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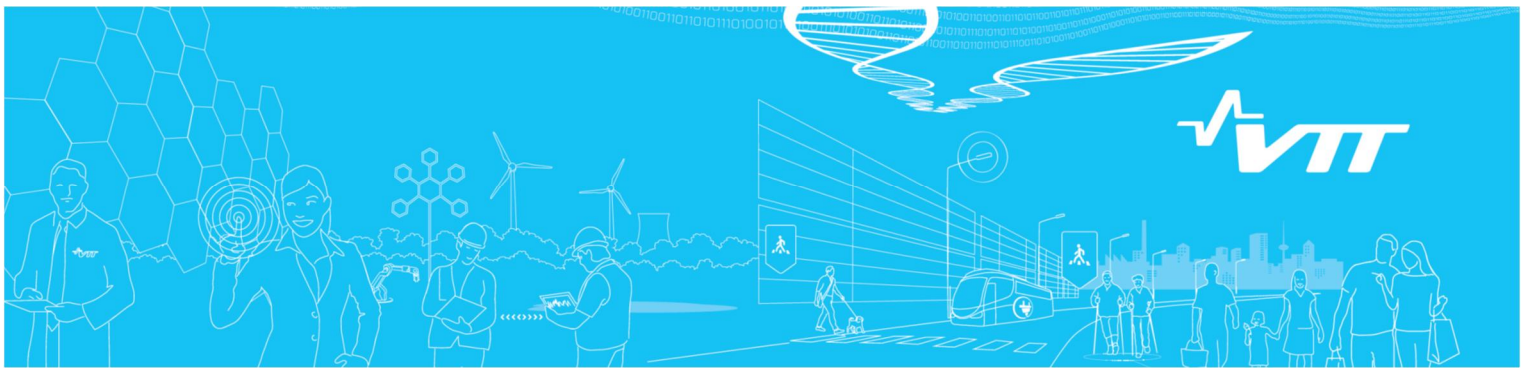

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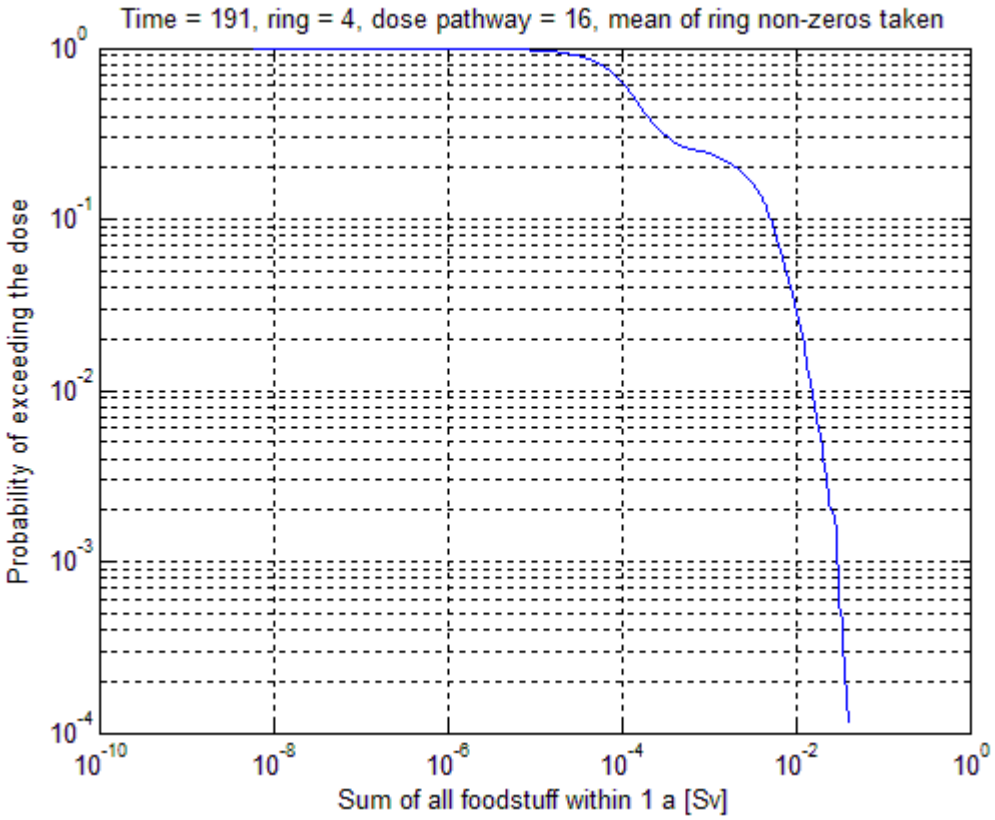

VALMA extension with ingestion doses assessment

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Summary

As a consequence of the 2011 Fukushima Daiichi accident, the IAEA started to develop recommendations which consider emergency planning outside the traditional protection and emergency planning zones. In response to these recommendations STUK activated a study in which the purpose is to estimate possible radiation doses at longer distances, up to 300 km. Based on the predicted doses it is possible to assess what kind of countermeasures could be needed.

VALMA can take into account changing weather conditions during plume dispersion. VALMA was originally developed for emergency preparedness purposes. In 2015, the model was extended in order to process trajectory data of one year or more for performing dose calculations in a probabilistic approach.

In 2016, coefficients relating ingestion doses (Sv) to nuclide-wise deposition (Bq/m2) were extracted from the AGRID model. The coefficients are for 1, 3 and 30 years consumption of green vegetables, grain, root vegetables, milk and meat produced on contaminated fields. They are used in VALMA for each deposition batch separately, which means that the summer/winter difference will be correct even for long-lasting releases. The results of VALMA indicate that it is possible to exceed 100 mSv from ingestion during the first year at 15 km distance even with the severe accident release limit (100 TBq of Cs-137).

The reader should note that parts of this report are intentionally common with the previous report on 2015 work. This is because this work is a direct continuation of the same study, augmented with ingestion doses assessment and more complete calculations with several source term assumptions.

Confidentiality	Public

Espoo 9.2.2017

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Preface

This report is a result of the CASA project, which in turn is a part of the SAFIR2018 research programme.

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Authors

Contents

1. Introduction

After a few draft versions IAEA published the general safety requirements for planning radiological protection measures outside the traditional emergency planning zone [IAEA 2015]. In order to evaluate this requirement, it is necessary to compute radiation doses at distances from 20 km up to 300 km, caused by severe accidents. The present emergency planning zone extends to the distance of 20 km from the NPP site.

In the first part of this project comparison calculations with ARANO and VALMA had been done [Rossi & Ilvonen 2015 and 2016]. ARANO is a straight line, constant weather model. VALMA is a trajectory based, changing weather model. Because weather strongly affects the dose especially at longer distances, it is necessary to treat weather conditions as a changing parameter in the dose distribution calculations. The conclusion of the preliminary calculations was that VALMA is more applicable for this task because then atmospheric dispersion of the release plume can be described more realistically.

In principle, a large amount of different weather conditions are needed to determine also probabilities of the doses. In this study, SILAM-based weather data of year 2012 for Olkiluoto site was used. The year is described as successive 1-hour intervals so that a release lasting 3 hours is assumed to start 8770 times during the year. However, it is generally known that one year is not enough for reliable assessment of probability distributions of radiation doses. So this study must be considered as a pilot work, exploring the possibilities of a still more complete study that could be performed in the future.

The current objective is to determine probability distributions of radiation doses from different exposure pathways at distances beyond 20 km from the power plant. Three different release magnitudes are used. Weather data covers winding trajectory data for one year. Finally, the calculated dose estimates are compared with the threshold values given in the recommendations of IAEA and then necessity of the countermeasures can be elucidated and concluded.

The newest extension of the VALMA model used in this work utilizes nuclide-wise coefficients that relate radiation doses (Sv) through ingestion to unit deposition (Bq/m2). The coefficients were extracted from the AGRID model by Kakko & Partanen (1984) for green vegetables, grain, root vegetables, cow milk and cow meat, in each case for assumed use of the contaminated fields during 1, 3 or 30 years, and for unit consumption (1 kg/a) of the foodstuff. The coefficients as such can be found in Appendices 1 and 2. All other results presented in this report are given for the actual predicted deposition and actual human consumption rates.

As a result of this study, ccdf curves (complementary cumulative density functions) for radiation doses through various dose pathways, both external and internal, were generated. Using a ccdf curve, the end user can directly read the probability of exceeding a certain radiation dose. Such curves are now available for many combinations of parameters: source term magnitude, time from accident, distance from the NPP, dose pathway, and the statistic used to describe the radiation doses at the affected receptor points at the chosen distance.

2. Calculation of the dose from unit deposition based on the AGRID model

In the AGRID-report by Kakko & Partanen (1984) the calculation procedure for ingestion dose pathways to be used in the ARANO model was introduced. The purpose of the current task was to define coefficients, which by multiplying with nuclide specific deposition (Bq/m2) and foodstuff consumption (kg/a), result in dose estimates for three ingestion time periods (1, 3 and 30 years). These results were then utilized in the VALMA model. This chapter elucidates how the dose conversion coefficients were specified.

2.1 Exposure pathways

The AGRID model consists of five dose pathways including green vegetables, grain, root vegetables and cow's milk and meat. Calculation methods for the cultivation and cattle pathways differ to some degree from each other. Both are based on the FOOD-MARC model of NRPB. The AGRID model takes into account Nordic seasonal variation as well. Results are presented for nuclide specific unit deposition without pathway dependent ingestion rate. As the ingestion rate of the theoretically most exposed inhabitant may e.g. the following annual values be given: cow's milk 365 kg, cattle meat 50 kg, green vegetables 60 kg, grain 100 kg and root vegetables 100 kg. These values are larger than the average values presented in the national research of diet (KTL 2008).

2.1.1 Green vegetables, grain and root vegetables

Calculation of the dose from ingestion of the cultivated plants requires partial modification of the AGRID model (Kakko & Partanen 1984). Their Chapter 4.1 considers procedures for calculation of deposition and concentration in the ground. Chapter 4.2 handles calculations for growing season and overwintering season. The duration of the growing season is assumed to be 60 days. In their Table 2, they presented nuclide specific derived dose factors which include the delay between harvest and consumption. Their Chapter 4.2.2 handles the dose caused by the transfer of activity via root uptake. Concerning their Table 3 it should be noticed that the columns of Vegetables and Roots are misplaced and should be exchanged. The current results for unit deposition and ingestion rate are shown in Appendix 1 of this report.

2.1.2 Cow's milk and meat

Chapter 4.3 of Kakko & Partanen (1984) considers activity transfer from animal products to a human being. Calculation is divided into three time periods: first year, 2nd and 3rd year, the years 4…30. Their Chapter 4.3 considers the calculation. The dose factors for the first year are introduced in their Tables 6 (cow's milk) and 7 (cow's meat) in the pasturing season. Column $D_{e,i}$ depicts the required coefficient. The coefficient depicting the dose for three years is given in the column $D_{k,i}$. The coefficients for overwintering season are obtained with the help of Tables 9 and 10 (1st column depicts the share of the 1st year). In addition their Formula 33 is needed; there only the concentration illustrating the 1st year $C^m(100d)$ is taken into account. The dose of the first three years are obtained with the help of column $D_{t,i}$. The duration of the pasturing season is assumed to be 100 days. The current results for unit deposition and ingestion rate are shown in Appendix 2 of this report.

3. Objective of the current task

The target in context of the CASA project is to evaluate with the VALMA model whether in the case of a severe accident release there would be need for countermeasures outside the current emergency preparedness zone of 20 km. There could be weather conditions in which radioactive material could spread outside of the emergency planning zone in amounts large enough to cause there small individual doses, but possibly remarkable collective dose. This question arose as a consequence of the Fukushima accident in March 2011, when countermeasures in Japan were extended beyond 20 km from the power plants [WHO 2012]. Although deterministic effects are not expected at longer distances, countermeasures also there could reduce the risk of stochastic effects.

The proposed two new zones are planned to be extended to the distances from 20 km up to 100 km and from 100 km up to 300 km from a power plant [STUK 2013a].

In the first zone (extended planning zone / distance, EPD) the purpose is to identify areas within a period of time that would be effective in reducing the risk of stochastic effects by taking protective actions and other response actions within a day to a week or to a few weeks following a release (see Table 2 below from Appendix 2 of IAEA 2015). Width of the EPD is studied later on herein.

In the second new zone (ingestion and commodities planning zone / distance, ICPD) the purpose is to identify if there is need to take response actions

(1) for protecting the food chain and water supply as well as for protecting commodities other than food from contamination following a significant release and
(2) for protecting the public from the ingestion of food, milk and drinking water and from the use of commodities other than food with possible contamination following a significant release [IAEA 2015, Appendix 2].

Width of the ICPD is studied below in this study.

Table 3.1 provides generic criteria for use in developing a protection strategy and operational criteria for effective implementation of protective actions and other response actions to reduce the risk of stochastic effects in a nuclear or radiological emergency as elaborated in Ref. [IAEA 2015].

Table 3.1. Generic criteria for protective actions and other response actions in an emergency to reduce the risk of stochastic effects. Abbreviated from [IAEA 2015].

Projected dose that exceeds the following generic criteria: Take urgent protective actions and other response actions.		
$H_{Thyroid}$ (equivalent dose)	50 mSv in the first 7 days	Iodine thyroid blocking
E (effective dose)	100 mSv in the first 7 days	Sheltering; evacuation; prevention of inadvertent ingestion; restrictions on food, milk and drinking water and restrictions on the food chain and water supply; restrictions on commodities other than food; contamination control; decontamination; registration; reassurance of the public
Projected dose that exceeds the following generic criteria: Take early protective actions and other response actions.		
E	100 mSv in the first year	Temporary relocation; prevention of inadvertent ingestion; restrictions on food, milk and drinking water and restrictions on the food chain and water supply; restrictions on commodities other than food; contamination control; decontamination; registration; reassurance of the public
Dose that has been received and that exceeds the following generic criteria: Take longer term medical actions to detect and to effectively treat radiation induced health effects.		
E	100 mSv in a month	Health screening based on equivalent doses to specific radiosensitive organs (as a basis for longer term medical follow-up), registration, counselling

Table 3.2 provides generic criteria for use in developing a protection strategy and operational

criteria for effective implementation of protective actions and other response actions to reasonably reduce the risk of stochastic effects from ingestion of food, milk and drinking water and from use of other commodities in a nuclear or radiological emergency.

Generic criterion of 1/10 of the generic criteria for early protective actions and other response actions given in Table 3.2 is established for food, milk and drinking water and other commodities restrictions to ensure that the dose from all exposure pathways, including ingestion, will not exceed the generic criteria for early protective actions and other response actions given in Table 3.1.

If restriction of consumption of food, milk and drinking water will result in severe malnutrition or dehydration because replacements are not available, food, milk and drinking water with concentration levels projected to result in a dose above the generic criteria in table 3.2 may be consumed until replacements are available, or the affected people can be relocated, provided this will not result in doses above the generic criteria in Table 3.1.

Table 3.2. Generic criteria for food, milk and drinking water and other commodities to reduce the risk of stochastic effects in an emergency. Abbreviated from [IAEA 2015].

Generic criteria		Examples of protective actions and other response actions
Projected dose from ingestion of food, milk and drinking water that exceeds the following generic criteria: Take protective actions and other response actions as justified.		
E	10 mSv per annum	Restrict consumption, distribution and sale of non-essential food, milk and drinking water and restrict the use and distribution of other commodities. Replace essential food, milk and drinking water as soon as possible or relocate the people affected if replacements are not available. Estimate the doses of those who might have consumed food, milk and drinking water or used other commodities to determine whether this may have resulted in doses warranting medical attention in accordance with Table 3.1.

Figure 3.1 illustrates the circular rings, located around Olkiluoto NPP, used in this work. These rings represent the distances 15, 20, 50, 100, 200 and 300 km, where doses are calculated. Actually these rings consist of discrete points on the circle in the dose calculations. This means that every time when the plume is crossing the ring, the corresponding affected receptor point dose values are written in the result data file. Using several rings for the results helps to create better insight of the dose behaviour in the calculation area. For example Helsinki and Stockholm are situated close to the ring of 200 km.

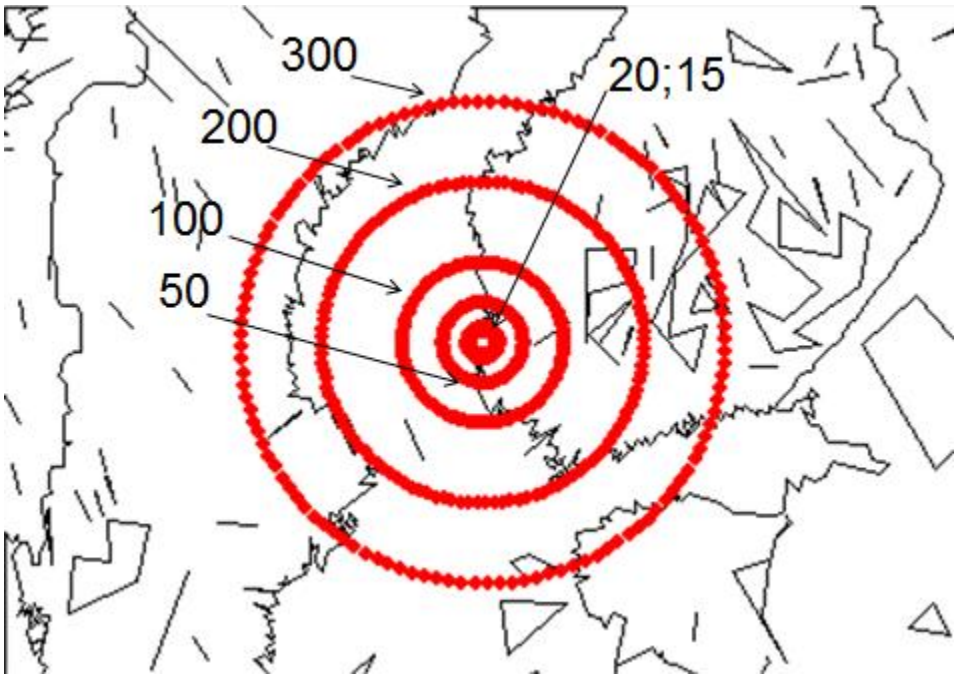

Figure 3.1. Graph of the calculation distances around the Olkiluoto nuclear power plant. Ring 1 corresponds to 15 km,ring 2 to 20 km, ring 3 to 50 km, etc. The map with plot of the points was generated with VALMA GUI (graphical user interface).

On each ring there are 120 calculation points (3° lateral spacing) given in the geographical coordinates (lat, lon) and the dose values are calculated at the point when the plume parts cover the point. Olkiluoto NPP is located at 21.44 E (eastern longitude) and 61.24 N (northern latitude).

In summary, based on Figure 3.1 and Tables 3.1 and 3.2, a simplified approach to answer the question – what countermeasures are needed beyond 20 km – is to calculate the dose at the rings and especially at the distances of:

- 20 to 100 km: to study if the dose level of 100 mSv is exceeded in a week or in a year
- 100 to 300 km: to study if the dose level of 10 mSv is exceeded in a year from ingestion

Adopting this approach means that there is finally no need to estimate more accurately the number of stochastic effects based on the collective dose. This approach is recommended by IAEA [IAEA 2015].

4. VALMA model for the evaluation of doses

VALMA is a dispersion and dose assessment code for accidental atmospheric radioactive releases [Ilvonen, 2002]. It was developed at VTT in late 1990's and its main purpose was to serve as an emergency preparedness tool for radiation safety authorities (STUK in Finland). In such use, it is essential to produce predictions of concentrations, depositions, dose rates and doses in a reasonably short time to enable possible rapid countermeasures. It is not possible to perform CFD-like calculations that may last days. Furthermore, it is possible that the best existing weather data from FMI cannot be received due to e.g. increased web traffic. The weather data is produced by FMI (Finnish Meteorological Institute) with Monte Carlo particles (even a limited number) that can be calculated, based on NWP (numerical weather prediction) models, with the SILAM dispersion model. Another option is the data measured at the weather mast of the NPP, or possibly several masts. Regardless of the source of weather data, VALMA offers the flexibility to calculate with changing source term estimates, including released nuclide inventory and the temporal and height distributions of different nuclides. This is accomplished by separation of the dose assessment part from the atmospheric dispersion, and using only those SILAM trajectories that correspond to the assumed time and height intervals of the release. It is also easy to set the spatial and temporal grids and to view the Lagrangian trajectories and dozens of result quantities on map or as temporal trends at chosen locations.

In short, VALMA works by dividing the release into a finite number of 'packets' or 'puffs', each of which corresponds to a 'slot' within release time and height intervals. For each packet, VALMA receives from SILAM or computes by itself from mast data a possibly winding central trajectory, which the packet will follow according to available wind information. VALMA follows each packet along the trajectory and calculates its spread, chain decay and deposition scavenging at the same time. VALMA calculates dozens of radiologically interesting quantities, like concentrations, depositions, dose rates and doses via different exposure pathways, together with their time derivatives and integrals. In contrast to a Eulerian dispersion model, VALMA uses a grid only to represent and accumulate the result quantities, not for calculating them. The results will be a superposition of all the 'puffs' that were used and followed along their trajectories; the puffs do not interact with each other. In the extreme, with millions of Monte Carlo particles, calculation of concentrations reduces to adding the nuclide activities in the same result grid cell. In the other extreme, there can be only one central trajectory, followed by one single puff.

For the CASA project, a probabilistic approach was needed and the VALMA model had to be extended to enable processing of numerous weather conditions from the trajectory data of one year. This extension, in 2015, was technical (did not affect the physical models). For the current

task (2016), assessment of ingestion doses, a lot of new code was written in VALMA. The new internal exposure pathways can be considered a new model in VALMA. However, the starting point for the change is quite simple, as it comprises basically multiplication of deposited activities, nuclide by nuclide, with their corresponding dose conversion (DC) coefficients in the new pathways.

4.1 Weather data

The weather data was provided by the FMI (Finnish Meteorological Institute). The data consists of the air parcel trajectories (massless particles only) of the year 2012 based on the numerical weather predictions of ECMWF (The European Centre for Medium-Range Weather Forecasts). The data covers the grid area of 1000*1200 km (56.8137...65.6583N, 10.7129...32.1711E). The calculation resolution of the ECMWF data was 16 km. There are 20 trajectories in every 12 minutes resulting in 100 trajectories in one hour. So each dispersion case in this study was described with 100 trajectories. The total number of the trajectories is 878400 (2012 was a leap year). Each trajectory was followed for 96 hours if not leaving the calculation area. The release point is Olkiluoto and the release height of the trajectories was 0-200 m. For the current calculations the trajectories starting between the altitudes of 80 and 120 m were sampled for the calculations. This corresponds to the height of the ventilation stack from which the release was assumed to occur. For future work, other release heights should be used, too.

4.2 Exposure pathways

There are four exposure pathways considered in this study: direct external gamma radiation from the radioactive cloud, direct external gamma radiation from fallout, internal exposure from radioactive material through inhalation, and internal exposure through ingestion. The inhalation dose caused by dry matter dusting in the air (resuspension) has not been examined because the significance of the exposure route is generally considered to be minor in Finnish conditions due to ground flora and seasonal changes. Subsections 1–4 describe the implementation of the exposure routes in VALMA and present the related calculation parameter selections.

1) External gamma radiation from the activity in the cloud

The protection factor value for people is 1.0, meaning that 100% of the dose received by a fully-unprotected person is taken into account when the release duration is short (like the duration of 3 hours in this study). If the release duration is longer than few hours it is reasonable to assume that the person is not outdoors all the time and the shielding factor is less than 1. The dose is received as the cloud passes.

The cloud gamma dose is caused by all nuclides in the release, regardless of if they are deposible or not. Of the exposure pathways considered in this study, noble gases can only cause radiation doses through the direct cloud gamma pathway. Near the source, the cloud is still relatively concentrated and the 3D distribution of concentration must be accounted for. Further away, cloud spread makes concentrations almost uniform in the lateral direction (as far as the effective range of gamma radiation is considered), but there may be essential differences in the vertical, which are caused by e.g. different winds at different heights, changes of atmospheric stability

conditions and mixing height, and deposition processes acting as a sink for deposable nuclides near the ground surface.

2) External gamma radiation through fallout

The protection factor, i.e. the relation between the true dose and the dose received without any protection, can be determined. The calculation criterion assumes that the following protection factors due to shielding by buildings etc. prevail in the nuclear power plant facility's environment for external radiation originating from fallout:

- Outdoors 0.7
- In a detached house 0.4
- In a multi-storey house 0.1

In addition, it is assumed that people spend 10% of their time outdoors and 90% indoors. A total of 40% of the population live in detached houses and 60% in multi-storey house, resulting in the following calculation:

$0.1 \cdot 0.7 + 0.9 \cdot 0.4 \cdot 0.4 + 0.9 \cdot 0.6 \cdot 0.1 = 0.3$

The value of 0.3 was used in ARANO calculations. In VALMA calculations the value of 1.0 was used for the dose combination pathway 4 (outdoors) and the value of 0.5 (shielding) for the dose combination pathway 5. This explains partly why VALMA shows higher doses.

The total durations examined for the exposure are one week (time step 190) and one year (time step 191).

VALMA calculates the release as divided into separate, non-interacting parts represented by puffs that move along their central trajectories. During each time step, certain fractions of the puff's nuclide activities are deposited on ground surface by the processes of dry and wet deposition. These pieces of deposition are considered separately by VALMA, and the end result is the superposition of all the deposition batches left by all the puffs. The gamma dose from fallout follows from chain decay of the deposited nuclide 'cocktail' and tabulated dose conversion coefficients, for each nuclide.

3) Internal radiation dose through inhalation

The protection factor is 1, i.e. no protection is assumed to exist. Inhalation rate is 22.2 m^3/24 h in ARANO and 21 m^3/24 h (0.000243 m^3/s) in VALMA [ICRP 1995]. The inhalation dose factors (conversion coefficients) are from [STUK 1999]. Inhalation doses are assumed to be caused only by those nuclides that deposit in the lungs (and are then absorbed by the human body); they are the same that deposit on the ground surface. Inhalation doses are directly related to the concentrations in air of the nuclides at breathing height, which in VALMA is set as 1.62 m. Both inhalation rate and breathing height are free-to-set compile-time parameters in VALMA.

4) Internal doses through ingestion

VALMA was extended with this exposure pathway by additional coding in 2016. In contrast to the other 3 pathways mentioned just above, the ingestion path is technically divided into 15 different modes, corresponding to the 5 different foodstuff groups (green vegetables, grain, root vegetables, cow milk and cow meat) and for each group, 3 different consumption times (1 a, 3 a and 30 a). The time period of consumption means that the fallout-contaminated fields are used for production for that many years, and the products are then yearly consumed. Note that the actual time during which the human body receives the radiation dose (the so-called committed dose) from the nuclides inside is longer (50 a). This can be regarded as a conservative choice, since in most cases the exposed persons will live less than 50 years after the exposure, simply because of their age at exposure time.

Also in contrast to the other above-mentioned dose pathways, the ingestion paths have a strong dependence on the season during which the fallout arrived. In the summertime (60 d for edible plants and 100 d for cattle feed), radioactive nuclides may be directly deposited on the plant parts which are then consumed by humans or cattle. For winter fallout, and always after the first year, the intake by plants takes place by uptake through the roots. The summer time periods used in VALMA are June 15 – August 14 for green vegetables, grain and root vegetables, and May 29 – September 5 for cow feed (pasturing season). The implementation in VALMA considers each part of the release separately, which means that a long release, like Chernobyl or Fukushima or even longer, may happen partly during winter and partly during summer time. Another possible future advantage of the method is that the summer-winter shift (now abrupt, on fixed dates) could take place gradually, in a more continuous fashion. (In real life, all farmers are not starting to use their fields at the same time.) Unfortunately, this scheme consumes more CPU time than starting from the final deposition field. The running time of VALMA increased to almost two-fold, compared with the situation before ingestion pathways. This CPU time was quite prohibitive in the practical performing of the CASA calculations.

The extraction of AGRID coefficients for use in VALMA was already described above in Chapter 2. The coefficients are not directly those of ICRP-30 (Limits for intakes of radionuclides, 1982), because the AGRID model readily includes other factors like delay between production and consumption, and the generation and effects of daughter nuclides. The main developments made in VALMA code in order to calculate the ingestion doses are briefly documented in the following.

Module ‘nuclides’

In VALMA code, the nuclides module with its subroutines, functions and data takes care of all nuclide-related tasks, like the radioactive chain decay and the radiological properties of the nuclides. The main implementation for ingestion doses is in the function fu_ingestion_dc. The needed inputs are nuclide index, integration time, day number during the year, and type of foodstuff. The summer / winter decision follows from the foodstuff and day number. This would be the correct place to perform interpolation, i.e. gradual change between the seasons. During first call the coefficient file is read, and the correspondence with current case’s nuclides is established, after which the values can be delivered fast during subsequent calls. Even

interpolations between the integration times (1 a, 3 a and 30 a) could easily be implemented here.

Module ‘doses’

The doses module, with its 3000 lines of Fortran code, is among the largest modules of VALMA. Its high-level subroutine do_separate_dose_assessment takes care of the logic and logistics of the accident source term, its correspondence with available weather data, all the time-splitting of release duration and transport time, calculation of the various VALMA result quantities, and expressing them either in user-defined grid cells or separate receptor points (‘probes’ in CFD terminology). Several changes were implemented in different subroutines in the doses module, but due to the relative simplicity of getting ingestion doses from the deposited nuclide activities, the main functionality is contained within the subroutine put_quantities_into_final_grids. Simplicity results from the fact that the foodstuff are always assumed to be produced and consumed locally, i.e. geographical distributions of agricultural production are not used. Two important features must be noted here: The consideration of one fallout batch at a time, and the use of the nuclide cocktail only as it was deposited on the ground, not its future compositions after chain decay etc. Here ‘fallout batch’ means the deposition left by one puff during one time step. Final results will be the superposition of a large number of non-interacting fallout batches. This method makes it possible to divide long-lasting releases between different seasons. For the direct fallout gamma dose, calculation of chain decay is needed, but for ingestion doses this is not the case, as the AGRID coefficients readily contain the effect of daughter nuclides. The ingestion doses are accumulated in the array point_ing_results. All quantities in VALMA code and result files are in SI basic units. At each result time step, the dose means the committed dose, received by the human body during the next 50 years, from all the fallout batches that came during that or previous time steps. Note that the ingestion doses are currently implemented only in the calculation part of VALMA, and there only for the separate receptor points, i.e. not in the result grid, and they cannot be visualized using the graphical user interface (VALMA GUI). To add these would be another major development task.

Module ‘dose_output’

The output subroutines made for the CASA project in VALMA module dose_output are tailored modifications of the subroutine write_point_results. A PSA level 3 run with VALMA produces a point_res.out file for each calculation case (8784 cases in this project, according to hourly coverage of year 2012). In the 2015 CASA project, a separate code was still used to pick interesting result quantities from those files, which as such contain the non-zero data for 31 different quantities (concentration, deposited amounts, dose rates and doses) and for all the time steps used in the calculation. In 2016, this cumbersome procedure was replaced with the ability of VALMA itself writing a more compact result file by the subroutine write_picked_point_results. This file contains the time steps, numbers of rings (distances from 15 km to 300 km), numbers of points on the ring (120 smoothly, with 3° lateral spacing, distributed geographical receptor points on each ring) and the interesting doses: cloud direct, fallout direct and inhalation. For the ingestion doses, a separate dedicated subroutine (write_point_ing_results) produces a similar file, but with a larger number of dose pathways (5 foodstuff groups and their sum, in each case with all the different integration times). Each

CASA result file readily contains information for one month of the whole PSA level 3 study (in this case, a month in year 2012). The addition of ingestion doses increased the CPU time of VALMA execution to almost two-fold. Currently, on an Intel Core i7 laptop, one month of weather data with one source term takes appr. 20 hours (depending on the month's weather data). Because the cases are independent, the task would be relatively easy to run in parallel, but so far there were not enough resources to implement such strategy.

New developments in VALMA in the CASA projects turned out to be more difficult than expected, partly because of a long time period without major development / maintenance of VALMA, and partly because of the necessity to change from an older development environment (on Windows XP) to the new one (on Windows 7). Note however that the calculation part of VALMA is quite general and standard fortran-90 code and should be portable to various environments, e.g. a Linux cluster. Also the CPU time needed to run the PSA level 3 calculations was more than expected.

4.3 Presentation of results

Matlab codes for generating ccdf curves and tabulated results

A dedicated Matlab script (valma_ccdf_picked.m / valma_ccdf_ing.m) was used to read the monthly result files and produce from them numerical tables and two kinds of plots: doses during 2012 as a function of time, and the corresponding dose distributions in the form of ccdf (complementary cumulative density function) curves. The ccdf shows, for each dose level, the probability of exceeding that dose. As a result of this study, there are quite many such curves: 540 for the 'old' VALMA dose pathways, and 972 for the newly added ingestion pathways.

The total number 540 comes from:

- 3 different source terms (CASA1, CASA2 and CASA3)
- 2 time points (1 week and one year)
- 6 distances (15, 20, 50, 100, 200 and 300 km)
- 5 dose pathways (cloud, fallout, inhalation, direct sum, sum with shielding)
- 3 statistics describing the dose at the distance (mean, median and maximum)

The total number 972 for ingestion doses comes from:

- 3 different source terms (CASA1, CASA2 and CASA3)
- 6 distances (15, 20, 50, 100, 200 and 300 km)
- 6 foodstuff groups (green vegetables, grain, root vegetables, milk, meat, sum total)
- 3 consumption time periods (1 a, 3 a and 30 a)
- 3 statistics describing the dose at the distance (mean, median and maximum)

The difference of the time points (1 week or one year) is really only meaningful in the case of direct dose from fallout. It is possible to reduce that dose by e.g. evacuation even after the whole radioactive cloud has passed. In contrast, the pathways ‘cloud direct’ and ‘inhalation’ are directly dependent on what happened during cloud passage. In the case of ingestion doses, the fallout arrived during cloud passage, and doses can be reduced by restrictions on foodstuff use. For that purpose, the 3 different consumption time periods are included.

It is evident that all the ccdf results cannot be included in graphical form in this report. Therefore, appendices 3 to 8 contain numerical tables, where each line corresponds to one specific ccdf dose distribution. Each distribution is described by its mean, median and maximum values that occurred during 2012, as well as the values ’95 %’ and ’99.5 %’, meaning that the probability of exceeding them is 5 % and 0.5 %, respectively. Only some sample ccdf curves are included in this report in graphical form. The most important ones were considerd to be for source term CASA1, which is the maximum release allowed for a serious accident in Finland), and for the distances 100 km and 300 km (the new IAEA recommendations).

Examples of seasonal and weather-induced variation of doses

The doses as a function of time are not directly useful for end results of this study, but some examples are included here in order to illuminate how the weather conditions affect the doses of an individual person, and in the case of ingestion doses, how the seasonal differences look like.

Comparison of the time evolution of the cloud and fallout doses (Figures 4.1 and 4.2) shows that they are generally not correlated with each other. Cloud gamma dose comes from all nuclides, but fallout dose from the deposable nuclides only. With the integration time of 1 year, groundshine (fallout) is more significant than cloudshine.

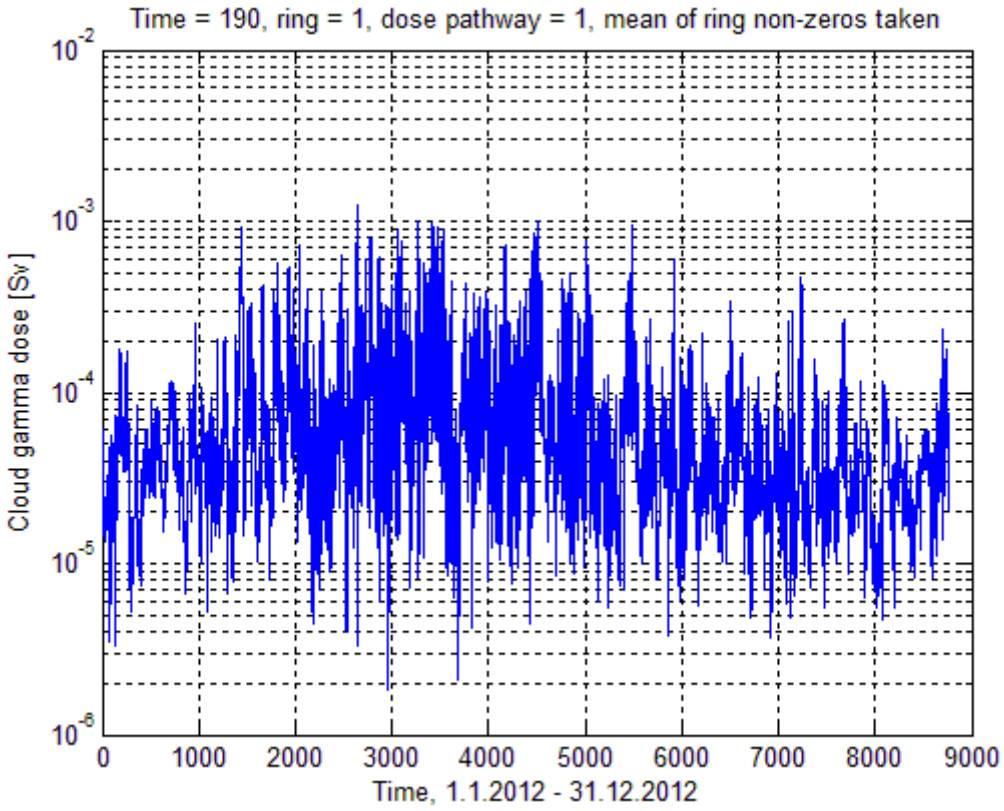

Figure 4.1. Direct external cloud gamma dose from CASA1 source term, mean non-zero value at the distance of 15 km.

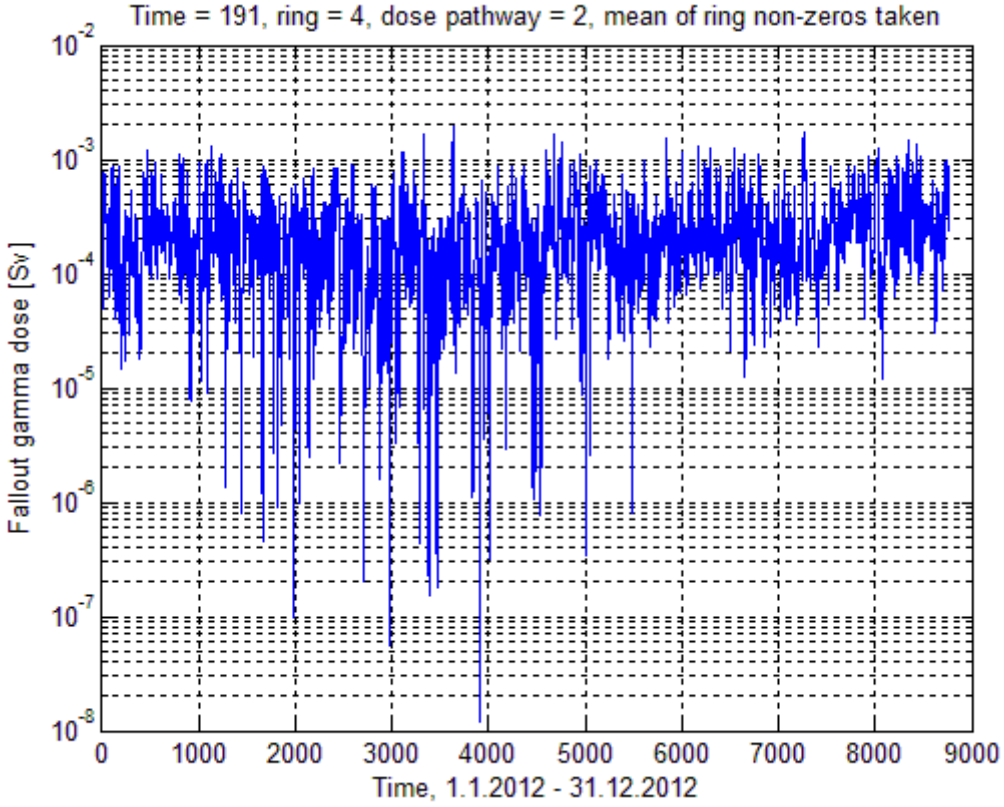

Figure 4.2. Direct external fallout gamma dose from CASA1 source term, integration up to 1 year, mean non-zero value at the distance of 100 km.

A specific feature of the ingestion doses is the dependence on season (Figure 4.3, grain, and Figure 4.4, milk). Substantially higher doses result from grain being contaminated during the Finnish growing season (taken as June 15 to August 14), or milk coming from cows that pastured on contaminated fields during the Finnish pasture season (May 29 to September 5). In all cases of a dose as a function of time we see clearly the partly random nature of weather (dispersion) conditions, sometimes leading to very low or very high doses.

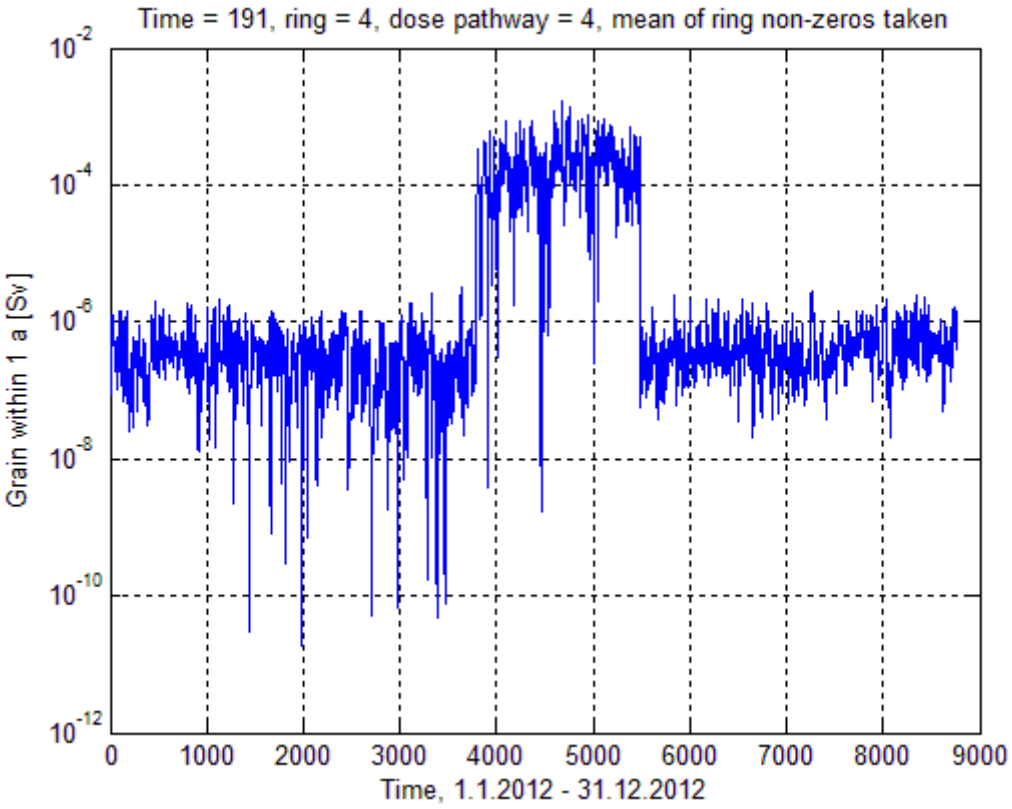

Figure 4.3. Internal dose from the ingestion of locally produced grain (consumption of first year), CASA1 source term, mean non-zero value at the distance of 100 km.

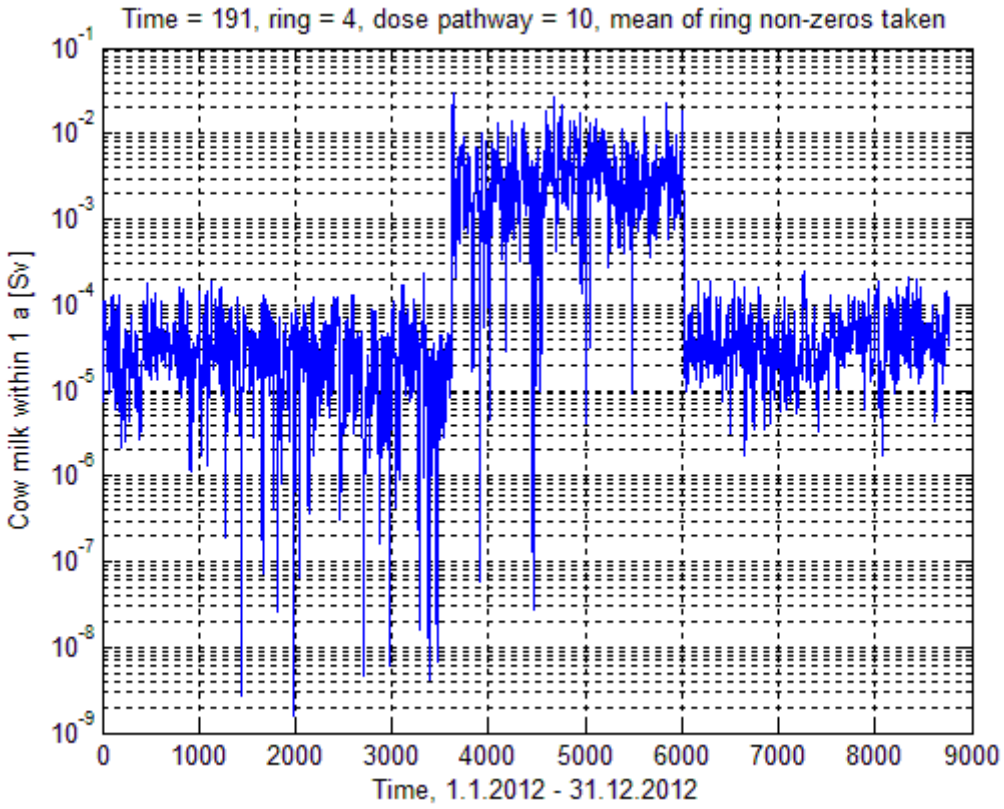

Figure 4.4. Internal dose from the ingestion of locally produced milk (consumption of first year), CASA1 source term, mean non-zero value at the distance of 100 km.

4.4 Source terms

Three alternative release categories of severe accident source terms are considered [STUK 2013a]. The release start time is assumed to be four hours after shutdown and the release duration is set to three hours. The release altitude is 80…120 m. This means that the trajectories starting at the altitude between 80…120 m are picked by VALMA for the calculation. Table 4.1 shows the activity inventory and the release cases:

Case 1: ‘CASA1’, noble gases 1%, I-131 1000 TBq, Cs-137 100 TBq (Severe accident release)

Case 2: ‘CASA2’, noble gases 20%, iodine + caesium 2%

Case 3: ‘CASA3’, noble gases 100%, iodine + caesium 20% (No containment)

Table 4.1. Inventory and releases of the OL3 reactor for the nuclides used here (TVO 2004). Releases shall be corrected by chain decay according to decay times during delays in the release start time and duration.

Nuclide	OL3 inventory [Bq]	Release [Bq]		
Noble gases (9)		**Case 1**	**Case 2**	**Case 3**
Kr-85	5.7E+16	5.7E+14	1.1E+16	5.7E+16
Kr-85M	1.3E+18	1.3E+16	2.6E+17	1.3E+18
Kr-87	2.5E+18	2.5E+16	5.0E+17	2.5E+18
Kr-88	3.5E+18	3.5E+16	7.0E+17	3.5E+18
Xe-133	9.7E+18	9.7E+16	1.9E+18	9.7E+18
Xe-133M	3.1E+17	3.1E+15	6.2E+16	3.1E+17
Xe-135	3.0E+18	3.0E+16	6.0E+17	3.0E+18
Xe-135M	2.1E+18	2.1E+16	4.2E+17	2.1E+18
Xe-138	8.6E+18	8.6E+16	1.7E+18	8.6E+18
Iodine (5)				
I-131	4.8E+18	1.0E+15	9.6E+16	9.6E+17
I-132	7.0E+18	1.5E+15	1.4E+17	1.4E+18
I-133	1.0E+19	2.1E+15	2.0E+17	2.0E+18
I-134	1.1E+19	2.3E+15	2.2E+17	2.2E+18
I-135	9.5E+18	2.0E+15	1.9E+17	1.9E+18
Cesium (4) + rubidium (2)				
Cs-134	9.3E+17	1.5E+14	1.9E+16	1.9E+17
Cs-136	2.3E+17	3.6E+13	4.6E+15	4.6E+16
Cs-137	6.4E+17	1.0E+14	1.3E+16	1.3E+17
Cs-138	9.3E+18	1.5E+15	1.9E+17	1.9E+18
Rb-88	3.6E+18	5.6E+14	7.2E+16	7.2E+17
Rb-89	4.7E+18	7.3E+14	9.4E+16	9.4E+17

5. Results calculated by VALMA

5.1 VALMA output example by the GUI (Graphical User Interface)

Initially VALMA was tailored for emergency preparedness use. In the following, two examples of its functions and output properties are shown (Fig. 5.1). The examples show the basic output on the map. The purpose here is to indicate (as single and not necessarily representative examples) the behaviour of the plume in two different dispersion conditions. There are 31 output quantities available, but here only one of them (total dose, i.e. cloud + fallout + inhalation) is visualized. Two different sets of trajectory data are used. Source term is that of the severe accident used in this study (Case 1).

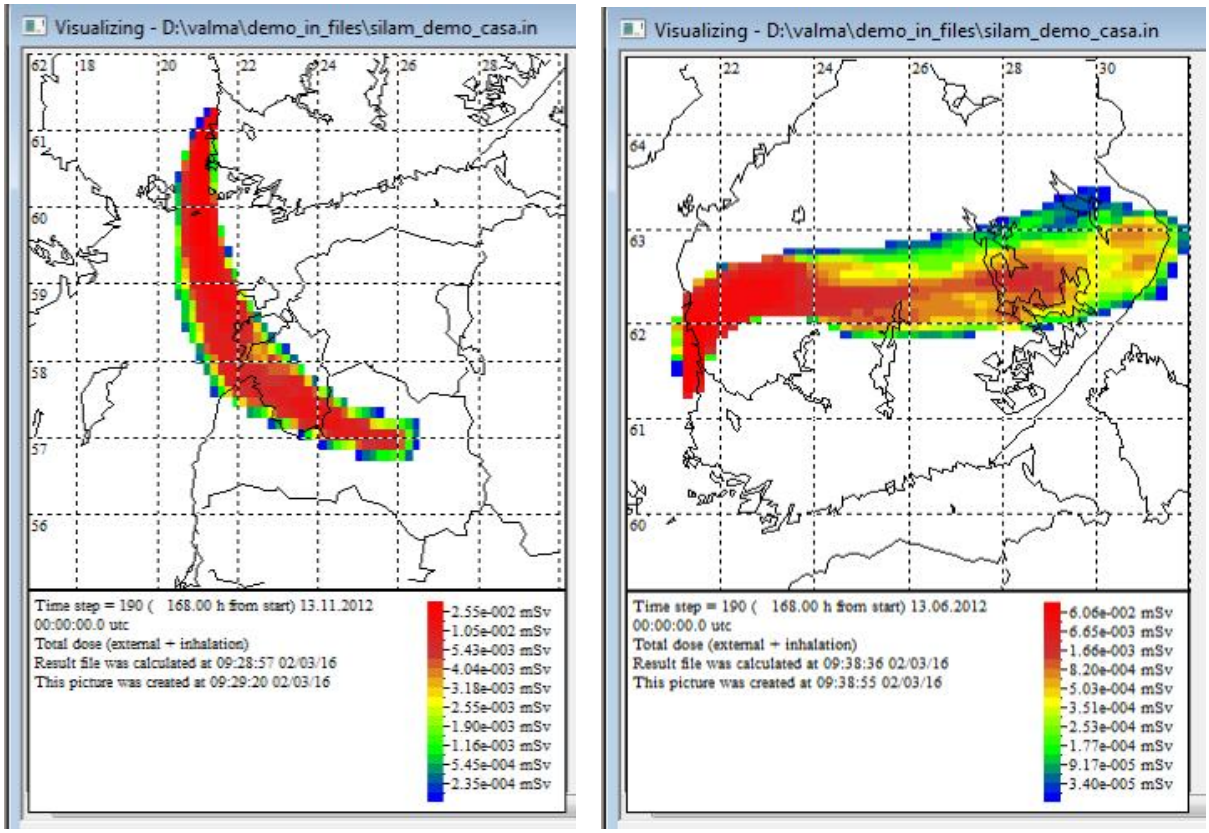

Figure 5.1 Examples of the VALMA GUI outputs. Total dose in one week is presented with two different release starting times during the year 2012.

Figure 5.1 illustrates the areas affected by the plume on the map. Figures indicate how the prevailing wind fields affect the plume dispersion. This also depicts the fact that in the case of a large number of releases (PSA level 3 study), there is always a single dispersion case as the basis of the result data. These kinds of pictures are not needed when a large number of weather cases are calculated as is the case in CASA.

5.2 Some comparisons of VALMA results from the CASA1 source term

In this section, VALMA results calculated with the smallest (CASA1) source term and the whole year's (2012) weather data are compared with respect to the distance from source, choice of the statistic used to describe the dose of one dispersion case at a certain distance, dose pathways and integration times. The CASA1 source term corresponds to the Finnish release limit for a severe accident (100 TBq of Cs-137), but contains also several other nuclides. 100 TBq is only appr. 0.016 % of the Cs-137 in Olkiluoto-3 reactor core radioactive inventory. Note that similar comparisons were shown in the previous CASA report, but they were based on only one month's worth of weather data, did not have ingestion dose pathways, and the ccdf curves were shown on linear-linear scales (now log-linear or log-log).

Running time of VALMA with one month trajectory data depends on the machine (CPU and other features), extent of trajectory data (how many hours from start each trajectory is followed)

and number of trajectories used per case. Execution times proved to be from 10 hours to 26 hours. Difference between months may be several hours. The results presented here are compiled by new VALMA code as excerpt from a larger material consisting of the VALMA case-specific outputs. In VALMA, the usual case-specific outputs are the grid_res.out and point_res.out files. In the CASA study, all the point_res.* files were archived for later examination; * is the run number and also the starting hour within the month. This file includes the normal VALMA output for the geographical coordinates called also measurement points and are specified for the 6 distance rings as described before. For example in the case of June there will be 720 (= 30 x 24) of the point_res.* files. The total size of these monthly output files is about 41 GB for the whole year (2012).

New VALMA code was used to pick up into one combined file the results for the time points of one week and one year which best correspond to the time specifications of the IAEA's recommendations. From these data, different distributions (e.g. complementary cumulative density functions, or ccdfs) are prepared. Because at a certain time point several measurement points at a ring may be affected, it is necessary to select in some way the quantity to be used for the ccdf. Here three different choices were used: mean, median and maximum. The values are determined from the non-zero values on the ring. It should be noticed that the shielding factor of 0.5 for fallout was used in VALMA but the corresponding value in ARANO was 0.3 (less conservative).

Figure 5.2 illustrates different dose quantities at the ring of 20 km when the integration time is one week or one year. Time step 190 is one week and 191 is one year. The dose combination 'pathway 5' is the total dose from the external radiation from the plume and fallout (including the effect shielding) and internal dose from inhalation.

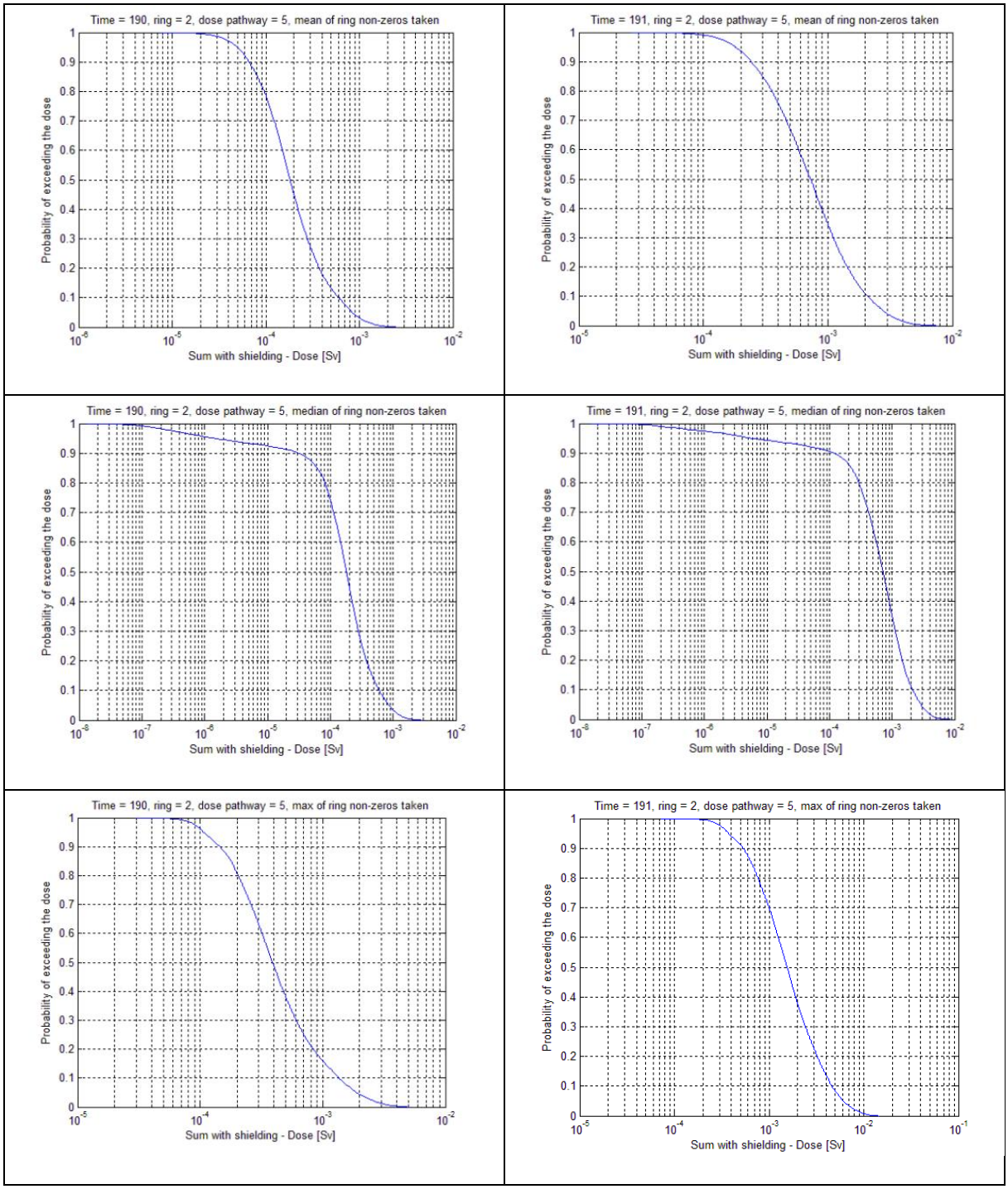

Figure 5.2. Significance of different dose statistics, chosen to describe one dispersion case at a certain distance: mean (top row), median (central row) and maximum (bottom row). Curve for total dose (cloud + fallout + inhalation), 20 km, two time integrals: 1 week (190, left column) and 1 year (191, right column). Trajectory data of Olkiluoto, 2012. CASA1 source term. Note different horizontal scales.

Figure 5.2 illustrates that difference between mean and median values is small in both time periods. Instead the maximum value is higher roughly with a factor of two. If the absolute values are studied it can be found that the values at the 95% level are 0.8 mSv in one week and 3 mSv in one year (cf. also Table A-7, rows 28 and 118) when the mean and medium values are considered. The corresponding values are 3 and 8 mSv in the case of the maximum values. These are a bit higher than the maxima from June 2012 only (in previous year's CASA report, Rossi & Ilvonen 2016).

The corresponding values from ARANO (using sector mean) are 0.2 and 1 mSv. The difference is quite small, a factor of 3 for the mean value (one year).

Figure 5.3 shows the same kind of comparison for ingestion doses: the sum of all foodstuff groups, and consumption time either first year only (left column) or 30 years (right column). One can immediately note a basic difference from the other dose pathways: The probability is not decreasing completely smoothly, but there is a 'plateau' in the middle of the curve. This arises from the fact that there are plenty of small wintertime doses, and also quite a lot of bigger summertime doses, but clearly fewer values in between. Another immediate observation is that the ccdf curves for 1st year and 30 years consumption (cf. Table A-8, lines 100-102 and 106-108) look almost the same. Actually only in the case of root vegetables there is a big difference between the 1 a and 30 a doses, and the other dose pathways are dominating over roots. In the other foodstuff groups, the edible parts of the plants may receive direct deposition over them. Without any countermeasures, as is the case in all results of this study, the ingestion doses (appr. 70 mSv) are clearly dominating over the other dose pathways (3 mSv, as mentioned right above). Note also that the VALMA calculation time step (191) in Figure 5.3 is 1 year; but there is no difference from e.g. 1 week (190), because in both cases, the cloud has already completely passed and the difference in consumption times is included in the DC coefficients (1 a, 3 a and 30 a). Calculation of ingestion doses in VALMA always starts at the moment when the deposition arrives on the ground.

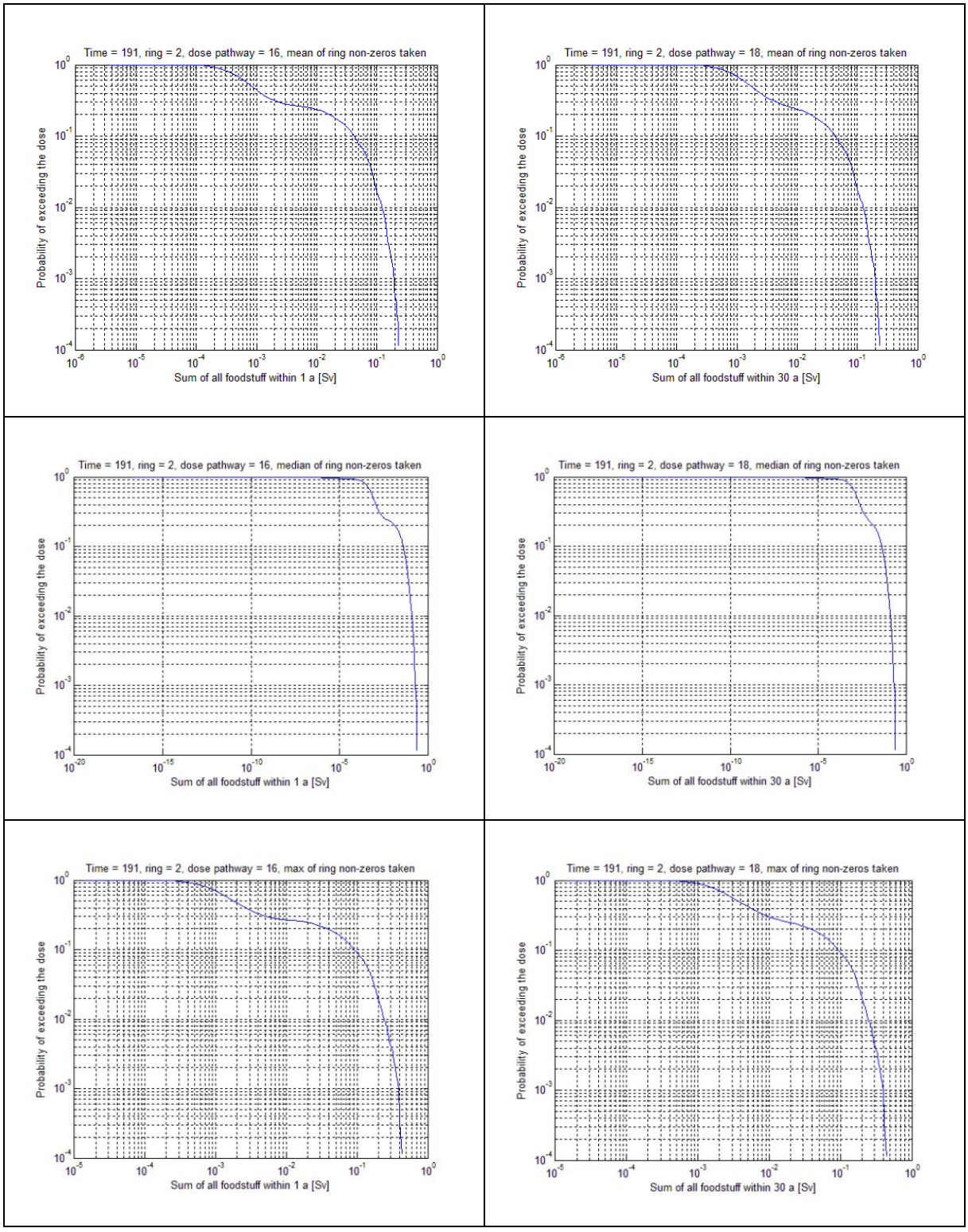

Figure 5.3. Significance of different dose statistics, chosen to describe one dispersion case at a certain distance: mean (top row), median (central row) and maximum (bottom row). Curve for total ingestion dose (green vegetables + grain + root vegetables + milk + meat, 50 years dose commitment), 20 km, two consumption time periods: 1 year (left column) and 30 years (right column). Trajectory data of Olkiluoto, 2012. CASA1 source term. Note different horizontal scales.

Figures 5.4 and 5.5 illustrate significance of the dose components (pathways), external and internal, at the distance of 100 km.

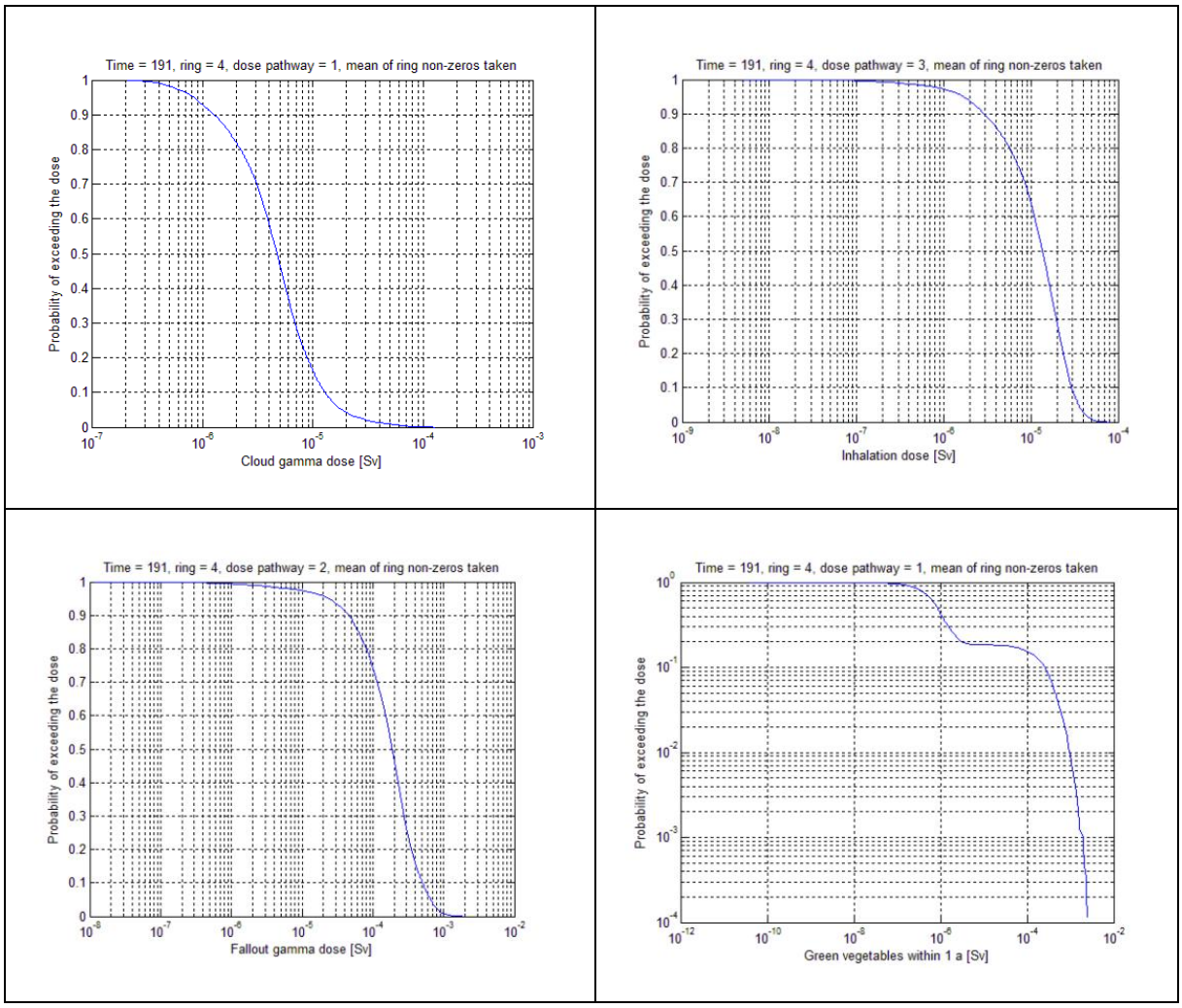

Figure 5.4. Significance of the dose components (dose pathways). Distance 100 km. In the upper part are cloudshine and inhalation doses. In the lower part there are groundshine dose with time integral of one year (step 191) and internal dose through contaminated green vegetables (1st year consumption). Trajectory data of Olkiluoto, 2012. CASA1 source term. Note different horizontal and vertical scales.

Figure 5.4 illustrates that the doses for cloudshine and inhalation are roughly of the same magnitude. Integrated for one year (step 191), the groundshine dose is roughly tenfold larger without shielding. If the shielding factor of 0.5 for groundshine is used, the groundshine dose is larger than cloudshine or inhalation with a factor of 5. The other dose components in Figures 5.4 and 5.5 are the 5 internal ones. It is clearly seen that their order of significance, from most to least significant, is milk – meat – green vegetables – grain – root vegetables.

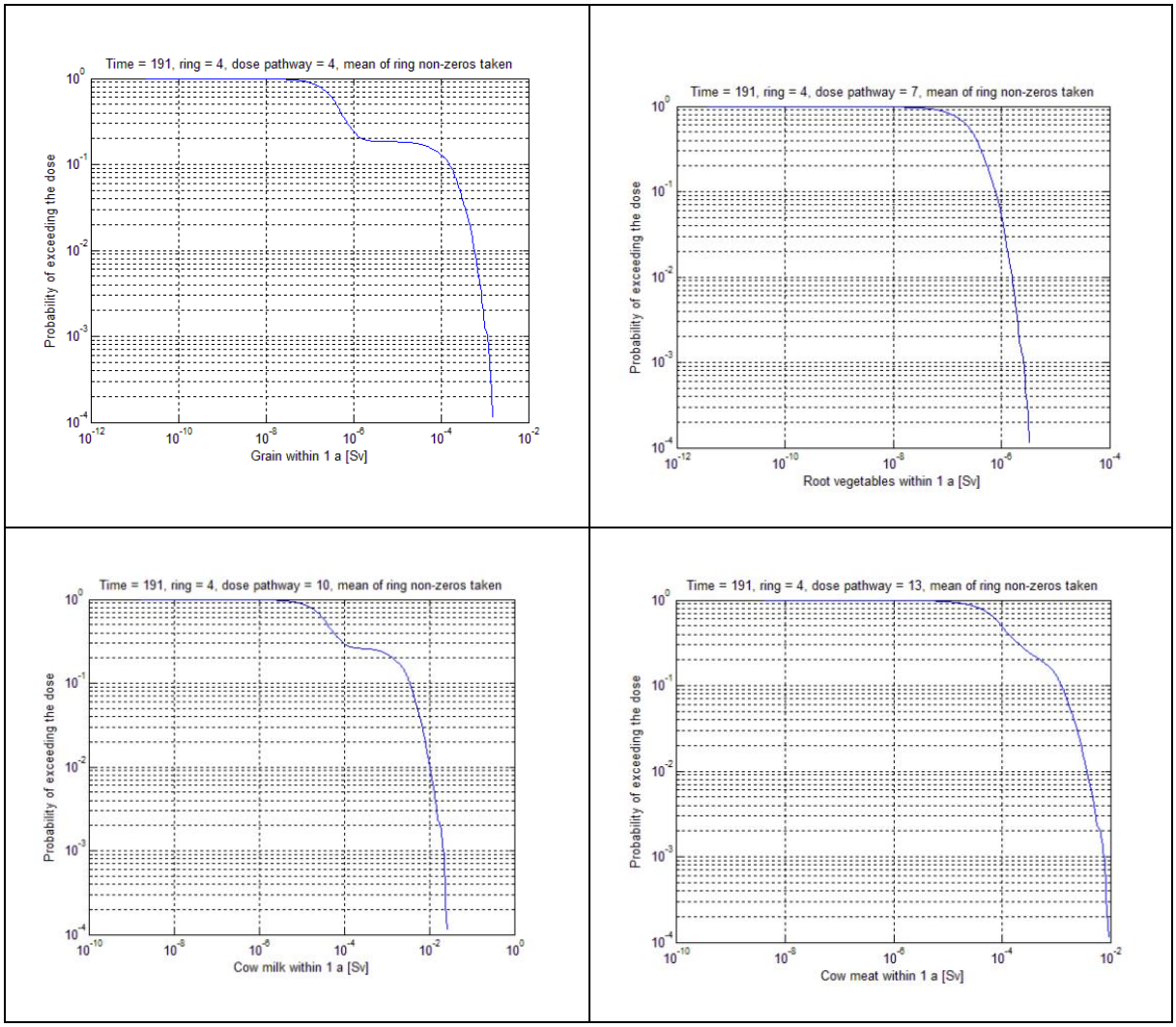

Figure 5.5. Significance of the dose components (dose pathways). Distance 100 km, internal doses through ingestion (1st year consumption): Grain and root vegetables (top row), cow milk and meat (bottom row). See also Table A-8, lines 172, 181, 190 and 199. Trajectory data of Olkiluoto, 2012. CASA1 source term. Note different horizontal and vertical scales.

Figure 5.6 illustrates the total dose (without ingestion) at six rings assuming one week integration time. The ccdf of the mean value of affected points is presented. Shielding factor 0.5 for groundshine is included.

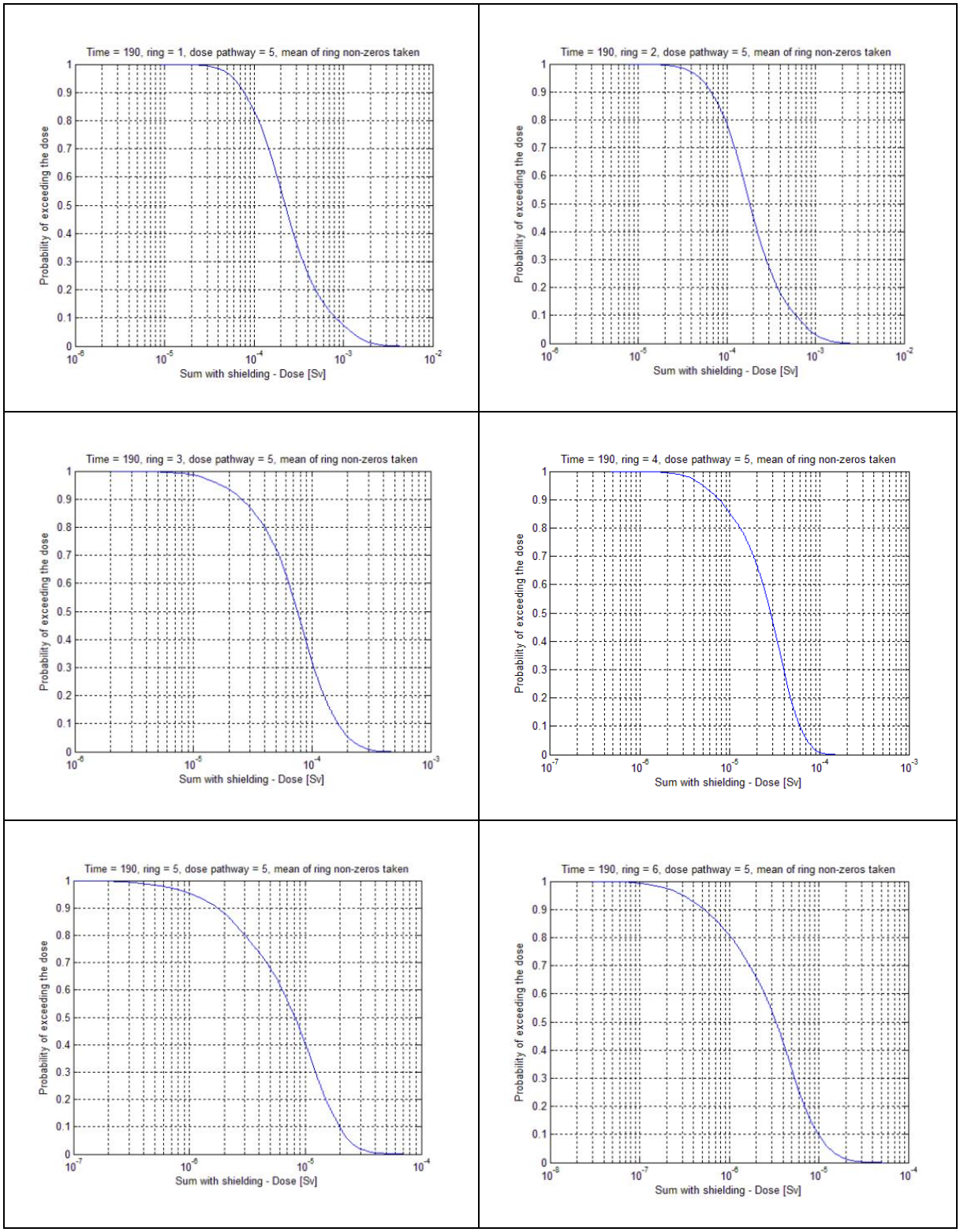

Figure 5.6. Mean value of the total dose (without ingestion) at six distances (rings 1…6): 15, 20, 50, 100, 200 and 300 km. Time integral of 1 week (step 190). See also Table A-7, lines 13, 28, 43, 58, 73 and 88. Trajectory data of Olkiluoto, 2012. CASA1 source term.

Figure 5.6 illustrates that when the distance increases the dose correspondingly decreases monotonically. The 95% percentile mean values (= 5% probability of exceeding) at the

distances of the rings are: 1.26 mSv, 0.845 mSv, 0.205 mSv, 72.4 µSv, 24.1 µSv and 13.3 µSv. Compared with ARANO results, VALMA's doses are generally higher with the factor of two. This can be understood better if Figure 7.1 is studied in [Rossi & Ilvonen 2015].

Table 5.1 shows the 95% percentile values picked from Figure 5.6 for the case mean dose, and from Table A-7 (case mean, median and maximum available).

Table 5.1. Total dose [mSv] at six distances, 95% percentile. Time integral of 1 week. Trajectory data of Olkiluoto, 2012. VALMA results and ARANO comparison.

Distance [km]	**Mean**	**Median**	**Maximum**	**ARANO(mean)**
15	1.26	1.29	2.74	0.9
20	0.845	0.868	1.9	0.6
50	0.205	0.196	0.471	0.1
100	0.0724	0.0669	0.167	0.04
200	0.0241	0.0222	0.0569	0.01
300	0.0133	0.0116	0.0319	0.005

The maximum value is about twofold compared with the mean and median values in VALMA. The mean value provided by ARANO is roughly equal to half of the mean and median values of VALMA.

Figure 5.7 illustrates the total dose at the 6 distance rings assuming one year integration time. The ccdf of the mean value is presented. Shielding factor 0.5 for groundshine is included.

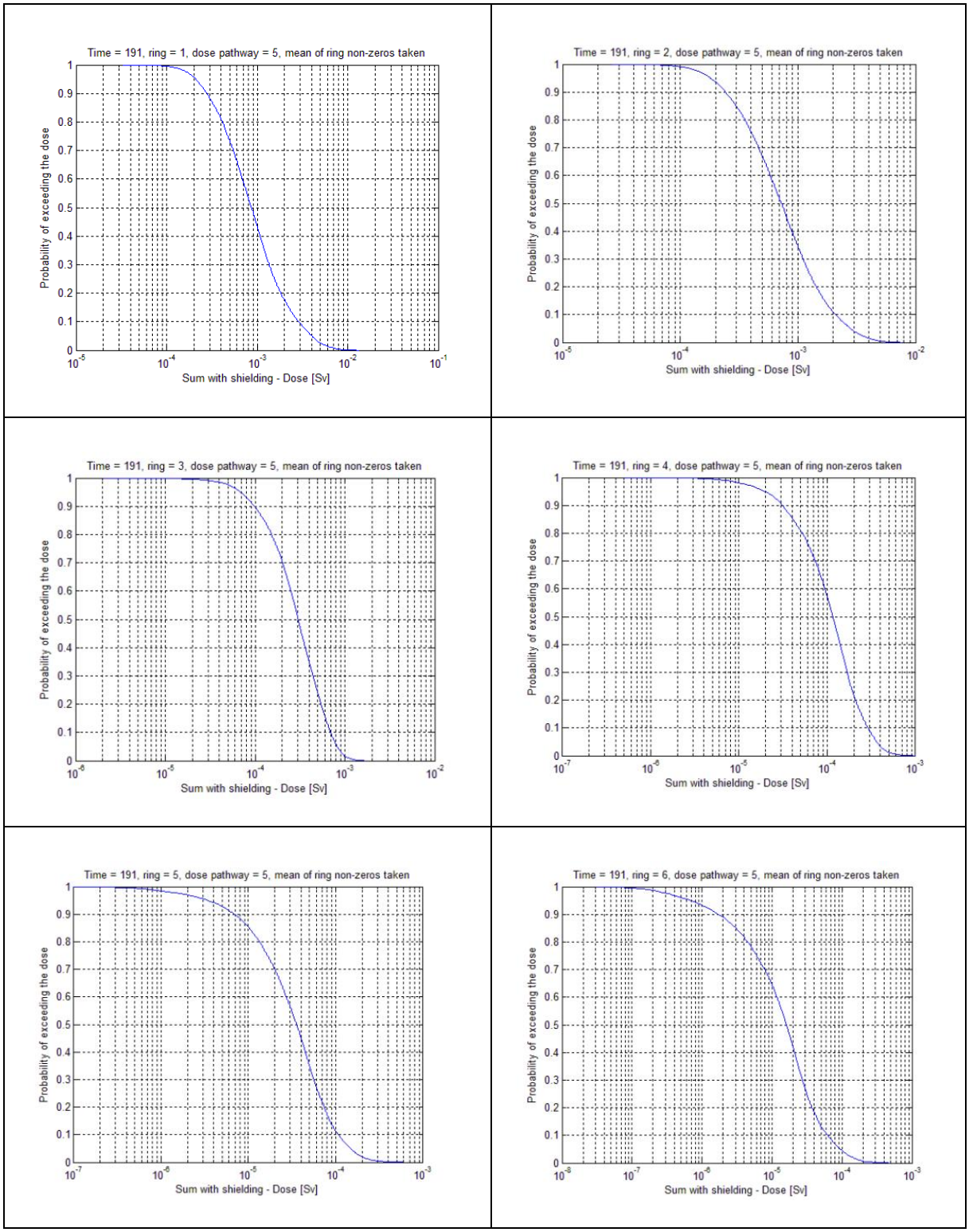

Figure 5.7. Mean value of the total dose (without ingestion) at six distances (rings 1…6): 15, 20, 50, 100, 200 and 300 km. Time integral of 1 year (step 191). See also Table A-7, lines 103, 118, 133, 148, 163 and 178. Trajectory data of Olkiluoto, 2012. CASA1 source term.

Figure 5.7 again illustrates that when the distance increases the dose correspondingly decreases monotonically. The 95% values at the distances of the rings are: 4.06, 2.8, 0.823, 0.365, 0.148 and 0.0964 mSv. Compared to ARANO results, VALMA's doses are now with the factor of three higher. Groundshine dose is the most important component due to longer exposure time and lesser shielding used in VALMA results in higher dose value. If the ratio of the shielding factors (0.3/0.5 = 0.6) in VALMA and ARANO is taken into account, the difference in the total dose is about a factor of 2. Anyhow, absolute dose values are at a level where no countermeasures are needed based on IAEA's recommendations.

The newly added ingestion dose pathways (green vegetables, grain, root vegetables, cow milk and cow meat) in VALMA are shown in Figure 5.8 as the sum of all foodstuff groups. Figure 5.8 shows the ccdf curves, for the case mean value at a distance, at the 6 ring distances of this study. The curves can be compared with Figure 5.7, which showed a similar sum of 3 dose pathways: cloudshine, groundshine and inhalation. The 95 % dose values of Figure 5.7, mentioned right above, are exceeded by the total ingestion dose of Figure 5.8 by a factor ranging from 13 to 27: 90.3, 69.5, 22.1, 7.65, 2.43 and 1.29 mSv. One should note that it was always assumed that locally produced foodstuff were consumed without any countermeasures, like restrictions on their use.

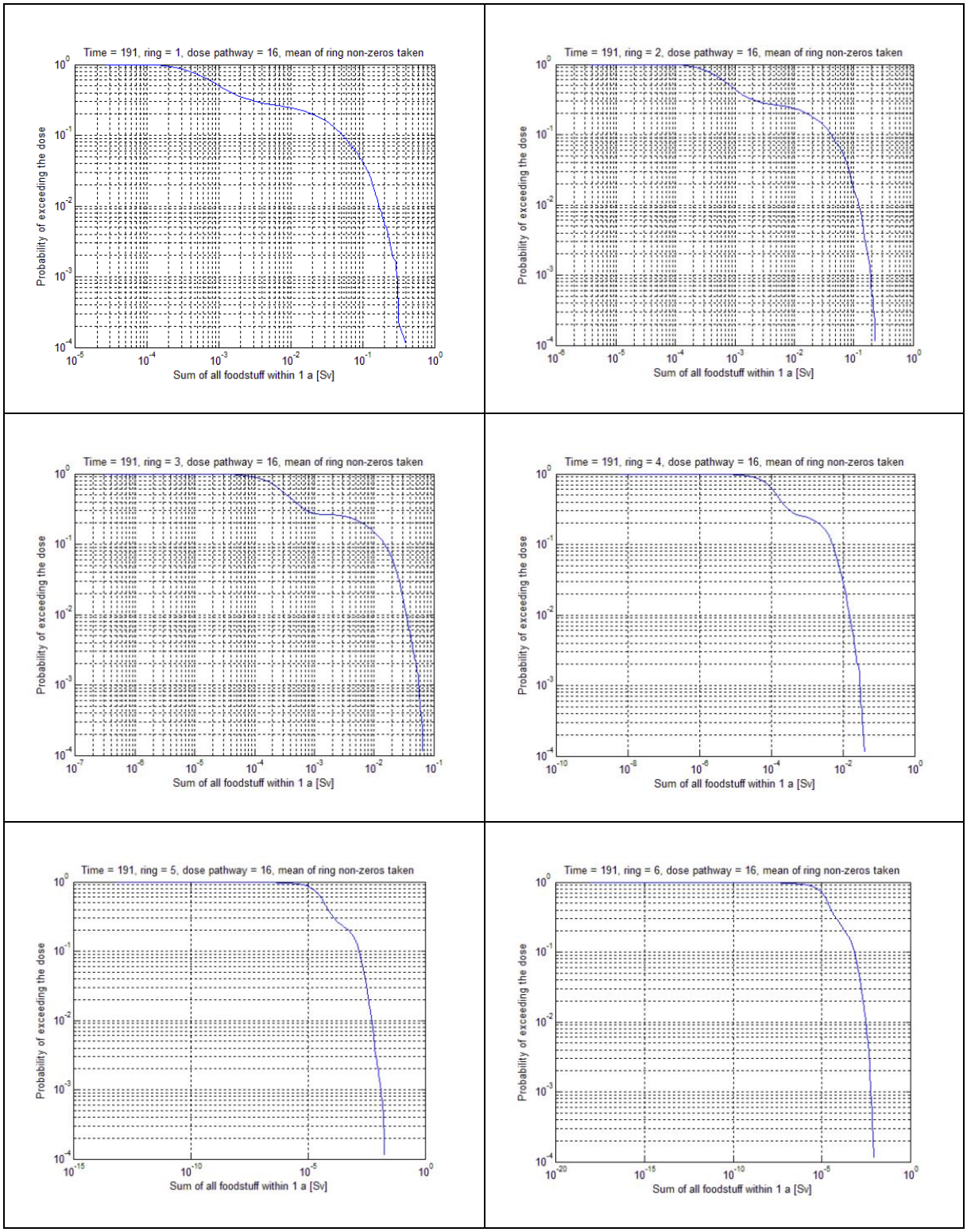

Figure 5.8. Mean value of the total ingestion dose (sum of all 5 foodstuff groups) at six distances (rings 1…6): 15, 20, 50, 100, 200 and 300 km. Foodstuff consumption of 1st year. See also Table A-8, lines 46, 100, 154, 208, 262 and 316. Trajectory data of Olkiluoto, 2012. CASA1 source term.

As a conclusion from these calculations, it is shown that the release specified for the severe accident in Finland (case 1 or CASA1) results in small doses. In addition, VALMA calculates higher doses than ARANO but the difference is not outstandingly large; here a factor of two was found. The newly implemented ingestion doses in VALMA turned out cause appr. 20 times higher doses than the other dose pathways, when the integration / consumption time period is 1 year for both.

6. Larger releases

6.1 ARANO results for comparison

Case 2

In 2014 preliminary results were calculated by the ARANO model for case 2 (CASA2; noble gases 20%, iodine + caesium 2%; cf. Chapter 4.4). Figure 6.1 is copied from the previous study and presents the dose components. In addition to cloudshine and inhalation dose, goundshine dose of one week and one year are presented.

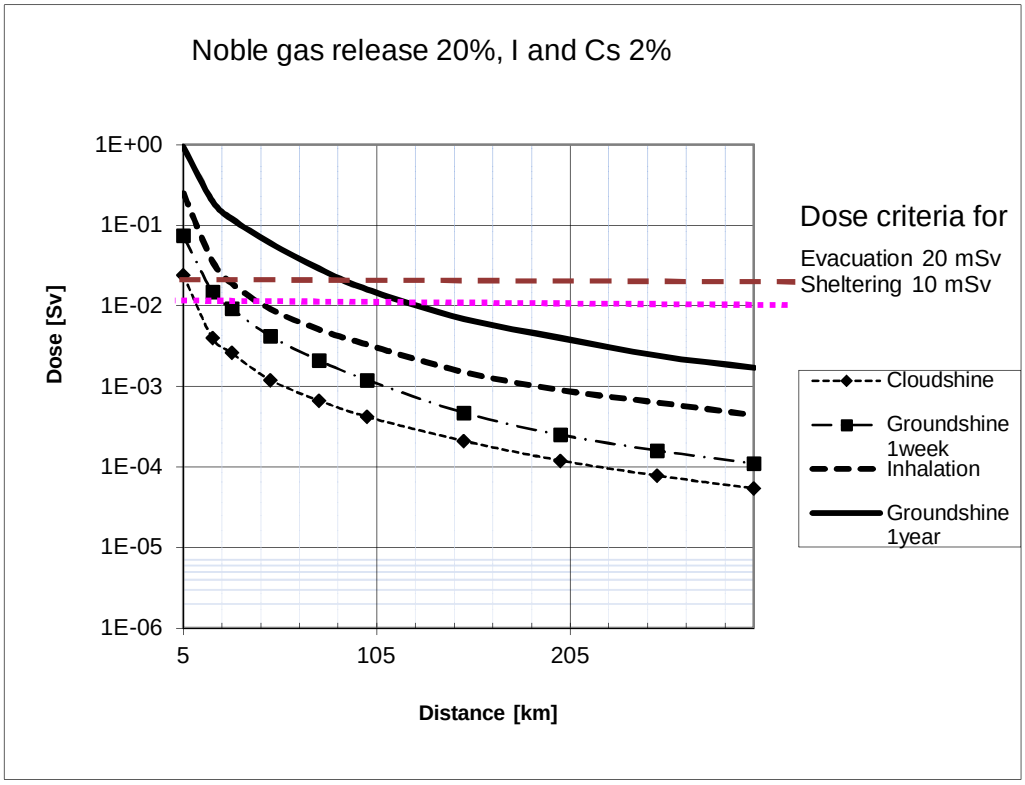

Figure 6.1. ARANO - The dose components (mean value over dispersion sector), 95% fractiles as a function of distance from the power plant. Weather data covers the years from 2009 to 2013. Release case 2. [Rossi & Ilvonen 2015].

Figure 6.1 depicts that dose from inhalation dominates in the acute phase but if exposure time is one year then external dose from the ground becomes dominating component. The IAEA dose criterion of 100 mSv is slightly exceeded beyond 20 km when the one year dose is considered, but not if one week's dose is considered.

Case 3

In 2014 preliminary results were calculated by the ARANO model for case 3 (CASA3; noble gases 100%, iodine + caesium 20%; cf. Chapter 4.4). Figure 6.2 is copied from the previous study and presents the dose components. In addition to cloudshine and inhalation dose, goundshine dose of one week and one year are presented.

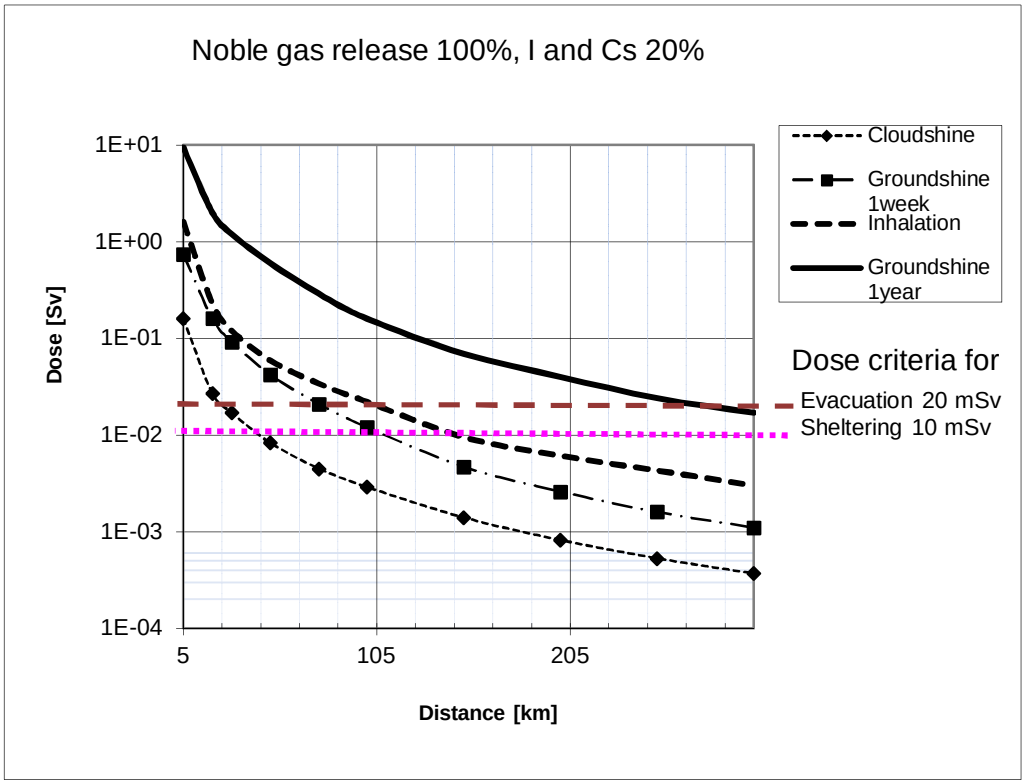

Figure 6.2. ARANO - The dose components (mean value over dispersion sector), 95% fractiles as a function of distance from the power plant. Weather data covers the years from 2009 to 2013. Release case 3. [Rossi & Ilvonen 2015].

Figure 6.2 depicts that the dose from inhalation dominates in the acute phase but if exposure time is one year then external dose from the ground becomes dominating component. The IAEA dose criterion of 100 mSv could be exceeded up to the distance of 120 km.

6.2 VALMA results (CASA2 and CASA3)

As the severe accident release limit (100 TBq of Cs-137), corresponding to the case 1 source term (CASA1) is considered the most important, the larger releases are only briefly presented

here. In the licensing of the nuclear power plants in Finland, it must readily be proved with sufficient reliability the severe accident release limit cannot be exceeded.

Case 2

As the CASA2 source term (cf. Chapter 4.4) is the medium one in this study, the interested reader is referred to Tables A-9 and A-10, in Appendices 5 and 6. The same ccdf curves (there are 504 of them) as for CASA1 and CASA3 source terms are available in graphical form, but not included in this report at all. Note that in the previous year's report (Rossi & Ilvonen 2016) some results were presented for CASA2 source term, but the calculations were for June 2012 only and without ingestion dose pathways.

Case 3

Figure 6.3 illustrates the total dose (cloudshine + groundshine + inhalation) at the six distance rings assuming 1 week integration time. The ccdf of the case mean value is presented. Shielding factor 0.5 for groundshine is included.

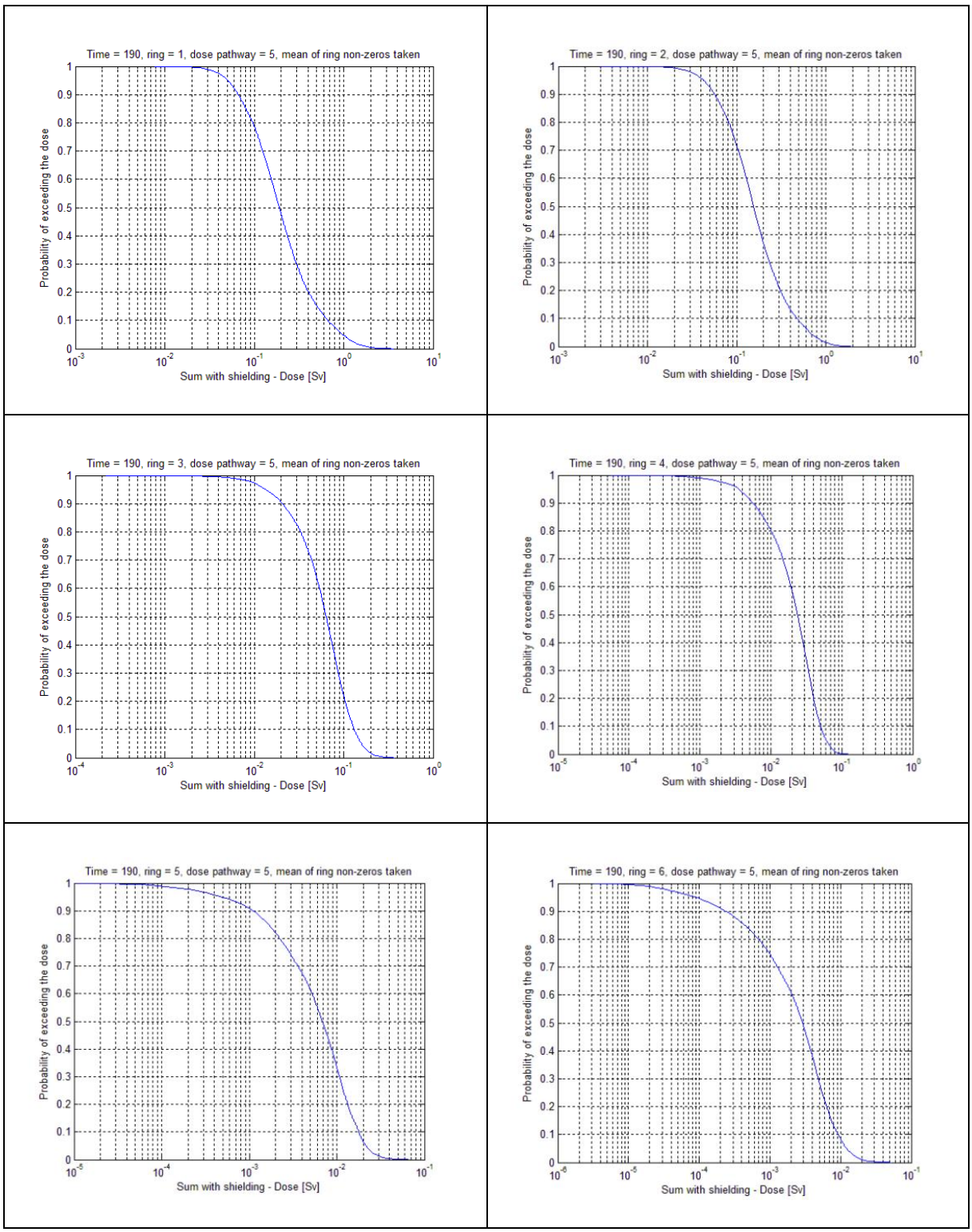

Figure 6.3. Mean value of the total dose (without ingestion) at six distances (rings 1…6): 15, 20, 50, 100, 200 and 300 km. Time integral of 1 week (step 190). See also Table A-11, lines 13, 28, 43, 58, 73 and 88. Trajectory data of Olkiluoto, 2012. CASA3 (largest) source term.

Figure 6.3 illustrates that when the distance increases the dose correspondingly decreases monotonically. Table 6.1 shows the 95% percentile values picked from Figure 6.3 / Table A-

11, integration time 1 week, source term case 3. Also ARANO results for this case are included in Table 6.1 for easy comparison.

Table 6.1. Total dose cloudshine + groundshine + inhalation [mSv] at the 6 distances, 95% percentile, case 3. Time integral of 1 week. Trajectory data of Olkiluoto, 2012. Note that mean, median and maximum mean those of one dispersion case at the specified distance.

Distance [km]	Mean	Median	Maximum	ARANO(mean)
15	984	1040	2150	500
20	667	692	1480	350
50	158	153	356	60
100	60.5	56.1	140	20
200	21.6	19.8	51.4	7
300	12.2	10.8	29.9	3

Doses in Table 6.1 show that the mean and median values are almost the same, but the maximum value is about twofold greater. The ARANO results are approximately ½ or 1/3 of the VALMA mean and median values. If compared to the IAEA's recommendation values, the VALMA mean and median values exceed 100 mSv up to a distance between 50 and 100 km. The maximum value exceeds 100 mSv up to a distance between 100 and 200 km. Note that the CASA3 source term is very large and can only be released into the atmosphere with an extremely low probability. When compared with the corresponding table in the previous report (Rossi & Ilvonen 2016; June 2012 only), we see that up to 100 km distance the doses remained approximately on the same level, but at farther distances they increased when the whole year's weather data was used.

Table 6.2 shows the 95% percentile values picked from Table A-11 (lines 103, 118, 133, 148, 163 and 178), integration time 1 year, source term case 3. Also ARANO results for this case are included in the last column of Table 6.2.

Table 6.2. Total dose cloudshine + groundshine + inhalation [mSv] at the 6 distances, 95% percentile, case 3. Time integral of 1 year. Trajectory data of Olkiluoto, 2012. Note that mean, median and maximum mean those of one dispersion case at the specified distance.

Distance [km]	Mean	Median	Maximum	ARANO(mean)
15	4550	4770	9770	3000
20	3180	3300	6850	2000
50	965	969	2130	550
100	439	400	1020	150
200	180	150	435	40
300	118	94.3	287	20

The doses of Table 6.2 depict the same trend as before. The limit value of 100 mSv is exceeded in all VALMA results up to the distance of 200 km and even at 300 km. Compared with the previous results with June 2012 only, we see once again that up to 100 km the results remained approximately on the same level, but at the longer distances, the whole year's weather data

leads to clearly larger doses than June only. The same is true when comparing with ARANO predictions: the mean values' 95 % percentile in VALMA is about 1.5 times that of ARANO at 15 km, but as much as 6 times larger at 300 km. This behaviour might be related to the fact that ARANO changes the calculation formula for the lateral spread σ_y at the distance of 100 km, whereas the SILAM trajectories (defining the plume spread in VALMA) seem to remain quite near each other in many dispersion cases even after 100 km.

Based on the IAEA's recommendations of Table 3.1 (for '100 mSv during the first year'), the results for the case of type 3 source term mean that preparedness for countermeasures should extend to the distance of 300 km. If conclusions are based on the maximum dose values the countermeasure distances are clearly longer, even roughly twofold.

The newly implemented ingestion dose pathways in VALMA lead to predicted radiation doses according to Table A-12 in Appendix 8. As expected, they are still much larger than the other dose components: For example, the sum of all foodstuff groups (first year's consumption) at the distance of 300 km is 1.57 Sv (line 316 in Table A-12), when each dispersion case is represented by the mean value at the distance, and the 95 % percentile is taken from the whole year's (2012) cases, of which there are 8784. Complete information on the total ingestion dose (1 a) for all the 6 distances can be seen in graphical form in Figure 6.4 below.

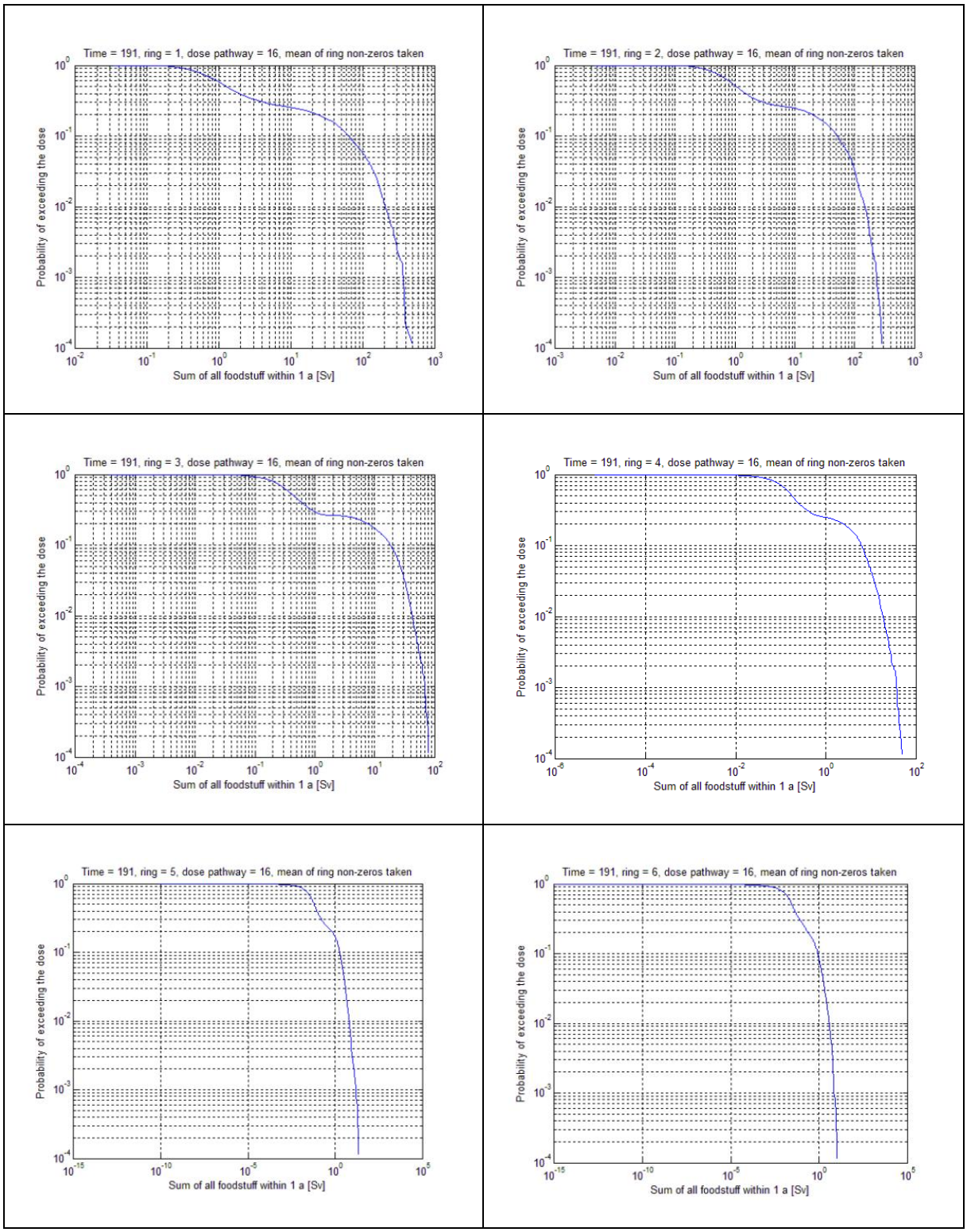

Figure 6.4. Mean value of the total ingestion dose (sum of all 5 foodstuff groups) at six distances (rings 1…6): 15, 20, 50, 100, 200 and 300 km. Foodstuff consumption of 1st year. See also Table A-12, lines 46, 100, 154, 208, 262 and 316. Trajectory data of Olkiluoto, 2012. CASA3 source term.

7. Conclusions

This task, on the atmospheric transport of radioactive releases caused by severe accidents of nuclear power plants, in the CASA project of 2016, is the latest accomplishment in a series of related tasks that started in 2014. The purpose was to investigate the expected dose levels at distances beyond the usual emergency planning zone of 20 km: 'extended planning zone' (100 km) and 'ingestion and commodities planning zone' (300 km). The study was to be performed with a large number of cases of real weather in order to produce probability distributions of the doses in the form of ccdf curves. As a first result, we find out that such a computation task is feasible nowadays, taking very little time with the simpler ARANO model, but even several weeks or months of CPU time with the more complicated VALMA model, when a single CPU is used.

The latest addition for the task was the implementation of ingestion dose pathways in VALMA, based on coefficients acquired from the AGRID nutrition dose model. This report can be regarded as an extension of the previous one: Only now have all the 3 source terms been calculated with VALMA using the whole year's (2012) Olkiluoto weather data (from ECMWF / SILAM by FMI) and now all the results include the ingestion pathways: green vegetables, grain, root vegetables, cow milk and cow meat, in addition to the previously existing ones in VALMA (cloudshine, groundshine and inhalation doses). Here, the whole succession of development (2014-2016) done to accomplish the task is briefly summarized.

The computation method for processing a large amount of trajectory data in calculation of off-site radiation doses by the VALMA model has been created. The method has a probabilistic approach to calculate doses in different weather conditions. Various result quantities can be picked from the standard VALMA outputs (describing one dispersion case) into a file which combines the dispersion cases of one year or many years. These are e.g. mean, median and maximum values of the doses, on different dose pathways, at different time points and at different locations.

The objective was to evaluate doses and determine probability distributions of doses at distances beyond 20 km from the power plant when three different severe accident release magnitudes were used. Weather data used in the calculations consists of FMI's SILAM-based winding trajectory data for one year for the site of Olkiuoto NPP. The calculated dose estimates are compared with the threshold values given in the recommendations of IAEA and then the possible necessity of countermeasures can be elucidated and concluded. Because early health effects are not expected at the longer distances, the aim of the countermeasures is to reduce the risk of statistical health effects.

Use of long-term weather data enables presentation of the results in a probabilistic way when doses are first calculated in a large number of weather conditions and finally the complementary cumulative density functions (ccdf) are built. This means that e.g. the probabilities of exceeding the threshold values recommended by IAEA can be determined.

The national emergency planning zone traditionally extends to the distance of 20 km from the NPP. If the severe accident release is reduced to the level defined in the Nuclear Energy Act (100 TBq of Cs-137) the dose levels at the distance of 20 km remain clearly below the limit value of 100 mSv. But if the release exceeds significantly the criterion of the severe accident, offsite doses may increase over the level of 100 mSv. In the largest release case (CASA3) the release fraction of iodine and cesium were 20%, and the expected distance for exceeding the dose criterion for countermeasures is slightly more than 200 km, but if the maximum doses are considered the distance might be even beyond 300 km. It was found that case 2 and 3 results, based on the trajectory data of June 2012 only (previous report) underestimated doses particularly at longer distances. Countermeasures would consist of sheltering, evacuation, decontamination, access control, relocation and food control.

Ingestion dose is important when the release includes iodine and cesium. If deposition occurs during growing season potential doses from contaminated foodstuffs may be significant. The difference between summertime and wintertime doses can be orders of magnitude, as in summer the deposition may arrive directly on the edible plant parts, used for humans or cattle. In the case of the releases considered in this study it was expectedly found that dose criteria are exceeded also on the ingestion pathways, even with the smallest (CASA1) source term if the sum of all foodstuff groups, 15 km distance and the 99.5 % percentile or case maximum value are considered (lines 46-48 of Table A-8). Then the countermeasures would focus on stopping the consumption of food grown on the contaminated fields.

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Appendix 1

Table A-1. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from one year's ingestion is obtained (=annual dose), when multiplied by actual deposition and ingestion rate. Growing season is 60 days e.g. 15.6…14.8 (summer). At another time the coefficients for winter should be used.

		Summer			Winter		
		Green veg	Grain	Roots	Green veg	Grain	Roots
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	1.47E-11	2.53E-12	1.00E-13	5.19E-13	6.61E-15	4.45E-14
6	SR90	1.33E-09	5.12E-10	9.09E-12	1.05E-10	3.00E-12	9.04E-12
7	SR91	1.65E-11	3.40E-12	6.93E-15	2.98E-15	1.47E-15	2.98E-15
8	Y90	6.54E-13	6.06E-20	2.42E-16	3.29E-23	7.31E-30	3.29E-23
9	Y91	1.64E-11	3.38E-12	6.06E-15	2.95E-15	1.46E-15	2.95E-15
10	ZR95	2.45E-11	4.69E-12	3.05E-15	2.38E-15	7.47E-16	2.38E-15
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	2.47E-12	3.23E-13	3.05E-15	9.11E-16	2.86E-16	9.11E-16
13	MO99	3.03E-13	4.76E-20	3.69E-15	1.05E-21	3.90E-28	1.05E-21
14	TC99M	3.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	2.68E-12	4.02E-13	3.31E-15	4.56E-16	2.42E-15	1.14E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.26E-10	4.77E-11	1.55E-13	5.52E-14	7.42E-13	1.38E-13
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	1.96E-22	0.00E+00	2.15E-23	0.00E+00	0.00E+00	0.00E+00
20	TE129M	1.18E-11	1.69E-12	1.30E-12	3.73E-13	1.11E-13	3.73E-13
21	TE131M	1.48E-11	3.95E-14	3.10E-13	1.87E-16	1.16E-18	1.87E-16
22	TE132	7.68E-13	1.39E-18	8.44E-14	1.87E-19	7.03E-25	1.87E-19
23	I131	1.22E-11	3.18E-14	3.01E-14	1.57E-16	9.78E-19	1.57E-16
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.30E-18	0.00E+00	3.19E-21	0.00E+00	0.00E+00	0.00E+00
26	I133	1.25E-21	0.00E+00	3.08E-24	2.80E-45	0.00E+00	2.80E-45
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	1.43E-15	0.00E+00	3.53E-18	0.00E+00	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	5.08E-10	2.00E-10	3.13E-13	1.18E-12	3.36E-13	2.95E-13
33	CS136	4.24E-12	7.88E-14	2.61E-15	4.04E-16	5.40E-18	1.01E-16
34	CS137	4.06E-10	1.68E-10	2.50E-13	9.95E-13	2.96E-13	2.49E-13
35	BA140	3.30E-12	5.56E-14	2.04E-15	7.43E-17	3.00E-18	7.43E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	1.05E-10	3.80E-11	3.89E-14	7.81E-14	2.91E-14	3.35E-14
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	1.61E-15	0.00E+00	1.77E-16	0.00E+00	0.00E+00	0.00E+00
68	TE127M	2.99E-11	9.92E-12	3.29E-12	2.23E-12	1.54E-12	2.23E-12
69	SB127	2.99E-11	9.92E-12	3.29E-12	2.24E-12	1.55E-12	2.24E-12
70	SB129	1.18E-11	1.69E-12	1.30E-12	3.74E-13	1.11E-13	3.74E-13
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	1.64E-11	3.38E-12	6.06E-15	2.95E-15	1.46E-15	2.95E-15
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	1.23E-11	3.19E-14	3.34E-14	1.57E-16	9.78E-19	1.57E-16
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-2. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from a three-year ingestion is obtained, when multiplied by actual deposition and ingestion rate. Growing season is 60 days e.g. 15.6…14.8 (summer). At another time the coefficients for winter should be used.

		Summer			Winter		
		Green veg	Grain	Roots	Green veg	Grain	Roots
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	1.47E-11	2.53E-12	1.01E-13	5.23E-13	6.66E-15	4.48E-14
6	SR90	1.54E-09	5.18E-10	2.64E-11	3.07E-10	8.72E-12	2.63E-11
7	SR91	1.65E-11	3.40E-12	7.02E-15	3.02E-15	1.49E-15	3.02E-15
8	Y90	6.54E-13	6.06E-20	2.42E-16	3.29E-23	7.31E-30	3.29E-23
9	Y91	1.64E-11	3.38E-12	6.14E-15	2.99E-15	1.48E-15	2.99E-15
10	ZR95	2.45E-11	4.69E-12	3.18E-15	2.45E-15	7.69E-16	2.45E-15
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	2.47E-12	3.23E-13	3.05E-15	9.11E-16	2.86E-16	9.11E-16
13	MO99	3.03E-13	4.76E-20	3.69E-15	1.05E-21	3.90E-28	1.05E-21
14	TC99M	3.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	2.68E-12	4.02E-13	3.32E-15	4.57E-16	2.42E-15	1.14E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.26E-10	4.83E-11	2.71E-13	9.64E-14	1.29E-12	2.41E-13
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	1.96E-22	0.00E+00	2.15E-23	0.00E+00	0.00E+00	0.00E+00
20	TE129M	1.18E-11	1.69E-12	1.30E-12	3.74E-13	1.11E-13	3.74E-13
21	TE131M	1.48E-11	3.95E-14	3.10E-13	1.87E-16	1.16E-18	1.87E-16
22	TE132	7.68E-13	1.39E-18	8.44E-14	1.87E-19	7.03E-25	1.87E-19
23	I131	1.22E-11	3.18E-14	3.01E-14	1.57E-16	9.78E-19	1.57E-16
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.30E-18	0.00E+00	3.19E-21	0.00E+00	0.00E+00	0.00E+00
26	I133	1.25E-21	0.00E+00	3.08E-24	2.80E-45	0.00E+00	2.80E-45
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	1.43E-15	0.00E+00	3.53E-18	0.00E+00	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	5.10E-10	2.01E-10	6.92E-13	2.61E-12	7.42E-13	6.53E-13
33	CS136	4.24E-12	7.88E-14	2.61E-15	4.04E-16	5.40E-18	1.01E-16
34	CS137	4.08E-10	1.68E-10	7.28E-13	2.90E-12	8.63E-13	7.24E-13
35	BA140	3.30E-12	5.56E-14	2.04E-15	7.43E-17	3.00E-18	7.43E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	1.05E-10	3.81E-11	6.11E-14	1.23E-13	4.57E-14	5.26E-14
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	1.61E-15	0.00E+00	1.77E-16	0.00E+00	0.00E+00	0.00E+00
68	TE127M	3.03E-11	1.02E-11	3.64E-12	2.47E-12	1.70E-12	2.47E-12
69	SB127	3.03E-11	1.02E-11	3.64E-12	2.48E-12	1.71E-12	2.48E-12
70	SB129	1.18E-11	1.69E-12	1.30E-12	3.74E-13	1.11E-13	3.74E-13
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	1.64E-11	3.38E-12	6.14E-15	2.99E-15	1.48E-15	2.99E-15
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	1.23E-11	3.19E-14	3.34E-14	1.57E-16	9.78E-19	1.57E-16
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-3. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from a thirty year ingestion is obtained, when multiplied by actual deposition and ingestion rate. Growing season is 60 days e.g. 15.6…14.8 (summer). At another time the coefficients for winter should be used.

		Summer			Winter		
		Green veg	Grain	Roots	Green veg	Grain	Roots
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	1.47E-11	2.53E-12	1.01E-13	5.23E-13	6.66E-15	4.48E-14
6	SR90	3.32E-09	5.68E-10	1.79E-10	2.08E-09	5.91E-11	1.78E-10
7	SR91	1.65E-11	3.40E-12	7.02E-15	3.02E-15	1.49E-15	3.02E-15
8	Y90	6.54E-13	6.06E-20	2.42E-16	3.29E-23	7.31E-30	3.29E-23
9	Y91	1.64E-11	3.38E-12	6.14E-15	2.99E-15	1.48E-15	2.99E-15
10	ZR95	2.45E-11	4.69E-12	3.18E-15	2.45E-15	7.69E-16	2.45E-15
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	2.47E-12	3.23E-13	3.05E-15	9.11E-16	2.86E-16	9.11E-16
13	MO99	3.03E-13	4.76E-20	3.69E-15	1.05E-21	3.90E-28	1.05E-21
14	TC99M	3.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	2.68E-12	4.02E-13	3.32E-15	4.57E-16	2.42E-15	1.14E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.26E-10	4.85E-11	3.09E-13	1.10E-13	1.48E-12	2.75E-13
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	1.96E-22	0.00E+00	2.15E-23	0.00E+00	0.00E+00	0.00E+00
20	TE129M	1.18E-11	1.69E-12	1.30E-12	3.74E-13	1.11E-13	3.74E-13
21	TE131M	1.48E-11	3.95E-14	3.10E-13	1.87E-16	1.16E-18	1.87E-16
22	TE132	7.68E-13	1.39E-18	8.44E-14	1.87E-19	7.03E-25	1.87E-19
23	I131	1.22E-11	3.18E-14	3.01E-14	1.57E-16	9.78E-19	1.57E-16
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.30E-18	0.00E+00	3.19E-21	0.00E+00	0.00E+00	0.00E+00
26	I133	1.25E-21	0.00E+00	3.08E-24	2.80E-45	0.00E+00	2.80E-45
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	1.43E-15	0.00E+00	3.53E-18	0.00E+00	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	5.11E-10	2.01E-10	1.07E-12	4.06E-12	1.15E-12	1.01E-12
33	CS136	4.24E-12	7.88E-14	2.61E-15	4.04E-16	5.40E-18	1.01E-16
34	CS137	4.25E-10	1.73E-10	5.02E-12	2.00E-11	5.95E-12	5.00E-12
35	BA140	3.30E-12	5.56E-14	2.04E-15	7.43E-17	3.00E-18	7.43E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	1.05E-10	3.81E-11	6.56E-14	1.32E-13	4.90E-14	5.64E-14
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	1.61E-15	0.00E+00	1.77E-16	0.00E+00	0.00E+00	0.00E+00
68	TE127M	3.03E-11	1.02E-11	3.64E-12	2.47E-12	1.70E-12	2.47E-12
69	SB127	3.03E-11	1.02E-11	3.65E-12	2.48E-12	1.71E-12	2.48E-12
70	SB129	1.18E-11	1.69E-12	1.30E-12	3.74E-13	1.11E-13	3.74E-13
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	1.64E-11	3.38E-12	6.14E-15	2.99E-15	1.48E-15	2.99E-15
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	1.23E-11	3.19E-14	3.34E-14	1.57E-16	9.78E-19	1.57E-16
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 2

Table A-4. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from one year's ingestion is obtained (=annual dose), when multiplied by actual deposition and ingestion rate. Growing season is 100 days e.g. 29.5…5.9 (summer). At another time the coefficients for winter should be used.

		Summer		Winter	
		Milk	Meat	Milk	Meat
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	3.55E-12	7.57E-13	7.00E-14	2.10E-14
6	SR90	2.53E-10	7.33E-11	2.60E-11	8.10E-12
7	SR91	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Y90	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Y91	7.37E-14	8.71E-14	1.90E-16	1.90E-14
10	ZR95	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	1.26E-11	7.60E-14	1.60E-14	1.60E-15
13	MO99	1.15E-13	5.11E-14	2.02E-27	1.56E-26
14	TC99M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	4.00E-16	8.60E-14	1.80E-18	8.00E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.49E-14	1.07E-11	4.10E-16	1.80E-12
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	TE129M	7.87E-13	1.19E-11	3.50E-14	8.50E-13
21	TE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	TE132	6.29E-14	1.77E-13	2.91E-25	5.86E-24
23	I131	5.08E-11	9.75E-12	2.27E-18	1.46E-18
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.01E-21	2.32E-30	0.00E+00	0.00E+00
26	I133	1.43E-13	1.98E-15	0.00E+00	0.00E+00
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	3.19E-17	2.58E-20	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	6.81E-10	2.26E-09	8.20E-12	1.50E-10
33	CS136	1.06E-11	4.90E-12	2.90E-16	4.90E-15
34	CS137	5.28E-10	1.90E-09	7.10E-12	1.30E-10
35	BA140	3.57E-13	2.54E-13	8.40E-18	1.45E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	4.09E-13	8.61E-13	2.40E-15	2.00E-13
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00

48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	TE127M	1.71E-12	3.52E-11	3.70E-13	9.20E-12
69	SB127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	SB129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-5. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from a three-year ingestion is obtained, when multiplied by actual deposition and ingestion rate. Growing season is 100 days e.g. 29.5…5.9 (summer). At another time the coefficients for winter should be used.

		Summer		Winter	
		Milk	Meat	Milk	Meat
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	3.55E-12	7.57E-13	7.04E-14	2.13E-14
6	SR90	2.89E-10	8.43E-11	5.98E-11	1.83E-11
7	SR91	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Y90	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Y91	7.37E-14	8.78E-14	1.91E-16	1.95E-14
10	ZR95	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	1.26E-11	7.60E-14	1.65E-14	1.65E-15
13	MO99	1.15E-13	5.11E-14	2.02E-27	1.56E-26
14	TC99M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	4.00E-16	8.61E-14	1.83E-18	7.97E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.52E-14	1.19E-11	6.43E-16	2.71E-12
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	TE129M	7.87E-13	1.19E-11	3.50E-14	8.50E-13
21	TE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	TE132	6.29E-14	1.77E-13	2.91E-25	5.86E-24
23	I131	5.08E-11	9.75E-12	2.27E-18	1.46E-18
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.01E-24	2.32E-30	0.00E+00	0.00E+00
26	I133	1.43E-13	1.98E-15	0.00E+00	0.00E+00
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	3.19E-17	2.58E-20	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	6.89E-10	2.37E-09	1.48E-11	2.39E-10
33	CS136	1.06E-11	4.90E-12	2.93E-16	4.91E-15
34	CS137	5.37E-10	2.03E-09	1.58E-11	2.43E-10
35	BA140	3.57E-13	2.54E-13	8.45E-18	1.46E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	4.10E-13	9.79E-13	3.37E-15	2.87E-13
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00

51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00
52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	TE127M	1.77E-12	3.67E-11	3.98E-13	9.92E-12
69	SB127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	SB129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-6. AGRID coefficients per unit deposition (Sv·a/kg)/(Bq/m^2). Dose from a thirty-year ingestion is obtained, when multiplied by actual deposition and ingestion rate. Growing season is 100 days e.g. 29.5…5.9 (summer). At another time the coefficients for winter should be used.

		Summer		Winter	
		Milk	Meat	Milk	Meat
1	KR85	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	KR85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	KR87	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	KR88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	SR89	3.55E-12	7.58E-13	7.15E-14	2.16E-14
6	SR90	2.96E-10	8.65E-11	6.72E-11	2.05E-11
7	SR91	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	Y90	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	Y91	7.37E-14	8.96E-14	1.93E-16	2.00E-14
10	ZR95	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	ZR97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	NB95	1.26E-11	7.61E-14	1.69E-14	1.66E-15
13	MO99	1.15E-13	5.20E-14	2.02E-27	1.56E-26
14	TC99M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	RU103	4.00E-16	8.67E-14	1.90E-18	8.08E-15
16	RU105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17	RU106	1.52E-14	1.20E-11	6.74E-16	2.76E-12
18	RH105	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19	TE129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
20	TE129M	8.00E-13	1.22E-11	3.62E-14	8.89E-13
21	TE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
22	TE132	6.35E-14	1.88E-13	2.91E-25	5.86E-24
23	I131	5.08E-11	9.76E-12	2.27E-18	1.46E-18
24	MI131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25	I132	1.01E-24	2.70E-30	0.00E+00	0.00E+00
26	I133	1.43E-13	1.99E-15	0.00E+00	0.00E+00
27	I134	0.00E+00	0.00E+00	0.00E+00	0.00E+00
28	I135	3.19E-17	2.64E-20	0.00E+00	0.00E+00
29	MI135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
30	XE133	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31	XE135	0.00E+00	0.00E+00	0.00E+00	0.00E+00
32	CS134	6.90E-10	2.38E-09	1.62E-11	2.45E-10
33	CS136	1.06E-11	4.91E-12	3.09E-16	4.97E-15
34	CS137	5.44E-10	2.06E-09	2.27E-11	2.73E-10
35	BA140	3.57E-13	2.54E-13	8.57E-18	1.48E-17
36	LA140	0.00E+00	0.00E+00	0.00E+00	0.00E+00
37	CE141	0.00E+00	0.00E+00	0.00E+00	0.00E+00
38	CE143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39	CE144	4.10E-13	9.80E-13	3.38E-15	2.87E-13
40	PR143	0.00E+00	0.00E+00	0.00E+00	0.00E+00
41	ND147	0.00E+00	0.00E+00	0.00E+00	0.00E+00
42	PU238	0.00E+00	0.00E+00	0.00E+00	0.00E+00
43	PU239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
44	PU240	0.00E+00	0.00E+00	0.00E+00	0.00E+00
45	PU241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
46	H3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
47	C14	0.00E+00	0.00E+00	0.00E+00	0.00E+00
48	N13	0.00E+00	0.00E+00	0.00E+00	0.00E+00
49	AR39	0.00E+00	0.00E+00	0.00E+00	0.00E+00
50	AR41	0.00E+00	0.00E+00	0.00E+00	0.00E+00
51	CR51	0.00E+00	0.00E+00	0.00E+00	0.00E+00

52	MN54	0.00E+00	0.00E+00	0.00E+00	0.00E+00
53	FE59	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54	CO58	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55	CO60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
56	ZN65	0.00E+00	0.00E+00	0.00E+00	0.00E+00
57	KR83M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
58	KR89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
59	AG110M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
60	SB124	0.00E+00	0.00E+00	0.00E+00	0.00E+00
61	XE131M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
62	XE133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
63	XE135M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
64	XE137	0.00E+00	0.00E+00	0.00E+00	0.00E+00
65	XE138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
66	RB86	0.00E+00	0.00E+00	0.00E+00	0.00E+00
67	TE127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
68	TE127M	1.77E-12	3.67E-11	3.98E-13	9.92E-12
69	SB127	0.00E+00	0.00E+00	0.00E+00	0.00E+00
70	SB129	0.00E+00	0.00E+00	0.00E+00	0.00E+00
71	NP239	0.00E+00	0.00E+00	0.00E+00	0.00E+00
72	AM241	0.00E+00	0.00E+00	0.00E+00	0.00E+00
73	CM242	0.00E+00	0.00E+00	0.00E+00	0.00E+00
74	CM244	0.00E+00	0.00E+00	0.00E+00	0.00E+00
75	RB88	0.00E+00	0.00E+00	0.00E+00	0.00E+00
76	RB89	0.00E+00	0.00E+00	0.00E+00	0.00E+00
77	Y91M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
78	NB97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
79	RH103M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
80	TE131	0.00E+00	0.00E+00	0.00E+00	0.00E+00
81	BA137M	0.00E+00	0.00E+00	0.00E+00	0.00E+00
82	CS138	0.00E+00	0.00E+00	0.00E+00	0.00E+00
83	PR144	0.00E+00	0.00E+00	0.00E+00	0.00E+00
84	I129	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 3

Table A-7. Statistics of VALMA dose results (cloud, fallout and inhalation) with the smallest ('CASA1') source term.

The columns of the table are:

1. running line number (1-180)
2. index of time point (190 = 1 week, 191 = one year)
3. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
4. dose pathway (1 = cloud, 2 = fallout, 3 = inhalation, 4 = sum (1+2+3), 5 = weighted sum (with fallout shielding factor 0.5)
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	190	15km	1	mean	8.15e-05	4.20e-05	3.04e-04	7.31e-04	1.23e-03
2	190	15km	1	med	8.01e-05	4.14e-05	3.09e-04	7.41e-04	1.37e-03
3	190	15km	1	max	1.81e-04	8.76e-05	7.07e-04	1.62e-03	2.17e-03
4	190	15km	2	mean	1.78e-04	1.20e-04	5.46e-04	1.03e-03	1.74e-03
5	190	15km	2	med	1.78e-04	1.20e-04	5.69e-04	1.09e-03	2.46e-03
6	190	15km	2	max	3.84e-04	2.52e-04	1.17e-03	2.18e-03	3.11e-03
7	190	15km	3	mean	1.96e-04	1.18e-04	6.65e-04	1.38e-03	2.56e-03
8	190	15km	3	med	1.96e-04	1.15e-04	6.97e-04	1.47e-03	2.81e-03
9	190	15km	3	max	4.24e-04	2.44e-04	1.46e-03	2.91e-03	4.41e-03
10	190	15km	4	mean	4.55e-04	2.88e-04	1.51e-03	3.12e-03	5.53e-03
11	190	15km	4	med	4.54e-04	2.88e-04	1.58e-03	3.24e-03	6.11e-03
12	190	15km	4	max	9.88e-04	5.98e-04	3.32e-03	6.43e-03	9.53e-03
13	190	15km	5	mean	3.66e-04	2.25e-04	1.26e-03	2.60e-03	4.66e-03
14	190	15km	5	med	3.65e-04	2.22e-04	1.29e-03	2.71e-03	5.15e-03
15	190	15km	5	max	7.96e-04	4.64e-04	2.74e-03	5.39e-03	8.01e-03
16	190	20km	1	mean	6.22e-05	3.40e-05	2.28e-04	5.30e-04	7.33e-04
17	190	20km	1	med	5.98e-05	3.32e-05	2.29e-04	5.03e-04	7.93e-04
18	190	20km	1	max	1.40e-04	7.17e-05	5.46e-04	1.20e-03	1.69e-03
19	190	20km	2	mean	1.38e-04	1.01e-04	3.85e-04	6.70e-04	1.04e-03
20	190	20km	2	med	1.36e-04	9.91e-05	4.02e-04	7.03e-04	1.23e-03
21	190	20km	2	max	3.00e-04	2.17e-04	8.29e-04	1.44e-03	1.89e-03
22	190	20km	3	mean	1.43e-04	9.40e-05	4.47e-04	8.81e-04	1.32e-03
23	190	20km	3	med	1.41e-04	9.27e-05	4.58e-04	9.32e-04	1.60e-03
24	190	20km	3	max	3.15e-04	2.02e-04	9.82e-04	1.90e-03	2.68e-03
25	190	20km	4	mean	3.43e-04	2.36e-04	1.03e-03	2.02e-03	3.06e-03
26	190	20km	4	med	3.37e-04	2.34e-04	1.06e-03	2.08e-03	3.53e-03
27	190	20km	4	max	7.55e-04	5.05e-04	2.31e-03	4.33e-03	6.10e-03
28	190	20km	5	mean	2.74e-04	1.82e-04	8.45e-04	1.70e-03	2.54e-03
29	190	20km	5	med	2.69e-04	1.82e-04	8.68e-04	1.73e-03	2.93e-03
30	190	20km	5	max	6.05e-04	3.89e-04	1.90e-03	3.64e-03	5.16e-03
31	190	50km	1	mean	2.03e-05	1.32e-05	6.28e-05	1.73e-04	2.68e-04
32	190	50km	1	med	1.77e-05	1.16e-05	5.68e-05	1.55e-04	2.68e-04
33	190	50km	1	max	5.01e-05	3.08e-05	1.63e-04	4.01e-04	6.27e-04
34	190	50km	2	mean	4.96e-05	4.06e-05	1.22e-04	1.81e-04	2.76e-04

35	190	50km	2	med	4.46e-05	3.55e-05	1.22e-04	1.95e-04	3.18e-04
36	190	50km	2	max	1.17e-04	9.79e-05	2.64e-04	3.78e-04	5.47e-04
37	190	50km	3	mean	4.31e-05	3.67e-05	1.01e-04	1.62e-04	2.49e-04
38	190	50km	3	med	3.85e-05	3.29e-05	9.61e-05	1.69e-04	3.25e-04
39	190	50km	3	max	1.02e-04	8.69e-05	2.27e-04	3.48e-04	4.90e-04
40	190	50km	4	mean	1.13e-04	9.84e-05	2.54e-04	4.01e-04	5.62e-04
41	190	50km	4	med	1.01e-04	8.74e-05	2.44e-04	4.02e-04	7.75e-04
42	190	50km	4	max	2.67e-04	2.35e-04	5.77e-04	8.74e-04	1.20e-03
43	190	50km	5	mean	8.82e-05	7.59e-05	2.05e-04	3.25e-04	4.66e-04
44	190	50km	5	med	7.88e-05	6.77e-05	1.96e-04	3.23e-04	6.17e-04
45	190	50km	5	max	2.09e-04	1.79e-04	4.71e-04	7.23e-04	9.99e-04
46	190	100km	1	mean	6.77e-06	4.72e-06	1.84e-05	6.63e-05	1.29e-04
47	190	100km	1	med	5.53e-06	3.68e-06	1.63e-05	5.81e-05	1.34e-04
48	190	100km	1	max	1.80e-05	1.20e-05	5.26e-05	1.54e-04	2.81e-04
49	190	100km	2	mean	1.93e-05	1.49e-05	5.42e-05	9.47e-05	1.53e-04
50	190	100km	2	med	1.58e-05	1.16e-05	4.88e-05	9.39e-05	1.53e-04
51	190	100km	2	max	4.91e-05	3.91e-05	1.25e-04	2.07e-04	4.49e-04
52	190	100km	3	mean	1.54e-05	1.36e-05	3.55e-05	5.32e-05	7.89e-05
53	190	100km	3	med	1.26e-05	1.07e-05	3.27e-05	5.35e-05	7.63e-05
54	190	100km	3	max	3.89e-05	3.46e-05	8.46e-05	1.21e-04	2.06e-04
55	190	100km	4	mean	4.14e-05	3.65e-05	9.53e-05	1.42e-04	1.91e-04
56	190	100km	4	med	3.41e-05	2.91e-05	8.93e-05	1.43e-04	1.92e-04
57	190	100km	4	max	1.05e-04	9.49e-05	2.20e-04	3.15e-04	5.69e-04
58	190	100km	5	mean	3.18e-05	2.84e-05	7.24e-05	1.07e-04	1.50e-04
59	190	100km	5	med	2.62e-05	2.27e-05	6.69e-05	1.07e-04	1.56e-04
60	190	100km	5	max	8.10e-05	7.37e-05	1.67e-04	2.58e-04	3.50e-04
61	190	200km	1	mean	1.80e-06	1.29e-06	4.75e-06	1.65e-05	3.49e-05
62	190	200km	1	med	1.41e-06	8.90e-07	4.26e-06	1.39e-05	4.31e-05
63	190	200km	1	max	4.85e-06	3.36e-06	1.29e-05	4.46e-05	8.69e-05
64	190	200km	2	mean	6.48e-06	4.33e-06	2.11e-05	4.49e-05	9.22e-05
65	190	200km	2	med	4.99e-06	2.86e-06	1.72e-05	4.46e-05	9.22e-05
66	190	200km	2	max	1.68e-05	1.16e-05	5.16e-05	9.62e-05	1.34e-04
67	190	200km	3	mean	4.68e-06	3.92e-06	1.21e-05	1.93e-05	3.27e-05
68	190	200km	3	med	3.68e-06	2.69e-06	1.11e-05	2.00e-05	3.27e-05
69	190	200km	3	max	1.19e-05	1.03e-05	2.84e-05	4.14e-05	7.70e-05
70	190	200km	4	mean	1.30e-05	1.05e-05	3.36e-05	6.04e-05	1.16e-04
71	190	200km	4	med	1.01e-05	7.25e-06	3.00e-05	6.31e-05	1.16e-04
72	190	200km	4	max	3.32e-05	2.77e-05	7.87e-05	1.29e-04	1.73e-04
73	190	200km	5	mean	9.73e-06	8.13e-06	2.41e-05	4.00e-05	6.97e-05
74	190	200km	5	med	7.63e-06	5.72e-06	2.22e-05	4.27e-05	6.97e-05
75	190	200km	5	max	2.49e-05	2.14e-05	5.69e-05	8.57e-05	1.35e-04
76	190	300km	1	mean	7.31e-07	5.33e-07	2.03e-06	4.97e-06	1.23e-05
77	190	300km	1	med	5.57e-07	3.63e-07	1.71e-06	3.99e-06	1.20e-05
78	190	300km	1	max	1.91e-06	1.35e-06	5.11e-06	1.49e-05	4.40e-05
79	190	300km	2	mean	3.46e-06	1.87e-06	1.34e-05	3.18e-05	6.65e-05
80	190	300km	2	med	2.62e-06	1.15e-06	1.06e-05	3.17e-05	6.65e-05
81	190	300km	2	max	8.79e-06	4.90e-06	3.25e-05	6.83e-05	1.21e-04
82	190	300km	3	mean	2.09e-06	1.60e-06	5.90e-06	1.01e-05	1.74e-05
83	190	300km	3	med	1.63e-06	1.05e-06	5.24e-06	1.01e-05	1.74e-05
84	190	300km	3	max	5.19e-06	4.26e-06	1.39e-05	2.44e-05	4.26e-05
85	190	300km	4	mean	6.28e-06	4.32e-06	1.97e-05	4.07e-05	8.77e-05
86	190	300km	4	med	4.84e-06	2.80e-06	1.65e-05	4.13e-05	8.77e-05
87	190	300km	4	max	1.57e-05	1.15e-05	4.73e-05	9.00e-05	1.52e-04
88	190	300km	5	mean	4.55e-06	3.32e-06	1.33e-05	2.62e-05	5.46e-05
89	190	300km	5	med	3.53e-06	2.19e-06	1.16e-05	2.67e-05	5.46e-05
90	190	300km	5	max	1.14e-05	8.80e-06	3.19e-05	5.78e-05	9.42e-05
91	191	15km	1	mean	8.15e-05	4.20e-05	3.04e-04	7.31e-04	1.23e-03
92	191	15km	1	med	8.01e-05	4.14e-05	3.09e-04	7.41e-04	1.37e-03
93	191	15km	1	max	1.81e-04	8.76e-05	7.07e-04	1.62e-03	2.17e-03
94	191	15km	2	mean	2.04e-03	1.39e-03	6.20e-03	1.16e-02	1.93e-02
95	191	15km	2	med	2.04e-03	1.38e-03	6.54e-03	1.22e-02	2.74e-02

96	191	15km	2	max	4.39e-03	2.89e-03	1.33e-02	2.46e-02	3.53e-02
97	191	15km	3	mean	1.96e-04	1.18e-04	6.65e-04	1.38e-03	2.56e-03
98	191	15km	3	med	1.96e-04	1.15e-04	6.97e-04	1.47e-03	2.81e-03
99	191	15km	3	max	4.24e-04	2.44e-04	1.46e-03	2.91e-03	4.41e-03
100	191	15km	4	mean	2.31e-03	1.56e-03	7.13e-03	1.37e-02	2.31e-02
101	191	15km	4	med	2.31e-03	1.55e-03	7.46e-03	1.42e-02	2.94e-02
102	191	15km	4	max	4.99e-03	3.24e-03	1.53e-02	2.87e-02	4.15e-02
103	191	15km	5	mean	1.30e-03	8.64e-04	4.06e-03	7.67e-03	1.34e-02
104	191	15km	5	med	1.30e-03	8.63e-04	4.21e-03	8.13e-03	1.57e-02
105	191	15km	5	max	2.80e-03	1.80e-03	8.69e-03	1.64e-02	2.38e-02
106	191	20km	1	mean	6.22e-05	3.40e-05	2.28e-04	5.30e-04	7.33e-04
107	191	20km	1	med	5.98e-05	3.32e-05	2.29e-04	5.03e-04	7.93e-04
108	191	20km	1	max	1.40e-04	7.17e-05	5.46e-04	1.20e-03	1.69e-03
109	191	20km	2	mean	1.58e-03	1.16e-03	4.36e-03	7.56e-03	1.15e-02
110	191	20km	2	med	1.56e-03	1.15e-03	4.54e-03	7.97e-03	1.37e-02
111	191	20km	2	max	3.44e-03	2.52e-03	9.40e-03	1.59e-02	2.10e-02
112	191	20km	3	mean	1.43e-04	9.40e-05	4.47e-04	8.81e-04	1.32e-03
113	191	20km	3	med	1.41e-04	9.27e-05	4.58e-04	9.32e-04	1.60e-03
114	191	20km	3	max	3.15e-04	2.02e-04	9.82e-04	1.90e-03	2.68e-03
115	191	20km	4	mean	1.78e-03	1.31e-03	4.99e-03	8.73e-03	1.35e-02
116	191	20km	4	med	1.76e-03	1.30e-03	5.18e-03	9.18e-03	1.53e-02
117	191	20km	4	max	3.89e-03	2.81e-03	1.08e-02	1.89e-02	2.52e-02
118	191	20km	5	mean	9.94e-04	7.27e-04	2.80e-03	5.06e-03	7.74e-03
119	191	20km	5	med	9.80e-04	7.18e-04	2.91e-03	5.31e-03	8.83e-03
120	191	20km	5	max	2.17e-03	1.55e-03	6.10e-03	1.08e-02	1.47e-02
121	191	50km	1	mean	2.03e-05	1.32e-05	6.28e-05	1.73e-04	2.68e-04
122	191	50km	1	med	1.77e-05	1.16e-05	5.68e-05	1.55e-04	2.68e-04
123	191	50km	1	max	5.01e-05	3.08e-05	1.63e-04	4.01e-04	6.27e-04
124	191	50km	2	mean	5.90e-04	4.86e-04	1.42e-03	2.09e-03	3.15e-03
125	191	50km	2	med	5.30e-04	4.26e-04	1.42e-03	2.26e-03	3.52e-03
126	191	50km	2	max	1.40e-03	1.18e-03	3.11e-03	4.44e-03	6.66e-03
127	191	50km	3	mean	4.31e-05	3.67e-05	1.01e-04	1.62e-04	2.49e-04
128	191	50km	3	med	3.85e-05	3.29e-05	9.61e-05	1.69e-04	3.25e-04
129	191	50km	3	max	1.02e-04	8.69e-05	2.27e-04	3.48e-04	4.90e-04
130	191	50km	4	mean	6.54e-04	5.46e-04	1.53e-03	2.26e-03	3.28e-03
131	191	50km	4	med	5.86e-04	4.82e-04	1.53e-03	2.40e-03	3.98e-03
132	191	50km	4	max	1.54e-03	1.33e-03	3.37e-03	4.78e-03	7.16e-03
133	191	50km	5	mean	3.59e-04	3.03e-04	8.23e-04	1.22e-03	1.71e-03
134	191	50km	5	med	3.22e-04	2.68e-04	8.15e-04	1.27e-03	2.22e-03
135	191	50km	5	max	8.48e-04	7.37e-04	1.82e-03	2.58e-03	3.83e-03
136	191	100km	1	mean	6.77e-06	4.72e-06	1.84e-05	6.63e-05	1.29e-04
137	191	100km	1	med	5.53e-06	3.68e-06	1.63e-05	5.81e-05	1.34e-04
138	191	100km	1	max	1.80e-05	1.20e-05	5.26e-05	1.54e-04	2.81e-04
139	191	100km	2	mean	2.40e-04	1.88e-04	6.64e-04	1.14e-03	1.95e-03
140	191	100km	2	med	1.96e-04	1.45e-04	5.98e-04	1.14e-03	1.84e-03
141	191	100km	2	max	6.14e-04	4.93e-04	1.53e-03	2.56e-03	5.64e-03
142	191	100km	3	mean	1.54e-05	1.36e-05	3.55e-05	5.32e-05	7.89e-05
143	191	100km	3	med	1.26e-05	1.07e-05	3.27e-05	5.35e-05	7.63e-05
144	191	100km	3	max	3.89e-05	3.46e-05	8.46e-05	1.21e-04	2.06e-04
145	191	100km	4	mean	2.62e-04	2.09e-04	6.94e-04	1.18e-03	1.97e-03
146	191	100km	4	med	2.15e-04	1.63e-04	6.32e-04	1.18e-03	1.88e-03
147	191	100km	4	max	6.70e-04	5.50e-04	1.61e-03	2.65e-03	5.76e-03
148	191	100km	5	mean	1.42e-04	1.16e-04	3.65e-04	6.07e-04	9.97e-04
149	191	100km	5	med	1.17e-04	9.10e-05	3.35e-04	6.19e-04	9.56e-04
150	191	100km	5	max	3.63e-04	3.04e-04	8.40e-04	1.37e-03	2.94e-03
151	191	200km	1	mean	1.80e-06	1.29e-06	4.75e-06	1.65e-05	3.49e-05
152	191	200km	1	med	1.41e-06	8.90e-07	4.26e-06	1.39e-05	4.31e-05
153	191	200km	1	max	4.85e-06	3.36e-06	1.29e-05	4.46e-05	8.69e-05
154	191	200km	2	mean	8.62e-05	5.88e-05	2.72e-04	5.76e-04	1.15e-03
155	191	200km	2	med	6.62e-05	3.90e-05	2.24e-04	5.66e-04	1.15e-03
156	191	200km	2	max	2.25e-04	1.58e-04	6.67e-04	1.26e-03	1.80e-03

157	191	200km	3	mean	4.68e-06	3.92e-06	1.21e-05	1.93e-05	3.27e-05
158	191	200km	3	med	3.68e-06	2.69e-06	1.11e-05	2.00e-05	3.27e-05
159	191	200km	3	max	1.19e-05	1.03e-05	2.84e-05	4.14e-05	7.70e-05
160	191	200km	4	mean	9.27e-05	6.50e-05	2.84e-04	5.89e-04	1.17e-03
161	191	200km	4	med	7.13e-05	4.32e-05	2.36e-04	5.81e-04	1.17e-03
162	191	200km	4	max	2.41e-04	1.75e-04	6.89e-04	1.30e-03	1.84e-03
163	191	200km	5	mean	4.96e-05	3.56e-05	1.48e-04	2.99e-04	5.98e-04
164	191	200km	5	med	3.83e-05	2.39e-05	1.23e-04	2.98e-04	5.98e-04
165	191	200km	5	max	1.29e-04	9.51e-05	3.57e-04	6.64e-04	9.39e-04
166	191	300km	1	mean	7.31e-07	5.33e-07	2.03e-06	4.97e-06	1.23e-05
167	191	300km	1	med	5.57e-07	3.63e-07	1.71e-06	3.99e-06	1.20e-05
168	191	300km	1	max	1.91e-06	1.35e-06	5.11e-06	1.49e-05	4.40e-05
169	191	300km	2	mean	4.84e-05	2.73e-05	1.81e-04	4.23e-04	9.14e-04
170	191	300km	2	med	3.66e-05	1.70e-05	1.44e-04	4.24e-04	9.14e-04
171	191	300km	2	max	1.24e-04	7.24e-05	4.43e-04	9.36e-04	1.60e-03
172	191	300km	3	mean	2.09e-06	1.60e-06	5.90e-06	1.01e-05	1.74e-05
173	191	300km	3	med	1.63e-06	1.05e-06	5.24e-06	1.01e-05	1.74e-05
174	191	300km	3	max	5.19e-06	4.26e-06	1.39e-05	2.44e-05	4.26e-05
175	191	300km	4	mean	5.13e-05	2.98e-05	1.86e-04	4.28e-04	9.38e-04
176	191	300km	4	med	3.88e-05	1.86e-05	1.49e-04	4.31e-04	9.38e-04
177	191	300km	4	max	1.31e-04	7.84e-05	4.57e-04	9.53e-04	1.63e-03
178	191	300km	5	mean	2.70e-05	1.62e-05	9.64e-05	2.18e-04	4.79e-04
179	191	300km	5	med	2.05e-05	1.02e-05	7.70e-05	2.18e-04	4.79e-04
180	191	300km	5	max	6.90e-05	4.24e-05	2.35e-04	4.86e-04	8.31e-04

Appendix 4

Table A-8. Statistics of VALMA dose results (ingestion pathways) with the smallest ('CASA1') source term.

The columns of the table are:

1. running line number (1-324)
2. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
3. ingestion dose pathway (1 = green vegetables, 2 = grain, 3 = root vegetables, 4 = milk, 5 = meat, 6 = sum (1+2+3+4+5)
4. time frame within which the contaminated fields are used
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	15km	1	1a	mean	7.98e-04	5.87e-06	5.44e-03	1.44e-02	3.05e-02
2	15km	1	1a	med	7.94e-04	5.85e-06	5.40e-03	1.49e-02	4.34e-02
3	15km	1	1a	max	1.70e-03	1.22e-05	1.19e-02	2.92e-02	4.90e-02
4	15km	1	3a	mean	8.09e-04	1.45e-05	5.48e-03	1.44e-02	3.06e-02
5	15km	1	3a	med	8.05e-04	1.43e-05	5.43e-03	1.50e-02	4.36e-02
6	15km	1	3a	max	1.73e-03	3.01e-05	1.20e-02	2.93e-02	4.92e-02
7	15km	1	30a	mean	8.57e-04	5.53e-05	5.56e-03	1.46e-02	3.11e-02
8	15km	1	30a	med	8.53e-04	5.44e-05	5.50e-03	1.52e-02	4.42e-02
9	15km	1	30a	max	1.83e-03	1.15e-04	1.22e-02	2.98e-02	4.99e-02
10	15km	2	1a	mean	4.83e-04	2.83e-06	3.30e-03	8.70e-03	1.85e-02
11	15km	2	1a	med	4.80e-04	2.82e-06	3.28e-03	9.06e-03	2.63e-02
12	15km	2	1a	max	1.03e-03	5.89e-06	7.23e-03	1.77e-02	2.97e-02
13	15km	2	3a	mean	4.88e-04	6.99e-06	3.31e-03	8.73e-03	1.85e-02
14	15km	2	3a	med	4.85e-04	6.94e-06	3.28e-03	9.09e-03	2.64e-02
15	15km	2	3a	max	1.04e-03	1.46e-05	7.26e-03	1.78e-02	2.98e-02
16	15km	2	30a	mean	5.11e-04	2.71e-05	3.35e-03	8.82e-03	1.87e-02
17	15km	2	30a	med	5.08e-04	2.67e-05	3.32e-03	9.19e-03	2.67e-02
18	15km	2	30a	max	1.09e-03	5.65e-05	7.33e-03	1.80e-02	3.01e-02
19	15km	3	1a	mean	3.23e-06	2.10e-06	1.04e-05	1.99e-05	4.00e-05
20	15km	3	1a	med	3.24e-06	2.06e-06	1.09e-05	2.15e-05	5.70e-05
21	15km	3	1a	max	6.95e-06	4.38e-06	2.20e-05	4.15e-05	6.43e-05
22	15km	3	3a	mean	7.51e-06	4.99e-06	2.35e-05	4.34e-05	8.15e-05
23	15km	3	3a	med	7.52e-06	4.96e-06	2.44e-05	4.68e-05	1.16e-04
24	15km	3	3a	max	1.61e-05	1.04e-05	4.97e-05	9.09e-05	1.31e-04
25	15km	3	30a	mean	2.77e-05	1.87e-05	8.49e-05	1.56e-04	2.73e-04
26	15km	3	30a	med	2.78e-05	1.86e-05	8.93e-05	1.67e-04	3.89e-04
27	15km	3	30a	max	5.96e-05	3.91e-05	1.81e-04	3.34e-04	4.73e-04
28	15km	4	1a	mean	1.02e-02	2.83e-04	6.14e-02	1.42e-01	2.95e-01
29	15km	4	1a	med	1.02e-02	2.81e-04	6.28e-02	1.49e-01	4.20e-01
30	15km	4	1a	max	2.16e-02	6.20e-04	1.28e-01	2.83e-01	4.74e-01
31	15km	4	3a	mean	1.05e-02	5.55e-04	6.20e-02	1.43e-01	2.98e-01
32	15km	4	3a	med	1.05e-02	5.48e-04	6.35e-02	1.51e-01	4.23e-01
33	15km	4	3a	max	2.22e-02	1.22e-03	1.29e-01	2.86e-01	4.78e-01
34	15km	4	30a	mean	1.07e-02	6.87e-04	6.23e-02	1.44e-01	3.00e-01

35	15km	4	30a	med	1.07e-02	6.75e-04	6.35e-02	1.51e-01	4.27e-01
36	15km	4	30a	max	2.25e-02	1.50e-03	1.30e-01	2.87e-01	4.82e-01
37	15km	5	1a	mean	4.11e-03	7.10e-04	2.21e-02	5.10e-02	1.06e-01
38	15km	5	1a	med	4.12e-03	6.90e-04	2.26e-02	5.35e-02	1.51e-01
39	15km	5	1a	max	8.70e-03	1.56e-03	4.59e-02	1.02e-01	1.70e-01
40	15km	5	3a	mean	4.66e-03	1.19e-03	2.33e-02	5.39e-02	1.12e-01
41	15km	5	3a	med	4.66e-03	1.16e-03	2.38e-02	5.65e-02	1.60e-01
42	15km	5	3a	max	9.88e-03	2.58e-03	4.84e-02	1.08e-01	1.80e-01
43	15km	5	30a	mean	4.74e-03	1.27e-03	2.35e-02	5.42e-02	1.13e-01
44	15km	5	30a	med	4.75e-03	1.23e-03	2.40e-02	5.70e-02	1.61e-01
45	15km	5	30a	max	1.01e-02	2.73e-03	4.88e-02	1.09e-01	1.81e-01
46	15km	6	1a	mean	1.56e-02	1.01e-03	9.03e-02	2.12e-01	4.50e-01
47	15km	6	1a	med	1.56e-02	9.92e-04	9.18e-02	2.27e-01	6.41e-01
48	15km	6	1a	max	3.30e-02	2.20e-03	1.90e-01	4.32e-01	7.24e-01
49	15km	6	3a	mean	1.65e-02	1.79e-03	9.21e-02	2.17e-01	4.60e-01
50	15km	6	3a	med	1.65e-02	1.75e-03	9.35e-02	2.32e-01	6.53e-01
51	15km	6	3a	max	3.49e-02	3.92e-03	1.94e-01	4.41e-01	7.37e-01
52	15km	6	30a	mean	1.68e-02	2.09e-03	9.27e-02	2.18e-01	4.63e-01
53	15km	6	30a	med	1.68e-02	2.04e-03	9.41e-02	2.34e-01	6.59e-01
54	15km	6	30a	max	3.56e-02	4.57e-03	1.95e-01	4.44e-01	7.44e-01
55	20km	1	1a	mean	5.91e-04	4.90e-06	4.11e-03	9.72e-03	1.61e-02
56	20km	1	1a	med	5.69e-04	4.88e-06	3.96e-03	1.04e-02	2.16e-02
57	20km	1	1a	max	1.29e-03	1.04e-05	9.24e-03	1.93e-02	3.08e-02
58	20km	1	3a	mean	5.99e-04	1.21e-05	4.13e-03	9.75e-03	1.62e-02
59	20km	1	3a	med	5.77e-04	1.20e-05	3.98e-03	1.04e-02	2.17e-02
60	20km	1	3a	max	1.31e-03	2.56e-05	9.24e-03	1.94e-02	3.09e-02
61	20km	1	30a	mean	6.37e-04	4.62e-05	4.19e-03	9.90e-03	1.64e-02
62	20km	1	30a	med	6.14e-04	4.55e-05	4.03e-03	1.06e-02	2.20e-02
63	20km	1	30a	max	1.39e-03	9.84e-05	9.42e-03	1.96e-02	3.13e-02
64	20km	2	1a	mean	3.58e-04	2.36e-06	2.49e-03	5.88e-03	9.76e-03
65	20km	2	1a	med	3.44e-04	2.35e-06	2.40e-03	6.28e-03	1.31e-02
66	20km	2	1a	max	7.78e-04	5.02e-06	5.59e-03	1.17e-02	1.86e-02
67	20km	2	3a	mean	3.62e-04	5.83e-06	2.50e-03	5.90e-03	9.79e-03
68	20km	2	3a	med	3.48e-04	5.79e-06	2.41e-03	6.30e-03	1.31e-02
69	20km	2	3a	max	7.87e-04	1.24e-05	5.61e-03	1.17e-02	1.87e-02
70	20km	2	30a	mean	3.80e-04	2.27e-05	2.53e-03	5.96e-03	9.89e-03
71	20km	2	30a	med	3.66e-04	2.23e-05	2.43e-03	6.37e-03	1.33e-02
72	20km	2	30a	max	8.26e-04	4.81e-05	5.67e-03	1.18e-02	1.89e-02
73	20km	3	1a	mean	2.49e-06	1.75e-06	7.30e-06	1.29e-05	2.12e-05
74	20km	3	1a	med	2.46e-06	1.73e-06	7.48e-06	1.38e-05	2.84e-05
75	20km	3	1a	max	5.42e-06	3.80e-06	1.56e-05	2.65e-05	4.04e-05
76	20km	3	3a	mean	5.81e-06	4.18e-06	1.63e-05	2.80e-05	4.30e-05
77	20km	3	3a	med	5.73e-06	4.15e-06	1.70e-05	3.02e-05	5.76e-05
78	20km	3	3a	max	1.26e-05	9.11e-06	3.51e-05	5.92e-05	8.21e-05
79	20km	3	30a	mean	2.15e-05	1.57e-05	5.97e-05	1.03e-04	1.53e-04
80	20km	3	30a	med	2.12e-05	1.55e-05	6.28e-05	1.09e-04	1.93e-04
81	20km	3	30a	max	4.67e-05	3.41e-05	1.28e-04	2.17e-04	2.80e-04
82	20km	4	1a	mean	7.74e-03	2.39e-04	4.68e-02	9.41e-02	1.56e-01
83	20km	4	1a	med	7.51e-03	2.34e-04	4.56e-02	1.00e-01	2.10e-01
84	20km	4	1a	max	1.67e-02	5.15e-04	1.00e-01	1.87e-01	2.98e-01
85	20km	4	3a	mean	7.96e-03	4.67e-04	4.73e-02	9.51e-02	1.58e-01
86	20km	4	3a	med	7.73e-03	4.54e-04	4.60e-02	1.01e-01	2.12e-01
87	20km	4	3a	max	1.72e-02	1.01e-03	1.01e-01	1.89e-01	3.01e-01
88	20km	4	30a	mean	8.07e-03	5.78e-04	4.75e-02	9.55e-02	1.58e-01
89	20km	4	30a	med	7.84e-03	5.62e-04	4.62e-02	1.02e-01	2.12e-01
90	20km	4	30a	max	1.74e-02	1.24e-03	1.01e-01	1.90e-01	3.03e-01
91	20km	5	1a	mean	3.12e-03	5.94e-04	1.68e-02	3.39e-02	5.61e-02
92	20km	5	1a	med	3.04e-03	5.75e-04	1.64e-02	3.61e-02	7.55e-02
93	20km	5	1a	max	6.73e-03	1.29e-03	3.60e-02	6.70e-02	1.07e-01
94	20km	5	3a	mean	3.55e-03	9.98e-04	1.78e-02	3.57e-02	5.92e-02
95	20km	5	3a	med	3.46e-03	9.60e-04	1.73e-02	3.81e-02	7.95e-02

96	20km	5	3a	max	7.66e-03	2.17e-03	3.79e-02	7.10e-02	1.13e-01
97	20km	5	30a	mean	3.61e-03	1.06e-03	1.79e-02	3.60e-02	5.96e-02
98	20km	5	30a	med	3.52e-03	1.02e-03	1.74e-02	3.84e-02	8.00e-02
99	20km	5	30a	max	7.80e-03	2.29e-03	3.82e-02	7.15e-02	1.14e-01
100	20km	6	1a	mean	1.18e-02	8.47e-04	6.95e-02	1.44e-01	2.38e-01
101	20km	6	1a	med	1.15e-02	8.22e-04	6.75e-02	1.53e-01	3.20e-01
102	20km	6	1a	max	2.55e-02	1.83e-03	1.47e-01	2.85e-01	4.55e-01
103	20km	6	3a	mean	1.25e-02	1.51e-03	7.08e-02	1.46e-01	2.43e-01
104	20km	6	3a	med	1.21e-02	1.46e-03	6.88e-02	1.56e-01	3.26e-01
105	20km	6	3a	max	2.69e-02	3.25e-03	1.50e-01	2.91e-01	4.64e-01
106	20km	6	30a	mean	1.27e-02	1.75e-03	7.13e-02	1.47e-01	2.44e-01
107	20km	6	30a	med	1.24e-02	1.70e-03	6.93e-02	1.57e-01	3.28e-01
108	20km	6	30a	max	2.74e-02	3.79e-03	1.51e-01	2.93e-01	4.67e-01
109	50km	1	1a	mean	1.85e-04	2.06e-06	1.31e-03	2.70e-03	4.39e-03
110	50km	1	1a	med	1.58e-04	1.85e-06	1.14e-03	2.58e-03	4.60e-03
111	50km	1	1a	max	4.52e-04	4.94e-06	3.16e-03	5.77e-03	1.06e-02
112	50km	1	3a	mean	1.88e-04	5.08e-06	1.31e-03	2.71e-03	4.41e-03
113	50km	1	3a	med	1.60e-04	4.54e-06	1.15e-03	2.59e-03	4.62e-03
114	50km	1	3a	max	4.59e-04	1.22e-05	3.17e-03	5.80e-03	1.07e-02
115	50km	1	30a	mean	2.02e-04	1.94e-05	1.33e-03	2.75e-03	4.48e-03
116	50km	1	30a	med	1.73e-04	1.71e-05	1.16e-03	2.63e-03	4.69e-03
117	50km	1	30a	max	4.92e-04	4.65e-05	3.21e-03	5.87e-03	1.09e-02
118	50km	2	1a	mean	1.12e-04	9.94e-07	7.93e-04	1.64e-03	2.66e-03
119	50km	2	1a	med	9.54e-05	8.93e-07	6.93e-04	1.56e-03	2.79e-03
120	50km	2	1a	max	2.73e-04	2.38e-06	1.91e-03	3.50e-03	6.45e-03
121	50km	2	3a	mean	1.13e-04	2.46e-06	7.96e-04	1.64e-03	2.67e-03
122	50km	2	3a	med	9.67e-05	2.20e-06	6.95e-04	1.57e-03	2.80e-03
123	50km	2	3a	max	2.77e-04	5.89e-06	1.92e-03	3.51e-03	6.47e-03
124	50km	2	30a	mean	1.20e-04	9.52e-06	8.05e-04	1.66e-03	2.70e-03
125	50km	2	30a	med	1.03e-04	8.41e-06	7.02e-04	1.59e-03	2.83e-03
126	50km	2	30a	max	2.93e-04	2.28e-05	1.94e-03	3.54e-03	6.54e-03
127	50km	3	1a	mean	9.21e-07	7.32e-07	2.26e-06	3.60e-06	5.75e-06
128	50km	3	1a	med	8.23e-07	6.48e-07	2.21e-06	3.67e-06	6.04e-06
129	50km	3	1a	max	2.18e-06	1.80e-06	4.98e-06	7.71e-06	1.39e-05
130	50km	3	3a	mean	2.16e-06	1.76e-06	5.22e-06	7.88e-06	1.17e-05
131	50km	3	3a	med	1.94e-06	1.55e-06	5.15e-06	8.23e-06	1.23e-05
132	50km	3	3a	max	5.11e-06	4.31e-06	1.14e-05	1.71e-05	2.83e-05
133	50km	3	30a	mean	8.04e-06	6.58e-06	1.93e-05	2.85e-05	4.22e-05
134	50km	3	30a	med	7.21e-06	5.80e-06	1.93e-05	3.11e-05	4.70e-05
135	50km	3	30a	max	1.90e-05	1.60e-05	4.24e-05	6.03e-05	9.52e-05
136	50km	4	1a	mean	2.61e-03	9.99e-05	1.49e-02	2.71e-02	4.25e-02
137	50km	4	1a	med	2.24e-03	8.87e-05	1.33e-02	2.68e-02	4.82e-02
138	50km	4	1a	max	6.34e-03	2.33e-04	3.55e-02	6.10e-02	1.03e-01
139	50km	4	3a	mean	2.69e-03	1.95e-04	1.51e-02	2.73e-02	4.30e-02
140	50km	4	3a	med	2.32e-03	1.72e-04	1.35e-02	2.71e-02	4.87e-02
141	50km	4	3a	max	6.55e-03	4.56e-04	3.59e-02	6.17e-02	1.04e-01
142	50km	4	30a	mean	2.73e-03	2.41e-04	1.52e-02	2.75e-02	4.32e-02
143	50km	4	30a	med	2.36e-03	2.12e-04	1.35e-02	2.72e-02	4.89e-02
144	50km	4	30a	max	6.64e-03	5.62e-04	3.60e-02	6.21e-02	1.04e-01
145	50km	5	1a	mean	1.07e-03	2.47e-04	5.38e-03	9.74e-03	1.53e-02
146	50km	5	1a	med	9.30e-04	2.13e-04	4.80e-03	9.65e-03	1.74e-02
147	50km	5	1a	max	2.60e-03	5.80e-04	1.28e-02	2.20e-02	3.71e-02
148	50km	5	3a	mean	1.23e-03	4.16e-04	5.67e-03	1.03e-02	1.62e-02
149	50km	5	3a	med	1.07e-03	3.56e-04	5.07e-03	1.02e-02	1.83e-02
150	50km	5	3a	max	2.97e-03	9.80e-04	1.34e-02	2.32e-02	3.91e-02
151	50km	5	30a	mean	1.26e-03	4.43e-04	5.71e-03	1.04e-02	1.63e-02
152	50km	5	30a	med	1.09e-03	3.79e-04	5.10e-03	1.03e-02	1.85e-02
153	50km	5	30a	max	3.03e-03	1.04e-03	1.36e-02	2.34e-02	3.94e-02
154	50km	6	1a	mean	3.98e-03	3.53e-04	2.21e-02	4.11e-02	6.49e-02
155	50km	6	1a	med	3.43e-03	3.11e-04	1.96e-02	4.00e-02	6.81e-02
156	50km	6	1a	max	9.67e-03	8.24e-04	5.23e-02	9.03e-02	1.57e-01

157	50km	6	3a	mean	4.23e-03	6.26e-04	2.25e-02	4.19e-02	6.63e-02
158	50km	6	3a	med	3.65e-03	5.44e-04	2.00e-02	4.08e-02	6.94e-02
159	50km	6	3a	max	1.03e-02	1.46e-03	5.34e-02	9.22e-02	1.60e-01
160	50km	6	30a	mean	4.32e-03	7.30e-04	2.27e-02	4.22e-02	6.67e-02
161	50km	6	30a	med	3.73e-03	6.32e-04	2.01e-02	4.11e-02	6.99e-02
162	50km	6	30a	max	1.05e-02	1.71e-03	5.37e-02	9.29e-02	1.61e-01
163	100km	1	1a	mean	6.82e-05	8.34e-07	4.50e-04	1.20e-03	2.69e-03
164	100km	1	1a	med	5.57e-05	6.72e-07	3.77e-04	1.09e-03	2.74e-03
165	100km	1	1a	max	1.78e-04	2.12e-06	1.19e-03	2.81e-03	5.78e-03
166	100km	1	3a	mean	6.94e-05	2.05e-06	4.51e-04	1.20e-03	2.70e-03
167	100km	1	3a	med	5.68e-05	1.64e-06	3.78e-04	1.09e-03	2.74e-03
168	100km	1	3a	max	1.81e-04	5.21e-06	1.19e-03	2.83e-03	5.80e-03
169	100km	1	30a	mean	7.51e-05	7.76e-06	4.58e-04	1.22e-03	2.74e-03
170	100km	1	30a	med	6.14e-05	6.18e-06	3.83e-04	1.11e-03	2.78e-03
171	100km	1	30a	max	1.96e-04	1.99e-05	1.21e-03	2.87e-03	5.89e-03
172	100km	2	1a	mean	4.13e-05	4.02e-07	2.73e-04	7.25e-04	1.63e-03
173	100km	2	1a	med	3.37e-05	3.24e-07	2.29e-04	6.60e-04	1.66e-03
174	100km	2	1a	max	1.08e-04	1.02e-06	7.19e-04	1.71e-03	3.51e-03
175	100km	2	3a	mean	4.19e-05	9.91e-07	2.74e-04	7.28e-04	1.64e-03
176	100km	2	3a	med	3.42e-05	7.95e-07	2.29e-04	6.61e-04	1.66e-03
177	100km	2	3a	max	1.09e-04	2.52e-06	7.21e-04	1.71e-03	3.52e-03
178	100km	2	30a	mean	4.46e-05	3.81e-06	2.77e-04	7.36e-04	1.66e-03
179	100km	2	30a	med	3.65e-05	3.03e-06	2.31e-04	6.68e-04	1.68e-03
180	100km	2	30a	max	1.16e-04	9.73e-06	7.29e-04	1.73e-03	3.56e-03
181	100km	3	1a	mean	3.72e-07	2.91e-07	1.02e-06	1.84e-06	3.53e-06
182	100km	3	1a	med	3.05e-07	2.23e-07	9.51e-07	1.80e-06	3.57e-06
183	100km	3	1a	max	9.53e-07	7.55e-07	2.38e-06	4.02e-06	8.10e-06
184	100km	3	3a	mean	8.77e-07	6.91e-07	2.40e-06	4.16e-06	7.17e-06
185	100km	3	3a	med	7.19e-07	5.33e-07	2.21e-06	4.15e-06	7.28e-06
186	100km	3	3a	max	2.25e-06	1.80e-06	5.58e-06	9.63e-06	1.99e-05
187	100km	3	30a	mean	3.27e-06	2.57e-06	9.03e-06	1.54e-05	2.63e-05
188	100km	3	30a	med	2.68e-06	1.99e-06	8.14e-06	1.55e-05	2.48e-05
189	100km	3	30a	max	8.38e-06	6.76e-06	2.08e-05	3.52e-05	7.62e-05
190	100km	4	1a	mean	9.60e-04	4.02e-05	5.23e-03	1.31e-02	3.01e-02
191	100km	4	1a	med	7.84e-04	3.22e-05	4.56e-03	1.14e-02	2.64e-02
192	100km	4	1a	max	2.52e-03	1.02e-04	1.37e-02	3.09e-02	5.58e-02
193	100km	4	3a	mean	9.95e-04	7.84e-05	5.29e-03	1.32e-02	3.04e-02
194	100km	4	3a	med	8.12e-04	6.24e-05	4.60e-03	1.16e-02	2.67e-02
195	100km	4	3a	max	2.61e-03	2.00e-04	1.38e-02	3.12e-02	5.66e-02
196	100km	4	30a	mean	1.01e-03	9.68e-05	5.30e-03	1.33e-02	3.06e-02
197	100km	4	30a	med	8.25e-04	7.70e-05	4.62e-03	1.16e-02	2.68e-02
198	100km	4	30a	max	2.65e-03	2.46e-04	1.39e-02	3.14e-02	5.66e-02
199	100km	5	1a	mean	4.03e-04	9.91e-05	1.89e-03	4.71e-03	1.09e-02
200	100km	5	1a	med	3.29e-04	7.69e-05	1.65e-03	4.13e-03	9.55e-03
201	100km	5	1a	max	1.05e-03	2.52e-04	4.94e-03	1.12e-02	2.01e-02
202	100km	5	3a	mean	4.67e-04	1.66e-04	1.99e-03	4.96e-03	1.15e-02
203	100km	5	3a	med	3.82e-04	1.25e-04	1.74e-03	4.36e-03	1.01e-02
204	100km	5	3a	max	1.22e-03	4.23e-04	5.20e-03	1.18e-02	2.12e-02
205	100km	5	30a	mean	4.77e-04	1.76e-04	2.01e-03	5.01e-03	1.16e-02
206	100km	5	30a	med	3.90e-04	1.33e-04	1.75e-03	4.39e-03	1.01e-02
207	100km	5	30a	max	1.24e-03	4.51e-04	5.25e-03	1.18e-02	2.15e-02
208	100km	6	1a	mean	1.47e-03	1.42e-04	7.65e-03	1.96e-02	4.10e-02
209	100km	6	1a	med	1.20e-03	1.13e-04	6.70e-03	1.70e-02	4.03e-02
210	100km	6	1a	max	3.86e-03	3.61e-04	2.02e-02	4.52e-02	8.53e-02
211	100km	6	3a	mean	1.57e-03	2.51e-04	7.80e-03	2.00e-02	4.19e-02
212	100km	6	3a	med	1.29e-03	1.98e-04	6.83e-03	1.73e-02	4.11e-02
213	100km	6	3a	max	4.12e-03	6.39e-04	2.06e-02	4.62e-02	8.72e-02
214	100km	6	30a	mean	1.61e-03	2.93e-04	7.85e-03	2.01e-02	4.23e-02
215	100km	6	30a	med	1.32e-03	2.29e-04	6.88e-03	1.75e-02	4.14e-02
216	100km	6	30a	max	4.21e-03	7.43e-04	2.07e-02	4.66e-02	8.75e-02
217	200km	1	1a	mean	2.14e-05	2.78e-07	1.32e-04	4.43e-04	1.24e-03

218	200km	1	1a	med	1.70e-05	1.98e-07	1.13e-04	3.70e-04	1.41e-03
219	200km	1	1a	max	5.50e-05	7.38e-07	3.40e-04	1.07e-03	2.69e-03
220	200km	1	3a	mean	2.18e-05	6.83e-07	1.32e-04	4.45e-04	1.25e-03
221	200km	1	3a	med	1.73e-05	4.78e-07	1.13e-04	3.71e-04	1.42e-03
222	200km	1	3a	max	5.62e-05	1.81e-06	3.41e-04	1.07e-03	2.70e-03
223	200km	1	30a	mean	2.39e-05	2.59e-06	1.34e-04	4.52e-04	1.27e-03
224	200km	1	30a	med	1.89e-05	1.78e-06	1.15e-04	3.77e-04	1.43e-03
225	200km	1	30a	max	6.16e-05	6.84e-06	3.46e-04	1.09e-03	2.74e-03
226	200km	2	1a	mean	1.30e-05	1.34e-07	8.00e-05	2.69e-04	7.54e-04
227	200km	2	1a	med	1.03e-05	9.57e-08	6.85e-05	2.25e-04	8.54e-04
228	200km	2	1a	max	3.33e-05	3.56e-07	2.06e-04	6.51e-04	1.63e-03
229	200km	2	3a	mean	1.32e-05	3.30e-07	8.04e-05	2.70e-04	7.59e-04
230	200km	2	3a	med	1.04e-05	2.32e-07	6.87e-05	2.25e-04	8.57e-04
231	200km	2	3a	max	3.39e-05	8.74e-07	2.07e-04	6.53e-04	1.64e-03
232	200km	2	30a	mean	1.42e-05	1.27e-06	8.11e-05	2.73e-04	7.65e-04
233	200km	2	30a	med	1.12e-05	8.76e-07	6.94e-05	2.28e-04	8.66e-04
234	200km	2	30a	max	3.65e-05	3.37e-06	2.09e-04	6.60e-04	1.65e-03
235	200km	3	1a	mean	1.33e-07	9.16e-08	4.22e-07	8.96e-07	1.65e-06
236	200km	3	1a	med	1.02e-07	6.01e-08	3.51e-07	8.72e-07	1.84e-06
237	200km	3	1a	max	3.46e-07	2.50e-07	1.00e-06	1.97e-06	3.52e-06
238	200km	3	3a	mean	3.16e-07	2.19e-07	9.89e-07	2.09e-06	4.05e-06
239	200km	3	3a	med	2.42e-07	1.43e-07	8.18e-07	2.06e-06	4.05e-06
240	200km	3	3a	max	8.22e-07	5.87e-07	2.40e-06	4.63e-06	7.16e-06
241	200km	3	30a	mean	1.18e-06	8.13e-07	3.71e-06	7.88e-06	1.55e-05
242	200km	3	30a	med	9.06e-07	5.35e-07	3.06e-06	7.76e-06	1.55e-05
243	200km	3	30a	max	3.08e-06	2.19e-06	9.07e-06	1.73e-05	2.45e-05
244	200km	4	1a	mean	3.01e-04	1.40e-05	1.66e-03	4.50e-03	1.29e-02
245	200km	4	1a	med	2.35e-04	9.93e-06	1.35e-03	3.94e-03	1.38e-02
246	200km	4	1a	max	8.01e-04	3.65e-05	4.34e-03	1.12e-02	2.60e-02
247	200km	4	3a	mean	3.13e-04	2.71e-05	1.68e-03	4.54e-03	1.30e-02
248	200km	4	3a	med	2.45e-04	1.91e-05	1.36e-03	3.98e-03	1.39e-02
249	200km	4	3a	max	8.34e-04	7.08e-05	4.42e-03	1.13e-02	2.62e-02
250	200km	4	30a	mean	3.19e-04	3.33e-05	1.68e-03	4.56e-03	1.31e-02
251	200km	4	30a	med	2.50e-04	2.35e-05	1.37e-03	4.01e-03	1.40e-02
252	200km	4	30a	max	8.49e-04	8.76e-05	4.42e-03	1.14e-02	2.64e-02
253	200km	5	1a	mean	1.30e-04	3.36e-05	6.01e-04	1.62e-03	4.66e-03
254	200km	5	1a	med	1.01e-04	2.32e-05	4.90e-04	1.43e-03	5.00e-03
255	200km	5	1a	max	3.45e-04	8.85e-05	1.58e-03	4.07e-03	9.40e-03
256	200km	5	3a	mean	1.53e-04	5.57e-05	6.34e-04	1.71e-03	4.90e-03
257	200km	5	3a	med	1.19e-04	3.78e-05	5.25e-04	1.51e-03	5.25e-03
258	200km	5	3a	max	4.05e-04	1.47e-04	1.67e-03	4.29e-03	9.90e-03
259	200km	5	30a	mean	1.57e-04	5.92e-05	6.42e-04	1.73e-03	4.96e-03
260	200km	5	30a	med	1.22e-04	3.99e-05	5.29e-04	1.52e-03	5.30e-03
261	200km	5	30a	max	4.15e-04	1.57e-04	1.68e-03	4.32e-03	9.95e-03
262	200km	6	1a	mean	4.65e-04	4.88e-05	2.43e-03	6.64e-03	1.84e-02
263	200km	6	1a	med	3.64e-04	3.44e-05	1.99e-03	5.60e-03	2.08e-02
264	200km	6	1a	max	1.23e-03	1.28e-04	6.33e-03	1.64e-02	3.97e-02
265	200km	6	3a	mean	5.02e-04	8.59e-05	2.47e-03	6.77e-03	1.87e-02
266	200km	6	3a	med	3.92e-04	5.99e-05	2.03e-03	5.73e-03	2.12e-02
267	200km	6	3a	max	1.33e-03	2.26e-04	6.48e-03	1.67e-02	4.05e-02
268	200km	6	30a	mean	5.15e-04	9.99e-05	2.49e-03	6.82e-03	1.89e-02
269	200km	6	30a	med	4.03e-04	6.97e-05	2.05e-03	5.76e-03	2.13e-02
270	200km	6	30a	max	1.36e-03	2.63e-04	6.52e-03	1.68e-02	4.07e-02
271	300km	1	1a	mean	9.60e-06	1.34e-07	6.25e-05	2.19e-04	5.87e-04
272	300km	1	1a	med	7.44e-06	8.82e-08	4.69e-05	1.76e-04	5.82e-04
273	300km	1	1a	max	2.42e-05	3.52e-07	1.57e-04	5.46e-04	1.50e-03
274	300km	1	3a	mean	9.85e-06	3.27e-07	6.29e-05	2.19e-04	5.89e-04
275	300km	1	3a	med	7.64e-06	2.15e-07	4.70e-05	1.77e-04	5.82e-04
276	300km	1	3a	max	2.49e-05	8.58e-07	1.57e-04	5.48e-04	1.51e-03
277	300km	1	30a	mean	1.10e-05	1.22e-06	6.37e-05	2.22e-04	5.99e-04
278	300km	1	30a	med	8.52e-06	7.98e-07	4.78e-05	1.80e-04	5.92e-04

279	300km	1	30a	max	2.79e-05	3.19e-06	1.60e-04	5.56e-04	1.53e-03
280	300km	2	1a	mean	5.82e-06	6.48e-08	3.81e-05	1.33e-04	3.57e-04
281	300km	2	1a	med	4.51e-06	4.28e-08	2.84e-05	1.07e-04	3.52e-04
282	300km	2	1a	max	1.47e-05	1.70e-07	9.52e-05	3.32e-04	9.12e-04
283	300km	2	3a	mean	5.94e-06	1.59e-07	3.83e-05	1.33e-04	3.58e-04
284	300km	2	3a	med	4.60e-06	1.04e-07	2.85e-05	1.07e-04	3.53e-04
285	300km	2	3a	max	1.50e-05	4.16e-07	9.55e-05	3.33e-04	9.15e-04
286	300km	2	30a	mean	6.51e-06	6.03e-07	3.87e-05	1.35e-04	3.62e-04
287	300km	2	30a	med	5.03e-06	3.94e-07	2.88e-05	1.09e-04	3.57e-04
288	300km	2	30a	max	1.65e-05	1.57e-06	9.65e-05	3.36e-04	9.24e-04
289	300km	3	1a	mean	7.40e-08	4.24e-08	2.68e-07	6.13e-07	1.33e-06
290	300km	3	1a	med	5.59e-08	2.64e-08	2.15e-07	6.39e-07	1.33e-06
291	300km	3	1a	max	1.90e-07	1.13e-07	6.64e-07	1.38e-06	2.31e-06
292	300km	3	3a	mean	1.77e-07	1.01e-07	6.52e-07	1.50e-06	3.26e-06
293	300km	3	3a	med	1.34e-07	6.29e-08	5.17e-07	1.51e-06	3.26e-06
294	300km	3	3a	max	4.54e-07	2.69e-07	1.61e-06	3.34e-06	5.68e-06
295	300km	3	30a	mean	6.65e-07	3.78e-07	2.48e-06	5.71e-06	1.24e-05
296	300km	3	30a	med	5.02e-07	2.36e-07	1.96e-06	5.75e-06	1.24e-05
297	300km	3	30a	max	1.71e-06	1.00e-06	6.05e-06	1.27e-05	2.17e-05
298	300km	4	1a	mean	1.51e-04	6.65e-06	8.58e-04	2.92e-03	6.18e-03
299	300km	4	1a	med	1.13e-04	4.49e-06	6.30e-04	2.42e-03	5.61e-03
300	300km	4	1a	max	3.99e-04	1.75e-05	2.12e-03	7.63e-03	1.63e-02
301	300km	4	3a	mean	1.58e-04	1.28e-05	8.68e-04	2.95e-03	6.23e-03
302	300km	4	3a	med	1.18e-04	8.61e-06	6.35e-04	2.44e-03	5.67e-03
303	300km	4	3a	max	4.17e-04	3.34e-05	2.14e-03	7.74e-03	1.65e-02
304	300km	4	30a	mean	1.62e-04	1.57e-05	8.70e-04	2.96e-03	6.27e-03
305	300km	4	30a	med	1.20e-04	1.05e-05	6.39e-04	2.45e-03	5.69e-03
306	300km	4	30a	max	4.26e-04	4.11e-05	2.15e-03	7.77e-03	1.66e-02
307	300km	5	1a	mean	6.73e-05	1.56e-05	3.12e-04	1.05e-03	2.24e-03
308	300km	5	1a	med	5.03e-05	1.03e-05	2.35e-04	8.75e-04	2.03e-03
309	300km	5	1a	max	1.77e-04	4.08e-05	7.70e-04	2.81e-03	5.90e-03
310	300km	5	3a	mean	8.02e-05	2.55e-05	3.41e-04	1.11e-03	2.36e-03
311	300km	5	3a	med	6.00e-05	1.67e-05	2.66e-04	9.20e-04	2.14e-03
312	300km	5	3a	max	2.10e-04	6.70e-05	8.25e-04	2.96e-03	6.20e-03
313	300km	5	30a	mean	8.23e-05	2.71e-05	3.45e-04	1.12e-03	2.38e-03
314	300km	5	30a	med	6.16e-05	1.77e-05	2.71e-04	9.30e-04	2.16e-03
315	300km	5	30a	max	2.15e-04	7.10e-05	8.35e-04	2.99e-03	6.25e-03
316	300km	6	1a	mean	2.34e-04	2.30e-05	1.29e-03	4.15e-03	8.66e-03
317	300km	6	1a	med	1.75e-04	1.54e-05	9.37e-04	3.39e-03	8.57e-03
318	300km	6	1a	max	6.15e-04	6.02e-05	3.11e-03	1.09e-02	2.22e-02
319	300km	6	3a	mean	2.54e-04	4.02e-05	1.31e-03	4.25e-03	8.84e-03
320	300km	6	3a	med	1.90e-04	2.65e-05	9.57e-04	3.47e-03	8.75e-03
321	300km	6	3a	max	6.67e-04	1.05e-04	3.17e-03	1.12e-02	2.27e-02
322	300km	6	30a	mean	2.62e-04	4.66e-05	1.32e-03	4.28e-03	8.90e-03
323	300km	6	30a	med	1.96e-04	3.07e-05	9.63e-04	3.49e-03	8.80e-03
324	300km	6	30a	max	6.87e-04	1.22e-04	3.19e-03	1.13e-02	2.29e-02

Appendix 5

Table A-9. Statistics of VALMA dose results (cloud, fallout and inhalation) with the medium ('CASA2') source term.

The columns of the table are:

1. running line number (1-180)
2. index of time point (190 = 1 week, 191 = one year)
3. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
4. dose pathway (1 = cloud, 2 = fallout, 3 = inhalation, 4 = sum (1+2+3), 5 = weighted sum (with fallout shielding factor 0.5)
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	190	15km	1	mean	2.22e-03	1.19e-03	8.15e-03	1.86e-02	3.26e-02
2	190	15km	1	med	2.19e-03	1.17e-03	8.40e-03	1.88e-02	3.63e-02
3	190	15km	1	max	4.89e-03	2.49e-03	1.86e-02	3.94e-02	5.58e-02
4	190	15km	2	mean	1.85e-02	1.26e-02	5.69e-02	1.06e-01	1.79e-01
5	190	15km	2	med	1.86e-02	1.25e-02	5.94e-02	1.13e-01	2.54e-01
6	190	15km	2	max	4.00e-02	2.63e-02	1.21e-01	2.26e-01	3.22e-01
7	190	15km	3	mean	1.94e-02	1.17e-02	6.59e-02	1.37e-01	2.53e-01
8	190	15km	3	med	1.94e-02	1.14e-02	6.90e-02	1.45e-01	2.78e-01
9	190	15km	3	max	4.20e-02	2.42e-02	1.45e-01	2.88e-01	4.37e-01
10	190	15km	4	mean	4.01e-02	2.61e-02	1.29e-01	2.58e-01	4.65e-01
11	190	15km	4	med	4.02e-02	2.60e-02	1.37e-01	2.71e-01	5.13e-01
12	190	15km	4	max	8.69e-02	5.43e-02	2.81e-01	5.42e-01	8.04e-01
13	190	15km	5	mean	3.09e-02	1.96e-02	1.02e-01	2.05e-01	3.75e-01
14	190	15km	5	med	3.09e-02	1.95e-02	1.07e-01	2.17e-01	4.13e-01
15	190	15km	5	max	6.69e-02	4.06e-02	2.22e-01	4.33e-01	6.48e-01
16	190	20km	1	mean	1.67e-03	9.60e-04	5.95e-03	1.28e-02	1.81e-02
17	190	20km	1	med	1.62e-03	9.38e-04	6.04e-03	1.26e-02	1.97e-02
18	190	20km	1	max	3.75e-03	2.03e-03	1.38e-02	2.86e-02	4.03e-02
19	190	20km	2	mean	1.43e-02	1.06e-02	3.98e-02	6.92e-02	1.07e-01
20	190	20km	2	med	1.42e-02	1.03e-02	4.16e-02	7.25e-02	1.26e-01
21	190	20km	2	max	3.12e-02	2.27e-02	8.56e-02	1.48e-01	1.94e-01
22	190	20km	3	mean	1.42e-02	9.32e-03	4.42e-02	8.71e-02	1.31e-01
23	190	20km	3	med	1.40e-02	9.20e-03	4.54e-02	9.23e-02	1.58e-01
24	190	20km	3	max	3.12e-02	2.00e-02	9.72e-02	1.88e-01	2.64e-01
25	190	20km	4	mean	3.02e-02	2.14e-02	8.80e-02	1.69e-01	2.55e-01
26	190	20km	4	med	2.98e-02	2.14e-02	9.15e-02	1.74e-01	3.02e-01
27	190	20km	4	max	6.61e-02	4.61e-02	1.95e-01	3.56e-01	4.97e-01
28	190	20km	5	mean	2.30e-02	1.58e-02	6.85e-02	1.34e-01	2.02e-01
29	190	20km	5	med	2.27e-02	1.58e-02	7.11e-02	1.39e-01	2.41e-01
30	190	20km	5	max	5.05e-02	3.40e-02	1.53e-01	2.85e-01	4.00e-01
31	190	50km	1	mean	5.24e-04	3.67e-04	1.48e-03	3.67e-03	5.63e-03
32	190	50km	1	med	4.60e-04	3.27e-04	1.41e-03	3.41e-03	5.49e-03
33	190	50km	1	max	1.28e-03	8.61e-04	3.83e-03	8.45e-03	1.32e-02
34	190	50km	2	mean	5.20e-03	4.27e-03	1.27e-02	1.88e-02	2.87e-02

35	190	50km	2	med	4.68e-03	3.73e-03	1.27e-02	2.04e-02	3.27e-02
36	190	50km	2	max	1.23e-02	1.03e-02	2.76e-02	3.96e-02	5.75e-02
37	190	50km	3	mean	4.27e-03	3.64e-03	1.00e-02	1.61e-02	2.46e-02
38	190	50km	3	med	3.82e-03	3.27e-03	9.52e-03	1.68e-02	3.21e-02
39	190	50km	3	max	1.01e-02	8.63e-03	2.25e-02	3.45e-02	4.83e-02
40	190	50km	4	mean	1.00e-02	8.81e-03	2.19e-02	3.44e-02	4.90e-02
41	190	50km	4	med	8.97e-03	7.84e-03	2.14e-02	3.57e-02	6.85e-02
42	190	50km	4	max	2.36e-02	2.12e-02	4.90e-02	7.22e-02	1.03e-01
43	190	50km	5	mean	7.40e-03	6.55e-03	1.63e-02	2.63e-02	3.82e-02
44	190	50km	5	med	6.63e-03	5.86e-03	1.58e-02	2.69e-02	5.21e-02
45	190	50km	5	max	1.74e-02	1.54e-02	3.67e-02	5.58e-02	7.72e-02
46	190	100km	1	mean	1.74e-04	1.31e-04	4.48e-04	1.36e-03	2.63e-03
47	190	100km	1	med	1.42e-04	1.03e-04	4.02e-04	1.22e-03	2.74e-03
48	190	100km	1	max	4.56e-04	3.33e-04	1.21e-03	3.16e-03	5.75e-03
49	190	100km	2	mean	2.04e-03	1.59e-03	5.72e-03	9.93e-03	1.63e-02
50	190	100km	2	med	1.67e-03	1.23e-03	5.15e-03	9.88e-03	1.61e-02
51	190	100km	2	max	5.19e-03	4.15e-03	1.32e-02	2.20e-02	4.75e-02
52	190	100km	3	mean	1.53e-03	1.35e-03	3.54e-03	5.28e-03	7.83e-03
53	190	100km	3	med	1.26e-03	1.07e-03	3.26e-03	5.32e-03	7.53e-03
54	190	100km	3	max	3.87e-03	3.44e-03	8.42e-03	1.21e-02	2.06e-02
55	190	100km	4	mean	3.74e-03	3.28e-03	8.78e-03	1.33e-02	1.81e-02
56	190	100km	4	med	3.08e-03	2.59e-03	8.21e-03	1.33e-02	1.89e-02
57	190	100km	4	max	9.49e-03	8.50e-03	2.02e-02	2.97e-02	5.66e-02
58	190	100km	5	mean	2.72e-03	2.43e-03	6.17e-03	8.96e-03	1.24e-02
59	190	100km	5	med	2.24e-03	1.93e-03	5.72e-03	9.09e-03	1.26e-02
60	190	100km	5	max	6.90e-03	6.32e-03	1.43e-02	2.02e-02	3.28e-02
61	190	200km	1	mean	4.63e-05	3.55e-05	1.16e-04	3.39e-04	7.16e-04
62	190	200km	1	med	3.63e-05	2.45e-05	1.09e-04	2.88e-04	8.85e-04
63	190	200km	1	max	1.23e-04	9.25e-05	2.99e-04	9.15e-04	1.78e-03
64	190	200km	2	mean	6.92e-04	4.64e-04	2.24e-03	4.78e-03	9.75e-03
65	190	200km	2	med	5.33e-04	3.07e-04	1.84e-03	4.73e-03	9.75e-03
66	190	200km	2	max	1.79e-03	1.25e-03	5.48e-03	1.03e-02	1.44e-02
67	190	200km	3	mean	4.68e-04	3.92e-04	1.21e-03	1.92e-03	3.26e-03
68	190	200km	3	med	3.67e-04	2.69e-04	1.10e-03	2.01e-03	3.26e-03
69	190	200km	3	max	1.19e-03	1.03e-03	2.84e-03	4.14e-03	7.71e-03
70	190	200km	4	mean	1.21e-03	9.43e-04	3.27e-03	6.06e-03	1.15e-02
71	190	200km	4	med	9.40e-04	6.43e-04	2.86e-03	6.12e-03	1.15e-02
72	190	200km	4	max	3.08e-03	2.50e-03	7.65e-03	1.29e-02	1.79e-02
73	190	200km	5	mean	8.60e-04	7.00e-04	2.19e-03	3.73e-03	6.68e-03
74	190	200km	5	med	6.73e-04	4.85e-04	2.01e-03	3.93e-03	6.68e-03
75	190	200km	5	max	2.19e-03	1.85e-03	5.20e-03	7.99e-03	1.16e-02
76	190	300km	1	mean	1.88e-05	1.41e-05	5.07e-05	1.12e-04	2.51e-04
77	190	300km	1	med	1.44e-05	9.81e-06	4.35e-05	9.47e-05	2.52e-04
78	190	300km	1	max	4.83e-05	3.64e-05	1.22e-04	3.11e-04	9.01e-04
79	190	300km	2	mean	3.72e-04	2.02e-04	1.43e-03	3.42e-03	7.13e-03
80	190	300km	2	med	2.82e-04	1.24e-04	1.14e-03	3.42e-03	7.14e-03
81	190	300km	2	max	9.46e-04	5.30e-04	3.49e-03	7.34e-03	1.29e-02
82	190	300km	3	mean	2.09e-04	1.61e-04	5.90e-04	1.01e-03	1.75e-03
83	190	300km	3	med	1.63e-04	1.05e-04	5.23e-04	1.01e-03	1.75e-03
84	190	300km	3	max	5.20e-04	4.28e-04	1.39e-03	2.45e-03	4.26e-03
85	190	300km	4	mean	6.00e-04	4.02e-04	1.94e-03	4.07e-03	8.92e-03
86	190	300km	4	med	4.62e-04	2.56e-04	1.62e-03	4.16e-03	8.92e-03
87	190	300km	4	max	1.50e-03	1.07e-03	4.66e-03	9.15e-03	1.55e-02
88	190	300km	5	mean	4.14e-04	2.97e-04	1.24e-03	2.49e-03	5.35e-03
89	190	300km	5	med	3.21e-04	1.90e-04	1.09e-03	2.53e-03	5.35e-03
90	190	300km	5	max	1.03e-03	7.85e-04	3.03e-03	5.48e-03	9.28e-03
91	191	15km	1	mean	2.22e-03	1.19e-03	8.15e-03	1.86e-02	3.26e-02
92	191	15km	1	med	2.19e-03	1.17e-03	8.40e-03	1.88e-02	3.63e-02
93	191	15km	1	max	4.89e-03	2.49e-03	1.86e-02	3.94e-02	5.58e-02
94	191	15km	2	mean	2.54e-01	1.73e-01	7.72e-01	1.44e+00	2.40e+00
95	191	15km	2	med	2.54e-01	1.71e-01	8.15e-01	1.52e+00	3.41e+00

96	191	15km	2	max	5.47e-01	3.60e-01	1.66e+00	3.06e+00	4.40e+00
97	191	15km	3	mean	1.94e-02	1.17e-02	6.59e-02	1.37e-01	2.53e-01
98	191	15km	3	med	1.94e-02	1.14e-02	6.90e-02	1.45e-01	2.78e-01
99	191	15km	3	max	4.20e-02	2.42e-02	1.45e-01	2.88e-01	4.37e-01
100	191	15km	4	mean	2.76e-01	1.87e-01	8.42e-01	1.60e+00	2.69e+00
101	191	15km	4	med	2.76e-01	1.86e-01	8.84e-01	1.67e+00	3.56e+00
102	191	15km	4	max	5.94e-01	3.88e-01	1.81e+00	3.37e+00	4.86e+00
103	191	15km	5	mean	1.49e-01	1.00e-01	4.58e-01	8.79e-01	1.49e+00
104	191	15km	5	med	1.49e-01	9.98e-02	4.80e-01	9.16e-01	1.86e+00
105	191	15km	5	max	3.20e-01	2.09e-01	9.84e-01	1.83e+00	2.66e+00
106	191	20km	1	mean	1.67e-03	9.60e-04	5.95e-03	1.28e-02	1.81e-02
107	191	20km	1	med	1.62e-03	9.38e-04	6.04e-03	1.26e-02	1.97e-02
108	191	20km	1	max	3.75e-03	2.03e-03	1.38e-02	2.86e-02	4.03e-02
109	191	20km	2	mean	1.97e-01	1.45e-01	5.43e-01	9.42e-01	1.42e+00
110	191	20km	2	med	1.94e-01	1.43e-01	5.67e-01	9.91e-01	1.70e+00
111	191	20km	2	max	4.29e-01	3.14e-01	1.17e+00	1.98e+00	2.61e+00
112	191	20km	3	mean	1.42e-02	9.32e-03	4.42e-02	8.71e-02	1.31e-01
113	191	20km	3	med	1.40e-02	9.20e-03	4.54e-02	9.23e-02	1.58e-01
114	191	20km	3	max	3.12e-02	2.00e-02	9.72e-02	1.88e-01	2.64e-01
115	191	20km	4	mean	2.13e-01	1.56e-01	5.93e-01	1.02e+00	1.57e+00
116	191	20km	4	med	2.10e-01	1.54e-01	6.16e-01	1.07e+00	1.80e+00
117	191	20km	4	max	4.63e-01	3.38e-01	1.27e+00	2.21e+00	2.91e+00
118	191	20km	5	mean	1.14e-01	8.41e-02	3.20e-01	5.58e-01	8.61e-01
119	191	20km	5	med	1.13e-01	8.31e-02	3.32e-01	5.90e-01	9.90e-01
120	191	20km	5	max	2.49e-01	1.81e-01	6.90e-01	1.21e+00	1.61e+00
121	191	50km	1	mean	5.24e-04	3.67e-04	1.48e-03	3.67e-03	5.63e-03
122	191	50km	1	med	4.60e-04	3.27e-04	1.41e-03	3.41e-03	5.49e-03
123	191	50km	1	max	1.28e-03	8.61e-04	3.83e-03	8.45e-03	1.32e-02
124	191	50km	2	mean	7.37e-02	6.07e-02	1.77e-01	2.61e-01	3.93e-01
125	191	50km	2	med	6.61e-02	5.32e-02	1.77e-01	2.82e-01	4.39e-01
126	191	50km	2	max	1.74e-01	1.47e-01	3.88e-01	5.55e-01	8.32e-01
127	191	50km	3	mean	4.27e-03	3.64e-03	1.00e-02	1.61e-02	2.46e-02
128	191	50km	3	med	3.82e-03	3.27e-03	9.52e-03	1.68e-02	3.21e-02
129	191	50km	3	max	1.01e-02	8.63e-03	2.25e-02	3.45e-02	4.83e-02
130	191	50km	4	mean	7.85e-02	6.53e-02	1.85e-01	2.74e-01	4.03e-01
131	191	50km	4	med	7.04e-02	5.75e-02	1.85e-01	2.94e-01	4.75e-01
132	191	50km	4	max	1.85e-01	1.59e-01	4.08e-01	5.78e-01	8.69e-01
133	191	50km	5	mean	4.17e-02	3.50e-02	9.68e-02	1.42e-01	2.07e-01
134	191	50km	5	med	3.74e-02	3.08e-02	9.71e-02	1.51e-01	2.55e-01
135	191	50km	5	max	9.84e-02	8.50e-02	2.13e-01	3.02e-01	4.53e-01
136	191	100km	1	mean	1.74e-04	1.31e-04	4.48e-04	1.36e-03	2.63e-03
137	191	100km	1	med	1.42e-04	1.03e-04	4.02e-04	1.22e-03	2.74e-03
138	191	100km	1	max	4.56e-04	3.33e-04	1.21e-03	3.16e-03	5.75e-03
139	191	100km	2	mean	3.00e-02	2.35e-02	8.29e-02	1.42e-01	2.44e-01
140	191	100km	2	med	2.45e-02	1.82e-02	7.47e-02	1.42e-01	2.30e-01
141	191	100km	2	max	7.68e-02	6.17e-02	1.92e-01	3.21e-01	7.05e-01
142	191	100km	3	mean	1.53e-03	1.35e-03	3.54e-03	5.28e-03	7.83e-03
143	191	100km	3	med	1.26e-03	1.07e-03	3.26e-03	5.32e-03	7.53e-03
144	191	100km	3	max	3.87e-03	3.44e-03	8.42e-03	1.21e-02	2.06e-02
145	191	100km	4	mean	3.17e-02	2.53e-02	8.52e-02	1.46e-01	2.45e-01
146	191	100km	4	med	2.60e-02	1.96e-02	7.74e-02	1.45e-01	2.33e-01
147	191	100km	4	max	8.10e-02	6.63e-02	1.98e-01	3.27e-01	7.14e-01
148	191	100km	5	mean	1.67e-02	1.35e-02	4.40e-02	7.47e-02	1.24e-01
149	191	100km	5	med	1.37e-02	1.05e-02	4.01e-02	7.42e-02	1.18e-01
150	191	100km	5	max	4.27e-02	3.54e-02	1.02e-01	1.68e-01	3.62e-01
151	191	200km	1	mean	4.63e-05	3.55e-05	1.16e-04	3.39e-04	7.16e-04
152	191	200km	1	med	3.63e-05	2.45e-05	1.09e-04	2.88e-04	8.85e-04
153	191	200km	1	max	1.23e-04	9.25e-05	2.99e-04	9.15e-04	1.78e-03
154	191	200km	2	mean	1.08e-02	7.36e-03	3.41e-02	7.20e-02	1.43e-01
155	191	200km	2	med	8.28e-03	4.88e-03	2.81e-02	7.07e-02	1.43e-01
156	191	200km	2	max	2.81e-02	1.98e-02	8.35e-02	1.58e-01	2.26e-01

157	191	200km	3	mean	4.68e-04	3.92e-04	1.21e-03	1.92e-03	3.26e-03
158	191	200km	3	med	3.67e-04	2.69e-04	1.10e-03	2.01e-03	3.26e-03
159	191	200km	3	max	1.19e-03	1.03e-03	2.84e-03	4.14e-03	7.71e-03
160	191	200km	4	mean	1.13e-02	7.88e-03	3.50e-02	7.28e-02	1.45e-01
161	191	200km	4	med	8.69e-03	5.22e-03	2.90e-02	7.18e-02	1.45e-01
162	191	200km	4	max	2.94e-02	2.12e-02	8.52e-02	1.61e-01	2.29e-01
163	191	200km	5	mean	5.91e-03	4.19e-03	1.81e-02	3.70e-02	7.35e-02
164	191	200km	5	med	4.55e-03	2.78e-03	1.50e-02	3.67e-02	7.35e-02
165	191	200km	5	max	1.54e-02	1.12e-02	4.36e-02	8.16e-02	1.16e-01
166	191	300km	1	mean	1.88e-05	1.41e-05	5.07e-05	1.12e-04	2.51e-04
167	191	300km	1	med	1.44e-05	9.81e-06	4.35e-05	9.47e-05	2.52e-04
168	191	300km	1	max	4.83e-05	3.64e-05	1.22e-04	3.11e-04	9.01e-04
169	191	300km	2	mean	6.07e-03	3.43e-03	2.27e-02	5.29e-02	1.15e-01
170	191	300km	2	med	4.58e-03	2.13e-03	1.81e-02	5.31e-02	1.15e-01
171	191	300km	2	max	1.56e-02	9.07e-03	5.55e-02	1.17e-01	2.00e-01
172	191	300km	3	mean	2.09e-04	1.61e-04	5.90e-04	1.01e-03	1.75e-03
173	191	300km	3	med	1.63e-04	1.05e-04	5.23e-04	1.01e-03	1.75e-03
174	191	300km	3	max	5.20e-04	4.28e-04	1.39e-03	2.45e-03	4.26e-03
175	191	300km	4	mean	6.30e-03	3.64e-03	2.31e-02	5.33e-02	1.17e-01
176	191	300km	4	med	4.76e-03	2.27e-03	1.85e-02	5.36e-02	1.17e-01
177	191	300km	4	max	1.61e-02	9.58e-03	5.65e-02	1.19e-01	2.02e-01
178	191	300km	5	mean	3.26e-03	1.92e-03	1.19e-02	2.70e-02	5.92e-02
179	191	300km	5	med	2.47e-03	1.20e-03	9.44e-03	2.71e-02	5.92e-02
180	191	300km	5	max	8.34e-03	5.05e-03	2.88e-02	6.02e-02	1.03e-01

Appendix 6

Table A-10. Statistics of VALMA dose results (ingestion pathways) with the medium ('CASA2') source term. The columns of the table are:

1. running line number (1-324)
2. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
3. ingestion dose pathway (1 = green vegetables, 2 = grain, 3 = root vegetables, 4 = milk, 5 = meat, 6 = sum (1+2+3+4+5)
4. time frame within which the contaminated fields are used
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	15km	1	1a	mean	9.97e-02	7.50e-04	6.81e-01	1.79e+00	3.81e+00
2	15km	1	1a	med	9.91e-02	7.47e-04	6.75e-01	1.87e+00	5.42e+00
3	15km	1	1a	max	2.13e-01	1.56e-03	1.49e+00	3.65e+00	6.12e+00
4	15km	1	3a	mean	1.01e-01	1.85e-03	6.85e-01	1.80e+00	3.82e+00
5	15km	1	3a	med	1.01e-01	1.84e-03	6.78e-01	1.88e+00	5.44e+00
6	15km	1	3a	max	2.16e-01	3.85e-03	1.50e+00	3.67e+00	6.12e+00
7	15km	1	30a	mean	1.07e-01	7.14e-03	6.94e-01	1.83e+00	3.88e+00
8	15km	1	30a	med	1.07e-01	7.02e-03	6.90e-01	1.90e+00	5.53e+00
9	15km	1	30a	max	2.29e-01	1.49e-02	1.52e+00	3.72e+00	6.24e+00
10	15km	2	1a	mean	6.17e-02	3.62e-04	4.22e-01	1.11e+00	2.36e+00
11	15km	2	1a	med	6.14e-02	3.61e-04	4.18e-01	1.16e+00	3.36e+00
12	15km	2	1a	max	1.32e-01	7.54e-04	9.25e-01	2.26e+00	3.79e+00
13	15km	2	3a	mean	6.24e-02	8.95e-04	4.23e-01	1.12e+00	2.37e+00
14	15km	2	3a	med	6.20e-02	8.89e-04	4.20e-01	1.16e+00	3.37e+00
15	15km	2	3a	max	1.33e-01	1.86e-03	9.28e-01	2.27e+00	3.80e+00
16	15km	2	30a	mean	6.54e-02	3.50e-03	4.28e-01	1.13e+00	2.40e+00
17	15km	2	30a	med	6.50e-02	3.45e-03	4.24e-01	1.17e+00	3.41e+00
18	15km	2	30a	max	1.40e-01	7.31e-03	9.38e-01	2.30e+00	3.85e+00
19	15km	3	1a	mean	4.04e-04	2.64e-04	1.27e-03	2.41e-03	4.75e-03
20	15km	3	1a	med	4.04e-04	2.62e-04	1.35e-03	2.62e-03	6.76e-03
21	15km	3	1a	max	8.68e-04	5.55e-04	2.71e-03	4.97e-03	7.63e-03
22	15km	3	3a	mean	9.52e-04	6.36e-04	2.97e-03	5.46e-03	1.00e-02
23	15km	3	3a	med	9.53e-04	6.33e-04	3.09e-03	5.88e-03	1.43e-02
24	15km	3	3a	max	2.05e-03	1.33e-03	6.30e-03	1.16e-02	1.61e-02
25	15km	3	30a	mean	3.57e-03	2.41e-03	1.09e-02	2.02e-02	3.49e-02
26	15km	3	30a	med	3.58e-03	2.40e-03	1.15e-02	2.15e-02	4.97e-02
27	15km	3	30a	max	7.68e-03	5.04e-03	2.33e-02	4.30e-02	6.11e-02
28	15km	4	1a	mean	1.23e+00	3.62e-02	7.37e+00	1.70e+01	3.55e+01
29	15km	4	1a	med	1.23e+00	3.59e-02	7.52e+00	1.79e+01	5.04e+01
30	15km	4	1a	max	2.60e+00	7.92e-02	1.53e+01	3.40e+01	5.69e+01
31	15km	4	3a	mean	1.27e+00	7.11e-02	7.46e+00	1.72e+01	3.59e+01
32	15km	4	3a	med	1.27e+00	7.01e-02	7.61e+00	1.81e+01	5.11e+01
33	15km	4	3a	max	2.68e+00	1.55e-01	1.55e+01	3.44e+01	5.77e+01
34	15km	4	30a	mean	1.28e+00	8.81e-02	7.49e+00	1.73e+01	3.60e+01
35	15km	4	30a	med	1.29e+00	8.67e-02	7.63e+00	1.82e+01	5.15e+01
36	15km	4	30a	max	2.72e+00	1.93e-01	1.55e+01	3.45e+01	5.80e+01

37	15km	5	1a	mean	5.23e-01	9.08e-02	2.81e+00	6.49e+00	1.35e+01
38	15km	5	1a	med	5.24e-01	8.80e-02	2.88e+00	6.85e+00	1.93e+01
39	15km	5	1a	max	1.11e+00	1.99e-01	5.85e+00	1.30e+01	2.17e+01
40	15km	5	3a	mean	5.94e-01	1.53e-01	2.97e+00	6.86e+00	1.43e+01
41	15km	5	3a	med	5.95e-01	1.48e-01	3.03e+00	7.20e+00	2.03e+01
42	15km	5	3a	max	1.26e+00	3.30e-01	6.15e+00	1.37e+01	2.29e+01
43	15km	5	30a	mean	6.05e-01	1.63e-01	2.99e+00	6.91e+00	1.44e+01
44	15km	5	30a	med	6.06e-01	1.57e-01	3.06e+00	7.25e+00	2.05e+01
45	15km	5	30a	max	1.28e+00	3.50e-01	6.20e+00	1.38e+01	2.31e+01
46	15km	6	1a	mean	1.91e+00	1.29e-01	1.10e+01	2.60e+01	5.52e+01
47	15km	6	1a	med	1.92e+00	1.27e-01	1.12e+01	2.77e+01	7.84e+01
48	15km	6	1a	max	4.05e+00	2.82e-01	2.33e+01	5.29e+01	8.86e+01
49	15km	6	3a	mean	2.03e+00	2.29e-01	1.13e+01	2.65e+01	5.64e+01
50	15km	6	3a	med	2.03e+00	2.25e-01	1.15e+01	2.83e+01	8.02e+01
51	15km	6	3a	max	4.29e+00	5.01e-01	2.38e+01	5.40e+01	9.05e+01
52	15km	6	30a	mean	2.07e+00	2.68e-01	1.14e+01	2.67e+01	5.67e+01
53	15km	6	30a	med	2.07e+00	2.60e-01	1.15e+01	2.86e+01	8.10e+01
54	15km	6	30a	max	4.38e+00	5.86e-01	2.39e+01	5.44e+01	9.13e+01
55	20km	1	1a	mean	7.38e-02	6.27e-04	5.14e-01	1.21e+00	2.01e+00
56	20km	1	1a	med	7.10e-02	6.24e-04	4.95e-01	1.30e+00	2.70e+00
57	20km	1	1a	max	1.61e-01	1.33e-03	1.15e+00	2.41e+00	3.85e+00
58	20km	1	3a	mean	7.49e-02	1.55e-03	5.16e-01	1.22e+00	2.02e+00
59	20km	1	3a	med	7.21e-02	1.53e-03	4.97e-01	1.30e+00	2.71e+00
60	20km	1	3a	max	1.63e-01	3.28e-03	1.16e+00	2.42e+00	3.86e+00
61	20km	1	30a	mean	7.97e-02	5.98e-03	5.24e-01	1.24e+00	2.05e+00
62	20km	1	30a	med	7.69e-02	5.87e-03	5.04e-01	1.32e+00	2.75e+00
63	20km	1	30a	max	1.74e-01	1.27e-02	1.18e+00	2.45e+00	3.92e+00
64	20km	2	1a	mean	4.57e-02	3.02e-04	3.19e-01	7.51e-01	1.25e+00
65	20km	2	1a	med	4.40e-02	3.01e-04	3.07e-01	8.03e-01	1.67e+00
66	20km	2	1a	max	9.95e-02	6.41e-04	7.15e-01	1.49e+00	2.38e+00
67	20km	2	3a	mean	4.62e-02	7.48e-04	3.20e-01	7.55e-01	1.25e+00
68	20km	2	3a	med	4.45e-02	7.42e-04	3.08e-01	8.06e-01	1.68e+00
69	20km	2	3a	max	1.01e-01	1.59e-03	7.17e-01	1.50e+00	2.39e+00
70	20km	2	30a	mean	4.86e-02	2.93e-03	3.23e-01	7.63e-01	1.27e+00
71	20km	2	30a	med	4.68e-02	2.89e-03	3.11e-01	8.14e-01	1.70e+00
72	20km	2	30a	max	1.06e-01	6.22e-03	7.25e-01	1.51e+00	2.42e+00
73	20km	3	1a	mean	3.12e-04	2.21e-04	9.01e-04	1.55e-03	2.51e-03
74	20km	3	1a	med	3.07e-04	2.18e-04	9.21e-04	1.67e-03	3.37e-03
75	20km	3	1a	max	6.78e-04	4.81e-04	1.93e-03	3.26e-03	4.79e-03
76	20km	3	3a	mean	7.36e-04	5.33e-04	2.07e-03	3.55e-03	5.30e-03
77	20km	3	3a	med	7.27e-04	5.28e-04	2.16e-03	3.83e-03	7.12e-03
78	20km	3	3a	max	1.60e-03	1.16e-03	4.42e-03	7.51e-03	1.01e-02
79	20km	3	30a	mean	2.77e-03	2.03e-03	7.69e-03	1.33e-02	1.97e-02
80	20km	3	30a	med	2.73e-03	2.00e-03	8.07e-03	1.40e-02	2.47e-02
81	20km	3	30a	max	6.01e-03	4.40e-03	1.65e-02	2.79e-02	3.62e-02
82	20km	4	1a	mean	9.30e-01	3.05e-02	5.62e+00	1.13e+01	1.87e+01
83	20km	4	1a	med	9.03e-01	2.98e-02	5.47e+00	1.21e+01	2.51e+01
84	20km	4	1a	max	2.00e+00	6.57e-02	1.20e+01	2.24e+01	3.58e+01
85	20km	4	3a	mean	9.59e-01	5.98e-02	5.69e+00	1.14e+01	1.90e+01
86	20km	4	3a	med	9.32e-01	5.82e-02	5.53e+00	1.22e+01	2.54e+01
87	20km	4	3a	max	2.07e+00	1.29e-01	1.22e+01	2.27e+01	3.62e+01
88	20km	4	30a	mean	9.73e-01	7.41e-02	5.71e+00	1.15e+01	1.90e+01
89	20km	4	30a	med	9.45e-01	7.19e-02	5.55e+00	1.22e+01	2.56e+01
90	20km	4	30a	max	2.10e+00	1.60e-01	1.22e+01	2.28e+01	3.64e+01
91	20km	5	1a	mean	3.98e-01	7.60e-02	2.14e+00	4.31e+00	7.14e+00
92	20km	5	1a	med	3.87e-01	7.31e-02	2.09e+00	4.59e+00	9.60e+00
93	20km	5	1a	max	8.58e-01	1.65e-01	4.58e+00	8.55e+00	1.37e+01
94	20km	5	3a	mean	4.52e-01	1.28e-01	2.26e+00	4.54e+00	7.54e+00
95	20km	5	3a	med	4.41e-01	1.23e-01	2.20e+00	4.86e+00	1.01e+01
96	20km	5	3a	max	9.76e-01	2.77e-01	4.83e+00	9.05e+00	1.44e+01
97	20km	5	30a	mean	4.61e-01	1.36e-01	2.28e+00	4.58e+00	7.60e+00

98	20km	5	30a	med	4.49e-01	1.31e-01	2.22e+00	4.90e+00	1.02e+01
99	20km	5	30a	max	9.95e-01	2.93e-01	4.87e+00	9.10e+00	1.45e+01
100	20km	6	1a	mean	1.45e+00	1.08e-01	8.50e+00	1.76e+01	2.92e+01
101	20km	6	1a	med	1.40e+00	1.05e-01	8.24e+00	1.88e+01	3.91e+01
102	20km	6	1a	max	3.12e+00	2.34e-01	1.81e+01	3.49e+01	5.57e+01
103	20km	6	3a	mean	1.53e+00	1.93e-01	8.68e+00	1.79e+01	2.98e+01
104	20km	6	3a	med	1.49e+00	1.86e-01	8.43e+00	1.92e+01	3.99e+01
105	20km	6	3a	max	3.31e+00	4.16e-01	1.84e+01	3.57e+01	5.69e+01
106	20km	6	30a	mean	1.56e+00	2.25e-01	8.74e+00	1.81e+01	3.00e+01
107	20km	6	30a	med	1.52e+00	2.17e-01	8.48e+00	1.93e+01	4.02e+01
108	20km	6	30a	max	3.38e+00	4.86e-01	1.86e+01	3.59e+01	5.72e+01
109	50km	1	1a	mean	2.31e-02	2.64e-04	1.63e-01	3.37e-01	5.49e-01
110	50km	1	1a	med	1.97e-02	2.37e-04	1.43e-01	3.22e-01	5.76e-01
111	50km	1	1a	max	5.65e-02	6.30e-04	3.94e-01	7.20e-01	1.33e+00
112	50km	1	3a	mean	2.35e-02	6.51e-04	1.64e-01	3.38e-01	5.51e-01
113	50km	1	3a	med	2.01e-02	5.81e-04	1.43e-01	3.23e-01	5.77e-01
114	50km	1	3a	max	5.74e-02	1.56e-03	3.95e-01	7.26e-01	1.33e+00
115	50km	1	30a	mean	2.53e-02	2.51e-03	1.67e-01	3.43e-01	5.59e-01
116	50km	1	30a	med	2.17e-02	2.21e-03	1.45e-01	3.28e-01	5.87e-01
117	50km	1	30a	max	6.17e-02	6.00e-03	4.01e-01	7.32e-01	1.36e+00
118	50km	2	1a	mean	1.43e-02	1.27e-04	1.02e-01	2.09e-01	3.40e-01
119	50km	2	1a	med	1.22e-02	1.14e-04	8.85e-02	2.00e-01	3.57e-01
120	50km	2	1a	max	3.50e-02	3.05e-04	2.44e-01	4.47e-01	8.24e-01
121	50km	2	3a	mean	1.45e-02	3.15e-04	1.02e-01	2.10e-01	3.41e-01
122	50km	2	3a	med	1.24e-02	2.81e-04	8.88e-02	2.00e-01	3.57e-01
123	50km	2	3a	max	3.54e-02	7.54e-04	2.45e-01	4.48e-01	8.27e-01
124	50km	2	30a	mean	1.54e-02	1.23e-03	1.03e-01	2.12e-01	3.45e-01
125	50km	2	30a	med	1.32e-02	1.09e-03	8.98e-02	2.03e-01	3.62e-01
126	50km	2	30a	max	3.75e-02	2.95e-03	2.48e-01	4.53e-01	8.36e-01
127	50km	3	1a	mean	1.15e-04	9.27e-05	2.83e-04	4.35e-04	6.84e-04
128	50km	3	1a	med	1.03e-04	8.19e-05	2.76e-04	4.46e-04	7.17e-04
129	50km	3	1a	max	2.73e-04	2.28e-04	6.20e-04	9.47e-04	1.65e-03
130	50km	3	3a	mean	2.75e-04	2.24e-04	6.62e-04	9.81e-04	1.45e-03
131	50km	3	3a	med	2.46e-04	1.97e-04	6.57e-04	1.04e-03	1.58e-03
132	50km	3	3a	max	6.49e-04	5.47e-04	1.45e-03	2.13e-03	3.50e-03
133	50km	3	30a	mean	1.04e-03	8.49e-04	2.49e-03	3.68e-03	5.45e-03
134	50km	3	30a	med	9.30e-04	7.49e-04	2.49e-03	4.01e-03	6.08e-03
135	50km	3	30a	max	2.45e-03	2.06e-03	5.47e-03	7.76e-03	1.22e-02
136	50km	4	1a	mean	3.14e-01	1.28e-02	1.79e+00	3.25e+00	5.11e+00
137	50km	4	1a	med	2.70e-01	1.13e-02	1.60e+00	3.22e+00	5.80e+00
138	50km	4	1a	max	7.63e-01	2.98e-02	4.27e+00	7.34e+00	1.24e+01
139	50km	4	3a	mean	3.25e-01	2.50e-02	1.81e+00	3.28e+00	5.17e+00
140	50km	4	3a	med	2.80e-01	2.20e-02	1.62e+00	3.26e+00	5.86e+00
141	50km	4	3a	max	7.89e-01	5.84e-02	4.31e+00	7.41e+00	1.25e+01
142	50km	4	30a	mean	3.30e-01	3.09e-02	1.82e+00	3.30e+00	5.19e+00
143	50km	4	30a	med	2.84e-01	2.71e-02	1.63e+00	3.27e+00	5.89e+00
144	50km	4	30a	max	8.01e-01	7.23e-02	4.34e+00	7.45e+00	1.26e+01
145	50km	5	1a	mean	1.37e-01	3.16e-02	6.84e-01	1.24e+00	1.95e+00
146	50km	5	1a	med	1.18e-01	2.73e-02	6.13e-01	1.23e+00	2.21e+00
147	50km	5	1a	max	3.31e-01	7.40e-02	1.63e+00	2.80e+00	4.72e+00
148	50km	5	3a	mean	1.57e-01	5.33e-02	7.22e-01	1.31e+00	2.06e+00
149	50km	5	3a	med	1.37e-01	4.56e-02	6.45e-01	1.29e+00	2.34e+00
150	50km	5	3a	max	3.79e-01	1.26e-01	1.71e+00	2.96e+00	4.98e+00
151	50km	5	30a	mean	1.60e-01	5.67e-02	7.28e-01	1.32e+00	2.07e+00
152	50km	5	30a	med	1.40e-01	4.85e-02	6.50e-01	1.31e+00	2.35e+00
153	50km	5	30a	max	3.86e-01	1.34e-01	1.73e+00	2.97e+00	5.00e+00
154	50km	6	1a	mean	4.88e-01	4.51e-02	2.70e+00	5.02e+00	7.95e+00
155	50km	6	1a	med	4.20e-01	3.97e-02	2.40e+00	4.90e+00	8.32e+00
156	50km	6	1a	max	1.19e+00	1.06e-01	6.41e+00	1.11e+01	1.92e+01
157	50km	6	3a	mean	5.20e-01	8.02e-02	2.76e+00	5.14e+00	8.12e+00
158	50km	6	3a	med	4.49e-01	6.96e-02	2.45e+00	5.01e+00	8.49e+00

159	50km	6	3a	max	1.26e+00	1.87e-01	6.54e+00	1.13e+01	1.96e+01
160	50km	6	30a	mean	5.32e-01	9.36e-02	2.78e+00	5.17e+00	8.17e+00
161	50km	6	30a	med	4.60e-01	8.10e-02	2.46e+00	5.04e+00	8.56e+00
162	50km	6	30a	max	1.29e+00	2.18e-01	6.60e+00	1.14e+01	1.98e+01
163	100km	1	1a	mean	8.52e-03	1.07e-04	5.61e-02	1.49e-01	3.36e-01
164	100km	1	1a	med	6.96e-03	8.58e-05	4.70e-02	1.36e-01	3.41e-01
165	100km	1	1a	max	2.22e-02	2.71e-04	1.48e-01	3.52e-01	7.20e-01
166	100km	1	3a	mean	8.68e-03	2.62e-04	5.64e-02	1.50e-01	3.37e-01
167	100km	1	3a	med	7.10e-03	2.11e-04	4.73e-02	1.36e-01	3.43e-01
168	100km	1	3a	max	2.26e-02	6.66e-04	1.49e-01	3.53e-01	7.26e-01
169	100km	1	30a	mean	9.42e-03	1.00e-03	5.72e-02	1.52e-01	3.42e-01
170	100km	1	30a	med	7.70e-03	7.98e-04	4.79e-02	1.39e-01	3.48e-01
171	100km	1	30a	max	2.45e-02	2.56e-03	1.51e-01	3.58e-01	7.38e-01
172	100km	2	1a	mean	5.27e-03	5.14e-05	3.49e-02	9.28e-02	2.09e-01
173	100km	2	1a	med	4.31e-03	4.14e-05	2.92e-02	8.42e-02	2.12e-01
174	100km	2	1a	max	1.38e-02	1.31e-04	9.19e-02	2.18e-01	4.48e-01
175	100km	2	3a	mean	5.35e-03	1.27e-04	3.50e-02	9.31e-02	2.09e-01
176	100km	2	3a	med	4.38e-03	1.02e-04	2.93e-02	8.46e-02	2.13e-01
177	100km	2	3a	max	1.40e-02	3.23e-04	9.22e-02	2.19e-01	4.50e-01
178	100km	2	30a	mean	5.71e-03	4.92e-04	3.53e-02	9.41e-02	2.11e-01
179	100km	2	30a	med	4.67e-03	3.92e-04	2.96e-02	8.54e-02	2.15e-01
180	100km	2	30a	max	1.49e-02	1.26e-03	9.32e-02	2.21e-01	4.55e-01
181	100km	3	1a	mean	4.67e-05	3.66e-05	1.28e-04	2.29e-04	4.19e-04
182	100km	3	1a	med	3.83e-05	2.82e-05	1.19e-04	2.28e-04	4.24e-04
183	100km	3	1a	max	1.20e-04	9.53e-05	2.97e-04	5.06e-04	1.04e-03
184	100km	3	3a	mean	1.12e-04	8.76e-05	3.05e-04	5.22e-04	8.85e-04
185	100km	3	3a	med	9.14e-05	6.79e-05	2.81e-04	5.23e-04	8.99e-04
186	100km	3	3a	max	2.86e-04	2.30e-04	7.11e-04	1.20e-03	2.55e-03
187	100km	3	30a	mean	4.22e-04	3.31e-04	1.16e-03	1.99e-03	3.40e-03
188	100km	3	30a	med	3.46e-04	2.57e-04	1.05e-03	2.00e-03	3.21e-03
189	100km	3	30a	max	1.08e-03	8.71e-04	2.68e-03	4.54e-03	9.84e-03
190	100km	4	1a	mean	1.16e-01	5.14e-03	6.29e-01	1.57e+00	3.62e+00
191	100km	4	1a	med	9.43e-02	4.12e-03	5.47e-01	1.38e+00	3.17e+00
192	100km	4	1a	max	3.03e-01	1.31e-02	1.64e+00	3.72e+00	6.72e+00
193	100km	4	3a	mean	1.20e-01	1.00e-02	6.36e-01	1.59e+00	3.67e+00
194	100km	4	3a	med	9.80e-02	7.98e-03	5.53e-01	1.39e+00	3.21e+00
195	100km	4	3a	max	3.15e-01	2.56e-02	1.66e+00	3.76e+00	6.79e+00
196	100km	4	30a	mean	1.22e-01	1.24e-02	6.39e-01	1.59e+00	3.68e+00
197	100km	4	30a	med	9.97e-02	9.85e-03	5.57e-01	1.39e+00	3.22e+00
198	100km	4	30a	max	3.20e-01	3.16e-02	1.67e+00	3.76e+00	6.83e+00
199	100km	5	1a	mean	5.13e-02	1.27e-02	2.40e-01	6.00e-01	1.39e+00
200	100km	5	1a	med	4.19e-02	9.81e-03	2.09e-01	5.25e-01	1.21e+00
201	100km	5	1a	max	1.34e-01	3.22e-02	6.30e-01	1.42e+00	2.56e+00
202	100km	5	3a	mean	5.96e-02	2.12e-02	2.54e-01	6.33e-01	1.46e+00
203	100km	5	3a	med	4.87e-02	1.60e-02	2.21e-01	5.55e-01	1.28e+00
204	100km	5	3a	max	1.55e-01	5.40e-02	6.65e-01	1.50e+00	2.71e+00
205	100km	5	30a	mean	6.08e-02	2.25e-02	2.56e-01	6.37e-01	1.47e+00
206	100km	5	30a	med	4.97e-02	1.70e-02	2.23e-01	5.60e-01	1.29e+00
207	100km	5	30a	max	1.58e-01	5.75e-02	6.70e-01	1.51e+00	2.73e+00
208	100km	6	1a	mean	1.81e-01	1.81e-02	9.36e-01	2.40e+00	5.01e+00
209	100km	6	1a	med	1.48e-01	1.44e-02	8.18e-01	2.08e+00	4.94e+00
210	100km	6	1a	max	4.73e-01	4.62e-02	2.47e+00	5.54e+00	1.04e+01
211	100km	6	3a	mean	1.94e-01	3.22e-02	9.56e-01	2.45e+00	5.13e+00
212	100km	6	3a	med	1.58e-01	2.53e-02	8.37e-01	2.13e+00	5.04e+00
213	100km	6	3a	max	5.07e-01	8.18e-02	2.52e+00	5.67e+00	1.07e+01
214	100km	6	30a	mean	1.99e-01	3.75e-02	9.63e-01	2.47e+00	5.16e+00
215	100km	6	30a	med	1.62e-01	2.94e-02	8.41e-01	2.14e+00	5.08e+00
216	100km	6	30a	max	5.19e-01	9.53e-02	2.54e+00	5.69e+00	1.08e+01
217	200km	1	1a	mean	2.67e-03	3.56e-05	1.65e-02	5.55e-02	1.56e-01
218	200km	1	1a	med	2.12e-03	2.53e-05	1.41e-02	4.63e-02	1.76e-01
219	200km	1	1a	max	6.88e-03	9.42e-05	4.25e-02	1.34e-01	3.36e-01

220	200km	1	3a	mean	2.73e-03	8.75e-05	1.65e-02	5.56e-02	1.56e-01
221	200km	1	3a	med	2.16e-03	6.12e-05	1.41e-02	4.64e-02	1.76e-01
222	200km	1	3a	max	7.03e-03	2.31e-04	4.27e-02	1.34e-01	3.37e-01
223	200km	1	30a	mean	3.00e-03	3.34e-04	1.68e-02	5.65e-02	1.58e-01
224	200km	1	30a	med	2.37e-03	2.29e-04	1.43e-02	4.71e-02	1.79e-01
225	200km	1	30a	max	7.73e-03	8.88e-04	4.33e-02	1.36e-01	3.43e-01
226	200km	2	1a	mean	1.66e-03	1.72e-05	1.02e-02	3.43e-02	9.64e-02
227	200km	2	1a	med	1.31e-03	1.22e-05	8.73e-03	2.87e-02	1.09e-01
228	200km	2	1a	max	4.26e-03	4.55e-05	2.64e-02	8.32e-02	2.09e-01
229	200km	2	3a	mean	1.68e-03	4.23e-05	1.03e-02	3.46e-02	9.68e-02
230	200km	2	3a	med	1.34e-03	2.98e-05	8.79e-03	2.88e-02	1.10e-01
231	200km	2	3a	max	4.34e-03	1.12e-04	2.65e-02	8.35e-02	2.09e-01
232	200km	2	30a	mean	1.81e-03	1.64e-04	1.04e-02	3.49e-02	9.79e-02
233	200km	2	30a	med	1.44e-03	1.13e-04	8.87e-03	2.91e-02	1.11e-01
234	200km	2	30a	max	4.68e-03	4.36e-04	2.68e-02	8.44e-02	2.12e-01
235	200km	3	1a	mean	1.67e-05	1.16e-05	5.30e-05	1.13e-04	2.10e-04
236	200km	3	1a	med	1.29e-05	7.58e-06	4.37e-05	1.11e-04	2.19e-04
237	200km	3	1a	max	4.36e-05	3.16e-05	1.27e-04	2.51e-04	4.18e-04
238	200km	3	3a	mean	4.02e-05	2.78e-05	1.26e-04	2.66e-04	5.19e-04
239	200km	3	3a	med	3.08e-05	1.82e-05	1.04e-04	2.63e-04	5.19e-04
240	200km	3	3a	max	1.05e-04	7.47e-05	3.06e-04	5.86e-04	8.85e-04
241	200km	3	30a	mean	1.52e-04	1.05e-04	4.79e-04	1.02e-03	2.00e-03
242	200km	3	30a	med	1.17e-04	6.91e-05	3.95e-04	1.00e-03	2.00e-03
243	200km	3	30a	max	3.97e-04	2.82e-04	1.17e-03	2.23e-03	3.16e-03
244	200km	4	1a	mean	3.62e-02	1.78e-03	1.99e-01	5.40e-01	1.55e+00
245	200km	4	1a	med	2.84e-02	1.27e-03	1.62e-01	4.74e-01	1.66e+00
246	200km	4	1a	max	9.65e-02	4.67e-03	5.26e-01	1.35e+00	3.12e+00
247	200km	4	3a	mean	3.78e-02	3.46e-03	2.02e-01	5.46e-01	1.57e+00
248	200km	4	3a	med	2.96e-02	2.44e-03	1.64e-01	4.80e-01	1.68e+00
249	200km	4	3a	max	1.01e-01	9.09e-03	5.29e-01	1.37e+00	3.16e+00
250	200km	4	30a	mean	3.86e-02	4.27e-03	2.02e-01	5.48e-01	1.57e+00
251	200km	4	30a	med	3.02e-02	3.01e-03	1.65e-01	4.83e-01	1.69e+00
252	200km	4	30a	max	1.03e-01	1.12e-02	5.33e-01	1.37e+00	3.17e+00
253	200km	5	1a	mean	1.66e-02	4.29e-03	7.65e-02	2.06e-01	5.93e-01
254	200km	5	1a	med	1.29e-02	2.97e-03	6.22e-02	1.82e-01	6.35e-01
255	200km	5	1a	max	4.40e-02	1.13e-02	2.00e-01	5.20e-01	1.20e+00
256	200km	5	3a	mean	1.95e-02	7.14e-03	8.09e-02	2.17e-01	6.26e-01
257	200km	5	3a	med	1.52e-02	4.83e-03	6.65e-02	1.92e-01	6.70e-01
258	200km	5	3a	max	5.17e-02	1.88e-02	2.12e-01	5.45e-01	1.26e+00
259	200km	5	30a	mean	2.00e-02	7.57e-03	8.17e-02	2.19e-01	6.30e-01
260	200km	5	30a	med	1.56e-02	5.11e-03	6.73e-02	1.93e-01	6.75e-01
261	200km	5	30a	max	5.29e-02	2.00e-02	2.14e-01	5.50e-01	1.27e+00
262	200km	6	1a	mean	5.72e-02	6.24e-03	2.97e-01	8.14e-01	2.25e+00
263	200km	6	1a	med	4.47e-02	4.40e-03	2.44e-01	6.87e-01	2.55e+00
264	200km	6	1a	max	1.52e-01	1.64e-02	7.75e-01	2.00e+00	4.86e+00
265	200km	6	3a	mean	6.18e-02	1.10e-02	3.03e-01	8.32e-01	2.30e+00
266	200km	6	3a	med	4.83e-02	7.66e-03	2.49e-01	7.00e-01	2.60e+00
267	200km	6	3a	max	1.64e-01	2.89e-02	7.93e-01	2.05e+00	4.96e+00
268	200km	6	30a	mean	6.36e-02	1.28e-02	3.05e-01	8.37e-01	2.31e+00
269	200km	6	30a	med	4.97e-02	8.92e-03	2.51e-01	7.06e-01	2.62e+00
270	200km	6	30a	max	1.68e-01	3.36e-02	8.00e-01	2.06e+00	5.00e+00
271	300km	1	1a	mean	1.20e-03	1.72e-05	7.82e-03	2.73e-02	7.34e-02
272	300km	1	1a	med	9.31e-04	1.13e-05	5.86e-03	2.21e-02	7.25e-02
273	300km	1	1a	max	3.03e-03	4.50e-05	1.96e-02	6.84e-02	1.88e-01
274	300km	1	3a	mean	1.23e-03	4.19e-05	7.86e-03	2.74e-02	7.37e-02
275	300km	1	3a	med	9.55e-04	2.75e-05	5.88e-03	2.21e-02	7.28e-02
276	300km	1	3a	max	3.11e-03	1.10e-04	1.96e-02	6.84e-02	1.88e-01
277	300km	1	30a	mean	1.38e-03	1.58e-04	7.98e-03	2.78e-02	7.48e-02
278	300km	1	30a	med	1.07e-03	1.03e-04	5.96e-03	2.25e-02	7.41e-02
279	300km	1	30a	max	3.50e-03	4.12e-04	1.99e-02	6.96e-02	1.91e-01
280	300km	2	1a	mean	7.44e-04	8.29e-06	4.88e-03	1.70e-02	4.57e-02

281	300km	2	1a	med	5.77e-04	5.48e-06	3.64e-03	1.37e-02	4.50e-02
282	300km	2	1a	max	1.88e-03	2.18e-05	1.22e-02	4.24e-02	1.17e-01
283	300km	2	3a	mean	7.60e-04	2.03e-05	4.89e-03	1.71e-02	4.58e-02
284	300km	2	3a	med	5.89e-04	1.34e-05	3.65e-03	1.37e-02	4.52e-02
285	300km	2	3a	max	1.92e-03	5.34e-05	1.22e-02	4.26e-02	1.17e-01
286	300km	2	30a	mean	8.33e-04	7.79e-05	4.94e-03	1.73e-02	4.62e-02
287	300km	2	30a	med	6.44e-04	5.08e-05	3.69e-03	1.39e-02	4.57e-02
288	300km	2	30a	max	2.11e-03	2.03e-04	1.23e-02	4.30e-02	1.18e-01
289	300km	3	1a	mean	9.34e-06	5.36e-06	3.41e-05	7.81e-05	1.69e-04
290	300km	3	1a	med	7.06e-06	3.33e-06	2.71e-05	7.85e-05	1.69e-04
291	300km	3	1a	max	2.40e-05	1.43e-05	8.45e-05	1.74e-04	2.95e-04
292	300km	3	3a	mean	2.25e-05	1.29e-05	8.32e-05	1.92e-04	4.17e-04
293	300km	3	3a	med	1.70e-05	8.02e-06	6.61e-05	1.92e-04	4.17e-04
294	300km	3	3a	max	5.79e-05	3.42e-05	2.04e-04	4.28e-04	7.28e-04
295	300km	3	30a	mean	8.58e-05	4.88e-05	3.17e-04	7.37e-04	1.61e-03
296	300km	3	30a	med	6.48e-05	3.04e-05	2.53e-04	7.41e-04	1.61e-03
297	300km	3	30a	max	2.20e-04	1.29e-04	7.82e-04	1.65e-03	2.81e-03
298	300km	4	1a	mean	1.82e-02	8.49e-04	1.03e-01	3.51e-01	7.43e-01
299	300km	4	1a	med	1.36e-02	5.73e-04	7.58e-02	2.90e-01	6.74e-01
300	300km	4	1a	max	4.81e-02	2.23e-03	2.55e-01	9.23e-01	1.96e+00
301	300km	4	3a	mean	1.91e-02	1.63e-03	1.05e-01	3.55e-01	7.51e-01
302	300km	4	3a	med	1.43e-02	1.10e-03	7.67e-02	2.93e-01	6.82e-01
303	300km	4	3a	max	5.05e-02	4.27e-03	2.57e-01	9.31e-01	1.98e+00
304	300km	4	30a	mean	1.96e-02	2.01e-03	1.05e-01	3.56e-01	7.54e-01
305	300km	4	30a	med	1.46e-02	1.34e-03	7.70e-02	2.95e-01	6.86e-01
306	300km	4	30a	max	5.16e-02	5.26e-03	2.58e-01	9.38e-01	1.99e+00
307	300km	5	1a	mean	8.57e-03	1.99e-03	3.98e-02	1.34e-01	2.86e-01
308	300km	5	1a	med	6.41e-03	1.31e-03	3.00e-02	1.11e-01	2.58e-01
309	300km	5	1a	max	2.25e-02	5.20e-03	9.80e-02	3.57e-01	7.50e-01
310	300km	5	3a	mean	1.02e-02	3.27e-03	4.35e-02	1.42e-01	3.02e-01
311	300km	5	3a	med	7.66e-03	2.14e-03	3.39e-02	1.18e-01	2.72e-01
312	300km	5	3a	max	2.68e-02	8.55e-03	1.05e-01	3.77e-01	7.90e-01
313	300km	5	30a	mean	1.05e-02	3.46e-03	4.40e-02	1.43e-01	3.04e-01
314	300km	5	30a	med	7.86e-03	2.26e-03	3.45e-02	1.19e-01	2.74e-01
315	300km	5	30a	max	2.74e-02	9.05e-03	1.06e-01	3.80e-01	8.00e-01
316	300km	6	1a	mean	2.88e-02	2.94e-03	1.57e-01	5.07e-01	1.06e+00
317	300km	6	1a	med	2.15e-02	1.96e-03	1.15e-01	4.15e-01	1.05e+00
318	300km	6	1a	max	7.56e-02	7.68e-03	3.80e-01	1.34e+00	2.71e+00
319	300km	6	3a	mean	3.14e-02	5.13e-03	1.61e-01	5.18e-01	1.08e+00
320	300km	6	3a	med	2.35e-02	3.39e-03	1.17e-01	4.24e-01	1.07e+00
321	300km	6	3a	max	8.23e-02	1.34e-02	3.89e-01	1.37e+00	2.77e+00
322	300km	6	30a	mean	3.24e-02	5.95e-03	1.62e-01	5.23e-01	1.09e+00
323	300km	6	30a	med	2.42e-02	3.93e-03	1.18e-01	4.27e-01	1.08e+00
324	300km	6	30a	max	8.48e-02	1.56e-02	3.91e-01	1.38e+00	2.80e+00

Appendix 7

Table A-11. Statistics of VALMA dose results (cloud, fallout and inhalation) with the large ('CASA3') source term.

The columns of the table are:

1. running line number (1-180)
2. index of time point (190 = 1 week, 191 = one year)
3. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
4. dose pathway (1 = cloud, 2 = fallout, 3 = inhalation, 4 = sum (1+2+3), 5 = weighted sum (with fallout shielding factor 0.5)
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	190	15km	1	mean	1.48e-02	8.18e-03	5.41e-02	1.19e-01	2.14e-01
2	190	15km	1	med	1.47e-02	8.05e-03	5.60e-02	1.23e-01	2.37e-01
3	190	15km	1	max	3.26e-02	1.71e-02	1.22e-01	2.54e-01	3.66e-01
4	190	15km	2	mean	1.85e-01	1.26e-01	5.66e-01	1.06e+00	1.78e+00
5	190	15km	2	med	1.85e-01	1.25e-01	5.93e-01	1.13e+00	2.52e+00
6	190	15km	2	max	3.99e-01	2.63e-01	1.21e+00	2.25e+00	3.21e+00
7	190	15km	3	mean	1.94e-01	1.17e-01	6.58e-01	1.37e+00	2.53e+00
8	190	15km	3	med	1.94e-01	1.14e-01	6.89e-01	1.45e+00	2.78e+00
9	190	15km	3	max	4.20e-01	2.42e-01	1.44e+00	2.88e+00	4.36e+00
10	190	15km	4	mean	3.93e-01	2.56e-01	1.27e+00	2.51e+00	4.52e+00
11	190	15km	4	med	3.94e-01	2.56e-01	1.34e+00	2.63e+00	4.99e+00
12	190	15km	4	max	8.50e-01	5.34e-01	2.75e+00	5.28e+00	7.83e+00
13	190	15km	5	mean	3.01e-01	1.92e-01	9.84e-01	1.98e+00	3.63e+00
14	190	15km	5	med	3.01e-01	1.90e-01	1.04e+00	2.10e+00	4.00e+00
15	190	15km	5	max	6.51e-01	3.97e-01	2.15e+00	4.20e+00	6.28e+00
16	190	20km	1	mean	1.11e-02	6.58e-03	3.85e-02	8.07e-02	1.17e-01
17	190	20km	1	med	1.08e-02	6.43e-03	3.94e-02	8.05e-02	1.30e-01
18	190	20km	1	max	2.47e-02	1.40e-02	8.82e-02	1.79e-01	2.50e-01
19	190	20km	2	mean	1.43e-01	1.05e-01	3.97e-01	6.89e-01	1.06e+00
20	190	20km	2	med	1.41e-01	1.03e-01	4.13e-01	7.22e-01	1.26e+00
21	190	20km	2	max	3.11e-01	2.26e-01	8.52e-01	1.47e+00	1.93e+00
22	190	20km	3	mean	1.42e-01	9.31e-02	4.41e-01	8.70e-01	1.30e+00
23	190	20km	3	med	1.39e-01	9.19e-02	4.54e-01	9.22e-01	1.58e+00
24	190	20km	3	max	3.12e-01	2.00e-01	9.71e-01	1.88e+00	2.64e+00
25	190	20km	4	mean	2.96e-01	2.10e-01	8.60e-01	1.63e+00	2.48e+00
26	190	20km	4	med	2.91e-01	2.10e-01	8.95e-01	1.69e+00	2.93e+00
27	190	20km	4	max	6.47e-01	4.54e-01	1.90e+00	3.47e+00	4.82e+00
28	190	20km	5	mean	2.24e-01	1.55e-01	6.67e-01	1.29e+00	1.95e+00
29	190	20km	5	med	2.21e-01	1.55e-01	6.92e-01	1.33e+00	2.33e+00
30	190	20km	5	max	4.92e-01	3.33e-01	1.48e+00	2.76e+00	3.86e+00
31	190	50km	1	mean	3.37e-03	2.50e-03	9.20e-03	1.97e-02	2.98e-02
32	190	50km	1	med	2.98e-03	2.23e-03	8.67e-03	1.85e-02	2.85e-02
33	190	50km	1	max	8.15e-03	5.88e-03	2.32e-02	4.51e-02	6.99e-02
34	190	50km	2	mean	5.19e-02	4.27e-02	1.27e-01	1.88e-01	2.86e-01

35	190	50km	2	med	4.66e-02	3.72e-02	1.27e-01	2.03e-01	3.26e-01
36	190	50km	2	max	1.22e-01	1.03e-01	2.75e-01	3.95e-01	5.74e-01
37	190	50km	3	mean	4.27e-02	3.63e-02	1.00e-01	1.60e-01	2.46e-01
38	190	50km	3	med	3.81e-02	3.26e-02	9.52e-02	1.67e-01	3.21e-01
39	190	50km	3	max	1.01e-01	8.62e-02	2.25e-01	3.44e-01	4.82e-01
40	190	50km	4	mean	9.79e-02	8.63e-02	2.14e-01	3.36e-01	4.79e-01
41	190	50km	4	med	8.79e-02	7.69e-02	2.10e-01	3.49e-01	6.72e-01
42	190	50km	4	max	2.31e-01	2.07e-01	4.79e-01	7.03e-01	1.01e+00
43	190	50km	5	mean	7.20e-02	6.41e-02	1.58e-01	2.56e-01	3.72e-01
44	190	50km	5	med	6.45e-02	5.72e-02	1.53e-01	2.62e-01	5.09e-01
45	190	50km	5	max	1.70e-01	1.51e-01	3.56e-01	5.37e-01	7.52e-01
46	190	100km	1	mean	1.11e-03	8.82e-04	2.82e-03	7.07e-03	1.36e-02
47	190	100km	1	med	9.17e-04	6.94e-04	2.57e-03	6.57e-03	1.42e-02
48	190	100km	1	max	2.89e-03	2.26e-03	7.17e-03	1.64e-02	3.00e-02
49	190	100km	2	mean	2.03e-02	1.58e-02	5.72e-02	9.92e-02	1.63e-01
50	190	100km	2	med	1.67e-02	1.22e-02	5.14e-02	9.87e-02	1.61e-01
51	190	100km	2	max	5.18e-02	4.14e-02	1.32e-01	2.19e-01	4.74e-01
52	190	100km	3	mean	1.53e-02	1.35e-02	3.53e-02	5.28e-02	7.83e-02
53	190	100km	3	med	1.26e-02	1.06e-02	3.26e-02	5.32e-02	7.52e-02
54	190	100km	3	max	3.87e-02	3.44e-02	8.41e-02	1.21e-01	2.05e-01
55	190	100km	4	mean	3.67e-02	3.22e-02	8.65e-02	1.30e-01	1.80e-01
56	190	100km	4	med	3.02e-02	2.53e-02	8.10e-02	1.30e-01	1.89e-01
57	190	100km	4	max	9.32e-02	8.36e-02	1.99e-01	2.93e-01	5.61e-01
58	190	100km	5	mean	2.65e-02	2.38e-02	6.05e-02	8.78e-02	1.21e-01
59	190	100km	5	med	2.19e-02	1.87e-02	5.61e-02	8.92e-02	1.24e-01
60	190	100km	5	max	6.73e-02	6.19e-02	1.40e-01	1.97e-01	3.24e-01
61	190	200km	1	mean	2.98e-04	2.37e-04	7.32e-04	1.82e-03	3.75e-03
62	190	200km	1	med	2.35e-04	1.64e-04	6.82e-04	1.60e-03	4.64e-03
63	190	200km	1	max	7.79e-04	6.21e-04	1.83e-03	4.86e-03	9.25e-03
64	190	200km	2	mean	6.91e-03	4.64e-03	2.24e-02	4.77e-02	9.73e-02
65	190	200km	2	med	5.32e-03	3.06e-03	1.84e-02	4.71e-02	9.73e-02
66	190	200km	2	max	1.79e-02	1.25e-02	5.48e-02	1.03e-01	1.44e-01
67	190	200km	3	mean	4.67e-03	3.92e-03	1.21e-02	1.92e-02	3.26e-02
68	190	200km	3	med	3.67e-03	2.68e-03	1.10e-02	2.01e-02	3.26e-02
69	190	200km	3	max	1.19e-02	1.03e-02	2.84e-02	4.14e-02	7.71e-02
70	190	200km	4	mean	1.19e-02	9.29e-03	3.24e-02	6.01e-02	1.15e-01
71	190	200km	4	med	9.26e-03	6.29e-03	2.83e-02	6.05e-02	1.15e-01
72	190	200km	4	max	3.04e-02	2.47e-02	7.58e-02	1.28e-01	1.78e-01
73	190	200km	5	mean	8.43e-03	6.86e-03	2.16e-02	3.69e-02	6.60e-02
74	190	200km	5	med	6.59e-03	4.71e-03	1.98e-02	3.89e-02	6.60e-02
75	190	200km	5	max	2.15e-02	1.82e-02	5.14e-02	7.89e-02	1.13e-01
76	190	300km	1	mean	1.21e-04	9.27e-05	3.17e-04	6.84e-04	1.43e-03
77	190	300km	1	med	9.35e-05	6.45e-05	2.84e-04	5.95e-04	1.47e-03
78	190	300km	1	max	3.08e-04	2.40e-04	7.67e-04	1.79e-03	4.72e-03
79	190	300km	2	mean	3.71e-03	2.02e-03	1.42e-02	3.42e-02	7.13e-02
80	190	300km	2	med	2.81e-03	1.24e-03	1.14e-02	3.42e-02	7.13e-02
81	190	300km	2	max	9.45e-03	5.30e-03	3.48e-02	7.34e-02	1.29e-01
82	190	300km	3	mean	2.09e-03	1.60e-03	5.90e-03	1.01e-02	1.75e-02
83	190	300km	3	med	1.63e-03	1.05e-03	5.24e-03	1.01e-02	1.75e-02
84	190	300km	3	max	5.20e-03	4.28e-03	1.39e-02	2.45e-02	4.26e-02
85	190	300km	4	mean	5.92e-03	3.97e-03	1.93e-02	4.04e-02	8.87e-02
86	190	300km	4	med	4.56e-03	2.53e-03	1.60e-02	4.15e-02	8.87e-02
87	190	300km	4	max	1.48e-02	1.06e-02	4.64e-02	9.11e-02	1.55e-01
88	190	300km	5	mean	4.07e-03	2.92e-03	1.22e-02	2.47e-02	5.31e-02
89	190	300km	5	med	3.15e-03	1.86e-03	1.08e-02	2.49e-02	5.31e-02
90	190	300km	5	max	1.01e-02	7.71e-03	2.99e-02	5.42e-02	9.21e-02
91	191	15km	1	mean	1.48e-02	8.18e-03	5.41e-02	1.19e-01	2.14e-01
92	191	15km	1	med	1.47e-02	8.05e-03	5.60e-02	1.23e-01	2.37e-01
93	191	15km	1	max	3.26e-02	1.71e-02	1.22e-01	2.54e-01	3.66e-01
94	191	15km	2	mean	2.54e+00	1.73e+00	7.72e+00	1.44e+01	2.40e+01
95	191	15km	2	med	2.54e+00	1.71e+00	8.15e+00	1.53e+01	3.41e+01

96	191	15km	2	max	5.47e+00	3.61e+00	1.66e+01	3.06e+01	4.40e+01
97	191	15km	3	mean	1.94e-01	1.17e-01	6.58e-01	1.37e+00	2.53e+00
98	191	15km	3	med	1.94e-01	1.14e-01	6.89e-01	1.45e+00	2.78e+00
99	191	15km	3	max	4.20e-01	2.42e-01	1.44e+00	2.88e+00	4.36e+00
100	191	15km	4	mean	2.75e+00	1.87e+00	8.39e+00	1.59e+01	2.67e+01
101	191	15km	4	med	2.75e+00	1.85e+00	8.83e+00	1.67e+01	3.56e+01
102	191	15km	4	max	5.92e+00	3.88e+00	1.80e+01	3.36e+01	4.84e+01
103	191	15km	5	mean	1.48e+00	1.00e+00	4.55e+00	8.72e+00	1.47e+01
104	191	15km	5	med	1.48e+00	9.94e-01	4.77e+00	9.10e+00	1.85e+01
105	191	15km	5	max	3.19e+00	2.08e+00	9.77e+00	1.82e+01	2.64e+01
106	191	20km	1	mean	1.11e-02	6.58e-03	3.85e-02	8.07e-02	1.17e-01
107	191	20km	1	med	1.08e-02	6.43e-03	3.94e-02	8.05e-02	1.30e-01
108	191	20km	1	max	2.47e-02	1.40e-02	8.82e-02	1.79e-01	2.50e-01
109	191	20km	2	mean	1.97e+00	1.45e+00	5.43e+00	9.41e+00	1.42e+01
110	191	20km	2	med	1.94e+00	1.43e+00	5.66e+00	9.91e+00	1.70e+01
111	191	20km	2	max	4.28e+00	3.14e+00	1.17e+01	1.98e+01	2.61e+01
112	191	20km	3	mean	1.42e-01	9.31e-02	4.41e-01	8.70e-01	1.30e+00
113	191	20km	3	med	1.39e-01	9.19e-02	4.54e-01	9.22e-01	1.58e+00
114	191	20km	3	max	3.12e-01	2.00e-01	9.71e-01	1.88e+00	2.64e+00
115	191	20km	4	mean	2.12e+00	1.56e+00	5.91e+00	1.02e+01	1.57e+01
116	191	20km	4	med	2.09e+00	1.54e+00	6.14e+00	1.07e+01	1.78e+01
117	191	20km	4	max	4.62e+00	3.37e+00	1.27e+01	2.20e+01	2.90e+01
118	191	20km	5	mean	1.14e+00	8.36e-01	3.18e+00	5.53e+00	8.54e+00
119	191	20km	5	med	1.12e+00	8.26e-01	3.30e+00	5.85e+00	9.77e+00
120	191	20km	5	max	2.48e+00	1.80e+00	6.85e+00	1.20e+01	1.59e+01
121	191	50km	1	mean	3.37e-03	2.50e-03	9.20e-03	1.97e-02	2.98e-02
122	191	50km	1	med	2.98e-03	2.23e-03	8.67e-03	1.85e-02	2.85e-02
123	191	50km	1	max	8.15e-03	5.88e-03	2.32e-02	4.51e-02	6.99e-02
124	191	50km	2	mean	7.37e-01	6.07e-01	1.77e+00	2.61e+00	3.93e+00
125	191	50km	2	med	6.61e-01	5.32e-01	1.77e+00	2.82e+00	4.39e+00
126	191	50km	2	max	1.74e+00	1.47e+00	3.88e+00	5.55e+00	8.32e+00
127	191	50km	3	mean	4.27e-02	3.63e-02	1.00e-01	1.60e-01	2.46e-01
128	191	50km	3	med	3.81e-02	3.26e-02	9.52e-02	1.67e-01	3.21e-01
129	191	50km	3	max	1.01e-01	8.62e-02	2.25e-01	3.44e-01	4.82e-01
130	191	50km	4	mean	7.83e-01	6.51e-01	1.85e+00	2.73e+00	4.03e+00
131	191	50km	4	med	7.02e-01	5.73e-01	1.85e+00	2.94e+00	4.74e+00
132	191	50km	4	max	1.85e+00	1.58e+00	4.07e+00	5.78e+00	8.68e+00
133	191	50km	5	mean	4.15e-01	3.48e-01	9.65e-01	1.41e+00	2.06e+00
134	191	50km	5	med	3.72e-01	3.07e-01	9.69e-01	1.51e+00	2.54e+00
135	191	50km	5	max	9.79e-01	8.46e-01	2.13e+00	3.01e+00	4.52e+00
136	191	100km	1	mean	1.11e-03	8.82e-04	2.82e-03	7.07e-03	1.36e-02
137	191	100km	1	med	9.17e-04	6.94e-04	2.57e-03	6.57e-03	1.42e-02
138	191	100km	1	max	2.89e-03	2.26e-03	7.17e-03	1.64e-02	3.00e-02
139	191	100km	2	mean	2.99e-01	2.35e-01	8.29e-01	1.42e+00	2.44e+00
140	191	100km	2	med	2.45e-01	1.82e-01	7.47e-01	1.42e+00	2.30e+00
141	191	100km	2	max	7.67e-01	6.17e-01	1.92e+00	3.21e+00	7.05e+00
142	191	100km	3	mean	1.53e-02	1.35e-02	3.53e-02	5.28e-02	7.83e-02
143	191	100km	3	med	1.26e-02	1.06e-02	3.26e-02	5.32e-02	7.52e-02
144	191	100km	3	max	3.87e-02	3.44e-02	8.41e-02	1.21e-01	2.05e-01
145	191	100km	4	mean	3.16e-01	2.52e-01	8.51e-01	1.46e+00	2.45e+00
146	191	100km	4	med	2.59e-01	1.95e-01	7.73e-01	1.45e+00	2.33e+00
147	191	100km	4	max	8.09e-01	6.62e-01	1.98e+00	3.27e+00	7.14e+00
148	191	100km	5	mean	1.66e-01	1.34e-01	4.39e-01	7.46e-01	1.24e+00
149	191	100km	5	med	1.36e-01	1.04e-01	4.00e-01	7.40e-01	1.18e+00
150	191	100km	5	max	4.25e-01	3.53e-01	1.02e+00	1.68e+00	3.61e+00
151	191	200km	1	mean	2.98e-04	2.37e-04	7.32e-04	1.82e-03	3.75e-03
152	191	200km	1	med	2.35e-04	1.64e-04	6.82e-04	1.60e-03	4.64e-03
153	191	200km	1	max	7.79e-04	6.21e-04	1.83e-03	4.86e-03	9.25e-03
154	191	200km	2	mean	1.08e-01	7.36e-02	3.41e-01	7.19e-01	1.43e+00
155	191	200km	2	med	8.28e-02	4.88e-02	2.81e-01	7.07e-01	1.43e+00
156	191	200km	2	max	2.81e-01	1.98e-01	8.35e-01	1.58e+00	2.26e+00

157	191	200km	3	mean	4.67e-03	3.92e-03	1.21e-02	1.92e-02	3.26e-02
158	191	200km	3	med	3.67e-03	2.68e-03	1.10e-02	2.01e-02	3.26e-02
159	191	200km	3	max	1.19e-02	1.03e-02	2.84e-02	4.14e-02	7.71e-02
160	191	200km	4	mean	1.13e-01	7.87e-02	3.50e-01	7.27e-01	1.45e+00
161	191	200km	4	med	8.68e-02	5.22e-02	2.89e-01	7.18e-01	1.45e+00
162	191	200km	4	max	2.94e-01	2.12e-01	8.51e-01	1.61e+00	2.29e+00
163	191	200km	5	mean	5.89e-02	4.17e-02	1.80e-01	3.69e-01	7.34e-01
164	191	200km	5	med	4.54e-02	2.77e-02	1.50e-01	3.67e-01	7.34e-01
165	191	200km	5	max	1.53e-01	1.12e-01	4.35e-01	8.15e-01	1.16e+00
166	191	300km	1	mean	1.21e-04	9.27e-05	3.17e-04	6.84e-04	1.43e-03
167	191	300km	1	med	9.35e-05	6.45e-05	2.84e-04	5.95e-04	1.47e-03
168	191	300km	1	max	3.08e-04	2.40e-04	7.67e-04	1.79e-03	4.72e-03
169	191	300km	2	mean	6.07e-02	3.43e-02	2.27e-01	5.28e-01	1.15e+00
170	191	300km	2	med	4.58e-02	2.13e-02	1.81e-01	5.31e-01	1.15e+00
171	191	300km	2	max	1.56e-01	9.07e-02	5.55e-01	1.17e+00	2.00e+00
172	191	300km	3	mean	2.09e-03	1.60e-03	5.90e-03	1.01e-02	1.75e-02
173	191	300km	3	med	1.63e-03	1.05e-03	5.24e-03	1.01e-02	1.75e-02
174	191	300km	3	max	5.20e-03	4.28e-03	1.39e-02	2.45e-02	4.26e-02
175	191	300km	4	mean	6.29e-02	3.63e-02	2.31e-01	5.33e-01	1.16e+00
176	191	300km	4	med	4.76e-02	2.26e-02	1.85e-01	5.36e-01	1.16e+00
177	191	300km	4	max	1.61e-01	9.58e-02	5.64e-01	1.19e+00	2.02e+00
178	191	300km	5	mean	3.26e-02	1.92e-02	1.18e-01	2.69e-01	5.91e-01
179	191	300km	5	med	2.47e-02	1.20e-02	9.43e-02	2.71e-01	5.91e-01
180	191	300km	5	max	8.33e-02	5.05e-02	2.87e-01	6.02e-01	1.02e+00

Appendix 8

Table A-12. Statistics of VALMA dose results (ingestion pathways) with the large ('CASA3') source term.

The columns of the table are:

1. running line number (1-324)
2. distance from Olkiluoto NPP (15 / 20 / 50 / 100 / 200 / 300 km)
3. ingestion dose pathway (1 = green vegetables, 2 = grain, 3 = root vegetables, 4 = milk, 5 = meat, 6 = sum (1+2+3+4+5)
4. time frame within which the contaminated fields are used
5. statistic describing one dispersion case at the distance: mean, median, or maximum of affected receptor points
6. mean dose of the dispersion cases of year 2012
7. median dose of the dispersion cases of year 2012
8. the '95 % dose', i.e. the probability of exceeding it is 5 %
9. the '99.5 % dose', i.e. the probability of exceeding it is 0.5 %
10. maximum dose of the dispersion cases of year 2012

1	2	3	4	5	6	7	8	9	10
1	15km	1	1a	mean	9.97e-01	7.50e-03	6.81e+00	1.79e+01	3.81e+01
2	15km	1	1a	med	9.91e-01	7.47e-03	6.75e+00	1.87e+01	5.42e+01
3	15km	1	1a	max	2.13e+00	1.56e-02	1.49e+01	3.65e+01	6.12e+01
4	15km	1	3a	mean	1.01e+00	1.85e-02	6.85e+00	1.80e+01	3.82e+01
5	15km	1	3a	med	1.01e+00	1.84e-02	6.78e+00	1.88e+01	5.44e+01
6	15km	1	3a	max	2.16e+00	3.86e-02	1.50e+01	3.67e+01	6.12e+01
7	15km	1	30a	mean	1.07e+00	7.14e-02	6.94e+00	1.83e+01	3.88e+01
8	15km	1	30a	med	1.07e+00	7.02e-02	6.90e+00	1.90e+01	5.53e+01
9	15km	1	30a	max	2.29e+00	1.49e-01	1.52e+01	3.72e+01	6.24e+01
10	15km	2	1a	mean	6.17e-01	3.62e-03	4.22e+00	1.11e+01	2.36e+01
11	15km	2	1a	med	6.14e-01	3.61e-03	4.18e+00	1.16e+01	3.36e+01
12	15km	2	1a	max	1.32e+00	7.54e-03	9.25e+00	2.26e+01	3.79e+01
13	15km	2	3a	mean	6.24e-01	8.95e-03	4.23e+00	1.12e+01	2.37e+01
14	15km	2	3a	med	6.20e-01	8.89e-03	4.20e+00	1.16e+01	3.37e+01
15	15km	2	3a	max	1.33e+00	1.86e-02	9.28e+00	2.27e+01	3.80e+01
16	15km	2	30a	mean	6.54e-01	3.50e-02	4.28e+00	1.13e+01	2.40e+01
17	15km	2	30a	med	6.50e-01	3.45e-02	4.25e+00	1.17e+01	3.41e+01
18	15km	2	30a	max	1.40e+00	7.31e-02	9.38e+00	2.30e+01	3.85e+01
19	15km	3	1a	mean	4.04e-03	2.64e-03	1.27e-02	2.41e-02	4.75e-02
20	15km	3	1a	med	4.04e-03	2.62e-03	1.35e-02	2.62e-02	6.76e-02
21	15km	3	1a	max	8.68e-03	5.55e-03	2.71e-02	4.97e-02	7.63e-02
22	15km	3	3a	mean	9.52e-03	6.36e-03	2.97e-02	5.46e-02	1.00e-01
23	15km	3	3a	med	9.53e-03	6.32e-03	3.09e-02	5.89e-02	1.43e-01
24	15km	3	3a	max	2.05e-02	1.33e-02	6.30e-02	1.16e-01	1.61e-01
25	15km	3	30a	mean	3.57e-02	2.41e-02	1.09e-01	2.02e-01	3.49e-01
26	15km	3	30a	med	3.58e-02	2.40e-02	1.15e-01	2.15e-01	4.97e-01
27	15km	3	30a	max	7.68e-02	5.03e-02	2.33e-01	4.30e-01	6.11e-01
28	15km	4	1a	mean	1.23e+01	3.62e-01	7.37e+01	1.70e+02	3.55e+02
29	15km	4	1a	med	1.23e+01	3.59e-01	7.52e+01	1.79e+02	5.04e+02
30	15km	4	1a	max	2.60e+01	7.92e-01	1.53e+02	3.40e+02	5.69e+02
31	15km	4	3a	mean	1.27e+01	7.11e-01	7.46e+01	1.72e+02	3.59e+02
32	15km	4	3a	med	1.27e+01	7.01e-01	7.61e+01	1.81e+02	5.11e+02
33	15km	4	3a	max	2.68e+01	1.55e+00	1.55e+02	3.44e+02	5.77e+02
34	15km	4	30a	mean	1.28e+01	8.81e-01	7.49e+01	1.73e+02	3.60e+02

35	15km	4	30a	med	1.29e+01	8.67e-01	7.63e+01	1.82e+02	5.15e+02
36	15km	4	30a	max	2.72e+01	1.93e+00	1.55e+02	3.45e+02	5.80e+02
37	15km	5	1a	mean	5.23e+00	9.08e-01	2.81e+01	6.49e+01	1.35e+02
38	15km	5	1a	med	5.24e+00	8.80e-01	2.87e+01	6.85e+01	1.93e+02
39	15km	5	1a	max	1.11e+01	1.99e+00	5.85e+01	1.30e+02	2.17e+02
40	15km	5	3a	mean	5.94e+00	1.53e+00	2.97e+01	6.86e+01	1.43e+02
41	15km	5	3a	med	5.95e+00	1.48e+00	3.03e+01	7.20e+01	2.03e+02
42	15km	5	3a	max	1.26e+01	3.30e+00	6.15e+01	1.37e+02	2.29e+02
43	15km	5	30a	mean	6.05e+00	1.63e+00	2.99e+01	6.91e+01	1.44e+02
44	15km	5	30a	med	6.06e+00	1.57e+00	3.06e+01	7.25e+01	2.05e+02
45	15km	5	30a	max	1.28e+01	3.50e+00	6.20e+01	1.38e+02	2.31e+02
46	15km	6	1a	mean	1.91e+01	1.29e+00	1.10e+02	2.60e+02	5.52e+02
47	15km	6	1a	med	1.92e+01	1.27e+00	1.12e+02	2.77e+02	7.84e+02
48	15km	6	1a	max	4.05e+01	2.82e+00	2.33e+02	5.29e+02	8.86e+02
49	15km	6	3a	mean	2.03e+01	2.29e+00	1.13e+02	2.65e+02	5.64e+02
50	15km	6	3a	med	2.03e+01	2.25e+00	1.15e+02	2.83e+02	8.02e+02
51	15km	6	3a	max	4.29e+01	5.01e+00	2.38e+02	5.40e+02	9.05e+02
52	15km	6	30a	mean	2.07e+01	2.68e+00	1.14e+02	2.67e+02	5.67e+02
53	15km	6	30a	med	2.07e+01	2.60e+00	1.15e+02	2.86e+02	8.10e+02
54	15km	6	30a	max	4.38e+01	5.86e+00	2.39e+02	5.44e+02	9.13e+02
55	20km	1	1a	mean	7.38e-01	6.27e-03	5.14e+00	1.21e+01	2.01e+01
56	20km	1	1a	med	7.10e-01	6.24e-03	4.95e+00	1.30e+01	2.70e+01
57	20km	1	1a	max	1.61e+00	1.33e-02	1.15e+01	2.41e+01	3.85e+01
58	20km	1	3a	mean	7.49e-01	1.55e-02	5.16e+00	1.22e+01	2.02e+01
59	20km	1	3a	med	7.21e-01	1.53e-02	4.96e+00	1.30e+01	2.71e+01
60	20km	1	3a	max	1.63e+00	3.28e-02	1.16e+01	2.42e+01	3.86e+01
61	20km	1	30a	mean	7.97e-01	5.98e-02	5.24e+00	1.24e+01	2.05e+01
62	20km	1	30a	med	7.69e-01	5.87e-02	5.04e+00	1.32e+01	2.75e+01
63	20km	1	30a	max	1.74e+00	1.27e-01	1.18e+01	2.45e+01	3.92e+01
64	20km	2	1a	mean	4.57e-01	3.02e-03	3.19e+00	7.51e+00	1.25e+01
65	20km	2	1a	med	4.40e-01	3.01e-03	3.07e+00	8.03e+00	1.67e+01
66	20km	2	1a	max	9.95e-01	6.42e-03	7.15e+00	1.49e+01	2.38e+01
67	20km	2	3a	mean	4.62e-01	7.48e-03	3.20e+00	7.55e+00	1.25e+01
68	20km	2	3a	med	4.45e-01	7.42e-03	3.08e+00	8.05e+00	1.68e+01
69	20km	2	3a	max	1.01e+00	1.59e-02	7.17e+00	1.50e+01	2.39e+01
70	20km	2	30a	mean	4.86e-01	2.93e-02	3.23e+00	7.63e+00	1.27e+01
71	20km	2	30a	med	4.68e-01	2.89e-02	3.11e+00	8.14e+00	1.70e+01
72	20km	2	30a	max	1.06e+00	6.22e-02	7.25e+00	1.51e+01	2.42e+01
73	20km	3	1a	mean	3.12e-03	2.21e-03	9.01e-03	1.55e-02	2.51e-02
74	20km	3	1a	med	3.07e-03	2.18e-03	9.21e-03	1.67e-02	3.37e-02
75	20km	3	1a	max	6.78e-03	4.81e-03	1.93e-02	3.26e-02	4.79e-02
76	20km	3	3a	mean	7.36e-03	5.33e-03	2.07e-02	3.55e-02	5.30e-02
77	20km	3	3a	med	7.27e-03	5.28e-03	2.16e-02	3.83e-02	7.12e-02
78	20km	3	3a	max	1.60e-02	1.16e-02	4.42e-02	7.51e-02	1.01e-01
79	20km	3	30a	mean	2.77e-02	2.03e-02	7.69e-02	1.33e-01	1.97e-01
80	20km	3	30a	med	2.73e-02	2.00e-02	8.07e-02	1.40e-01	2.47e-01
81	20km	3	30a	max	6.01e-02	4.40e-02	1.65e-01	2.79e-01	3.62e-01
82	20km	4	1a	mean	9.30e+00	3.05e-01	5.62e+01	1.13e+02	1.87e+02
83	20km	4	1a	med	9.03e+00	2.98e-01	5.48e+01	1.21e+02	2.51e+02
84	20km	4	1a	max	2.00e+01	6.57e-01	1.20e+02	2.24e+02	3.58e+02
85	20km	4	3a	mean	9.59e+00	5.98e-01	5.69e+01	1.14e+02	1.90e+02
86	20km	4	3a	med	9.32e+00	5.82e-01	5.53e+01	1.22e+02	2.54e+02
87	20km	4	3a	max	2.07e+01	1.29e+00	1.22e+02	2.27e+02	3.62e+02
88	20km	4	30a	mean	9.73e+00	7.41e-01	5.71e+01	1.15e+02	1.90e+02
89	20km	4	30a	med	9.45e+00	7.19e-01	5.55e+01	1.22e+02	2.55e+02
90	20km	4	30a	max	2.10e+01	1.60e+00	1.22e+02	2.28e+02	3.64e+02
91	20km	5	1a	mean	3.98e+00	7.60e-01	2.14e+01	4.31e+01	7.14e+01
92	20km	5	1a	med	3.87e+00	7.31e-01	2.08e+01	4.60e+01	9.60e+01
93	20km	5	1a	max	8.58e+00	1.65e+00	4.58e+01	8.55e+01	1.37e+02
94	20km	5	3a	mean	4.52e+00	1.28e+00	2.26e+01	4.54e+01	7.54e+01
95	20km	5	3a	med	4.41e+00	1.23e+00	2.20e+01	4.86e+01	1.01e+02

96	20km	5	3a	max	9.76e+00	2.77e+00	4.83e+01	9.05e+01	1.44e+02
97	20km	5	30a	mean	4.61e+00	1.36e+00	2.28e+01	4.58e+01	7.60e+01
98	20km	5	30a	med	4.49e+00	1.31e+00	2.22e+01	4.90e+01	1.02e+02
99	20km	5	30a	max	9.95e+00	2.94e+00	4.87e+01	9.10e+01	1.45e+02
100	20km	6	1a	mean	1.45e+01	1.08e+00	8.50e+01	1.76e+02	2.92e+02
101	20km	6	1a	med	1.40e+01	1.05e+00	8.24e+01	1.88e+02	3.91e+02
102	20km	6	1a	max	3.12e+01	2.34e+00	1.81e+02	3.49e+02	5.57e+02
103	20km	6	3a	mean	1.53e+01	1.93e+00	8.68e+01	1.79e+02	2.98e+02
104	20km	6	3a	med	1.49e+01	1.86e+00	8.43e+01	1.92e+02	3.99e+02
105	20km	6	3a	max	3.31e+01	4.16e+00	1.84e+02	3.57e+02	5.69e+02
106	20km	6	30a	mean	1.56e+01	2.25e+00	8.74e+01	1.81e+02	3.00e+02
107	20km	6	30a	med	1.52e+01	2.17e+00	8.48e+01	1.93e+02	4.02e+02
108	20km	6	30a	max	3.38e+01	4.86e+00	1.86e+02	3.59e+02	5.72e+02
109	50km	1	1a	mean	2.31e-01	2.64e-03	1.63e+00	3.37e+00	5.49e+00
110	50km	1	1a	med	1.97e-01	2.37e-03	1.43e+00	3.22e+00	5.76e+00
111	50km	1	1a	max	5.65e-01	6.30e-03	3.94e+00	7.20e+00	1.33e+01
112	50km	1	3a	mean	2.35e-01	6.51e-03	1.64e+00	3.38e+00	5.51e+00
113	50km	1	3a	med	2.01e-01	5.81e-03	1.43e+00	3.23e+00	5.77e+00
114	50km	1	3a	max	5.74e-01	1.56e-02	3.95e+00	7.26e+00	1.33e+01
115	50km	1	30a	mean	2.53e-01	2.51e-02	1.67e+00	3.43e+00	5.59e+00
116	50km	1	30a	med	2.17e-01	2.21e-02	1.45e+00	3.28e+00	5.87e+00
117	50km	1	30a	max	6.17e-01	6.00e-02	4.01e+00	7.32e+00	1.36e+01
118	50km	2	1a	mean	1.43e-01	1.27e-03	1.02e+00	2.09e+00	3.40e+00
119	50km	2	1a	med	1.22e-01	1.14e-03	8.85e-01	2.00e+00	3.57e+00
120	50km	2	1a	max	3.50e-01	3.05e-03	2.44e+00	4.47e+00	8.24e+00
121	50km	2	3a	mean	1.45e-01	3.15e-03	1.02e+00	2.10e+00	3.41e+00
122	50km	2	3a	med	1.24e-01	2.81e-03	8.88e-01	2.00e+00	3.58e+00
123	50km	2	3a	max	3.54e-01	7.54e-03	2.45e+00	4.48e+00	8.27e+00
124	50km	2	30a	mean	1.54e-01	1.23e-02	1.03e+00	2.12e+00	3.45e+00
125	50km	2	30a	med	1.32e-01	1.09e-02	8.98e-01	2.03e+00	3.62e+00
126	50km	2	30a	max	3.75e-01	2.95e-02	2.48e+00	4.53e+00	8.36e+00
127	50km	3	1a	mean	1.15e-03	9.27e-04	2.83e-03	4.35e-03	6.84e-03
128	50km	3	1a	med	1.03e-03	8.19e-04	2.76e-03	4.46e-03	7.17e-03
129	50km	3	1a	max	2.73e-03	2.28e-03	6.20e-03	9.47e-03	1.65e-02
130	50km	3	3a	mean	2.75e-03	2.24e-03	6.62e-03	9.81e-03	1.45e-02
131	50km	3	3a	med	2.46e-03	1.98e-03	6.57e-03	1.04e-02	1.58e-02
132	50km	3	3a	max	6.49e-03	5.47e-03	1.45e-02	2.13e-02	3.50e-02
133	50km	3	30a	mean	1.04e-02	8.49e-03	2.49e-02	3.68e-02	5.45e-02
134	50km	3	30a	med	9.30e-03	7.49e-03	2.49e-02	4.01e-02	6.08e-02
135	50km	3	30a	max	2.45e-02	2.06e-02	5.47e-02	7.76e-02	1.22e-01
136	50km	4	1a	mean	3.14e+00	1.28e-01	1.79e+01	3.25e+01	5.11e+01
137	50km	4	1a	med	2.70e+00	1.13e-01	1.60e+01	3.22e+01	5.80e+01
138	50km	4	1a	max	7.63e+00	2.98e-01	4.27e+01	7.34e+01	1.24e+02
139	50km	4	3a	mean	3.25e+00	2.50e-01	1.81e+01	3.28e+01	5.17e+01
140	50km	4	3a	med	2.80e+00	2.20e-01	1.62e+01	3.26e+01	5.86e+01
141	50km	4	3a	max	7.89e+00	5.84e-01	4.31e+01	7.41e+01	1.25e+02
142	50km	4	30a	mean	3.30e+00	3.09e-01	1.82e+01	3.30e+01	5.19e+01
143	50km	4	30a	med	2.84e+00	2.71e-01	1.63e+01	3.27e+01	5.89e+01
144	50km	4	30a	max	8.01e+00	7.23e-01	4.34e+01	7.45e+01	1.26e+02
145	50km	5	1a	mean	1.37e+00	3.16e-01	6.84e+00	1.24e+01	1.95e+01
146	50km	5	1a	med	1.18e+00	2.73e-01	6.13e+00	1.23e+01	2.21e+01
147	50km	5	1a	max	3.31e+00	7.40e-01	1.63e+01	2.80e+01	4.72e+01
148	50km	5	3a	mean	1.57e+00	5.33e-01	7.22e+00	1.31e+01	2.06e+01
149	50km	5	3a	med	1.37e+00	4.56e-01	6.45e+00	1.30e+01	2.34e+01
150	50km	5	3a	max	3.79e+00	1.26e+00	1.72e+01	2.95e+01	4.98e+01
151	50km	5	30a	mean	1.60e+00	5.67e-01	7.28e+00	1.32e+01	2.07e+01
152	50km	5	30a	med	1.40e+00	4.85e-01	6.50e+00	1.31e+01	2.35e+01
153	50km	5	30a	max	3.86e+00	1.34e+00	1.73e+01	2.98e+01	5.00e+01
154	50km	6	1a	mean	4.88e+00	4.51e-01	2.70e+01	5.02e+01	7.95e+01
155	50km	6	1a	med	4.20e+00	3.97e-01	2.40e+01	4.90e+01	8.32e+01
156	50km	6	1a	max	1.19e+01	1.06e+00	6.41e+01	1.11e+02	1.92e+02

157	50km	6	3a	mean	5.20e+00	8.02e-01	2.76e+01	5.14e+01	8.12e+01
158	50km	6	3a	med	4.49e+00	6.96e-01	2.45e+01	5.01e+01	8.49e+01
159	50km	6	3a	max	1.26e+01	1.87e+00	6.54e+01	1.13e+02	1.96e+02
160	50km	6	30a	mean	5.32e+00	9.36e-01	2.78e+01	5.17e+01	8.17e+01
161	50km	6	30a	med	4.60e+00	8.10e-01	2.46e+01	5.04e+01	8.56e+01
162	50km	6	30a	max	1.29e+01	2.18e+00	6.60e+01	1.14e+02	1.98e+02
163	100km	1	1a	mean	8.52e-02	1.07e-03	5.61e-01	1.49e+00	3.36e+00
164	100km	1	1a	med	6.96e-02	8.58e-04	4.70e-01	1.36e+00	3.41e+00
165	100km	1	1a	max	2.22e-01	2.71e-03	1.48e+00	3.52e+00	7.20e+00
166	100km	1	3a	mean	8.68e-02	2.62e-03	5.64e-01	1.50e+00	3.37e+00
167	100km	1	3a	med	7.10e-02	2.11e-03	4.73e-01	1.36e+00	3.43e+00
168	100km	1	3a	max	2.26e-01	6.66e-03	1.49e+00	3.53e+00	7.26e+00
169	100km	1	30a	mean	9.42e-02	1.00e-02	5.72e-01	1.52e+00	3.42e+00
170	100km	1	30a	med	7.70e-02	7.98e-03	4.79e-01	1.39e+00	3.48e+00
171	100km	1	30a	max	2.45e-01	2.56e-02	1.51e+00	3.58e+00	7.38e+00
172	100km	2	1a	mean	5.27e-02	5.14e-04	3.49e-01	9.28e-01	2.09e+00
173	100km	2	1a	med	4.31e-02	4.14e-04	2.92e-01	8.42e-01	2.12e+00
174	100km	2	1a	max	1.38e-01	1.31e-03	9.19e-01	2.18e+00	4.48e+00
175	100km	2	3a	mean	5.35e-02	1.27e-03	3.50e-01	9.30e-01	2.09e+00
176	100km	2	3a	med	4.38e-02	1.02e-03	2.93e-01	8.46e-01	2.13e+00
177	100km	2	3a	max	1.40e-01	3.23e-03	9.22e-01	2.19e+00	4.50e+00
178	100km	2	30a	mean	5.71e-02	4.92e-03	3.53e-01	9.41e-01	2.11e+00
179	100km	2	30a	med	4.67e-02	3.92e-03	2.96e-01	8.54e-01	2.15e+00
180	100km	2	30a	max	1.49e-01	1.26e-02	9.32e-01	2.21e+00	4.55e+00
181	100km	3	1a	mean	4.67e-04	3.66e-04	1.28e-03	2.29e-03	4.19e-03
182	100km	3	1a	med	3.83e-04	2.82e-04	1.19e-03	2.28e-03	4.24e-03
183	100km	3	1a	max	1.20e-03	9.53e-04	2.97e-03	5.06e-03	1.04e-02
184	100km	3	3a	mean	1.12e-03	8.76e-04	3.05e-03	5.22e-03	8.85e-03
185	100km	3	3a	med	9.14e-04	6.79e-04	2.81e-03	5.23e-03	8.99e-03
186	100km	3	3a	max	2.86e-03	2.30e-03	7.11e-03	1.20e-02	2.55e-02
187	100km	3	30a	mean	4.22e-03	3.31e-03	1.16e-02	1.99e-02	3.40e-02
188	100km	3	30a	med	3.46e-03	2.57e-03	1.05e-02	2.00e-02	3.21e-02
189	100km	3	30a	max	1.08e-02	8.71e-03	2.68e-02	4.54e-02	9.84e-02
190	100km	4	1a	mean	1.16e+00	5.14e-02	6.29e+00	1.57e+01	3.62e+01
191	100km	4	1a	med	9.43e-01	4.12e-02	5.47e+00	1.38e+01	3.17e+01
192	100km	4	1a	max	3.03e+00	1.31e-01	1.64e+01	3.72e+01	6.72e+01
193	100km	4	3a	mean	1.20e+00	1.00e-01	6.36e+00	1.59e+01	3.67e+01
194	100km	4	3a	med	9.80e-01	7.98e-02	5.53e+00	1.39e+01	3.21e+01
195	100km	4	3a	max	3.15e+00	2.56e-01	1.66e+01	3.76e+01	6.79e+01
196	100km	4	30a	mean	1.22e+00	1.24e-01	6.39e+00	1.59e+01	3.68e+01
197	100km	4	30a	med	9.97e-01	9.85e-02	5.57e+00	1.39e+01	3.22e+01
198	100km	4	30a	max	3.20e+00	3.16e-01	1.67e+01	3.76e+01	6.83e+01
199	100km	5	1a	mean	5.13e-01	1.27e-01	2.40e+00	6.00e+00	1.39e+01
200	100km	5	1a	med	4.19e-01	9.81e-02	2.09e+00	5.25e+00	1.22e+01
201	100km	5	1a	max	1.34e+00	3.22e-01	6.30e+00	1.42e+01	2.57e+01
202	100km	5	3a	mean	5.96e-01	2.12e-01	2.54e+00	6.33e+00	1.46e+01
203	100km	5	3a	med	4.87e-01	1.60e-01	2.21e+00	5.55e+00	1.28e+01
204	100km	5	3a	max	1.55e+00	5.40e-01	6.65e+00	1.50e+01	2.71e+01
205	100km	5	30a	mean	6.08e-01	2.25e-01	2.56e+00	6.37e+00	1.47e+01
206	100km	5	30a	med	4.97e-01	1.70e-01	2.23e+00	5.60e+00	1.29e+01
207	100km	5	30a	max	1.58e+00	5.75e-01	6.70e+00	1.51e+01	2.73e+01
208	100km	6	1a	mean	1.81e+00	1.81e-01	9.36e+00	2.40e+01	5.01e+01
209	100km	6	1a	med	1.48e+00	1.44e-01	8.18e+00	2.08e+01	4.94e+01
210	100km	6	1a	max	4.73e+00	4.62e-01	2.47e+01	5.54e+01	1.04e+02
211	100km	6	3a	mean	1.94e+00	3.22e-01	9.56e+00	2.45e+01	5.13e+01
212	100km	6	3a	med	1.58e+00	2.53e-01	8.37e+00	2.13e+01	5.04e+01
213	100km	6	3a	max	5.07e+00	8.18e-01	2.52e+01	5.67e+01	1.07e+02
214	100km	6	30a	mean	1.99e+00	3.75e-01	9.63e+00	2.47e+01	5.16e+01
215	100km	6	30a	med	1.62e+00	2.94e-01	8.41e+00	2.14e+01	5.08e+01
216	100km	6	30a	max	5.19e+00	9.53e-01	2.54e+01	5.69e+01	1.08e+02
217	200km	1	1a	mean	2.67e-02	3.56e-04	1.65e-01	5.55e-01	1.56e+00

218	200km	1	1a	med	2.12e-02	2.53e-04	1.41e-01	4.63e-01	1.76e+00
219	200km	1	1a	max	6.88e-02	9.42e-04	4.25e-01	1.34e+00	3.36e+00
220	200km	1	3a	mean	2.73e-02	8.75e-04	1.65e-01	5.56e-01	1.56e+00
221	200km	1	3a	med	2.16e-02	6.12e-04	1.41e-01	4.64e-01	1.76e+00
222	200km	1	3a	max	7.03e-02	2.31e-03	4.27e-01	1.34e+00	3.37e+00
223	200km	1	30a	mean	3.00e-02	3.34e-03	1.68e-01	5.65e-01	1.58e+00
224	200km	1	30a	med	2.37e-02	2.30e-03	1.43e-01	4.71e-01	1.79e+00
225	200km	1	30a	max	7.73e-02	8.88e-03	4.33e-01	1.36e+00	3.43e+00
226	200km	2	1a	mean	1.66e-02	1.72e-04	1.02e-01	3.43e-01	9.64e-01
227	200km	2	1a	med	1.31e-02	1.22e-04	8.73e-02	2.87e-01	1.09e+00
228	200km	2	1a	max	4.26e-02	4.55e-04	2.64e-01	8.32e-01	2.09e+00
229	200km	2	3a	mean	1.68e-02	4.23e-04	1.03e-01	3.46e-01	9.68e-01
230	200km	2	3a	med	1.34e-02	2.98e-04	8.79e-02	2.88e-01	1.10e+00
231	200km	2	3a	max	4.34e-02	1.12e-03	2.65e-01	8.35e-01	2.09e+00
232	200km	2	30a	mean	1.81e-02	1.64e-03	1.04e-01	3.49e-01	9.79e-01
233	200km	2	30a	med	1.44e-02	1.13e-03	8.87e-02	2.91e-01	1.11e+00
234	200km	2	30a	max	4.68e-02	4.36e-03	2.68e-01	8.44e-01	2.12e+00
235	200km	3	1a	mean	1.67e-04	1.16e-04	5.30e-04	1.13e-03	2.11e-03
236	200km	3	1a	med	1.29e-04	7.59e-05	4.37e-04	1.11e-03	2.19e-03
237	200km	3	1a	max	4.36e-04	3.16e-04	1.27e-03	2.51e-03	4.18e-03
238	200km	3	3a	mean	4.02e-04	2.78e-04	1.26e-03	2.66e-03	5.19e-03
239	200km	3	3a	med	3.08e-04	1.82e-04	1.04e-03	2.63e-03	5.19e-03
240	200km	3	3a	max	1.05e-03	7.47e-04	3.06e-03	5.86e-03	8.85e-03
241	200km	3	30a	mean	1.52e-03	1.05e-03	4.79e-03	1.01e-02	2.00e-02
242	200km	3	30a	med	1.17e-03	6.91e-04	3.95e-03	1.00e-02	2.00e-02
243	200km	3	30a	max	3.97e-03	2.81e-03	1.17e-02	2.23e-02	3.16e-02
244	200km	4	1a	mean	3.62e-01	1.78e-02	1.99e+00	5.40e+00	1.55e+01
245	200km	4	1a	med	2.84e-01	1.27e-02	1.62e+00	4.75e+00	1.66e+01
246	200km	4	1a	max	9.65e-01	4.67e-02	5.26e+00	1.35e+01	3.12e+01
247	200km	4	3a	mean	3.78e-01	3.46e-02	2.02e+00	5.46e+00	1.57e+01
248	200km	4	3a	med	2.96e-01	2.44e-02	1.64e+00	4.80e+00	1.68e+01
249	200km	4	3a	max	1.01e+00	9.09e-02	5.29e+00	1.37e+01	3.16e+01
250	200km	4	30a	mean	3.86e-01	4.27e-02	2.02e+00	5.48e+00	1.57e+01
251	200km	4	30a	med	3.02e-01	3.01e-02	1.65e+00	4.83e+00	1.69e+01
252	200km	4	30a	max	1.03e+00	1.12e-01	5.33e+00	1.37e+01	3.17e+01
253	200km	5	1a	mean	1.66e-01	4.29e-02	7.65e-01	2.06e+00	5.93e+00
254	200km	5	1a	med	1.29e-01	2.97e-02	6.22e-01	1.82e+00	6.35e+00
255	200km	5	1a	max	4.40e-01	1.13e-01	2.00e+00	5.20e+00	1.19e+01
256	200km	5	3a	mean	1.95e-01	7.14e-02	8.09e-01	2.17e+00	6.26e+00
257	200km	5	3a	med	1.52e-01	4.83e-02	6.65e-01	1.92e+00	6.70e+00
258	200km	5	3a	max	5.17e-01	1.89e-01	2.12e+00	5.45e+00	1.26e+01
259	200km	5	30a	mean	2.00e-01	7.57e-02	8.17e-01	2.19e+00	6.30e+00
260	200km	5	30a	med	1.56e-01	5.11e-02	6.72e-01	1.93e+00	6.75e+00
261	200km	5	30a	max	5.29e-01	2.00e-01	2.14e+00	5.50e+00	1.27e+01
262	200km	6	1a	mean	5.72e-01	6.24e-02	2.97e+00	8.14e+00	2.25e+01
263	200km	6	1a	med	4.47e-01	4.40e-02	2.44e+00	6.87e+00	2.55e+01
264	200km	6	1a	max	1.52e+00	1.64e-01	7.75e+00	2.00e+01	4.86e+01
265	200km	6	3a	mean	6.18e-01	1.10e-01	3.03e+00	8.32e+00	2.30e+01
266	200km	6	3a	med	4.83e-01	7.66e-02	2.49e+00	7.00e+00	2.60e+01
267	200km	6	3a	max	1.64e+00	2.89e-01	7.93e+00	2.05e+01	4.96e+01
268	200km	6	30a	mean	6.36e-01	1.28e-01	3.05e+00	8.37e+00	2.31e+01
269	200km	6	30a	med	4.97e-01	8.92e-02	2.51e+00	7.06e+00	2.62e+01
270	200km	6	30a	max	1.68e+00	3.36e-01	8.00e+00	2.06e+01	5.00e+01
271	300km	1	1a	mean	1.20e-02	1.72e-04	7.82e-02	2.73e-01	7.34e-01
272	300km	1	1a	med	9.31e-03	1.13e-04	5.86e-02	2.21e-01	7.25e-01
273	300km	1	1a	max	3.03e-02	4.50e-04	1.96e-01	6.84e-01	1.88e+00
274	300km	1	3a	mean	1.23e-02	4.19e-04	7.86e-02	2.74e-01	7.37e-01
275	300km	1	3a	med	9.55e-03	2.75e-04	5.88e-02	2.21e-01	7.28e-01
276	300km	1	3a	max	3.11e-02	1.10e-03	1.96e-01	6.84e-01	1.88e+00
277	300km	1	30a	mean	1.38e-02	1.58e-03	7.98e-02	2.78e-01	7.48e-01
278	300km	1	30a	med	1.07e-02	1.03e-03	5.96e-02	2.25e-01	7.41e-01

279	300km	1	30a	max	3.50e-02	4.12e-03	1.99e-01	6.96e-01	1.91e+00
280	300km	2	1a	mean	7.44e-03	8.29e-05	4.88e-02	1.70e-01	4.57e-01
281	300km	2	1a	med	5.77e-03	5.48e-05	3.64e-02	1.37e-01	4.50e-01
282	300km	2	1a	max	1.88e-02	2.18e-04	1.22e-01	4.24e-01	1.17e+00
283	300km	2	3a	mean	7.60e-03	2.03e-04	4.89e-02	1.71e-01	4.58e-01
284	300km	2	3a	med	5.89e-03	1.34e-04	3.65e-02	1.37e-01	4.52e-01
285	300km	2	3a	max	1.92e-02	5.34e-04	1.22e-01	4.26e-01	1.17e+00
286	300km	2	30a	mean	8.33e-03	7.79e-04	4.94e-02	1.73e-01	4.62e-01
287	300km	2	30a	med	6.44e-03	5.08e-04	3.69e-02	1.39e-01	4.57e-01
288	300km	2	30a	max	2.11e-02	2.03e-03	1.23e-01	4.30e-01	1.18e+00
289	300km	3	1a	mean	9.34e-05	5.36e-05	3.41e-04	7.81e-04	1.69e-03
290	300km	3	1a	med	7.06e-05	3.33e-05	2.71e-04	7.85e-04	1.69e-03
291	300km	3	1a	max	2.40e-04	1.43e-04	8.45e-04	1.74e-03	2.95e-03
292	300km	3	3a	mean	2.25e-04	1.29e-04	8.33e-04	1.92e-03	4.17e-03
293	300km	3	3a	med	1.70e-04	8.02e-05	6.61e-04	1.93e-03	4.17e-03
294	300km	3	3a	max	5.79e-04	3.42e-04	2.04e-03	4.28e-03	7.28e-03
295	300km	3	30a	mean	8.58e-04	4.88e-04	3.17e-03	7.37e-03	1.61e-02
296	300km	3	30a	med	6.48e-04	3.04e-04	2.53e-03	7.41e-03	1.61e-02
297	300km	3	30a	max	2.20e-03	1.29e-03	7.82e-03	1.65e-02	2.81e-02
298	300km	4	1a	mean	1.82e-01	8.49e-03	1.03e+00	3.51e+00	7.43e+00
299	300km	4	1a	med	1.36e-01	5.73e-03	7.58e-01	2.90e+00	6.74e+00
300	300km	4	1a	max	4.81e-01	2.23e-02	2.55e+00	9.23e+00	1.96e+01
301	300km	4	3a	mean	1.91e-01	1.63e-02	1.05e+00	3.55e+00	7.51e+00
302	300km	4	3a	med	1.43e-01	1.10e-02	7.66e-01	2.93e+00	6.82e+00
303	300km	4	3a	max	5.05e-01	4.27e-02	2.57e+00	9.31e+00	1.98e+01
304	300km	4	30a	mean	1.96e-01	2.01e-02	1.05e+00	3.56e+00	7.54e+00
305	300km	4	30a	med	1.46e-01	1.34e-02	7.70e-01	2.95e+00	6.86e+00
306	300km	4	30a	max	5.16e-01	5.26e-02	2.58e+00	9.38e+00	1.99e+01
307	300km	5	1a	mean	8.57e-02	1.99e-02	3.98e-01	1.34e+00	2.86e+00
308	300km	5	1a	med	6.41e-02	1.31e-02	3.00e-01	1.11e+00	2.58e+00
309	300km	5	1a	max	2.25e-01	5.20e-02	9.80e-01	3.57e+00	7.50e+00
310	300km	5	3a	mean	1.02e-01	3.27e-02	4.35e-01	1.42e+00	3.02e+00
311	300km	5	3a	med	7.66e-02	2.14e-02	3.39e-01	1.18e+00	2.72e+00
312	300km	5	3a	max	2.68e-01	8.55e-02	1.05e+00	3.77e+00	7.90e+00
313	300km	5	30a	mean	1.05e-01	3.46e-02	4.40e-01	1.43e+00	3.04e+00
314	300km	5	30a	med	7.86e-02	2.26e-02	3.46e-01	1.19e+00	2.74e+00
315	300km	5	30a	max	2.74e-01	9.05e-02	1.06e+00	3.80e+00	8.00e+00
316	300km	6	1a	mean	2.88e-01	2.94e-02	1.57e+00	5.07e+00	1.06e+01
317	300km	6	1a	med	2.15e-01	1.96e-02	1.15e+00	4.15e+00	1.05e+01
318	300km	6	1a	max	7.56e-01	7.68e-02	3.80e+00	1.34e+01	2.71e+01
319	300km	6	3a	mean	3.14e-01	5.13e-02	1.61e+00	5.18e+00	1.08e+01
320	300km	6	3a	med	2.35e-01	3.39e-02	1.17e+00	4.24e+00	1.07e+01
321	300km	6	3a	max	8.23e-01	1.34e-01	3.89e+00	1.37e+01	2.77e+01
322	300km	6	30a	mean	3.24e-01	5.95e-02	1.62e+00	5.23e+00	1.09e+01
323	300km	6	30a	med	2.42e-01	3.93e-02	1.18e+00	4.27e+00	1.08e+01
324	300km	6	30a	max	8.48e-01	1.56e-01	3.91e+00	1.38e+01	2.80e+01