    ********************************************************************************
    * RESULT 3 OPTIONS BLOCK, LOADED BY INOUT3, STORED IN /INOUT3/
    * NUMBER OF PEOPLE WHOSE DOSE TO A GIVEN ORGAN EXCEEDS A GIVEN THRESHOLD.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
```

```
70  TYPE3NUMBER  0
    *
    *                ORGAN NAME   DOSE THRESHOLD (Sv)
    *
    *TYPE3OUT001    'A-RED MARR'        1.5
    *TYPE3OUT002    'A-LUNGS'           5.0
    *TYPE3OUT003    'L-EDEWBODY'        0.05
    ********************************************************************************
    * RESULT 4 OPTIONS BLOCK, LOADED BY INOUT4, STORED IN /INOUT4/
    * 360 DEGREE AVERAGE RISK OF A GIVEN EFFECT AT A GIVEN DISTANCE.
    *
    * POSSIBLE TYPES OF EFFECTS ARE:
    *
    *   'ERL FAT/TOTAL'
    *   'ERL INJ/INJURY NAME'
    *   'CAN FAT/CANCER NAME'
    *   'CAN FAT/TOTAL'
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
71  TYPE4NUMBER  3
    *
    *             RADIAL INDEX   TYPE OF EFFECT
    *
72  TYPE4OUT001       1         'ERL FAT/TOTAL'
73  TYPE4OUT002       2         'ERL FAT/TOTAL'
74  TYPE4OUT003       3         'ERL FAT/TOTAL'
    ********************************************************************************
    * RESULT 5 OPTIONS BLOCK, LOADED BY INOUT5, STORED IN /INOUT5/
    *
    * TOTAL POPULATION DOSE TO A GIVEN ORGAN BETWEEN TWO DISTANCES.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
75  TYPE5NUMBER     1
    *
    *              ORGAN      I1DIS5     I2DIS5
    *
76  TYPE5OUT001 'L-EDEWBODY'      1         15     NOCCDF    (0-50 MILES)
    ********************************************************************************
    * RESULT 6 OPTIONS BLOCK, LOADED BY INOUT6, STORED IN /INOUT6/
    *
    * CENTERLINE DOSE TO AN ORGAN VS DIST BY PATHWAY, PATHWAY NAMES ARE AS FOLLOWS:
    *
    *  PATHWAY NAME:
    *    'CLD'     - CLOUDSHINE
    *    'GRD'     - GROUNDSHINE
    *    'INH ACU' - "ACUTE DOSE EQUIVALENT" FROM DIRECT INHALATION OF THE CLOUD
    *    'INH LIF' - "LIFETIME DOSE COMMITMENT" FROM DIRECT INHALATION OF THE CLOUD
    *    'RES ACU' - "ACUTE DOSE EQUIVALENT" FROM RESUSPENSION INHALATION
    *    'RES LIF' - "LIFETIME DOSE COMMITMENT" FROM RESUSPENSION INHALATION
    *    'TOT ACU' - "ACUTE DOSE EQUIVALENT" FROM ALL PATHWAYS
    *    'TOT LIF' - "LIFETIME DOSE COMMITMENT" FROM ALL PATHWAYS
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
77  TYPE6NUMBER     0
    *
    *              ORGNAM        PATHNM      I1DIS6   I2DIS6
```

```
       *
       *TYPE6OUT001  'A-RED MARR'    'TOT ACU'      1       19     (0-50 MILES)
       *TYPE6OUT002  'A-LUNGS'       'TOT ACU'      1       19     (0-50 MILES)
       *TYPE6OUT003  'L-EDEWBODY'    'TOT LIF'      1       26     (0-1000 MILES)
       ********************************************************************************
       * RESULT 7 OPTIONS BLOCK, LOADED BY INOUT7, STORED IN /INOUT7/
       *
       * CENTERLINE RISK OF A GIVEN EFFECT VS DISTANCE
       *
       * NUMBER OF DESIRED RESULTS OF THIS TYPE
       *
   78  TYPE7NUMBER   0
       *
       *                    NAME           I1DIS7       I2DIS7
       *
       *TYPE7OUT001     'ERL FAT/TOTAL'        1           19       (0-50 MILES)
       *TYPE7OUT002     'CAN FAT/TOTAL'        1           26       (0-1000 MILES)
       ********************************************************************************
       * RESULT 8 OPTIONS BLOCK, LOADED BY INOUT8, STORED IN /INOUT8/
       *
       * POPULATION WEIGHTED FATALITY RISK BETWEEN 2 DISTANCES
       *
       * NUMBER OF DESIRED RESULTS OF THIS TYPE
       *
   79  TYPE8NUMBER   2
       *
       *                NAME       I1DIS8  I2DIS8
       *
   80  TYPE8OUT001 'ERL FAT/TOTAL'   1       3     NOCCDF
   81  TYPE8OUT002 'CAN FAT/TOTAL'   1      11     NOCCDF  (0-10 MILES)
       ********************************************************************************
       * RESULT A OPTIONS BLOCK, LOADED BY INOUTA, STORED IN /INOUTA/
       *
       * peak dose to a given organ
       *
       *            NUMA
   82  TYPEANUMBER   0
       *
       *              ORGNAM    I1DISA  I2DISA
       *TYPEAOUT001 'L-EDEWBODY'  1       15
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE

NUMBER OF RECORDS READ                         =  341
NUMBER OF BLANK OR COMMENT RECORDS READ        =  258
NUMBER OF TERMINATOR RECORDS                   =    1
NUMBER OF RECORDS PROCESSED                    =   82
     NUMBER OF PROCESSED RECORDS DUPLICATED     =    0
     NUMBER OF PROCESSED RECORDS SORTED         =   82
****************************************************************************************************



The list of defined organs is as follows (A- is ACUTE and L- is LIFETIME):
   A-SKIN
   A-RED MARR
```

```
   A-LUNGS
   A-THYROIDH
   A-STOMACH
   L-EDEWBODY
   L-RED MARR
   L-BONE SUR
   L-BREAST
   L-LUNGS
   L-THYROID
   L-LOWER LI
   L-BLAD WAL
   L-THYROIDH
Am using a DOSFAC/DOSFAC2/IDCF2 dose factor file

READING FROM A DOSE CONVERSION FILE WITH THE FOLLOWING HEADER:
MACCS File DOSDATA.INP: Changed by D. CHANIN25-JUN-92, 09:53:47
Seven new organs added with MACCS Version 1.5.11.1

NO EVACUATION REQUESTED


USING THE FOLLOWING SITE DATA FILE:

MACCS2 Site Data File for Indian Point Energy Center
SITE FILE
  15 SPATIAL INTERVALS
  16 WIND DIRECTIONS
   7 CROP CATEGORIES
   4 WATER PATHWAY ISOTOPES
   1 WATERSHEDS
  21 ECONOMIC REGIONS
 SPATIAL DISTANCES     KILOMETERS
    0.3219    1.6093    3.2187    4.8280    6.4374    8.0467    9.6561   11.2654
   12.8748   14.4841   16.0935   32.1869   48.2804   64.3739   80.4674
 POPULATION
        6.        0.      271.     2059.     2501.      909.      931.     1223.
     1389.     1503.     1696.    22955.    30654.    39620.    51057.0
       16.        7.      170.     1943.     2912.     2051.     1177.     1388.
     1577.     1798.     1913.    28140.    39917.    56226.    67213.0
       17.      193.      883.     2131.     2964.     3843.     3910.     3059.
     2464.     1998.     1915.    29419.    53692.    62559.    41261.0
       17.      364.     1275.     2132.     2977.     3453.     4507.     5282.
     6140.     6960.     7279.    74856.   119073.   152175.   176338.0
       17.      390.     1218.     2138.     2934.     3792.     4424.     5513.
     5587.     7201.     8076.   118335.   156720.   200581.   208394.0
       17.      409.     1256.     2136.     2970.     3592.     3698.     3857.
     5734.     6783.     7409.   121515.   144267.    54180.    34361.0
       17.      410.     1274.     2138.     2872.     3808.     4537.     5279.
     6284.     7194.     8060.   111946.    87735.   236426.   379990.0
       17.      360.     1268.     1645.      882.      495.       15.     1442.
      948.     1911.     3214.    98326.   481703.  1380249.  1218170.0
       17.      400.      701.      246.      124.      620.     1538.     3253.
     4129.     4455.     5138.   135211.  1164596.  3732339.  3164306.0
       17.      377.      562.      500.     1700.     2882.     3544.     4187.
     4873.     5517.     6159.   202605.   395389.   922649.  1034467.0
       17.      217.      187.     1566.     2274.     2916.     3574.     4188.
     4361.     5358.     6138.   183372.   276902.   197362.   246076.0
        9.        0.      620.     1623.     2197.     2924.     3550.     4014.
     4196.     4255.     4335.    64428.   209197.   109102.    85849.0
```

```
        3.        0.      855.     1602.     2267.     2815.     2368.     1787.
     1423.     1775.     2030.    32026.    50974.    61380.    57384.0
        2.        0.      938.     1624.     2245.     1341.     1135.     1419.
     1505.     1756.     2071.    32528.    54577.    57977.    29719.0
        2.       45.      974.     1589.     1933.      972.     1140.     1351.
     1541.     1781.     2093.    32572.    54557.    24046.    22317.0
        3.       50.      809.     1051.     1587.      740.     1204.     1407.
     1620.     1787.     2028.    31660.    32569.    27599.    34374.0
 LAND FRACTION
 0.37 0.00 0.23 0.96 0.99 0.94 0.78 0.87 0.85 0.81 0.82 0.83 0.94 0.94 0.93
 0.92 0.02 0.13 0.91 0.97 0.98 1.00 1.00 0.98 0.99 0.94 0.95 0.99 0.99 0.98
 1.00 0.47 0.69 1.00 0.99 1.00 0.98 0.96 0.95 1.00 0.94 0.91 0.94 0.95 0.96
 1.00 0.89 0.99 1.00 0.99 0.90 0.96 0.95 0.96 0.96 0.97 0.91 0.92 0.95 0.98
 1.00 0.95 0.95 1.00 0.98 0.99 0.94 0.99 0.87 0.99 0.99 0.92 0.97 0.97 0.78
 1.00 1.00 0.98 1.00 0.99 0.93 0.79 0.69 0.89 0.93 0.91 0.97 0.95 0.27 0.12
 1.00 1.00 0.99 1.00 0.96 0.99 0.96 0.95 0.98 0.99 0.99 0.93 0.53 0.48 0.98
 1.00 0.88 0.99 0.77 0.29 0.13 0.00 0.26 0.16 0.30 0.43 0.77 0.70 0.79 0.82
 1.00 0.97 0.55 0.12 0.05 0.21 0.43 0.77 0.85 0.81 0.83 0.84 0.87 0.81 0.59
 1.00 0.92 0.44 0.31 0.75 0.99 0.99 0.99 1.00 1.00 1.00 0.99 0.99 0.93 0.92
 1.00 0.53 0.18 0.96 1.00 1.00 1.00 0.99 0.89 0.97 0.99 0.98 0.93 0.90 0.94
 0.52 0.00 0.64 1.00 0.97 1.00 0.99 0.95 0.91 0.92 0.94 0.94 0.93 0.97 0.94
 0.19 0.00 0.88 0.99 1.00 1.00 1.00 0.98 0.86 0.95 0.97 0.97 0.98 0.97 0.97
 0.13 0.00 0.96 1.00 1.00 0.99 0.94 0.99 0.91 0.94 0.99 0.98 0.99 0.97 0.95
 0.14 0.14 1.00 0.98 0.99 0.98 0.94 0.94 0.93 0.95 1.00 0.98 0.99 0.99 0.96
 0.20 0.16 0.83 0.57 0.65 0.75 0.99 0.98 0.98 0.95 0.97 0.96 0.96 0.99 0.96
 REGION INDEX
202120202014141414131406060606
202120202014141414141414060606
202020202020201414141414060303
202020202020202020202020010104
202020202020202020202020010104
202020202020202020202020010117
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202116161613131313131313131318
201616161613131313131313131818
201616162013131313131313191919
 WATERSHED INDEX
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```

```
 CROP SEASON AND SHARE
   1 PASTURE               90. 270.  0.0162
   2 STORED FORAGE        150. 240.  0.0480
   3 GRAINS               150. 240.  0.0079
   4 GRN LEAFY VEGETABLES 150. 240.  0.0005
   5 OTHER FOOD CROPS     150. 240.  0.0036
   6 LEGUMES AND SEEDS    150. 240.  0.0002
   7 ROOTS AND TUBERS     150. 240.  0.0018
 WATERSHED DEFINITION  -- INITIAL AND ANNUAL WASHOFF AND INGESTION FACTORS
   1 Sr-89                           5.00E-06
   2 Sr-90                           5.00E-06
   3 Cs-134                          5.00E-06
   4 Cs-137                          5.00E-06
 REGIONAL ECONOMIC DATA
  01 FAIRFIELD      0.032 .008    5831.0   66592.0  287881.0
  02 BERGEN         0.009 .000   14568.0  124496.0  262186.0
  03 LITCHFIELD     0.159 .371     795.0   22373.0  186016.0
  04 NEWHAVEN       0.067 .029    5439.0   36942.0  192427.0
  05 ESSEX          0.002 .000   11903.0  120139.0  197400.0
  06 DUTCHESS       0.219 .207     698.0   16206.0  169417.0
  07 MORRIS         0.057 .006    6005.0   67365.0  277661.0
  08 PASSAIC        0.013 .000    9836.0   81944.0  161864.0
  09 SUSSEX         0.226 .311     483.0   18496.0  165741.0
  10 UNION          0.003 .000   91646.0  243939.0  209708.0
  11 KINGS          0.000 .000       0.0       0.0  123701.0
  12 NASSAU         0.006 .000   18237.0   88422.0  239932.0
  13 ORANGE         0.207 .288    1516.0   13148.0  148873.0
  14 PUTNAM         0.045 .000     892.0   24525.0  180274.0
  15 QUEENS         0.000 .000       0.0       0.0  226728.0
  16 ROCKLAND       0.011 .047    6365.0   65755.0  203359.0
  17 SUFFOLK        0.058 .000   14567.0   54566.0  192471.0
  18 SULLIVAN       0.103 .233    1466.0    7911.0  139374.0
  19 ULSTER         0.116 .043    1019.0    9908.0  138739.0
  20 WESTCHESTR     0.036 .009    2206.0   39116.0  263389.0
  21 WATER          0.000 .000       0.0       0.0       0.0
POPULATION

>>The Record Identifier TYPEBNUMBER was not found:
>>Type B results not being generated



USER INPUT IS READ FROM UNIT 26
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                   RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "CHRONC" INPUT FILE
       *
    1  CHCHNAME001 'CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model'
       ********************************************************************************
       * EMERGENCY RESPONSE COST DATA BLOCK
       *
       * DAILY COST FOR A PERSON WHO IS EVACUATED (DOLLARS/PERSON-DAY)
       *
    2  CHEVACST001  46.7   (INCLUDES FOOD AND HOUSING COSTS BUT NOT LOST INCOME)
```

```
    *
    * DAILY COST FOR A PERSON WHO IS RELOCATED (DOLLARS/PERSON-DAY)
    *
 3  CHRELCST001  46.7   (INCLUDES FOOD AND HOUSING COSTS BUT NOT LOST INCOME)
    ********************************************************************************
    * LONG TERM PROTECTIVE ACTION DATA BLOCK
    *
    * Duration of the intermediate phase period--at version 1.11c TMIPND is no
    * longer processed.  The new input variable DUR_INTPHAS is the period's
    * duration, not the time after plume arrival at which the period ends.
    *
 4  DUR_INTPHAS   0.0    (in seconds)   (no intermediate phase)
    *
    * LONG-TERM PHASE DOSE PROJECTION PERIOD, THE DURATION OF THE EXPOSURE
    * PERIOD OVER WHICH THE LONG-TERM DOSE CRITERION IS EVALUATED (SECONDS)
    *
 5  CHTMPACT001   1.58E8             (5 YEARS)
    *
    * DOSE CRITERION FOR INTERMEDIATE PHASE RELOCATION (Sv)
    *
 6  CHDSCRTI001   1.0E5              (NO INTERMEDIATE PHASE RELOCATION)
    *
    * DOSE CRITERION FOR LONG-TERM PHASE RELOCATION (Sv)
    *
 7  CHDSCRLT001    0.04
    *
    * CRITICAL ORGAN NAME FOR LONG-TERM ACTIONS
    *
 8  CHCRTOCR001 'L-EDEWBODY'
    *
    * Long Term Exposure Period    Previously permanently set to:
    *    one million years = 3.15 E13 seconds
    *    MACCS2 allowable range is 3.15E7 to 1.E10
    *
 9  CHEXPTIM001    9.45E8
    ********************************************************************************
    * DECONTAMINATION PLAN DATA BLOCK
    *
    * NUMBER OF LEVELS OF DECONTAMINATION
    *
10  CHLVLDEC001  2
    *
    * DECONTAMINATION TIMES CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
    *  (SECONDS)
    *
11  CHTIMDEC001   5.184E6  1.0368E7    (60, 120 DAYS)
    *
    * DOSE REDUCTION FACTORS CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
    *
12  CHDSRFCT001   3.      15.
    *
    * COST OF FARM DECONTAMINATION PER FARMLAND UNIT AREA (DOLLARS/HECTARE)
    *  FOR THE VARIOUS LEVELS OF DECONTAMINATION
    *
13  CHCDFRM0001   972.   2160.
    *
    * COST OF NONFARM DECONTAMINATION PER RESIDENT PERSON (DOLLARS/PERSON)
    *  FOR THE VARIOUS LEVELS OF DECONTAMINATION
    *
```

```
14  CHCDNFRM001   5184.   13824.
    *
    * FRACTION OF FARMLAND DECONTAMINATION COST DUE TO LABOR
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
15  CHFRFDL0001  .3      .35
    *
    * FRACTION OF NON-FARM DECONTAMINATION COST DUE TO LABOR
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
16  CHFRNFDL001  .7      .5
    *
    * FRACTION OF TIME WORKERS IN FARM AREAS SPEND IN CONTAMINATED AREAS
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
17  CHTFWKF0001  .10     .33
    *
    * FRACTION OF TIME WORKERS IN NON-FARM AREAS SPEND IN CONTAMINATED AREAS
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
18  CHTFWKNF001  .33     .33
    *
    * AVERAGE COST OF DECONTAMINATION LABOR (DOLLARS/MAN-YEAR)
    *
19  CHDLBCST001   60480.
    ********************************************************************************
    * INTERDICTION COST DATA BLOCK
    *
    * DEPRECIATION (DETERIORATION) RATE DURING INTERDICTION PERIOD (PER YEAR)
    *
20  CHDPRATE001    .20   (VALUE OBTAINED FROM WASH-1400, APPENDIX 6)
    *
    * INVESTMENT INCOME RETURN (DISCOUNT RATE) DURING INTERDICTION PERIOD (PER YEAR)
    * THIS VALUE SHOULD BE DERIVED AS A REAL RETURN RATE ADJUSTED FOR INFLATION
    *
21  CHDSRATE001    .12   (VALUE OBTAINED FROM WASH-1400, APPENDIX 6)
    *
    * POPULATION RELOCATION COST (DOLLARS/PERSON):
    *  ALTERNATIVE HOUSING, MOVING COSTS, AND LOST INCOME FOR PEOPLE IN
    *  AREAS WHICH REQUIRE DECONTAMINATION, INTERDICTION, OR CONDEMNATION
    *
22  CHPOPCST001   8640.
    ********************************************************************************
    * GROUNDSHINE WEATHERING DEFINITION DATA BLOCK
    *
    * NUMBER OF TERMS IN THE GROUNDSHINE WEATHERING RELATIONSHIP (EITHER 1 OR 2)
    *
23  CHNGWTRM001   2
    *
    * GROUNDSHINE WEATHERING COEFFICIENTS
    *
24  CHGWCOEF001   0.5    0.5            (JON HELTON)
    *
    * HALF LIVES CORRESPONDING TO THE GROUNDSHINE WEATHERING COEFFICIENTS (S)
    *
25  CHTGWHLF001   1.6E7  2.8E9          (JON HELTON)
    ********************************************************************************
    * RESUSPENSION WEATHERING DEFINITION DATA BLOCK
    *
```

```
    * NUMBER OF TERMS IN THE RESUSPENSION WEATHERING RELATIONSHIP
    *
26  CHNRWTRM001    3
    *
    * RESUSPENSION CONCENTRATION COEFFICIENTS   (/ METER)
    *  RELATIONSHIP BETWEEN GROUND CONCENTRATION AND INSTANTANEOUS AIR CONC.
    *
27  CHRWCOEF001  1.0E-5   1.0E-7   1.0E-9  (VALUES HERE SELECTED BY JON HELTON)
    *
    * HALF-LIVES CORRESPONDING TO THE RESUSPENSION CONCENTRATION COEFFICIENTS (S)
    *
28  CHTRWHLF001  1.6E7    1.6E8    1.6E9   (6 MONTHS, 5 YEARS, 50 YEARS)
    ********************************************************************************
    * SITE REGION DESCRIPTION DATA BLOCK
    *
    * FRACTION OF AREA THAT IS LAND IN THE REGION
    *
29  CHFRACLD001   0.95   (ROUGH GUESS VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * FRACTION OF LAND DEVOTED TO FARMING IN THE REGION
    *
30  CHFRCFRM001   0.382  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * AVERAGE VALUE OF ANNUAL FARM PRODUCTION IN THE REGION (DOLLARS/HECTARE)
    *  (CASH RECEIPTS FROM FARMING PLUS VALUE OF HOME CONSUMPTION)/(LAND IN FARMS)
    *
31  CHFRMPRD001   371.0  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * FRACTION OF FARM PRODUCTION RESULTING FROM DAIRY PRODUCTION IN THE REGION
    *  (VALUE OF MILK PRODUCED)/(CASH RECEIPTS FROM FARMING PLUS HOME CONSUMPTION)
    *
32  CHDPFRCT001   0.198  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * VALUE OF FARM WEALTH (DOLLARS/HECTARE)
    *  (AVERAGE VALUE PER HECTARE OF FARM LAND AND BUILDINGS TO 100 MILES)
    *
33  CHVALWF0001    50071.
    *
    * FRACTION OF FARM WEALTH IN IMPROVEMENTS FOR THE REGION
    *
34  CHFRFIM0001   0.25
    *
    * NON-FARM WEALTH, PROPERTY AND IMPROVEMENTS FOR THE REGION (DOLLARS/PERSON)
    *  THE VALUE OF ALL RESIDENTIAL, BUSINESS, AND PUBLIC ASSETS WHICH WOULD BE
    *  LOST IN THE EVENT OF PERMANENT INTERDICTION (CONDEMNATION) OF THE AREA
    *
35  CHVALWNF001    208838.
    *
    * FRACTION OF NON-FARM WEALTH IN IMPROVEMENTS FOR THE REGION
    *
36  CHFRNFIM001   0.8
    ******************************************************************************
37  CHFDPATH001 'NEW'
    *
    * name of the COMIDA2 binary output file
    *
38  BIN_FILE001 'SAMP_A.BIN'   (revised data file of 8/12/95)
    *
    * Dose limits triggering first year crop disposal of the separate
```

```
    * milk and non-milk components of the diet, corresponding in purpose,
    * more or less, to the MACCS 1.5 input variables PSCMLK and PSCOTH
    *
    * For NUREG-1150 calculations, the maximum allowable ground concentrations for
    * production of milk and non-milk crops contaminated by an accident occurring
    * in the growing season were derived based on an assumed maximum allowable
    * dose of 5 rem effective or 15 rem thyroid, per the 1982 FDA guidance that's
    * reprinted in the 1992 EPA PAG Manual.  For purposes of comparison against
    * the prior results, it is being assumed, for simplicity, that milk and
    * non-milk crops contribute equally to the first year dose.  Thus, the 5 rem
    * effective dose limit used in NUREG-1150 is equally split between milk and
    * non-milk crops, with 2.5 rem allowed for each.  Similarly, the 15 rem
    * thyroid limit is split into 7.5 and 7.5 rem for the milk and non-milk
    * portions of the diet.
    *
    *             effective     thyroid  (doses in sieverts)
39  DOSEMILK001    0.025          0.075
40  DOSEOTHR001    0.025          0.075
    *
    * Annual dose limits for the subsequent year's (i.e., after the first year)
    * interdiction of BOTH the milk and non-milk (combined) components of the diet
    *
    * Note: the long-term food critera, GCMAXR, used for NUREG-1150 wre based on
    * an ingestion dose integrated from zero to infinity.  It is not possible to
    * translate those parameter values into corresponding annual dose limits, as is
    * required by the COMIDA2-based food model.  The "total" dose limits used in
    * NUREG-1150 for "root uptake", 0.5 rem effective and 1.5 rem thyroid, are used
    * here as annual dose limits for interdiction of food production in years the
    * years subsequent to the accident.
    *
    *             effective     thyroid  (doses in sieverts)
41  DOSELONG001    0.005          0.015
    *
    * NUMBER OF NUCLIDES IN THE WATER INGESTION PATHWAY MODEL
    *
42  CHNUMWPI001    4
    *
    * TABLE OF NUCLIDE DEFINITIONS IN THE WATER INGESTION PATHWAY MODEL
    *
    * IF A SITE DATA FILE IS DEFINED, THE DATA DEFINING THE WATERSHED INGESTION
    *  FACTOR IS SUPERSEDED BY THE CORRESPONDING DATA IN THE SITE DATA FILE
    *
    *                        INITIAL     ANNUAL    INGESTION FACTOR
    *             WATER      WASHOFF     WASHOFF    ((Bq INGESTED)/
    *            NUCLIDE     FRACTION     RATE        (Bq IN WATER))
    *
    *             NAMWPI      WSHFRI      WSHRTA         WINGF
43  CHWTRISO001   Sr-89        0.01       0.004          5.0E-6
44  CHWTRISO002   Sr-90        0.01       0.004          5.0E-6
45  CHWTRISO003   Cs-134       0.005      0.001          5.0E-6
46  CHWTRISO004   Cs-137       0.005      0.001          5.0E-6
    ********************************************************************************
    * SPECIAL OPTIONS DATA BLOCK
    *
    * DETAILED PRINT OPTION CONTROL SWITCHES, LOOK AT THE CODE BEFORE TURNING ON!!
    *          KSWDSC
    *
47  CHKSWTCH001   0
    ********************************************************************************
```

```
    * DEFINE THE TYPE 9 RESULTS
    *
    * LONG-TERM POPULATION DOSE IN A GIVEN REGION BROKEN DOWN BY THE 12 PATHWAYS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
    *
48  TYPE9NUMBER   1      (UP TO 10 ALLOWED)
    *
    *              ORGNAM        INNER      OUTER
    *
49  TYPE9OUT001   'L-EDEWBODY'       1          15    (0-50 MILES)
    ********************************************************************************
    * ECONOMIC COST RESULTS IN A REGION BROKEN DOWN BY 12 TYPES OF COSTS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
    *
50  TYP10NUMBER   1      (UP TO 10 ALLOWED)
    *
    *              INNER      OUTER
    *
51  TYP10OUT001      1          15    (0-50 MILES)
    ********************************************************************************
    * DEFINE A FLAG THAT CONTROLS THE PRODUCTION OF THE ACTION DISTANCE RESULTS
    *
    * SPECIFYING A VALUE OF .TRUE. TURNS ON ALL 8 OF THE ACTION DISTANCE RESULTS,
    * A VALUE OF .FALSE. WILL ELIMINATE THE ACTION DISTANCE RESULTS FROM THE OUTPUT.
    *
52  TYP11FLAG11  .FALSE.
    ********************************************************************************
    * IMPACTED AREA/POPULATION RESULTS IN A REGION BROKEN DOWN BY 6 TYPES OF IMPACTS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 8
    *
53  TYP12NUMBER   0      (UP TO 10 ALLOWED)
    *
    *              INNER      OUTER
    *
    *TYP12OUT001      1          15    (0-50 MILES)
    ********************************************************************************
    * Maximal annual food ingestion dose to an individual, requested by IXOT13
    *
    * This result is calculated after accounting for temporary or
    * permanent interdiction.  It is only available for the "new" food model.
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    *
54  TYP13NUMBER   0   (UP TO 10 ALLOWED)
    *
    * IRAD13 is the radial spatial interval at which results are requested
    *
    * ORGN13 is the name of the organ for which results are requested
    *  (allowable values for ORGN13 are 'EFFECTIVE' or 'THYROID')
    *
    *          IRAD13   ORGN13
    *
    *TYP13OUT001   2    EFFECTIVE
```

```
        *TYP13OUT002   4    EFFECTIVE
        *TYP13OUT003   6    EFFECTIVE
        *TYP13OUT004   8    EFFECTIVE
        *TYP13OUT005  10    EFFECTIVE
        *TYP13OUT006  12    EFFECTIVE
        *TYP13OUT007  15    EFFECTIVE
        *TYP13OUT008   2    THYROID
        *TYP13OUT009   4    THYROID
        *TYP13OUT010   6    THYROID
        *TYP13OUT011   8    THYROID
        *TYP13OUT012  10    THYROID
        *TYP13OUT013  12    THYROID
        *TYP13OUT014  15    THYROID
        .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE

NUMBER OF RECORDS READ                          =  318
NUMBER OF BLANK OR COMMENT RECORDS READ         =  263
NUMBER OF TERMINATOR RECORDS                    =    1
NUMBER OF RECORDS PROCESSED                     =   54
     NUMBER OF PROCESSED RECORDS DUPLICATED     =    0
     NUMBER OF PROCESSED RECORDS SORTED         =   54
****************************************************************************************************


COMIDA2 binary file header =
COMIDA2 01/14/2004 13:06:02   Version 1.11.1, 01/12/2004

COMIDA2 descriptive title  =
MACCS File DOSDATA.INP: Changed by D. CHANIN25-JUN-92, 09:53:47

Seven new organs added with MACCS Version 1.5.11.1


A SITE DATA FILE IS BEING USED FOR BOTH "EARLY" AND "CHRONC"

 7 CANCER EFFECTS ARE DEFINED IN THE MODEL.
    INDEX  CANCER EFFECT                   ORGAN       ALPHA       BETA     CFRISK     CIRISK
       1                      LEUKEMIA     L-RED MARR   1.000E+00  0.000E+00  9.700E-03  0.000E+00
       2                      BONE         L-BONE SUR   1.000E+00  0.000E+00  9.000E-04  0.000E+00
       3                      BREAST       L-BREAST     1.000E+00  0.000E+00  5.400E-03  1.700E-02
       4                      LUNG         L-LUNGS      1.000E+00  0.000E+00  1.550E-02  0.000E+00
       5                      THYROID      L-THYROIDH   1.000E+00  0.000E+00  7.200E-04  7.200E-03
       6                      GI           L-LOWER LI   1.000E+00  0.000E+00  3.360E-02  0.000E+00
       7                      OTHER        L-EDEWBODY   1.000E+00  0.000E+00  2.760E-02  0.000E+00

  TIME OF HOTSPOT RELOCATION IS 4.3200E+04.
  TIME OF NORMAL RETURN IS  8.640E+04 AND THE EMERGENCY PHASE ENDS AT  6.048E+05.


GROUNDSHINE SHIELDING FACTOR   = 0.400

RESUSPENSION PROTECTION FACTOR = 0.410

BREATHING RATE (CUBIC M/S) =   2.660E-04
```

DISPERSION MODEL FLAG IS 2

WINDROSE PROBABILITIES BY WIND DIRECTION AND MET BIN NUMBER

BIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0.0826	0.0092	0.0092	0.0917	0.0826	0.1284	0.1651	0.1743	0.0917	0.0000	0.0092	0.0000	0.0000	0.0092	0.0000	0.1468
2	0.0659	0.0330	0.0220	0.0000	0.0220	0.0440	0.1538	0.0769	0.2747	0.0549	0.0000	0.0000	0.0000	0.0000	0.0000	0.2527
3	0.1147	0.0734	0.0550	0.0321	0.0092	0.0138	0.0046	0.0229	0.0321	0.0642	0.0596	0.0642	0.1147	0.1009	0.1422	0.0963
4	0.1583	0.0922	0.0414	0.0487	0.0472	0.0392	0.0465	0.0632	0.1089	0.1126	0.0712	0.0428	0.0196	0.0116	0.0254	0.0712
5	0.1236	0.0471	0.0206	0.0330	0.0671	0.1065	0.0989	0.1024	0.1919	0.1254	0.0288	0.0041	0.0018	0.0000	0.0029	0.0459
6	0.0750	0.0200	0.0069	0.0110	0.0399	0.1287	0.1913	0.1115	0.2230	0.1383	0.0172	0.0007	0.0000	0.0000	0.0007	0.0358
7	0.0548	0.0205	0.0137	0.0000	0.0205	0.0342	0.2740	0.0685	0.3425	0.1438	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
8	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.2000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.1179	0.0866	0.0755	0.0368	0.0221	0.0276	0.0239	0.0313	0.0810	0.1087	0.0608	0.0589	0.0405	0.0718	0.0810	0.0755
10	0.1882	0.0935	0.0646	0.0256	0.0167	0.0067	0.0089	0.0100	0.0468	0.1904	0.1626	0.0512	0.0245	0.0100	0.0134	0.0869
11	0.2271	0.0542	0.0034	0.0034	0.0068	0.0068	0.0034	0.0136	0.0441	0.4237	0.1627	0.0034	0.0000	0.0000	0.0000	0.0475
12	0.2982	0.0526	0.0351	0.0000	0.0000	0.0175	0.0000	0.0175	0.2456	0.2105	0.0351	0.0000	0.0000	0.0000	0.0000	0.0877
13	0.0506	0.0169	0.0393	0.0000	0.0225	0.0337	0.0449	0.0899	0.2247	0.2079	0.0730	0.0562	0.0337	0.0112	0.0449	0.0506
14	0.0167	0.0083	0.0083	0.0042	0.0083	0.0000	0.0000	0.0042	0.0542	0.6750	0.1708	0.0333	0.0042	0.0042	0.0000	0.0083
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7069	0.2759	0.0000	0.0000	0.0000	0.0000	0.0172
16	0.1429	0.0000	0.0000	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	0.4286	0.2857	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
18	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
19	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
20	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
21	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
22	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
23	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
24	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
25	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
26	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
27	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
28	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
29	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
30	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
31	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
32	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
33	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
34	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
35	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
36	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
37	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
38	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
39	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
40	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
41	0.1279	0.0557	0.0301	0.0255	0.0346	0.0587	0.0717	0.0627	0.1402	0.1744	0.0677	0.0267	0.0182	0.0166	0.0209	0.0686

Processing a Site Data File with Header: MACCS2 Site Data File for Indian Point Energy Center

SITE FILE

```
 THIS PROGRAM CURRENTLY ALLOWS THE GENERATION OF UP TO  394 RESULTS

YOU HAVE REQUESTED  10 RESULTS FROM "EARLY" COMPOSED OF:

   4 RESULTS OF TYPE 1
   0 RESULTS OF TYPE 2
   0 RESULTS OF TYPE 3
   3 RESULTS OF TYPE 4
   1 RESULTS OF TYPE 5
   0 RESULTS OF TYPE 6
   0 RESULTS OF TYPE 7
   2 RESULTS OF TYPE 8
   0 RESULTS OF TYPE A
   0 RESULTS OF TYPE B

YOU HAVE REQUESTED   30 RESULTS FROM "CHRONC" COMPOSED OF:

  17 RESULTS OF TYPE 9
  13 RESULTS OF TYPE 10
   0 RESULTS OF TYPE 11
   0 RESULTS OF TYPE 12
   0 RESULTS OF TYPE 13


     TRIAL        DAY       HOUR        BIN     PRBMET
          1        152         16          1   3.11E-03
```

```
WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
```

```
 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
          2        156          2          16   2.00E-04
For Julian Day 156, selecting COMIDA2 results # 4 of 9
          3        156         14           2   2.60E-03
For Julian Day 156, selecting COMIDA2 results # 4 of 9
          4        158          4          28   1.23E-03
For Julian Day 158, selecting COMIDA2 results # 4 of 9
          5        158         14          23   1.86E-03
For Julian Day 158, selecting COMIDA2 results # 4 of 9
          6        163         16          27   5.42E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          7        163         17          25   4.00E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          8        163         18          24   1.43E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          9        163         22          18   1.34E-03
For Julian Day 163, selecting COMIDA2 results # 4 of 9
         10        164         11          21   5.76E-03
For Julian Day 164, selecting COMIDA2 results # 4 of 9
         11        165         13          28   1.23E-03
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         12        165         17          26   2.00E-04
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         13        165         20          24   1.43E-04
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         14        166          5           3   6.22E-03
For Julian Day 166, selecting COMIDA2 results # 4 of 9
         15        166         12           4   3.93E-02
For Julian Day 166, selecting COMIDA2 results # 4 of 9
         16        169          4           9   1.55E-02
For Julian Day 169, selecting COMIDA2 results # 5 of 9
         17        170         10          30   1.14E-04
For Julian Day 170, selecting COMIDA2 results # 5 of 9
         18        179          8          40   1.14E-03
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         19        179         12          38   1.71E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         20        179         13          37   2.85E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         21        179         14          35   8.56E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         22        180          1          15   1.66E-03
For Julian Day 180, selecting COMIDA2 results # 5 of 9
         23        180         21          10   2.56E-02
For Julian Day 180, selecting COMIDA2 results # 5 of 9
         24        184          4          14   6.85E-03
For Julian Day 184, selecting COMIDA2 results # 5 of 9
         25        193          9           6   4.15E-02
For Julian Day 193, selecting COMIDA2 results # 6 of 9
         26        196         13          27   5.42E-04
For Julian Day 196, selecting COMIDA2 results # 6 of 9
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        27        196          14          26   2.00E-04
For Julian Day 196, selecting COMIDA2 results # 6 of 9
        28        197           3          24   1.43E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        29        197           6          30   1.14E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        30        197           7          29   5.99E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        31        197          14          25   4.00E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        32        199          24          34   8.28E-04
For Julian Day 199, selecting COMIDA2 results # 6 of 9
        33        200           2          33   4.00E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        34        200           6          31   2.00E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        35        200           7          30   1.14E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        36        203          12          28   1.23E-03
For Julian Day 203, selecting COMIDA2 results # 6 of 9
        37        206           2          15   1.66E-03
For Julian Day 206, selecting COMIDA2 results # 6 of 9
        38        206           7          11   8.42E-03
For Julian Day 206, selecting COMIDA2 results # 6 of 9
        39        208           3          22   9.70E-03
For Julian Day 208, selecting COMIDA2 results # 6 of 9
        40        212           5          20   2.08E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        41        212           6          19   2.71E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        42        212          13          17   8.28E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        43        213           1           3   6.22E-03
For Julian Day 213, selecting COMIDA2 results # 6 of 9
        44        216          17          39   6.28E-04
For Julian Day 216, selecting COMIDA2 results # 6 of 9
        45        216          19          35   8.56E-04
For Julian Day 216, selecting COMIDA2 results # 6 of 9
        46        218          15           5   4.85E-02
For Julian Day 218, selecting COMIDA2 results # 6 of 9
        47        219          21          27   5.42E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        48        219          22          26   2.00E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        49        219          23          25   4.00E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        50        228          16          40   1.14E-03
For Julian Day 228, selecting COMIDA2 results # 7 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
        51        228          22          39   6.28E-04
For Julian Day 228, selecting COMIDA2 results # 7 of 9
        52        228          23          39   6.28E-04
For Julian Day 228, selecting COMIDA2 results # 7 of 9
        53        229           1          38   1.71E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
        54        229           2          38   1.71E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
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        55        229          3          37   2.85E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
        56        245         12          24   1.43E-04
For Julian Day 245, selecting COMIDA2 results # 7 of 9
        57        246          6          21   5.76E-03
For Julian Day 246, selecting COMIDA2 results # 7 of 9
        58        250          2          11   8.42E-03
For Julian Day 250, selecting COMIDA2 results # 7 of 9
        59        251         14           1   3.11E-03
For Julian Day 251, selecting COMIDA2 results # 7 of 9
        60        256         23          33   4.00E-04
For Julian Day 256, selecting COMIDA2 results # 7 of 9
        61        257          1          31   2.00E-04
For Julian Day 257, selecting COMIDA2 results # 8 of 9
        62        258         17          40   1.14E-03
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        63        258         22          38   1.71E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        64        258         23          37   2.85E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        65        258         24          36   1.14E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        66        259          2          29   5.99E-04
For Julian Day 259, selecting COMIDA2 results # 8 of 9
        67        260         24          10   2.56E-02
For Julian Day 260, selecting COMIDA2 results # 8 of 9
        68        263          9          40   1.14E-03
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        69        263         13          39   6.28E-04
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        70        263         18          35   8.56E-04
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        71        264         23          13   5.08E-03
For Julian Day 264, selecting COMIDA2 results # 8 of 9
        72        271         19           9   1.55E-02
For Julian Day 271, selecting COMIDA2 results # 8 of 9
        73        272         11           2   2.60E-03
For Julian Day 272, selecting COMIDA2 results # 8 of 9
        74        273         15           4   3.93E-02
For Julian Day 273, selecting COMIDA2 results # 8 of 9
        75        276         24          14   6.85E-03
For Julian Day 276, selecting COMIDA2 results # 8 of 9
        76        282         12           1   3.11E-03
For Julian Day 282, selecting COMIDA2 results # 8 of 9
        77        284         13           5   4.85E-02
For Julian Day 284, selecting COMIDA2 results # 8 of 9
        78        288          6          13   5.08E-03
For Julian Day 288, selecting COMIDA2 results # 9 of 9
        79        295         23          12   1.63E-03
For Julian Day 295, selecting COMIDA2 results # 9 of 9
        80        299          2          15   1.66E-03
For Julian Day 299, selecting COMIDA2 results # 9 of 9
        81        301          3          14   6.85E-03
For Julian Day 301, selecting COMIDA2 results # 9 of 9
        82        302         10           7   4.17E-03
For Julian Day 302, selecting COMIDA2 results # 9 of 9
        83        311          8           4   3.93E-02
For Julian Day 311, selecting COMIDA2 results # 9 of 9
        84        314         10          22   9.70E-03
```

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For Julian Day 314, selecting COMIDA2 results # 9 of 9
        85        314         18         20   2.08E-03
For Julian Day 314, selecting COMIDA2 results # 9 of 9
        86        314         20         18   1.34E-03
For Julian Day 314, selecting COMIDA2 results # 9 of 9
        87        315          9         23   1.86E-03
For Julian Day 315, selecting COMIDA2 results # 9 of 9
        88        319          8         19   2.71E-03
For Julian Day 319, selecting COMIDA2 results # 9 of 9
        89        319         16         25   4.00E-04
For Julian Day 319, selecting COMIDA2 results # 9 of 9
        90        331         16         11   8.42E-03
For Julian Day 331, selecting COMIDA2 results # 9 of 9
        91        334         22         19   2.71E-03
For Julian Day 334, selecting COMIDA2 results # 1 of 9
        92        339         18         10   2.56E-02
For Julian Day 339, selecting COMIDA2 results # 1 of 9
        93        347         10          8   1.43E-04
For Julian Day 347, selecting COMIDA2 results # 1 of 9
        94        349          6         23   1.86E-03
For Julian Day 349, selecting COMIDA2 results # 1 of 9
        95        352          8         27   5.42E-04
For Julian Day 352, selecting COMIDA2 results # 1 of 9
        96        363          1          5   4.85E-02
For Julian Day 363, selecting COMIDA2 results # 1 of 9
        97        364          6          6   4.15E-02
For Julian Day 364, selecting COMIDA2 results # 1 of 9
        98        365         11         17   8.28E-03
For Julian Day 365, selecting COMIDA2 results # 1 of 9
        99          4         13         34   8.28E-04
For Julian Day   4, selecting COMIDA2 results # 1 of 9
       100          9          8         22   9.70E-03
For Julian Day   9, selecting COMIDA2 results # 1 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
       101         10          3         34   8.28E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       102         10          8         33   4.00E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       103         10         11         32   1.14E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       104         10         13         31   2.00E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       105         11          1         12   1.63E-03
For Julian Day  11, selecting COMIDA2 results # 1 of 9
       106         13         16          7   4.17E-03
For Julian Day  13, selecting COMIDA2 results # 1 of 9
       107         14         15          7   4.17E-03
For Julian Day  14, selecting COMIDA2 results # 1 of 9
       108         16         23          8   1.43E-04
For Julian Day  16, selecting COMIDA2 results # 1 of 9
       109         22         12          6   4.15E-02
For Julian Day  22, selecting COMIDA2 results # 1 of 9
       110         25         11          8   1.43E-04
For Julian Day  25, selecting COMIDA2 results # 1 of 9
       111         30         20         18   1.34E-03
For Julian Day  30, selecting COMIDA2 results # 1 of 9
       112         38          2         12   1.63E-03
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For Julian Day  38, selecting COMIDA2 results # 2 of 9
        113         40          2          11   8.42E-03
For Julian Day  40, selecting COMIDA2 results # 2 of 9
        114         41          2          15   1.66E-03
For Julian Day  41, selecting COMIDA2 results # 2 of 9
        115         44          5          16   2.00E-04
For Julian Day  44, selecting COMIDA2 results # 2 of 9
        116         45         11          16   2.00E-04
For Julian Day  45, selecting COMIDA2 results # 2 of 9
        117         49          8          21   5.76E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
        118         49          9          20   2.08E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
        119         49         17          17   8.28E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
        120         55          4          13   5.08E-03
For Julian Day  55, selecting COMIDA2 results # 2 of 9
        121         56          2          28   1.23E-03
For Julian Day  56, selecting COMIDA2 results # 2 of 9
        122         56          9          26   2.00E-04
For Julian Day  56, selecting COMIDA2 results # 2 of 9
        123         58          2           9   1.55E-02
For Julian Day  58, selecting COMIDA2 results # 2 of 9
        124         58         24          31   2.00E-04
For Julian Day  58, selecting COMIDA2 results # 2 of 9
        125         59          1          30   1.14E-04
For Julian Day  59, selecting COMIDA2 results # 2 of 9
        126         71         15          29   5.99E-04
For Julian Day  71, selecting COMIDA2 results # 2 of 9
        127         78          4           8   1.43E-04
For Julian Day  78, selecting COMIDA2 results # 2 of 9
        128         78          9           6   4.15E-02
For Julian Day  78, selecting COMIDA2 results # 2 of 9
        129         86          3          13   5.08E-03
For Julian Day  86, selecting COMIDA2 results # 2 of 9
        130         88          2          29   5.99E-04
For Julian Day  88, selecting COMIDA2 results # 2 of 9
        131         95          6          19   2.71E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
        132         95          7          17   8.28E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
        133         95         10          12   1.63E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
        134         97          2           9   1.55E-02
For Julian Day  97, selecting COMIDA2 results # 3 of 9
        135         97          3          10   2.56E-02
For Julian Day  97, selecting COMIDA2 results # 3 of 9
        136         97         20           7   4.17E-03
For Julian Day  97, selecting COMIDA2 results # 3 of 9
        137         99          5           3   6.22E-03
For Julian Day  99, selecting COMIDA2 results # 3 of 9
        138        100          1          21   5.76E-03
For Julian Day 100, selecting COMIDA2 results # 3 of 9
        139        105         16           2   2.60E-03
For Julian Day 105, selecting COMIDA2 results # 3 of 9
        140        112         17          23   1.86E-03
For Julian Day 112, selecting COMIDA2 results # 3 of 9
        141        120          6          16   2.00E-04
For Julian Day 120, selecting COMIDA2 results # 3 of 9
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        142        124          3          14   6.85E-03
For Julian Day 124, selecting COMIDA2 results # 3 of 9
        143        125         13           2   2.60E-03
For Julian Day 125, selecting COMIDA2 results # 3 of 9
        144        127         11           4   3.93E-02
For Julian Day 127, selecting COMIDA2 results # 3 of 9
        145        129          7          34   8.28E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
        146        129         12          33   4.00E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
        147        129         13          32   1.14E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
        148        131         17          20   2.08E-03
For Julian Day 131, selecting COMIDA2 results # 3 of 9
        149        132         15           5   4.85E-02
For Julian Day 132, selecting COMIDA2 results # 3 of 9
        150        134         21          35   8.56E-04
For Julian Day 134, selecting COMIDA2 results # 3 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
        151        137         14           1   3.11E-03
For Julian Day 137, selecting COMIDA2 results # 4 of 9
        152        138         23          22   9.70E-03
For Julian Day 138, selecting COMIDA2 results # 4 of 9
        153        141          9          18   1.34E-03
For Julian Day 141, selecting COMIDA2 results # 4 of 9
        154        145          1          37   2.85E-04
For Julian Day 145, selecting COMIDA2 results # 4 of 9
        155        151          1           3   6.22E-03
For Julian Day 151, selecting COMIDA2 results # 4 of 9
```

WARNING!! WARNING!! WARNING!! WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!! WARNING!! WARNING!! WARNING!!

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  22.89 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
For Julian Day 158, selecting COMIDA2 results # 4 of 9
For Julian Day 158, selecting COMIDA2 results # 4 of 9
For Julian Day 163, selecting COMIDA2 results # 4 of 9
For Julian Day 163, selecting COMIDA2 results # 4 of 9
For Julian Day 163, selecting COMIDA2 results # 4 of 9
For Julian Day 163, selecting COMIDA2 results # 4 of 9
For Julian Day 164, selecting COMIDA2 results # 4 of 9
For Julian Day 165, selecting COMIDA2 results # 4 of 9
For Julian Day 165, selecting COMIDA2 results # 4 of 9
For Julian Day 165, selecting COMIDA2 results # 4 of 9
For Julian Day 166, selecting COMIDA2 results # 4 of 9
For Julian Day 166, selecting COMIDA2 results # 4 of 9
For Julian Day 169, selecting COMIDA2 results # 5 of 9
For Julian Day 170, selecting COMIDA2 results # 5 of 9
For Julian Day 179, selecting COMIDA2 results # 5 of 9
For Julian Day 179, selecting COMIDA2 results # 5 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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WARNING!! WARNING!! WARNING!! WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!! WARNING!! WARNING!! WARNING!!

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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  DATE AND TIME OF RUN = MACCS2 11-NOV-09  19:34:05   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
  "ATMOS"  DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
  "EARLY"  DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
  "CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM  1 OF  8:
    NCF

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

                                                                                          FRACTION OF THE PEOPLE
                                                                                                          ------
    COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE                                             1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

    COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

11-NOV-09  19:34:05    PAGE   1         PROB                        QUANTILES                               PEAK      PEAK  PEAK
                                      NON-ZERO   MEAN      50TH      90TH      95TH      99TH     99.5TH     CONS      PROB  TRIAL
HEALTH EFFECTS CASES
 CAN FAT/TOTAL              0-80.5 km  1.0000  2.12E+00  2.01E+00  3.75E+00  4.76E+00  7.30E+00  7.82E+00  9.18E+00  1.00E-03   98
 CAN FAT/TOTAL              0-16.1 km  1.0000  8.47E-01  8.00E-01  1.36E+00  1.61E+00  2.04E+00  2.09E+00  2.68E+00  1.24E-06  147

POPULATION DOSE (Sv)
 L-EDEWBODY  TOT LIF        0-80.5 km  1.0000  4.75E+01  4.28E+01  9.54E+01  1.12E+02  1.51E+02  1.72E+02  2.05E+02  1.00E-03   98

POPULATION WEIGHTED RISK
 CAN FAT/TOTAL              0-16.1 km  1.0000  2.15E-06  2.03E-06  3.58E-06  4.16E-06  5.12E-06  5.24E-06  6.82E-06  1.24E-06  147
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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 1 OF 8:
NCF

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

11-NOV-09 19:34:05 PAGE 2

		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	1.53E-01	1.20E-01	2.94E-01	3.30E-01	4.21E-01	4.67E-01	5.98E-01	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	6.41E-02	5.93E-02	1.04E-01	1.09E-01	1.22E-01	1.27E-01	2.02E-01	1.24E-06	147
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	3.34E+00	3.08E+00	6.50E+00	7.74E+00	1.02E+01	1.10E+01	1.31E+01	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	1.64E-07	1.40E-07	3.02E-07	3.22E-07	3.72E-07	3.95E-07	5.17E-07	1.24E-06	147

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 1 OF 8:
NCF

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

11-NOV-09 19:34:05 PAGE 3

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	1.97E+00	1.75E+00	3.57E+00	4.52E+00	6.14E+00	6.84E+00	8.58E+00	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	7.83E-01	7.44E-01	1.27E+00	1.48E+00	2.01E+00	2.04E+00	2.48E+00	1.24E-06	147
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	4.41E+01	3.75E+01	7.89E+01	9.98E+01	1.31E+02	1.47E+02	1.92E+02	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.98E-06	1.76E-06	3.40E-06	3.87E-06	5.03E-06	5.12E-06	6.30E-06	1.24E-06	147
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	4.41E+01	3.75E+01	7.89E+01	9.98E+01	1.31E+02	1.47E+02	1.92E+02	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	4.36E+01	3.68E+01	7.89E+01	9.98E+01	1.31E+02	1.47E+02	1.92E+02	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	5.17E-01	1.87E-01	1.53E+00	2.05E+00	2.38E+00	2.54E+00	3.97E+00	4.53E-05	62
LONG-TERM GROUNDSHINE DOSE		1.0000	4.23E+01	3.44E+01	7.83E+01	9.91E+01	1.29E+02	1.44E+02	1.86E+02	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	1.32E+00	1.08E+00	2.38E+00	3.01E+00	4.11E+00	4.70E+00	5.80E+00	1.00E-03	98
WATER INGESTION DOSE		1.0000	2.40E-02	2.14E-02	4.15E-02	5.00E-02	5.37E-02	5.54E-02	7.32E-02	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		0.2966	3.51E-03	0.00E+00	1.11E-02	1.23E-02	1.57E-02	1.74E-02	2.30E-02	3.19E-04	30
FARM-DEPENDENT DECONTAMINATION DOSE		0.2966	3.65E-07	0.00E+00	1.12E-06	1.24E-06	1.59E-06	1.77E-06	2.38E-06	3.19E-04	30
INGESTION OF GRAINS		1.0000	1.50E-02	5.36E-03	5.05E-02	6.36E-02	7.64E-02	8.00E-02	1.12E-01	4.53E-05	62
INGESTION OF LEAF VEG		1.0000	2.78E-02	7.07E-03	7.83E-02	9.72E-02	2.58E-01	3.06E-01	4.83E-01	4.53E-05	62
INGESTION OF ROOT CROPS		1.0000	1.99E-02	7.20E-03	6.56E-02	8.07E-02	1.05E-01	1.09E-01	1.46E-01	4.53E-05	62
INGESTION OF FRUITS		1.0000	2.93E-02	1.07E-02	9.73E-02	1.07E-01	1.25E-01	1.34E-01	2.15E-01	4.53E-05	62
INGESTION OF LEGUMES		1.0000	1.70E-02	5.93E-03	5.44E-02	7.13E-02	8.32E-02	8.90E-02	1.25E-01	4.53E-05	62
INGESTION OF BEEF		1.0000	1.55E-01	5.56E-02	4.66E-01	6.36E-01	7.63E-01	7.97E-01	1.07E+00	4.87E-05	4
INGESTION OF MILK		1.0000	1.79E-01	5.70E-02	5.96E-01	7.37E-01	9.10E-01	9.96E-01	1.29E+00	4.87E-05	4
INGESTION OF POULTRY		1.0000	4.07E-02	1.30E-02	1.16E-01	1.53E-01	3.21E-01	3.51E-01	6.23E-01	4.53E-05	62
INGESTION OF OTHER MEAT CROPS		1.0000	9.22E-03	4.85E-03	2.26E-02	2.86E-02	6.19E-02	7.16E-02	1.18E-01	4.53E-05	62
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		0.7594	9.98E+04	2.54E+03	3.22E+05	3.46E+05	4.08E+05	4.38E+05	4.86E+05	1.83E-03	74
POP.-DEPENDENT COSTS		0.2966	9.37E+04	0.00E+00	NOT-FOUND	NOT-FOUND	NOT-FOUND	NOT-FOUND	4.12E+05	1.83E-01	1
FARM-DEPENDENT COSTS		0.7594	6.11E+03	9.94E+02	2.03E+04	2.43E+04	4.88E+04	7.14E+04	7.36E+04	1.83E-03	74
POP.-DEPENDENT DECONTAMINATION COST		0.2966	2.00E+04	0.00E+00	NOT-FOUND	NOT-FOUND	NOT-FOUND	NOT-FOUND	8.81E+04	1.83E-01	1
FARM-DEPENDENT DECONTAMINATION COST		0.2966	1.61E+01	0.00E+00	NOT-FOUND	NOT-FOUND	NOT-FOUND	NOT-FOUND	7.04E+01	1.83E-01	1
POP.-DEPENDENT INTERDICTION COST		0.2966	7.36E+04	0.00E+00	NOT-FOUND	NOT-FOUND	NOT-FOUND	NOT-FOUND	3.24E+05	1.83E-01	1
FARM-DEPENDENT INTERDICTION COST		0.7580	4.77E+03	7.10E+02	1.28E+04	1.58E+04	4.87E+04	5.28E+04	5.73E+04	1.83E-03	74
POP.-DEPENDENT CONDEMNATION COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
FARM-DEPENDENT CONDEMNATION COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
EMERGENCY PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

11-NOV-09 19:34:05 PAGE 4	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	0.7424	1.89E+01	1.11E+00	6.06E+01	9.49E+01	2.20E+02	2.60E+02	3.37E+02	1.23E-03	18
CROP DISPOSAL COST	0.7410	1.30E+03	1.95E+02	3.62E+03	4.29E+03	1.12E+04	1.30E+04	1.62E+04	1.83E-03	74

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 2 OF 8:
EARLY HIGH

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	4.03E+04	2.44E+04	9.18E+04	1.04E+05	1.17E+05	1.24E+05	1.76E+05	4.84E-05	146
CAN FAT/TOTAL	0-16.1 km	1.0000	6.22E+03	5.77E+03	1.03E+04	1.11E+04	1.33E+04	1.43E+04	2.02E+04	2.28E-04	120
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.51E+05	3.65E+05	1.58E+06	2.07E+06	2.82E+06	NOT-FOUND	2.86E+06	9.30E-03	149
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.53E-02	1.27E-02	2.49E-02	2.95E-02	3.62E-02	3.93E-02	5.16E-02	2.28E-04	120

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SOURCE TERM 2 OF 8:
EARLY HIGH

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.9938	1.63E+02	6.78E+01	4.28E+02	5.17E+02	5.97E+02	6.35E+02	1.03E+03	1.33E-05	121
CAN FAT/TOTAL	0-80.5 km	1.0000	2.57E+04	1.65E+04	6.05E+04	8.31E+04	1.05E+05	1.09E+05	1.24E+05	2.85E-04	1
CAN FAT/TOTAL	0-16.1 km	1.0000	5.82E+03	5.43E+03	9.85E+03	1.08E+04	1.30E+04	1.40E+04	2.02E+04	2.28E-04	120
ERL FAT/TOTAL	0-16.1 km	0.9938	1.63E+02	6.78E+01	4.28E+02	5.17E+02	5.97E+02	6.35E+02	1.03E+03	1.33E-05	121
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.9938	1.62E-01	1.34E-01	2.04E-01	2.08E-01	2.19E-01	2.23E-01	2.26E-01	3.11E-03	1
ERL FAT/TOTAL	0.3-1.6 km	0.8493	3.14E-02	2.13E-02	7.08E-02	7.32E-02	7.91E-02	8.17E-02	9.03E-02	6.28E-04	69
ERL FAT/TOTAL	1.6-3.2 km	0.5219	1.93E-03	2.17E-04	7.20E-03	1.13E-02	2.15E-02	2.28E-02	2.59E-02	1.23E-03	121
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	3.24E+05	2.06E+05	8.15E+05	1.02E+06	1.17E+06	1.24E+06	1.57E+06	2.85E-04	151
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.9938	9.72E-03	4.35E-03	2.60E-02	3.10E-02	3.58E-02	3.80E-02	5.79E-02	1.33E-05	121
CAN FAT/TOTAL	0-16.1 km	1.0000	1.49E-02	1.24E-02	2.47E-02	2.94E-02	3.52E-02	3.78E-02	5.16E-02	2.28E-04	120

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
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SOURCE TERM 2 OF 8:
EARLY HIGH

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	1.45E+04	7.11E+03	3.78E+04	4.71E+04	5.38E+04	5.57E+04	6.00E+04	1.18E-03	100
CAN FAT/TOTAL	0-16.1 km	1.0000	4.00E+02	3.55E+02	5.33E+02	5.73E+02	6.77E+02	7.21E+02	9.10E+02	2.57E-04	151
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	3.27E+05	1.75E+05	8.46E+05	1.01E+06	1.15E+06	1.22E+06	1.36E+06	1.18E-03	100
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	0.9544	3.70E-04	3.37E-04	6.25E-04	7.30E-04	9.42E-04	1.04E-03	1.47E-03	2.57E-04	151
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	3.27E+05	1.75E+05	8.46E+05	1.01E+06	1.15E+06	1.22E+06	1.36E+06	1.18E-03	100
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	2.59E+05	1.23E+05	6.26E+05	7.25E+05	9.25E+05	NOT-FOUND	9.35E+05	9.30E-03	149
TOTAL INGESTION PATHWAYS DOSE		1.0000	3.96E+03	3.55E+03	6.66E+03	7.43E+03	8.95E+03	9.70E+03	1.15E+04	4.57E-04	120
LONG-TERM GROUNDSHINE DOSE		1.0000	2.48E+05	1.13E+05	6.18E+05	7.19E+05	9.02E+05	NOT-FOUND	9.11E+05	9.30E-03	149
LONG-TERM RESUSPENSION DOSE		1.0000	1.03E+04	4.67E+03	2.29E+04	2.50E+04	3.05E+04	3.26E+04	3.75E+04	1.14E-03	78
WATER INGESTION DOSE		1.0000	3.81E+03	3.41E+03	6.55E+03	7.38E+03	8.82E+03	9.53E+03	1.15E+04	4.57E-04	120
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	6.45E+04	3.14E+04	1.62E+05	2.42E+05	3.54E+05	3.91E+05	4.78E+05	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	3.71E+01	1.40E+01	1.03E+02	1.09E+02	1.26E+02	1.34E+02	1.92E+02	8.56E-05	149
INGESTION OF GRAINS		1.0000	3.21E+00	1.41E+00	8.26E+00	1.01E+01	1.33E+01	1.50E+01	2.63E+01	2.40E-05	51
INGESTION OF LEAF VEG		1.0000	2.55E+01	1.03E+01	6.84E+01	7.87E+01	1.02E+02	1.05E+02	1.29E+02	8.56E-05	149
INGESTION OF ROOT CROPS		1.0000	1.52E+01	6.35E+00	3.72E+01	4.51E+01	6.71E+01	7.09E+01	7.87E+01	8.56E-05	149
INGESTION OF FRUITS		1.0000	1.34E+01	5.91E+00	3.36E+01	3.95E+01	5.13E+01	5.29E+01	6.29E+01	8.56E-05	149
INGESTION OF LEGUMES		1.0000	2.96E+01	1.28E+01	7.74E+01	9.17E+01	1.10E+02	1.16E+02	1.56E+02	8.56E-05	149
INGESTION OF BEEF		1.0000	2.58E+01	9.23E+00	7.13E+01	1.29E+02	2.28E+02	2.57E+02	4.58E+02	2.29E-05	126
INGESTION OF MILK		1.0000	2.89E+01	1.13E+01	7.69E+01	1.29E+02	2.47E+02	2.96E+02	3.88E+02	8.56E-05	112
INGESTION OF POULTRY		1.0000	7.61E+00	2.43E+00	2.49E+01	3.86E+01	5.49E+01	5.85E+01	1.18E+02	5.71E-05	75
INGESTION OF OTHER MEAT CROPS		1.0000	3.27E+00	1.02E+00	9.14E+00	2.05E+01	2.73E+01	3.04E+01	3.55E+01	8.28E-04	109
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	2.05E+11	1.17E+11	5.17E+11	6.26E+11	7.96E+11	8.57E+11	1.02E+12	1.18E-03	100
POP.-DEPENDENT COSTS		1.0000	2.05E+11	1.17E+11	5.17E+11	6.26E+11	7.96E+11	8.57E+11	1.02E+12	1.18E-03	100
FARM-DEPENDENT COSTS		1.0000	3.92E+08	1.99E+08	1.01E+09	1.04E+09	1.12E+09	1.16E+09	1.32E+09	2.57E-04	76
POP.-DEPENDENT DECONTAMINATION COST		1.0000	4.41E+10	1.81E+10	1.05E+11	1.13E+11	1.35E+11	1.45E+11	1.96E+11	2.85E-04	76
FARM-DEPENDENT DECONTAMINATION COST		1.0000	3.41E+07	1.44E+07	8.72E+07	1.01E+08	1.10E+08	1.15E+08	1.51E+08	2.85E-05	76
POP.-DEPENDENT INTERDICTION COST		1.0000	1.46E+11	7.49E+10	3.74E+11	4.71E+11	7.33E+11	7.68E+11	8.46E+11	1.18E-03	100
FARM-DEPENDENT INTERDICTION COST		1.0000	3.04E+08	1.13E+08	7.50E+08	8.02E+08	9.38E+08	1.00E+09	1.11E+09	2.57E-04	76
POP.-DEPENDENT CONDEMNATION COST		1.0000	1.48E+10	7.99E+09	4.08E+10	5.21E+10	6.34E+10	NOT-FOUND	6.61E+10	7.09E-03	39
FARM-DEPENDENT CONDEMNATION COST		1.0000	1.26E+07	7.33E+06	3.27E+07	5.09E+07	5.43E+07	5.59E+07	6.21E+07	3.75E-04	27
EMERGENCY PHASE COST		1.0000	2.16E+08	8.19E+07	4.27E+08	7.11E+08	2.06E+09	NOT-FOUND	2.43E+09	9.30E-03	77
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB		QUANTILES					PEAK	PEAK	PEAK
	NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.96E+05	1.24E+05	2.84E+06	3.42E+06	5.00E+06	5.14E+06	6.29E+06	2.85E-05	76
CROP DISPOSAL COST	1.0000	4.11E+07	4.03E+07	6.07E+07	6.71E+07	7.55E+07	7.86E+07	8.95E+07	5.14E-04	76

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 3 OF 8:
EARLY MEDIUM

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	1.04E+04	7.02E+03	2.53E+04	3.03E+04	3.23E+04	3.33E+04	4.22E+04	1.38E-05	147
CAN FAT/TOTAL	0-16.1 km	1.0000	1.32E+03	1.15E+03	2.16E+03	2.41E+03	3.04E+03	3.13E+03	3.82E+03	5.71E-05	75
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.94E+05	1.13E+05	4.75E+05	6.04E+05	7.40E+05	7.65E+05	8.40E+05	6.99E-04	10
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.08E-03	3.01E-03	5.21E-03	5.79E-03	7.13E-03	7.38E-03	9.28E-03	5.71E-05	75

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
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SOURCE TERM 3 OF 8:
EARLY MEDIUM

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.7430	4.81E+00	1.45E+00	1.63E+01	2.06E+01	2.31E+01	2.42E+01	2.82E+01	5.79E-04	86
CAN FAT/TOTAL	0-80.5 km	1.0000	4.63E+03	3.25E+03	1.03E+04	1.32E+04	2.04E+04	2.11E+04	2.79E+04	1.38E-05	147
CAN FAT/TOTAL	0-16.1 km	1.0000	1.06E+03	1.01E+03	1.80E+03	2.10E+03	2.57E+03	2.80E+03	3.50E+03	5.71E-05	75
ERL FAT/TOTAL	0-16.1 km	0.7430	4.81E+00	1.45E+00	1.63E+01	2.06E+01	2.31E+01	2.42E+01	2.82E+01	5.79E-04	86
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.7430	2.28E-02	7.90E-03	7.14E-02	7.54E-02	8.55E-02	9.02E-02	1.04E-01	1.34E-03	86
ERL FAT/TOTAL	0.3-1.6 km	0.0289	1.14E-05	0.00E+00	0.00E+00	0.00E+00	4.48E-04	5.45E-04	7.66E-04	1.23E-03	121
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.55E+04	4.09E+04	1.53E+05	2.14E+05	3.14E+05	3.33E+05	3.93E+05	6.99E-04	10
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.7430	2.89E-04	8.52E-05	1.01E-03	1.08E-03	1.27E-03	1.36E-03	1.69E-03	5.79E-04	86
CAN FAT/TOTAL	0-16.1 km	1.0000	2.72E-03	2.54E-03	4.62E-03	5.34E-03	6.79E-03	7.17E-03	8.96E-03	5.71E-05	75

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
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"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 3 OF 8:
EARLY MEDIUM

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.80E+03	2.91E+03	1.33E+04	1.66E+04	2.13E+04	2.22E+04	2.71E+04	2.00E-04	137
CAN FAT/TOTAL	0-16.1 km	1.0000	2.54E+02	2.37E+02	3.78E+02	4.29E+02	5.14E+02	5.27E+02	6.69E+02	6.34E-06	69
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.29E+05	6.61E+04	3.28E+05	3.78E+05	5.05E+05	5.21E+05	6.00E+05	2.00E-04	137
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.57E-04	3.22E-04	5.46E-04	6.06E-04	7.08E-04	7.17E-04	8.12E-04	6.34E-06	69
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.29E+05	6.61E+04	3.28E+05	3.78E+05	5.05E+05	5.21E+05	6.00E+05	2.00E-04	137
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.18E+05	5.66E+04	3.06E+05	3.58E+05	5.02E+05	5.13E+05	5.68E+05	2.00E-04	137
TOTAL INGESTION PATHWAYS DOSE		1.0000	3.84E+02	3.30E+02	7.01E+02	7.31E+02	8.05E+02	8.39E+02	1.23E+03	8.82E-05	126
LONG-TERM GROUNDSHINE DOSE		1.0000	1.09E+05	4.92E+04	2.87E+05	3.20E+05	3.83E+05	4.14E+05	5.25E+05	2.00E-04	137
LONG-TERM RESUSPENSION DOSE		1.0000	8.75E+03	4.15E+03	2.33E+04	2.79E+04	3.40E+04	3.64E+04	4.38E+04	7.13E-04	143
WATER INGESTION DOSE		1.0000	2.58E+02	2.35E+02	4.31E+02	5.17E+02	6.76E+02	7.24E+02	8.56E+02	4.57E-04	120
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	1.04E+04	6.96E+03	2.31E+04	3.17E+04	5.28E+04	5.68E+04	7.91E+04	6.99E-04	10
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	6.72E+00	2.66E+00	2.02E+01	2.37E+01	3.14E+01	3.32E+01	4.08E+01	3.85E-04	100
INGESTION OF GRAINS		1.0000	4.09E+00	8.63E-01	1.29E+01	1.86E+01	2.60E+01	2.94E+01	3.86E+01	4.57E-04	14
INGESTION OF LEAF VEG		1.0000	1.06E+01	3.85E+00	2.85E+01	4.16E+01	9.00E+01	1.03E+02	1.39E+02	3.27E-05	70
INGESTION OF ROOT CROPS		1.0000	6.16E+00	2.15E+00	2.02E+01	2.62E+01	3.47E+01	3.77E+01	5.15E+01	4.57E-04	14
INGESTION OF FRUITS		1.0000	9.19E+00	3.35E+00	3.00E+01	3.66E+01	5.40E+01	5.97E+01	7.56E+01	4.57E-04	14
INGESTION OF LEGUMES		1.0000	7.40E+00	3.03E+00	2.08E+01	2.59E+01	3.37E+01	3.62E+01	4.63E+01	4.57E-04	14
INGESTION OF BEEF		1.0000	4.79E+01	1.95E+01	1.30E+02	1.82E+02	2.78E+02	3.06E+02	4.09E+02	2.29E-05	126
INGESTION OF MILK		1.0000	2.43E+01	7.81E+00	6.27E+01	1.05E+02	1.78E+02	2.07E+02	2.76E+02	3.16E-04	119
INGESTION OF POULTRY		1.0000	1.31E+01	5.23E+00	3.43E+01	4.36E+01	7.19E+01	7.69E+01	1.21E+02	3.27E-05	70
INGESTION OF OTHER MEAT CROPS		1.0000	3.80E+00	1.65E+00	1.02E+01	1.56E+01	2.22E+01	2.36E+01	3.18E+01	3.16E-04	98
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	5.87E+10	2.74E+10	2.05E+11	2.35E+11	3.05E+11	3.14E+11	3.41E+11	6.99E-04	10
POP.-DEPENDENT COSTS		1.0000	5.85E+10	2.73E+10	2.05E+11	2.35E+11	3.05E+11	3.14E+11	3.41E+11	6.99E-04	10
FARM-DEPENDENT COSTS		1.0000	1.96E+08	8.74E+07	5.58E+08	6.89E+08	1.00E+09	1.01E+09	1.07E+09	8.56E-05	149
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.45E+10	6.64E+09	3.76E+10	5.43E+10	8.64E+10	9.99E+10	1.12E+11	6.99E-04	10
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.27E+07	5.30E+06	3.28E+07	3.82E+07	5.06E+07	5.18E+07	5.92E+07	8.56E-05	149
POP.-DEPENDENT INTERDICTION COST		1.0000	4.31E+10	1.99E+10	1.12E+11	1.50E+11	2.07E+11	2.12E+11	2.28E+11	6.99E-04	10
FARM-DEPENDENT INTERDICTION COST		1.0000	1.61E+08	5.23E+07	4.75E+08	6.20E+08	7.47E+08	7.74E+08	9.53E+08	8.56E-05	149
POP.-DEPENDENT CONDEMNATION COST		0.9876	9.04E+08	6.65E+08	1.78E+09	2.19E+09	3.05E+09	3.38E+09	5.57E+09	1.14E-04	120
FARM-DEPENDENT CONDEMNATION COST		0.9876	2.80E+05	2.40E+05	5.78E+05	7.74E+05	1.08E+06	1.16E+06	2.04E+06	2.85E-05	114
EMERGENCY PHASE COST		1.0000	1.52E+07	1.05E+07	3.50E+07	5.49E+07	7.12E+07	7.28E+07	7.76E+07	6.37E-04	50
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	6.94E+05	4.82E+04	2.30E+06	3.03E+06	4.17E+06	4.78E+06	6.26E+06	2.85E-05	76
CROP DISPOSAL COST	1.0000	2.14E+07	1.66E+07	4.84E+07	5.44E+07	6.79E+07	7.20E+07	8.38E+07	4.00E-04	76

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
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"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 4 OF 8:
EARLY LOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

11-NOV-09 19:34:05 PAGE 13

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.71E+03	1.88E+03	9.19E+03	1.14E+04	1.70E+04	2.00E+04	2.40E+04	1.73E-05	56
CAN FAT/TOTAL	0-16.1 km	1.0000	3.27E+02	3.06E+02	5.18E+02	5.77E+02	7.32E+02	8.00E+02	9.07E+02	1.86E-03	74
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	7.93E+04	4.02E+04	1.96E+05	3.05E+05	4.22E+05	4.85E+05	5.25E+05	1.73E-05	56
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	7.72E-04	7.29E-04	1.20E-03	1.36E-03	1.81E-03	2.02E-03	2.15E-03	1.86E-03	74

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 4 OF 8:
EARLY LOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0832	3.39E-03	0.00E+00	0.00E+00	1.25E-02	8.96E-02	1.09E-01	1.82E-01	6.53E-04	121
CAN FAT/TOTAL	0-80.5 km	1.0000	6.05E+02	4.75E+02	1.18E+03	1.56E+03	2.09E+03	2.16E+03	2.81E+03	1.38E-05	147
CAN FAT/TOTAL	0-16.1 km	1.0000	1.85E+02	1.64E+02	3.27E+02	3.68E+02	4.85E+02	5.31E+02	5.97E+02	1.86E-03	74
ERL FAT/TOTAL	0-16.1 km	0.0832	3.39E-03	0.00E+00	0.00E+00	1.25E-02	8.96E-02	1.09E-01	1.82E-01	6.53E-04	121
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0832	1.44E-05	0.00E+00	0.00E+00	5.98E-05	4.19E-04	5.38E-04	6.68E-04	1.23E-03	121
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.04E+04	7.57E+03	2.23E+04	3.02E+04	3.33E+04	3.48E+04	5.14E+04	1.38E-05	147
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0832	2.03E-07	0.00E+00	0.00E+00	8.81E-07	4.45E-06	7.39E-06	1.09E-05	6.53E-04	121
CAN FAT/TOTAL	0-16.1 km	1.0000	4.75E-04	4.27E-04	8.36E-04	9.79E-04	1.22E-03	1.34E-03	1.53E-03	1.86E-03	74

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 4 OF 8:
EARLY LOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.10E+03	1.41E+03	8.18E+03	1.08E+04	1.62E+04	1.93E+04	2.16E+04	1.73E-05	56
CAN FAT/TOTAL	0-16.1 km	1.0000	1.42E+02	1.22E+02	2.14E+02	2.35E+02	2.90E+02	3.08E+02	3.61E+02	3.42E-04	72
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.89E+04	3.27E+04	1.75E+05	2.60E+05	3.26E+05	3.40E+05	4.80E+05	1.73E-05	56
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.98E-04	2.87E-04	4.69E-04	5.17E-04	5.81E-04	6.11E-04	7.32E-04	3.42E-04	72
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	6.89E+04	3.27E+04	1.75E+05	2.60E+05	3.26E+05	3.40E+05	4.80E+05	1.73E-05	56
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	6.80E+04	3.17E+04	1.74E+05	2.60E+05	3.26E+05	3.40E+05	4.80E+05	1.73E-05	56
TOTAL INGESTION PATHWAYS DOSE		1.0000	1.58E+02	1.08E+02	3.28E+02	3.78E+02	5.06E+02	5.24E+02	6.36E+02	8.56E-05	143
LONG-TERM GROUNDSHINE DOSE		1.0000	6.49E+04	3.03E+04	1.62E+05	2.51E+05	3.23E+05	3.35E+05	4.58E+05	1.73E-05	56
LONG-TERM RESUSPENSION DOSE		1.0000	3.02E+03	1.32E+03	8.17E+03	1.08E+04	1.62E+04	1.93E+04	2.17E+04	1.73E-05	56
WATER INGESTION DOSE		1.0000	5.64E+01	5.34E+01	9.68E+01	1.08E+02	1.31E+02	1.43E+02	1.92E+02	4.57E-04	120
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	8.13E+02	6.69E+02	1.47E+03	1.85E+03	2.40E+03	2.63E+03	6.22E+03	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	4.91E-01	2.42E-01	1.28E+00	2.10E+00	3.14E+00	3.48E+00	4.35E+00	1.11E-03	72
INGESTION OF GRAINS		1.0000	3.47E+00	7.15E-01	1.11E+01	1.35E+01	2.04E+01	2.15E+01	3.01E+01	8.56E-05	143
INGESTION OF LEAF VEG		1.0000	6.73E+00	1.59E+00	1.75E+01	2.58E+01	7.17E+01	8.01E+01	9.09E+01	2.28E-03	77
INGESTION OF ROOT CROPS		1.0000	4.71E+00	1.03E+00	1.36E+01	1.82E+01	2.62E+01	3.00E+01	4.09E+01	8.56E-05	143
INGESTION OF FRUITS		1.0000	7.10E+00	1.81E+00	2.24E+01	2.72E+01	3.95E+01	4.59E+01	6.01E+01	8.56E-05	143
INGESTION OF LEGUMES		1.0000	4.34E+00	1.36E+00	1.25E+01	1.58E+01	2.36E+01	2.68E+01	3.49E+01	8.56E-05	143
INGESTION OF BEEF		1.0000	3.60E+01	1.45E+01	1.00E+02	1.19E+02	1.76E+02	2.03E+02	2.78E+02	8.56E-05	143
INGESTION OF MILK		1.0000	2.65E+01	1.12E+01	7.07E+01	8.73E+01	1.29E+02	1.49E+02	1.60E+02	3.62E-03	15
INGESTION OF POULTRY		1.0000	1.02E+01	4.07E+00	2.38E+01	3.27E+01	7.38E+01	8.51E+01	1.03E+02	2.28E-03	77
INGESTION OF OTHER MEAT CROPS		1.0000	2.65E+00	1.28E+00	6.63E+00	1.00E+01	1.33E+01	1.51E+01	1.74E+01	2.28E-03	77
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	6.39E+09	3.60E+09	1.32E+10	2.13E+10	3.79E+10	4.25E+10	1.24E+11	1.18E-03	100
POP.-DEPENDENT COSTS		1.0000	6.30E+09	3.42E+09	1.31E+10	2.13E+10	3.79E+10	4.25E+10	1.24E+11	1.18E-03	100
FARM-DEPENDENT COSTS		1.0000	9.33E+07	3.23E+07	3.06E+08	3.57E+08	5.02E+08	5.14E+08	5.92E+08	8.56E-05	149
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.43E+09	7.80E+08	3.61E+09	5.75E+09	8.29E+09	9.02E+09	2.65E+10	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.98E+06	5.79E+05	6.32E+06	8.54E+06	1.16E+07	1.26E+07	1.75E+07	3.71E-04	100
POP.-DEPENDENT INTERDICTION COST		1.0000	4.76E+09	2.62E+09	1.16E+10	1.76E+10	2.57E+10	2.92E+10	9.71E+10	1.87E-03	100
FARM-DEPENDENT INTERDICTION COST		1.0000	7.94E+07	1.84E+07	2.72E+08	3.36E+08	4.81E+08	5.05E+08	5.47E+08	8.56E-05	149
POP.-DEPENDENT CONDEMNATION COST		0.9731	1.01E+08	1.02E+08	2.34E+08	3.08E+08	3.79E+08	4.14E+08	1.05E+09	6.79E-06	52
FARM-DEPENDENT CONDEMNATION COST		0.9184	2.79E+04	8.08E+03	7.83E+04	8.59E+04	1.14E+05	1.37E+05	2.90E+05	1.18E-04	84
EMERGENCY PHASE COST		1.0000	2.02E+06	1.63E+06	4.05E+06	5.54E+06	8.09E+06	8.85E+06	1.25E+07	2.28E-04	120
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	3.93E+05	2.79E+04	1.27E+06	1.72E+06	2.97E+06	3.39E+06	5.51E+06	6.28E-04	137
CROP DISPOSAL COST	1.0000	1.15E+07	8.81E+06	2.68E+07	3.26E+07	4.43E+07	5.02E+07	5.74E+07	5.14E-04	76

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 5 OF 8:
LATE HIGH

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	7.32E+03	4.07E+03	1.65E+04	2.10E+04	2.81E+04	3.12E+04	3.74E+04	1.20E-03	23
CAN FAT/TOTAL	0-16.1 km	1.0000	6.39E+02	5.91E+02	1.03E+03	1.07E+03	1.18E+03	1.22E+03	1.58E+03	5.71E-05	90
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.63E+05	9.05E+04	4.04E+05	5.12E+05	6.43E+05	7.08E+05	8.42E+05	1.20E-03	23
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.46E-03	1.24E-03	2.37E-03	2.73E-03	3.12E-03	3.20E-03	3.75E-03	5.71E-05	90

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 5 OF 8:
LATE HIGH

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.2844	9.68E-02	0.00E+00	3.72E-01	5.03E-01	9.63E-01	1.12E+00	2.27E+00	2.59E-04	30
CAN FAT/TOTAL	0-80.5 km	1.0000	1.66E+03	1.20E+03	3.39E+03	4.41E+03	5.89E+03	6.44E+03	7.78E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	4.21E+02	3.73E+02	7.56E+02	8.58E+02	1.02E+03	1.04E+03	1.19E+03	5.71E-05	90
ERL FAT/TOTAL	0-16.1 km	0.2844	9.68E-02	0.00E+00	3.72E-01	5.03E-01	9.63E-01	1.12E+00	2.27E+00	2.59E-04	30
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.2844	4.63E-04	0.00E+00	1.68E-03	2.20E-03	3.18E-03	3.81E-03	8.33E-03	5.99E-04	30
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	3.62E+04	2.90E+04	8.00E+04	1.04E+05	1.32E+05	1.46E+05	1.85E+05	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.2844	5.81E-06	0.00E+00	2.17E-05	3.00E-05	4.78E-05	7.47E-05	1.36E-04	2.59E-04	30
CAN FAT/TOTAL	0-16.1 km	1.0000	1.08E-03	1.01E-03	1.86E-03	2.09E-03	2.40E-03	2.55E-03	3.05E-03	5.71E-05	90

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 5 OF 8:
LATE HIGH

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.66E+03	2.68E+03	1.41E+04	1.88E+04	2.36E+04	2.55E+04	3.20E+04	1.20E-03	23
CAN FAT/TOTAL	0-16.1 km	1.0000	2.18E+02	2.07E+02	3.11E+02	3.23E+02	3.53E+02	3.66E+02	6.19E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.27E+05	6.07E+04	3.32E+05	3.87E+05	5.30E+05	5.80E+05	7.17E+05	1.20E-03	23
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.85E-04	3.43E-04	6.06E-04	6.96E-04	7.45E-04	7.66E-04	1.13E-03	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.27E+05	6.07E+04	3.32E+05	3.87E+05	5.30E+05	5.80E+05	7.17E+05	1.20E-03	23
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.21E+05	5.64E+04	3.18E+05	3.71E+05	5.19E+05	5.70E+05	6.91E+05	1.20E-03	23
TOTAL INGESTION PATHWAYS DOSE		1.0000	3.95E+02	3.45E+02	7.00E+02	7.34E+02	8.20E+02	8.60E+02	1.07E+03	8.82E-05	126
LONG-TERM GROUNDSHINE DOSE		1.0000	1.19E+05	5.50E+04	3.15E+05	3.68E+05	5.15E+05	5.63E+05	6.77E+05	1.20E-03	23
LONG-TERM RESUSPENSION DOSE		1.0000	2.66E+03	1.20E+03	7.17E+03	8.28E+03	1.10E+04	1.22E+04	1.49E+04	1.20E-03	67
WATER INGESTION DOSE		1.0000	3.39E+02	3.01E+02	6.09E+02	7.05E+02	7.60E+02	7.84E+02	1.04E+03	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	4.91E+03	3.51E+03	1.06E+04	1.37E+04	2.24E+04	2.59E+04	3.44E+04	1.00E-03	98
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	3.35E+00	1.49E+00	1.01E+01	1.10E+01	1.33E+01	1.45E+01	2.02E+01	3.28E-04	98
INGESTION OF GRAINS		1.0000	1.98E+00	6.15E-01	6.67E+00	8.39E+00	1.08E+01	1.14E+01	1.64E+01	3.35E-05	51
INGESTION OF LEAF VEG		1.0000	4.28E+00	1.59E+00	1.16E+01	1.55E+01	3.06E+01	3.28E+01	4.91E+01	8.56E-05	77
INGESTION OF ROOT CROPS		1.0000	2.89E+00	1.12E+00	9.39E+00	1.07E+01	1.27E+01	1.37E+01	2.19E+01	2.40E-05	51
INGESTION OF FRUITS		1.0000	5.30E+00	2.41E+00	1.38E+01	1.97E+01	2.30E+01	2.44E+01	3.38E+01	2.40E-05	51
INGESTION OF LEGUMES		1.0000	3.24E+00	1.47E+00	9.29E+00	1.05E+01	1.20E+01	1.27E+01	2.00E+01	2.40E-05	51
INGESTION OF BEEF		1.0000	1.77E+01	7.11E+00	5.33E+01	7.45E+01	1.03E+02	1.08E+02	1.63E+02	2.29E-05	126
INGESTION OF MILK		1.0000	1.14E+01	4.01E+00	3.56E+01	5.09E+01	7.54E+01	8.26E+01	1.36E+02	2.29E-05	126
INGESTION OF POULTRY		1.0000	6.15E+00	2.46E+00	1.42E+01	1.93E+01	4.41E+01	5.12E+01	6.15E+01	8.56E-05	77
INGESTION OF OTHER MEAT CROPS		1.0000	2.96E+00	1.13E+00	1.01E+01	1.33E+01	2.08E+01	2.17E+01	2.59E+01	3.71E-04	100
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	4.64E+10	2.24E+10	1.31E+11	2.07E+11	2.41E+11	2.57E+11	2.99E+11	1.00E-03	98
POP.-DEPENDENT COSTS		1.0000	4.61E+10	2.23E+10	1.31E+11	2.07E+11	2.41E+11	2.57E+11	2.99E+11	1.00E-03	98
FARM-DEPENDENT COSTS		1.0000	2.45E+08	1.27E+08	7.15E+08	7.70E+08	9.14E+08	9.84E+08	1.06E+09	3.27E-05	150
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.07E+10	5.02E+09	2.97E+10	3.99E+10	5.84E+10	6.45E+10	8.84E+10	1.00E-03	98
FARM-DEPENDENT DECONTAMINATION COST		1.0000	9.58E+06	3.65E+06	2.71E+07	3.20E+07	3.99E+07	4.38E+07	5.39E+07	3.16E-04	98
POP.-DEPENDENT INTERDICTION COST		1.0000	3.41E+10	1.39E+10	1.00E+11	1.14E+11	1.54E+11	1.75E+11	2.10E+11	1.00E-03	98
FARM-DEPENDENT INTERDICTION COST		1.0000	2.02E+08	6.90E+07	6.32E+08	7.15E+08	7.68E+08	7.92E+08	9.90E+08	3.27E-05	150
POP.-DEPENDENT CONDEMNATION COST		1.0000	1.28E+09	1.08E+09	2.69E+09	3.27E+09	4.53E+09	5.04E+09	5.78E+09	1.20E-04	26
FARM-DEPENDENT CONDEMNATION COST		1.0000	4.24E+05	3.43E+05	9.08E+05	1.05E+06	1.26E+06	1.36E+06	3.22E+06	2.04E-05	146
EMERGENCY PHASE COST		1.0000	7.32E+06	7.04E+06	1.15E+07	1.28E+07	1.64E+07	1.82E+07	6.87E+07	1.84E-04	145
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.07E+05	1.14E+05	2.73E+06	3.38E+06	5.02E+06	5.16E+06	6.29E+06	3.40E-05	150
CROP DISPOSAL COST	1.0000	3.19E+07	3.02E+07	5.59E+07	6.10E+07	7.10E+07	7.23E+07	8.38E+07	2.16E-05	150

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  DATE AND TIME OF RUN = MACCS2 11-NOV-09  19:34:05   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
  "ATMOS"  DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
  "EARLY"  DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
  "CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM  6 OF  8:
    LATE MEDIUM

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

                                                                                  FRACTION OF THE PEOPLE
                                                                                                  ------
    COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE                                     1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

    COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.
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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.15E+03	1.56E+03	7.98E+03	1.04E+04	1.41E+04	1.61E+04	2.02E+04	1.26E-03	16
CAN FAT/TOTAL	0-16.1 km	1.0000	2.92E+02	2.61E+02	5.05E+02	5.32E+02	6.00E+02	6.32E+02	7.48E+02	1.14E-04	78
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.87E+04	3.58E+04	1.76E+05	2.53E+05	3.49E+05	3.79E+05	4.48E+05	1.26E-03	16
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	6.88E-04	6.16E-04	1.05E-03	1.10E-03	1.24E-03	1.31E-03	1.74E-03	1.14E-04	78

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 6 OF 8:
LATE MEDIUM

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

11-NOV-09 19:34:05 PAGE 22

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	4.28E+02	3.61E+02	9.01E+02	1.07E+03	1.31E+03	1.43E+03	1.75E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.53E+02	1.31E+02	2.87E+02	3.11E+02	3.47E+02	3.63E+02	4.67E+02	1.14E-04	78
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	7.93E+03	7.10E+03	1.72E+04	2.11E+04	2.60E+04	2.84E+04	3.61E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	3.92E-04	3.48E-04	7.26E-04	7.78E-04	9.17E-04	9.83E-04	1.20E-03	1.14E-04	78

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 6 OF 8:
LATE MEDIUM

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

11-NOV-09 19:34:05 PAGE 23

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	2.72E+03	1.29E+03	7.24E+03	9.47E+03	1.21E+04	1.32E+04	1.85E+04	3.71E-04	38
CAN FAT/TOTAL	0-16.1 km	1.0000	1.39E+02	1.18E+02	2.06E+02	2.18E+02	2.48E+02	2.62E+02	3.37E+02	9.80E-05	84
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.07E+04	2.95E+04	1.52E+05	2.16E+05	3.18E+05	3.36E+05	4.13E+05	3.71E-04	38
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.96E-04	2.83E-04	4.49E-04	5.08E-04	5.59E-04	5.82E-04	6.95E-04	2.45E-04	84
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	6.07E+04	2.95E+04	1.52E+05	2.16E+05	3.18E+05	3.36E+05	4.13E+05	3.71E-04	38
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	5.99E+04	2.83E+04	1.52E+05	2.15E+05	3.16E+05	3.35E+05	4.13E+05	3.71E-04	38
TOTAL INGESTION PATHWAYS DOSE		1.0000	1.44E+02	1.14E+02	2.59E+02	3.03E+02	3.39E+02	3.56E+02	4.72E+02	8.56E-05	71
LONG-TERM GROUNDSHINE DOSE		1.0000	5.75E+04	2.57E+04	1.40E+05	2.02E+05	3.13E+05	3.29E+05	3.96E+05	3.71E-04	38
LONG-TERM RESUSPENSION DOSE		1.0000	2.35E+03	1.04E+03	6.53E+03	8.93E+03	1.16E+04	1.25E+04	1.66E+04	3.71E-04	38
WATER INGESTION DOSE		1.0000	6.41E+01	5.85E+01	1.04E+02	1.09E+02	1.22E+02	1.28E+02	1.96E+02	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	7.22E+02	6.36E+02	1.20E+03	1.36E+03	1.81E+03	2.03E+03	2.42E+03	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	4.65E-01	2.56E-01	9.89E-01	1.64E+00	2.66E+00	3.02E+00	4.08E+00	3.28E-05	145
INGESTION OF GRAINS		1.0000	2.87E+00	6.42E-01	1.00E+01	1.09E+01	1.32E+01	1.44E+01	2.16E+01	3.27E-05	150
INGESTION OF LEAF VEG		1.0000	5.49E+00	1.15E+00	1.54E+01	2.32E+01	5.04E+01	5.30E+01	6.16E+01	6.28E-04	67
INGESTION OF ROOT CROPS		1.0000	3.90E+00	8.85E-01	1.11E+01	1.23E+01	1.58E+01	1.76E+01	2.95E+01	3.27E-05	150
INGESTION OF FRUITS		1.0000	5.93E+00	1.60E+00	2.00E+01	2.15E+01	2.55E+01	2.75E+01	4.34E+01	3.27E-05	150
INGESTION OF LEGUMES		1.0000	3.58E+00	1.09E+00	1.06E+01	1.16E+01	1.44E+01	1.58E+01	2.53E+01	3.27E-05	150
INGESTION OF BEEF		1.0000	2.98E+01	1.25E+01	7.81E+01	9.51E+01	1.09E+02	1.13E+02	1.68E+02	5.66E-06	13
INGESTION OF MILK		1.0000	1.74E+01	7.61E+00	4.77E+01	6.05E+01	8.44E+01	9.46E+01	1.31E+02	4.57E-04	113
INGESTION OF POULTRY		1.0000	8.32E+00	2.87E+00	2.08E+01	2.88E+01	5.48E+01	6.34E+01	7.37E+01	6.28E-04	67
INGESTION OF OTHER MEAT CROPS		1.0000	2.79E+00	1.31E+00	7.66E+00	1.04E+01	1.35E+01	1.50E+01	2.07E+01	8.28E-04	97
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	6.06E+09	4.48E+09	1.14E+10	1.74E+10	3.11E+10	3.19E+10	3.64E+10	1.00E-04	101
POP.-DEPENDENT COSTS		1.0000	5.96E+09	4.38E+09	1.12E+10	1.73E+10	3.11E+10	3.19E+10	3.64E+10	1.00E-04	101
FARM-DEPENDENT COSTS		1.0000	1.00E+08	3.51E+07	3.19E+08	3.88E+08	5.35E+08	5.73E+08	7.19E+08	6.28E-04	23
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.34E+09	1.01E+09	3.10E+09	4.44E+09	7.31E+09	7.52E+09	8.50E+09	2.49E-04	4
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.95E+06	6.85E+05	5.75E+06	7.91E+06	1.07E+07	1.13E+07	1.55E+07	6.97E-05	4
POP.-DEPENDENT INTERDICTION COST		1.0000	4.41E+09	3.19E+09	9.92E+09	1.47E+10	2.13E+10	2.21E+10	2.78E+10	1.00E-04	101
FARM-DEPENDENT INTERDICTION COST		1.0000	8.49E+07	2.07E+07	3.01E+08	3.55E+08	5.08E+08	5.43E+08	6.61E+08	6.28E-04	23
POP.-DEPENDENT CONDEMNATION COST		0.9917	2.06E+08	1.29E+08	4.79E+08	6.07E+08	1.03E+09	NOT-FOUND	1.05E+09	6.64E-03	77
FARM-DEPENDENT CONDEMNATION COST		0.9917	4.01E+04	9.54E+03	8.34E+04	9.20E+04	2.03E+05	2.36E+05	2.90E+05	1.95E-03	6
EMERGENCY PHASE COST		1.0000	1.60E+06	1.33E+06	3.05E+06	3.94E+06	5.25E+06	5.43E+06	8.05E+06	5.56E-06	146
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB		QUANTILES					PEAK	PEAK	PEAK
	NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	5.55E+05	3.37E+04	1.87E+06	2.56E+06	3.59E+06	3.97E+06	5.60E+06	3.40E-05	150
CROP DISPOSAL COST	1.0000	1.27E+07	8.07E+06	3.04E+07	3.31E+07	4.05E+07	4.41E+07	5.71E+07	2.28E-04	23

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 7 OF 8:
LATE LOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	7.24E+02	5.15E+02	1.58E+03	2.13E+03	3.17E+03	3.46E+03	4.26E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.03E+02	9.87E+01	1.51E+02	1.81E+02	2.10E+02	2.17E+02	2.62E+02	5.26E-05	40
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.61E+04	1.14E+04	3.66E+04	4.87E+04	7.34E+04	7.94E+04	9.53E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.53E-04	2.32E-04	3.80E-04	4.37E-04	5.19E-04	5.34E-04	6.40E-04	5.26E-05	40

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 7 OF 8:
LATE LOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	7.52E+01	7.04E+01	1.41E+02	1.80E+02	2.32E+02	2.50E+02	3.11E+02	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	2.88E+01	2.70E+01	5.18E+01	6.05E+01	7.19E+01	7.33E+01	8.76E+01	8.36E-06	145
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.59E+03	1.21E+03	3.05E+03	3.60E+03	5.14E+03	5.60E+03	6.82E+03	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	7.39E-05	6.96E-05	1.23E-04	1.43E-04	2.00E-04	2.02E-04	2.24E-04	8.36E-06	145

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 7 OF 8:
LATE LOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	6.48E+02	4.18E+02	1.42E+03	1.97E+03	3.13E+03	3.36E+03	3.95E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	7.41E+01	7.02E+01	1.06E+02	1.11E+02	1.25E+02	1.31E+02	2.13E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.45E+04	9.48E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.85E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.79E-04	1.59E-04	3.03E-04	3.15E-04	3.45E-04	3.58E-04	5.35E-04	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.45E+04	9.48E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.85E+04	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.44E+04	9.44E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.84E+04	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	8.45E+01	3.44E+01	2.49E+02	3.13E+02	4.10E+02	4.60E+02	5.03E+02	2.40E-03	23
LONG-TERM GROUNDSHINE DOSE		1.0000	1.38E+04	9.09E+03	3.21E+04	4.33E+04	6.07E+04	6.75E+04	8.45E+04	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	6.27E+02	3.88E+02	1.40E+03	1.94E+03	2.62E+03	2.97E+03	3.88E+03	1.00E-03	98
WATER INGESTION DOSE		1.0000	1.30E+01	1.11E+01	2.27E+01	2.63E+01	3.10E+01	3.18E+01	3.91E+01	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	8.12E+01	7.49E+01	1.32E+02	1.55E+02	2.06E+02	2.15E+02	3.18E+02	1.24E-06	147
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	3.71E-02	2.74E-02	7.78E-02	1.04E-01	2.04E-01	2.16E-01	3.66E-01	1.59E-05	146
INGESTION OF GRAINS		1.0000	2.84E+00	3.95E-01	1.03E+01	1.24E+01	1.93E+01	2.09E+01	2.47E+01	6.28E-04	23
INGESTION OF LEAF VEG		1.0000	4.77E+00	6.70E-01	1.49E+01	2.22E+01	3.53E+01	4.07E+01	6.71E+01	2.29E-05	66
INGESTION OF ROOT CROPS		1.0000	3.84E+00	5.73E-01	1.29E+01	1.84E+01	2.85E+01	3.05E+01	3.27E+01	6.28E-04	23
INGESTION OF FRUITS		1.0000	5.59E+00	8.05E-01	2.05E+01	2.71E+01	3.50E+01	3.78E+01	4.77E+01	6.28E-04	23
INGESTION OF LEGUMES		1.0000	3.38E+00	6.11E-01	1.16E+01	1.53E+01	2.18E+01	2.33E+01	2.82E+01	6.28E-04	23
INGESTION OF BEEF		1.0000	2.59E+01	6.43E+00	8.47E+01	1.02E+02	1.14E+02	1.19E+02	1.88E+02	5.46E-06	13
INGESTION OF MILK		1.0000	1.65E+01	4.77E+00	5.38E+01	6.98E+01	8.47E+01	9.19E+01	1.30E+02	7.64E-06	12
INGESTION OF POULTRY		1.0000	7.13E+00	1.95E+00	2.34E+01	3.27E+01	5.13E+01	5.43E+01	8.74E+01	2.29E-05	66
INGESTION OF OTHER MEAT CROPS		1.0000	1.49E+00	4.70E-01	4.29E+00	5.86E+00	1.00E+01	1.05E+01	1.55E+01	2.29E-05	66
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	6.59E+08	5.97E+08	1.06E+09	1.12E+09	1.28E+09	1.36E+09	2.07E+09	2.10E-05	40
POP.-DEPENDENT COSTS		1.0000	6.43E+08	5.78E+08	1.05E+09	1.12E+09	1.28E+09	1.36E+09	2.06E+09	2.10E-05	40
FARM-DEPENDENT COSTS		1.0000	1.57E+07	4.26E+06	5.36E+07	7.41E+07	1.07E+08	1.14E+08	1.65E+08	4.16E-05	4
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.58E+08	1.35E+08	3.06E+08	3.20E+08	3.55E+08	3.72E+08	5.26E+08	2.10E-05	40
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.90E+05	8.98E+04	4.15E+05	7.38E+05	1.12E+06	1.21E+06	1.42E+06	1.11E-03	123
POP.-DEPENDENT INTERDICTION COST		1.0000	4.76E+08	4.23E+08	9.73E+08	1.03E+09	1.12E+09	1.16E+09	1.52E+09	2.10E-05	40
FARM-DEPENDENT INTERDICTION COST		1.0000	1.36E+07	2.81E+06	5.04E+07	6.78E+07	1.04E+08	1.09E+08	1.51E+08	4.16E-05	4
POP.-DEPENDENT CONDEMNATION COST		0.8144	8.73E+06	3.75E+06	1.39E+07	1.72E+07	1.03E+08	1.06E+08	1.25E+08	6.75E-05	6
FARM-DEPENDENT CONDEMNATION COST		0.8629	5.27E+03	2.46E+03	8.12E+03	9.01E+03	7.20E+04	7.48E+04	7.73E+04	2.73E-03	6
EMERGENCY PHASE COST		0.9903	1.57E+05	1.07E+05	4.01E+05	5.24E+05	9.05E+05	1.02E+06	1.10E+06	1.83E-03	144
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	1.25E+05	8.03E+03	4.84E+05	6.43E+05	1.29E+06	1.55E+06	2.63E+06	2.57E-04	23
CROP DISPOSAL COST	1.0000	1.80E+06	1.03E+06	5.12E+06	6.06E+06	1.00E+07	1.03E+07	1.18E+07	8.03E-05	4

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DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 8 OF 8:
LATE LOWLOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

11-NOV-09 19:34:05 PAGE 29

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	6.16E+02	4.08E+02	1.32E+03	1.79E+03	2.54E+03	2.87E+03	3.61E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	9.13E+01	8.58E+01	1.30E+02	1.49E+02	2.00E+02	2.03E+02	2.43E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.38E+04	1.00E+04	3.19E+04	4.19E+04	5.99E+04	6.67E+04	8.10E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.25E-04	2.10E-04	3.45E-04	3.85E-04	4.99E-04	5.08E-04	6.16E-04	1.73E-06	54

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 8 OF 8:
LATE LOWLOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

11-NOV-09 19:34:05 PAGE 30		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	5.01E+01	4.42E+01	9.84E+01	1.10E+02	1.41E+02	1.57E+02	2.07E+02	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.90E+01	1.66E+01	3.31E+01	3.77E+01	5.01E+01	5.08E+01	6.00E+01	1.24E-06	147
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.10E+03	1.01E+03	2.10E+03	2.68E+03	3.52E+03	3.83E+03	4.66E+03	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	4.86E-05	4.37E-05	9.12E-05	1.02E-04	1.08E-04	1.11E-04	1.54E-04	1.24E-06	147

DATE AND TIME OF RUN = MACCS2 11-NOV-09 19:34:05 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 8 OF 8:
LATE LOWLOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

11-NOV-09 19:34:05 PAGE 31

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.66E+02	3.61E+02	1.26E+03	1.72E+03	2.51E+03	2.84E+03	3.40E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	7.23E+01	6.70E+01	1.06E+02	1.11E+02	1.25E+02	1.31E+02	2.25E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.27E+04	8.44E+03	3.03E+04	4.08E+04	5.98E+04	6.66E+04	7.63E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.76E-04	1.57E-04	2.95E-04	3.11E-04	3.42E-04	3.56E-04	5.68E-04	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.27E+04	8.44E+03	3.03E+04	4.08E+04	5.98E+04	6.66E+04	7.63E+04	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.26E+04	8.36E+03	3.02E+04	4.07E+04	5.98E+04	6.66E+04	7.62E+04	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	8.17E+01	3.18E+01	2.29E+02	3.11E+02	4.73E+02	5.15E+02	5.84E+02	6.28E-04	23
LONG-TERM GROUNDSHINE DOSE		1.0000	1.22E+04	8.20E+03	2.99E+04	3.92E+04	5.87E+04	6.59E+04	7.41E+04	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	3.46E+02	2.29E+02	7.84E+02	1.00E+03	1.52E+03	1.82E+03	2.12E+03	1.00E-03	98
WATER INGESTION DOSE		1.0000	1.08E+01	9.54E+00	1.97E+01	2.21E+01	2.83E+01	3.01E+01	3.28E+01	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	6.43E+01	5.93E+01	1.17E+02	1.39E+02	2.00E+02	2.04E+02	2.51E+02	1.24E-06	147
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	2.87E-02	2.22E-02	5.87E-02	7.41E-02	1.34E-01	1.87E-01	2.56E-01	1.59E-05	146
INGESTION OF GRAINS		1.0000	2.84E+00	4.01E-01	1.00E+01	1.27E+01	2.05E+01	2.19E+01	2.65E+01	6.28E-04	23
INGESTION OF LEAF VEG		1.0000	4.74E+00	6.38E-01	1.57E+01	2.23E+01	3.27E+01	3.66E+01	7.05E+01	2.85E-05	75
INGESTION OF ROOT CROPS		1.0000	3.78E+00	5.64E-01	1.25E+01	1.81E+01	2.85E+01	3.09E+01	3.48E+01	6.28E-04	23
INGESTION OF FRUITS		1.0000	5.56E+00	8.04E-01	1.79E+01	2.68E+01	3.95E+01	4.53E+01	5.11E+01	6.28E-04	23
INGESTION OF LEGUMES		1.0000	3.27E+00	5.21E-01	1.10E+01	1.51E+01	2.22E+01	2.39E+01	2.98E+01	6.28E-04	23
INGESTION OF BEEF		1.0000	2.54E+01	6.50E+00	8.09E+01	1.07E+02	1.53E+02	1.79E+02	2.08E+02	6.28E-04	23
INGESTION OF MILK		1.0000	1.65E+01	4.60E+00	5.26E+01	6.75E+01	1.01E+02	1.05E+02	1.46E+02	5.46E-06	13
INGESTION OF POULTRY		1.0000	7.37E+00	1.91E+00	2.55E+01	3.42E+01	5.09E+01	5.54E+01	9.67E+01	2.85E-05	75
INGESTION OF OTHER MEAT CROPS		1.0000	1.41E+00	4.56E-01	4.46E+00	5.79E+00	7.80E+00	8.48E+00	1.61E+01	2.85E-05	75
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	5.62E+08	5.20E+08	1.02E+09	1.07E+09	1.18E+09	1.23E+09	1.75E+09	2.10E-05	40
POP.-DEPENDENT COSTS		1.0000	5.51E+08	4.91E+08	1.02E+09	1.06E+09	1.18E+09	1.23E+09	1.74E+09	2.10E-05	40
FARM-DEPENDENT COSTS		1.0000	1.15E+07	3.18E+06	3.59E+07	5.42E+07	9.60E+07	1.05E+08	1.49E+08	6.29E-05	5
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.36E+08	1.19E+08	2.61E+08	3.05E+08	3.32E+08	3.45E+08	4.37E+08	6.26E-05	26
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.61E+05	8.03E+04	3.69E+05	6.35E+05	1.04E+06	1.11E+06	1.25E+06	1.13E-03	26
POP.-DEPENDENT INTERDICTION COST		1.0000	4.09E+08	3.64E+08	7.64E+08	8.79E+08	1.04E+09	1.07E+09	1.31E+09	2.10E-05	85
FARM-DEPENDENT INTERDICTION COST		1.0000	1.00E+07	1.94E+06	3.48E+07	5.24E+07	8.07E+07	1.02E+08	1.37E+08	6.29E-05	5
POP.-DEPENDENT CONDEMNATION COST		0.8040	5.25E+06	3.43E+06	1.10E+07	1.20E+07	1.46E+07	1.59E+07	1.25E+08	1.64E-05	6
FARM-DEPENDENT CONDEMNATION COST		0.7189	1.98E+03	2.03E+03	2.74E+03	7.70E+03	NOT-FOUND	NOT-FOUND	8.49E+03	4.80E-02	1
EMERGENCY PHASE COST		0.9902	7.17E+04	1.51E+04	1.95E+05	3.18E+05	3.95E+05	4.34E+05	4.97E+05	1.83E-03	20
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.39E+04	5.58E+03	3.52E+05	5.31E+05	1.13E+06	1.30E+06	2.26E+06	6.28E-04	137
CROP DISPOSAL COST	1.0000	1.26E+06	6.64E+05	3.17E+06	4.08E+06	5.88E+06	6.55E+06	1.18E+07	3.87E-05	62

```
Successful completion of MACCS2 was achieved!
This job required a total of     56.508 CPU seconds

   Input processing required      0.547 CPU seconds
         Simulation required     54.977 CPU seconds
  Output processing required      0.984 CPU seconds
```

Attachment A.2

IP3 MACCS2 Input and Output File

```
MACCS2 12-NOV-09  13:50:14   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
P1:  ATMOS USER INPUT (UNIT 24) = atmbi3NS.INP
P2:  EARLY USER INPUT (UNIT 25) = earbi-noE.INP
P3: CHRONC USER INPUT (UNIT 26) = chrbiEC.INP
P4:  METEOROLOGY DATA (UNIT 28) = meti00.INP
P5:   SITE DATA INPUT (UNIT 29) = siteiEC.INP
P6:       LIST OUTPUT (UNIT 06) = conbi3NS-noE-NmetEC.OUT



USER INPUT IS READ FROM UNIT 24
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                  RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "ATMOS" INPUT
       *
    1  RIATNAM1001 'ATMOS INPUT FOR IPEC CALCULATIONS'
       ********************************************************************************
       * GEOMETRY DATA BLOCK, LOADED BY INPGEO, STORED IN /GEOM/
       *
       * NUMBER OF RADIAL SPATIAL ELEMENTS
       *
    2  GENUMRAD001  15
       *
       *
       *
    3  GESPAEND001     0.32      1.61      3.22      4.83      6.44
    4  GESPAEND002     8.05      9.66     11.27     12.87     14.48
    5  GESPAEND003    16.09     32.19     48.28     64.37     80.47
       ********************************************************************************
       * NUCLIDE DATA BLOCK, LOADED BY INPISO, STORED IN /ISOGRP/, /ISONAM/
       *
       * Number of pseudo-stable nuclides (used to truncate the decay chains)
       *
    6  ISNUMSTB001      27
       *
       * List of pseudo-stable nuclides
       *
    7  ISNAMSTB001     I-129    (daughter of Te-129 and Te-129m)
    8  ISNAMSTB002     Xe-131m  (daughter of I-131)
    9  ISNAMSTB003     Xe-133m  (daughter of I-133)
   10  ISNAMSTB004     Xe-135m  (daughter of I-135)
   11  ISNAMSTB005     Cs-135   (daughter of Xe-135 and Xe-135m)
   12  ISNAMSTB006     Sm-147   (daughter of Pm-147)
   13  ISNAMSTB007     U-234    (daughter of Pu-238)
   14  ISNAMSTB008     U-235    (daughter of Pu-239)
   15  ISNAMSTB009     U-236    (daughter of Pu-240)
   16  ISNAMSTB010     U-237    (daughter of Pu-241)
   17  ISNAMSTB011     Np-237   (daughter of Am-241)
   18  ISNAMSTB012     Rb-87    (daughter of Kr-87)
   19  ISNAMSTB013     Ba-137m  (daughter of Cs-137)
   20  ISNAMSTB014     Rb-88    (daughter of Kr-88)
   21  ISNAMSTB015     Y-91m    (daughter of Sr-91)
   22  ISNAMSTB016     Zr-93    (daughter of Y-93)
   23  ISNAMSTB017     Nb-93m   (daughter of Zr-93)
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24  ISNAMSTB018     Nb-95m   (daughter of Zr-95)
25  ISNAMSTB019     Nb-97    (daughter of Zr-97 and Nb-97m)
26  ISNAMSTB020     Nb-97m   (daughter of Zr-97)
27  ISNAMSTB021     Tc-99    (daughter of Mo-99)
28  ISNAMSTB022     Rh-103m  (daughter of Ru-103)
29  ISNAMSTB023     Rh-106   (daughter of Ru-106)
30  ISNAMSTB024    Te-131    (daughter of Te-131m)
31  ISNAMSTB025     Pr-144   (daughter of Ce-144 and Pr-144m)
32  ISNAMSTB026     Pr-144m  (daughter of Ce-144)
33  ISNAMSTB027     Pm-147   (daughter of Nd-147)
    *
    * Number of radioactive nuclides to be considered
    *
34  ISNUMISO001 60
    *
    * NUMBER OF NUCLIDE GROUPS
    *
35  ISMAXGRP001  9
    *
    * WET AND DRY DEPOSITION FLAGS FOR EACH NUCLIDE GROUP
    *
    *              WETDEP     DRYDEP
    *
36  ISDEPFLA001    .FALSE.   .FALSE.
37  ISDEPFLA002    .TRUE.    .TRUE.
38  ISDEPFLA003    .TRUE.    .TRUE.
39  ISDEPFLA004    .TRUE.    .TRUE.
40  ISDEPFLA005    .TRUE.    .TRUE.
41  ISDEPFLA006    .TRUE.    .TRUE.
42  ISDEPFLA007    .TRUE.    .TRUE.
43  ISDEPFLA008    .TRUE.    .TRUE.
44  ISDEPFLA009    .TRUE.    .TRUE.
    *
    * NUCLIDE GROUP DATA FOR 9 NUCLIDE GROUPS
    *
    *               NUCNAM    IGROUP
    *
45  ISOTPGRP001     Co-58        6
46  ISOTPGRP002     Co-60        6
47  ISOTPGRP003     Kr-85        1
48  ISOTPGRP004     Kr-85m       1
49  ISOTPGRP005     Kr-87        1
50  ISOTPGRP006     Kr-88        1
51  ISOTPGRP007     Rb-86        3
52  ISOTPGRP008     Sr-89        5
53  ISOTPGRP009     Sr-90        5
54  ISOTPGRP010     Sr-91        5
55  ISOTPGRP011     Sr-92        5
56  ISOTPGRP012     Y-90         7
57  ISOTPGRP013     Y-91         7
58  ISOTPGRP014     Y-92         7
59  ISOTPGRP015     Y-93         7
60  ISOTPGRP016     Zr-95        7
61  ISOTPGRP017     Zr-97        7
62  ISOTPGRP018     Nb-95        7
63  ISOTPGRP019     Mo-99        6
64  ISOTPGRP020     Tc-99m       6
65  ISOTPGRP021     Ru-103       6
66  ISOTPGRP022     Ru-105       6
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 67  ISOTPGRP023     Ru-106       6
 68  ISOTPGRP024     Rh-105       6
 69  ISOTPGRP025     Sb-127       4
 70  ISOTPGRP026     Sb-129       4
 71  ISOTPGRP027     Te-127       4
 72  ISOTPGRP028     Te-127m      4
 73  ISOTPGRP029     Te-129       4
 74  ISOTPGRP030     Te-129m      4
 75  ISOTPGRP031     Te-131m      4
 76  ISOTPGRP032     Te-132       4
 77  ISOTPGRP033     I-131        2
 78  ISOTPGRP034     I-132        2
 79  ISOTPGRP035     I-133        2
 80  ISOTPGRP036     I-134        2
 81  ISOTPGRP037     I-135        2
 82  ISOTPGRP038     Xe-133       1
 83  ISOTPGRP039     Xe-135       1
 84  ISOTPGRP040     Cs-134       3
 85  ISOTPGRP041     Cs-136       3
 86  ISOTPGRP042     Cs-137       3
 87  ISOTPGRP043     Ba-139       9
 88  ISOTPGRP044     Ba-140       9
 89  ISOTPGRP045     La-140       7
 90  ISOTPGRP046     La-141       7
 91  ISOTPGRP047     La-142       7
 92  ISOTPGRP048     Ce-141       8
 93  ISOTPGRP049     Ce-143       8
 94  ISOTPGRP050     Ce-144       8
 95  ISOTPGRP051     Pr-143       7
 96  ISOTPGRP052     Nd-147       7
 97  ISOTPGRP053     Np-239       8
 98  ISOTPGRP054     Pu-238       8
 99  ISOTPGRP055     Pu-239       8
100  ISOTPGRP056     Pu-240       8
101  ISOTPGRP057     Pu-241       8
102  ISOTPGRP058     Am-241       7
103  ISOTPGRP059     Cm-242       7
104  ISOTPGRP060     Cm-244       7
     *******************************************************************************
     * WET DEPOSITION DATA BLOCK, LOADED BY INPWET, STORED IN /WETCON/
     *
     * WASHOUT COEFFICIENT NUMBER ONE, LINEAR FACTOR
     *
105  WDCWASH1001  9.5E-5   (JON HELTON AFTER JONES, 1986)
     *
     * WASHOUT COEFFICIENT NUMBER TWO, EXPONENTIAL FACTOR
     *
106  WDCWASH2001  0.8      (JON HELTON AFTER JONES, 1986)
     ********************************************************************************
     * DRY DEPOSITION DATA BLOCK, LOADED BY INPDRY, STORED IN /DRYCON/
     *
     * NUMBER OF PARTICLE SIZE GROUPS
     *
107  DDNPSGRP001   1
     *
     * DEPOSITION VELOCITY OF EACH PARTICLE SIZE GROUP (M/S)
     *
108  DDVDEPOS001   0.01   (VALUE SELECTED BY S. ACHARYA, NRC)
     ********************************************************************************
```

```
     * DISPERSION PARAMETER DATA BLOCK, LOADED BY INPDIS, STORED IN /DISPY/, /DISPZ/
     *
     * # of distances in plume-size tables--which can be used as an alternative to the power-law model:
     * (to utilize the power-law model, set NUM_DIST to zero or delete the following data card)
     *
109  NUM_DIST001   0
     *
     * SIGMA = A * X ** B
     *
     * Tadmor and Gur Parameterization for Distance Range 0.5 to 5.0 km
     * as taken from Atmospheric Motion and Air Pollution (Dobbins 1979).
     * P-G CLASS:          A            B            C           D            E            F
110  DPCYSIGA001         0.3658       0.2751       0.2089      0.1474       0.1046     0.0722
111  DPCYSIGB001         0.9031       0.9031       0.9031      0.9031       0.9031     0.9031
112  DPCZSIGA001         2.5E-4       1.9E-3       0.2         0.3          0.4        0.2
113  DPCZSIGB001         2.125        1.6021       0.8543      0.6532       0.6021     0.6020
     *
     *  LINEAR SCALING FACTOR FOR SIGMA-Y FUNCTION, NORMALLY 1
     *
114  DPYSCALE001    1.
     *
     *  LINEAR SCALING FACTOR FOR SIGMA-Z FUNCTION,
     *  NORMALLY USED FOR SURFACE ROUGHNESS LENGTH CORRECTION.
     *  (Z1 / Z0) ** 0.2,   FROM CRAC2 WE HAVE  (10 CM / 3 CM) ** 0.2 = 1.27
     *
115  DPZSCALE001    1.27
     ******************************************************************************* *
     * EXPANSION FACTOR DATA BLOCK, LOADED BY INPEXP, STORED IN /EXPAND/
     *
     * TIME BASE FOR EXPANSION FACTOR (SECONDS)
     *
116  PMTIMBAS001    600.   (10 MINUTES)
     *
     * BREAK POINT FOR FORMULA CHANGE (SECONDS)
     *
117  PMBRKPNT001   3600.   (1 HOUR)
     *
     * EXPONENTIAL EXPANSION FACTOR NUMBER 1
     *
118  PMXPFAC1001      0.2
     *
     * EXPONENTIAL EXPANSION FACTOR NUMBER 2
     *
119  PMXPFAC2001      0.25
     *********************************************************************************
     * PLUME RISE DATA BLOCK, LOADED BY INPLRS, STORED IN /PLUMRS/
     *
     * SCALING FACTOR FOR THE CRITICAL WIND SPEED FOR ENTRAINMENT OF A BOUYANT PLUME
     * (USED BY FUNCTION CAUGHT)
     *
120  PRSCLCRW001   1.
     *
     * SCALING FACTOR FOR THE A-D STABILITY PLUME RISE FORMULA
     * (USED BY FUNCTION PLMRIS)
     *
121  PRSCLADP001   1.
     *
     * SCALING FACTOR FOR THE E-F STABILITY PLUME RISE FORMULA
     * (USED BY FUNCTION PLMRIS)
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     *
122  PRSCLEFP001   1.
     ********************************************************************************
     * RELEASE DATA BLOCK, LOADED BY INPREL, STORED IN /ATNAM2/, /MULREL/
     *********************** RELEASE DATA BLOCK ************
     * SOURCE TERM NUMBER  1 OF 8
123  RDATNAM2001 'NCF'
     *
     * TIME AFTER ACCIDENT INITIATION WHEN THE ACCIDENT REACHES GENERAL EMERGENCY
     * CONDITIONS (AS DEFINED IN NUREG-0654), OR WHEN PLANT PERSONNEL CAN RELIABLY
     * PREDICT THAT GENERAL EMERGENCY CONDITIONS WILL BE ATTAINED
     *
124  RDOALARM001   1.26E+04
     *
     * NUMBER OF PLUME SEGMENTS THAT ARE RELEASED
     *
125  RDNUMREL001          1
     *
     * SELECTION OF RISK DOMINANT PLUME
     *
126  RDMAXRIS001          1
     *
     * REFERENCE TIME FOR DISPERSION AND RADIOACTIVE DECAY
     *
127  RDREFTIM001        0.5
     *
     * HEAT CONTENT OF THE RELEASE SEGMENTS (W)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
128  RDPLHEAT001   9.20E+05
     *
     * HEIGHT OF THE PLUME SEGMENTS AT RELEASE (M)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
129  RDPLHITE001        30.
     *
     * DURATION OF THE PLUME SEGMENTS (S)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
130  RDPLUDUR001   8.64E+04
     *
     * TIME OF RELEASE FOR EACH PLUME (S AFTER SCRAM)
     * A VALUE SPECIFIED FOR EACH OF THE RELEASE SEGMENTS
     *
131  RDPDELAY001   0.00E+00
     *
     * Initial value of sigma-y for each plume--Note: values required for each plume
     *
132  SIGYINIT001   9.9  (initial sigma-y = W/4.3 = 42.5/4.3)
     *
     * Initial value of sigma-z for each plume--Note: values required for each plume
     *
133  SIGZINIT001  31.1  (initial sigma-z = H/2.15 = 66.8/2.15)
     *
     * Building height (meters)--Note: values required for each plume
     *
134  WEBUILDH001   66.8
     *
     * PARTICLE SIZE DISTRIBUTION OF EACH NUCLIDE GROUP
```

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     * YOU MUST SPECIFY A COLUMN OF DATA FOR EACH OF THE PARTICLE SIZE GROUPS
     *
135  RDPSDIST001      1.
136  RDPSDIST002      1.
137  RDPSDIST003      1.
138  RDPSDIST004      1.
139  RDPSDIST005      1.
140  RDPSDIST006      1.
141  RDPSDIST007      1.
142  RDPSDIST008      1.
143  RDPSDIST009      1.
     *
     *
     *               NUCNAM  CORINV (Bq)
     *
144  RDCORINV001     Co-58    3.04E+16
145  RDCORINV002     Co-60    2.32E+16
146  RDCORINV003     Kr-85    3.87E+16
147  RDCORINV004     Kr-85m   8.52E+17
148  RDCORINV005     Kr-87    1.64E+18
149  RDCORINV006     Kr-88    2.30E+18
150  RDCORINV007     Rb-86    8.24E+15
151  RDCORINV008     Sr-89    3.09E+18
152  RDCORINV009     Sr-90    3.07E+17
153  RDCORINV010     Sr-91    3.87E+18
154  RDCORINV011     Sr-92    4.19E+18
155  RDCORINV012     Y-90     3.20E+17
156  RDCORINV013     Y-91     3.98E+18
157  RDCORINV014     Y-92     4.22E+18
158  RDCORINV015     Y-93     4.85E+18
159  RDCORINV016     Zr-95    5.38E+18
160  RDCORINV017     Zr-97    5.41E+18
161  RDCORINV018     Nb-95    5.45E+18
162  RDCORINV019     Mo-99    6.11E+18
163  RDCORINV020     Tc-99m   5.34E+18
164  RDCORINV021     Ru-103   4.85E+18
165  RDCORINV022     Ru-105   3.34E+18
166  RDCORINV023     Ru-106   1.69E+18
167  RDCORINV024     Rh-105   3.08E+18
168  RDCORINV025     Sb-127   3.45E+17
169  RDCORINV026     Sb-129   1.04E+18
170  RDCORINV027     Te-127   3.43E+17
171  RDCORINV028     Te-127m  4.47E+16
172  RDCORINV029     Te-129   1.02E+18
173  RDCORINV030     Te-129m  1.49E+17
174  RDCORINV031     Te-131m  4.64E+17
175  RDCORINV032     Te-132   4.54E+18
176  RDCORINV033     I-131    3.18E+18
177  RDCORINV034     I-132    4.64E+18
178  RDCORINV035     I-133    6.56E+18
179  RDCORINV036     I-134    7.19E+18
180  RDCORINV037     I-135    6.14E+18
181  RDCORINV038     Xe-133   6.25E+18
182  RDCORINV039     Xe-135   1.67E+18
183  RDCORINV040     Cs-134   7.16E+17
184  RDCORINV041     Cs-136   2.08E+17
185  RDCORINV042     Cs-137   4.15E+17
186  RDCORINV043     Ba-139   5.86E+18
187  RDCORINV044     Ba-140   5.58E+18
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188  RDCORINV045     La-140   5.76E+18
189  RDCORINV046     La-141   5.34E+18
190  RDCORINV047     La-142   5.17E+18
191  RDCORINV048     Ce-141   5.31E+18
192  RDCORINV049     Ce-143   4.99E+18
193  RDCORINV050     Ce-144   4.19E+18
194  RDCORINV051     Pr-143   4.78E+18
195  RDCORINV052     Nd-147   2.12E+18
196  RDCORINV053     Np-239   6.53E+19
197  RDCORINV054     Pu-238   1.43E+16
198  RDCORINV055     Pu-239   1.22E+15
199  RDCORINV056     Pu-240   1.82E+15
200  RDCORINV057     Pu-241   4.08E+17
201  RDCORINV058     Am-241   5.03E+14
202  RDCORINV059     Cm-242   1.21E+17
203  RDCORINV060     Cm-244   1.29E+16
     *
     *  SCALING FACTOR TO ADJUST THE CORE INVENTORY FOR POWER LEVEL
     *
     *
204  RDCORSCA001   1.0
     *
205  RDAPLFRC001   PARENT      (apply rel fracs the same as prior versions)
     *
     * RELEASE FRACTIONS FOR ISOTOPE GROUPS IN RELEASE
     *
     *  ISOTOPE GROUPS:
     *
     *          Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
     *
206  RDRELFRC001 9.6E-05 6.5E-06 2.7E-06 2.1E-06 6.1E-08 5.2E-07 3.3E-09 2.7E-08 1.8E-07
     *
     ********************************************************************************
     * OUTPUT CONTROL DATA BLOCK, LOADED BY INPOPT, STORED IN /STOPME/, /ATMOPT/
     *
     * FLAG TO INDICATE THAT THIS IS THE LAST PROGRAM IN THE SERIES TO BE RUN
     *
207  OCENDAT1001  .FALSE. (SET THIS VALUE TO .TRUE. TO SKIP EARLY AND CHRONC)
     *
208  OCIDEBUG001  0
     *
     * NAME OF THE NUCLIDE TO BE LISTED ON THE DISPERSION LISTINGS
     *
     *OCNUCOUT001  Cs-137
     *
     *             NUM0
209  TYPE0NUMBER      0
     *
     *             INDREL   INDRAD
     *TYPE0OUT001      1        9
     *TYPE0OUT002      1       10         CCDF
     ********************************************************************************
     * METEOROLOGICAL SAMPLING DATA BLOCK
     *
     * METEOROLOGICAL SAMPLING OPTION CODE:
     *
     * METCOD = 1, USER SPECIFIED DAY AND HOUR IN THE YEAR (FROM MET FILE),
     *          2, WEATHER CATEGORY BIN SAMPLING,
     *          3, 120 HOURS OF WEATHER SPECIFIED ON THE ATMOS USER INPUT FILE,
```

```
       *          4, CONSTANT MET (BOUNDARY WEATHER USED FROM THE START),
       *          5, STRATIFIED RANDOM SAMPLES FOR EACH DAY OF THE YEAR.
       *
  210  M1METCOD001  2
       *
       * LAST SPATIAL INTERVAL FOR MEASURED WEATHER
       *
  211  M2LIMSPA001  15
       *
       * BOUNDARY WEATHER MIXING LAYER HEIGHT
       *
  212  M2BNDMXH001  1000.  (METERS)
       *
       * BOUNDARY WEATHER STABILITY CLASS INDEX
       *
  213  M2IBDSTB001  4      (D-STABILITY)
       *
       * BOUNDARY WEATHER RAIN RATE
       *
  214  M2BNDRAN001  0.     (MM/HR)
       *
       * BOUNDARY WEATHER WIND SPEED
       *
  215  M2BNDWND001  5.     (M/S)
       *
       * NUMBER OF RAIN DISTANCE INTERVALS FOR BINNING
       *
  216  M4NRNINT001  6
       *
       * ENDPOINTS OF THE RAIN DISTANCE INTERVALS (KILOMETERS)
       *
       * NOTE: THESE MUST BE CHOSEN TO MATCH THE SPATIAL ENDPOINT DISTANCES
       *       SPECIFIED FOR THE ARRAY SPAEND (10 % ERROR IS ALLOWED).
       *
       *             2.0    4.0      7     10.0     20.0   40.0   MILES
       *
  217  M4RNDSTS001  3.23  6.45    11.29   16.13    32.26  64.52   KM
       *
       * NUMBER OF RAIN INTENSITIY BREAKPOINTS
       *
  218  M4NRINTN001   3
       *
       * RAIN INTENSITY BREAKPOINTS FOR WEATHER BINNING (MILLIMETERS PER HOUR)
       *
  219  M4RNRATE001   2.  4.  6.
       *
       * NUMBER OF SAMPLES PER BIN
       *
  220  M4NSMPLS001  4  (THIS NUMBER SHOULD BE SET TO 4 FOR RISK ASSESSMENT)
       *
       * INITIAL SEED FOR RANDOM NUMBER GENERATOR
       *
  221  M4IRSEED001   79
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE
```

```
NUMBER OF RECORDS READ                            =  449
NUMBER OF BLANK OR COMMENT RECORDS READ           =  227
NUMBER OF TERMINATOR RECORDS                      =    1
NUMBER OF RECORDS PROCESSED                       =  221
     NUMBER OF PROCESSED RECORDS DUPLICATED       =    0
     NUMBER OF PROCESSED RECORDS SORTED           =  221
****************************************************************************************************



Decay Chain #  Ba-139

Decay Chain #  Ba-140   La-140
Fraction of Ba-140  going to La-140  in this chain = 1.000000

Decay Chain #  Ce-143   Pr-143
Fraction of Ce-143  going to Pr-143  in this chain = 1.000000

Decay Chain #  Ce-144

Decay Chain #  Cm-242   Pu-238
Fraction of Cm-242  going to Pu-238  in this chain = 1.000000

Decay Chain #  Cm-244   Pu-240
Fraction of Cm-244  going to Pu-240  in this chain = 1.000000

Decay Chain #  Co-58

Decay Chain #  Co-60

Decay Chain #  Cs-134

Decay Chain #  Cs-136

Decay Chain #  Cs-137

Decay Chain #  I-133    Xe-133
Fraction of I-133   going to Xe-133  in this chain = 0.971000

Decay Chain #  I-134

Decay Chain #  I-135    Xe-135
Fraction of I-135   going to Xe-135  in this chain = 0.846000

Decay Chain #  Kr-85m   Kr-85
Fraction of Kr-85m  going to Kr-85   in this chain = 0.211000

Decay Chain #  Kr-87

Decay Chain #  Kr-88

Decay Chain #  La-141   Ce-141
Fraction of La-141  going to Ce-141  in this chain = 1.000000

Decay Chain #  La-142

Decay Chain #  Mo-99    Tc-99m
Fraction of Mo-99   going to Tc-99m  in this chain = 0.876000
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```
Decay Chain #  Nd-147

Decay Chain #  Np-239   Pu-239
Fraction of Np-239  going to Pu-239  in this chain = 1.000000

Decay Chain #  Pu-241   Am-241
Fraction of Pu-241  going to Am-241  in this chain = 1.000000

Decay Chain #  Rb-86

Decay Chain #  Ru-103

Decay Chain #  Ru-105   Rh-105
Fraction of Ru-105  going to Rh-105  in this chain = 1.000000

Decay Chain #  Ru-106

Decay Chain #  Sb-127   Te-127
Fraction of Sb-127  going to Te-127  in this chain = 0.824000

Decay Chain #  Sb-127   Te-127m  Te-127
Fraction of Sb-127  going to Te-127m in this chain = 0.176000
Fraction of Sb-127  going to Te-127  in this chain = 0.171776
Fraction of Te-127m going to Te-127  in this chain = 0.976000

Decay Chain #  Sb-129   Te-129
Fraction of Sb-129  going to Te-129  in this chain = 0.775000

Decay Chain #  Sb-129   Te-129m  Te-129
Fraction of Sb-129  going to Te-129m in this chain = 0.225000
Fraction of Sb-129  going to Te-129  in this chain = 0.146250
Fraction of Te-129m going to Te-129  in this chain = 0.650000

Decay Chain #  Sr-89

Decay Chain #  Sr-90    Y-90
Fraction of Sr-90   going to Y-90    in this chain = 1.000000

Decay Chain #  Sr-91    Y-91
Fraction of Sr-91   going to Y-91    in this chain = 0.422000

Decay Chain #  Sr-92    Y-92
Fraction of Sr-92   going to Y-92    in this chain = 1.000000

Decay Chain #  Te-131m  I-131
Fraction of Te-131m going to I-131   in this chain = 0.778000

Decay Chain #  Te-132   I-132
Fraction of Te-132  going to I-132   in this chain = 1.000000

Decay Chain #  Y-93

Decay Chain #  Zr-95    Nb-95
Fraction of Zr-95   going to Nb-95   in this chain = 0.993000

Decay Chain #  Zr-97


RELEASED INVENTORY OF ALL PLUMES
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Co-58	1.57E+10
Co-60	1.21E+10
Kr-85	3.72E+12
Kr-85m	1.28E+13
Kr-87	2.27E+11
Kr-88	1.18E+13
Rb-86	2.18E+10
Sr-89	1.87E+11
Sr-90	1.87E+10
Sr-91	9.84E+10
Sr-92	1.19E+10
Y-90	3.21E+09
Y-91	1.34E+10
Y-92	4.22E+10
Y-93	7.02E+09
Zr-95	1.77E+10
Zr-97	1.09E+10
Nb-95	1.80E+10
Mo-99	2.80E+12
Tc-99m	2.63E+12
Ru-103	2.50E+12
Ru-105	2.67E+11
Ru-106	8.78E+11
Rh-105	1.42E+12
Sb-127	6.62E+11
Sb-129	3.18E+11
Te-127	6.84E+11
Te-127m	9.40E+10
Te-129	5.40E+11
Te-129m	3.12E+11
Te-131m	7.38E+11
Te-132	8.57E+12
I-131	1.98E+13
I-132	9.38E+12
I-133	2.86E+13
I-134	3.54E+09
I-135	1.13E+13
Xe-133	5.64E+14
Xe-135	7.47E+13
Cs-134	1.93E+12
Cs-136	5.47E+11
Cs-137	1.12E+12
Ba-139	2.53E+09
Ba-140	9.77E+11
La-140	2.00E+11
La-141	2.12E+09
La-142	7.74E+07
Ce-141	1.42E+11
Ce-143	1.05E+11
Ce-144	1.13E+11
Pr-143	1.84E+10
Nd-147	6.78E+09
Np-239	1.52E+12
Pu-238	3.86E+08
Pu-239	3.30E+07
Pu-240	4.91E+07
Pu-241	1.10E+10
Am-241	1.68E+06
Cm-242	3.98E+08

Cm-244 4.26E+07

READING FROM A WEATHER FILE WITH THE FOLLOWING HEADER:
INDIAN POINT ENERGY CENTER METEORLOGICAL DATAFILE
Input file for the MACCS2 model using the year 2000
METEOROLOGICAL DATA FILE CONTAINS 397 HOURS OF OBSERVED RAIN DATA.
ACCUMULATED RAIN MEASUREMENTS TOTALED 30.31 INCHES FOR THE YEAR.
CONSTANT LID HEIGHTS (M) FOR 4 SEASONS = 1100 1500 1500 1300
NON-ZERO WINDSPEEDS LESS THAN 0.5 M/S ARE SET TO 0.5 M/S
NUMTRI= 155

* * * * METEOROLOGICAL BIN SUMMARY * * * *

BIN PRIORITIES
RI XX - RAIN INTENSITY I WITHIN THE INTERVAL ENDING AT XX
INTERVAL ENDPOINTS ARE IN KILOMETERS FROM THE ACCIDENT SITE, THE 6 INTERVAL ENDPOINTS ARE 3 6 11 16 32 65
RAIN INTENSITIES ARE IN MILLIMETERS OF RAIN PER HOUR, THE 3 INTENSITY BREAKPOINTS ARE 2.0 4.0 6.0
S V - INITIAL WEATHER CONDITIONS WITH STABILITY CLASS S AND WIND SPEED INTERVAL V
STABILITY CLASSES ARE B = A/B, D = C/D, E = E, AND F = F
WIND SPEED INTERVALS ARE IN METERS PER SECOND, 1 (0-1), 2 (1-2), 3 (2-3), 4 (3-5), 5 (5-7), 6 (GT 7)

	WIND DIRECTION																	
METBIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	PER CENT
1 B 3	0.083	0.009	0.009	0.092	0.083	0.128	0.165	0.174	0.092	0.000	0.009	0.000	0.000	0.009	0.000	0.147	109	1.2443
2 B 4	0.066	0.033	0.022	0.000	0.022	0.044	0.154	0.077	0.275	0.055	0.000	0.000	0.000	0.000	0.000	0.253	91	1.0388
3 D 1	0.115	0.073	0.055	0.032	0.009	0.014	0.005	0.023	0.032	0.064	0.060	0.064	0.115	0.101	0.142	0.096	218	2.4886
4 D 2	0.158	0.092	0.041	0.049	0.047	0.039	0.046	0.063	0.109	0.113	0.071	0.043	0.020	0.012	0.025	0.071	1377	15.7192
5 D 3	0.124	0.047	0.021	0.033	0.067	0.107	0.099	0.102	0.192	0.125	0.029	0.004	0.002	0.000	0.003	0.046	1699	19.3950
6 D 4	0.075	0.020	0.007	0.011	0.040	0.129	0.191	0.111	0.223	0.138	0.017	0.001	0.000	0.000	0.001	0.036	1453	16.5868
7 D 5	0.055	0.021	0.014	0.000	0.021	0.034	0.274	0.068	0.342	0.144	0.000	0.000	0.000	0.000	0.000	0.027	146	1.6667
8 D 6	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.200	0.400	0.200	0.000	0.000	0.000	0.000	0.000	0.000	5	0.0571
9 E 1	0.118	0.087	0.076	0.037	0.022	0.028	0.024	0.031	0.081	0.109	0.061	0.059	0.041	0.072	0.081	0.076	543	6.1986
10 E 2	0.188	0.094	0.065	0.026	0.017	0.007	0.009	0.010	0.047	0.190	0.163	0.051	0.024	0.010	0.013	0.087	898	10.2511
11 E 3	0.227	0.054	0.003	0.003	0.007	0.007	0.003	0.014	0.044	0.424	0.163	0.003	0.000	0.000	0.000	0.047	295	3.3676
12 E 4	0.298	0.053	0.035	0.000	0.000	0.018	0.000	0.018	0.246	0.211	0.035	0.000	0.000	0.000	0.000	0.088	57	0.6507
13 F 1	0.051	0.017	0.039	0.000	0.022	0.034	0.045	0.090	0.225	0.208	0.073	0.056	0.034	0.011	0.045	0.051	178	2.0320
14 F 2	0.017	0.008	0.008	0.004	0.008	0.000	0.000	0.004	0.054	0.675	0.171	0.033	0.004	0.004	0.000	0.008	240	2.7397
15 F 3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.276	0.000	0.000	0.000	0.000	0.017	58	0.6621
16 F 4	0.143	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.429	0.286	0.000	0.000	0.000	0.000	0.000	7	0.0799
17 R1 3	0.107	0.017	0.014	0.014	0.007	0.031	0.034	0.038	0.214	0.259	0.055	0.034	0.041	0.045	0.034	0.055	290	3.3105
18 R1 6	0.149	0.043	0.021	0.000	0.000	0.000	0.000	0.000	0.106	0.106	0.085	0.128	0.128	0.085	0.043	0.106	47	0.5365
19 R1 11	0.095	0.053	0.032	0.000	0.000	0.042	0.011	0.021	0.084	0.253	0.074	0.074	0.074	0.021	0.063	0.105	95	1.0845
20 R1 16	0.192	0.041	0.000	0.014	0.014	0.027	0.014	0.055	0.110	0.164	0.055	0.055	0.027	0.082	0.041	0.110	73	0.8333
21 R1 32	0.149	0.035	0.045	0.015	0.005	0.040	0.005	0.015	0.069	0.243	0.099	0.050	0.035	0.030	0.020	0.149	202	2.3059
22 R1 65	0.124	0.074	0.029	0.021	0.018	0.029	0.003	0.029	0.115	0.203	0.109	0.029	0.026	0.035	0.021	0.135	340	3.8813
23 R2 3	0.108	0.031	0.000	0.015	0.031	0.000	0.015	0.046	0.231	0.277	0.062	0.046	0.015	0.046	0.000	0.077	65	0.7420
24 R2 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000	0.000	0.200	0.400	0.200	5	0.0571
25 R2 11	0.214	0.071	0.000	0.000	0.000	0.000	0.000	0.071	0.071	0.143	0.000	0.000	0.000	0.000	0.071	0.357	14	0.1598
26 R2 16	0.429	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.000	0.143	0.143	7	0.0799
27 R2 32	0.263	0.211	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.211	0.053	0.000	0.053	0.000	0.053	0.105	19	0.2169
28 R2 65	0.233	0.047	0.070	0.023	0.000	0.000	0.000	0.000	0.070	0.163	0.116	0.023	0.023	0.023	0.093	0.116	43	0.4909
29 R3 3	0.143	0.048	0.048	0.000	0.048	0.000	0.000	0.000	0.095	0.286	0.048	0.095	0.048	0.048	0.000	0.095	21	0.2397
30 R3 6	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.250	4	0.0457
31 R3 11	0.000	0.286	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.286	0.143	0.286	7	0.0799
32 R3 16	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	2	0.0228
33 R3 32	0.214	0.357	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.000	0.000	0.071	0.143	0.000	0.143	14	0.1598
34 R3 65	0.276	0.138	0.000	0.000	0.034	0.000	0.000	0.034	0.034	0.172	0.069	0.000	0.034	0.000	0.000	0.207	29	0.3311
35 R4 3	0.133	0.033	0.000	0.033	0.000	0.033	0.000	0.000	0.033	0.300	0.033	0.067	0.067	0.067	0.100	0.100	30	0.3425

36	R4 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1	0.0114
37	R4 11	0.200	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.100	0.000	0.100	0.000	0.000	0.100	10	0.1142
38	R4 16	0.000	0.000	0.167	0.167	0.000	0.000	0.000	0.000	0.000	0.333	0.167	0.000	0.000	0.000	0.167	0.000	6	0.0685
39	R4 32	0.227	0.045	0.091	0.136	0.000	0.045	0.000	0.045	0.045	0.227	0.045	0.000	0.000	0.000	0.000	0.091	22	0.2511
40	R4 65	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.150	0.300	0.025	0.000	0.000	0.000	0.000	0.125	40	0.4566
41	ALL	0.128	0.056	0.030	0.025	0.035	0.059	0.072	0.063	0.140	0.174	0.068	0.027	0.018	0.017	0.021	0.069	8760	

* * * * METEOROLOGICAL BIN SUMMARY * * * *

BIN PRIORITIES

RI XX - RAIN INTENSITY I WITHIN THE INTERVAL ENDING AT XX

INTERVAL ENDPOINTS ARE IN KILOMETERS FROM THE ACCIDENT SITE, THE 6 INTERVAL ENDPOINTS ARE 3 6 11 16 32 65

RAIN INTENSITIES ARE IN MILLIMETERS OF RAIN PER HOUR, THE 3 INTENSITY BREAKPOINTS ARE 2.0 4.0 6.0

S V - INITIAL WEATHER CONDITIONS WITH STABILITY CLASS S AND WIND SPEED INTERVAL V

STABILITY CLASSES ARE B = A/B, D = C/D, E = E, AND F = F

WIND SPEED INTERVALS ARE IN METERS PER SECOND (M/S), 1 (0-1), 2 (1-2), 3 (2-3), 4 (3-5), 5 (5-7), 6 (GT 7)

WIND DIRECTION

METBIN			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL	PER CENT
1	B	3	9	1	1	10	9	14	18	19	10	0	1	0	0	1	0	16	109	1.2443
2	B	4	6	3	2	0	2	4	14	7	25	5	0	0	0	0	0	23	91	1.0388
3	D	1	25	16	12	7	2	3	1	5	7	14	13	14	25	22	31	21	218	2.4886
4	D	2	218	127	57	67	65	54	64	87	150	155	98	59	27	16	35	98	1377	15.7192
5	D	3	210	80	35	56	114	181	168	174	326	213	49	7	3	0	5	78	1699	19.3950
6	D	4	109	29	10	16	58	187	278	162	324	201	25	1	0	0	1	52	1453	16.5868
7	D	5	8	3	2	0	3	5	40	10	50	21	0	0	0	0	0	4	146	1.6667
8	D	6	0	0	0	0	1	0	0	1	2	1	0	0	0	0	0	0	5	0.0571
9	E	1	64	47	41	20	12	15	13	17	44	59	33	32	22	39	44	41	543	6.1986
10	E	2	169	84	58	23	15	6	8	9	42	171	146	46	22	9	12	78	898	10.2511
11	E	3	67	16	1	1	2	2	1	4	13	125	48	1	0	0	0	14	295	3.3676
12	E	4	17	3	2	0	0	1	0	1	14	12	2	0	0	0	0	5	57	0.6507
13	F	1	9	3	7	0	4	6	8	16	40	37	13	10	6	2	8	9	178	2.0320
14	F	2	4	2	2	1	2	0	0	1	13	162	41	8	1	1	0	2	240	2.7397
15	F	3	0	0	0	0	0	0	0	0	0	41	16	0	0	0	0	1	58	0.6621
16	F	4	1	0	0	0	0	1	0	0	0	3	2	0	0	0	0	0	7	0.0799
17	R1	3	31	5	4	4	2	9	10	11	62	75	16	10	12	13	10	16	290	3.3105
18	R1	6	7	2	1	0	0	0	0	0	5	5	4	6	6	4	2	5	47	0.5365
19	R1	11	9	5	3	0	0	4	1	2	8	24	7	7	7	2	6	10	95	1.0845
20	R1	16	14	3	0	1	1	2	1	4	8	12	4	4	2	6	3	8	73	0.8333
21	R1	32	30	7	9	3	1	8	1	3	14	49	20	10	7	6	4	30	202	2.3059
22	R1	65	42	25	10	7	6	10	1	10	39	69	37	10	9	12	7	46	340	3.8813
23	R2	3	7	2	0	1	2	0	1	3	15	18	4	3	1	3	0	5	65	0.7420
24	R2	6	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	1	5	0.0571
25	R2	11	3	1	0	0	0	0	0	1	1	2	0	0	0	0	1	5	14	0.1598
26	R2	16	3	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	7	0.0799
27	R2	32	5	4	0	0	0	0	0	0	1	4	1	0	1	0	1	2	19	0.2169
28	R2	65	10	2	3	1	0	0	0	0	3	7	5	1	1	1	4	5	43	0.4909
29	R3	3	3	1	1	0	1	0	0	0	2	6	1	2	1	1	0	2	21	0.2397
30	R3	6	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	4	0.0457
31	R3	11	0	2	0	0	0	0	0	0	0	0	0	0	0	2	1	2	7	0.0799
32	R3	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0.0228
33	R3	32	3	5	0	0	0	0	0	0	0	1	0	0	1	2	0	2	14	0.1598
34	R3	65	8	4	0	0	1	0	0	1	1	5	2	0	1	0	0	6	29	0.3311
35	R4	3	4	1	0	1	0	1	0	0	1	9	1	2	2	2	3	3	30	0.3425
36	R4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.0114
37	R4	11	2	3	0	0	0	0	0	0	0	2	1	0	1	0	0	1	10	0.1142
38	R4	16	0	0	1	1	0	0	0	0	0	2	1	0	0	0	1	0	6	0.0685
39	R4	32	5	1	2	3	0	1	0	1	1	5	1	0	0	0	0	2	22	0.2511
40	R4	65	16	0	0	0	0	0	0	0	6	12	1	0	0	0	0	5	40	0.4566

* * * * SUMMARIES * * * *

R	204	74	34	22	14	35	15	36	168	308	106	56	53	55	47	159	1386	15.8219
B	15	4	3	10	11	18	32	26	35	5	1	0	0	1	0	39	200	2.2831

D		570	255	116	146	243	430	551	439	859	605	185	81	55	38	72	253	4898	55.9132
E		317	150	102	44	29	24	22	31	113	367	229	79	44	48	56	138	1793	20.4680
F		14	5	9	1	6	7	8	17	53	243	72	18	7	3	8	12	483	5.5137
	1	98	66	60	27	18	24	22	38	91	110	59	56	53	63	83	71	939	10.7192
	2	391	213	117	92	83	60	78	101	206	488	286	113	50	26	47	180	2531	28.8927
	3	286	97	37	66	124	197	181	193	348	379	113	8	3	1	5	107	2145	24.4863
	4	132	34	14	16	60	193	292	170	360	221	29	1	0	0	1	79	1602	18.2877
	5	9	4	2	0	3	5	40	10	53	21	0	0	0	0	0	5	152	1.7352
	6	0	0	0	0	1	0	0	1	2	1	0	0	0	0	0	0	5	0.0571

* * * * * BIN WINDROSE SUMMARY * * * * *

BIN	DIRECTION 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
1	0.083	0.009	0.009	0.092	0.083	0.128	0.165	0.174	0.092	0.000	0.009	0.000	0.000	0.009	0.000	0.147	1.000000
2	0.066	0.033	0.022	0.000	0.022	0.044	0.154	0.077	0.275	0.055	0.000	0.000	0.000	0.000	0.000	0.253	1.000000
3	0.115	0.073	0.055	0.032	0.009	0.014	0.005	0.023	0.032	0.064	0.060	0.064	0.115	0.101	0.142	0.096	1.000000
4	0.158	0.092	0.041	0.049	0.047	0.039	0.046	0.063	0.109	0.113	0.071	0.043	0.020	0.012	0.025	0.071	1.000000
5	0.124	0.047	0.021	0.033	0.067	0.107	0.099	0.102	0.192	0.125	0.029	0.004	0.002	0.000	0.003	0.046	1.000000
6	0.075	0.020	0.007	0.011	0.040	0.129	0.191	0.111	0.223	0.138	0.017	0.001	0.000	0.000	0.001	0.036	1.000000
7	0.055	0.021	0.014	0.000	0.021	0.034	0.274	0.068	0.342	0.144	0.000	0.000	0.000	0.000	0.000	0.027	1.000000
8	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.200	0.400	0.200	0.000	0.000	0.000	0.000	0.000	0.000	1.000000
9	0.118	0.087	0.076	0.037	0.022	0.028	0.024	0.031	0.081	0.109	0.061	0.059	0.041	0.072	0.081	0.076	1.000000
10	0.188	0.094	0.065	0.026	0.017	0.007	0.009	0.010	0.047	0.190	0.163	0.051	0.024	0.010	0.013	0.087	1.000000
11	0.227	0.054	0.003	0.003	0.007	0.007	0.003	0.014	0.044	0.424	0.163	0.003	0.000	0.000	0.000	0.047	1.000000
12	0.298	0.053	0.035	0.000	0.000	0.018	0.000	0.018	0.246	0.211	0.035	0.000	0.000	0.000	0.000	0.088	1.000000
13	0.051	0.017	0.039	0.000	0.022	0.034	0.045	0.090	0.225	0.208	0.073	0.056	0.034	0.011	0.045	0.051	1.000000
14	0.017	0.008	0.008	0.004	0.008	0.000	0.000	0.004	0.054	0.675	0.171	0.033	0.004	0.004	0.000	0.008	1.000000
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.707	0.276	0.000	0.000	0.000	0.000	0.017	1.000000
16	0.143	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.429	0.286	0.000	0.000	0.000	0.000	0.000	1.000000
17	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
18	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
19	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
20	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
21	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
22	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
23	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
24	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
25	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
26	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
27	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
28	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
29	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
30	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
31	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
32	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
33	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
34	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
35	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
36	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
37	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
38	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
39	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
40	0.147	0.053	0.025	0.016	0.010	0.025	0.011	0.026	0.121	0.222	0.076	0.040	0.038	0.040	0.034	0.115	1.000000
41	0.128	0.056	0.030	0.025	0.035	0.059	0.072	0.063	0.140	0.174	0.068	0.027	0.018	0.017	0.021	0.069	1.000000

```
******** BEGINNING OF CHANGE CASE   1 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  2 OF 8
       *
  222  RDATNAM2001 'EARLY HIGH'
********   RECORD NUMBER   222 REPLACES RECORD NUMBER   123   ********
       *
  223  RDOALARM001   1.27E+04
********   RECORD NUMBER   223 REPLACES RECORD NUMBER   124   ********
  224  RDNUMREL001   1
********   RECORD NUMBER   224 REPLACES RECORD NUMBER   125   ********
  225  RDMAXRIS001   1
```

```
********   RECORD NUMBER   225 REPLACES RECORD NUMBER   126   ********
  226  RDREFTIM001   0.0
********   RECORD NUMBER   226 REPLACES RECORD NUMBER   127   ********
  227  RDPLHEAT001   1.03E+06
********   RECORD NUMBER   227 REPLACES RECORD NUMBER   128   ********
  228  RDPLHITE001   30.
********   RECORD NUMBER   228 REPLACES RECORD NUMBER   129   ********
  229  RDPLUDUR001   7.92E+04
********   RECORD NUMBER   229 REPLACES RECORD NUMBER   130   ********
  230  RDPDELAY001   1.20E+04
********   RECORD NUMBER   230 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  231  RDRELFRC001 6.4E-01 1.6E-01 1.5E-01 1.5E-01 1.6E-02 6.5E-02 5.6E-04 3.0E-03 3.1E-02
********   RECORD NUMBER   231 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   1 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   1
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************



RELEASED INVENTORY OF ALL PLUMES
Co-58      1.97E+15
Co-60      1.51E+15
Kr-85      2.48E+16
Kr-85m     3.26E+17
Kr-87      1.71E+17
Kr-88      6.53E+17
Rb-86      1.23E+15
Sr-89      4.93E+16
Sr-90      4.91E+15
Sr-91      4.86E+16
Sr-92      2.86E+16
Y-90       3.47E+14
Y-91       2.26E+15
Y-92       2.19E+16
Y-93       2.16E+15
Zr-95      3.01E+15
Zr-97      2.64E+15
Nb-95      3.05E+15
Mo-99      3.83E+17
Tc-99m     3.45E+17
Ru-103     3.14E+17
Ru-105     1.29E+17
Ru-106     1.10E+17
Rh-105     1.98E+17
Sb-127     5.05E+16
Sb-129     9.14E+16
Te-127     5.08E+16
Te-127m    6.71E+15
Te-129     1.08E+17
Te-129m    2.24E+16
Te-131m    6.44E+16
Te-132     6.61E+17
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I-131      5.03E+17
I-132      6.96E+17
I-133      9.39E+17
I-134      8.25E+16
I-135      6.93E+17
Xe-133     3.94E+18
Xe-135     9.85E+17
Cs-134     1.07E+17
Cs-136     3.10E+16
Cs-137     6.22E+16
Ba-139     3.40E+16
Ba-140     1.72E+17
La-140     1.27E+16
La-141     1.66E+15
La-142     6.47E+14
Ce-141     1.59E+16
Ce-143     1.40E+16
Ce-144     1.26E+16
Pr-143     2.76E+15
Nd-147     1.18E+15
Np-239     1.88E+17
Pu-238     4.29E+13
Pu-239     3.66E+12
Pu-240     5.46E+12
Pu-241     1.22E+15
Am-241     2.82E+11
Cm-242     6.77E+13
Cm-244     7.22E+12


******** BEGINNING OF CHANGE CASE   2 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  3 OF 8
       *
  232  RDATNAM2001 'EARLY MEDIUM'
********   RECORD NUMBER   232 REPLACES RECORD NUMBER   123   ********
       *
  233  RDOALARM001   9.18E+03
********   RECORD NUMBER   233 REPLACES RECORD NUMBER   124   ********
  234  RDNUMREL001   1
********   RECORD NUMBER   234 REPLACES RECORD NUMBER   125   ********
  235  RDMAXRIS001   1
********   RECORD NUMBER   235 REPLACES RECORD NUMBER   126   ********
  236  RDREFTIM001   0.0
********   RECORD NUMBER   236 REPLACES RECORD NUMBER   127   ********
  237  RDPLHEAT001   1.07E+06
********   RECORD NUMBER   237 REPLACES RECORD NUMBER   128   ********
  238  RDPLHITE001   30.
********   RECORD NUMBER   238 REPLACES RECORD NUMBER   129   ********
  239  RDPLUDUR001   8.21E+04
********   RECORD NUMBER   239 REPLACES RECORD NUMBER   130   ********
  240  RDPDELAY001   9.22E+03
********   RECORD NUMBER   240 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  241  RDRELFRC001 9.9E-01 1.3E-02 1.2E-02 2.7E-02 8.5E-04 3.0E-02 5.2E-05 3.1E-04 2.0E-02
********   RECORD NUMBER   241 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   2 USER INPUT ********
```

```
USER INPUT PROCESSING SUMMARY - CHANGE CASE   2
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************
```

RELEASED INVENTORY OF ALL PLUMES

Co-58	9.11E+14
Co-60	6.96E+14
Kr-85	3.83E+16
Kr-85m	5.68E+17
Kr-87	4.02E+17
Kr-88	1.22E+18
Rb-86	9.85E+13
Sr-89	2.62E+15
Sr-90	2.61E+14
Sr-91	2.73E+15
Sr-92	1.85E+15
Y-90	2.33E+13
Y-91	2.08E+14
Y-92	1.14E+15
Y-93	2.12E+14
Zr-95	2.79E+14
Zr-97	2.53E+14
Nb-95	2.83E+14
Mo-99	1.78E+17
Tc-99m	1.60E+17
Ru-103	1.45E+17
Ru-105	6.72E+16
Ru-106	5.07E+16
Rh-105	9.19E+16
Sb-127	9.14E+15
Sb-129	1.86E+16
Te-127	9.18E+15
Te-127m	1.21E+15
Te-129	2.13E+16
Te-129m	4.03E+15
Te-131m	1.18E+16
Te-132	1.20E+17
I-131	4.10E+16
I-132	9.30E+16
I-133	7.83E+16
I-134	1.23E+16
I-135	6.10E+16
Xe-133	6.10E+18
Xe-135	1.37E+18
Cs-134	8.59E+15
Cs-136	2.48E+15
Cs-137	4.98E+15
Ba-139	3.23E+16
Ba-140	1.11E+17
La-140	5.09E+15
La-141	1.77E+14
La-142	8.50E+13
Ce-141	1.64E+15
Ce-143	1.47E+15

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Ce-144     1.30E+15
Pr-143     2.55E+14
Nd-147     1.09E+14
Np-239     1.96E+16
Pu-238     4.43E+12
Pu-239     3.78E+11
Pu-240     5.64E+11
Pu-241     1.26E+14
Am-241     2.62E+10
Cm-242     6.29E+12
Cm-244     6.71E+11


******** BEGINNING OF CHANGE CASE   3 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  4 OF 8
       *
  242  RDATNAM2001 'EARLY LOW'
********   RECORD NUMBER   242 REPLACES RECORD NUMBER   123   ********
       *
  243  RDOALARM001   9.31E+03
********   RECORD NUMBER   243 REPLACES RECORD NUMBER   124   ********
  244  RDNUMREL001   1
********   RECORD NUMBER   244 REPLACES RECORD NUMBER   125   ********
  245  RDMAXRIS001   1
********   RECORD NUMBER   245 REPLACES RECORD NUMBER   126   ********
  246  RDREFTIM001   0.0
********   RECORD NUMBER   246 REPLACES RECORD NUMBER   127   ********
  247  RDPLHEAT001   1.11E+06
********   RECORD NUMBER   247 REPLACES RECORD NUMBER   128   ********
  248  RDPLHITE001   30.
********   RECORD NUMBER   248 REPLACES RECORD NUMBER   129   ********
  249  RDPLUDUR001   8.49E+04
********   RECORD NUMBER   249 REPLACES RECORD NUMBER   130   ********
  250  RDPDELAY001   9.90E+03
********   RECORD NUMBER   250 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  251  RDRELFRC001 2.4E-01 2.0E-03 1.6E-03 2.9E-03 9.0E-05 3.0E-03 5.2E-06 3.1E-05 1.9E-03
********   RECORD NUMBER   251 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   3 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   3
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      9.11E+13
Co-60      6.96E+13
Kr-85      9.29E+15
Kr-85m     1.34E+17
Kr-87      8.79E+16
Kr-88      2.82E+17
Rb-86      1.31E+13
```

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Sr-89      2.78E+14
Sr-90      2.76E+13
Sr-91      2.85E+14
Sr-92      1.87E+14
Y-90       2.43E+12
Y-91       2.08E+13
Y-92       1.22E+14
Y-93       2.09E+13
Zr-95      2.79E+13
Zr-97      2.51E+13
Nb-95      2.83E+13
Mo-99      1.78E+16
Tc-99m     1.60E+16
Ru-103     1.45E+16
Ru-105     6.52E+15
Ru-106     5.07E+15
Rh-105     9.18E+15
Sb-127     9.80E+14
Sb-129     1.94E+15
Te-127     9.85E+14
Te-127m    1.30E+14
Te-129     2.24E+15
Te-129m    4.32E+14
Te-131m    1.26E+15
Te-132     1.28E+16
I-131      6.31E+15
I-132      1.14E+16
I-133      1.20E+16
I-134      1.63E+15
I-135      9.20E+15
Xe-133     1.48E+18
Xe-135     3.27E+17
Cs-134     1.15E+15
Cs-136     3.31E+14
Cs-137     6.64E+14
Ba-139     2.79E+15
Ba-140     1.05E+16
La-140     5.17E+14
La-141     1.71E+13
La-142     7.81E+12
Ce-141     1.64E+14
Ce-143     1.46E+14
Ce-144     1.30E+14
Pr-143     2.56E+13
Nd-147     1.09E+13
Np-239     1.96E+15
Pu-238     4.43E+11
Pu-239     3.78E+10
Pu-240     5.64E+10
Pu-241     1.26E+13
Am-241     2.62E+09
Cm-242     6.29E+11
Cm-244     6.71E+10


******** BEGINNING OF CHANGE CASE   4 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  5 OF 8
       *
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```
  252  RDATNAM2001 'LATE HIGH'
********   RECORD NUMBER   252 REPLACES RECORD NUMBER   123   ********
       *
  253  RDOALARM001   5.58E+03
********   RECORD NUMBER   253 REPLACES RECORD NUMBER   124   ********
  254  RDNUMREL001   1
********   RECORD NUMBER   254 REPLACES RECORD NUMBER   125   ********
  255  RDMAXRIS001   1
********   RECORD NUMBER   255 REPLACES RECORD NUMBER   126   ********
  256  RDREFTIM001   0.5
********   RECORD NUMBER   256 REPLACES RECORD NUMBER   127   ********
  257  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   257 REPLACES RECORD NUMBER   128   ********
  258  RDPLHITE001   30.
********   RECORD NUMBER   258 REPLACES RECORD NUMBER   129   ********
  259  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   259 REPLACES RECORD NUMBER   130   ********
  260  RDPDELAY001   7.38E+04
********   RECORD NUMBER   260 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  261  RDRELFRC001 9.9E-01 1.2E-01 2.3E-02 4.8E-03 2.1E-04 3.7E-03 1.3E-05 1.2E-04 9.1E-04
********   RECORD NUMBER   261 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   4 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   4
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      1.11E+14
Co-60      8.58E+13
Kr-85      3.83E+16
Kr-85m     5.52E+15
Kr-87      3.29E+10
Kr-88      8.17E+14
Rb-86      1.80E+14
Sr-89      6.37E+14
Sr-90      6.45E+13
Sr-91      7.59E+13
Sr-92      2.16E+11
Y-90       2.21E+13
Y-91       5.30E+13
Y-92       4.34E+12
Y-93       6.78E+12
Zr-95      6.89E+13
Zr-97      1.85E+13
Nb-95      7.08E+13
Mo-99      1.61E+16
Tc-99m     1.54E+16
Ru-103     1.75E+16
Ru-105     7.74E+13
Ru-106     6.24E+15
Rh-105     6.95E+15
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Sb-127     1.30E+15
Sb-129     2.71E+13
Te-127     1.39E+15
Te-127m    2.15E+14
Te-129     4.85E+14
Te-129m    7.01E+14
Te-131m    1.05E+15
Te-132     1.63E+16
I-131      3.40E+17
I-132      1.69E+16
I-133      2.67E+17
I-134      5.97E+06
I-135      2.44E+16
Xe-133     5.25E+18
Xe-135     2.23E+17
Cs-134     1.64E+16
Cs-136     4.45E+15
Cs-137     9.54E+15
Ba-139     4.25E+08
Ba-140     4.72E+15
La-140     2.13E+15
La-141     2.25E+11
La-142     3.03E+07
Ce-141     6.19E+14
Ce-143     3.03E+14
Ce-144     5.01E+14
Pr-143     8.69E+13
Nd-147     2.53E+13
Np-239     5.26E+15
Pu-238     1.72E+12
Pu-239     1.47E+11
Pu-240     2.18E+11
Pu-241     4.90E+13
Am-241     6.83E+09
Cm-242     1.56E+12
Cm-244     1.68E+11


******** BEGINNING OF CHANGE CASE   5 USER INPUT ********
       ********************** RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  6 OF 8
       *
  262  RDATNAM2001 'LATE MEDIUM'
********   RECORD NUMBER   262 REPLACES RECORD NUMBER   123   ********
       *
  263  RDOALARM001   7.17E+03
********   RECORD NUMBER   263 REPLACES RECORD NUMBER   124   ********
  264  RDNUMREL001   1
********   RECORD NUMBER   264 REPLACES RECORD NUMBER   125   ********
  265  RDMAXRIS001   1
********   RECORD NUMBER   265 REPLACES RECORD NUMBER   126   ********
  266  RDREFTIM001   0.5
********   RECORD NUMBER   266 REPLACES RECORD NUMBER   127   ********
  267  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   267 REPLACES RECORD NUMBER   128   ********
  268  RDPLHITE001   30.
********   RECORD NUMBER   268 REPLACES RECORD NUMBER   129   ********
  269  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   269 REPLACES RECORD NUMBER   130   ********
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```
  270  RDPDELAY001   7.70E+04
********   RECORD NUMBER   270 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  271  RDRELFRC001 8.2E-01 1.5E-02 4.3E-03 1.5E-03 8.0E-05 1.4E-03 5.1E-06 4.7E-05 3.5E-04
********   RECORD NUMBER   271 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   5 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   5
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************
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RELEASED INVENTORY OF ALL PLUMES

Co-58	4.20E+13
Co-60	3.25E+13
Kr-85	3.17E+16
Kr-85m	3.99E+15
Kr-87	1.68E+10
Kr-88	5.45E+14
Rb-86	3.36E+13
Sr-89	2.43E+14
Sr-90	2.46E+13
Sr-91	2.71E+13
Sr-92	6.55E+10
Y-90	8.59E+12
Y-91	2.08E+13
Y-92	1.40E+12
Y-93	2.50E+12
Zr-95	2.70E+13
Zr-97	7.02E+12
Nb-95	2.78E+13
Mo-99	6.02E+15
Tc-99m	5.79E+15
Ru-103	6.63E+15
Ru-105	2.55E+13
Ru-106	2.36E+15
Rh-105	2.59E+15
Sb-127	4.03E+14
Sb-129	7.35E+12
Te-127	4.33E+14
Te-127m	6.72E+13
Te-129	1.50E+14
Te-129m	2.19E+14
Te-131m	3.22E+14
Te-132	5.07E+15
I-131	4.24E+16
I-132	5.22E+15
I-133	3.23E+16
I-134	3.70E+05
I-135	2.78E+15
Xe-133	4.27E+18
Xe-135	1.17E+17
Cs-134	3.07E+15
Cs-136	8.31E+14

```
Cs-137     1.78E+15
Ba-139     1.05E+08
Ba-140     1.81E+15
La-140     8.36E+14
La-141     7.54E+10
La-142     7.97E+06
Ce-141     2.42E+14
Ce-143     1.16E+14
Ce-144     1.96E+14
Pr-143     3.42E+13
Nd-147     9.90E+12
Np-239     2.04E+15
Pu-238     6.72E+11
Pu-239     5.76E+10
Pu-240     8.55E+10
Pu-241     1.92E+13
Am-241     2.68E+09
Cm-242     6.13E+11
Cm-244     6.58E+10


******** BEGINNING OF CHANGE CASE   6 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  7 OF 8
       *
  272  RDATNAM2001 'LATE LOW'
********   RECORD NUMBER   272 REPLACES RECORD NUMBER   123   ********
       *
  273  RDOALARM001   2.19E+04
********   RECORD NUMBER   273 REPLACES RECORD NUMBER   124   ********
  274  RDNUMREL001   1
********   RECORD NUMBER   274 REPLACES RECORD NUMBER   125   ********
  275  RDMAXRIS001   1
********   RECORD NUMBER   275 REPLACES RECORD NUMBER   126   ********
  276  RDREFTIM001   0.5
********   RECORD NUMBER   276 REPLACES RECORD NUMBER   127   ********
  277  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   277 REPLACES RECORD NUMBER   128   ********
  278  RDPLHITE001   30.
********   RECORD NUMBER   278 REPLACES RECORD NUMBER   129   ********
  279  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   279 REPLACES RECORD NUMBER   130   ********
  280  RDPDELAY001   9.13E+04
********   RECORD NUMBER   280 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  281  RDRELFRC001 7.0E-01 1.1E-03 7.9E-04 1.2E-03 8.7E-05 3.5E-06 2.6E-06 2.4E-05 7.4E-05
********   RECORD NUMBER   281 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   6 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   6
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************
```

RELEASED INVENTORY OF ALL PLUMES

Co-58	1.05E+11
Co-60	8.12E+10
Kr-85	2.71E+16
Kr-85m	1.84E+15
Kr-87	1.64E+09
Kr-88	1.76E+14
Rb-86	6.14E+12
Sr-89	2.63E+14
Sr-90	2.67E+13
Sr-91	2.20E+13
Sr-92	2.58E+10
Y-90	9.44E+12
Y-91	1.10E+13
Y-92	7.15E+11
Y-93	9.71E+11
Zr-95	1.38E+13
Zr-97	3.04E+12
Nb-95	1.42E+13
Mo-99	1.44E+13
Tc-99m	1.39E+13
Ru-103	1.65E+13
Ru-105	3.43E+10
Ru-106	5.90E+12
Rh-105	5.98E+12
Sb-127	3.13E+14
Sb-129	3.11E+12
Te-127	3.38E+14
Te-127m	5.37E+13
Te-129	1.17E+14
Te-129m	1.75E+14
Te-131m	2.35E+14
Te-132	3.91E+15
I-131	3.09E+15
I-132	4.03E+15
I-133	2.08E+15
I-134	1.17E+03
I-135	1.34E+14
Xe-133	3.56E+18
Xe-135	6.83E+16
Cs-134	5.65E+14
Cs-136	1.51E+14
Cs-137	3.28E+14
Ba-139	3.00E+06
Ba-140	3.79E+14
La-140	1.95E+14
La-141	1.91E+10
La-142	6.81E+05
Ce-141	1.23E+14
Ce-143	5.46E+13
Ce-144	1.00E+14
Pr-143	1.78E+13
Nd-147	5.00E+12
Np-239	9.91E+14
Pu-238	3.43E+11
Pu-239	2.94E+10
Pu-240	4.37E+10
Pu-241	9.79E+12
Am-241	1.37E+09

```
Cm-242     3.13E+11
Cm-244     3.35E+10


******** BEGINNING OF CHANGE CASE   7 USER INPUT ********
       ********************* RELEASE DATA BLOCK *************
       * SOURCE TERM NUMBER  8 OF 8
       *
  282  RDATNAM2001 'LATE LOWLOW'
********   RECORD NUMBER   282 REPLACES RECORD NUMBER   123   ********
       *
  283  RDOALARM001   2.56E+04
********   RECORD NUMBER   283 REPLACES RECORD NUMBER   124   ********
  284  RDNUMREL001   1
********   RECORD NUMBER   284 REPLACES RECORD NUMBER   125   ********
  285  RDMAXRIS001   1
********   RECORD NUMBER   285 REPLACES RECORD NUMBER   126   ********
  286  RDREFTIM001   0.5
********   RECORD NUMBER   286 REPLACES RECORD NUMBER   127   ********
  287  RDPLHEAT001   9.20E+05
********   RECORD NUMBER   287 REPLACES RECORD NUMBER   128   ********
  288  RDPLHITE001   30.
********   RECORD NUMBER   288 REPLACES RECORD NUMBER   129   ********
  289  RDPLUDUR001   8.64E+04
********   RECORD NUMBER   289 REPLACES RECORD NUMBER   130   ********
  290  RDPDELAY001   1.13E+05
********   RECORD NUMBER   290 REPLACES RECORD NUMBER   131   ********
       *           Xe/Kr   I       Cs      Te      Sr      Ru      La      Ce      Ba
       *
  291  RDRELFRC001 9.1E-01 8.1E-04 7.0E-04 7.6E-04 3.6E-05 2.1E-06 1.1E-06 1.2E-05 3.3E-05
********   RECORD NUMBER   291 REPLACES RECORD NUMBER   206   ********
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF CHANGE CASE   7 USER INPUT ********

USER INPUT PROCESSING SUMMARY - CHANGE CASE   7
NUMBER OF RECORDS CHANGED             =   10
NUMBER OF RECORDS ADDED               =    0
****************************************************************************************************




RELEASED INVENTORY OF ALL PLUMES
Co-58      6.27E+10
Co-60      4.87E+10
Kr-85      3.52E+16
Kr-85m     9.42E+14
Kr-87      8.00E+07
Kr-88      5.27E+13
Rb-86      5.39E+12
Sr-89      1.09E+14
Sr-90      1.11E+13
Sr-91      5.88E+12
Sr-92      2.28E+09
Y-90       4.36E+12
Y-91       4.66E+12
Y-92       9.41E+10
Y-93       2.72E+11
Zr-95      5.80E+12
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Zr-97      1.00E+12
Nb-95      5.99E+12
Mo-99      8.14E+12
Tc-99m     7.83E+12
Ru-103     9.87E+12
Ru-105     8.02E+09
Ru-106     3.54E+12
Rh-105     3.19E+12
Sb-127     1.89E+14
Sb-129     7.49E+11
Te-127     2.06E+14
Te-127m    3.40E+13
Te-129     7.24E+13
Te-129m    1.10E+14
Te-131m    1.29E+14
Te-132     2.35E+15
I-131      2.23E+15
I-132      2.42E+15
I-133      1.25E+15
I-134      7.35E+00
I-135      5.26E+13
Xe-133     4.48E+18
Xe-135     5.59E+16
Cs-134     5.00E+14
Cs-136     1.32E+14
Cs-137     2.90E+14
Ba-139     6.46E+04
Ba-140     1.67E+14
La-140     9.47E+13
La-141     2.79E+09
La-142     1.92E+04
Ce-141     6.13E+13
Ce-143     2.41E+13
Ce-144     5.01E+13
Pr-143     8.24E+12
Nd-147     2.08E+12
Np-239     4.60E+14
Pu-238     1.72E+11
Pu-239     1.47E+10
Pu-240     2.18E+10
Pu-241     4.89E+12
Am-241     5.92E+08
Cm-242     1.32E+11
Cm-244     1.42E+10


USER INPUT IS READ FROM UNIT 25
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                   RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "EARLY" INPUT FILE
       *
    1  MIEANAM1001 'EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES'
    2  DCF_FILE001 'DOSDATA.INP'  (DCF file of MACCS 1.5.11.1)
       *
```

```
    *             ORGNAM         ORGFLG
    *
 3  MIORGDEF001  'A-SKIN'        .TRUE.
 4  MIORGDEF002  'A-RED MARR'    .TRUE.
 5  MIORGDEF003  'A-LUNGS'       .TRUE.
 6  MIORGDEF004  'A-THYROIDH'    .TRUE.
 7  MIORGDEF005  'A-STOMACH'     .TRUE.
 8  MIORGDEF006  'A-LOWER LI'    .FALSE.  (does not contribute to early fatalities)
 9  MIORGDEF007  'L-EDEWBODY'    .TRUE.
10  MIORGDEF008  'L-RED MARR'    .TRUE.
11  MIORGDEF009  'L-BONE SUR'    .TRUE.
12  MIORGDEF010  'L-BREAST'      .TRUE.
13  MIORGDEF011  'L-LUNGS'       .TRUE.
14  MIORGDEF012  'L-THYROID'     .TRUE.
15  MIORGDEF013  'L-LOWER LI'    .TRUE.
16  MIORGDEF014  'L-BLAD WAL'    .TRUE.
17  MIORGDEF015  'L-LIVER'       .FALSE.
18  MIORGDEF016  'L-THYROIDH'    .TRUE.
    *
    * FLAG TO INDICATE THAT THIS IS THE LAST PROGRAM IN THE SERIES TO BE RUN
    *
19  MIENDAT2001  .FALSE.    (SET THIS VALUE TO .TRUE. TO SKIP CHRONC)
    *
    * DISPERSION MODEL OPTION CODE:  1  *  STRAIGHT LINE
    *                                2  *  WIND-SHIFT WITH ROTATION
    *                                3  *  WIND-SHIFT WITHOUT ROTATION
    *
20  MIIPLUME001  2
    *
    * NUMBER OF FINE GRID SUBDIVISIONS USED BY THE MODEL
    *
21  MINUMFIN001  7    (3, 5 OR 7 ALLOWED)
    *
    * LEVEL OF DEBUG OUTPUT REQUIRED, NORMAL RUNS SHOULD SPECIFY ZERO
    *
22  MIIPRINT001  0
    *
    * LOGICAL FLAG SIGNIFYING THAT THE BREAKDOWN OF RISK BY WEATHER CATEGORY
    * BIN ARE TO BE PRESENTED TO SHOW THEIR RELATIVE CONTRIBUTION TO THE MEAN
    *
    *             RISBIN
    *
23  MIRISCAT001   .FALSE.
    *
    * FLAG INDICATING IF WIND-ROSES FROM ATMOS ARE TO BE OVERRIDDEN
    *
24  MIOVRRID001  .FALSE.  (USE THE WIND ROSE CALCULATED FOR EACH WEATHER BIN)
    ********************************************************************************
    * POPULATION DISTRIBUTION DATA BLOCK, LOADED BY INPOPU, STORED IN /POPDAT/
    *
25  PDPOPFLG001  FILE
    *
    *PDPOPFLG001  UNIFORM
    *PDIBEGIN001  1   (SPATIAL INTERVAL AT WHICH POPULATION BEGINS)
    *PDPOPDEN001  50. (POPULATION DENSITY (PEOPLE PER SQUARE KILOMETER))
    ********************************************************************************
    * SHIELDING AND EXPOSURE FACTORS, LOADED BY INDFAC, STORED IN /EADFAC/
    *
    * THREE VALUES OF EACH PROTECTION FACTOR ARE SUPPLIED,
```

```
    * ONE FOR EACH TYPE OF ACTIVTY:
    *
    * ACTIVITY TYPE:
    *     1 - EVACUEES WHILE MOVING
    *     2 - NORMAL ACTIVITY IN SHELTERING AND EVACUATION ZONE
    *     3 - SHELTERED ACTIVITY
    *
    * CLOUD SHIELDING FACTOR
    *
    *    SITE        GG   PB   SEQ  SUR  ZION
    *    SHELTERING  0.7  0.5  0.65 0.6  0.5
    *
    *            EVACUEES  NORMAL  SHELTER
    *
26  SECSFACT001      1.     0.75     0.6   *  SURRY SHELTERING VALUE
    *
    * PROTECTION FACTOR FOR INHALATION
    *
27  SEPROTIN001      1.     0.41      0.33  * VALUES FOR NORMAL ACTIVITY AND
    *                                         SHELTERING SELECTED BY NRC STAFF
    *
    * BREATHING RATE (CUBIC METERS PER SECOND)
    *
28  SEBRRATE001  2.66E-4  2.66E-4  2.66E-4
    *
    * SKIN PROTECTION FACTOR
    *
29  SESKPFAC001  1.0      0.41     0.33    * VALUES FOR NORMAL ACTIVITY AND
    *                                        SHELTERING SELECTED BY NRC STAFF
    *
    * GROUND SHIELDING FACTOR
    *
    *    SITE        GG   PB   SEQ  SUR  ZION
    *    SHELTERING  0.25 0.1  0.2  0.2  0.1
    *
30  SEGSHFAC001      0.5    0.4    0.2   * VALUE FOR NORMAL ACTIVITY SELECTED BY
    *                                      NRC STAFF
    *
    * RESUSPENSION INHALATION MODEL CONCENTRATION COEFFICIENT (/METER)
    *
    *   RESCON = 1.E-4 IS APPROPRIATE FOR MECHANICAL RESUSPENSION BY VEHICLES.
    *   RESHAF = 2.11 DAYS CAUSES 1.E-4 TO DECAY IN ONE WEEK TO 1.E-5, THE VALUE
    *   OF RESCON USED IN THE FIRST TERM OF THE LONG-TERM RESUSPENSION EQUATION
    *   USED IN CHRONC.
    *
31  SERESCON001   1.E-4     (RESUSPENSION IS TURNED ON)
    *
    * RESUSPENSION CONCENTRATION COEFFICIENT HALF-LIFE (SEC)
    *
32  SERESHAF001   1.82E5    (2.11 DAYS)
    ********************************************************************************
    * EVACUATION ZONE DATA BLOCK, LOADED BY EVNETW, STORED IN /NETWOR/, /EOPTIO/
    *
    * SPECIFIC DESCRIPTION OF THE EMERGENCY RESPONSE SCENARIO BEING USED
    *
33  EZEANAM2001  'NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE'
    *
    * THE TYPE OF WEIGHTING TO BE APPLIED TO THE EMERGENCY RESPONSE SCENARIOS
    * YOU MUST SUPPLY A VALUE OF 'TIME' OR 'PEOPLE'
```

```
    *
34  EZWTNAME001  'PEOPLE'
    *
    * WEIGHTING FRACTION APPLICABLE TO THIS SCENARIO
    *
35  EZWTFRAC001  1.00
    *
    * LAST RING IN THE MOVEMENT ZONE
    *
36  EZLASMOV001     0   (A ZERO TURNS OFF THE EVACUATION MODEL)
    *
    ***********************************************************************
    * SHELTER AND RELOCATION ZONE DATA BLOCK, LOADED BY INPEMR,
    *                                          STORED IN /INPSRZ/, /RELOCA/
    *
    * DURATION OF THE EMERGENCY PHASE (SECONDS FROM PLUME ARRIVAL)
    *
37  SRENDEMP001  604800.   (ONE WEEK)
    *
    * CRITICAL ORGAN FOR RELOCATION DECISIONS
    *
38  SRCRIORG001 'L-EDEWBODY'
    *
    * HOT SPOT RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)
    *
39  SRTIMHOT001  43200.    (ONE-HALF DAY)
    *
    * NORMAL RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)
    *
40  SRTIMNRM001  86400.    (ONE DAY)
    *
    * HOT SPOT RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
    *
41  SRDOSHOT001  0.5    (50 REM DOSE TO WHOLE BODY IN 1 WEEK TRIGGERS RELOCATION)
    *
    * NORMAL RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
    *
42  SRDOSNRM001  0.25   (25 REM DOSE TO WHOLE BODY IN 1 WEEK TRIGGERS RELOCATION)
    ********************************************************************************
    * EARLY FATALITY MODEL PARAMETERS, LOADED BY INEFAT, STORED IN /EFATAL/
    *
    * NUMBER OF EARLY FATALITY EFFECTS
    *
43  EFNUMEFA001   2
    *
    *            ORGNAM       EFFACA   EFFACB   EFFTHR
    *
44  EFATAGRP001 'A-RED MARR'      3.8      5.0    1.5
45  EFATAGRP002 'A-LUNGS'        10.0      7.0    5.0
    ********************************************************************************
    * EARLY INJURY MODEL PARAMETERS, LOADED BY INEINJ, STORED IN /EINJUR/
    *
    * NUMBER OF EARLY INJURY EFFECTS
    *
46  EINUMEIN001  7
    *
    *            EINAME           ORGNAM   EISUSC EITHRE EIFACA EIFACB
    *
47  EINJUGRP001 'PRODROMAL VOMIT' 'A-STOMACH'  1.     .5     2.     3.
```

```
48  EINJUGRP002 'DIARRHEA'        'A-STOMACH'  1.     1.     3.     2.5
49  EINJUGRP003 'PNEUMONITIS'     'A-LUNGS'    1.     5.    10.     7.
50  EINJUGRP004 'SKIN ERYTHEMA'   'A-SKIN'     1.     3.     6.     5.
51  EINJUGRP005 'TRANSEPIDERMAL'  'A-SKIN'     1.    10.    20.     5.
52  EINJUGRP006 'THYROIDITIS'     'A-THYROIDH' 1.    40.   240.     2.
53  EINJUGRP007 'HYPOTHYROIDISM'  'A-THYROIDH' 1.     2.    60.     1.3
    ********************************************************************************
    * ACUTE EXPOSURE CANCER PARAMETERS, LOADED BY INACAN STORED IN /ACANCR/.
    *
    * NUMBER OF ACUTE EXPOSURE CANCER EFFECTS
    *
54  LCNUMACA001   7
    *
    * THRESHOLD DOSE FOR APPLYING THE DOSE DEPENDENT REDUCTION FACTOR
    *
55  LCDDTHRE001   0.2  (LOWEST DOSE FOR WHICH DDREFA WILL BE APPLIED)
    *
    * DOSE THRESHOLD FOR LINEAR DOSE RESPONSE (Sv)
    *
56  LCACTHRE001   0.0  (LINEAR-QUADRATIC MODEL IS NOT BEING USED)
    *
    *            ACNAME     ORGNAM  ACSUSC DOSEFA DOSEFB CFRISK   CIRISK  DDREFA
    *
57  LCANCERS001 'LEUKEMIA' 'L-RED MARR'  1.0   1.0   0.0   9.70E-3   0.0     2.0
58  LCANCERS002 'BONE'     'L-BONE SUR'  1.0   1.0   0.0   9.00E-4   0.0     2.0
59  LCANCERS003 'BREAST'   'L-BREAST'    1.0   1.0   0.0   5.40E-3   1.7E-2  1.0
60  LCANCERS004 'LUNG'     'L-LUNGS'     1.0   1.0   0.0   1.55E-2   0.0     2.0
61  LCANCERS005 'THYROID'  'L-THYROIDH'  1.0   1.0   0.0   7.20E-4   7.2E-3  1.0
62  LCANCERS006 'GI'       'L-LOWER LI'  1.0   1.0   0.0   3.36E-2   0.0     2.0
63  LCANCERS007 'OTHER'    'L-EDEWBODY'  1.0   1.0   0.0   2.76E-2   0.0     2.0
    ********************************************************************************
    * RESULT 1 OPTIONS BLOCK, LOADED BY INOUT1, STORED IN /INOUT1/
    * TOTAL NUMBER OF A GIVEN EFFECT (LATENT CANCER, EARLY DEATH, EARLY INJURY)
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
64  TYPE1NUMBER    4
    *
65  TYPE1OUT001    'ERL FAT/TOTAL'                1  15   NOCCDF (0 TO 50 MILES)
66  TYPE1OUT009    'CAN FAT/TOTAL'                1  15   NOCCDF
67  TYPE1OUT019    'CAN FAT/TOTAL'                1  11   NOCCDF (0 TO 10 MILES)
68  TYPE1OUT020    'ERL FAT/TOTAL'                1  11          (0 TO 10 MILES)
    *******************************************************************************
    * RESULT 2 OPTIONS BLOCK, LOADED BY INOUT2, STORED IN /INOUT2/
    * FURTHEST DISTANCE AT WHICH A GIVEN RISK OF EARLY DEATH IS EXCEEDED.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
69  TYPE2NUMBER  0
    *
    *            FATALITY RISK THRESHOLD
    *
    *TYPE2OUT001  0.
    ********************************************************************************
    * RESULT 3 OPTIONS BLOCK, LOADED BY INOUT3, STORED IN /INOUT3/
    * NUMBER OF PEOPLE WHOSE DOSE TO A GIVEN ORGAN EXCEEDS A GIVEN THRESHOLD.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
```

```
70  TYPE3NUMBER  0
    *
    *               ORGAN NAME   DOSE THRESHOLD (Sv)
    *
    *TYPE3OUT001    'A-RED MARR'        1.5
    *TYPE3OUT002    'A-LUNGS'           5.0
    *TYPE3OUT003    'L-EDEWBODY'        0.05
    ********************************************************************************
    * RESULT 4 OPTIONS BLOCK, LOADED BY INOUT4, STORED IN /INOUT4/
    * 360 DEGREE AVERAGE RISK OF A GIVEN EFFECT AT A GIVEN DISTANCE.
    *
    * POSSIBLE TYPES OF EFFECTS ARE:
    *
    *   'ERL FAT/TOTAL'
    *   'ERL INJ/INJURY NAME'
    *   'CAN FAT/CANCER NAME'
    *   'CAN FAT/TOTAL'
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
71  TYPE4NUMBER  3
    *
    *            RADIAL INDEX   TYPE OF EFFECT
    *
72  TYPE4OUT001       1         'ERL FAT/TOTAL'
73  TYPE4OUT002       2         'ERL FAT/TOTAL'
74  TYPE4OUT003       3         'ERL FAT/TOTAL'
    ********************************************************************************
    * RESULT 5 OPTIONS BLOCK, LOADED BY INOUT5, STORED IN /INOUT5/
    *
    * TOTAL POPULATION DOSE TO A GIVEN ORGAN BETWEEN TWO DISTANCES.
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
75  TYPE5NUMBER     1
    *
    *             ORGAN      I1DIS5     I2DIS5
    *
76  TYPE5OUT001 'L-EDEWBODY'      1         15     NOCCDF    (0-50 MILES)
    ********************************************************************************
    * RESULT 6 OPTIONS BLOCK, LOADED BY INOUT6, STORED IN /INOUT6/
    *
    * CENTERLINE DOSE TO AN ORGAN VS DIST BY PATHWAY, PATHWAY NAMES ARE AS FOLLOWS:
    *
    *  PATHWAY NAME:
    *    'CLD'     - CLOUDSHINE
    *    'GRD'     - GROUNDSHINE
    *    'INH ACU' - "ACUTE DOSE EQUIVALENT" FROM DIRECT INHALATION OF THE CLOUD
    *    'INH LIF' - "LIFETIME DOSE COMMITMENT" FROM DIRECT INHALATION OF THE CLOUD
    *    'RES ACU' - "ACUTE DOSE EQUIVALENT" FROM RESUSPENSION INHALATION
    *    'RES LIF' - "LIFETIME DOSE COMMITMENT" FROM RESUSPENSION INHALATION
    *    'TOT ACU' - "ACUTE DOSE EQUIVALENT" FROM ALL PATHWAYS
    *    'TOT LIF' - "LIFETIME DOSE COMMITMENT" FROM ALL PATHWAYS
    *
    * NUMBER OF DESIRED RESULTS OF THIS TYPE
    *
77  TYPE6NUMBER     0
    *
    *             ORGNAM        PATHNM      I1DIS6   I2DIS6
```

```
       *
       *TYPE6OUT001  'A-RED MARR'    'TOT ACU'      1       19     (0-50 MILES)
       *TYPE6OUT002  'A-LUNGS'       'TOT ACU'      1       19     (0-50 MILES)
       *TYPE6OUT003  'L-EDEWBODY'    'TOT LIF'      1       26     (0-1000 MILES)
       ********************************************************************************
       * RESULT 7 OPTIONS BLOCK, LOADED BY INOUT7, STORED IN /INOUT7/
       *
       * CENTERLINE RISK OF A GIVEN EFFECT VS DISTANCE
       *
       * NUMBER OF DESIRED RESULTS OF THIS TYPE
       *
   78  TYPE7NUMBER   0
       *
       *                    NAME           I1DIS7       I2DIS7
       *
       *TYPE7OUT001     'ERL FAT/TOTAL'        1           19       (0-50 MILES)
       *TYPE7OUT002     'CAN FAT/TOTAL'        1           26       (0-1000 MILES)
       ********************************************************************************
       * RESULT 8 OPTIONS BLOCK, LOADED BY INOUT8, STORED IN /INOUT8/
       *
       * POPULATION WEIGHTED FATALITY RISK BETWEEN 2 DISTANCES
       *
       * NUMBER OF DESIRED RESULTS OF THIS TYPE
       *
   79  TYPE8NUMBER   2
       *
       *                NAME       I1DIS8  I2DIS8
       *
   80  TYPE8OUT001 'ERL FAT/TOTAL'   1       3     NOCCDF
   81  TYPE8OUT002 'CAN FAT/TOTAL'   1      11     NOCCDF  (0-10 MILES)
       ********************************************************************************
       * RESULT A OPTIONS BLOCK, LOADED BY INOUTA, STORED IN /INOUTA/
       *
       * peak dose to a given organ
       *
       *            NUMA
   82  TYPEANUMBER   0
       *
       *              ORGNAM    I1DISA  I2DISA
       *TYPEAOUT001 'L-EDEWBODY'  1       15
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE

NUMBER OF RECORDS READ                          =  341
NUMBER OF BLANK OR COMMENT RECORDS READ         =  258
NUMBER OF TERMINATOR RECORDS                    =    1
NUMBER OF RECORDS PROCESSED                     =   82
     NUMBER OF PROCESSED RECORDS DUPLICATED     =    0
     NUMBER OF PROCESSED RECORDS SORTED         =   82
****************************************************************************************************



The list of defined organs is as follows (A- is ACUTE and L- is LIFETIME):
   A-SKIN
   A-RED MARR
```

```
   A-LUNGS
   A-THYROIDH
   A-STOMACH
   L-EDEWBODY
   L-RED MARR
   L-BONE SUR
   L-BREAST
   L-LUNGS
   L-THYROID
   L-LOWER LI
   L-BLAD WAL
   L-THYROIDH
Am using a DOSFAC/DOSFAC2/IDCF2 dose factor file

READING FROM A DOSE CONVERSION FILE WITH THE FOLLOWING HEADER:
MACCS File DOSDATA.INP: Changed by D. CHANIN25-JUN-92, 09:53:47
Seven new organs added with MACCS Version 1.5.11.1

NO EVACUATION REQUESTED


USING THE FOLLOWING SITE DATA FILE:

MACCS2 Site Data File for Indian Point Energy Center
SITE FILE
  15 SPATIAL INTERVALS
  16 WIND DIRECTIONS
   7 CROP CATEGORIES
   4 WATER PATHWAY ISOTOPES
   1 WATERSHEDS
  21 ECONOMIC REGIONS
 SPATIAL DISTANCES     KILOMETERS
    0.3219    1.6093    3.2187    4.8280    6.4374    8.0467    9.6561   11.2654
   12.8748   14.4841   16.0935   32.1869   48.2804   64.3739   80.4674
 POPULATION
        6.        0.      271.     2059.     2501.      909.      931.     1223.
     1389.     1503.     1696.    22955.    30654.    39620.    51057.0
       16.        7.      170.     1943.     2912.     2051.     1177.     1388.
     1577.     1798.     1913.    28140.    39917.    56226.    67213.0
       17.      193.      883.     2131.     2964.     3843.     3910.     3059.
     2464.     1998.     1915.    29419.    53692.    62559.    41261.0
       17.      364.     1275.     2132.     2977.     3453.     4507.     5282.
     6140.     6960.     7279.    74856.   119073.   152175.   176338.0
       17.      390.     1218.     2138.     2934.     3792.     4424.     5513.
     5587.     7201.     8076.   118335.   156720.   200581.   208394.0
       17.      409.     1256.     2136.     2970.     3592.     3698.     3857.
     5734.     6783.     7409.   121515.   144267.    54180.    34361.0
       17.      410.     1274.     2138.     2872.     3808.     4537.     5279.
     6284.     7194.     8060.   111946.    87735.   236426.   379990.0
       17.      360.     1268.     1645.      882.      495.       15.     1442.
      948.     1911.     3214.    98326.   481703.  1380249.  1218170.0
       17.      400.      701.      246.      124.      620.     1538.     3253.
     4129.     4455.     5138.   135211.  1164596.  3732339.  3164306.0
       17.      377.      562.      500.     1700.     2882.     3544.     4187.
     4873.     5517.     6159.   202605.   395389.   922649.  1034467.0
       17.      217.      187.     1566.     2274.     2916.     3574.     4188.
     4361.     5358.     6138.   183372.   276902.   197362.   246076.0
        9.        0.      620.     1623.     2197.     2924.     3550.     4014.
     4196.     4255.     4335.    64428.   209197.   109102.    85849.0
```

```
       3.        0.      855.     1602.     2267.     2815.     2368.     1787.
    1423.     1775.     2030.    32026.    50974.    61380.    57384.0
       2.        0.      938.     1624.     2245.     1341.     1135.     1419.
    1505.     1756.     2071.    32528.    54577.    57977.    29719.0
       2.       45.      974.     1589.     1933.      972.     1140.     1351.
    1541.     1781.     2093.    32572.    54557.    24046.    22317.0
       3.       50.      809.     1051.     1587.      740.     1204.     1407.
    1620.     1787.     2028.    31660.    32569.    27599.    34374.0
 LAND FRACTION
 0.37 0.00 0.23 0.96 0.99 0.94 0.78 0.87 0.85 0.81 0.82 0.83 0.94 0.94 0.93
 0.92 0.02 0.13 0.91 0.97 0.98 1.00 1.00 0.98 0.99 0.94 0.95 0.99 0.99 0.98
 1.00 0.47 0.69 1.00 0.99 1.00 0.98 0.96 0.95 1.00 0.94 0.91 0.94 0.95 0.96
 1.00 0.89 0.99 1.00 0.99 0.90 0.96 0.95 0.96 0.96 0.97 0.91 0.92 0.95 0.98
 1.00 0.95 0.95 1.00 0.98 0.99 0.94 0.99 0.87 0.99 0.99 0.92 0.97 0.97 0.78
 1.00 1.00 0.98 1.00 0.99 0.93 0.79 0.69 0.89 0.93 0.91 0.97 0.95 0.27 0.12
 1.00 1.00 0.99 1.00 0.96 0.99 0.96 0.95 0.98 0.99 0.99 0.93 0.53 0.48 0.98
 1.00 0.88 0.99 0.77 0.29 0.13 0.00 0.26 0.16 0.30 0.43 0.77 0.70 0.79 0.82
 1.00 0.97 0.55 0.12 0.05 0.21 0.43 0.77 0.85 0.81 0.83 0.84 0.87 0.81 0.59
 1.00 0.92 0.44 0.31 0.75 0.99 0.99 0.99 1.00 1.00 1.00 0.99 0.99 0.93 0.92
 1.00 0.53 0.18 0.96 1.00 1.00 1.00 0.99 0.89 0.97 0.99 0.98 0.93 0.90 0.94
 0.52 0.00 0.64 1.00 0.97 1.00 0.99 0.95 0.91 0.92 0.94 0.94 0.93 0.97 0.94
 0.19 0.00 0.88 0.99 1.00 1.00 1.00 0.98 0.86 0.95 0.97 0.97 0.98 0.97 0.97
 0.13 0.00 0.96 1.00 1.00 0.99 0.94 0.99 0.91 0.94 0.99 0.98 0.99 0.97 0.95
 0.14 0.14 1.00 0.98 0.99 0.98 0.94 0.94 0.93 0.95 1.00 0.98 0.99 0.99 0.96
 0.20 0.16 0.83 0.57 0.65 0.75 0.99 0.98 0.98 0.95 0.97 0.96 0.96 0.99 0.96
 REGION INDEX
202120202014141414131406060606
202120202014141414141414060606
202020202020201414141414060303
202020202020202020202020010104
202020202020202020202020010104
202020202020202020202020010117
202020202020202020202020011217
202020202020212020202020201212
202020202116161616161616021511
202020161616161616161602020510
202016161616161616161616080707
202116161616161616161613080909
202116161616131313131313130909
202116161613131313131313131318
201616161613131313131313131818
201616162013131313131313191919
 WATERSHED INDEX
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

```
 CROP SEASON AND SHARE
   1 PASTURE               90. 270.  0.0162
   2 STORED FORAGE        150. 240.  0.0480
   3 GRAINS               150. 240.  0.0079
   4 GRN LEAFY VEGETABLES 150. 240.  0.0005
   5 OTHER FOOD CROPS     150. 240.  0.0036
   6 LEGUMES AND SEEDS    150. 240.  0.0002
   7 ROOTS AND TUBERS     150. 240.  0.0018
 WATERSHED DEFINITION  -- INITIAL AND ANNUAL WASHOFF AND INGESTION FACTORS
   1 Sr-89                           5.00E-06
   2 Sr-90                           5.00E-06
   3 Cs-134                          5.00E-06
   4 Cs-137                          5.00E-06
 REGIONAL ECONOMIC DATA
  01 FAIRFIELD      0.032 .008    5831.0   66592.0  287881.0
  02 BERGEN         0.009 .000   14568.0  124496.0  262186.0
  03 LITCHFIELD     0.159 .371     795.0   22373.0  186016.0
  04 NEWHAVEN       0.067 .029    5439.0   36942.0  192427.0
  05 ESSEX          0.002 .000   11903.0  120139.0  197400.0
  06 DUTCHESS       0.219 .207     698.0   16206.0  169417.0
  07 MORRIS         0.057 .006    6005.0   67365.0  277661.0
  08 PASSAIC        0.013 .000    9836.0   81944.0  161864.0
  09 SUSSEX         0.226 .311     483.0   18496.0  165741.0
  10 UNION          0.003 .000   91646.0  243939.0  209708.0
  11 KINGS          0.000 .000       0.0       0.0  123701.0
  12 NASSAU         0.006 .000   18237.0   88422.0  239932.0
  13 ORANGE         0.207 .288    1516.0   13148.0  148873.0
  14 PUTNAM         0.045 .000     892.0   24525.0  180274.0
  15 QUEENS         0.000 .000       0.0       0.0  226728.0
  16 ROCKLAND       0.011 .047    6365.0   65755.0  203359.0
  17 SUFFOLK        0.058 .000   14567.0   54566.0  192471.0
  18 SULLIVAN       0.103 .233    1466.0    7911.0  139374.0
  19 ULSTER         0.116 .043    1019.0    9908.0  138739.0
  20 WESTCHESTR     0.036 .009    2206.0   39116.0  263389.0
  21 WATER          0.000 .000       0.0       0.0       0.0
POPULATION

>>The Record Identifier TYPEBNUMBER was not found:
>>Type B results not being generated



USER INPUT IS READ FROM UNIT 26
RECORD IDENTIFIER FIELDS  11 CHARACTERS LONG ARE EXPECTED.
THE FIRST 100 COLUMNS OF EACH INPUT RECORD ARE PROCESSED.
THE MAXIMUM NUMBER OF IDENTIFIER RECORDS THAT MAY BE SAVED AS THE BASE CASE IS  1000.

RECORD
NUMBER                                  RECORD

       * GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "CHRONC" INPUT FILE
       *
    1  CHCHNAME001 'CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model'
       ********************************************************************************
       * EMERGENCY RESPONSE COST DATA BLOCK
       *
       * DAILY COST FOR A PERSON WHO IS EVACUATED (DOLLARS/PERSON-DAY)
       *
    2  CHEVACST001  46.7   (INCLUDES FOOD AND HOUSING COSTS BUT NOT LOST INCOME)
```

```
    *
    * DAILY COST FOR A PERSON WHO IS RELOCATED (DOLLARS/PERSON-DAY)
    *
 3  CHRELCST001  46.7   (INCLUDES FOOD AND HOUSING COSTS BUT NOT LOST INCOME)
    ********************************************************************************
    * LONG TERM PROTECTIVE ACTION DATA BLOCK
    *
    * Duration of the intermediate phase period--at version 1.11c TMIPND is no
    * longer processed.  The new input variable DUR_INTPHAS is the period's
    * duration, not the time after plume arrival at which the period ends.
    *
 4  DUR_INTPHAS   0.0    (in seconds)   (no intermediate phase)
    *
    * LONG-TERM PHASE DOSE PROJECTION PERIOD, THE DURATION OF THE EXPOSURE
    * PERIOD OVER WHICH THE LONG-TERM DOSE CRITERION IS EVALUATED (SECONDS)
    *
 5  CHTMPACT001   1.58E8             (5 YEARS)
    *
    * DOSE CRITERION FOR INTERMEDIATE PHASE RELOCATION (Sv)
    *
 6  CHDSCRTI001   1.0E5              (NO INTERMEDIATE PHASE RELOCATION)
    *
    * DOSE CRITERION FOR LONG-TERM PHASE RELOCATION (Sv)
    *
 7  CHDSCRLT001    0.04
    *
    * CRITICAL ORGAN NAME FOR LONG-TERM ACTIONS
    *
 8  CHCRTOCR001 'L-EDEWBODY'
    *
    * Long Term Exposure Period    Previously permanently set to:
    *    one million years = 3.15 E13 seconds
    *    MACCS2 allowable range is 3.15E7 to 1.E10
    *
 9  CHEXPTIM001    9.45E8
    ********************************************************************************
    * DECONTAMINATION PLAN DATA BLOCK
    *
    * NUMBER OF LEVELS OF DECONTAMINATION
    *
10  CHLVLDEC001  2
    *
    * DECONTAMINATION TIMES CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
    *  (SECONDS)
    *
11  CHTIMDEC001   5.184E6  1.0368E7    (60, 120 DAYS)
    *
    * DOSE REDUCTION FACTORS CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
    *
12  CHDSRFCT001   3.      15.
    *
    * COST OF FARM DECONTAMINATION PER FARMLAND UNIT AREA (DOLLARS/HECTARE)
    *  FOR THE VARIOUS LEVELS OF DECONTAMINATION
    *
13  CHCDFRM0001   972.   2160.
    *
    * COST OF NONFARM DECONTAMINATION PER RESIDENT PERSON (DOLLARS/PERSON)
    *  FOR THE VARIOUS LEVELS OF DECONTAMINATION
    *
```

```
14  CHCDNFRM001   5184.   13824.
    *
    * FRACTION OF FARMLAND DECONTAMINATION COST DUE TO LABOR
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
15  CHFRFDL0001  .3      .35
    *
    * FRACTION OF NON-FARM DECONTAMINATION COST DUE TO LABOR
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
16  CHFRNFDL001  .7      .5
    *
    * FRACTION OF TIME WORKERS IN FARM AREAS SPEND IN CONTAMINATED AREAS
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
17  CHTFWKF0001  .10     .33
    *
    * FRACTION OF TIME WORKERS IN NON-FARM AREAS SPEND IN CONTAMINATED AREAS
    *  FOR THE VARIOUS DECONTAMINATION LEVELS
    *
18  CHTFWKNF001  .33     .33
    *
    * AVERAGE COST OF DECONTAMINATION LABOR (DOLLARS/MAN-YEAR)
    *
19  CHDLBCST001   60480.
    ********************************************************************************
    * INTERDICTION COST DATA BLOCK
    *
    * DEPRECIATION (DETERIORATION) RATE DURING INTERDICTION PERIOD (PER YEAR)
    *
20  CHDPRATE001    .20   (VALUE OBTAINED FROM WASH-1400, APPENDIX 6)
    *
    * INVESTMENT INCOME RETURN (DISCOUNT RATE) DURING INTERDICTION PERIOD (PER YEAR)
    * THIS VALUE SHOULD BE DERIVED AS A REAL RETURN RATE ADJUSTED FOR INFLATION
    *
21  CHDSRATE001    .12   (VALUE OBTAINED FROM WASH-1400, APPENDIX 6)
    *
    * POPULATION RELOCATION COST (DOLLARS/PERSON):
    *  ALTERNATIVE HOUSING, MOVING COSTS, AND LOST INCOME FOR PEOPLE IN
    *  AREAS WHICH REQUIRE DECONTAMINATION, INTERDICTION, OR CONDEMNATION
    *
22  CHPOPCST001   8640.
    ********************************************************************************
    * GROUNDSHINE WEATHERING DEFINITION DATA BLOCK
    *
    * NUMBER OF TERMS IN THE GROUNDSHINE WEATHERING RELATIONSHIP (EITHER 1 OR 2)
    *
23  CHNGWTRM001   2
    *
    * GROUNDSHINE WEATHERING COEFFICIENTS
    *
24  CHGWCOEF001   0.5    0.5            (JON HELTON)
    *
    * HALF LIVES CORRESPONDING TO THE GROUNDSHINE WEATHERING COEFFICIENTS (S)
    *
25  CHTGWHLF001   1.6E7  2.8E9          (JON HELTON)
    ********************************************************************************
    * RESUSPENSION WEATHERING DEFINITION DATA BLOCK
    *
```

```
    * NUMBER OF TERMS IN THE RESUSPENSION WEATHERING RELATIONSHIP
    *
26  CHNRWTRM001    3
    *
    * RESUSPENSION CONCENTRATION COEFFICIENTS   (/ METER)
    *  RELATIONSHIP BETWEEN GROUND CONCENTRATION AND INSTANTANEOUS AIR CONC.
    *
27  CHRWCOEF001  1.0E-5   1.0E-7   1.0E-9  (VALUES HERE SELECTED BY JON HELTON)
    *
    * HALF-LIVES CORRESPONDING TO THE RESUSPENSION CONCENTRATION COEFFICIENTS (S)
    *
28  CHTRWHLF001  1.6E7    1.6E8    1.6E9   (6 MONTHS, 5 YEARS, 50 YEARS)
    ********************************************************************************
    * SITE REGION DESCRIPTION DATA BLOCK
    *
    * FRACTION OF AREA THAT IS LAND IN THE REGION
    *
29  CHFRACLD001   0.95   (ROUGH GUESS VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * FRACTION OF LAND DEVOTED TO FARMING IN THE REGION
    *
30  CHFRCFRM001   0.382  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * AVERAGE VALUE OF ANNUAL FARM PRODUCTION IN THE REGION (DOLLARS/HECTARE)
    *  (CASH RECEIPTS FROM FARMING PLUS VALUE OF HOME CONSUMPTION)/(LAND IN FARMS)
    *
31  CHFRMPRD001   371.0  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * FRACTION OF FARM PRODUCTION RESULTING FROM DAIRY PRODUCTION IN THE REGION
    *  (VALUE OF MILK PRODUCED)/(CASH RECEIPTS FROM FARMING PLUS HOME CONSUMPTION)
    *
32  CHDPFRCT001   0.198  (VIRGINIA STATE VALUE, SITE FILE OVERRIDES THIS VALUE)
    *
    * VALUE OF FARM WEALTH (DOLLARS/HECTARE)
    *  (AVERAGE VALUE PER HECTARE OF FARM LAND AND BUILDINGS TO 100 MILES)
    *
33  CHVALWF0001    50071.
    *
    * FRACTION OF FARM WEALTH IN IMPROVEMENTS FOR THE REGION
    *
34  CHFRFIM0001   0.25
    *
    * NON-FARM WEALTH, PROPERTY AND IMPROVEMENTS FOR THE REGION (DOLLARS/PERSON)
    *  THE VALUE OF ALL RESIDENTIAL, BUSINESS, AND PUBLIC ASSETS WHICH WOULD BE
    *  LOST IN THE EVENT OF PERMANENT INTERDICTION (CONDEMNATION) OF THE AREA
    *
35  CHVALWNF001    208838.
    *
    * FRACTION OF NON-FARM WEALTH IN IMPROVEMENTS FOR THE REGION
    *
36  CHFRNFIM001   0.8
    *****************************************************************************
37  CHFDPATH001 'NEW'
    *
    * name of the COMIDA2 binary output file
    *
38  BIN_FILE001 'SAMP_A.BIN'   (revised data file of 8/12/95)
    *
    * Dose limits triggering first year crop disposal of the separate
```

```
    * milk and non-milk components of the diet, corresponding in purpose,
    * more or less, to the MACCS 1.5 input variables PSCMLK and PSCOTH
    *
    * For NUREG-1150 calculations, the maximum allowable ground concentrations for
    * production of milk and non-milk crops contaminated by an accident occurring
    * in the growing season were derived based on an assumed maximum allowable
    * dose of 5 rem effective or 15 rem thyroid, per the 1982 FDA guidance that's
    * reprinted in the 1992 EPA PAG Manual.  For purposes of comparison against
    * the prior results, it is being assumed, for simplicity, that milk and
    * non-milk crops contribute equally to the first year dose.  Thus, the 5 rem
    * effective dose limit used in NUREG-1150 is equally split between milk and
    * non-milk crops, with 2.5 rem allowed for each.  Similarly, the 15 rem
    * thyroid limit is split into 7.5 and 7.5 rem for the milk and non-milk
    * portions of the diet.
    *
    *             effective     thyroid  (doses in sieverts)
39  DOSEMILK001    0.025          0.075
40  DOSEOTHR001    0.025          0.075
    *
    * Annual dose limits for the subsequent year's (i.e., after the first year)
    * interdiction of BOTH the milk and non-milk (combined) components of the diet
    *
    * Note: the long-term food critera, GCMAXR, used for NUREG-1150 wre based on
    * an ingestion dose integrated from zero to infinity.  It is not possible to
    * translate those parameter values into corresponding annual dose limits, as is
    * required by the COMIDA2-based food model.  The "total" dose limits used in
    * NUREG-1150 for "root uptake", 0.5 rem effective and 1.5 rem thyroid, are used
    * here as annual dose limits for interdiction of food production in years the
    * years subsequent to the accident.
    *
    *             effective     thyroid  (doses in sieverts)
41  DOSELONG001    0.005          0.015
    *
    * NUMBER OF NUCLIDES IN THE WATER INGESTION PATHWAY MODEL
    *
42  CHNUMWPI001    4
    *
    * TABLE OF NUCLIDE DEFINITIONS IN THE WATER INGESTION PATHWAY MODEL
    *
    * IF A SITE DATA FILE IS DEFINED, THE DATA DEFINING THE WATERSHED INGESTION
    *  FACTOR IS SUPERSEDED BY THE CORRESPONDING DATA IN THE SITE DATA FILE
    *
    *                        INITIAL     ANNUAL    INGESTION FACTOR
    *             WATER      WASHOFF     WASHOFF    ((Bq INGESTED)/
    *            NUCLIDE     FRACTION     RATE       (Bq IN WATER))
    *
    *             NAMWPI      WSHFRI      WSHRTA         WINGF
43  CHWTRISO001   Sr-89        0.01       0.004          5.0E-6
44  CHWTRISO002   Sr-90        0.01       0.004          5.0E-6
45  CHWTRISO003   Cs-134       0.005      0.001          5.0E-6
46  CHWTRISO004   Cs-137       0.005      0.001          5.0E-6
    ********************************************************************************
    * SPECIAL OPTIONS DATA BLOCK
    *
    * DETAILED PRINT OPTION CONTROL SWITCHES, LOOK AT THE CODE BEFORE TURNING ON!!
    *          KSWDSC
    *
47  CHKSWTCH001   0
    ********************************************************************************
```

```
    * DEFINE THE TYPE 9 RESULTS
    *
    * LONG-TERM POPULATION DOSE IN A GIVEN REGION BROKEN DOWN BY THE 12 PATHWAYS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
    *
48  TYPE9NUMBER   1      (UP TO 10 ALLOWED)
    *
    *              ORGNAM        INNER      OUTER
    *
49  TYPE9OUT001   'L-EDEWBODY'       1          15    (0-50 MILES)
    ********************************************************************************
    * ECONOMIC COST RESULTS IN A REGION BROKEN DOWN BY 12 TYPES OF COSTS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
    *
50  TYP10NUMBER   1      (UP TO 10 ALLOWED)
    *
    *              INNER      OUTER
    *
51  TYP10OUT001      1          15    (0-50 MILES)
    ********************************************************************************
    * DEFINE A FLAG THAT CONTROLS THE PRODUCTION OF THE ACTION DISTANCE RESULTS
    *
    * SPECIFYING A VALUE OF .TRUE. TURNS ON ALL 8 OF THE ACTION DISTANCE RESULTS,
    * A VALUE OF .FALSE. WILL ELIMINATE THE ACTION DISTANCE RESULTS FROM THE OUTPUT.
    *
52  TYP11FLAG11  .FALSE.
    ********************************************************************************
    * IMPACTED AREA/POPULATION RESULTS IN A REGION BROKEN DOWN BY 6 TYPES OF IMPACTS
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    * FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 8
    *
53  TYP12NUMBER   0      (UP TO 10 ALLOWED)
    *
    *              INNER      OUTER
    *
    *TYP12OUT001      1          15    (0-50 MILES)
    ********************************************************************************
    * Maximal annual food ingestion dose to an individual, requested by IXOT13
    *
    * This result is calculated after accounting for temporary or
    * permanent interdiction.  It is only available for the "new" food model.
    *
    * NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
    *
54  TYP13NUMBER   0   (UP TO 10 ALLOWED)
    *
    * IRAD13 is the radial spatial interval at which results are requested
    *
    * ORGN13 is the name of the organ for which results are requested
    *  (allowable values for ORGN13 are 'EFFECTIVE' or 'THYROID')
    *
    *          IRAD13   ORGN13
    *
    *TYP13OUT001   2    EFFECTIVE
```

```
       *TYP13OUT002   4    EFFECTIVE
       *TYP13OUT003   6    EFFECTIVE
       *TYP13OUT004   8    EFFECTIVE
       *TYP13OUT005  10    EFFECTIVE
       *TYP13OUT006  12    EFFECTIVE
       *TYP13OUT007  15    EFFECTIVE
       *TYP13OUT008   2    THYROID
       *TYP13OUT009   4    THYROID
       *TYP13OUT010   6    THYROID
       *TYP13OUT011   8    THYROID
       *TYP13OUT012  10    THYROID
       *TYP13OUT013  12    THYROID
       *TYP13OUT014  15    THYROID
       .
******** TERMINATOR RECORD ENCOUNTERED -- END OF BASE CASE USER INPUT ********


USER INPUT PROCESSING SUMMARY - BASE CASE

NUMBER OF RECORDS READ                            =  318
NUMBER OF BLANK OR COMMENT RECORDS READ           =  263
NUMBER OF TERMINATOR RECORDS                      =    1
NUMBER OF RECORDS PROCESSED                       =   54
     NUMBER OF PROCESSED RECORDS DUPLICATED       =    0
     NUMBER OF PROCESSED RECORDS SORTED           =   54
****************************************************************************************************


COMIDA2 binary file header =
COMIDA2 01/14/2004 13:06:02   Version 1.11.1, 01/12/2004

COMIDA2 descriptive title  =
MACCS File DOSDATA.INP: Changed by D. CHANIN25-JUN-92, 09:53:47

Seven new organs added with MACCS Version 1.5.11.1


A SITE DATA FILE IS BEING USED FOR BOTH "EARLY" AND "CHRONC"

 7 CANCER EFFECTS ARE DEFINED IN THE MODEL.
    INDEX  CANCER EFFECT                   ORGAN       ALPHA       BETA     CFRISK     CIRISK
       1                      LEUKEMIA     L-RED MARR   1.000E+00  0.000E+00  9.700E-03  0.000E+00
       2                      BONE         L-BONE SUR   1.000E+00  0.000E+00  9.000E-04  0.000E+00
       3                      BREAST       L-BREAST     1.000E+00  0.000E+00  5.400E-03  1.700E-02
       4                      LUNG         L-LUNGS      1.000E+00  0.000E+00  1.550E-02  0.000E+00
       5                      THYROID      L-THYROIDH   1.000E+00  0.000E+00  7.200E-04  7.200E-03
       6                      GI           L-LOWER LI   1.000E+00  0.000E+00  3.360E-02  0.000E+00
       7                      OTHER        L-EDEWBODY   1.000E+00  0.000E+00  2.760E-02  0.000E+00

  TIME OF HOTSPOT RELOCATION IS 4.3200E+04.
  TIME OF NORMAL RETURN IS  8.640E+04 AND THE EMERGENCY PHASE ENDS AT  6.048E+05.


GROUNDSHINE SHIELDING FACTOR   = 0.400

RESUSPENSION PROTECTION FACTOR = 0.410

BREATHING RATE (CUBIC M/S) =   2.660E-04
```

DISPERSION MODEL FLAG IS 2

WINDROSE PROBABILITIES BY WIND DIRECTION AND MET BIN NUMBER

BIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0.0826	0.0092	0.0092	0.0917	0.0826	0.1284	0.1651	0.1743	0.0917	0.0000	0.0092	0.0000	0.0000	0.0092	0.0000	0.1468
2	0.0659	0.0330	0.0220	0.0000	0.0220	0.0440	0.1538	0.0769	0.2747	0.0549	0.0000	0.0000	0.0000	0.0000	0.0000	0.2527
3	0.1147	0.0734	0.0550	0.0321	0.0092	0.0138	0.0046	0.0229	0.0321	0.0642	0.0596	0.0642	0.1147	0.1009	0.1422	0.0963
4	0.1583	0.0922	0.0414	0.0487	0.0472	0.0392	0.0465	0.0632	0.1089	0.1126	0.0712	0.0428	0.0196	0.0116	0.0254	0.0712
5	0.1236	0.0471	0.0206	0.0330	0.0671	0.1065	0.0989	0.1024	0.1919	0.1254	0.0288	0.0041	0.0018	0.0000	0.0029	0.0459
6	0.0750	0.0200	0.0069	0.0110	0.0399	0.1287	0.1913	0.1115	0.2230	0.1383	0.0172	0.0007	0.0000	0.0000	0.0007	0.0358
7	0.0548	0.0205	0.0137	0.0000	0.0205	0.0342	0.2740	0.0685	0.3425	0.1438	0.0000	0.0000	0.0000	0.0000	0.0000	0.0274
8	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.2000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.1179	0.0866	0.0755	0.0368	0.0221	0.0276	0.0239	0.0313	0.0810	0.1087	0.0608	0.0589	0.0405	0.0718	0.0810	0.0755
10	0.1882	0.0935	0.0646	0.0256	0.0167	0.0067	0.0089	0.0100	0.0468	0.1904	0.1626	0.0512	0.0245	0.0100	0.0134	0.0869
11	0.2271	0.0542	0.0034	0.0034	0.0068	0.0068	0.0034	0.0136	0.0441	0.4237	0.1627	0.0034	0.0000	0.0000	0.0000	0.0475
12	0.2982	0.0526	0.0351	0.0000	0.0000	0.0175	0.0000	0.0175	0.2456	0.2105	0.0351	0.0000	0.0000	0.0000	0.0000	0.0877
13	0.0506	0.0169	0.0393	0.0000	0.0225	0.0337	0.0449	0.0899	0.2247	0.2079	0.0730	0.0562	0.0337	0.0112	0.0449	0.0506
14	0.0167	0.0083	0.0083	0.0042	0.0083	0.0000	0.0000	0.0042	0.0542	0.6750	0.1708	0.0333	0.0042	0.0042	0.0000	0.0083
15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7069	0.2759	0.0000	0.0000	0.0000	0.0000	0.0172
16	0.1429	0.0000	0.0000	0.0000	0.0000	0.1429	0.0000	0.0000	0.0000	0.4286	0.2857	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
18	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
19	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
20	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
21	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
22	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
23	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
24	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
25	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
26	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
27	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
28	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
29	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
30	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
31	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
32	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
33	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
34	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
35	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
36	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
37	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
38	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
39	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
40	0.1472	0.0534	0.0245	0.0159	0.0101	0.0253	0.0108	0.0260	0.1212	0.2222	0.0765	0.0404	0.0382	0.0397	0.0339	0.1147
41	0.1279	0.0557	0.0301	0.0255	0.0346	0.0587	0.0717	0.0627	0.1402	0.1744	0.0677	0.0267	0.0182	0.0166	0.0209	0.0686

Processing a Site Data File with Header: MACCS2 Site Data File for Indian Point Energy Center

SITE FILE

THIS PROGRAM CURRENTLY ALLOWS THE GENERATION OF UP TO 394 RESULTS

YOU HAVE REQUESTED 10 RESULTS FROM "EARLY" COMPOSED OF:

4 RESULTS OF TYPE 1
0 RESULTS OF TYPE 2
0 RESULTS OF TYPE 3
3 RESULTS OF TYPE 4
1 RESULTS OF TYPE 5
0 RESULTS OF TYPE 6
0 RESULTS OF TYPE 7
2 RESULTS OF TYPE 8
0 RESULTS OF TYPE A
0 RESULTS OF TYPE B

YOU HAVE REQUESTED 30 RESULTS FROM "CHRONC" COMPOSED OF:

17 RESULTS OF TYPE 9
13 RESULTS OF TYPE 10
0 RESULTS OF TYPE 11
0 RESULTS OF TYPE 12
0 RESULTS OF TYPE 13

TRIAL	DAY	HOUR	BIN	PRBMET
1	152	16	1	3.11E-03

WARNING!! WARNING!! WARNING!! WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!! WARNING!! WARNING!! WARNING!!

```
 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
          2        156          2          16   2.00E-04
For Julian Day 156, selecting COMIDA2 results # 4 of 9
          3        156         14           2   2.60E-03
For Julian Day 156, selecting COMIDA2 results # 4 of 9
          4        158          4          28   1.23E-03
For Julian Day 158, selecting COMIDA2 results # 4 of 9
          5        158         14          23   1.86E-03
For Julian Day 158, selecting COMIDA2 results # 4 of 9
          6        163         16          27   5.42E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          7        163         17          25   4.00E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          8        163         18          24   1.43E-04
For Julian Day 163, selecting COMIDA2 results # 4 of 9
          9        163         22          18   1.34E-03
For Julian Day 163, selecting COMIDA2 results # 4 of 9
         10        164         11          21   5.76E-03
For Julian Day 164, selecting COMIDA2 results # 4 of 9
         11        165         13          28   1.23E-03
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         12        165         17          26   2.00E-04
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         13        165         20          24   1.43E-04
For Julian Day 165, selecting COMIDA2 results # 4 of 9
         14        166          5           3   6.22E-03
For Julian Day 166, selecting COMIDA2 results # 4 of 9
         15        166         12           4   3.93E-02
For Julian Day 166, selecting COMIDA2 results # 4 of 9
         16        169          4           9   1.55E-02
For Julian Day 169, selecting COMIDA2 results # 5 of 9
         17        170         10          30   1.14E-04
For Julian Day 170, selecting COMIDA2 results # 5 of 9
         18        179          8          40   1.14E-03
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         19        179         12          38   1.71E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         20        179         13          37   2.85E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         21        179         14          35   8.56E-04
For Julian Day 179, selecting COMIDA2 results # 5 of 9
         22        180          1          15   1.66E-03
For Julian Day 180, selecting COMIDA2 results # 5 of 9
         23        180         21          10   2.56E-02
For Julian Day 180, selecting COMIDA2 results # 5 of 9
         24        184          4          14   6.85E-03
For Julian Day 184, selecting COMIDA2 results # 5 of 9
         25        193          9           6   4.15E-02
For Julian Day 193, selecting COMIDA2 results # 6 of 9
         26        196         13          27   5.42E-04
For Julian Day 196, selecting COMIDA2 results # 6 of 9
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        27        196          14          26   2.00E-04
For Julian Day 196, selecting COMIDA2 results # 6 of 9
        28        197           3          24   1.43E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        29        197           6          30   1.14E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        30        197           7          29   5.99E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        31        197          14          25   4.00E-04
For Julian Day 197, selecting COMIDA2 results # 6 of 9
        32        199          24          34   8.28E-04
For Julian Day 199, selecting COMIDA2 results # 6 of 9
        33        200           2          33   4.00E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        34        200           6          31   2.00E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        35        200           7          30   1.14E-04
For Julian Day 200, selecting COMIDA2 results # 6 of 9
        36        203          12          28   1.23E-03
For Julian Day 203, selecting COMIDA2 results # 6 of 9
        37        206           2          15   1.66E-03
For Julian Day 206, selecting COMIDA2 results # 6 of 9
        38        206           7          11   8.42E-03
For Julian Day 206, selecting COMIDA2 results # 6 of 9
        39        208           3          22   9.70E-03
For Julian Day 208, selecting COMIDA2 results # 6 of 9
        40        212           5          20   2.08E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        41        212           6          19   2.71E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        42        212          13          17   8.28E-03
For Julian Day 212, selecting COMIDA2 results # 6 of 9
        43        213           1           3   6.22E-03
For Julian Day 213, selecting COMIDA2 results # 6 of 9
        44        216          17          39   6.28E-04
For Julian Day 216, selecting COMIDA2 results # 6 of 9
        45        216          19          35   8.56E-04
For Julian Day 216, selecting COMIDA2 results # 6 of 9
        46        218          15           5   4.85E-02
For Julian Day 218, selecting COMIDA2 results # 6 of 9
        47        219          21          27   5.42E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        48        219          22          26   2.00E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        49        219          23          25   4.00E-04
For Julian Day 219, selecting COMIDA2 results # 6 of 9
        50        228          16          40   1.14E-03
For Julian Day 228, selecting COMIDA2 results # 7 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
        51        228          22          39   6.28E-04
For Julian Day 228, selecting COMIDA2 results # 7 of 9
        52        228          23          39   6.28E-04
For Julian Day 228, selecting COMIDA2 results # 7 of 9
        53        229           1          38   1.71E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
        54        229           2          38   1.71E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
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        55        229          3          37   2.85E-04
For Julian Day 229, selecting COMIDA2 results # 7 of 9
        56        245         12          24   1.43E-04
For Julian Day 245, selecting COMIDA2 results # 7 of 9
        57        246          6          21   5.76E-03
For Julian Day 246, selecting COMIDA2 results # 7 of 9
        58        250          2          11   8.42E-03
For Julian Day 250, selecting COMIDA2 results # 7 of 9
        59        251         14           1   3.11E-03
For Julian Day 251, selecting COMIDA2 results # 7 of 9
        60        256         23          33   4.00E-04
For Julian Day 256, selecting COMIDA2 results # 7 of 9
        61        257          1          31   2.00E-04
For Julian Day 257, selecting COMIDA2 results # 8 of 9
        62        258         17          40   1.14E-03
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        63        258         22          38   1.71E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        64        258         23          37   2.85E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        65        258         24          36   1.14E-04
For Julian Day 258, selecting COMIDA2 results # 8 of 9
        66        259          2          29   5.99E-04
For Julian Day 259, selecting COMIDA2 results # 8 of 9
        67        260         24          10   2.56E-02
For Julian Day 260, selecting COMIDA2 results # 8 of 9
        68        263          9          40   1.14E-03
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        69        263         13          39   6.28E-04
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        70        263         18          35   8.56E-04
For Julian Day 263, selecting COMIDA2 results # 8 of 9
        71        264         23          13   5.08E-03
For Julian Day 264, selecting COMIDA2 results # 8 of 9
        72        271         19           9   1.55E-02
For Julian Day 271, selecting COMIDA2 results # 8 of 9
        73        272         11           2   2.60E-03
For Julian Day 272, selecting COMIDA2 results # 8 of 9
        74        273         15           4   3.93E-02
For Julian Day 273, selecting COMIDA2 results # 8 of 9
        75        276         24          14   6.85E-03
For Julian Day 276, selecting COMIDA2 results # 8 of 9
        76        282         12           1   3.11E-03
For Julian Day 282, selecting COMIDA2 results # 8 of 9
        77        284         13           5   4.85E-02
For Julian Day 284, selecting COMIDA2 results # 8 of 9
        78        288          6          13   5.08E-03
For Julian Day 288, selecting COMIDA2 results # 9 of 9
        79        295         23          12   1.63E-03
For Julian Day 295, selecting COMIDA2 results # 9 of 9
        80        299          2          15   1.66E-03
For Julian Day 299, selecting COMIDA2 results # 9 of 9
        81        301          3          14   6.85E-03
For Julian Day 301, selecting COMIDA2 results # 9 of 9
        82        302         10           7   4.17E-03
For Julian Day 302, selecting COMIDA2 results # 9 of 9
        83        311          8           4   3.93E-02
For Julian Day 311, selecting COMIDA2 results # 9 of 9
        84        314         10          22   9.70E-03
```

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For Julian Day 314, selecting COMIDA2 results # 9 of 9
        85       314         18         20   2.08E-03
For Julian Day 314, selecting COMIDA2 results # 9 of 9
        86       314         20         18   1.34E-03
For Julian Day 314, selecting COMIDA2 results # 9 of 9
        87       315          9         23   1.86E-03
For Julian Day 315, selecting COMIDA2 results # 9 of 9
        88       319          8         19   2.71E-03
For Julian Day 319, selecting COMIDA2 results # 9 of 9
        89       319         16         25   4.00E-04
For Julian Day 319, selecting COMIDA2 results # 9 of 9
        90       331         16         11   8.42E-03
For Julian Day 331, selecting COMIDA2 results # 9 of 9
        91       334         22         19   2.71E-03
For Julian Day 334, selecting COMIDA2 results # 1 of 9
        92       339         18         10   2.56E-02
For Julian Day 339, selecting COMIDA2 results # 1 of 9
        93       347         10          8   1.43E-04
For Julian Day 347, selecting COMIDA2 results # 1 of 9
        94       349          6         23   1.86E-03
For Julian Day 349, selecting COMIDA2 results # 1 of 9
        95       352          8         27   5.42E-04
For Julian Day 352, selecting COMIDA2 results # 1 of 9
        96       363          1          5   4.85E-02
For Julian Day 363, selecting COMIDA2 results # 1 of 9
        97       364          6          6   4.15E-02
For Julian Day 364, selecting COMIDA2 results # 1 of 9
        98       365         11         17   8.28E-03
For Julian Day 365, selecting COMIDA2 results # 1 of 9
        99         4         13         34   8.28E-04
For Julian Day   4, selecting COMIDA2 results # 1 of 9
       100         9          8         22   9.70E-03
For Julian Day   9, selecting COMIDA2 results # 1 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
       101        10          3         34   8.28E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       102        10          8         33   4.00E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       103        10         11         32   1.14E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       104        10         13         31   2.00E-04
For Julian Day  10, selecting COMIDA2 results # 1 of 9
       105        11          1         12   1.63E-03
For Julian Day  11, selecting COMIDA2 results # 1 of 9
       106        13         16          7   4.17E-03
For Julian Day  13, selecting COMIDA2 results # 1 of 9
       107        14         15          7   4.17E-03
For Julian Day  14, selecting COMIDA2 results # 1 of 9
       108        16         23          8   1.43E-04
For Julian Day  16, selecting COMIDA2 results # 1 of 9
       109        22         12          6   4.15E-02
For Julian Day  22, selecting COMIDA2 results # 1 of 9
       110        25         11          8   1.43E-04
For Julian Day  25, selecting COMIDA2 results # 1 of 9
       111        30         20         18   1.34E-03
For Julian Day  30, selecting COMIDA2 results # 1 of 9
       112        38          2         12   1.63E-03
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For Julian Day  38, selecting COMIDA2 results # 2 of 9
       113        40         2         11   8.42E-03
For Julian Day  40, selecting COMIDA2 results # 2 of 9
       114        41         2         15   1.66E-03
For Julian Day  41, selecting COMIDA2 results # 2 of 9
       115        44         5         16   2.00E-04
For Julian Day  44, selecting COMIDA2 results # 2 of 9
       116        45        11         16   2.00E-04
For Julian Day  45, selecting COMIDA2 results # 2 of 9
       117        49         8         21   5.76E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
       118        49         9         20   2.08E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
       119        49        17         17   8.28E-03
For Julian Day  49, selecting COMIDA2 results # 2 of 9
       120        55         4         13   5.08E-03
For Julian Day  55, selecting COMIDA2 results # 2 of 9
       121        56         2         28   1.23E-03
For Julian Day  56, selecting COMIDA2 results # 2 of 9
       122        56         9         26   2.00E-04
For Julian Day  56, selecting COMIDA2 results # 2 of 9
       123        58         2          9   1.55E-02
For Julian Day  58, selecting COMIDA2 results # 2 of 9
       124        58        24         31   2.00E-04
For Julian Day  58, selecting COMIDA2 results # 2 of 9
       125        59         1         30   1.14E-04
For Julian Day  59, selecting COMIDA2 results # 2 of 9
       126        71        15         29   5.99E-04
For Julian Day  71, selecting COMIDA2 results # 2 of 9
       127        78         4          8   1.43E-04
For Julian Day  78, selecting COMIDA2 results # 2 of 9
       128        78         9          6   4.15E-02
For Julian Day  78, selecting COMIDA2 results # 2 of 9
       129        86         3         13   5.08E-03
For Julian Day  86, selecting COMIDA2 results # 2 of 9
       130        88         2         29   5.99E-04
For Julian Day  88, selecting COMIDA2 results # 2 of 9
       131        95         6         19   2.71E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
       132        95         7         17   8.28E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
       133        95        10         12   1.63E-03
For Julian Day  95, selecting COMIDA2 results # 3 of 9
       134        97         2          9   1.55E-02
For Julian Day  97, selecting COMIDA2 results # 3 of 9
       135        97         3         10   2.56E-02
For Julian Day  97, selecting COMIDA2 results # 3 of 9
       136        97        20          7   4.17E-03
For Julian Day  97, selecting COMIDA2 results # 3 of 9
       137        99         5          3   6.22E-03
For Julian Day  99, selecting COMIDA2 results # 3 of 9
       138       100         1         21   5.76E-03
For Julian Day 100, selecting COMIDA2 results # 3 of 9
       139       105        16          2   2.60E-03
For Julian Day 105, selecting COMIDA2 results # 3 of 9
       140       112        17         23   1.86E-03
For Julian Day 112, selecting COMIDA2 results # 3 of 9
       141       120         6         16   2.00E-04
For Julian Day 120, selecting COMIDA2 results # 3 of 9
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       142        124          3         14   6.85E-03
For Julian Day 124, selecting COMIDA2 results # 3 of 9
       143        125         13          2   2.60E-03
For Julian Day 125, selecting COMIDA2 results # 3 of 9
       144        127         11          4   3.93E-02
For Julian Day 127, selecting COMIDA2 results # 3 of 9
       145        129          7         34   8.28E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
       146        129         12         33   4.00E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
       147        129         13         32   1.14E-04
For Julian Day 129, selecting COMIDA2 results # 3 of 9
       148        131         17         20   2.08E-03
For Julian Day 131, selecting COMIDA2 results # 3 of 9
       149        132         15          5   4.85E-02
For Julian Day 132, selecting COMIDA2 results # 3 of 9
       150        134         21         35   8.56E-04
For Julian Day 134, selecting COMIDA2 results # 3 of 9


     TRIAL        DAY       HOUR        BIN     PRBMET
       151        137         14          1   3.11E-03
For Julian Day 137, selecting COMIDA2 results # 4 of 9
       152        138         23         22   9.70E-03
For Julian Day 138, selecting COMIDA2 results # 4 of 9
       153        141          9         18   1.34E-03
For Julian Day 141, selecting COMIDA2 results # 4 of 9
       154        145          1         37   2.85E-04
For Julian Day 145, selecting COMIDA2 results # 4 of 9
       155        151          1          3   6.22E-03
For Julian Day 151, selecting COMIDA2 results # 4 of 9
```

WARNING!! WARNING!! WARNING!! WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!! WARNING!! WARNING!! WARNING!!

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  22.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
For Julian Day 158, selecting COMIDA2 results # 4 of 9
For Julian Day 158, selecting COMIDA2 results # 4 of 9
For Julian Day 163, selecting COMIDA2 results # 4 of 9
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For Julian Day  30, selecting COMIDA2 results # 1 of 9
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For Julian Day 141, selecting COMIDA2 results # 4 of 9
For Julian Day 145, selecting COMIDA2 results # 4 of 9
For Julian Day 151, selecting COMIDA2 results # 4 of 9
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WARNING!! WARNING!! WARNING!! WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!! WARNING!! WARNING!! WARNING!!

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  22.81 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
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For Julian Day 141, selecting COMIDA2 results # 4 of 9
For Julian Day 145, selecting COMIDA2 results # 4 of 9
For Julian Day 151, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
```

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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  23.58 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
For Julian Day 156, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


For Julian Day 152, selecting COMIDA2 results # 4 of 9
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For Julian Day 151, selecting COMIDA2 results # 4 of 9
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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


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WARNING!!  WARNING!!  WARNING!!  WARNING!!

THE TOTAL RELEASE DURATION EXCEEDS 20 HOURS.

THIS MAY CAUSE ERRONEOUS RESULTS TO BE PRODUCED.

WARNING!!  WARNING!!  WARNING!!  WARNING!!
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 WARNING!!  WARNING!!  WARNING!!  WARNING!!

A 10 HOUR RELEASE DURATION IS BEING USED BY ATMOS FOR CALCULATING
THE EXPANSION FACTOR OF PLUME # 1 INSTEAD OF THE USER-SUPPLIED  24.00 HOURS

 WARNING!!  WARNING!!  WARNING!!  WARNING!!


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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 1 OF 8:
NCF

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

12-NOV-09 13:50:14 PAGE 1

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.60E+00	3.13E+00	7.08E+00	8.51E+00	1.15E+01	1.26E+01	1.57E+01	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.42E+00	1.22E+00	2.49E+00	3.00E+00	3.20E+00	3.29E+00	4.58E+00	1.24E-06	147
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	8.04E+01	7.27E+01	1.44E+02	1.84E+02	2.53E+02	2.84E+02	3.49E+02	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.61E-06	3.31E-06	6.89E-06	7.74E-06	9.93E-06	1.01E-05	1.16E-05	1.24E-06	147

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 1 OF 8:
NCF

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

12-NOV-09 13:50:14 PAGE 2

		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	2.70E-01	2.49E-01	5.07E-01	6.26E-01	8.23E-01	9.01E-01	1.05E+00	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.13E-01	1.06E-01	2.08E-01	2.33E-01	3.00E-01	3.04E-01	3.56E-01	1.24E-06	147
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	5.77E+00	5.32E+00	1.02E+01	1.16E+01	1.56E+01	1.78E+01	2.26E+01	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	2.89E-07	2.65E-07	5.30E-07	5.96E-07	7.13E-07	7.27E-07	9.11E-07	1.24E-06	147

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 1 OF 8:
NCF

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

12-NOV-09 13:50:14 PAGE 3

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.33E+00	3.07E+00	6.73E+00	8.36E+00	1.12E+01	1.21E+01	1.46E+01	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.31E+00	1.15E+00	2.26E+00	2.56E+00	3.08E+00	3.16E+00	4.22E+00	1.24E-06	147
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	7.46E+01	7.05E+01	1.34E+02	1.72E+02	2.48E+02	2.81E+02	3.26E+02	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.32E-06	3.11E-06	6.04E-06	7.09E-06	8.15E-06	8.65E-06	1.07E-05	1.24E-06	147
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	7.46E+01	7.05E+01	1.34E+02	1.72E+02	2.48E+02	2.81E+02	3.26E+02	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	7.37E+01	7.04E+01	1.34E+02	1.72E+02	2.48E+02	2.81E+02	3.26E+02	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	8.47E-01	3.31E-01	2.72E+00	3.18E+00	3.80E+00	4.10E+00	6.68E+00	4.53E-05	62
LONG-TERM GROUNDSHINE DOSE		1.0000	7.14E+01	6.82E+01	1.27E+02	1.62E+02	2.35E+02	2.64E+02	3.16E+02	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	2.30E+00	2.08E+00	4.58E+00	5.80E+00	7.79E+00	8.40E+00	1.02E+01	1.00E-03	98
WATER INGESTION DOSE		1.0000	4.04E-02	3.51E-02	7.41E-02	8.28E-02	1.01E-01	1.03E-01	1.23E-01	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		0.7008	1.24E-02	1.07E-02	2.58E-02	3.13E-02	4.11E-02	4.62E-02	6.95E-02	8.99E-04	85
FARM-DEPENDENT DECONTAMINATION DOSE		0.7008	1.29E-06	1.08E-06	3.02E-06	4.82E-06	5.72E-06	6.07E-06	7.21E-06	8.99E-04	85
INGESTION OF GRAINS		1.0000	2.47E-02	7.94E-03	8.11E-02	1.04E-01	1.19E-01	1.26E-01	1.90E-01	4.53E-05	62
INGESTION OF LEAF VEG		1.0000	4.54E-02	1.19E-02	1.27E-01	1.78E-01	4.14E-01	5.11E-01	8.26E-01	4.53E-05	62
INGESTION OF ROOT CROPS		1.0000	3.27E-02	1.10E-02	1.02E-01	1.14E-01	1.47E-01	1.64E-01	2.48E-01	4.53E-05	62
INGESTION OF FRUITS		1.0000	4.82E-02	1.42E-02	1.56E-01	2.07E-01	2.44E-01	2.62E-01	3.65E-01	4.53E-05	62
INGESTION OF LEGUMES		1.0000	2.80E-02	8.65E-03	9.39E-02	1.06E-01	1.24E-01	1.33E-01	2.12E-01	4.53E-05	62
INGESTION OF BEEF		1.0000	2.54E-01	8.75E-02	8.04E-01	1.02E+00	1.16E+00	1.23E+00	1.80E+00	4.87E-05	4
INGESTION OF MILK		1.0000	2.93E-01	8.65E-02	9.65E-01	1.07E+00	1.25E+00	1.34E+00	2.14E+00	4.87E-05	4
INGESTION OF POULTRY		1.0000	6.61E-02	1.89E-02	1.81E-01	2.57E-01	5.45E-01	6.14E-01	1.05E+00	4.53E-05	62
INGESTION OF OTHER MEAT CROPS		1.0000	1.50E-02	7.13E-03	3.52E-02	4.60E-02	9.99E-02	1.09E-01	1.98E-01	4.53E-05	62
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		0.9069	2.95E+05	3.04E+05	4.68E+05	9.73E+05	1.07E+06	1.11E+06	1.36E+06	5.55E-05	29
POP.-DEPENDENT COSTS		0.7008	2.79E+05	3.03E+05	4.40E+05	9.73E+05	NOT-FOUND	NOT-FOUND	1.24E+06	4.62E-02	1
FARM-DEPENDENT COSTS		0.9069	1.52E+04	1.71E+03	4.39E+04	7.41E+04	1.33E+05	1.62E+05	1.64E+05	4.79E-03	77
POP.-DEPENDENT DECONTAMINATION COST		0.7008	5.97E+04	7.06E+04	9.15E+04	2.16E+05	NOT-FOUND	NOT-FOUND	2.64E+05	4.62E-02	1
FARM-DEPENDENT DECONTAMINATION COST		0.7008	4.78E+01	6.38E+01	9.12E+01	1.62E+02	NOT-FOUND	NOT-FOUND	2.11E+02	4.62E-02	1
POP.-DEPENDENT INTERDICTION COST		0.7008	2.20E+05	3.03E+05	4.33E+05	7.65E+05	NOT-FOUND	NOT-FOUND	9.73E+05	4.62E-02	1
FARM-DEPENDENT INTERDICTION COST		0.8986	1.19E+04	1.23E+03	3.21E+04	5.33E+04	1.13E+05	1.27E+05	1.27E+05	4.79E-03	77
POP.-DEPENDENT CONDEMNATION COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
FARM-DEPENDENT CONDEMNATION COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
EMERGENCY PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

ECONOMIC COST MEASURES ($) 0-80.5 km	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
MILK DISPOSAL COST	0.8597	3.40E+01	1.66E+00	9.69E+01	1.62E+02	4.14E+02	5.12E+02	1.09E+04	4.53E-06	147
CROP DISPOSAL COST	0.8514	3.19E+03	2.65E+02	9.70E+03	1.50E+04	3.30E+04	3.61E+04	3.62E+04	4.79E-03	77

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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 2 OF 8:
EARLY HIGH

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

12-NOV-09 13:50:14 PAGE 5

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.06E+04	1.85E+04	6.89E+04	1.03E+05	1.57E+05	NOT-FOUND	1.60E+05	9.30E-03	77
CAN FAT/TOTAL	0-16.1 km	1.0000	4.66E+03	4.12E+03	7.69E+03	8.71E+03	1.08E+04	1.14E+04	1.49E+04	2.28E-04	120
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	5.08E+05	2.92E+05	1.19E+06	1.50E+06	2.08E+06	2.16E+06	2.55E+06	2.00E-04	43
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.14E-02	1.06E-02	1.86E-02	2.16E-02	2.80E-02	3.06E-02	3.80E-02	2.28E-04	120

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 2 OF 8:
EARLY HIGH

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

12-NOV-09 13:50:14 PAGE 6		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.9876	9.67E+01	4.41E+01	2.90E+02	3.20E+02	3.77E+02	4.04E+02	5.88E+02	1.33E-05	121
CAN FAT/TOTAL	0-80.5 km	1.0000	1.92E+04	1.17E+04	4.42E+04	6.22E+04	1.03E+05	NOT-FOUND	1.15E+05	9.30E-03	77
CAN FAT/TOTAL	0-16.1 km	1.0000	4.31E+03	3.73E+03	7.46E+03	8.51E+03	1.07E+04	1.13E+04	1.48E+04	2.28E-04	120
ERL FAT/TOTAL	0-16.1 km	0.9876	9.67E+01	4.41E+01	2.90E+02	3.20E+02	3.77E+02	4.04E+02	5.88E+02	1.33E-05	121
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.9876	1.46E-01	1.21E-01	1.98E-01	2.01E-01	2.02E-01	2.03E-01	2.05E-01	6.28E-04	69
ERL FAT/TOTAL	0.3-1.6 km	0.8314	1.80E-02	5.13E-03	5.10E-02	5.32E-02	5.89E-02	6.15E-02	7.16E-02	6.28E-04	69
ERL FAT/TOTAL	1.6-3.2 km	0.3506	4.25E-04	0.00E+00	1.03E-03	1.59E-03	7.41E-03	8.18E-03	1.06E-02	1.23E-03	121
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	2.52E+05	1.42E+05	6.19E+05	8.32E+05	1.37E+06	NOT-FOUND	1.39E+06	9.30E-03	77
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.9876	5.79E-03	2.66E-03	1.74E-02	2.08E-02	2.38E-02	2.52E-02	3.48E-02	1.33E-05	121
CAN FAT/TOTAL	0-16.1 km	1.0000	1.10E-02	1.05E-02	1.81E-02	2.12E-02	2.66E-02	2.94E-02	3.80E-02	2.28E-04	120

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  DATE AND TIME OF RUN = MACCS2 12-NOV-09  13:50:14   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
  "ATMOS"  DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
  "EARLY"  DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
  "CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM  2 OF  8:
    EARLY HIGH

RESULTS FROM THE "CHRONC" MODULE ALONE

    COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

12-NOV-09  13:50:14    PAGE   7          PROB                          QUANTILES                                  PEAK       PEAK  PEAK
                                       NON-ZERO   MEAN      50TH      90TH      95TH      99TH     99.5TH     CONS       PROB  TRIAL
HEALTH EFFECTS CASES
 CAN FAT/TOTAL             0-80.5 km  1.0000  1.14E+04  6.21E+03  2.70E+04  3.09E+04  3.56E+04  3.78E+04  5.26E+04  2.00E-04   43
 CAN FAT/TOTAL             0-16.1 km  1.0000  3.50E+02  3.25E+02  4.95E+02  5.49E+02  6.90E+02  7.06E+02  7.35E+02  2.57E-04  151

POPULATION DOSE (Sv)
 L-EDEWBODY  TOT LIF       0-80.5 km  1.0000  2.56E+05  1.29E+05  6.20E+05  7.69E+05  1.03E+06  1.06E+06  1.19E+06  2.00E-04   43

POPULATION WEIGHTED RISK
 CAN FAT/TOTAL             0-16.1 km  0.9714  3.86E-04  3.46E-04  6.58E-04  7.70E-04  1.02E-03  1.07E-03  1.28E-03  2.57E-04  151

L-EDEWBODY  POP. DOSE (Sv)    0-80.5 km
 TOTAL LONG-TERM PATHWAYS DOSE          1.0000  2.56E+05  1.29E+05  6.20E+05  7.69E+05  1.03E+06  1.06E+06  1.19E+06  2.00E-04   43
 LONG-TERM DIRECT EXPOSURE PATHWAYS     1.0000  2.07E+05  1.00E+05  5.05E+05  6.15E+05  7.43E+05  7.69E+05  9.07E+05  2.00E-04   43
 TOTAL INGESTION PATHWAYS DOSE          1.0000  2.62E+03  2.42E+03  4.25E+03  5.04E+03  5.81E+03  6.18E+03  7.47E+03  4.57E-04  120
 LONG-TERM GROUNDSHINE DOSE             1.0000  1.98E+05  1.00E+05  4.74E+05  5.97E+05  7.35E+05  7.58E+05  8.76E+05  2.00E-04   43
 LONG-TERM RESUSPENSION DOSE            1.0000  8.99E+03  4.24E+03  2.17E+04  2.39E+04  2.99E+04  3.02E+04  3.16E+04  1.49E-04   36
 WATER INGESTION DOSE                   1.0000  2.47E+03  2.30E+03  3.92E+03  4.60E+03  5.65E+03  6.04E+03  7.45E+03  4.57E-04  120
 POP.-DEPENDENT DECONTAMINATION DOSE    1.0000  4.60E+04  2.50E+04  1.11E+05  1.62E+05  2.32E+05  2.52E+05  3.43E+05  1.18E-03  100
 FARM-DEPENDENT DECONTAMINATION DOSE    1.0000  2.80E+01  1.10E+01  7.62E+01  8.87E+01  1.11E+02  1.19E+02  1.55E+02  3.71E-04  100
 INGESTION OF GRAINS                    1.0000  3.48E+00  1.29E+00  8.62E+00  1.34E+01  2.10E+01  2.18E+01  3.06E+01  1.09E-05   55
 INGESTION OF LEAF VEG                  1.0000  2.08E+01  8.88E+00  5.37E+01  6.12E+01  7.65E+01  8.20E+01  1.21E+02  2.40E-05   69
 INGESTION OF ROOT CROPS                1.0000  1.29E+01  4.93E+00  3.32E+01  3.88E+01  5.06E+01  5.16E+01  5.74E+01  8.56E-05  149
 INGESTION OF FRUITS                    1.0000  1.24E+01  5.11E+00  3.24E+01  4.12E+01  5.17E+01  5.29E+01  6.45E+01  1.09E-05   55
 INGESTION OF LEGUMES                   1.0000  2.39E+01  9.49E+00  6.26E+01  7.51E+01  1.01E+02  1.03E+02  1.15E+02  8.56E-05  149
 INGESTION OF BEEF                      1.0000  3.51E+01  1.12E+01  1.09E+02  1.56E+02  2.80E+02  4.20E+02  5.66E+02  8.28E-04  128
 INGESTION OF MILK                      1.0000  2.87E+01  1.13E+01  7.77E+01  1.23E+02  2.49E+02  5.03E+02  5.84E+02  8.28E-04  128
 INGESTION OF POULTRY                   1.0000  8.85E+00  3.01E+00  3.04E+01  3.82E+01  5.82E+01  6.64E+01  1.12E+02  2.40E-05   69
 INGESTION OF OTHER MEAT CROPS          1.0000  3.52E+00  1.18E+00  9.92E+00  1.59E+01  3.01E+01  3.33E+01  4.70E+01  4.57E-04   90

ECONOMIC COST MEASURES ($)    0-80.5 km
 TOTAL ECONOMIC COSTS                   1.0000  1.70E+11  9.63E+10  3.98E+11  4.97E+11  5.77E+11  6.14E+11  8.06E+11  1.18E-03  100
 POP.-DEPENDENT COSTS                   1.0000  1.69E+11  9.24E+10  3.98E+11  4.97E+11  5.77E+11  6.14E+11  8.06E+11  1.18E-03  100
 FARM-DEPENDENT COSTS                   1.0000  3.56E+08  1.82E+08  9.37E+08  1.02E+09  1.09E+09  1.12E+09  1.27E+09  1.71E-04  143
 POP.-DEPENDENT DECONTAMINATION COST    1.0000  4.12E+10  1.72E+10  1.04E+11  1.11E+11  1.30E+11  1.40E+11  1.93E+11  2.00E-04  137
 FARM-DEPENDENT DECONTAMINATION COST    1.0000  3.17E+07  1.37E+07  7.79E+07  8.94E+07  1.12E+08  1.20E+08  1.47E+08  7.13E-04  137
 POP.-DEPENDENT INTERDICTION COST       1.0000  1.20E+11  6.31E+10  3.10E+11  3.35E+11  4.01E+11  4.33E+11  6.56E+11  1.18E-03  100
 FARM-DEPENDENT INTERDICTION COST       1.0000  2.79E+08  1.05E+08  7.28E+08  7.67E+08  8.67E+08  9.14E+08  1.11E+09  1.71E-04  143
 POP.-DEPENDENT CONDEMNATION COST       1.0000  8.31E+09  5.62E+09  1.33E+10  3.17E+10  5.62E+10 NOT-FOUND  6.27E+10  6.33E-03    6
 FARM-DEPENDENT CONDEMNATION COST       1.0000  7.06E+06  4.49E+06  1.51E+07  2.23E+07  5.05E+07  5.11E+07  5.56E+07  1.84E-05    6
 EMERGENCY PHASE COST                   1.0000  9.95E+07  5.67E+07  1.98E+08  3.16E+08  4.12E+08  4.61E+08  1.52E+09  4.84E-05  146
 INTERMEDIATE PHASE COST                0.0000  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00  0.00E+00    0
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	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.65E+05	1.17E+05	2.82E+06	3.41E+06	5.00E+06	5.14E+06	6.29E+06	2.85E-05	76
CROP DISPOSAL COST	1.0000	3.77E+07	3.57E+07	5.88E+07	6.52E+07	7.49E+07	7.81E+07	8.95E+07	5.14E-04	76

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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 3 OF 8:
EARLY MEDIUM

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

12-NOV-09 13:50:14 PAGE 9		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	1.17E+04	7.80E+03	2.69E+04	3.33E+04	5.05E+04	NOT-FOUND	5.65E+04	9.30E-03	77
CAN FAT/TOTAL	0-16.1 km	1.0000	1.87E+03	1.62E+03	3.08E+03	3.40E+03	4.26E+03	4.70E+03	5.41E+03	5.71E-05	75
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	2.00E+05	1.17E+05	4.81E+05	6.50E+05	9.49E+05	NOT-FOUND	9.63E+05	9.30E-03	77
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	4.37E-03	3.82E-03	7.30E-03	8.29E-03	1.03E-02	1.06E-02	1.31E-02	5.71E-05	75

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 3 OF 8:
EARLY MEDIUM

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

12-NOV-09 13:50:14 PAGE 10

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.8842	9.24E+00	4.70E+00	2.40E+01	2.89E+01	3.10E+01	3.15E+01	3.61E+01	1.33E-05	121
CAN FAT/TOTAL	0-80.5 km	1.0000	6.13E+03	4.68E+03	1.18E+04	1.59E+04	2.93E+04	3.07E+04	3.85E+04	1.38E-05	147
CAN FAT/TOTAL	0-16.1 km	1.0000	1.57E+03	1.31E+03	2.56E+03	3.01E+03	3.39E+03	3.57E+03	4.97E+03	5.71E-05	75
ERL FAT/TOTAL	0-16.1 km	0.8842	9.24E+00	4.70E+00	2.40E+01	2.89E+01	3.10E+01	3.15E+01	3.61E+01	1.33E-05	121
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.8842	4.34E-02	2.93E-02	1.01E-01	1.04E-01	1.11E-01	1.14E-01	1.24E-01	6.28E-04	69
ERL FAT/TOTAL	0.3-1.6 km	0.1309	6.62E-05	0.00E+00	2.18E-04	5.17E-04	1.11E-03	1.34E-03	1.96E-03	1.23E-03	121
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	7.74E+04	5.15E+04	1.66E+05	2.49E+05	3.21E+05	3.32E+05	4.48E+05	1.38E-05	147
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.8842	5.54E-04	2.85E-04	1.14E-03	1.26E-03	1.57E-03	1.74E-03	2.17E-03	1.33E-05	121
CAN FAT/TOTAL	0-16.1 km	1.0000	4.03E-03	3.55E-03	6.65E-03	7.51E-03	9.37E-03	1.01E-02	1.27E-02	5.71E-05	75

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 3 OF 8:
EARLY MEDIUM

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

12-NOV-09 13:50:14 PAGE 11

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.57E+03	2.82E+03	1.38E+04	1.80E+04	2.71E+04	NOT-FOUND	2.75E+04	9.30E-03	149
CAN FAT/TOTAL	0-16.1 km	1.0000	2.95E+02	2.70E+02	4.65E+02	5.26E+02	6.30E+02	6.81E+02	7.40E+02	3.42E-04	72
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.22E+05	6.30E+04	3.07E+05	3.79E+05	5.95E+05	NOT-FOUND	6.05E+05	9.30E-03	149
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.40E-04	3.10E-04	5.14E-04	5.44E-04	6.23E-04	6.60E-04	7.68E-04	4.04E-06	7
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.22E+05	6.30E+04	3.07E+05	3.79E+05	5.95E+05	NOT-FOUND	6.05E+05	9.30E-03	149
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.09E+05	4.84E+04	2.87E+05	3.43E+05	4.92E+05	NOT-FOUND	5.49E+05	9.30E-03	149
TOTAL INGESTION PATHWAYS DOSE		1.0000	3.31E+02	2.72E+02	5.85E+02	6.73E+02	7.64E+02	7.97E+02	1.13E+03	9.24E-05	69
LONG-TERM GROUNDSHINE DOSE		1.0000	9.70E+04	4.59E+04	2.56E+05	3.22E+05	4.78E+05	NOT-FOUND	4.87E+05	9.30E-03	149
LONG-TERM RESUSPENSION DOSE		1.0000	1.22E+04	5.17E+03	3.18E+04	3.89E+04	6.09E+04	NOT-FOUND	6.21E+04	9.30E-03	149
WATER INGESTION DOSE		1.0000	1.90E+02	1.68E+02	3.17E+02	3.52E+02	4.49E+02	4.99E+02	5.78E+02	4.57E-04	120
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	1.30E+04	9.14E+03	2.64E+04	3.86E+04	5.63E+04	6.04E+04	8.54E+04	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	7.89E+00	3.18E+00	2.22E+01	2.95E+01	3.49E+01	3.74E+01	4.79E+01	3.85E-04	100
INGESTION OF GRAINS		1.0000	4.73E+00	1.08E+00	1.38E+01	1.86E+01	2.35E+01	2.54E+01	3.41E+01	5.66E-06	13
INGESTION OF LEAF VEG		1.0000	1.33E+01	4.82E+00	3.07E+01	5.80E+01	1.03E+02	1.09E+02	1.71E+02	3.35E-05	69
INGESTION OF ROOT CROPS		1.0000	7.02E+00	2.38E+00	2.20E+01	2.57E+01	3.14E+01	3.26E+01	4.58E+01	5.66E-06	13
INGESTION OF FRUITS		1.0000	1.01E+01	3.23E+00	3.20E+01	3.62E+01	4.81E+01	5.09E+01	6.68E+01	5.66E-06	13
INGESTION OF LEGUMES		1.0000	8.61E+00	3.58E+00	2.28E+01	2.72E+01	3.15E+01	3.24E+01	4.28E+01	5.66E-06	13
INGESTION OF BEEF		1.0000	5.34E+01	2.02E+01	1.31E+02	1.64E+02	2.32E+02	2.57E+02	3.51E+02	5.66E-06	13
INGESTION OF MILK		1.0000	2.67E+01	1.11E+01	7.21E+01	9.60E+01	1.46E+02	1.73E+02	3.12E+02	8.56E-05	112
INGESTION OF POULTRY		1.0000	1.30E+01	5.40E+00	3.44E+01	4.34E+01	6.40E+01	7.12E+01	1.06E+02	3.35E-05	69
INGESTION OF OTHER MEAT CROPS		1.0000	3.79E+00	1.70E+00	9.58E+00	1.23E+01	2.08E+01	2.48E+01	3.71E+01	4.57E-04	90
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	5.55E+10	2.73E+10	2.01E+11	2.07E+11	2.23E+11	2.30E+11	2.99E+11	1.38E-05	147
POP.-DEPENDENT COSTS		1.0000	5.53E+10	2.71E+10	2.01E+11	2.07E+11	2.23E+11	2.30E+11	2.99E+11	1.38E-05	147
FARM-DEPENDENT COSTS		1.0000	1.61E+08	6.90E+07	4.58E+08	5.60E+08	7.62E+08	8.51E+08	1.05E+09	7.13E-04	137
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.30E+10	6.50E+09	3.47E+10	5.06E+10	6.05E+10	6.54E+10	8.84E+10	6.23E-05	146
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.21E+07	5.28E+06	3.09E+07	3.29E+07	3.79E+07	4.03E+07	5.39E+07	1.96E-05	146
POP.-DEPENDENT INTERDICTION COST		1.0000	4.16E+10	1.86E+10	1.03E+11	1.15E+11	1.47E+11	1.63E+11	2.10E+11	1.38E-05	147
FARM-DEPENDENT INTERDICTION COST		1.0000	1.30E+08	4.38E+07	3.84E+08	5.06E+08	7.32E+08	7.84E+08	9.52E+08	7.13E-04	137
POP.-DEPENDENT CONDEMNATION COST		0.9938	6.64E+08	5.64E+08	1.19E+09	1.43E+09	2.10E+09	2.36E+09	4.31E+09	6.79E-06	51
FARM-DEPENDENT CONDEMNATION COST		0.9876	2.52E+05	2.11E+05	5.21E+05	6.85E+05	1.04E+06	1.10E+06	1.78E+06	2.49E-05	51
EMERGENCY PHASE COST		1.0000	2.24E+07	1.24E+07	5.76E+07	7.28E+07	1.02E+08	1.27E+08	3.77E+08	1.20E-03	92
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	6.07E+05	4.01E+04	1.99E+06	2.68E+06	3.76E+06	4.22E+06	6.26E+06	2.85E-05	76
CROP DISPOSAL COST	1.0000	1.78E+07	1.28E+07	4.03E+07	5.09E+07	6.44E+07	7.06E+07	8.38E+07	4.00E-04	76

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  DATE AND TIME OF RUN = MACCS2 12-NOV-09  13:50:14   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
  "ATMOS"  DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
  "EARLY"  DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
  "CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM  4 OF  8:
    EARLY LOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

                                                                                         FRACTION OF THE PEOPLE
                                                                                                         ------
    COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE                                            1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

    COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.
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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	2.60E+03	1.42E+03	6.23E+03	9.76E+03	1.11E+04	1.16E+04	1.44E+04	2.00E-04	43
CAN FAT/TOTAL	0-16.1 km	1.0000	3.60E+02	3.26E+02	5.72E+02	6.56E+02	7.93E+02	8.48E+02	9.34E+02	1.86E-03	74
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	5.21E+04	2.95E+04	1.38E+05	2.00E+05	2.25E+05	2.37E+05	3.06E+05	2.00E-04	43
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	8.52E-04	7.78E-04	1.26E-03	1.43E-03	1.95E-03	2.08E-03	2.23E-03	1.86E-03	74

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 4 OF 8:
EARLY LOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

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		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	6.72E+02	5.42E+02	1.27E+03	1.63E+03	2.11E+03	2.19E+03	3.05E+03	1.38E-05	147
CAN FAT/TOTAL	0-16.1 km	1.0000	2.39E+02	2.15E+02	3.82E+02	4.49E+02	5.73E+02	6.22E+02	7.04E+02	1.86E-03	74
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	9.88E+03	7.57E+03	2.16E+04	3.01E+04	3.31E+04	3.46E+04	4.94E+04	1.38E-05	147
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	6.12E-04	5.55E-04	1.04E-03	1.14E-03	1.43E-03	1.57E-03	1.80E-03	1.86E-03	74

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 4 OF 8:
EARLY LOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	1.93E+03	9.54E+02	4.79E+03	7.24E+03	1.03E+04	1.07E+04	1.24E+04	2.00E-04	43
CAN FAT/TOTAL	0-16.1 km	1.0000	1.21E+02	1.08E+02	1.70E+02	2.02E+02	2.23E+02	2.32E+02	2.96E+02	9.80E-05	84
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	4.22E+04	2.10E+04	1.03E+05	1.53E+05	2.14E+05	2.23E+05	2.71E+05	2.00E-04	43
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.40E-04	2.21E-04	3.28E-04	3.49E-04	4.03E-04	4.28E-04	5.40E-04	5.26E-05	40
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	4.22E+04	2.10E+04	1.03E+05	1.53E+05	2.14E+05	2.23E+05	2.71E+05	2.00E-04	43
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	4.13E+04	2.00E+04	1.03E+05	1.53E+05	2.14E+05	2.23E+05	2.71E+05	2.00E-04	43
TOTAL INGESTION PATHWAYS DOSE		1.0000	1.21E+02	6.11E+01	3.18E+02	3.50E+02	4.38E+02	4.82E+02	1.10E+03	2.85E-05	76
LONG-TERM GROUNDSHINE DOSE		1.0000	3.72E+04	1.67E+04	9.59E+04	1.33E+05	2.06E+05	2.13E+05	2.44E+05	2.00E-04	43
LONG-TERM RESUSPENSION DOSE		1.0000	4.03E+03	1.82E+03	1.03E+04	1.53E+04	2.13E+04	2.22E+04	2.66E+04	2.00E-04	43
WATER INGESTION DOSE		1.0000	2.50E+01	2.29E+01	4.08E+01	4.91E+01	5.75E+01	6.11E+01	7.62E+01	4.57E-04	120
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	8.06E+02	7.32E+02	1.31E+03	1.53E+03	2.14E+03	2.39E+03	3.10E+03	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	4.37E-01	2.56E-01	9.22E-01	1.37E+00	2.48E+00	2.88E+00	3.59E+00	5.71E-05	120
INGESTION OF GRAINS		1.0000	3.82E+00	7.27E-01	1.15E+01	1.34E+01	1.92E+01	2.18E+01	4.21E+01	2.85E-05	76
INGESTION OF LEAF VEG		1.0000	8.78E+00	1.54E+00	2.33E+01	5.04E+01	7.58E+01	8.61E+01	2.43E+02	2.85E-05	76
INGESTION OF ROOT CROPS		1.0000	5.14E+00	9.12E-01	1.71E+01	2.12E+01	2.59E+01	2.82E+01	5.48E+01	2.85E-05	76
INGESTION OF FRUITS		1.0000	7.56E+00	1.46E+00	2.55E+01	3.11E+01	3.81E+01	4.15E+01	8.07E+01	2.85E-05	76
INGESTION OF LEGUMES		1.0000	4.73E+00	1.26E+00	1.31E+01	1.67E+01	2.29E+01	2.49E+01	4.72E+01	2.85E-05	76
INGESTION OF BEEF		1.0000	3.51E+01	1.16E+01	1.05E+02	1.22E+02	1.70E+02	1.96E+02	2.72E+02	2.85E-05	76
INGESTION OF MILK		1.0000	1.88E+01	6.70E+00	5.22E+01	5.98E+01	7.84E+01	8.64E+01	1.44E+02	2.85E-05	76
INGESTION OF POULTRY		1.0000	9.53E+00	3.33E+00	2.69E+01	3.47E+01	5.43E+01	6.11E+01	1.76E+02	2.85E-05	76
INGESTION OF OTHER MEAT CROPS		1.0000	2.20E+00	8.84E-01	5.73E+00	7.21E+00	9.39E+00	1.11E+01	3.18E+01	2.85E-05	76
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	3.58E+09	2.78E+09	6.00E+09	6.79E+09	1.20E+10	1.57E+10	3.34E+10	1.04E-04	21
POP.-DEPENDENT COSTS		1.0000	3.53E+09	2.72E+09	5.99E+09	6.78E+09	1.20E+10	1.57E+10	3.34E+10	1.04E-04	21
FARM-DEPENDENT COSTS		1.0000	4.48E+07	1.35E+07	1.29E+08	1.71E+08	2.87E+08	3.10E+08	4.00E+08	8.56E-05	149
POP.-DEPENDENT DECONTAMINATION COST		1.0000	8.10E+08	6.27E+08	1.34E+09	1.56E+09	3.09E+09	3.98E+09	7.20E+09	1.04E-04	21
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.33E+06	4.36E+05	4.01E+06	5.12E+06	7.24E+06	7.95E+06	1.09E+07	2.90E-05	21
POP.-DEPENDENT INTERDICTION COST		1.0000	2.68E+09	1.90E+09	5.14E+09	5.78E+09	1.07E+10	1.49E+10	2.60E+10	1.04E-04	21
FARM-DEPENDENT INTERDICTION COST		1.0000	3.75E+07	6.80E+06	1.17E+08	1.47E+08	2.77E+08	3.07E+08	3.70E+08	8.56E-05	149
POP.-DEPENDENT CONDEMNATION COST		0.9584	3.34E+07	1.27E+07	1.05E+08	1.10E+08	1.25E+08	NOT-FOUND	1.25E+08	9.49E-03	4
FARM-DEPENDENT CONDEMNATION COST		0.9459	1.11E+04	4.21E+03	3.28E+04	7.08E+04	7.56E+04	NOT-FOUND	7.73E+04	5.72E-03	8
EMERGENCY PHASE COST		1.0000	1.85E+06	1.47E+06	3.67E+06	4.92E+06	6.45E+06	7.20E+06	1.23E+07	2.28E-04	120
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	2.53E+05	1.54E+04	9.60E+05	1.22E+06	1.99E+06	2.23E+06	3.15E+06	1.43E-04	149
CROP DISPOSAL COST	1.0000	5.69E+06	3.61E+06	1.30E+07	1.74E+07	3.55E+07	4.57E+07	4.64E+07	4.79E-03	149

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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 5 OF 8:
LATE HIGH

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	7.32E+03	4.09E+03	1.65E+04	2.10E+04	2.79E+04	3.11E+04	3.73E+04	1.20E-03	23
CAN FAT/TOTAL	0-16.1 km	1.0000	6.36E+02	5.89E+02	1.03E+03	1.07E+03	1.17E+03	1.22E+03	1.57E+03	5.71E-05	90
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.63E+05	9.05E+04	4.04E+05	5.13E+05	6.43E+05	7.08E+05	8.40E+05	1.20E-03	23
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.45E-03	1.23E-03	2.37E-03	2.72E-03	3.12E-03	3.20E-03	3.73E-03	5.71E-05	90

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SOURCE TERM 5 OF 8:
LATE HIGH

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

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		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.2844	9.35E-02	0.00E+00	3.32E-01	5.00E-01	8.97E-01	1.12E+00	2.22E+00	2.59E-04	30
CAN FAT/TOTAL	0-80.5 km	1.0000	1.65E+03	1.20E+03	3.39E+03	4.41E+03	5.89E+03	6.44E+03	7.73E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	4.18E+02	3.72E+02	7.46E+02	8.46E+02	1.02E+03	1.04E+03	1.18E+03	5.71E-05	90
ERL FAT/TOTAL	0-16.1 km	0.2844	9.35E-02	0.00E+00	3.32E-01	5.00E-01	8.97E-01	1.12E+00	2.22E+00	2.59E-04	30
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.2844	4.47E-04	0.00E+00	1.54E-03	2.10E-03	3.18E-03	3.81E-03	8.16E-03	5.99E-04	30
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	3.60E+04	2.83E+04	7.97E+04	1.04E+05	1.31E+05	1.45E+05	1.84E+05	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.2844	5.61E-06	0.00E+00	2.16E-05	3.00E-05	4.78E-05	5.72E-05	1.33E-04	2.59E-04	30
CAN FAT/TOTAL	0-16.1 km	1.0000	1.07E-03	1.01E-03	1.85E-03	2.07E-03	2.30E-03	2.40E-03	3.03E-03	5.71E-05	90

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SOURCE TERM  5 OF  8:
    LATE HIGH

RESULTS FROM THE "CHRONC" MODULE ALONE

    COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model
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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.67E+03	2.68E+03	1.42E+04	1.90E+04	2.36E+04	2.56E+04	3.20E+04	1.20E-03	23
CAN FAT/TOTAL	0-16.1 km	1.0000	2.18E+02	2.07E+02	3.11E+02	3.23E+02	3.53E+02	3.66E+02	6.18E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.27E+05	6.04E+04	3.35E+05	3.93E+05	5.37E+05	5.86E+05	7.16E+05	1.20E-03	23
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	3.84E-04	3.41E-04	6.05E-04	6.96E-04	7.45E-04	7.66E-04	1.13E-03	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.27E+05	6.04E+04	3.35E+05	3.93E+05	5.37E+05	5.86E+05	7.16E+05	1.20E-03	23
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.22E+05	5.66E+04	3.19E+05	3.74E+05	5.22E+05	5.72E+05	6.90E+05	1.20E-03	23
TOTAL INGESTION PATHWAYS DOSE		1.0000	3.94E+02	3.43E+02	6.98E+02	7.34E+02	8.20E+02	8.60E+02	1.06E+03	8.82E-05	126
LONG-TERM GROUNDSHINE DOSE		1.0000	1.19E+05	5.51E+04	3.16E+05	3.71E+05	5.20E+05	5.67E+05	6.75E+05	1.20E-03	23
LONG-TERM RESUSPENSION DOSE		1.0000	2.65E+03	1.20E+03	7.18E+03	8.37E+03	1.11E+04	1.22E+04	1.47E+04	1.20E-03	67
WATER INGESTION DOSE		1.0000	3.38E+02	3.00E+02	6.09E+02	7.05E+02	7.60E+02	7.84E+02	1.03E+03	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	4.87E+03	3.47E+03	1.06E+04	1.37E+04	2.24E+04	2.59E+04	3.42E+04	1.00E-03	98
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	3.33E+00	1.48E+00	1.01E+01	1.10E+01	1.33E+01	1.45E+01	2.01E+01	3.28E-04	98
INGESTION OF GRAINS		1.0000	1.97E+00	6.13E-01	6.59E+00	8.29E+00	1.07E+01	1.13E+01	1.64E+01	3.35E-05	51
INGESTION OF LEAF VEG		1.0000	4.27E+00	1.59E+00	1.16E+01	1.56E+01	3.06E+01	3.28E+01	4.90E+01	8.56E-05	77
INGESTION OF ROOT CROPS		1.0000	2.89E+00	1.12E+00	9.37E+00	1.07E+01	1.27E+01	1.37E+01	2.18E+01	2.40E-05	51
INGESTION OF FRUITS		1.0000	5.29E+00	2.38E+00	1.39E+01	1.99E+01	2.30E+01	2.44E+01	3.37E+01	2.40E-05	51
INGESTION OF LEGUMES		1.0000	3.23E+00	1.47E+00	9.25E+00	1.05E+01	1.20E+01	1.27E+01	2.00E+01	2.40E-05	51
INGESTION OF BEEF		1.0000	1.77E+01	7.10E+00	5.34E+01	7.45E+01	1.02E+02	1.08E+02	1.62E+02	2.29E-05	126
INGESTION OF MILK		1.0000	1.13E+01	4.00E+00	3.55E+01	5.08E+01	7.54E+01	8.26E+01	1.35E+02	2.29E-05	126
INGESTION OF POULTRY		1.0000	6.16E+00	2.47E+00	1.41E+01	1.89E+01	4.41E+01	5.12E+01	6.13E+01	8.56E-05	77
INGESTION OF OTHER MEAT CROPS		1.0000	2.98E+00	1.13E+00	1.02E+01	1.34E+01	2.07E+01	2.15E+01	2.62E+01	1.45E-04	88
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	4.61E+10	2.21E+10	1.30E+11	2.07E+11	2.41E+11	2.57E+11	2.99E+11	1.00E-03	98
POP.-DEPENDENT COSTS		1.0000	4.58E+10	2.20E+10	1.30E+11	2.07E+11	2.41E+11	2.57E+11	2.99E+11	1.00E-03	98
FARM-DEPENDENT COSTS		1.0000	2.45E+08	1.27E+08	7.15E+08	7.70E+08	9.14E+08	9.84E+08	1.06E+09	3.27E-05	150
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.06E+10	4.93E+09	2.97E+10	3.99E+10	5.84E+10	6.45E+10	8.84E+10	1.00E-03	98
FARM-DEPENDENT DECONTAMINATION COST		1.0000	9.48E+06	3.64E+06	2.69E+07	3.19E+07	3.98E+07	4.38E+07	5.39E+07	3.16E-04	98
POP.-DEPENDENT INTERDICTION COST		1.0000	3.39E+10	1.37E+10	1.00E+11	1.14E+11	1.54E+11	1.75E+11	2.10E+11	1.00E-03	98
FARM-DEPENDENT INTERDICTION COST		1.0000	2.02E+08	6.90E+07	6.32E+08	7.15E+08	7.68E+08	7.92E+08	9.90E+08	3.27E-05	150
POP.-DEPENDENT CONDEMNATION COST		1.0000	1.28E+09	1.08E+09	2.69E+09	3.27E+09	4.53E+09	5.04E+09	5.78E+09	1.20E-04	26
FARM-DEPENDENT CONDEMNATION COST		1.0000	4.24E+05	3.43E+05	9.08E+05	1.05E+06	1.26E+06	1.36E+06	3.22E+06	2.04E-05	146
EMERGENCY PHASE COST		1.0000	7.30E+06	7.02E+06	1.15E+07	1.28E+07	1.64E+07	1.82E+07	6.87E+07	1.84E-04	145
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.07E+05	1.14E+05	2.73E+06	3.38E+06	5.02E+06	5.16E+06	6.29E+06	3.40E-05	150
CROP DISPOSAL COST	1.0000	3.18E+07	3.01E+07	5.59E+07	6.10E+07	7.10E+07	7.23E+07	8.38E+07	2.16E-05	150

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"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 6 OF 8:
LATE MEDIUM

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	3.14E+03	1.56E+03	7.97E+03	1.04E+04	1.41E+04	1.61E+04	2.02E+04	1.26E-03	16
CAN FAT/TOTAL	0-16.1 km	1.0000	2.91E+02	2.61E+02	5.05E+02	5.32E+02	6.00E+02	6.32E+02	7.43E+02	5.71E-05	143
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.85E+04	3.58E+04	1.75E+05	2.53E+05	3.48E+05	3.78E+05	4.47E+05	1.26E-03	16
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	6.85E-04	6.11E-04	1.04E-03	1.09E-03	1.22E-03	1.28E-03	1.73E-03	5.71E-05	143

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 6 OF 8:
LATE MEDIUM

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	4.26E+02	3.61E+02	9.01E+02	1.07E+03	1.31E+03	1.43E+03	1.75E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.52E+02	1.30E+02	2.79E+02	3.09E+02	3.44E+02	3.60E+02	4.61E+02	1.14E-04	78
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	7.91E+03	7.09E+03	1.72E+04	2.11E+04	2.60E+04	2.84E+04	3.60E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	3.90E-04	3.46E-04	7.25E-04	7.78E-04	9.15E-04	9.81E-04	1.18E-03	1.14E-04	78

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DATE AND TIME OF RUN = MACCS2 12-NOV-09  13:50:14   VERSION 1.13.1:  last revised 1/8/04, K. McFadden
"ATMOS"  DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY"  DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model
```

SOURCE TERM 6 OF 8:
LATE MEDIUM

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	2.72E+03	1.28E+03	7.24E+03	9.47E+03	1.21E+04	1.32E+04	1.85E+04	3.71E-04	38
CAN FAT/TOTAL	0-16.1 km	1.0000	1.39E+02	1.18E+02	2.06E+02	2.18E+02	2.47E+02	2.61E+02	3.36E+02	9.80E-05	84
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	6.06E+04	2.93E+04	1.52E+05	2.16E+05	3.17E+05	3.35E+05	4.12E+05	3.71E-04	38
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.96E-04	2.81E-04	4.49E-04	5.08E-04	5.58E-04	5.82E-04	6.94E-04	2.45E-04	84
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	6.06E+04	2.93E+04	1.52E+05	2.16E+05	3.17E+05	3.35E+05	4.12E+05	3.71E-04	38
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	5.97E+04	2.83E+04	1.51E+05	2.15E+05	3.16E+05	3.34E+05	4.12E+05	3.71E-04	38
TOTAL INGESTION PATHWAYS DOSE		1.0000	1.44E+02	1.14E+02	2.59E+02	3.03E+02	3.39E+02	3.55E+02	4.70E+02	8.56E-05	71
LONG-TERM GROUNDSHINE DOSE		1.0000	5.74E+04	2.56E+04	1.40E+05	2.02E+05	3.13E+05	3.29E+05	3.95E+05	3.71E-04	38
LONG-TERM RESUSPENSION DOSE		1.0000	2.33E+03	1.04E+03	6.49E+03	8.92E+03	1.15E+04	1.24E+04	1.64E+04	3.71E-04	38
WATER INGESTION DOSE		1.0000	6.40E+01	5.84E+01	1.04E+02	1.09E+02	1.22E+02	1.28E+02	1.95E+02	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	7.19E+02	6.29E+02	1.20E+03	1.36E+03	1.81E+03	2.03E+03	2.41E+03	1.18E-03	100
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	4.64E-01	2.59E-01	9.81E-01	1.59E+00	2.65E+00	3.02E+00	4.06E+00	3.28E-05	145
INGESTION OF GRAINS		1.0000	2.86E+00	6.42E-01	1.00E+01	1.09E+01	1.32E+01	1.44E+01	2.16E+01	3.27E-05	150
INGESTION OF LEAF VEG		1.0000	5.47E+00	1.15E+00	1.53E+01	2.31E+01	5.04E+01	5.30E+01	6.13E+01	6.28E-04	67
INGESTION OF ROOT CROPS		1.0000	3.89E+00	8.76E-01	1.11E+01	1.23E+01	1.58E+01	1.76E+01	2.94E+01	3.27E-05	150
INGESTION OF FRUITS		1.0000	5.91E+00	1.60E+00	2.00E+01	2.15E+01	2.55E+01	2.75E+01	4.33E+01	3.27E-05	150
INGESTION OF LEGUMES		1.0000	3.57E+00	1.07E+00	1.06E+01	1.16E+01	1.44E+01	1.58E+01	2.52E+01	3.27E-05	150
INGESTION OF BEEF		1.0000	2.97E+01	1.25E+01	7.81E+01	9.48E+01	1.09E+02	1.13E+02	1.68E+02	5.66E-06	13
INGESTION OF MILK		1.0000	1.74E+01	7.47E+00	4.76E+01	6.04E+01	8.44E+01	9.46E+01	1.31E+02	4.57E-04	113
INGESTION OF POULTRY		1.0000	8.30E+00	2.87E+00	2.08E+01	2.88E+01	5.25E+01	5.66E+01	7.35E+01	6.28E-04	67
INGESTION OF OTHER MEAT CROPS		1.0000	2.78E+00	1.30E+00	7.58E+00	1.04E+01	1.35E+01	1.50E+01	2.06E+01	8.28E-04	97
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	6.06E+09	4.48E+09	1.14E+10	1.74E+10	3.11E+10	3.19E+10	3.64E+10	1.00E-04	101
POP.-DEPENDENT COSTS		1.0000	5.96E+09	4.38E+09	1.12E+10	1.73E+10	3.11E+10	3.19E+10	3.64E+10	1.00E-04	101
FARM-DEPENDENT COSTS		1.0000	1.00E+08	3.51E+07	3.19E+08	3.88E+08	5.35E+08	5.73E+08	7.19E+08	6.28E-04	23
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.34E+09	1.01E+09	3.10E+09	4.44E+09	7.31E+09	7.52E+09	8.50E+09	2.49E-04	4
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.95E+06	6.85E+05	5.75E+06	7.91E+06	1.07E+07	1.13E+07	1.55E+07	6.97E-05	4
POP.-DEPENDENT INTERDICTION COST		1.0000	4.41E+09	3.19E+09	9.92E+09	1.47E+10	2.13E+10	2.21E+10	2.78E+10	1.00E-04	101
FARM-DEPENDENT INTERDICTION COST		1.0000	8.49E+07	2.07E+07	3.01E+08	3.55E+08	5.08E+08	5.43E+08	6.61E+08	6.28E-04	23
POP.-DEPENDENT CONDEMNATION COST		0.9917	2.06E+08	1.29E+08	4.79E+08	6.07E+08	1.03E+09	NOT-FOUND	1.05E+09	6.64E-03	77
FARM-DEPENDENT CONDEMNATION COST		0.9917	3.77E+04	9.02E+03	8.29E+04	9.17E+04	2.03E+05	2.36E+05	2.90E+05	1.95E-03	6
EMERGENCY PHASE COST		1.0000	1.60E+06	1.33E+06	3.05E+06	3.94E+06	5.25E+06	5.43E+06	8.05E+06	5.56E-06	146
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	5.55E+05	3.37E+04	1.87E+06	2.56E+06	3.59E+06	3.97E+06	5.60E+06	3.40E-05	150
CROP DISPOSAL COST	1.0000	1.27E+07	8.07E+06	3.04E+07	3.31E+07	4.05E+07	4.41E+07	5.71E+07	2.28E-04	23

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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 7 OF 8:
LATE LOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

12-NOV-09 13:50:14 PAGE 25

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	7.23E+02	5.15E+02	1.58E+03	2.13E+03	3.17E+03	3.46E+03	4.25E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.03E+02	9.80E+01	1.51E+02	1.81E+02	2.10E+02	2.17E+02	2.63E+02	5.26E-05	40
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.61E+04	1.13E+04	3.65E+04	4.86E+04	7.34E+04	7.94E+04	9.52E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.52E-04	2.32E-04	3.82E-04	4.41E-04	5.20E-04	5.35E-04	6.41E-04	5.26E-05	40

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 7 OF 8:
LATE LOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	7.55E+01	7.04E+01	1.42E+02	1.80E+02	2.32E+02	2.50E+02	3.13E+02	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	2.90E+01	2.73E+01	5.22E+01	6.08E+01	7.19E+01	7.34E+01	8.80E+01	8.36E-06	145
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.60E+03	1.22E+03	3.06E+03	3.60E+03	5.15E+03	5.61E+03	6.86E+03	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	7.41E-05	6.98E-05	1.23E-04	1.43E-04	2.00E-04	2.03E-04	2.25E-04	8.36E-06	145

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 7 OF 8:
LATE LOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	6.47E+02	4.18E+02	1.42E+03	1.97E+03	3.13E+03	3.35E+03	3.94E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	7.40E+01	7.01E+01	1.06E+02	1.11E+02	1.25E+02	1.31E+02	2.13E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.45E+04	9.48E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.83E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.78E-04	1.59E-04	3.03E-04	3.15E-04	3.44E-04	3.58E-04	5.34E-04	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.45E+04	9.48E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.83E+04	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.44E+04	9.35E+03	3.36E+04	4.45E+04	6.14E+04	6.84E+04	8.83E+04	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	8.45E+01	3.45E+01	2.49E+02	3.12E+02	4.01E+02	4.46E+02	5.02E+02	2.40E-03	23
LONG-TERM GROUNDSHINE DOSE		1.0000	1.37E+04	8.96E+03	3.21E+04	4.33E+04	6.07E+04	6.75E+04	8.44E+04	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	6.23E+02	3.86E+02	1.40E+03	1.94E+03	2.62E+03	2.97E+03	3.86E+03	1.00E-03	98
WATER INGESTION DOSE		1.0000	1.30E+01	1.11E+01	2.27E+01	2.63E+01	3.10E+01	3.17E+01	3.91E+01	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	8.10E+01	7.49E+01	1.32E+02	1.55E+02	2.06E+02	2.15E+02	3.17E+02	1.24E-06	147
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	3.70E-02	2.73E-02	7.75E-02	1.03E-01	2.04E-01	2.16E-01	3.65E-01	1.59E-05	146
INGESTION OF GRAINS		1.0000	2.86E+00	3.95E-01	1.03E+01	1.24E+01	1.93E+01	2.09E+01	2.46E+01	6.28E-04	23
INGESTION OF LEAF VEG		1.0000	4.79E+00	6.81E-01	1.50E+01	2.23E+01	3.53E+01	4.07E+01	6.70E+01	2.29E-05	66
INGESTION OF ROOT CROPS		1.0000	3.86E+00	5.79E-01	1.29E+01	1.85E+01	2.85E+01	3.05E+01	3.26E+01	6.28E-04	23
INGESTION OF FRUITS		1.0000	5.61E+00	8.05E-01	2.05E+01	2.72E+01	3.50E+01	3.78E+01	4.76E+01	6.28E-04	23
INGESTION OF LEGUMES		1.0000	3.40E+00	6.12E-01	1.18E+01	1.62E+01	2.21E+01	2.35E+01	2.82E+01	6.28E-04	23
INGESTION OF BEEF		1.0000	2.59E+01	6.42E+00	8.47E+01	1.02E+02	1.14E+02	1.19E+02	1.88E+02	5.46E-06	13
INGESTION OF MILK		1.0000	1.65E+01	4.77E+00	5.39E+01	7.01E+01	8.47E+01	9.20E+01	1.30E+02	7.64E-06	12
INGESTION OF POULTRY		1.0000	7.14E+00	1.98E+00	2.41E+01	3.35E+01	5.13E+01	5.43E+01	8.72E+01	2.29E-05	66
INGESTION OF OTHER MEAT CROPS		1.0000	1.50E+00	4.70E-01	4.29E+00	5.85E+00	1.00E+01	1.05E+01	1.55E+01	2.29E-05	66
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	6.58E+08	5.97E+08	1.06E+09	1.12E+09	1.28E+09	1.36E+09	2.07E+09	2.10E-05	40
POP.-DEPENDENT COSTS		1.0000	6.43E+08	5.78E+08	1.05E+09	1.12E+09	1.28E+09	1.36E+09	2.06E+09	2.10E-05	40
FARM-DEPENDENT COSTS		1.0000	1.54E+07	4.20E+06	5.37E+07	7.42E+07	1.07E+08	1.14E+08	1.65E+08	4.16E-05	4
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.58E+08	1.35E+08	3.06E+08	3.20E+08	3.55E+08	3.72E+08	5.26E+08	2.10E-05	40
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.90E+05	8.98E+04	4.15E+05	7.38E+05	1.12E+06	1.21E+06	1.42E+06	1.11E-03	123
POP.-DEPENDENT INTERDICTION COST		1.0000	4.76E+08	4.23E+08	9.72E+08	1.03E+09	1.12E+09	1.16E+09	1.52E+09	2.10E-05	40
FARM-DEPENDENT INTERDICTION COST		1.0000	1.33E+07	2.80E+06	5.04E+07	6.78E+07	1.04E+08	1.09E+08	1.51E+08	4.16E-05	4
POP.-DEPENDENT CONDEMNATION COST		0.8144	8.73E+06	3.75E+06	1.39E+07	1.72E+07	1.03E+08	1.06E+08	1.25E+08	6.75E-05	6
FARM-DEPENDENT CONDEMNATION COST		0.8629	5.29E+03	2.47E+03	8.13E+03	9.02E+03	7.20E+04	7.48E+04	7.73E+04	2.75E-03	6
EMERGENCY PHASE COST		0.9903	1.57E+05	1.07E+05	4.01E+05	5.24E+05	9.05E+05	1.02E+06	1.10E+06	1.83E-03	144
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	1.25E+05	8.03E+03	4.84E+05	6.43E+05	1.29E+06	1.55E+06	2.63E+06	2.57E-04	23
CROP DISPOSAL COST	1.0000	1.80E+06	1.03E+06	5.12E+06	6.06E+06	1.00E+07	1.03E+07	1.18E+07	8.03E-05	4

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DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 8 OF 8:
LATE LOWLOW

OVERALL RESULTS OBTAINED BY COMBINING 1 EMERGENCY RESPONSE COHORTS FROM "EARLY" WITH THE WEIGHTING FRACTIONS BELOW APPLIED TO THEM:

	FRACTION OF THE PEOPLE
COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE	1.000

AND THEN MERGING THE 1 RESULTS ABOVE WITH THE SINGLE SET OF RESULTS FROM "CHRONC" DESCRIBED BELOW:

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

RESULTS WHICH ARE PRODUCED ONLY BY "EARLY" OR ONLY BY "CHRONC" ARE PRESENTED IN LATER SECTIONS.

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		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	6.15E+02	4.08E+02	1.32E+03	1.79E+03	2.54E+03	2.87E+03	3.60E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	9.10E+01	8.52E+01	1.29E+02	1.46E+02	1.96E+02	2.03E+02	2.43E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.38E+04	1.00E+04	3.19E+04	4.19E+04	5.99E+04	6.67E+04	8.08E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	2.24E-04	2.10E-04	3.45E-04	3.85E-04	4.99E-04	5.08E-04	6.15E-04	1.73E-06	54

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES

SOURCE TERM 8 OF 8:
LATE LOWLOW

RESULTS FOR A SINGLE EMERGENCY RESPONSE COHORT WITHOUT ANY WEIGHTING FRACTIONS BEING APPLIED

COHORT 1 = NO EVACUATION, RELOCATION MODELS APPLY EVERYWHE

12-NOV-09 13:50:14 PAGE 30

		PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
HEALTH EFFECTS CASES											
ERL FAT/TOTAL	0-80.5 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-80.5 km	1.0000	4.98E+01	4.41E+01	9.83E+01	1.10E+02	1.41E+02	1.57E+02	2.06E+02	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	1.89E+01	1.63E+01	3.31E+01	3.77E+01	5.01E+01	5.08E+01	5.97E+01	1.24E-06	147
ERL FAT/TOTAL	0-16.1 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
AVERAGE INDIVIDUAL RISK											
ERL FAT/TOTAL	0-0.3 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	0.3-1.6 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
ERL FAT/TOTAL	1.6-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.10E+03	1.01E+03	2.09E+03	2.60E+03	3.47E+03	3.79E+03	4.64E+03	1.00E-03	98
POPULATION WEIGHTED RISK											
ERL FAT/TOTAL	0-3.2 km	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
CAN FAT/TOTAL	0-16.1 km	1.0000	4.83E-05	4.37E-05	9.11E-05	1.02E-04	1.08E-04	1.11E-04	1.53E-04	1.24E-06	147

DATE AND TIME OF RUN = MACCS2 12-NOV-09 13:50:14 VERSION 1.13.1: last revised 1/8/04, K. McFadden
"ATMOS" DESCRIPTION = ATMOS INPUT FOR IPEC CALCULATIONS
"EARLY" DESCRIPTION = EARLY.IN, IPEC INPUT FROM THE EVACUATION TIME ESTIMATES
"CHRONC" DESCRIPTION = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

SOURCE TERM 8 OF 8:
LATE LOWLOW

RESULTS FROM THE "CHRONC" MODULE ALONE

COHORT 2 = CHRONC.IN - IPEC, "New" COMIDA2-Based Food Model

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		PROB		QUANTILES					PEAK	PEAK	PEAK
		NON-ZERO	MEAN	50TH	90TH	95TH	99TH	99.5TH	CONS	PROB	TRIAL
HEALTH EFFECTS CASES											
CAN FAT/TOTAL	0-80.5 km	1.0000	5.65E+02	3.61E+02	1.26E+03	1.72E+03	2.51E+03	2.84E+03	3.39E+03	1.00E-03	98
CAN FAT/TOTAL	0-16.1 km	1.0000	7.22E+01	6.69E+01	1.06E+02	1.11E+02	1.25E+02	1.31E+02	2.24E+02	1.73E-06	54
POPULATION DOSE (Sv)											
L-EDEWBODY TOT LIF	0-80.5 km	1.0000	1.27E+04	8.44E+03	3.02E+04	4.07E+04	5.98E+04	6.66E+04	7.61E+04	1.00E-03	98
POPULATION WEIGHTED RISK											
CAN FAT/TOTAL	0-16.1 km	1.0000	1.76E-04	1.57E-04	2.90E-04	3.10E-04	3.41E-04	3.55E-04	5.67E-04	1.73E-06	54
L-EDEWBODY POP. DOSE (Sv)	0-80.5 km										
TOTAL LONG-TERM PATHWAYS DOSE		1.0000	1.27E+04	8.44E+03	3.02E+04	4.07E+04	5.98E+04	6.66E+04	7.61E+04	1.00E-03	98
LONG-TERM DIRECT EXPOSURE PATHWAYS		1.0000	1.25E+04	8.36E+03	3.02E+04	4.07E+04	5.98E+04	6.66E+04	7.61E+04	1.00E-03	98
TOTAL INGESTION PATHWAYS DOSE		1.0000	8.15E+01	3.18E+01	2.27E+02	3.09E+02	4.73E+02	5.15E+02	5.82E+02	6.28E-04	23
LONG-TERM GROUNDSHINE DOSE		1.0000	1.22E+04	8.20E+03	2.99E+04	3.92E+04	5.87E+04	6.59E+04	7.40E+04	1.00E-03	98
LONG-TERM RESUSPENSION DOSE		1.0000	3.44E+02	2.29E+02	7.84E+02	1.00E+03	1.52E+03	1.82E+03	2.11E+03	1.00E-03	98
WATER INGESTION DOSE		1.0000	1.08E+01	9.53E+00	1.97E+01	2.21E+01	2.83E+01	3.01E+01	3.28E+01	1.04E-05	146
POP.-DEPENDENT DECONTAMINATION DOSE		1.0000	6.40E+01	5.91E+01	1.17E+02	1.38E+02	2.00E+02	2.04E+02	2.50E+02	1.24E-06	147
FARM-DEPENDENT DECONTAMINATION DOSE		1.0000	2.86E-02	2.21E-02	5.87E-02	7.40E-02	1.34E-01	1.87E-01	2.55E-01	1.59E-05	146
INGESTION OF GRAINS		1.0000	2.83E+00	4.00E-01	9.62E+00	1.25E+01	2.05E+01	2.19E+01	2.64E+01	6.28E-04	23
INGESTION OF LEAF VEG		1.0000	4.73E+00	6.38E-01	1.56E+01	2.22E+01	3.27E+01	3.66E+01	7.03E+01	2.85E-05	75
INGESTION OF ROOT CROPS		1.0000	3.77E+00	5.64E-01	1.24E+01	1.81E+01	2.85E+01	3.08E+01	3.47E+01	6.28E-04	23
INGESTION OF FRUITS		1.0000	5.54E+00	8.04E-01	1.79E+01	2.68E+01	3.95E+01	4.53E+01	5.10E+01	6.28E-04	23
INGESTION OF LEGUMES		1.0000	3.26E+00	5.23E-01	1.10E+01	1.51E+01	2.22E+01	2.39E+01	2.97E+01	6.28E-04	23
INGESTION OF BEEF		1.0000	2.54E+01	6.43E+00	8.06E+01	1.07E+02	1.53E+02	1.79E+02	2.08E+02	6.28E-04	23
INGESTION OF MILK		1.0000	1.64E+01	4.59E+00	5.25E+01	6.69E+01	1.01E+02	1.05E+02	1.46E+02	5.46E-06	13
INGESTION OF POULTRY		1.0000	7.35E+00	1.91E+00	2.55E+01	3.42E+01	5.09E+01	5.54E+01	9.64E+01	2.85E-05	75
INGESTION OF OTHER MEAT CROPS		1.0000	1.41E+00	4.56E-01	4.46E+00	5.79E+00	7.75E+00	8.38E+00	1.60E+01	2.85E-05	75
ECONOMIC COST MEASURES ($)	0-80.5 km										
TOTAL ECONOMIC COSTS		1.0000	5.62E+08	5.20E+08	1.02E+09	1.07E+09	1.18E+09	1.23E+09	1.75E+09	2.10E-05	40
POP.-DEPENDENT COSTS		1.0000	5.51E+08	4.91E+08	1.02E+09	1.06E+09	1.18E+09	1.23E+09	1.74E+09	2.10E-05	40
FARM-DEPENDENT COSTS		1.0000	1.15E+07	3.18E+06	3.59E+07	5.42E+07	9.60E+07	1.05E+08	1.49E+08	6.29E-05	5
POP.-DEPENDENT DECONTAMINATION COST		1.0000	1.36E+08	1.19E+08	2.61E+08	3.05E+08	3.32E+08	3.45E+08	4.37E+08	6.26E-05	26
FARM-DEPENDENT DECONTAMINATION COST		1.0000	1.61E+05	8.03E+04	3.69E+05	6.35E+05	1.04E+06	1.11E+06	1.25E+06	1.13E-03	26
POP.-DEPENDENT INTERDICTION COST		1.0000	4.09E+08	3.64E+08	7.64E+08	8.79E+08	1.04E+09	1.07E+09	1.31E+09	2.10E-05	85
FARM-DEPENDENT INTERDICTION COST		1.0000	1.00E+07	1.94E+06	3.48E+07	5.24E+07	8.07E+07	1.02E+08	1.37E+08	6.29E-05	5
POP.-DEPENDENT CONDEMNATION COST		0.8040	5.25E+06	3.43E+06	1.10E+07	1.20E+07	1.46E+07	1.59E+07	1.25E+08	1.64E-05	6
FARM-DEPENDENT CONDEMNATION COST		0.7189	1.98E+03	2.03E+03	2.74E+03	7.70E+03	NOT-FOUND	NOT-FOUND	8.49E+03	4.80E-02	1
EMERGENCY PHASE COST		0.9902	7.16E+04	1.51E+04	1.95E+05	3.17E+05	3.95E+05	4.34E+05	4.97E+05	1.83E-03	20
INTERMEDIATE PHASE COST		0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0

	PROB NON-ZERO	MEAN	QUANTILES 50TH	90TH	95TH	99TH	99.5TH	PEAK CONS	PEAK PROB	PEAK TRIAL
ECONOMIC COST MEASURES ($) 0-80.5 km										
MILK DISPOSAL COST	1.0000	9.39E+04	5.58E+03	3.52E+05	5.31E+05	1.13E+06	1.30E+06	2.26E+06	6.28E-04	137
CROP DISPOSAL COST	1.0000	1.25E+06	6.64E+05	3.17E+06	4.08E+06	5.88E+06	6.55E+06	1.18E+07	3.87E-05	62

Successful completion of MACCS2 was achieved!
This job required a total of 25.750 CPU seconds

Input processing required 0.227 CPU seconds
Simulation required 24.961 CPU seconds
Output processing required 0.562 CPU seconds

Entergy Attachment 3 to Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. François Lemay in Support of Consolidated Contention NYS-12C

Entergy, IP-RPT-09-00044, Revision 0, Re-Analysis of IP2 and IP3 Severe Accident Mitigation Alternatives (SAMAs) (Dec. 3, 2009)

Entergy

ENTERGY NUCLEAR

Engineering Report Cover Sheet

Engineering Report Title:

Re-Analysis of IP2 and IP3 Severe Accident Mitigation Alternatives (SAMAs)

Engineering Report Type:

New ☒ Revision ☐ Cancelled ☐ Superseded ☐

Applicable Site(s)

IP1 ☐ IP2 ☒ IP3 ☒ JAF ☐ PNPS ☐ VY ☐ WPO ☐
ANO1 ☐ ANO2 ☐ ECH ☐ GGNS ☐ RBS ☐ WF3 ☐

DRN No. ☒**N/A;** ☐____

Report Origin: ☒ Entergy ☐ Vendor

Vendor Document No.:________

Quality-Related: ☐ Yes ☒ No

Prepared by: K. Hong Kou John Hong J. Favara John Favara Date: 12/3/09
Responsible Engineer (Print Name/Sign)

Design Verified by: Date:
Design Verifier (if required) (Print Name/Sign)

Reviewed by: D. Gaynor Date: 12/3/09
Reviewer (Print Name/Sign)

Reviewed by: Date:
ANII (if required) (Print Name/Sign)

Approved by: C. Yeh Date: 12/3/09
Supervisor (Print Name/Sign)

RECORD OF REVISIONS

Revision No.	Description of Change	Reason For Change
0	Original report	NA

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SECTION 1

INTRODUCTION

1.1. PURPOSE

The purpose of this analysis is to re-evaluate the risk-reduction benefit and cost of implementation for potential plant-specific Severe Accident Mitigation Alternatives (SAMAs) at the Indian Point 2 (IP2) and Indian Point 3 (IP3) Nuclear Power Plants using revised meteorological input to identify potentially cost-effective plant modifications. This re-evaluation is required to address an error discovered in methodology used to derive five year average wind direction input into the benefit analysis used for the SAMA evaluation. This re-evaluation uses a single, bounding year (i.e. year 2000) rather than the five year average. The previous IP2 and IP3 evaluations are documented in Engineering Reports IP-RPT-07-00007 and IP-RPT-07-00008, respectively.

1.2. BACKGROUND

The NRC regulation, 10CFR51.53(c)(3)(ii)(L), requires a consideration of alternatives to mitigate severe accidents (SAMAs) in operating plant license renewal applications. To consider SAMAs at IP2 and IP3, the following analytical steps were taken and detailed in this (and the previous) engineering reports:

(1) <u>Establish the Baseline Impacts of a Severe Accident</u>

Severe accident impacts were evaluated in four areas:

1. Off-site exposure costs – Monetary value of consequences (dose) to off-site population.

   The PSA model was used to determine total accident frequency (core damage frequency and containment release frequency). The Melcor Accident Consequences Code System 2 (MACCS2) was used to convert release input to public dose. Dose was converted to present worth dollars based on a 20 year license renewal period, a valuation of $2,000 per person-rem and a present worth discount rate of 7%.

2. Off-site economic costs – Monetary value of damage to off-site property.

   The PSA model was used to determine total accident frequency (core damage frequency and containment release frequency). MACCS2 was used to convert release input to off-site property damage. Off-site property damage was converted to present worth dollars based on a 20 year license renewal period and a discount rate of 7%.

3. On-site exposure costs – Monetary value of dose to workers.

   Best estimate occupational dose values were used for immediate and long-term dose. Dose was converted to present worth dollars based on a 20 year license renewal period, a valuation of $2,000 per person-rem and a present worth discount rate of 7%.

4. On-site economic costs – Monetary value of damage to on-site property.

   Best estimate cleanup and decontamination costs were used. On-site property damage estimates were converted to present worth dollars based on a 20 year license renewal period and a discount rate of 7%. It was assumed that, subsequent to a severe accident, the plant would be decommissioned rather than restored. Therefore replacement/refurbishment costs were not included in on-site costs. Replacement power costs were considered.

(2) Identification of Potential SAMA Candidates

Potential SAMA candidates were identified from the following sources:

- Severe Accident Mitigation Design Alternative (SAMDA) analyses submitted in support of original licensing activities for other operating nuclear power plants and advanced light water reactor plants, including the evolutionary Westinghouse Advanced Pressurized Water Reactor (AP 600 and AP 1000) designs;
- SAMA analyses for other PWR plants;
- NRC and industry documentation discussing potential plant improvements;
- Reports documenting the plant specific Individual Plant Examinations (IPEs) of internal and external events and their updates. In these reports, several enhancements related to severe accident insights were recommended and implemented; and
- IP2 and IP3 PSA model risk significant contributors.

(3) Preliminary Screening (Phase I)

Potential SAMA candidates for IP2 and IP3 were screened out if they modified features not applicable to the unit, if they had already been implemented at the unit, or if they were similar in nature and could be combined with another SAMA candidate to develop a more comprehensive or plant-specific SAMA candidate.

(4) Final Screening and Cost-Benefit Evaluation (Phase II)

The remaining SAMA candidates were evaluated individually to determine the benefits and costs of implementation, as follows.

The total benefit of implementing a SAMA candidate was estimated in terms of averted cost risks associated with off-site population dose, off-site economic costs, on-site dose, and on-site economic costs.

The baseline PSA model was modified to reflect the maximum benefit of the improvement. Generally, the maximum benefit of a SAMA candidate was determined with a bounding modeling assumption. For example, if the objective of the SAMA candidate was to reduce the likelihood of a certain failure mode, then eliminating the failure mode from the PSA would bound the benefit, even though the SAMA candidate would not be expected to be 100% effective in eliminating the failure. The modified model was then used to produce a revised accident frequency.

Using the revised accident frequency, the method previously described for the four baseline severe accident impact areas was used to estimate the cost associated with each impact area following implementation of the SAMA candidate.

The benefit in terms of averted consequences for each SAMA candidate was then estimated by calculating the arithmetic difference between the total estimated cost associated with all four impact areas for the baseline plant design and the revised plant design following implementation of the SAMA candidate.

The cost of implementing a SAMA was estimated by one of the following methods (cost estimate).

- o An estimate for a similar modification considered in a previously performed SAMA analysis was used. These estimates were developed in the past and no credit was taken for inflation when applying them to IP2 or IP3.
- o Engineering judgment on the cost associated with procedural changes, engineering analysis, testing, training and hardware modification was applied to formulate a conclusion regarding the economic viability of the SAMA candidate.

(4) Sensitivity Analyses

Three sensitivity analyses were conducted to gauge the impact of key assumptions upon the analysis. The first sensitivity analysis was to investigate the sensitivity of assuming a 26-year period for remaining plant life for IP2 (i.e. six years on the original plant license plus the 20-year license renewal period) and assuming a 28-year period for remaining plant life for IP3 (i.e. eight years on the original plant license plus the 20-year license renewal period). The second sensitivity analysis was to investigate the sensitivity of each analysis case assuming a discount rate of 3%. The third sensitivity analysis was to investigate impacts resulting from economic losses due to tourism and business, which were not included in the base case. This third sensitivity analysis was re-quantified accounting for uncertainty in response to Item 4e in the NRC request for additional information (RAI), dated December 12, 2007. This re-evaluation assesses the impact of the change in meteorological input on this re-quantified third sensitivity case.

An additional sensitivity was performed in response to Item 5 in the NRC RAI dated April 9, 2008 [Reference 1] regarding the impact of assuming a more pessimistic approach for addressing scenarios that may lead to thermally induced steam generator tube ruptures (TI-SGTRs). The impact of the revised meteorological input on the results of that sensitivity study was also re-evaluated, and the results of that re-evaluation are also included in this report.

(5) Additional NRC requested SAMA Candidate

An additional item in the NRC RAI (Reference 1, Item 6) requested an evaluation of an additional SAMA related to use of a gagging device to close a stuck open main steam safety valve following a steam generator tube rupture, taking into account the modified TI-SGTR assumptions. That SAMA was evaluated using a very conservative simplified benefit analysis in response to that RAI and was determined to be potentially cost beneficial, given the estimated implementation cost of $50,000. For the purposes of completeness, the same conservative approach was taken for this re-analysis and produced a benefit with uncertainty of $13 million for IP2 and $19 million for IP3.

SECTION 2

SUMMARY OF RESULTS

This re-analysis addresses the SAMA candidates that were not screened out in Phase I of the SAMA analysis.

Indian Point 2

This re-analysis addresses the 68 IP2 SAMA candidates that were not screened out in Phase I of the SAMA analysis. The previous analysis, described in Engineering Report IP-RPT-07-00007, identified nine potentially cost beneficial IP2 SAMA candidates. As a result of this re-analysis three additional IP2 SAMA candidates were determined to be potentially cost-beneficial.

The full list of potentially cost beneficial IP2 Phase II SAMA candidates is presented in Table 9.

Indian Point 3

This re-analysis addresses the 62 IP3 SAMA candidates that were not screened out in Phase I of the SAMA analysis. The previous analysis, described in Engineering Report IP-RPT-07-00008, identified five potentially cost beneficial IP3 SAMA candidates. As a result of this re-analysis three additional IP3 SAMA candidates were determined to be potentially cost-beneficial.

The full list of potentially cost beneficial IP3 Phase II SAMA candidates is presented in Table 10.

As noted above, an additional SAMA requested by the NRC related to use of a gagging device to close a stuck open main steam safety valve following a steam generator tube rupture, taking into account the modified TI-SGTR assumptions was evaluated and determined to be potentially cost beneficial for both units.

SECTION 3

EVALUATION

3.1. SAMA IDENTIFICATION

For the purpose of this evaluation candidate SAMAs are defined as potential enhancements to the plant design, operating procedures, inspection programs, or maintenance programs that have the potential to reduce the severe accident risk at IP2 or IP3. These SAMAs can be characterized as either hardware (i.e., physical modification of plant structures, systems, and/or components) or non-hardware (i.e., operation, maintenance programs, and procedure changes) enhancements, or a combination of the two. The candidate SAMAs considered encompass both hardware and non-hardware modifications.

A list of SAMA candidates was developed in Phase I by reviewing industry documents and considering plant-specific enhancements not identified in published industry documents. Since IP2 and IP3 are typical pressurized water reactors, considerable attention was paid to the SAMA candidates from SAMA analyses for other pressurized water reactor plants. Additional discussion of this initial task is provided in IP-RPT-07-00007 and IP-RPT-07-00008, for IP2 and IP3, respectively (References 2 and 3). This task was not impacted by the current re-evaluation. Phase I SAMA candidates which were found to be applicable to IP2 or IP3, and not already implemented, were retained for further evaluation in Phase II of the SAMA analysis.

Tables 5 and 6 provide the results of the re-analysis of each of the IP2 and IP3 Phase II SAMA candidates, treating Sensitivity Case 3, with uncertainty, as the baseline case. The benefit values in this table represent the total SAMA benefits for both internal and external events.

3.2. ESTABLISHING THE BASELINE IMPACTS OF A SEVERE ACCIDENT

A baseline for each unit was established to enable estimation of the risk reductions attributable to implementation of potential SAMA candidates. These severe accident risks were estimated using the PSA model for each unit and the MACCS2 consequence analysis software code. The PSA models used for the SAMA analysis are internal events risk models.

3.2.1. <u>The PSA Internal Events Model - Level 1 and Level 2 Analysis</u>

The PSA models (Level 1 and Level 2) used for this re-evaluation were the same internal event risk models used for the previous SAMA analysis. The IP2 and IP3 PSA models (References 4 and 5) are complete, updated versions of the models used in the original IPE and reflect the plant specific configuration and design as of December 2005. They use component failure and unavailability data as of December 2005, and resolve all findings and observations from prior industry peer reviews.

The IP2 and IP3 PSA models utilize the small event tree / large fault tree approach and use the CAFTA code for quantifying CDF.

An uncertainty analysis associated with internal events CDF was performed for each unit. The ratio of the CDF at the 95th percent confidence level to the mean CDF is a factor of 2.10 for IP2 and 1.40 for IP3. The analyses are presented in Attachment C of IP-RPT-07-00007 and IP-RPT-07-00008.

The IP2 and IP3 Level 2 analyses uses a Containment Event Tree (CET) to analyze all core damage sequences identified in the Level 1 analysis. The CET evaluates systems, operator actions, and severe accident phenomena in order to characterize the magnitude and timing of radionuclide release. The result of the Level 2 analysis is a list of sequences involving radionuclide release, along with the frequency and magnitude/timing of release for each sequence.

3.2.2. The PSA External Events Model - Individual Plant Examination of External Events (IPEEE) Model

The IPEEE models for both units (References 6 and 7) were reviewed and used for the SAMA analysis. The seismic portion of the IPEEE was completed in conjunction with the Seismic Qualification Utility Group (SQUG) program. Both IP2 and IP3 performed a seismic Probabilistic Risk Assessment (PRA) following the guidance of NUREG-1407, *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities*, June 1991. A number of plant improvements were identified and, as described in NUREG-1742, *Perspectives Gained from the IPEEE Program*, Final Report, April 2002, these improvements were implemented.

The IP2 fire analysis was performed using the conservative EPRI Fire Induced Vulnerability Evaluation (FIVE) methodology for initial screening of fire zones. Unscreened fire zones were then analyzed in more detail using a fire PRA approach. The end result of IP2 IPEEE fire analysis identified the CDF for significant fire areas. A number of administrative procedures were revised to improve combustible and flammable material control.

The IP3 fire analysis was performed using the EPRI PRA Implementation Guide for quantitative screening of fire areas and for fire analysis of areas that did not screen. The fire analysis utilized the PSA internal event models to address fire induced initiators and equipment failure modes. A number of plant improvements were identified and, are described in NUREG1742, *Perspectives Gained from the IPEEE Program*, Final Report, April 2002. These improvements have been implemented. In addition, a number of administrative procedures were revised to improve combustible and flammable material control.

The IP2 IPEEE submittal, in addition to the internal fires and seismic events, examined a number of other external hazards:

- High Winds and /Tornadoes
- External Flooding
- Ice, Hazardous Chemical, Transportation and Nearby Facility Incidents

3.2.3. MACCS2 Model – Level 3 Analysis

A "Level 3" model was developed using the MACCS2 consequence analysis software code to estimate the hypothetical impacts of severe accidents on the surrounding environment and members of the public. The principal phenomena analyzed were atmospheric transport of radionuclides; mitigation actions (i.e., evacuation, condemnation of contaminated crops and milk) based on dose projection; dose accumulation by a number of pathways, including food and water ingestion; and economic costs. Input for the Level 3 analysis included the core radionuclide inventory, source terms from each unit's PSA model, site meteorological data, projected population distribution (within 50-mile radius) for the year 2034, emergency response evacuation modeling, and economic data. The Level 3 analyses performed for IP2 and IP3 are documented in IP-CALC-09-00265 (Reference 8).

3.2.4. Baseline Population Dose and Off-site Economic Cost Risk

The plant-specific risk models estimated the baseline population dose risk (PDR) to be 87.4 person-rem/yr for IP2 and 94.8 person-rem/yr for IP3. These values were determined based on each unit's baseline containment release fractions from the PSA model and the off-site dose parameters developed in the Level 3 PSA evaluation. The off-site dose was calculated in a 50-mile radius from the plant site The PDR for each release mode was calculated by multiplying frequency by dose, (and multiplying by 100 to convert sieverts to rem).

The plant-specific risk models estimated the baseline off-site economic cost risk (OECR) to be approximately $212,000/yr for IP2 and $261,000 for IP3. These values were determined based on the baseline containment release fractions from the PSA model and the off-site economic costs developed in the Level 3 PSA evaluation. The OECR is calculated for a 50-mile radius from the plant site.

The mean PDR and OECR for each release mode are provided in Table 1 for IP2 and Table 2 for IP3.

Table 1: IP2 Mean PDR and OECR Using Year 2000 Meteorological Data

Release Mode	Frequency (/yr)	Population Dose (person-sv)*	Offsite Economic Cost ($)	Population Dose Risk (PDR) (person-rem/yr)	Offsite Economic Cost Risk (OECR) ($/yr)
NCF	1.19E-05	4.75E+01	9.98E+04	5.64E-02**	1.18E+00
EARLY HIGH	6.50E-07	6.51E+05	2.05E+11	4.23E+01	1.33E+05
EARLY MEDIUM	4.23E-07	1.94E+05	5.87E+10	8.21E+00	2.48E+04
EARLY LOW	1.11E-07	7.93E+04	6.39E+09	8.81E-01	7.10E+02
LATE HIGH	6.88E-07	1.63E+05	4.64E+10	1.12E+01	3.19E+04
LATE MEDIUM	3.43E-06	6.87E+04	6.06E+09	2.36E+01	2.08E+04
LATE LOW	6.43E-07	1.61E+04	6.59E+08	1.04E+00	4.24E+02
LATE LOWLOW	5.82E-08	1.38E+04	5.62E+08	8.04E-02	3.27E+01
			Totals	8.74E+01	2.12E+05

* 1 sv = 100 rem
** 5.64E-02 (person-rem/yr) = 1.19E-05 (/yr) x 4.75E+01 (person-sv) x 100 (rem/sv)

Table 2: IP3 Mean PDR and OECR Using Year 2000 Meteorological Data

Release Mode	Frequency (/yr)	Population Dose (person-sv)*	Offsite Economic Cost ($)	Population Dose Risk (PDR) (person-rem/yr)	Offsite Economic Cost Risk (OECR) ($/yr)
NCF	6.30E-06	8.04E+01	2.95E+05	5.06E-02**	1.86E+00
EARLY HIGH	9.43E-07	5.08E+05	1.70E+11	4.79E+01	1.60E+05
EARLY MEDIUM	1.24E-06	2.00E+05	5.55E+10	2.47E+01	6.87E+04
EARLY LOW	1.46E-07	5.21E+04	3.58E+09	7.59E-01	5.21E+02
LATE HIGH	4.23E-07	1.63E+05	4.61E+10	6.89E+00	1.95E+04
LATE MEDIUM	2.01E-06	6.85E+04	6.06E+09	1.37E+01	1.22E+04
LATE LOW	3.75E-07	1.61E+04	6.58E+08	6.03E-01	2.47E+02
LATE LOWLOW	5.66E-08	1.38E+04	5.62E+08	7.81E-02	3.18E+01
			Totals	9.48E+01	2.61E+05

* 1 sv = 100 rem
** 5.06E-02 (person-rem/yr) = 6.30E-06 (/yr) x 8.04E+01 (person-sv) x 100 (rem/sv)

3.2.5 Present Dollar Value Equivalent Baseline Benefit

The cost associated with each of the four impact areas for the baseline case (i.e., without SAMA implementation) were calculated for each unit using the methodology described in the following sections. This analysis was used to establish the maximum benefit that a SAMA could achieve if it eliminated all risk due to at-power internal events.

3.2.5.1 Accident-Related Off-Site Dose Costs (APE)

The Level 3 baseline analysis resulted in an annual off-site exposure risk of 87.4 person-rem for IP2 and 94.8 person-rem for IP3. This value was converted to its monetary equivalent (dollars) via application of the $2,000 per person-rem conversion factor from the *Regulatory Analysis Technical Evaluation Handbook (Reference 9)*. This monetary equivalent was then discounted to present value using the formula from the same source:

$$APE = \left(F_S D_{P_S} - F_A D_{P_A}\right) R \frac{1 - e^{-rt_f}}{r}$$

Where,

APE = monetary value of accident risk avoided from population doses, after discounting

R = monetary equivalent of unit dose, ($/person-rem)

F = accident frequency (events/year)

D_P = population dose factor (person-rem/event)

S = status quo (current conditions)

A = after implementation of proposed action

r = discount rate

t_f = license renewal period (years)

Because there are eight accident releases considered in this study, the product FD_P, which represents population dose risk (PDR), was estimated by summing the product of the release frequency of each accident release and population dose over all eight releases.

For **IP2**, using a 20-year license renewal period, a 7% discount rate, assuming F_A is zero, and the baseline PDR value of 87.4 person-rem/ry resulted in the monetary equivalent value of $1,881,355.

For **IP3**, using a 20-year license renewal period, a 7% discount rate, assuming F_A is zero, and the baseline PDR value of 94.8 person-rem/ry resulted in the monetary equivalent value of $2,040,646.

These values are presented in Tables 3 and 4.

3.2.5.2 Accident-Related Off-Site Property Damage Costs (AOC)

The Level 3 baseline analysis resulted in an annual off-site economic risk monetary equivalent of $212,000 for IP2 and $261,000 for IP3. This value was discounted in the same manner as the public health risks in accordance with the following equation:

$$AOC = \left(F_S P_{D_S} - F_A P_{D_A}\right)\frac{1-e^{-rt_f}}{r}$$

Where,

AOC = monetary value of risk avoided from off-site property damage, after discounting

P_D = off-site property loss factor ($/event)

F = accident frequency (events/year)

S = status quo (current conditions)

A = after implementation of proposed action

r = discount rate

t_f = license renewal period (years)

The product F P_D, which represents off-site economic cost risk (OECR), was estimated by summing the product of the release frequency of each accident release and off-site economic costs over all eight releases.

For **IP2**, using previously defined values and the baseline OECR value of $212,000/yr, the resulting monetary equivalent is $2,281,735.

For **IP3**, using previously defined values and the baseline OECR value of $261,000/yr, the resulting monetary equivalent is $2,809,117.

These values are presented in Tables 3 and 4.

3.2.5.3 Total Accident-Related Occupational Exposures (AOE)

The values for occupational exposure associated with severe accidents were not derived from the PSA model, but from information in the *Regulatory Analysis Technical Evaluation Handbook (Reference 9)*. The values for occupational exposure consist of "immediate dose" and "long-term dose." The best estimate value provided for immediate occupational dose is 3,300 person-rem, and long-term occupational dose is 20,000 person-rem (over a 10-year clean-up period). The following equations were used to estimate monetary equivalents.

Immediate Dose

$$W_{IO} = \left(F_S D_{IO_S} - F_A D_{IO_A}\right) R \frac{1-e^{-rt_f}}{r} \qquad (1)$$

Where,

W_{IO} = monetary value of accident risk avoided from immediate doses, after discounting

IO = immediate occupational dose

R = monetary equivalent of unit dose, ($/person-rem)

F = accident frequency (events/year)

D_{IO} = immediate occupational dose (person-rem/event)

S = status quo (current conditions)

A = after implementation of proposed action

r = discount rate t_f = license renewal period (years)

The values used in the analysis were:

R = $2,000/person rem

r = 0.07

D_{IO} = 3,300 person-rem /accident

t_f = 20 years

For the basis discount rate, assuming F_A is zero, the bounding monetary value of the immediate dose is:

$$W_{IO} = \left(F_S D_{IO_S}\right) R \frac{1-e^{-rt_f}}{r}$$

$$W_{IO} = 3300 * F_S * \$2000 * \frac{1-e^{-.07*20}}{.07}$$

W_{IO} = ($7.10x10^7) F_S

For **IP2**, the baseline CDF is 1.79X10^{-5}/ry, and W_{IO} = $1,272

For **IP3**, the baseline CDF is 1.15X10^{-5}/ry, and W_{IO} = $817

Long-Term Dose

$$W_{LTO} = \left(F_S D_{LTO_S} - F_A D_{LTO_A}\right) R * \frac{1-e^{-rt_f}}{r} * \frac{1-e^{-rm}}{rm} \quad (2)$$

Where,

W_{LTO}= monetary value of accident risk avoided long-term doses, after discounting, ($)

LTO = long-term occupational dose

m =years over which long-term doses accrue

R = monetary equivalent of unit dose, ($/person-rem)

F = accident frequency (events/year)

D_{LTO} =long-term occupational dose (person-rem/event)

S = status quo (current conditions)

A = after implementation of proposed action

r = discount rate

t_f = license renewal period (years)

The values used in the analysis were:

R = $2,000/person rem

r = .07

D_{LTO} = 20,000 person-rem /accident

m = 10 years

t_f = 20 years

For the basis discount rate, assuming F_A is zero, the bounding monetary value of the long-term dose associated with accident risk is:

$$W_{LTO} = \left(F_S D_{LTO_S}\right) R * \frac{1-e^{-rt_f}}{r} * \frac{1-e^{-rm}}{rm}$$

$$W_{LTO} = \left(F_S \times 20000\right) \$2000 * \frac{1-e^{-.07*20}}{.07} * \frac{1-e^{-.07*10}}{.07*10}$$

W_{LTO} = (\$3.10x10^8) F_S

For **IP2**, the baseline CDF is 1.79X10^{-5}/ry, and $W_{LTO} = \$5{,}542$

For **IP3**, the baseline CDF is 1.15X10^{-5}/ry, and $W_{LTO} = \$3{,}560$

Total Occupational Exposures

Combining equations (1) and (2) above, using delta (Δ) to signify the difference in accident frequency resulting from the proposed actions, and using the above numerical values, the long-term accident related on-site (occupational) exposure avoided is:

$$AOE = \Delta W_{IO} + \Delta W_{LTO} \text{ (\$)}$$

Where,

AOE = on-site exposure avoided

The bounding value for occupational exposure (AOE_B) **for IP2** is:

$$AOE_B = W_{IO} + W_{LTO} = \$1{,}272 + \$5{,}542 = \$6{,}814$$

The bounding value for occupational exposure (AOE_B) **for IP3** is:

$$AOE_B = W_{IO} + W_{LTO} = \$817 + \$3{,}560 = \$4{,}377$$

The resulting monetary equivalents of \$6,814 for IP2 and \$4,377 for IP3 are presented in Tables 3 and 4.

3.2.5.4 Averted Costs Associated with Accident-Related On-Site Property Damage (AOSC)

Clean-up/Decontamination

The total cost of clean-up/decontamination of a power reactor facility subsequent to a severe accident is estimated in the *Regulatory Analysis Technical Evaluation Handbook (Reference 9)* to be $1.5x10^9$; this same value was adopted for these analyses. Considering a 10-year cleanup period, the present value of this cost is:

$$PV_{CD} = \left(\frac{C_{CD}}{m}\right)\left(\frac{1-e^{-rm}}{r}\right)$$

Where,

PV_{CD} = present value of the cost of cleanup/decontamination

CD = clean-up/decontamination

C_{CD} = total cost of the cleanup/decontamination effort, ($)

m = cleanup period (years)

r = discount rate

Based upon the values previously assumed,

$$PV_{CD} = \left(\frac{\$1.5E+9}{10}\right)\left(\frac{1-e^{-.07*10}}{.07}\right)$$

$$PV_{CD} = \$1.08E+9$$

This cost is integrated over the term of the proposed license extension as follows:

$$U_{CD} = PV_{CD}\frac{1-e^{-rt_f}}{r}$$

Where,

UCD = total cost of clean-up/decontamination over the life of the plant

Based upon the values previously assumed,

$$U_{CD} = \$1.16E+10$$

This applies to both IP2 and IP3.

Replacement Power Costs

Replacement power costs were estimated in accordance with the *Regulatory Analysis Technical Evaluation Handbook (Reference 9)*. Since replacement power will be needed for the time period following a severe accident, for the remainder of the expected generating plant life, long-term power replacement calculations have been used. The present value of replacement power was estimated as follows:

$$PV_{RP} = \left(\frac{\$1.2x10^8}{r}\right)\left(1 - e^{-rt_f}\right)^2$$

Where,

PV_{RP} = present value of the cost of replacement power for a single event

t_f = license renewal period

r = discount rate

The $\$1.2x10^8$ value has no intrinsic meaning, but is a substitute for a string of non-constant replacement power costs that occur over the lifetime of a "generic" reactor after an event. This equation was developed in the *Regulatory Analysis Technical Evaluation Handbook (Reference 9)* for discount rates between 5% and 10% only.

Based upon the values previously assumed:

$$PV_{RP} = \left(\frac{\$1.2x10^8}{r}\right)\left(1 - e^{-rt_f}\right)^2 = \left(\frac{\$1.2x10^8}{0.07}\right)\left(1 - e^{-(0.07)(20)}\right)^2 = \$9.73x10^8$$

To account for the entire lifetime of the facility, U_{RP} was then calculated from PV_{RP}, as follows:

$$U_{RP} = \left[\frac{PV_{RP}}{r}\right]\left(1 - e^{-rt_f}\right)^2$$

Where,

U_{RP} = present value of the cost of replacement power over the remaining life

t_f = license renewal period

r = discount rate

Based upon the values previously assumed:

$$U_{RP} = \left(\frac{PV_{RP}}{r}\right)\left(1 - e^{-rt_f}\right)^2 = \left(\frac{\$9.73x10^8}{0.07}\right)\left(1 - e^{-(0.07)(20)}\right)^2 = \$7.89x10^9$$

Since net generation can vary based on plant demands, a power level of 1071 MWe, which reflects typical gross generation levels, was used to conservatively bound the net generated power that would need to be replaced at either IP2 or IP3. After applying a correction factor to account for the difference in typical gross power generation level used for IP2 and IP3, and the generic reactor described in the Regulatory Analysis Technical Evaluation Handbook (i.e., 1071 MWe/910 MWe), the value of U_{RP} becomes 9.29×10^9.

This applies to both IP2 and IP3.

Total On-site Property Damage Costs

Combining the cleanup/decontamination and replacement power costs, using delta (ΔF) to signify the difference in accident frequency resulting from the proposed actions, and using the above numerical values, the best-estimate value of averted occupational exposure can be expressed as:

$$AOSC = \Delta F\left(U_{CD} + U_{RP}\right) = \Delta F\left(\$1.16x10^{10} + \$9.29x10^9\right) = \Delta F\left(\$2.09x10^{10}\right)$$

Where,

ΔF = difference in annual accident frequency resulting from the proposed action

For IP2, the baseline CDF is $1.79X10^{-5}$/ry, and the AOSC = $374,303

For IP3, the baseline CDF is $1.15X10^{-5}$/ry, and the AOSC = $240,475

The resulting monetary equivalents of $374,303 for IP2 and $240,475 for IP3 are presented in Tables 3 and 4.

Table 3: Estimated Present Dollar Value Equivalent of Internal Events CDF at IP2

Parameter	Present Dollar Value ($)
Off-site population dose	$1,881,355
Off-site economic costs	$2,281,735
On-site dose	$6,814
On-site economic costs	$374,303
Total	$4,544,208

Table 4: Estimated Present Dollar Value Equivalent of Internal Events CDF at IP3

Parameter	Present Dollar Value ($)
Off-site population dose	$2,040,646
Off-site economic costs	$2,809,117
On-site dose	$4,377
On-site economic costs	$240,475
Total	$5,094,615

The values used in the above equations were used as inputs in the benefit evaluation. Other inputs used in the benefit estimates are discussed in Section 3.4.2 of IP-RPT-07-00007 and IP-RPT-07-00008.

3.3. EVALUATION OF SAMA CANDIDATE BENEFITS

The result of implementation of each SAMA candidate would be a change in the severe accident risk (i.e., a change in frequency or consequence of severe accidents). The method of calculating the magnitude of these changes is straightforward. First, the severe accident risk after implementation of each SAMA candidate was estimated using the same method as for the baseline. The results of the Level 2 model were combined with the Level 3 model to calculate these post-SAMA risks.

IP-RPT-07-00007 and IP-RPT-07-00008 describe:

- The key Level 2 inputs used in the SAMA evaluations (Section 3.4.2)
- The model evaluations associated with each representative analysis case used in the Phase II analysis (Attachment B)
- the original results for each of the remaining SAMAs after preliminary screening (Section 4)

Tables 5 and 6 provide the results, for IP2 and IP3 respectively, of the benefit analysis for each SAMA candidate. The "Benefit with Uncertainty" value for each SAMA represents the benefit associated with removing the associated contributions to CDF following implementation of the SAMA and includes both the additional benefit when considering external events as well as the impact of uncertainty. As described in Section 3.7 of IP-RPT-07-00007 and IP-RPT-07-00008, this was developed for each unit by using a multiplier of eight.

3.4. EVALUATION OF SAMA CANDIDATE IMPLEMENTATION COST ESTIMATES

To assess the viability of each SAMA considered for a final cost-benefit evaluation, the cost of implementing that particular SAMA was estimated and compared with the estimated benefit. If the cost of implementation was greater than the attainable benefit of a particular SAMA, then the modification was not considered economically viable and was eliminated from further consideration.

The expected cost of implementation of each SAMA was established from existing estimates of similar modifications or from plant specific estimates. The cost estimates did not include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles. Estimates based on modifications that were implemented or estimated in the past were presented in terms of dollar values at the time of implementation (or estimation), and were not adjusted to present-day dollars. This represents a conservatism for those cost estimates.

The benefit of implementing a SAMA candidate was estimated in terms of averted consequences. The benefit was estimated by calculating the arithmetic difference between the total estimated costs associated with the four impact areas for the baseline plant design and the total estimated impact area costs for the enhanced plant design (following implementation of the SAMA candidate).

Values for avoided public and occupational health risk were converted to a monetary equivalent (dollars) via application of the NUREG/BR-0184 (Reference 9) conversion factor of $2,000 per person-rem and discounted to present value. Values for avoided offsite economic costs were also discounted to present value.

As this analysis focuses on establishing the economic viability of each potential plant enhancement when compared to attainable benefit, detailed cost estimates often were not required to make informed decisions regarding the economic viability of a particular modification. As a result, conservatively low cost estimates used for several of the SAMA candidates that were clearly in excess of the attainable benefit estimated from a particular analysis case.

For less clear cases, a more detailed cost estimate was necessary, addressing the plant specific scope and cost associated with procedural changes, engineering analysis, testing, training, and hardware modifications to formulate a conclusion regarding the economic viability of a particular SAMA. As part of this re-analysis, some additional SAMAs, previously screened using the conservative approach, were subjected to the more detailed cost estimate process.

3.5. FINAL SCREENING AND COST BENEFIT EVALUATION (PHASE II)

The cost/benefit analysis performed on the remaining SAMA candidates for this re-evaluation used the same process used for the original analysis. The method for determining if a SAMA candidate was cost beneficial consisted of determining whether the benefit provided by implementation of the SAMA candidate exceeded the expected cost of enhancement (COE). The benefit was defined as the sum of the reduction in dollar equivalents for each severe accident impact area (off-site exposure, off-site economic costs, occupational exposure, and on-site economic costs). If the expected implementation cost exceeded the estimated benefit, the SAMA was not considered cost-beneficial. Additional description of the process to perform the final cost benefit analysis is described in Section 3.7 of IP-RPT-07-00007 and IP-RPT-07-00008.

The results of the cost-benefit evaluation are displayed in Table 5 for IP2 and Table 6 for IP3. These tables provide a comparison of cost with the benefits of SAMA implementation and the final conclusions drawn for each candidate SAMA. SAMAs identified as “Previously Retained” were previously shown to be potentially cost beneficial. SAMAs identified as “Retained Based on Revised Analysis” are additional SAMAs found to be potentially cost beneficial based on this re-analysis.

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
001 - Create an independent RCP seal injection system with a dedicated diesel.	9.59%	1.60%	1.42%	$374,757	$788,963	$1,137,000	Not Cost Beneficial
002 - Create an independent RCP seal injection system without a dedicated diesel.	8.29%	1.49%	1.42%	$350,396	$737,676	$1,000,000	Not Cost Beneficial
003 - Install an additional CCW pump.	0.12%	0.00%	0.00%	$0	$0	$1,500,000	Not Cost Beneficial
004 - Enhance procedural guidance for use of service water pumps.	1.88%	0.23%	0.00%	$48,723	$102,574	$1,750,000	Not Cost Beneficial
005 - Improve ability to cool the RHR heat exchangers by allowing manual alignment of the fire protection system.	2.93%	0.34%	0.47%	$105,892	$222,931	$565,000	Not Cost Beneficial
006 - Add a diesel building high temperature alarm.	1.13%	0.11%	0.07%	$30,496	$64,202	$274,000	Not Cost Beneficial
007 - Install a filtered containment vent to provide fission product scrubbing.	0.00%	16.70%	6.13%	$1,725,939	$3,633,555	$5,700,000	Not Cost Beneficial
008 - Create a large concrete crucible with heat removal potential under the base mat to contain molten core debris.	0.00%	47.03%	34.43%	$6,347,528	$13,363,217	$108,000,000	Not Cost Beneficial
009 - Create a reactor cavity flooding system.	0.00%	47.03%	34.43%	$6,347,528	$13,363,217	$4,100,000	Previously Retained
010 - Create a core melt source reduction system.	0.00%	47.03%	34.43%	$6,347,528	$13,363,217	$90,000,000	Not Cost Beneficial
011 - Provide a means to inert containment.	0.00%	17.51%	21.23%	$3,091,966	$6,509,402	$10,900,000	Not Cost Beneficial
012 - Use the fire protection system as a backup source for the containment spray system.	0.00%	0.00%	0.00%	$0	$0	$565,000	Not Cost Beneficial
013 - Install a passive containment spray system.	0.00%	0.00%	0.00%	$0	$0	$2,000,000	Not Cost Beneficial

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
014 – Increase the depth of the concrete base mat or use an alternative concrete material to ensure melt-through does not occur.	0.00%	11.56%	4.25%	$1,194,251	$2,514,214	>$5,000,000	Not Cost Beneficial
015 - Construct a building connected to primary containment that is maintained at a vacuum.	0.00%	40.50%	35.38%	$5,963,077	$12,553,847	$61,000,000	Not Cost Beneficial
016 - Install a redundant containment spray system.	0.00%	0.00%	0.00%	$0	$0	$5,800,000	Not Cost Beneficial
017 - Erect a barrier that provides containment liner protection from ejected core debris at high pressure.	0.00%	10.07%	11.79%	$1,742,298	$3,667,996	$5,500,000*	Not Cost Beneficial
018 - Install a highly reliable steam generator shell-side heat removal system that relies on natural circulation and stored water sources.	0.05%	0.46%	0.47%	$73,618	$154,986	$7,400,000	Not Cost Beneficial
019 - Increase secondary side pressure capacity such that a SGTR would not cause the relief valves to lift.	2.42%	30.21%	39.15%	$5,594,541	$11,777,981	>$100,000,000*	Not Cost Beneficial
020 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products.	0.00%	2.97%	4.25%	$580,766	$1,222,665	$9,700,000	Not Cost Beneficial
021 - Install additional pressure or leak monitoring instrumentation for ISLOCAs.	0.83%	11.33%	14.62%	$2,093,852	$4,408,109	$3,200,000*	Retained Based on Revised Analysis
022 - Add redundant and diverse limit switches to each containment isolation valve.	0.40%	5.72%	7.55%	$1,071,465	$2,255,716	$2,200,000*	Retained Based on Revised Analysis
023 - Increase leak testing of valves in ISLOCA paths.	0.40%	5.72%	7.55%	$1,071,465	$2,255,716	$7,964,000	Not Cost Beneficial

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
024 - Ensure all ISLOCA releases are scrubbed.	0.83%	11.33%	14.62%	$2,093,852	$4,408,109	$9,700,000	Not Cost Beneficial
025 - Improve MSIV design.	0.05%	0.57%	0.94%	$122,697	$258,310	$476,000	Not Cost Beneficial
026 - Provide additional DC battery capacity.	1.94%	0.23%	0.00%	$48,723	$102,574	>$1,875,000	Not Cost Beneficial
027 - Use fuel cells instead of lead-acid batteries.	1.94%	0.23%	0.00%	$48,723	$102,574	$2,000,000	Not Cost Beneficial
028 - Provide a portable diesel-driven battery charger.	4.79%	9.38%	7.08%	$1,357,046	$2,856,939	$938,000*	Previously Retained
029 - Increase/ improve DC bus load shedding.	1.94%	0.23%	0.00%	$48,723	$102,574	$460,000*	Not Cost Beneficial
030 - Create AC power cross-tie capability with other unit.	2.81%	0.23%	0.00%	$56,813	$119,607	$1,156,000	Not Cost Beneficial
031 - Create a backup source for diesel cooling (not from existing system).	1.69%	0.23%	0.00%	$40,632	$85,541	$1,700,000	Not Cost Beneficial
032 - Use fire protection system as a backup source for diesel cooling.	1.69%	0.23%	0.00%	$40,632	$85,541	$497,000	Not Cost Beneficial
033 - Convert under-voltage AFW and reactor protective system actuation signals from 2-out-of-4 to 3-out-of-4 logic.	0.00%	0.00%	0.00%	$0	$0	$1,254,000	Not Cost Beneficial
034 - Provide capability for diesel-driven, low pressure vessel makeup.	0.02%	0.06%	0.05%	$8,180	$17,221	>$632,000	Not Cost Beneficial
035 - Provide an additional high pressure injection pump with independent diesel.	0.29%	0.34%	0.47%	$73,529	$154,798	$5,000,000	Not Cost Beneficial
036 - Create automatic swap-over to recirculation cooling upon RWST depletion.	4.08%	0.46%	0.47%	$138,344	$291,251	>$1,000,000	Not Cost Beneficial
037 - Provide capability for alternate injection via diesel-driven fire pump.	0.02%	0.06%	0.05%	$8,180	$17,221	$750,000	Not Cost Beneficial

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
038 - Throttle low pressure injection pumps earlier in medium or large-break LOCAs to maintain reactor water storage tank inventory.	0.60%	0.11%	0.07%	$22,405	$47,169	$82,000	Not Cost Beneficial
039 - Replace two of three motor-driven SI pumps with diesel-powered pumps.	0.29%	0.34%	0.47%	$73,529	$154,798	$2,000,000	Not Cost Beneficial
040 - Create/enhance a reactor coolant depressurization system.	0.87%	3.20%	3.77%	$572,408	$1,205,070	$2,000,000*	Not Cost Beneficial
041 - Install a digital feed water upgrade.	4.85%	0.92%	0.47%	$179,154	$377,167	$900,000	Not Cost Beneficial
042 - Provide automatic nitrogen backup to steam generator atmospheric dump valves.	0.05%	0.23%	0.00%	$16,360	$34,441	$214,000	Not Cost Beneficial
043 - Add a motor-driven feed water pump.	4.85%	0.92%	0.47%	$179,154	$377,167	$2,000,000	Not Cost Beneficial
044 - Use fire water system as backup for steam generator inventory.	33.00%	14.19%	9.91%	$2,350,530	$4,948,485	$1,656,000	Previously Retained
045 - Replace current pilot operated relief valves with larger ones such that only one is required for successful feed and bleed.	18.30%	3.32%	1.89%	$667,806	$1,405,907	$2,700,000	Not Cost Beneficial
046 - Modify emergency operating procedures for ability to align diesel power to more air compressors.	0.00%	0.00%	0.00%	$0	$0	$82,000	Not Cost Beneficial
047 - Add an independent boron injection system.	0.00%	0.00%	0.00%	$0	$0	$300,000	Not Cost Beneficial
048 - Add a system of relief valves that prevent equipment damage from a pressure spike during an ATWS.	1.98%	0.46%	0.47%	$105,981	$223,119	$615,000	Not Cost Beneficial
049 - Install motor generator set trip breakers in control room.	0.91%	0.23%	0.00%	$32,541	$68,508	$716,000	Not Cost Beneficial

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
050 - Provide capability to remove power from the bus powering the control rods.	0.91%	0.23%	0.00%	$32,541	$68,508	$90,000	Not Cost Beneficial
051- Provide digital large break LOCA protection.	0.06%	0.00%	0.00%	$0	$0	$2,036,000	Not Cost Beneficial
052 - Install secondary side guard pipes up to the MSIVs.	0.45%	1.72%	1.89%	$294,384	$619,756	$1,100,000	Not Cost Beneficial
053 - Keep both pressurizer PORV block valves open.	17.61%	3.32%	1.89%	$659,715	$1,388,873	$800,000	Previously Retained
054 - Install flood alarm in the 480V switchgear room.	19.97%	39.24%	28.77%	$5,591,781	$11,772,170	$200,000	Previously Retained
055 - Perform a hardware modification to allow high-head recirculation from either RHR heat exchanger.	0.02%	0.00%	0.00%	$0	$0	$1,330,000	Not Cost Beneficial
056 - Keep RHR heat exchanger discharge motor operated valves (MOVs) normally open.	1.84%	0.23%	0.00%	$48,723	$102,574	$82,000	Previously Retained
057 - Provide DC power backup for the PORVs.	1.22%	0.46%	0.47%	$89,800	$189,052	$376,000	Not Cost Beneficial
058 - Provide procedural guidance to allow high-head recirculation from either RHR heat exchanger.	0.02%	0.00%	0.00%	$0	$0	$82,000	Not Cost Beneficial
059 - Re-install the low pressure suction trip on the AFW pumps and enhance procedures to respond to loss of the normal suction path.	0.68%	0.23%	0.00%	$24,450	$51,474	$318,000	Not Cost Beneficial
060 - Provide added protection against flood propagation from stairwell 4 into the 480V switchgear room.	4.52%	8.92%	6.60%	$1,275,337	$2,684,920	$216,000	Previously Retained
061 - Provide added protection against flood propagation from the deluge room into the 480V switchgear room.	9.84%	19.34%	14.15%	$2,754,991	$5,799,982	$192,000	Previously Retained

Table 5: Results of Cost-Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
062 - Provide a hard-wired connection to an SI pump from ASSS power supply.	3.08%	6.06%	4.25%	$850,165	$1,789,822	$1,500,000*	Retained Based on Revised Analysis
063 - Provide a water-tight door for additional protection of the RHR pumps against flooding.	1.39%	0.11%	0.00%	$32,452	$68,320	$324,000	Not Cost Beneficial
064 - Provide backup cooling water source for the CCW heat exchangers.	1.73%	0.23%	0.00%	$40,632	$85,541	$710,000	Not Cost Beneficial
065 - Upgrade the ASSS to allow timely restoration of seal injection and cooling.	19.97%	39.24%	28.77%	$5,591,781	$11,772,170	$560,000	Previously Retained
066 - Harden the EDG building and fuel oil transfer pumps against tornados and high winds.	85.05%	8.96%	6.19%	$2,505,846	$5,275,465	$33,500,000*	Not Cost Beneficial
067 - Provide hardware connections to allow the primary water system to cool the charging pumps.	0.17%	0.02%	0.00%	$9,727	$20,477	$576,000	Not Cost Beneficial
068 - Provide independent source of cooling for the recirculation pump motors.	0.27%	0.06%	0.01%	$13,408	$28,227	$710,000	Not Cost Beneficial

* New estimated cost. See Tables E.2-3 and E.4-3 of LRA submittal for original estimated cost

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
001 - Create an independent RCP seal injection system with a dedicated diesel.	6.87%	0.74%	0.38%	$236,610	$342,913	$1,137,000	Not Cost Beneficial
002 - Create an independent RCP seal injection system without a dedicated diesel.	5.05%	0.63%	0.38%	$201,222	$291,626	$1,000,000	Not Cost Beneficial
003 - Install an additional CCW pump.	0.11%	0.00%	0.00%	$0	$0	$1,500,000	Not Cost Beneficial
004 - Improved ability to cool the RHR heat exchangers by allowing manual alignment of the fire protection system.	0.65%	0.53%	0.38%	$130,575	$189,240	$565,000	Not Cost Beneficial
005 - Install a filtered containment vent to provide fission product scrubbing.	0.00%	9.60%	2.68%	$1,497,163	$2,169,801	$5,700,000	Not Cost Beneficial
006 - Create a large concrete crucible with heat removal potential under the base mat to contain molten core debris.	0.00%	24.16%	14.94%	$5,038,071	$7,301,552	$108,000,000	Not Cost Beneficial
007 - Create a reactor cavity flooding system.	0.00%	24.16%	14.94%	$5,038,071	$7,301,552	$4,100,000*	Retained Based on Revised Analysis
008 - Create a core melt source reduction system.	0.00%	24.16%	14.94%	$5,038,071	$7,301,552	$90,000,000	Not Cost Beneficial
009 - Provide means to inert containment.	0.00%	8.76%	9.20%	$2,412,095	$3,495,790	$10,900,000	Not Cost Beneficial
010 - Use the fire protection system as a backup source for the containment spray system.	0.11%	0.00%	0.00%	$0	$0	$565,000	Not Cost Beneficial
011 - Install a passive containment spray system.	0.11%	0.00%	0.00%	$0	$0	$2,000,000	Not Cost Beneficial

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
012 - Increase the depth of the concrete base mat or use an alternative concrete material to ensure melt-through does not occur.	0.00%	5.59%	1.53%	$867,404	$1,257,107	>$5,000,000	Not Cost Beneficial
013 - Construct a building connected to primary containment that is maintained at a vacuum.	0.00%	21.73%	15.71%	$4,883,602	$7,077,683	$61,000,000	Not Cost Beneficial
014 - Install a redundant containment spray system.	0.11%	0.00%	0.00%	$0	$0	$5,800,000	Not Cost Beneficial
015 - Erect a barrier that provides containment liner protection from ejected core debris at high pressure.	0.00%**	4.32%	4.21%	$1,140,695	$1,653,182	$5,500,000*	Not Cost Beneficial
016 - Install a highly reliable steam generator shell-side heat removal system that relies on natural circulation and stored water sources.	2.47%	5.27%	4.98%	$1,401,717	$2,031,473	$7,400,000	Not Cost Beneficial
017 - Increase secondary side pressure capacity such that an SGTR would not cause the relief valves to lift.	8.57%	45.15%	53.64%	$13,520,698	$19,595,215	>$100,000,000*	Not Cost Beneficial
018 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products.	0.00%	11.08%	13.41%	$3,327,028	$4,821,779	$12,000,000*	Not Cost Beneficial
019 - Install additional pressure or leak monitoring instrumentation for ISLOCAs.	1.26%	7.07%	8.43%	$2,126,663	$3,082,120	$2,800,000*	Retained Based on Revised Analysis
020 - Add redundant and diverse limit switches to each containment isolation valve.	0.68%	3.59%	4.21%	$1,069,272	$1,549,670	$4,000,000*	Not Cost Beneficial

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
021 - Increase leak testing of valves in ISLOCA paths.	0.68%	3.59%	4.21%	$1,069,272	$1,549,670	$10,604,000	Not Cost Beneficial
022 - Ensure all ISLOCA releases are scrubbed.	1.26%	7.07%	8.43%	$2,126,663	$3,082,120	$9,700,000	Not Cost Beneficial
023 - Improve MSIV design.	0.11%	0.00%	0.00%	$0	$0	$476,000	Not Cost Beneficial
024 - Provide additional DC battery capacity.	2.81%	0.11%	0.00%	$47,141	$68,320	>$1,875,000	Not Cost Beneficial
025 - Use fuel cells instead of lead-acid batteries.	2.81%	0.11%	0.00%	$47,141	$68,320	$2,000,000	Not Cost Beneficial
026 - Increase/ improve DC bus load shedding.	2.81%	0.11%	0.00%	$47,141	$68,320	$460,000*	Not Cost Beneficial
027 - Create AC power cross-tie capability with other unit.	4.50%	0.11%	0.00%	$70,647	$102,387	$1,156,000	Not Cost Beneficial
028 - Create a backup source for diesel cooling (not from existing system).	0.56%	0.03%	0.00%	$15,318	$22,199	$1,700,000	Not Cost Beneficial
029 - Use fire protection system as a backup source for diesel cooling.	0.56%	0.03%	0.00%	$15,318	$22,199	$497,000	Not Cost Beneficial
030 - Provide a portable diesel-driven battery charger.	3.69%	0.95%	0.38%	$213,363	$309,222	$938,000*	Not Cost Beneficial
031 - Convert under-voltage, AFW and reactor protective system actuation signals from 2-out-of-4 to 3-out-of-4 logic.	0.33%	0.53%	0.38%	$118,822	$172,206	$1,254,000	Not Cost Beneficial
032 - Provide capability for diesel-driven, low pressure vessel makeup.	0.24%	0.21%	0.00%	$23,764	$34,441	>$632,000	Not Cost Beneficial
033 - Provide an additional high pressure injection pump with independent diesel.	0.39%	0.42%	0.38%	$118,693	$172,019	$5,000,000	Not Cost Beneficial

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
034 - Create automatic swap-over to recirculation upon RWST depletion.	19.86%	1.27%	0.77%	$530,551	$768,914	>$1,000,000	Not Cost Beneficial
035 - Provide capability for alternate injection via diesel-driven fire pump.	0.24%	0.21%	0.00%	$23,764	$34,441	$750,000	Not Cost Beneficial
036 - Throttle low pressure injection pumps earlier in medium or large-break LOCAs to maintain reactor water storage tank inventory.	0.86%	0.00%	0.00%	$11,753	$17,033	$82,000	Not Cost Beneficial
037 - Replace two of three motor-driven SI pumps with diesel-powered pumps.	0.39%	0.42%	0.38%	$118,693	$172,019	$2,000,000	Not Cost Beneficial
038 - Create/enhance a reactor coolant depressurization system.	0.55%	0.95%	0.77%	$237,516	$344,225	$4,600,000	Not Cost Beneficial
039 - Install a digital feed water upgrade.	11.84%	0.95%	0.00%	$271,481	$393,450	$900,000	Not Cost Beneficial
040 - Provide automatic nitrogen backup to steam generator atmospheric dump valves.	0.51%	0.95%	0.77%	$237,516	$344,225	$950,000*	Not Cost Beneficial
041 - Add a motor-driven feedwater pump.	11.84%	0.95%	0.00%	$271,481	$393,450	$2,000,000	Not Cost Beneficial
042 - Provide hookup for portable generators to power the turbine-driven AFW pump after station batteries are depleted.	2.81%	0.11%	0.00%	$47,141	$68,320	$1,072,000	Not Cost Beneficial
043 - Use fire water system as backup for steam generator inventory.	6.75%	1.58%	1.15%	$450,490	$652,885	$1,656,000	Not Cost Beneficial
044 - Replace current pilot operated relief valves with larger ones such that only one is required for successful feed and bleed.	4.46%	4.75%	4.21%	$1,246,989	$1,807,230	$2,700,000	Not Cost Beneficial

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
045 - Add an independent boron injection system.	0.16%	0.00%	0.00%	$0	$0	$300,000	Not Cost Beneficial
046 - Add a system of relief valves that prevent equipment damage from a pressure spike during an ATWS.	10.28%	0.74%	0.00%	$224,210	$324,943	$615,000	Not Cost Beneficial
047 - Install motor generator set trip breakers in control room.	1.60%	0.11%	0.00%	$35,388	$51,287	$716,000	Not Cost Beneficial
048 - Provide capability to remove power from the bus powering the control rods.	1.60%	0.11%	0.00%	$35,388	$51,287	$90,000	Not Cost Beneficial
049 - Provide digital large break LOCA protection.	0.30%	0.00%	0.00%	$0	$0	$2,036,000	Not Cost Beneficial
050 - Install secondary side guard pipes up to the MSIVs.	4.67%	9.07%	8.81%	$2,447,095	$3,546,515	$9,671,000*	Not Cost Beneficial
051 - Operator action: Align main feedwater for secondary heat removal.	0.65%	0.11%	0.00%	$23,635	$34,254	$55,000	Not Cost Beneficial
052 - Open city water supply valve for alternative AFW pump suction.	0.89%	1.05%	0.77%	$249,398	$361,446	$50,000	Previously Retained
053 - Install an excess flow valve to reduce the risk associated with hydrogen explosions.	1.79%	2.07%	1.51%	$498,795	$722,892	$228,000	Previously Retained
054 - Provide DC power backup for the PORVs.	0.20%	0.00%	0.00%	$0	$0	$376,000	Not Cost Beneficial
055 - Provide hard-wired connection to a SI or RHR pump from the Appendix R bus (MCC 312A).	16.48%	18.35%	11.49%	$4,073,152	$5,903,118	$1,288,000	Previously Retained

Table 6: Results of Cost-Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Risk Reduction (%)			Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion
	CDF	PDR	OECR				
056 - Install pneumatic controls and indication for the turbine-driven AFW pump.	2.81%	0.11%	0.00%	$47,141	$68,320	$982,000	Not Cost Beneficial
057 - Provide backup cooling water source for the CCW heat exchangers.	2.51%	0.21%	0.00%	$59,023	$85,541	$109,000	Not Cost Beneficial
058 - Provide automatic DC power backup.	4.83%	0.21%	0.00%	$94,282	$136,640	$1,868,000	Not Cost Beneficial
059 - Provide hardware connections to allow the primary water system to cool the charging pumps.	0.19%	0.00%	0.00%	$0	$0	$576,000	Not Cost Beneficial
060 - Provide independent source of cooling for the recirculation pump motors.	0.20%	0.00%	0.00%	$0	$0	$710,000	Not Cost Beneficial
061 - Upgrade the ASSS to allow timely restoration of seal injection and cooling.	17.43%	19.73%	12.26%	$4,359,371	$6,317,929	$560,000	Previously Retained
062 - Install flood alarm in the 480 VAC switchgear room.	17.43%	19.73%	12.26%	$4,359,371	$6,317,929	$196,800	Previously Retained

* New estimated cost. See Tables E.2-3 and E.4-3 of LRA submittal for original estimated cost

** Reported as 0.11% in IP-RPT-07-00008 due to typographical error. This value is not used in the actual quantification of the SAMA benefit.

3.6. THERMALLY INDUCED STEAM GENERATOR TUBE RUPTURE SENSITIVITY ANALYSIS

As noted in Section 1.2, as part of an NRC RAI, Entergy was requested to evaluate the impact of more pessimistic assumptions regarding scenarios that involve the potential for a thermally induced steam generator tube rupture (TI-SGTR).

Although final industry consensus on this issue has not been reached, a sensitivity study was performed to determine the impact of applying values derived from NUREG-1570 (Reference 10). The full lists of IP2 and IP3 Phase II SAMAs were reviewed for impact. Of those, the following twenty seven IP2 SAMAs and twenty two IP3 SAMAs were identified as potentially impacted by the TI-SGTR assumption.

IP2 SAMAs: 1, 6, 18, 19, 20, 25, 26, 27, 28, 29 ,30 ,31, 32, 35, 39, 40, 42, 44, 46, 52, 54, 59, 60, 61, 62, 65, 66

IP3 SAMAs: 1, 16, 17, 18, 23, 24, 25, 26, 27, 28, 29, 30, 33, 38, 40, 42, 43, 55, 56, 58, 61, 62

Since IP2 SAMAs 28, 44, 54, 60, 61, 62 and 65 and IP3 SAMAs 55, 61 and 62 were previously determined to be potentially cost beneficial, they were not re-evaluated. Of the remaining SAMAs, a detailed evaluation was performed for those for which the cost outweighed the benefit by less than a factor of five. This screening criterion was applied to facilitate the re-evaluation by limiting it to those potentially impacted SAMA candidates with a realistic possibility of becoming cost-beneficial.

The unscreened IP2 SAMAs were SAMAs 1, 6, 25, 29, 40 and 52

The unscreened IP3 SAMAs were SAMAs 1, 16, 18, 30, 40 and 43

The baseline case (Table 5.8 of NUREG-1570) associated with moderate tube degradation was used for this sensitivity study. The full conditional induced SGTR value (0.25) shown for that case was used. The NUREG-1570 conditional probability was applied to all high/dry sequences in the Level 2 model for each unit; in both station blackout and transient sequences. Table 7 shows the values for the IP2 SAMAs re-evaluated in this sensitivity analysis. Table 8 shows the values for the IP3 SAMAs re-evaluated in this sensitivity analysis. While the costs of both the baseline case and the individual SAMAs increased, the extent to which the revised TI-SGTR assumption impacted the delta cost varied, based on the nature of the specific SAMA.

It should be noted that although the NUREG-1570 baseline case values were used for this sensitivity analysis, the baseline case applies to a steam generator with a moderate flaw distribution. The IP2 and IP3 steam generators have been replaced and are being maintained in accordance with the stringent standards recommended by NEI 97-06. The IP2 and IP3 steam generators have only 0.19% and 0.12% of the tubes plugged, and would be classified as “pristine” in accordance with generic criteria established by Westinghouse for categorizing steam generator tube integrity. Corrosion has not been observed in the steam generators. Therefore, using the baseline case for this sensitivity study is considered conservative relative to application of the NUREG-1570 results for pristine generators (Table 5.8, Case 8).

An additional item in the NRC RAI (Reference 1, Item 6) requested an evaluation of an additional SAMA related to use of a gagging device to close a stuck open main steam safety valve following a steam generator tube rupture, taking into account the modified TI-SGTR assumptions. That SAMA was evaluated using a very conservative simplified benefit analysis in response to that RAI and was determined to be potentially cost beneficial, given the estimated implementation cost of $50,000. For the purposes of completeness, the same conservative approach was taken for this re-analysis and produced a benefit with uncertainty of $13 million for IP2 and $19 million for IP3.

Table 7: IP2 TI-SGTR Sensitivity Results

IP2 Phase II SAMA	Original Benefit with Uncertainty	TI-SGTR Revised Benefit with Uncertainty	Estimated Cost	Conclusion
001 - Create an independent RCP seal injection system with a dedicated diesel.	$788,963	$892,287	$1,137,000	Not Cost Beneficial
006 - Add a diesel building high temperature alarm.	$64,202	$223,493	$274,000	Not Cost Beneficial
025 - Improve MSIV design.	$258,310	$430,516	$476,000	Not Cost Beneficial
029 - Increase/ improve DC bus load shedding.	$102,574	$257,560	$460,000*	Not Cost Beneficial
040 - Create/enhance a reactor coolant depressurization system.	$1,205,070	$1,325,614	$2,000,000*	Not Cost Beneficial
052 - Install secondary side guard pipes up to the MSIVs.	$619,756	$878,065	$1,100,000	Not Cost Beneficial

* New estimated cost. See Tables E.2-3 and E.4-3 of LRA submittal for original estimated cost.

Table 8: IP3 TI-SGTR Sensitivity Results

IP3 Phase II SAMA	Original Benefit with Uncertainty	TI-SGTR Revised Benefit with Uncertainty	Estimated Cost	Conclusion
001 - Create an independent RCP seal injection system with a dedicated diesel.	$342,913	$480,678	$1,137,000	Not Cost Beneficial
016 - Install a highly reliable steam generator shell-side heat removal system that relies on natural circulation and stored water sources.	$2,031,473	$2,289,783	$7,400,000	Not Cost Beneficial
018 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products.	$4,821,779	$14,637,545	$12,000,000*	Retained Based on Revised Analysis
030 - Provide a portable diesel-driven battery charger.	$309,222	$515,869	$938,000	Not Cost Beneficial
040 - Provide automatic nitrogen backup to steam generator atmospheric dump valves.	$344,225	$447,549	$950,000*	Not Cost Beneficial
043 - Use fire water system as backup for steam generator inventory.	$652,885	$825,091	$1,656,000	Not Cost Beneficial

* New estimated cost. See Tables E.2-3 and E.4-3 of LRA submittal for original estimated cost

SECTION 4

CONCLUSIONS

The re-evaluation of the Sensitivity Case with Uncertainty, together with the impact of the revised approach to TI-SGTR, where applicable, resulted in 12 potentially cost beneficial IP2 SAMA candidates, including nine SAMAs that were previously found to be potentially cost beneficial in the previous evaluation (in IP-RPT-07-00007). The full IP2 list is presented in Table 9.

The re-evaluation of the Sensitivity Case with Uncertainty together with the impact of the revised approach to TI-SGTR, where applicable, resulted in eight potentially cost beneficial IP3 SAMA candidates, including five that were previously found to be potentially cost beneficial in the previous evaluation (in IP-RPT-07-00008). The full IP3 list is presented in Table 10.

As noted above, an additional SAMA requested by the NRC related to use of a gagging device to close a stuck open main steam safety valve following a steam generator tube rupture, taking into account the modified TI-SGTR assumptions was evaluated and determined to be potentially cost beneficial for both units.

Table 9: Final List of Potentially Cost-Beneficial IP2 SAMA Candidates

IP2 Phase II SAMA	Benefit with Uncertainty	Estimated Cost	Conclusion
009 - Create a reactor cavity flooding system.	$13,363,217	$4,100,000	Previously Retained
021 - Install additional pressure or leak monitoring instrumentation for ISLOCAs.	$4,408,109	$3,200,000*	Retained Based on Revised Analysis
022 - Add redundant and diverse limit switches to each containment isolation valve.	$2,255,716	$2,200,000*	Retained Based on Revised Analysis
028 - Provide a portable diesel-driven battery charger.	$2,856,939	$938,000*	Previously Retained
044 - Use fire water system as backup for steam generator inventory.	$4,948,485	$1,656,000	Previously Retained
053 - Keep both pressurizer PORV block valves open.	$1,388,873	$800,000	Previously Retained
054 - Install flood alarm in the 480V switchgear room.	$11,772,170	$200,000	Previously Retained
056 - Keep RHR heat exchanger discharge motor operated valves (MOVs) normally open.	$102,574	$82,000	Previously Retained
060 - Provide added protection against flood propagation from stairwell 4 into the 480V switchgear room.	$2,684,920	$216,000	Previously Retained
061 - Provide added protection against flood propagation from the deluge room into the 480V switchgear room.	$5,799,982	$192,000	Previously Retained
062 - Provide a hard-wired connection to an SI pump from ASSS power supply.	$1,789,822	$1,500,000*	Retained Based on Revised Analysis
065 - Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$11,772,170	$560,000	Previously Retained

* New estimated cost. See Tables E.2-3 and E.4-3 of LRA submittal for original estimated cost

Table 10: Final List of Potentially Cost-Beneficial IP3 SAMA Candidates

IP3 Phase II SAMA	**Benefit with Uncertainty**	**Estimated Cost**	**Conclusion**
007 - Create a reactor cavity flooding system.	$7,301,552	$4,100,000*	Retained Based on Revised Analysis
018 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products.	$14,637,545	$12,000,000*	Retained Based on Revised Analysis
019 - Install additional pressure or leak monitoring instrumentation for ISLOCAs.	$3,082,120	$2,800,000*	Retained Based on Revised Analysis
052 - Open city water supply valve for alternative AFW pump suction.	$361,446	$50,000	Previously Retained
053 - Install an excess flow valve to reduce the risk associated with hydrogen explosions.	$722,892	$228,000	Previously Retained
055 - Provide hard-wired connection to a SI or RHR pump from the Appendix R bus (MCC 312A).	$5,903,118	$1,288,000	Previously Retained
061 - Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$6,317,929	$560,000	Previously Retained
062 - Install flood alarm in the 480 VAC switchgear room.	$6,317,929	$196,800	Previously Retained

SECTION 5

REFERENCES

1. Request for Additional Information (RAI) Regarding the Analysis of Severe Accident Mitigation Alternatives (SAMAs) for Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3), April 9, 2008

2. IP-RPT-07-00007, IP2 Cost-Benefit Analysis of Severe Accident Mitigation Alternatives, Revision 0, April 30, 2007

3. IP-RPT-07-00008, IP3 Cost-Benefit Analysis of Severe Accident Mitigation Alternatives, Revision 0, April 30, 2007

4. IP-RPT-07-00230 "Indian Point Unit 2 Nuclear Power Plant Probabilistic Safety Assessment Revision 1, April 2007.

5. IP-RPT-06-00071 "Indian Point Unit 3 Nuclear Power Plant Probabilistic Safety Assessment Revision 2, April 2007

6. Indian Point 2 Nuclear Generating Station Individual Plant Examination of External Events (IPEEE) Report, December 1995

7. IP3-RPT-UNSPEC-02182, Indian Point 3 Nuclear Generating Station Individual Plant Examination of External Events (IPEEE) Report, September 1997

8. IP-CALC-09-00265, “Re-Analysis of MACCS2 Models for IPEC.”

9. NUREG/BR-0184, Regulatory Analysis Technical Evaluation Handbook, U.S. Nuclear Regulatory Commission, January 1997

10. NUREG-1570, Risk Assessment of Severe-Accident Induced Steam Generator Tube Rupture, U.S. Nuclear Regulatory Commission, March 1998

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	January 30, 2012

MOTION CERTIFICATION

Pursuant to 10 C.F.R. § 2.323(b), counsel for Entergy certifies that he made a sincere effort to contact the other parties in this proceeding, to explain to them the factual and legal issues raised in this Motion, and to resolve those issues, and he certifies that his efforts have been unsuccessful. NYS indicated that it does not oppose Entergy's right to file this Motion in Limine and that it will file an answer. The NRC Staff indicated that it does not oppose Entergy's Motion in Limine and also will file an answer.

Signed (electronically) by Martin J. O'Neill

Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1000 Louisiana St., Suite 4000
Houston, TX 77002
Phone: (713) 890-5710
Fax: (713) 739-5001
E-mail: martin.oneill@morganlewis.com

Counsel for Entergy Nuclear Operations, Inc.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of ENTERGY NUCLEAR OPERATIONS, INC. (Indian Point Nuclear Generating Units 2 and 3)	Docket Nos. 50-247-LR and 50-286-LR January 30, 2012

CERTIFICATE OF SERVICE

I hereby certify that on January 30, 2012, a copy of the "Applicant's Motion in Limine to Exclude Portions of New York State's Prefiled Testimony, Report, and Filed by New York State and Dr. François Lemay in Support of Consolidated Contention NYS-12C" was served electronically via the Electronic Information Exchange on the following recipients:

Administrative Judge
Lawrence G. McDade, Chair
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: Lawrence.McDade@nrc.gov)

Administrative Judge
Dr. Kaye D. Lathrop
Atomic Safety and Licensing Board Panel
190 Cedar Lane E.
Ridgway, CO 81432
(E-mail: Kaye.Lathrop@nrc.gov)

Administrative Judge
Dr. Richard E. Wardwell
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: Richard.Wardwell@nrc.gov)

Office of the Secretary
Attn: Rulemaking and Adjudications Staff
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: hearingdocket@nrc.gov)

Office of Commission Appellate Adjudication
U.S. Nuclear Regulatory Commission
Mail Stop: O-7H4M
Washington, DC 20555-0001
(E-mail: ocaamail.resource@nrc.gov)

Josh Kirstein, Law Clerk
Anne Siarnacki, Law Clerk
Atomic Safety and Licensing Board Panel
Mail Stop: T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: Josh.Kirstein@nrc.gov)
(E-mail: Anne.Siarnacki@nrc.gov)

Sherwin E. Turk, Esq.
Edward L. Williamson, Esq.
Beth N. Mizuno, Esq.
David E. Roth, Esq.
Brian G. Harris, Esq.
Mary B. Spencer, Esq.
Anita Ghosh, Esq.
Brian Newell, Paralegal
Office of the General Counsel
Mail Stop: O-15D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: Sherwin.Turk@nrc.gov)
(E-mail: Edward.Williamson@nrc.gov)
(E-mail: Beth.Mizuno@nrc.gov)
(E-mail: David.Roth@nrc.gov)
(E-mail: Brian.Harris@nrc.gov)
(E-mail: Mary.Spencer@nrc.gov)
(E-mail: Anita.Ghosh@nrc.gov)
(E-mail: Brian.Newell@nrc.gov)

Melissa-Jean Rotini, Esq.
Assistant County Attorney
Office of Robert F. Meehan, Esq.
Westchester County Attorney
148 Martine Avenue, 6th Floor
White Plains, NY 10601
(E-mail: MJR1@westchestergov.com)

Manna Jo Greene
Karla Raimundi
Hudson River Sloop Clearwater, Inc.
724 Wolcott Ave.
Beacon, NY 12508
(E-mail: mannajo@clearwater.org)
(E-mail: karla@clearwater.org)
(E-mail: stephenfiller@gmail.com)

Daniel Riesel, Esq.
Victoria Shiah, Esq.
Sive, Paget & Riesel, P.C.
460 Park Avenue
New York, NY 10022
(E-mail: driesel@sprlaw.com)
(E-mail: vshiah@sprlaw.com)

Joan Leary Matthews, Esq.
Associate Commissioner
Hearings and Mediation Services
New York State Department of
Environmental Conservation
625 Broadway, 14th Floor
Albany, NY 12233-1500
(E-mail: jlmatthe@gw.dec.state.ny.us)

John Louis Parker, Esq.
Office of General Counsel, Region 3
NYS Dept. of Environmental Conservation
21 S. Putt Corners Road
New Paltz, New York 12561-1620
(E-mail: jlparker@gw.dec.state.ny.us)

John J. Sipos, Esq.
Charlie Donaldson Esq.
Assistant Attorneys General
Office of the Attorney General
of the State of New York
The Capitol
Albany, NY 12224-0341
(E-mail: John.Sipos@ag.ny.gov)

Michael J. Delaney, Esq.
Vice President -Energy Department
New York City Economic Development
Corporation (NYCDEC)
110 William Street New York, NY 10038
mdelaney@nycedc.com

Phillip Musegaas, Esq.
Deborah Brancato, Esq.
Riverkeeper, Inc.
20 Secor Road
Ossining, NY 10562
(E-mail: phillip@riverkeeper.org)
(E-mail: dbrancato@riverkeeper.org)

Sean Murray, Mayor
Kevin Hay, Village Administrator
Village of Buchanan
Municipal Building
236 Tate Avenue
Buchanan, NY 10511-1298
(E-mail: vob@bestweb.net)
(E-mail: smurray@villageofbuchanan.com)

Robert D. Snook, Esq.
Assistant Attorney General
Office of the Attorney General
State of Connecticut
55 Elm Street
P.O. Box 120
Hartford, CT 06141-0120
(E-mail: Robert.Snook@po.state.ct.us)

Janice A. Dean, Esq.
Assistant Attorney General
Office of the Attorney General
of the State of New York
120 Broadway, 26th Floor
New York, New York 10271
(E-mail: Janice.Dean@ag.ny.gov)

Signed (electronically) by Martin J. O'Neill

Martin J. O'Neill, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1000 Louisiana St., Suite 4000
Houston, TX 77002
Phone: (713) 890-5710
Fax: (713) 739-5001
E-mail: martin.oneill@morganlewis.com

Counsel for Entergy Nuclear Operations, Inc.

DB1/ 68853307